fischer

Catalogue.
Fixing Systems

“Innovative strength and technological competence strenghten our position at market.”

Foreword

Dear Partners,

Dear partners,

the fischer Group of Companies has stood for the highest quality and innovative strength for 75 years. In addition to plastic plugs, steel anchors and chemical systems, our broad portfolio also includes a comprehensive assortment of screws. Our large screw assortment enables you to flexibly install wood in all its facets and to get everything out of the material. With our high-tech products and our very high-quality standards throughout the industry, we lead your applications and projects to success.
The benefits for you, our partners, always come first, since a high assembly speed guarantees efficient and economical work.

With our new generation of fully threaded screws Power-Full II we offer the optimal economic professional solution for a permanently secure connection and reinforcement of load-bearing timber constructions.

Another new addition to the assortment is our FAFS adjustment screw, which enables infinitely adjustable assembly of wooden substructures. And our new chipboard screw Power-Fast II is suitable for any wood-wood and wood-metal connections as well as with tested loads in fischer plastic plugs.

We are also broadly positioned with our range of partially and fully threaded screws (fischer Power-Fast and fischer Power-Full). Different drive, head, thread and material variants as well as sizes cover almost all applications of carpenters, joiners and woodworkers. Screw tips and thread geometries matched to the fastening project speed up and simplify assembly.

The European Technical Assessment (ETA) provides certainty about the load-bearing capacity, which also covers processing in softwood and hardwood without pre-drilling and the use of tangential impact drivers. Screwing close to the edge, without splitting or splintering, is also successful.

Dear partners, with our new screw catalogue you will find the right solution for your fixing tasks around building and working with wood even easier and faster. The illustrative material and the depth of information provide clarity for all application questions.

We hope you enjoy discovering and using our screws!

Andreas Voll
Chairman of the management board of the fischer group of companies

“Whoever chooses fischer receives more than a range of safe products. The aim is to always develop the best solutions for our customers across the globe.”

Besides the innovative products, this predominantly concerns support that is focused on the customer, and services designed to improve customer benefit.

A brand and its promise to perform.

Continious improvement

The fischer ProzessSystem (fPS) we ensure that we are adapting and optimising our processes in line with customer requirements in a flexible manner and on a continuous basis. Thus we are glad having been awarded with the 1. place “Excellence in Operations” within the challenging contest “Factory of the Year”.

DIE FABRIK DES JAHRES
Global Excellence in Operations
Produktion ATKearney

Award 2015
Exellence in Operations

Safety that connects. Decisive quality.

We don’t make any compromises when it comes to the safety of our products. A whole host of our products are distinguished by comprehensive, up-to-date and international approvals. The fischer product range is well-positioned in all sectors of fixing technology – Steel, Nylon and Chemical fixings. In awardwinning quality which continues to impress both professional clients and private customers with equal measure.

ICC ES ESR-1990 See ICC-ES Evaluation Report at www.icc-es.org
ETA CE

International approvals characterise many of our products.

Always on the pulse of time

At fischer, innovation is more than just a sum of the patents. We are open to new things and are prepared for change – always with the aim of off ering our customers the greatest possible benefits. Over the years, our own development and production sites have been developing numerous fixing solutions for the most wideranging applications. Be it new production procedures or materials, such as renewable raw materials: We are carrying out the research for your safety and will continue to do so in the future. This gives us such great flexibility that we can even develop tailor-made customer solutions. This power to innovate has seen fischer become market leader in anchor technology and the fixing industry.

Our service to you

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

- Our products range from chemical systems to steel anchors through to plastic anchors.
- Competence and innovation through own research, development and production.
- Global presence and active sales service in over 100 countries.
- Qualified technical consulting for economical and compliant fastening solutions. Also on-site at the construction site requested.
- Training sessions, some with accreditation, at your premises or at the fischer academy.
- Design and construction software for demanding applications.

We take responsibility

Our active environment management policy means that we are helping to maintain an intact environment for our generation and for those that follow. The environment management policy at the Tumlingen site has been certified in line with DIN EN ISO 14001.
It fills us with particular pride that in 2020 we have received the most important and largest award in Europe in the field of sustainability: the German Sustainability Award - category large companies.
This was in recognition of our holistic approach and the strategic anchoring of our sustainability management.
With our greenline products we have launched the first range of fixings on the market that is based on renewable raw materials to more than 50%.

BIOBASED 50 - 85 %
DIN Geprüft
8C029

GreenLine assortment based on 50% regrowing raw materials

Deutscher Nachhaltigkeitspreis 2020
SIEGER
Großunternehmen

German Sustainability Award

Innovations to inspire professionals.

01 Bolt anchor FAZ II
For highest demands. Powerful and flexible.
Page 96

02 Concrete screw UltraCut FBS II 8-14
The high-performance Concrete screw for absolute installation ease.
Page 118

03 Adjusting washer FSW 10
To easily install wooden beams and timber sleepers.
Page 124

04 Gas actuated fastening tool FGC 100
Quick and easy fastening in concrete and steel.
Page 244

05 Injection mortar FIS V Plus
The powerful universal mortar for concrete and masonry.
Page 50

06 Frame fixing DuoXpand
Clever combinations for more power and intelligence.
Page 174

Content

2 Chemical fixings

1

MORTARS AND CAPSULES FOR GENERAL APPLICATIONS

ANCHOR RODS

3 High performance steel anchors

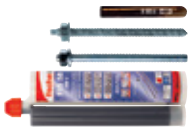
4 Frame fixings / Stand-off installation

5 General fixings

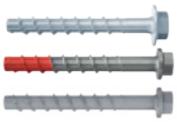
6 Adhesives

7 Power tools

Non-cracked concrete

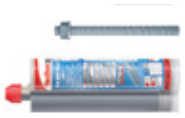
			Single fixings for non-cracked concrete Chemical systems		
Product	Type		Epoxy mortar-system FIS EM Plus	Superbond-system FSB	Injection mortar FIS V PLUS
	Page		**40**	**25**	**50**
	Image				
Connection thread or screw diameter	Anchor rod or anchor size		M8 – M30	M8 – M30	M6 – M30
	Internal thread		M8 – M20	M8 – M20	M8 – M20
	Reinforcing bar		ø 8 – 40 mm	ø 8 – 32 mm	ø 8 – 28 mm
	Screw diameter		–	–	–
Steel/material	gvz		●	●	●
	R		●	●	●
	HCR		●	●	●
	HDG/CP		–	–	–
	Nylon		–	–	–
Usable length	Up to		∞	∞	∞
Approvals/certificates	Approvals	ETA	●	●	●
		ICC	●	●	●
		DiBt	–	–	–
		Seismic	●	●	●
		Dynamic	–	–	–
	Certificates	Shock	–	–	–
		Fire resistance reports	●	●	●
Type of installation	Pre-positioned installation		●	●	●
	Push-through installation		●	●	●
	Stand-off installation		●	●	●
Drilling method	Hammer drilling		●	●	●
	Hollow drilling		●	●	●
	Diamond-drilling		●	●	–
Waiting time until loading at 20 °C	None		–	–	–
	Short	< 5 Minutes	–	–	–
	Middle	≤ 20 Minutes	–	●	●
	Long	> 20 Minutes	●	●	●
Substrate			-5 °C	-30 °C	-10 °C
Special features	Approved without drill hole cleaning		–	–	–
	Installation in concrete < C20/25 acc. certificate		–	–	–
	Installation in concrete > C50/60 acc. certificate		–	–	–
	Approved in water-filled drill holes		●	●	●
	Installation in steel fibre concrete possible		●	●	●
	Installation possible in narrow members ≤ 120 mm		●	●	●
	Removable	Flush with the surface	●*	●*	●*
		Completely	–	–	–

* With internal threaded anchor

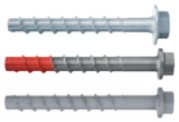
Single fixings for non-cracked concrete				Redundant fixtures (multiple fixtures)		
Steel anchors				Steel anchor	Hammerset anchor EAII	Frame fixing
Bolt anchor FAZ II	Bolt anchor FBN II	Concrete screw FBS II	High performance anchor FH II	Nail anchor FNA II	Drop-in anchor EA II	SXRL
96	**160**	**118**	**101**	**145**	**133**	**178**
						
M6 – M24	M6 – M20	ø 6 – 14 mm	ø 10 – 32 mm	ø 6 mm M6 – M8	–	ø 8 – 14 mm
●	–	–	M6 – M12	–	M6 – M12	–
–	–	–	–	–	–	–
–	–	–	–	–	–	ø 6 – 10 mm
●	●	●	●	●	●	●
●	●	●	●	●	●	●
●	–	–	–	●	–	–
–	●	●	–	–	–	–
–	–	–	–	–	–	●
300 mm	300 mm	205 mm	100 mm	120 mm	∞	290 mm
●	●	●	●	●	●	●
●	–	–	●	–	–	–
–	–	–	–	–	–	●
●	–	(●)*	●	–	–	–
–	–	–	–	–	–	–
●	–	–	●	–	–	–
●	●	●	●	●	●	–
●	●	–	●*	–	●	–
●	●	●	●	●	–	●
●	●	–	●*	–	●	–
●	●	●	●	●	●	●
●	●	●	●	–	–	–
●	–	●	–	–	–	–
●	●	●	●	●	●	●
–	–	–	–	–	–	–
–	–	–	–	–	–	–
–	–	–	–	–	–	–
-40 °C	-40 °C	-40 °C	-40 °C	-40 °C	-40 °C	-40 °C
–	–	●	–	–	–	–
●	–	–	–	–	–	–
●	–	–	–	–	–	–
●	●	●	●	●	●	–
–	–	–	–	–	–	–
●	●	●	●	●	●	●
–	–	●	●*	–	●	●
–	–	●	–	–	–	●

* With internal threaded anchor

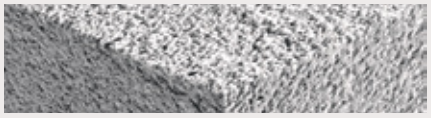
Cracked concrete

			Single fixings for cracked concrete		
			Chemical systems		
Product	Type		Epoxy mortar-system FIS EM Plus	Superbond-system FSB	Injection mortar FIS V PLUS
	Page		40	25	50
	Image				
Connection thread or screw diameter	Anchor rod or anchor size		M8 – M30	M8 – M30	M8 – M30
	Internal thread		M8 – M20	M 8 – M 20	–
	Reinforcing bar		ø 8 – 40 mm	ø 8 – 32 mm	ø 10 – 28 mm
	Screw diameter		–	–	–
Steel/material	gvz		●	●	●
	R		●	●	●
	HCR		●	●	●
	HDG/CP		–	–	–
	Nylon		–	–	–
Usable length	Up to		∞	∞	∞
Approvals/certif-icates	Approvals	ETA	●	●	●
		ICC	●	●	●
		DiBt	–	–	–
		Seismic	●	●	●
		Dynamic	–	–	–
	Certificates	Shock	–	–	–
		Fire resist-ance reports	●	●	●
Type of installation	Pre-positioned installation		●	●	●
	Push-through installation		●	●	●
	Stand-off installation		●	●	●
Drilling method	Hammer drilling		●	●	●
	Hollow drilling		●	●	●
	Diamond-drilling		●	●	–
Waiting time until loading at 20 °C	None		–	–	–
	Short	< 5 Minutes	–	–	–
	Middle	≤ 20 Minutes	–	●	●
	Long	> 20 Minutes	●	●	●
Substrate			+5 °C	-30 °C	-10 °C
Special features	Approved without drill-hole cleaning		–	–	–
	Installation in concrete < C20/25 acc. certificate		–	●	●
	Installation in concrete > C50/60 acc. certificate		–	●	●
	Approved in water-filled drill holes		●	●	●
	Installation in steel fibre concrete possible		●	●	●
	Installation possible in narrow members ≤ 120 mm		●	●	●
	Removable	Flush with the surface	●*	●*	–
		Completely	–	–	–

* With internal threaded anchor

Single fixings for cracked concrete				Redundant fixtures (multiple fixtures)		
Steel anchors			Frame fixing	Steel anchor		Frame fixing
Bolt anchor FAZ II	Concrete screw FBS II	High performance anchor FH II	SXRL 10	Nail anchor FNA II	Hammerset anchor EAII EA II	SXRL
96	**118**	**101**	**178**	**145**	**133**	**178**
						
M6 – M24	ø 6 – 14 mm	ø 10 – 32 mm	ø 10 mm	ø 6 mm M6 – M8	–	ø 8 – 14 mm
–	–	M6 – M12	–	–	M6 – M12	–
–	–	–	–	–	–	–
–	–	–	7 mm	–	–	ø 6 – 10 mm
●	●	●	●	●	●	●
●	●	●	●	●	●	●
●	–	–	–	●	–	–
–	●					–
–	–	–	●	–	–	●
300 mm	205 mm	100 mm	220 mm	120 mm	∞	290 mm
●	●	●	–	●	●	●
●	–	●	–	–	–	–
–	–	–	●	–	–	●
●	(●)*	●	–	–	–	–
–	–	–	–	–	–	–
●	–	●	–	–	–	–
●	●	●	–	●	●	–
●	–	●*	–	●	–	–
●	●	●	●	●	–	●
●	–	●*	–	–	●	–
●	●	●	●	●	●	●
●	●	–	–	–	–	–
●	●	–	–	–	–	–
●	●	●	●	●	●	●
–	–	–	–	–	–	–
–	–	–	–	–	–	–
–	–	–	–	–	–	–
-40 °C	-40 °C	-40 °C	-40 °C	-40 °C	-40 °C	-40 °C
–	●	–	–	–	–	–
●	●	–	–	●	●	–
●	–	–	–	–	–	–
●	●	●	●	●	●	–
–	–	–	–	–	–	–
●	–	–	–	●	●	●
–	●	●*	●	–	●	●
–	●	–	●	–	–	●

* With internal threaded anchor



Aircrete concrete

			Chemical systems	Steel-anchor	Frame fixings	General fixings	
Product	Type		Injection mortar FIS V PLUS	Aircrete anchor FPX-I	SXRL	Aircrete anchor GB	Turbo aircrete anchor FTP K/M
	Page		50	168	178	221	224
	Image						
Connection thread or screw diameter	Anchor rod or anchor size		M6 – M16	–	ø 8 – 14 mm	GB 10	ø 4 – 10 mm
	Internal thread		M6 – M12	M6 – M12	–	–	M6 – M10
	Screw diameter		–	–	ø 6 – 10 mm	ø 5 – 10 mm	ø 5 – 10 mm
Steel/material	gvz		●	●	●	–	●
	R		●	–	●	–	–
	Nylon		–	–	●	●	●
Usable length	Up to		∞	∞	290 mm	105 mm	∞
Approvals/certif-icates	Approvals	ETA	●	●	●	–	–
		DiBt	–	–	●	●	–
	Certificates	Fire restance report	●	●	–	–	–
Type of installation	Pre-positioned installation		●	●	–	●	●
	Push-through installation		●	–	●	–	–
	Stand-off installation		●	●	–	–	–
Drilling method	Hammer drilling		●	–	●	–	–
	Rotary drilling		●	●	●	●	●
Waiting time until loading at 20 °C	None		–	●	●	●	●
	Short	< 5 Minutes	–	–	–	–	–
	Middle	≤ 20 Minutes	●	–	–	–	–
	Long	> 20 Minutes	●	–	–	–	–
Minimum compo-nent temperature			-10 °C	-40 °C	-40 °C	-20 °C	-40 °C
Special features	Approved without drill hole cleaning		–	–	–	–	–
	Applicable in aircrete concrete ceilings		–	●	–	–	–
	Removable	Completely	●*	●	●	●	●
	Flush with the surface	Completely	–	–	●	●	●


Solid & perforated brick

			Chemical systems	Frame fixings			
Product	Type		Injection mortar FIS V PLUS	SXRL			
	Page		50	178			
	Image						
Connection thread or screw diameter	Anchor rod or anchor size		M6 – M16	ø 8 – 14 mm			
	Internal thread		M6 – M12	–			
	Screw diameter		–	ø 6 – 10 mm			
Steel/material	gvz		●	●			
	R		●	●			
	Nylon		–	●			
Usable length	Up to		∞	290 mm			
Approvals/certificates	Approvals	ETA	●	●			
		DiBt	–	●			
	Certificates	Fire resistance reports	●	–			
Type of installation	Pre-positioned installation		●	–			
	Push-through installation		●	●			
	Stand-off installation		●	–			
Drilling method	Hammer drilling		●	●			
	Rotary drilling		●	●			
Waiting time until loading at 20 °C	None		–	●			
	Short	< 5 Minutes	–	–			
	Middle	≤ 20 Minutes	●	–			
	Long	> 20 Minutes	●	–			
Minimum component temperature			-10 °C	-40 °C			
Special features	Approved without drill hole cleaning		–	–			
	Removable	Flush with the surface	●*	●			
		Completely	–	●			

* With internal threaded anchor

2

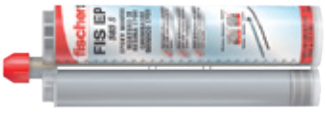
2
Chemical fixings

MORTARS AND CAPSULES FOR GENERAL APPLICATIONS

ANCHOR RODS

2

Mortar cartridges

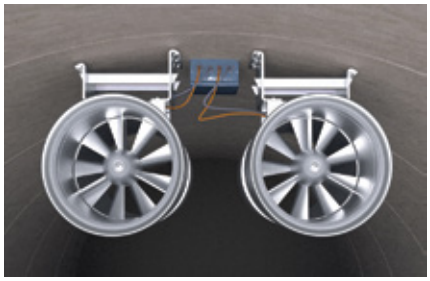
	Positioning	Approved substrates (ETA)					Approved features									Page
		Cracked concrete	Non-cracked concrete	Solid masonry	Perforated masonry	Aerated concrete	Post- installed rebar connection	ICC	Fire resistance R120	Seismic approval	Waterfilled drill hole	Diamond drilling	Hollow drilling	Dynamic loads	Others	
 Superbond-system FSB	The concrete all-rounder	●	●	–	–	–	●	●	●	C1, C2	–	–	●	●	Underwater applications	25
 Epoxy mortar FIS EM Plus	The powerful injection mortar for rebar connections and cracked concrete	●	●	–	–	–	●	●	●	C1, C2	●	●	●	–	–	40
 Epoxy mortar FIS EB II	The basic epoxy mortar for applications in concrete	●	●	–	–	–	●	●	●	C1, C2	●	●	●	–	–	44
 Epoxy mortar FIS EP	The cost-efficient epoxy mortar for applications in concrete	(●)	(●)	–	–	–	–	–	–	–	–	–	–	–	–	47
 Injection mortar FIS V Plus	The powerful universal mortar for concrete and masonry	●	●	●	●	●	●	●	●	C1, C2	●	–	●	–	–	50
 Injection mortar FIS VL	The solid injection mortar for standard applications in cracked concrete and masonry	●	●	●	●	●	●	–	●	–	●	–	●	–	–	57
 Injection mortar FIS V Zero	The first approved mortar made with renewable raw materials	–	●	●	●	●	–	–	●	–	–	–	–	–	Bio-based, EPD, Émission Dans L'Air Intérieur, NSF	62
 Injection mortar FIS P Plus	The approved injection mortar for anchorings in masonry and non-cracked concrete	–	●	●	●	●	–	–	●	–	●	–	●	–	–	67
 Resin capsules RSB	The concrete all-rounder	●	●	–	–	–	–	●	●	C1	●	●	●	●	–	33

Mortar cartridges									
	 FIS SB	 FIS EM Plus	 FIS EB II	 FIS EP	 FIS V Plus	 FIS VL	 FIS V Zero	 FIS P Plus	
Positioning	Concrete all-rounder	Powerful rebar connections + cracked concrete	Basic epoxy mortar for concrete	The cost-efficient epoxy mortar for applications in concrete	The powerful universal mortar for concrete and masonry	Solid mortar for standard anchorings in masonry and cracked concrete	First approved mortar made with renewable raw materials	Approved for masonry and non-cracked concrete	Page
 Threaded rod FIS A	●	●	●	(●)	●	●	●	●	71
 Threaded rod RG M	●	●	●	(●)	●	●	●	●	71
 Internal threaded anchor RG M I	●	●	–	–	●	●	●	–	77
 Internal threaded socket FIS E	–	–	–	–	●	●	●	●	79
 FHB dyn	–	–	–	–	–	–	–	–	20
 FDA	–	–	–	–	–	–	–	–	38

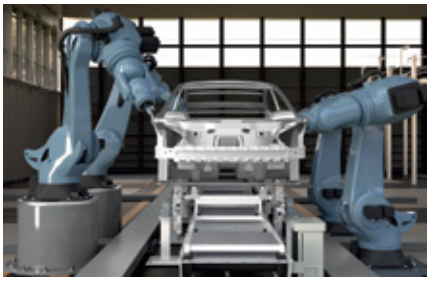
Mortar capsules			
	 FHB II-P, FHB II-PF high speed	 RSB	
Positioning	Best performance in concrete	Concrete all-rounder	Page
 Threaded rod FIS A	–	–	71
 Threaded rod RG M	–	●	75
 Internal threaded anchor RG M I	–	●	77
 Internal threaded socket FIS E	–	–	79
 FHB dyn	–	–	20
 FDA	–	–	38

Highbond anchor dynamic FHB dyn

The performance class amongst dynamic anchors



Tunnel ventilators



Production robots

Applications

- Jib cranes
- Gantry and overhead cranes
- Guide rails for elevators
- Tunnel ventilators (jet fans)
- Gantries in road construction
- Antennas and transmitter masts
- Industrial robots

Advantages

- During the setting process, the injection mortar FIS HB fills the annular gap in the fixture, and ensures optimum load distribution. This allows for the absorption of dynamic alternating loads.
- The cone shape of the FHB-A dyn anchor rod ensures a controlled expansion under dynamic stress, thus allowing for use in cracked concrete.
- The anchor rod FHB-A dyn is also available made from highly corrosion-resistant steel. This makes it suitable for use in aggressive atmospheres, for example in tunnels.
- The Highbond anchor dynamic system can achieve even greater shear loads thanks to the additional sleeve of the anchor rod FHB-A dyn V, and therefore provides an increased level of safety.

Certificates

Fire resistance classification
R120

Building materials

Approved for:
- Concrete C20/25 to C50/60, cracked and non-cracked

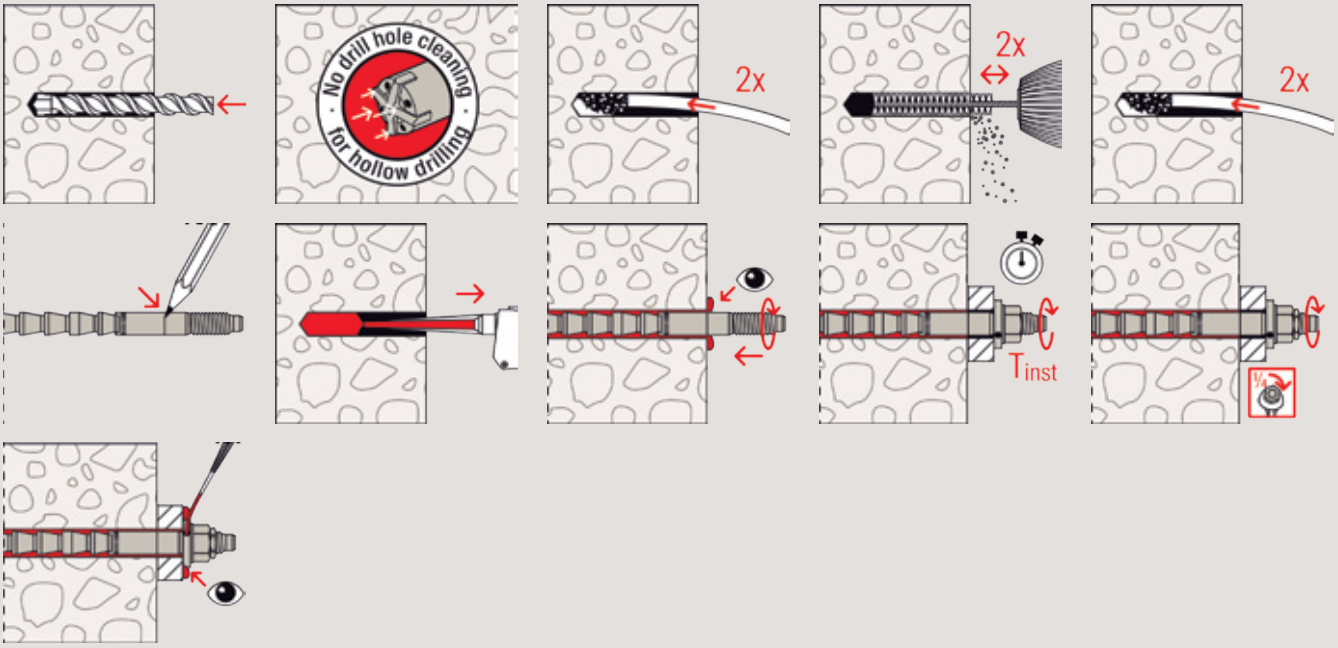
Versions

- Zinc-plated steel
- Highly corrosion-resistant steel

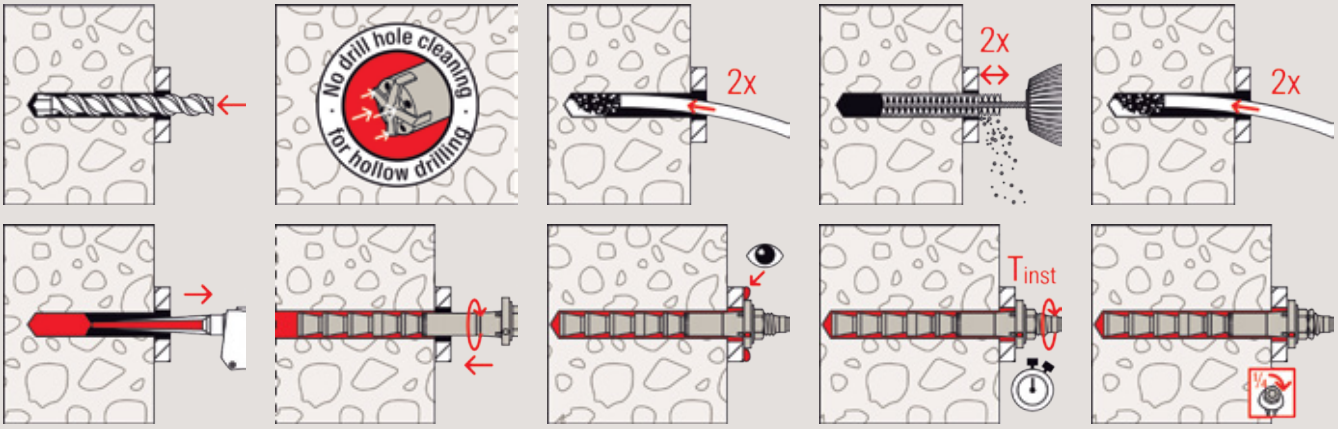
Functioning

- The injection system suitable for tensile zones consists of the Highbond dynamic anchor rod FHB-A dyn and the injection mortar FIS HB.
- FHB dyn is approved for pre-positioned and push-through installation.
- Extruding the mortar causes the two components to be mixed and activated in the static mixer.
- The mortar bonds the entire surface of the anchor rod with the drill hole wall and seals the drill hole.
- The centring sleeve centres the anchor in the fixture, thus ensuring a safe load application.
- The lock nut prevents the nut from becoming loose.

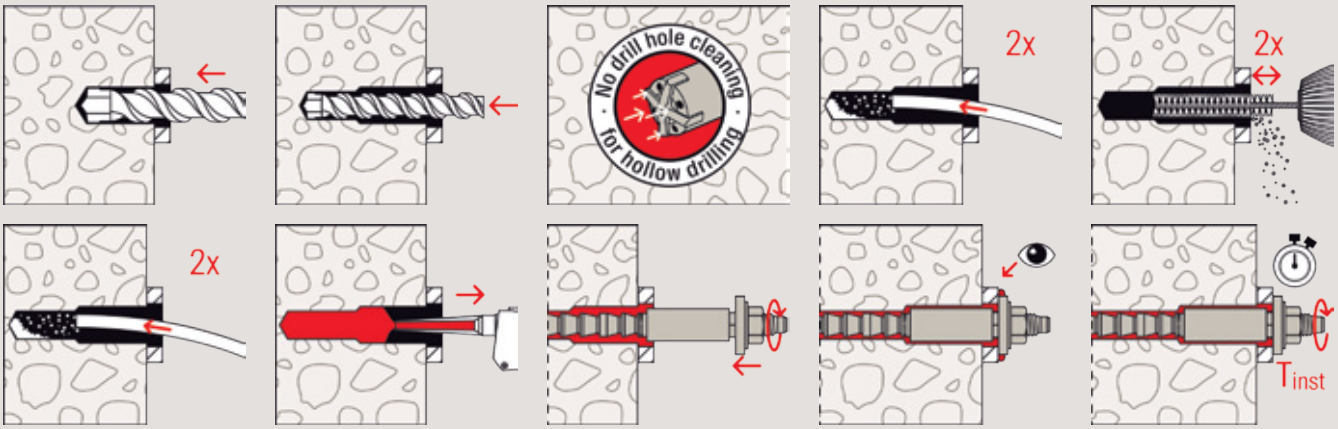
Pre-positioned installation in concrete with FIS HB and FHB DYN

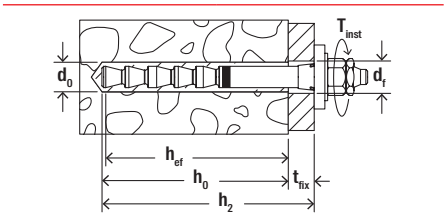


Push-through installation in concrete with FIS HB and FHB DYN



Push-through installation in concrete with FIS HB and FHB DYN V





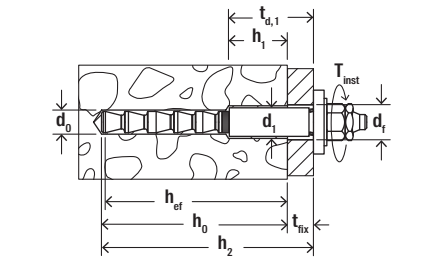
Technical data

Highbond-Anchor dynamic FHB-A dyn

FHB-A dyn

	Zinc-plated steel	Highly corrosion resistant steel	Approval	Drill hole diameter	Min. drill hole depth for through fixings	Anchorage depth	Min. - max. usable length	Drill hole diameter in fixture	Width across nut	Sales unit
	Item No.	Item No.		d_0 [mm]	h_2 [mm]	h_{ef} [mm]	t_{fix} [mm]	d_f [Ø mm]	SW [mm]	[pcs]
Item	**gvz**	**HCR**	**DIBt**							
FHB-A dyn 12 x 100/25	**092018**	**531384** [1]	●	14	130	100	8 - 25	15	19	10
FHB-A dyn 12 x 100/50	**092019**	**–**	●	14	155	100	8 - 50	15	19	10
FHB-A dyn 16 x 125/25	**092020**	**–**	●	18	155	125	10 - 25	19	24	10
FHB-A dyn 16 x 125/50	**092036**	**093445** [1]	●	18	180	125	10 - 50	19	24	10
FHB-A dyn 16 x 125/50	**–**	**561727** [1]	●	18	180	125	10 - 50	19	24	4
FHB-A dyn 16 x 125/75	**562302**	**–**	●	18	205	125	10 - 75	19	24	10
FHB-A dyn 16 x 125/80	**541874**	**–**	●	18	210	125	10 - 80	19	24	10
FHB-A dyn 16 x 125/100	**541875**	**–**	●	18	230	125	10 - 100	19	24	10
FHB-A dyn 16 x 125/125	**541873**	**–**	●	18	255	125	10 - 125	19	24	10
FHB-A dyn 16 x 125/150	**543657**	**–**	●	18	280	125	10 - 150	19	24	10
FHB-A dyn 20 x 170/50	**092037**	**–**	●	24	225	170	12 - 50	25	30	10
FHB-A dyn 24 x 220/50	**092038**	**–**	●	28	275	220	14 - 50	29	36	5

1) Prices and delivery time on requst.



Technical data

Highbond anchor dynamic FHB-A dyn V

FHB-A dyn V

	Zinc-plated steel	Approval	Drill hole diameter	Min. drill hole depth for through fixings	Anchorage depth	Min. - max. usable length	Drill hole diameter in fixture	Width across nut	Sales unit
	Item No.		d_0 [mm]	h_2 [mm]	h_{ef} [mm]	t_{fix} [mm]	d_f [Ø mm]	SW [mm]	[pcs]
Item	**gvz**	**DIBt**							
FHB-A dyn 12 x 100/50 V	**092039** [1]	●	14	160	105	8 - 50	21	19	10
FHB-A dyn 16 x 125/50 V	**092040** [2]	●	18	185	130	10 - 50	29	24	10

1) Stepped hole: 1st drill hole with Ø 20 mm and depth 85 mm. 2nd drill hole with Ø 14 mm and depth 160 mm.

2) Stepped hole: 1st drill hole with Ø 28 mm and depth 100 mm. 2nd drill hole with Ø 18 mm and depth 185 mm.

Technical data

Injection mortar FIS HB

FIS HB 345 S

FIS HB 360 S + FIS MR Plus

FIS MR Plus

Item	Item No.	Approval ETA	Languages on the cartridge	Contents	Sales unit [pcs]
FIS HB 345 S	**033211** [1]	●	DE, EN, FR, ES, NL, CS	1 cartridge 360 ml, 2 x FIS MR Plus	6
FIS HB 360 S	**562661**	●	EN, ES, PT, EL	1 cartridge 360 ml, 2 x FIS MR Plus	6
FIS MR Plus	**545853**	–	–	10 static mixer FIS MR Plus	10

1) incl. 2 static mixer per cartridge.

Curing times

FIS HB System temperature FIS HB (Mortar min. +5 °C) [°C]	Maximum processing time FIS HB t_{work} [min.]	Minimum curing time FIS HB [1] t_{cure} [min.]
-5 – -1	–	360
0 – +4	–	180
> +5 – +9	15	90
> +10 – +19	6	35
> +20 – +29	4	20
> +30 – +40	2	12

1) In wet concrete the curing times must be doubled.

Filling quantities

FHB dyn Type	Mortar volume in scale units shown on the cartridge labels' corresponding scala	Anchor per cartridge FIS HB 360 S*)
FHB-A dyn 12 x 100 / 25	7	24
FHB-A dyn 12 x 100 / 50	8	21
FHB-A dyn 16 x 125 / 25	9	18
FHB-A dyn 16 x 125 / 50	10	17
FHB-A dyn 20 x 170 / 50	23	7
FHB-A dyn 24 x 220 / 50	38	4
FHB-A dyn 12 x 100 / 50 V	12	14
FHB-A dyn 16 x 125 / 50 V	20	8

*) Max. number with one static mixer.

Loads

Highbond anchor dynamic FHB dyn

Design values for cyclic fatigue loading[1] of a single anchor normal concrete of strength class C20/25[2].
For the design the complete current approval Z-21.3-1748 has to be considered.

					Cracked and non-cracked concrete			
					Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type	Material/surface	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Installation torque T_{inst} [Nm]	$\Delta N_{Ed,max}$[3] [kN]	$\Delta V_{Ed,max}$[3][4] [kN]	s_{min}[4] [mm]	c_{min}[4] [mm]
FHB dyn 12 x 100	gvz	100	130	40	14.1	6.7	100	200[5]
	gvz	100	200	40	14.1	6.7	100	100[5]
	HCR / 1.4529	100	130	40	11.3	4.4	100	200[5]
	HCR / 1.4529	100	200	40	11.3	4.4	100	100[5]
FHB dyn 12 x 100 V	gvz	105	130	40	14.1	9.6	100	200[5]
	gvz	105	200	40	14.1	9.6	100	100
FHB dyn 16 x 125	gvz	125	160	60	23.0	11.9	100	200[5]
	gvz	125	250	60	23.0	11.9	100	100
	HCR / 1.4529	125	160	60	15.6	11.9	100	200[5]
	HCR / 1.4529	125	250	60	15.6	11.9	100	100[5]
FHB dyn 16 x 125 V	gvz	130	160	60	23.0	17.0	100	200[5]
	gvz	130	250	60	23.0	17.0	100	100
FHB dyn 20 x 170	gvz	170	220	100	28.4	17.0	80	80
FHB dyn 24 x 220	gvz	220	440	120	28.9	22.2	180	180[5]

[1] The design values of the cyclic fatigue loading apply for load cycles ≥ 5 x 10^6 in accordance with design method I - for unknown static lower load. If the static lower load is known and / or for lower number of load cycles higher load values are possible. The partial safety factors as regulated in the design standard are considered. As a single anchor counts e.g. an anchor with a spacing s ≥ 3 x h_{ef} . The given load values apply for anchorages in dry and wet concrete and temperatures in the base material up to 50 °C (resp. short-term up to 80 °C) and drill hole cleaning acc. to approval.

[2] For higher concrete strength classes up to C50/60 higher permissible loads may be possible, see approval. The concrete is assumed to be standard-reinforced.

[3] In the case of combinations of tensile loads, shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups) the design must be carried out in accordance with the provisions of the complete approval.

[4] Valid for pulsating loads. For alternating loads see approval.

[5] Without reduction of the tension and shear load. For details see approval.

Superbond system FSB

The concrete all-rounder

Bridges for traffic signs

Steel girders

Applications

- Heavy steel constructions
- Silo installations
- Tall shelving
- Sound barriers
- Guard rails
- Staircases
- Reinforcing steel (only FIS SB)
- Overhead installations
- Water-filled drill holes
- Diamond drilled holes

Advantages

- The Superbond system is a combined capsule and injection system for cracked and non-cracked concrete. The injection mortar FIS SB and resin capsule RSB perform the same as each other at the same anchorage depth. This gives the installer maximum flexibility.
- Variable anchorage depths from 4 x d_s to 20 x d_s enable ideal adaptation to the load to be applied, and thus ensure an optimised installation time and use of materials.
- Maximum application temperatures of up to +150 °C open up new areas of use for bonded anchors.
- Superbond is even approved for installation at frosty temperatures of -30 °C.
- The approval-compliant use for seismic applications (performance category C1, C2) as well as in waterfilled and diamond drill holes ensures safety even in extreme conditions.

Certificates

ETA-12/0258, for cracked concrete
ETA-13/0651, for post-installed rebar connection
ETA-19/0501, for concrete under fatigue cyclic loading

ESR-3572
See ICC-ES Evaluation Report at www.icc-es.org

Fire resistance classification R120

Building materials

Approved for anchorings in:
- Concrete C20/25 to C50/60, cracked and non-cracked

Also suitable for:
- Natural stone with dense structure

Functioning

- Superbond is a bonded anchor system based on a vinyl ester hybrid with silane technology.
- The threaded rod FIS A can only be set with injection mortar FIS SB (Standard and HIGH SPEED); the threaded rod RG M with oblique edge can be optionally set with injection mortar FIS SB (Standard and HIGH SPEED) or resin capsule RSB.
- Resin and hardener are stored in two separate chambers and are not mixed and activated until extrusion through the injection cartridge in the static mixer or destruction of the capsule during the setting procedure.
- The mortar bonds the entire surface of the fastening element with the drill hole wall and seals the drill hole.

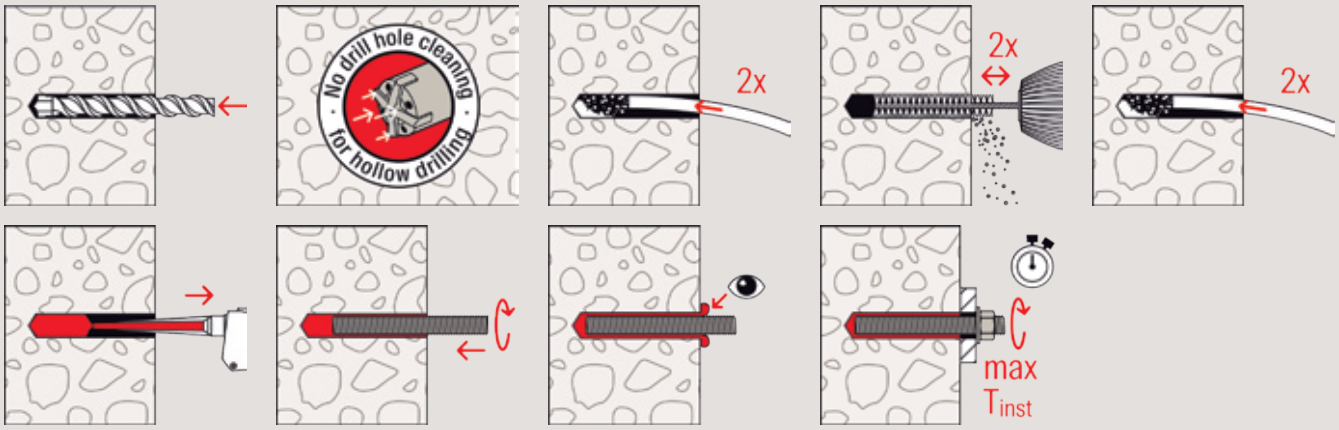
For use with

Anchors & sleeves page 71

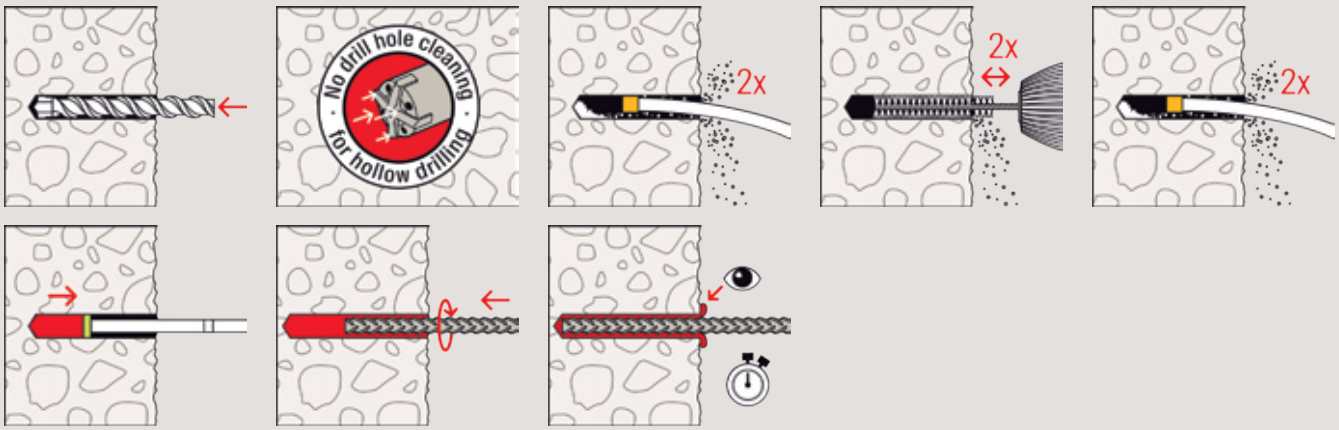
Dispenser page 87

Accessories page 89

Installation in concrete with FIS SB and FIS A / RG M

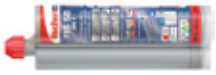


Installation of post-installed rebar connections in concrete with FIS SB in hammer drilled holes



Technical data

Injection mortar FIS SB



FIS SB 390 S

FIS MR Plus

Item	Item No.	Approval ETA	Approval ICC	Languages on the cartridge	Scale unit	Contents	Sales unit [pcs]
FIS SB 390 S	**518831**	●	●	EN, ES, PT	180	1 cartridge 390 ml, 2 x FIS MR Plus	6
FIS MR Plus	**545853**	–	–	–	–	10 static mixer FIS MR Plus	10

Technical data

Injection mortar FIS SB

FIS SB 390 S in bucket

	Item No.	Approval		Languages on the cartridge	Contents	Sales unit [pcs]
Item		**ETA**	**ICC**			
FIS SB 390 S in bucket	**540750**	●	●	EN, ES, PT	18 cartridges 390 ml, 36 x FIS MR Plus	1

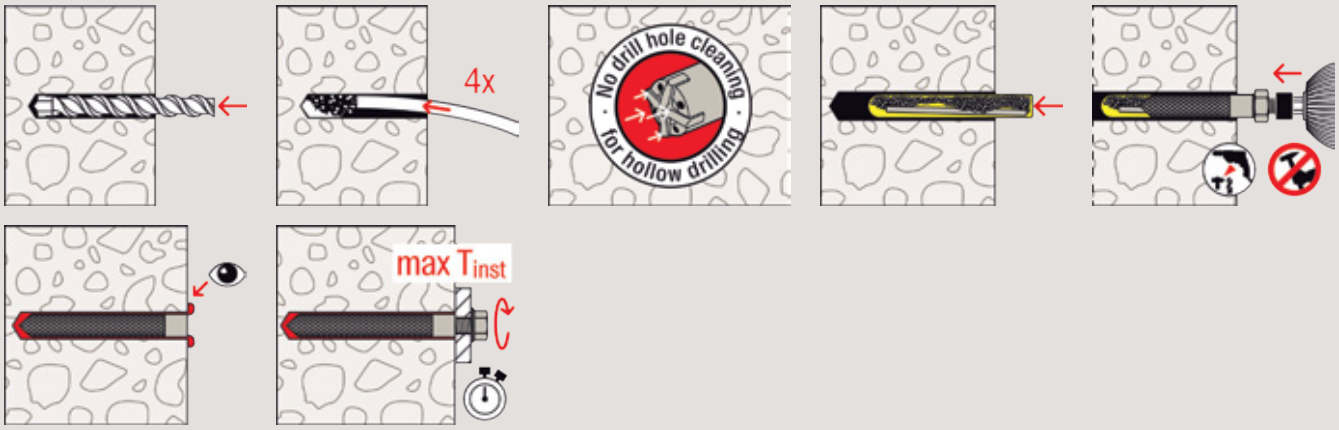
2

Curing times

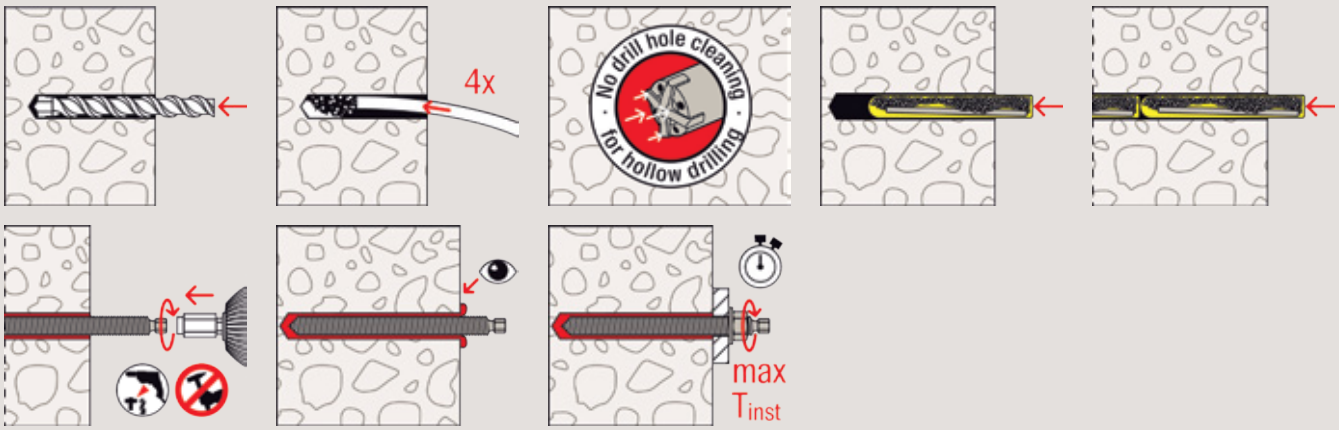
FIS SB Temperature in anchoring base [°C]	Maximum processing time FIS SB t_{work} [min.]	Maximum processing time FIS SB High Speed t_{work} [min.]	Minimum curing time FIS SB t_{cure} [hrs.]	[min.]	Minumum curing time FIS SB High Speed t_{cure} [hrs.]	[min.]
> -20 – -15	-	60	–	–	24	–
> -15 – -10	60	30	36	–	8	–
> -10 – -5	30	15	24	–	–	180
> -5 – 0	20	10	8	–	–	120
> +0 – +5	13	5	4	–	–	60
> +5 – +10	9	3	–	120	–	45
> +10 – +20	5	2	–	60	–	30
> +20 – +30	4	1	–	45	–	15
> +30 – +40	2	-	–	30	–	–

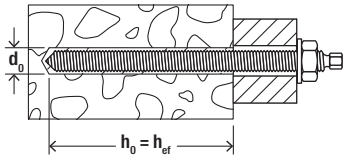
1) Minimum cartridge temperature +5°C

Installation in concrete with capsule RSB and RG M I



Installation in concrete with capsule RSB and RG M





Technical data

Resin capsule RSB

RSB

Item	Item No.	Approval ETA	Approval ICC	Drill hole diameter d_0 [mm]	Drill hole depth h_0 [mm]	Anchorage depth h_{ef} [mm]	Match	Sales unit [pcs]
RSB 8	**518807**	●	●	10	80	80	RG M 8	10
RSB 10 mini	**518820** [1]	●	●	12	75 / 150	75 / 150	RG M 10	10
RSB 10	**518821** [2]	●	●	12 / 14	90	90	RG M 10 / RG M 8 I	10
RSB 12 mini	**518822** [1]	●	●	14	75 / 150	75 / 150	RG M 12	10
RSB 12	**518823** [2]	●	●	14 / 18	110	110	RG M 12 / RG M 10 I	10
RSB 16 mini	**518824** [1]	●	●	18	95 / 190	95 / 190	RG M 16	10
RSB 16	**518825** [2]	●	●	18 / 20	125	125	RG M 16 / RG M 12 I	10
RSB 16 E	**518826**	●	–	24	160	160	RG M 16 I	10
RSB 20	**518827**	●	●	25	170	170	RG M 20	10
RSB 20 E/24	**518828**	●	●	25 / 28 / 32	210	210	RG M 20 / RG M 24 / RG M 20 I	5
RSB 30	**518829**	●	●	35	280	280	RG M 30	5

1) use 2 x RSB mini in a row for larger anchoring depth

2) / second value "Drill hole diameter" in conjunction with Internal threaded anchor RG MI

Curing times

RSB Temperature at anchoring base	Minimum curing time RSB t_{cure}	
[°C]	[hrs.]	[min.]
-30 – -20 [1]	120	–
> -20 – -15	48	–
> -15 – -10	30	–
> -10 – -5	16	–
> -5 – 0	10	–
> +0 – +5	–	45
> +5 – +10	–	30
> +10 – +20	–	20
> +20 – +30	–	5
> +30 – +40	–	3

1) Minimum resin capsule temperature -15°C

Loads

Superbond-System: Injection mortar FIS SB with internal threaded anchor RG M I

Permissible loads of a single anchor[1) 2)] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-12/0258 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Screw material[3]	Effective anchorage depth	Minimum member thickness	Maximum installation-torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst,max}$ [Nm]	N_{perm} [4)] [kN]	V_{perm} [4)] [kN]	s_{min} [4)] [mm]	c_{min} [4)] [mm]	N_{perm} [4)] [kN]	V_{perm} [4)] [kN]	s_{min} [4)] [mm]	c_{min} [4)] [mm]
RG M8 I	5.8	90	120	10	8.1	5.3	55	55	9.0	5.3	55	55
	8.8	90	120	10	8.1	8.3	55	55	13.8	8.3	55	55
	R-70	90	120	10	8.1	5.9	55	55	9.9	5.9	55	55
RG M10 I	5.8	90	130	20	10.8	8.3	65	65	13.8	8.3	65	65
	8.8	90	130	20	10.8	13.3	65	65	20.0	13.3	65	65
	R-70	90	130	20	10.8	9.3	65	65	15.7	9.3	65	65
RG M12 I	5.8	125	170	40	16.8	12.1	75	75	20.5	12.1	75	75
	8.8	125	170	40	16.8	19.3	75	75	32.4	19.3	75	75
	R-70	125	170	40	16.8	13.5	75	75	22.5	13.5	75	75
RG M16 I	5.8	160	210	80	26.3	22.4	95	95	37.6	22.4	95	95
	8.8	160	210	80	26.3	30.9	95	95	47.4	30.9	95	95
	R-70	160	210	80	26.3	25.1	95	95	42.0	25.1	95	95
RG M20 I	5.8	200	260	120	41.9	35.4	125	125	58.6	35.4	125	125
	8.8	200	260	120	41.9	51.4	125	125	66.3	51.4	125	125
	R-70	200	260	120	41.9	39.4	125	125	65.7	39.4	125	125

[1)] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of γ_L = 1.4 are considered. As a single anchor counts e.g. an anchor with a spacing s ≥ 3 x h_{ef} and an edge distance c ≥ 1.5 x h_{ef}. Accurate data see ETA.
[2)] The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 80 °C). Drill hole cleaning as per specification in the ETA. The factor Ψ_{sus} for sustained load was taken into account with 1.0.
[3)] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).
[4)] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Loads

Superbond-System: Injection morter FIS SB with threaded rod FIS A or RG M

Permissible loads of a single anchor[1) 2)] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-12/0258 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material/ surface[3)]	Effective anchorage depth	Minimum member thickness	Maximum installation-torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst,max}$ [Nm]	N_{perm}[4)] [kN]	V_{perm}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]	N_{perm}[4)] [kN]	V_{perm}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]
FIS A M 8	5.8	60	100	10	4.3	6.3	40	40	8.6	6.3	40	40
	5.8	80	110	10	5.7	6.3	40	40	9.0	6.3	40	40
	5.8	160	190	10	9.0	6.3	40	40	9.0	6.3	40	40
	R-70	60	100	10	4.3	6.0	40	40	8.6	6.0	40	40
	R-70	80	110	10	5.7	6.0	40	40	9.9	6.0	40	40
	R-70	160	190	10	9.9	6.0	40	40	9.9	6.0	40	40
FIS A M 10	5.8	60	100	20	5.8	9.7	45	45	10.8	9.7	45	45
	5.8	90	120	20	8.8	9.7	45	45	13.8	9.7	45	45
	5.8	200	230	20	13.8	9.7	45	45	13.8	9.7	45	45
	R-70	60	100	20	5.8	9.2	45	45	10.8	9.2	45	45
	R-70	90	120	20	8.8	9.2	45	45	15.7	9.2	45	45
	R-70	200	230	20	15.7	9.2	45	45	15.7	9.2	45	45
FIS A M 12	5.8	70	100	40	9.4	14.3	55	55	13.7	14.3	55	55
	5.8	110	140	40	14.8	14.3	55	55	20.5	14.3	55	55
	5.8	240	270	40	20.5	14.3	55	55	20.5	14.3	55	55
	R-70	70	100	40	9.4	13.7	55	55	13.7	13.7	55	55
	R-70	110	140	40	14.8	13.7	55	55	22.5	13.7	55	55
	R-70	240	270	40	22.5	13.7	55	55	22.5	13.7	55	55
FIS A M 16	5.8	80	120	60	11.7	23.5	65	65	16.8	26.9	65	65
	5.8	125	170	60	22.4	26.9	65	65	32.7	26.9	65	65
	5.8	320	360	60	37.6	26.9	65	65	37.6	26.9	65	65
	R-70	80	120	60	11.7	23.5	65	65	16.8	25.2	65	65
	R-70	125	170	60	22.4	25.2	65	65	32.7	25.2	65	65
	R-70	320	360	60	42.0	25.2	65	65	42.0	25.2	65	65
FIS A M 20	5.8	90	140	120	14.0	28.0	85	85	20.0	40.0	85	85
	5.8	170	220	120	36.3	42.3	85	85	51.9	42.3	85	85
	5.8	400	450	120	58.6	42.3	85	85	58.6	42.3	85	85
	R-70	90	140	120	14.0	28.0	85	85	20.0	39.4	85	85
	R-70	170	220	120	36.3	39.4	85	85	51.9	39.4	85	85
	R-70	400	450	120	65.7	39.4	85	85	65.7	39.4	85	85
FIS A M 24	5.8	96	160	150	15.4	30.8	105	105	22.0	44.1	105	105
	5.8	210	270	150	49.9	60.6	105	105	71.3	60.6	105	105
	5.8	480	540	150	84.3	60.6	105	105	84.3	60.6	105	105
	R-70	96	160	150	15.4	30.8	105	105	22.0	44.1	105	105
	R-70	210	270	150	49.9	56.8	105	105	71.3	56.8	105	105
	R-70	480	540	150	94.3	56.8	105	105	94.3	56.8	105	105
FIS A M 30	5.8	120	190	300	21.6	43.1	140	140	30.8	61.6	140	140
	5.8	280	350	300	76.8	96.0	140	140	109.8	96.0	140	140
	5.8	600	670	300	133.8	96.0	140	140	133.8	96.0	140	140
	R-70	120	190	300	21.6	43.1	140	140	30.8	61.6	140	140
	R-70	280	350	300	76.8	90.2	140	140	109.8	90.2	140	140
	R-70	600	670	300	150.1	90.2	140	140	150.1	90.2	140	140

[1)] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of γ_L = 1.4 are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.

[2)] The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 80 °C). Drill hole cleaning as per specification in the ETA. The factor Ψ_{sus} for sustained load was taken into account with 1.0.

[3)] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

[4)] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Loads

Superbond-System: Resin capsule RSB with threaded rod RG M

Permissible loads of a single anchor[1) 2)] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-12/0258 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material/ surface[3)]	Effective anchorage depth	Minimum member thickness	Maximum installation-torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst,max}$ [Nm]	N_{perm}[4)] [kN]	V_{perm}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]	N_{perm}[4)] [kN]	V_{perm}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]
RG M 8	5.8	80	110	10	5.7	6.3	40	40	9.0	6.3	40	40
	R-70	80	110	10	5.7	6.0	40	40	9.9	6.0	40	40
RG M 10	5.8	75	110	20	7.3	9.7	45	45	13.5	9.7	45	45
	5.8	90	120	20	8.8	9.7	45	45	13.8	9.7	45	45
	5.8	150	180	20	13.8	9.7	45	45	13.8	9.7	45	45
	R-70	75	110	20	7.3	9.2	45	45	13.5	9.2	45	45
	R-70	90	120	20	8.8	9.2	45	45	15.7	9.2	45	45
	R-70	150	180	20	14.6	9.2	45	45	15.7	9.2	45	45
RG M 12	5.8	75	110	40	10.1	14.3	55	55	15.2	14.3	55	55
	5.8	110	140	40	14.8	14.3	55	55	20.5	14.3	55	55
	5.8	150	180	40	20.2	14.3	55	55	20.5	14.3	55	55
	R-70	75	110	40	10.1	13.7	55	55	15.2	13.7	55	55
	R-70	110	140	40	14.8	13.7	55	55	22.5	13.7	55	55
	R-70	150	180	40	20.2	13.7	55	55	22.5	13.7	55	55
RG M 16	5.8	95	140	60	15.2	26.9	65	65	21.7	26.9	65	65
	5.8	125	170	60	22.4	26.9	65	65	32.7	26.9	65	65
	5.8	190	230	60	34.1	26.9	65	65	37.6	26.9	65	65
	R-70	95	140	60	15.2	25.2	65	65	21.7	25.2	65	65
	R-70	125	170	60	22.4	25.2	65	65	32.7	25.2	65	65
	R-70	190	230	60	34.1	25.2	65	65	42.0	25.2	65	65
RG M 20	5.8	170	220	120	36.3	42.3	85	85	51.9	42.3	85	85
	5.8	210	260	120	47.1	42.3	85	85	58.6	42.3	85	85
	R-70	170	220	120	36.3	39.4	85	85	51.9	39.4	85	85
	R-70	210	260	120	47.1	39.4	85	85	65.7	39.4	85	85
RG M 24	5.8	210	270	150	49.9	60.6	105	105	71.3	60.6	105	105
	R-70	210	270	150	49.9	56.8	105	105	71.3	56.8	105	105
RG M 30	5.8	280	350	300	76.8	96.0	140	140	109.8	96.0	140	140
	R-70	280	350	300	76.8	90.2	140	140	109.8	90.2	140	140

[1)] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.

[2)] The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 80 °C). Drill hole cleaning as per specification in the ETA. The factor Ψ_{sus} for sustained load was taken into account with 1.0.

[3)] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

[4)] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Loads

Superbond-System: Resin capsule RSB with Internal threaded anchor RG M I

Permissible loads of a single anchor[1) 2)] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-12/0258 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Screw material[3)]	Effective anchorage depth	Minimum member thickness	Maximum installation-torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst,max}$ [Nm]	N_{perm}[4)] [kN]	V_{perm}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]	N_{perm}[4)] [kN]	V_{perm}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]
RG M8 I	5.8	90	120	10	8.1	5.3	55	55	9.0	5.3	55	55
	8.8	90	120	10	8.1	8.3	55	55	13.8	8.3	55	55
	R-70	90	120	10	8.1	5.9	55	55	9.9	5.9	55	55
RG M10 I	5.8	90	130	20	10.8	8.3	65	65	13.8	8.3	65	65
	8.8	90	130	20	10.8	13.3	65	65	20.0	13.3	65	65
	R-70	90	130	20	10.8	9.3	65	65	15.7	9.3	65	65
RG M12 I	5.8	125	170	40	16.8	12.1	75	75	20.5	12.1	75	75
	8.8	125	170	40	16.8	19.3	75	75	32.4	19.3	75	75
	R-70	125	170	40	16.8	13.5	75	75	22.5	13.5	75	75
RG M16 I	5.8	160	210	80	26.3	22.4	95	95	37.6	22.4	95	95
	8.8	160	210	80	26.3	30.9	95	95	47.4	30.9	95	95
	R-70	160	210	80	26.3	25.1	95	95	42.0	25.1	95	95
RG M20 I	5.8	200	260	120	41.9	35.4	125	125	58.6	35.4	125	125
	8.8	200	260	120	41.9	51.4	125	125	66.3	51.4	125	125
	R-70	200	260	120	41.9	39.4	125	125	65.7	39.4	125	125

[1)] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of γ_L = 1.4 are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.

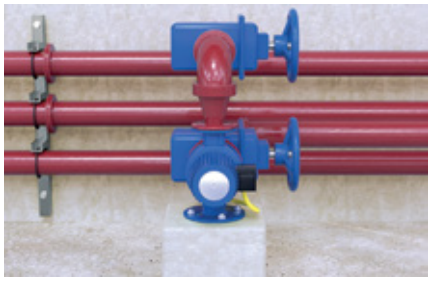
[2)] The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 80 °C). Drill hole cleaning as per specification in the ETA. The factor Ψ_{sus} for sustained load was taken into account with 1.0.

[3)] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

[4)] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Superbond dynamic FSB dyn

Dynamic fixation for FIS A and RG M with Superbond-System FSB



Pumps

Guide rails for elevators

Applications

- Small road sign
- Promotional sign
- Guide rails for elevators
- Pumps
- Conveyor belts
- Gates and doors
- Machines, components exposed to vibration

Advantages

- The system is the first to offer lightweight, dynamic load specifications in an ETA for fischer FIS A 8.8 and RG M threaded rods using the filling set. The ETA covers zinc-plated steel in sizes M12 and M16, and stainless steel R in sizes M12 to M24.
- FIS A threaded rods must be mounted with FIS SB injection mortar and RG M threaded rods must be mounted with RSB mortar capsules or FIS SB injection mortar.
- Variable anchoring depth enables ideal adaption to the load and ensures optimised installation and material use.
- The version with RG M threaded rods and RSB capsules is ideal for accessories kits or applications with diamond drill holes.
- Approved threaded rods in stainless steel R can be used outdoors.

Certificates

ETA-12/0258, for cracked concrete
ETA-13/0651, for post-installed rebar connection
ETA-19/0501, for concrete under fatigue cyclic loading

Building materials

Approved for:
- Concrete C20/25 to C50/60, cracked and non-cracked

Version

- Zinc-plated, steel grade 8.8
- Stainless steel R

Functioning

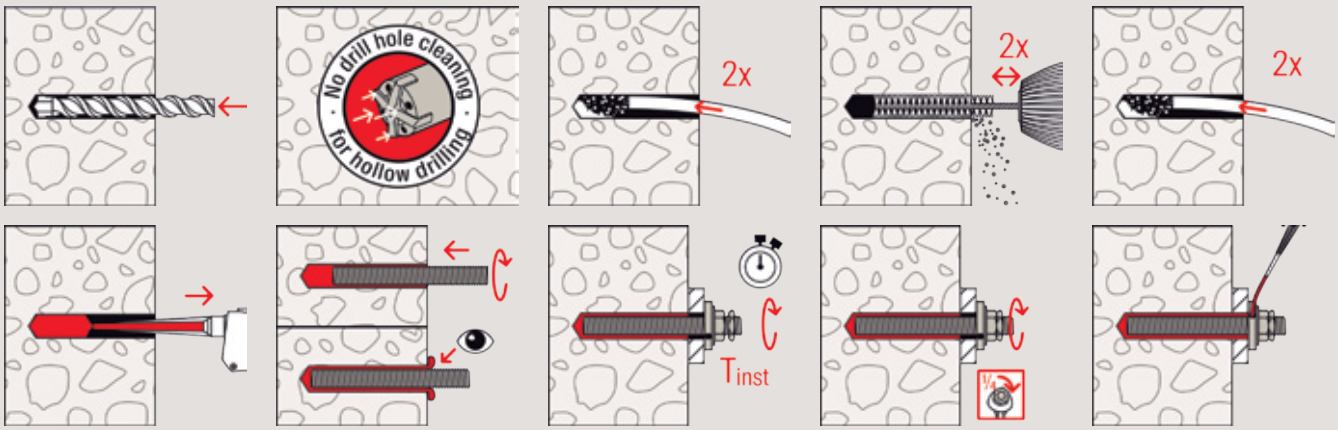
- Threaded rod FIS A in combination with injection mortar FIS SB is approved for pre-positioned and push-through installation.
- Threaded rod RG M in combination with the resin capsule RSB is approved for pre-positioned and push-through installation.
- The injection system ensures a full-surface bonding between the fixing element and wall of the drill hole and seals the drill hole.
- The filling disc ensures that the annular gap is filled seamlessly in pre-positioned installation, thereby ensuring reliable load transmission.
- The centering sleeve centres the threaded rod in the fixture, thus ensuring a safe load application.
- The lock nut prevents the hexagonal nut from becoming loose.

For use with

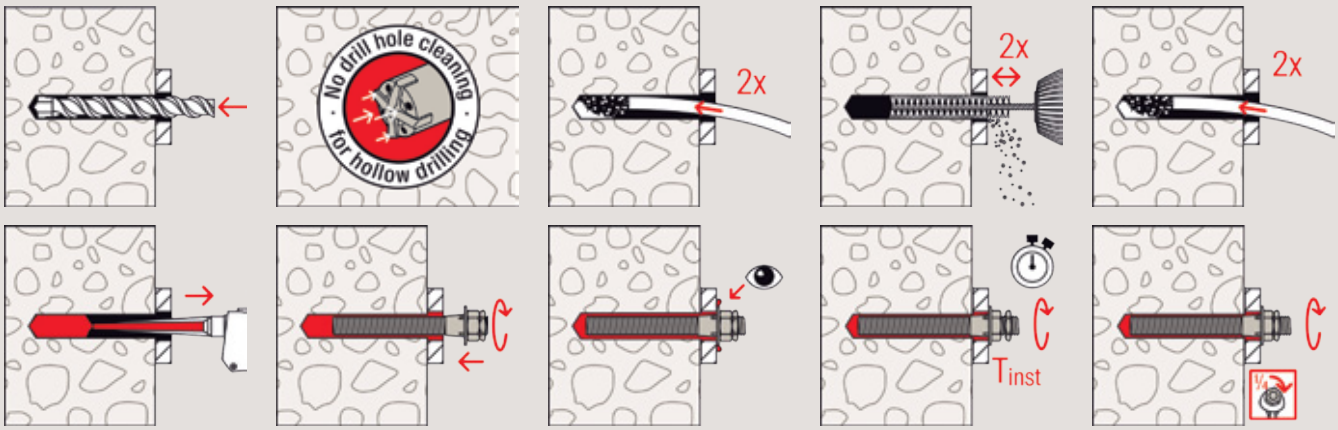
Dispenser page 87

Accessories page 89

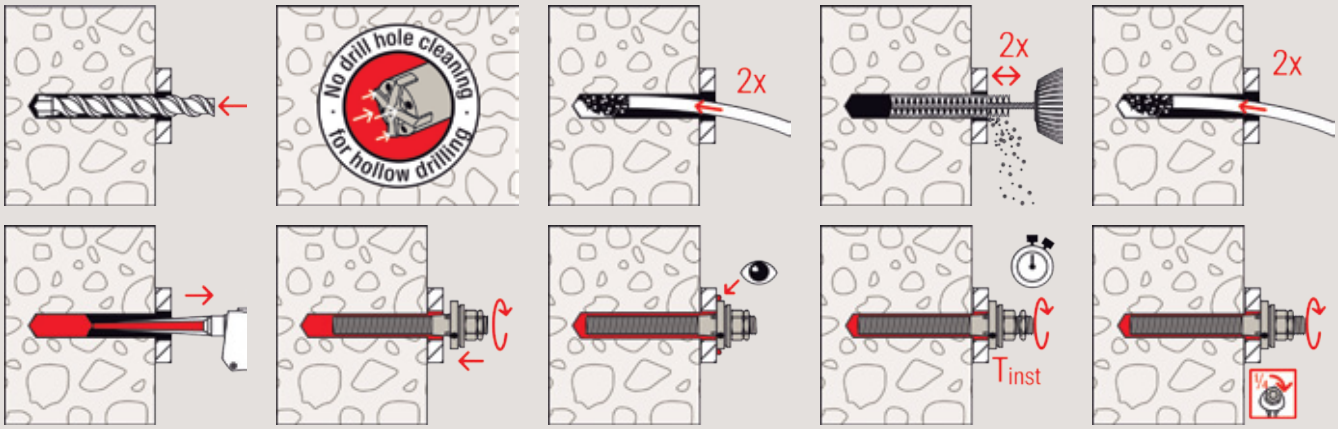
Pre-positioned installation FIS A with filling disc



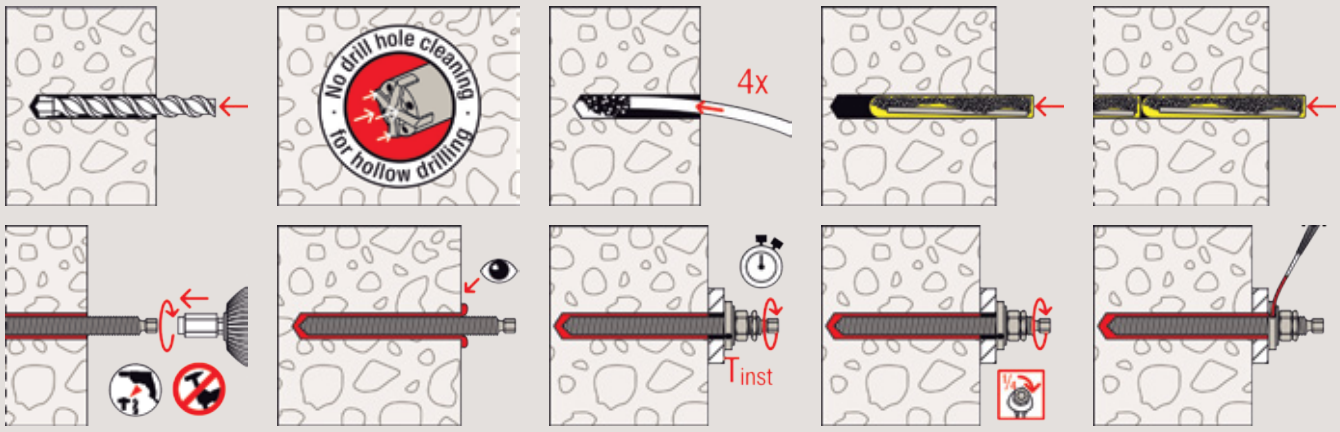
Push-through installation FIS A without filling disc



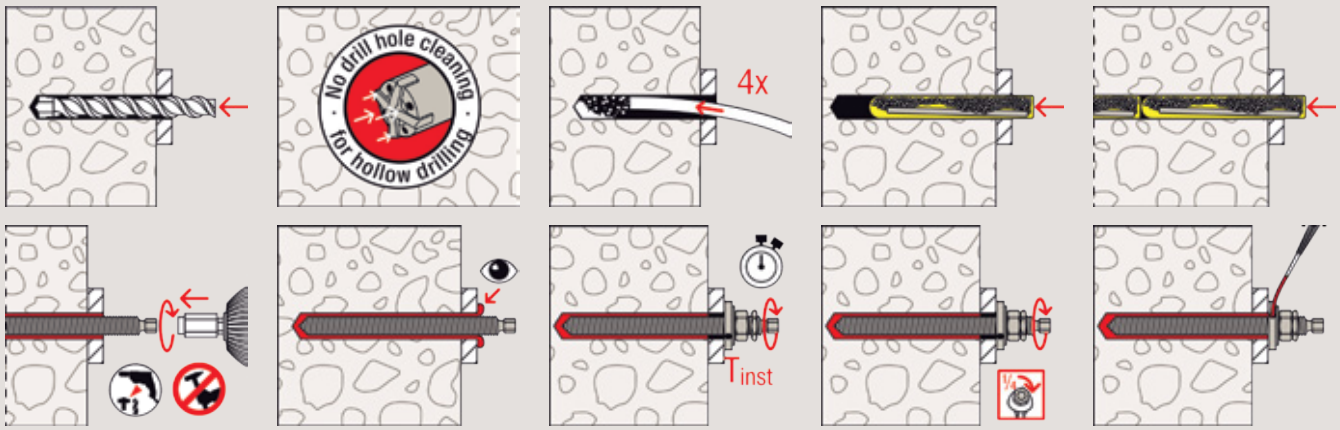
Push-through installation FIS A with filling disc



Pre-positioned installation RG M with capsule RSB (hammer drilling)



Push-through installation RG M with capsule RSB (hammer drilling)



Accessories

Filling set

Filling sets for subsequent filling of the annular gap

Item	Item No.	Match	Sales unit [pcs]
Filling set M 12	**537218**	FIS A/RG M 12	10
Filling set M 16	**537219**	FIS A/RG M 16	10
Filling set M 12 R	**557875**	FIS A/RG M 12 R	10
Filling set M 16 R	**557876**	FIS A/RG M 16 R	10
Filling set M 20 R	**557877**	FIS A/RG M 20 R	10
Filling set M 24 R	**557878**	FIS A/RG M 24 R	10
Filling set M 20 R push-through	**557879**	FIS A/RG M 20 R	10
Filling set M 24 R push-through	**557880**	FIS A/RG M 24 R	10

Loads

Superbond dynamic with Superbond mortar FIS SB and threaded rod FIS A resp. RG M

Design values for cyclic fatigue loading[1] of a single anchor normal concrete of strength class C20/25[2].
For the design the complete current assessment ETA-19/0501 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material/ surface	Effective anchorage depth	Minimum member thickness	Installation torque	Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	T_{inst} [Nm]	$\Delta N_{Ed,max}$ [3] [kN]	$\Delta V_{Ed,max}$ [3] [kN]	s_{min} [3] [mm]	c_{min} [3] [mm]	$\Delta N_{Ed,max}$ [3] [kN]	$\Delta V_{Ed,max}$ [3] [kN]	s_{min} [3] [mm]	c_{min} [3] [mm]
FIS A M 12	8.8	70	100	40	3.0	2.0	55	55	4.5	2.0	55	55
	8.8	110	140	40	4.5	2.0	55	55	4.5	2.0	55	55
	8.8	240	270	40	4.5	2.0	55	55	4.5	2.0	55	55
	R-70	70	100	40	3.0	2.7	55	55	4.8	2.7	55	55
	R-70	110	140	40	4.9	2.7	55	55	4.9	2.7	55	55
	R-70	240	270	40	4.9	2.7	55	55	4.9	2.7	55	55
FIS A M 16	8.8	80	120	60	4.8	3.7	65	65	8.4	3.7	65	65
	8.8	125	170	60	8.4	3.7	65	65	8.4	3.7	65	65
	8.8	320	360	60	8.4	3.7	65	65	8.4	3.7	65	65
	R-70	80	120	60	4.8	4.9	65	65	8.4	4.9	65	65
	R-70	125	170	60	8.8	4.9	65	65	9.2	4.9	65	65
	R-70	320	360	60	9.2	4.9	65	65	9.2	4.9	65	65
FIS A M 20	R-70	90	140	120	7.1	7.6	85	85	12.4	7.6	85	85
	R-70	170	220	120	14.3	7.6	85	85	14.3	7.6	85	85
	R-70	400	450	120	14.3	7.6	85	85	14.3	7.6	85	85
FIS A M 24	R-70	96	160	150	7.4	11.0	105	105	11.8	11.0	105	105
	R-70	210	270	150	20.2	11.0	105	105	20.6	11.0	105	105
	R-70	480	540	150	20.6	11.0	105	105	20.6	11.0	105	105

[1] The design values of the cyclic fatigue loading apply for load cycles > 10^8 in accordance with design method I acc. to TR061 - for unknown static lower load. If the static lower load is known and / or for lower number of load cycles higher load values are possible. The partial safety factors as regulated in the design standard are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$. The given load values apply for anchorages in dry and wet concrete and temperatures in the base material up to 50 °C (resp. short-term up to 80 °C) and drill hole cleaning acc. to assessment.

[2] For higher concrete strength classes up to C50/60 higher permissible loads may be possible, see assessment. The concrete is assumed to be standard-reinforced.

[3] In the case of combinations of tension loads, shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups) the design must be carried out in accordance with the provisions of the complete assessment.

Loads

Superbond dynamic with Superbond capsule RSB and threaded rod RG M

Design values for cyclic fatigue loading[1] of a single anchor normal concrete of strength class C20/25[2].
For the design the complete current assessment ETA-19/0501 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material/ surface	Effective anchorage depth	Minimum member thickness	Installation torque	Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
		h_{ef}	h_{min}	T_{inst}	$\Delta N_{Ed,max}$ [3]	$\Delta V_{Ed,max}$ [3]	s_{min} [3]	c_{min} [3]	$\Delta N_{Ed,max}$ [3]	$\Delta V_{Ed,max}$ [3]	s_{min} [3]	c_{min} [3]
Type		**[mm]**	**[mm]**	**[Nm]**	**[kN]**	**[kN]**	**[mm]**	**[mm]**	**[kN]**	**[kN]**	**[mm]**	**[mm]**
RG M 12	8.8	75	110	40	3.3	2.0	55	55	4.5	2.0	55	55
	8.8	110	140	40	4.5	2.0	55	55	4.5	2.0	55	55
	8.8	150	180	40	4.5	2.0	55	55	4.5	2.0	55	55
	R-70	75	110	40	3.3	2.7	55	55	4.9	2.7	55	55
	R-70	110	140	40	4.9	2.7	55	55	4.9	2.7	55	55
	R-70	150	180	40	4.9	2.7	55	55	4.9	2.7	55	55
RG M 16	8.8	95	140	60	6.2	3.7	65	65	8.4	3.7	65	65
	8.8	125	170	60	8.4	3.7	65	65	8.4	3.7	65	65
	8.8	190	230	60	8.4	3.7	65	65	8.4	3.7	65	65
	R-70	95	140	60	6.2	4.9	65	65	9.2	4.9	65	65
	R-70	125	170	60	8.8	4.9	65	65	9.2	4.9	65	65
	R-70	190	230	60	9.2	4.9	65	65	9.2	4.9	65	65
RG M 20	R-70	170	220	120	14.3	7.6	85	85	14.3	7.6	85	85
	R-70	210	260	120	14.3	7.6	85	85	14.3	7.6	85	85
RG M 24	R-70	210	270	150	20.2	11.0	105	105	20.6	11.0	105	105

[1] The design values of the cyclic fatigue loading apply for load cycles > 10^8 in accordance with design method I acc. to TR061 - for unknown static lower load. If the static lower load is known and / or for lower number of load cycles higher load values are possible. The partial safety factors as regulated in the design standard are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$. The given load values apply for anchorages in dry and wet concrete and temperatures in the base material up to 50 °C (resp. short-term up to 80 °C) and drill hole cleaning acc. to assessment.

[2] For higher concrete strength classes up to C50/60 higher permissible loads may be possible, see assessment. The concrete is assumed to be standard-reinforced.

[3] In the case of combinations of tension loads, shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups) the design must be carried out in accordance with the provisions of the complete assessment.

Dynamic anchor FDA

The dynamic push-through anchor for an economical serial installation at medium load level

Platform lifts

Applications

- hydraulic ramps
- Conveyor belts
- Industrial robots
- cooperation robots and -parts
- Guide rails for elevators

Advantages

- Medium load level for a variety of applications.
- Pre-assembled anchor rod for fast installation.
- Assessed safety acc. to ETA for endless numbers of load cycles.
- Easy push-through installation leads to cost effectiveness – especially for serial installations.
- Tight assortment with the size.
- Less spacings and edge distances.
- Drill holes are sealed.

Certificates

ETA-20/0206

Building materials

- Concrete C20/25 to C50/60, cracked and non-cracked

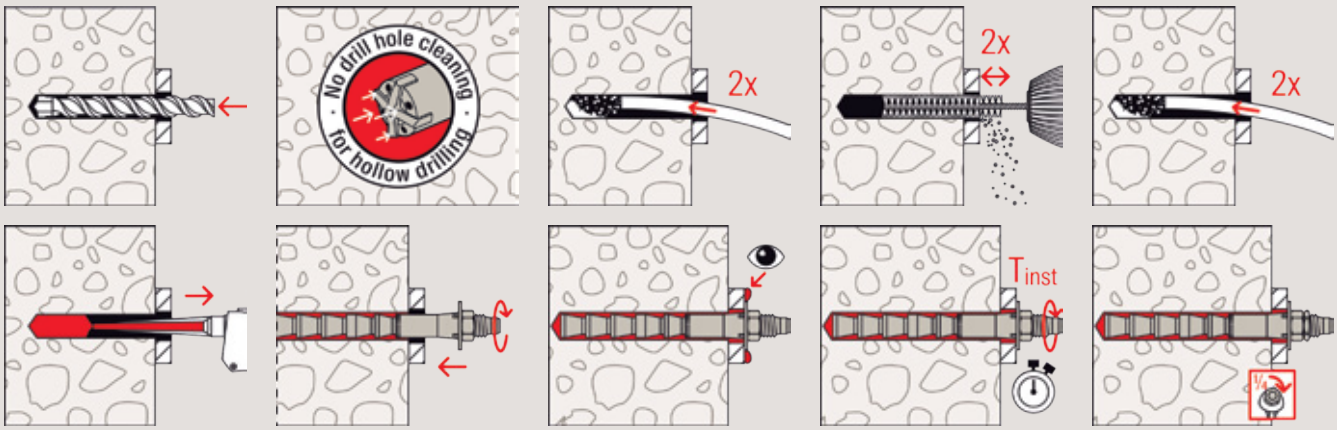
Versions

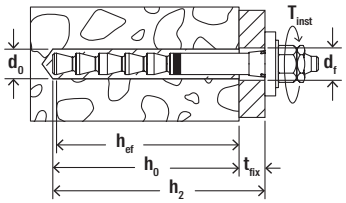
- Zinc-plated steel

Functioning

- The injection system suitable for tensile zones consists of the fischer dynamic anchor rod FDA-A dyn and the injection mortar FIS HB.
- FDA is approved for push-through installation.
- Extruding the mortar causes the two components to be mixed and activated in the static mixer.
- The mortar bonds the entire surface of the anchor rod with the drill hole wall and seals the drill hole.
- The centring sleeve centres the anchor in the fixture, thus ensuring a safe load application.
- During the setting process, the injection mortar FIS HB fills the annular gap in the fixture, and ensures optimum load distribution. This allows for the absorption of dynamic alternating loads.

Installation in concrete with FIS HB and FDA





Technical data

Dynamic anchor FDA

FDA

Item	Item No. gvz	Approval ETA	Drill hole diameter d_0 [mm]	Drill hole diameter in fixture d_f [Ø mm]	Anchorage depth h_{ef} [mm]	Min. - max. usable length t_{fix} [mm]	Min. drill hole depth for through fixings h_2 [mm]	Width across nut SW [mm]	Sales unit [pcs]
FDA-A 12 x 100/25 gvz	536943	●	14	15	100	12 - 25	130	19	10
FDA-A 12 x 100/50 gvz	536944	●	14	15	100	12 - 50	155	19	10
FDA-A 16 x 125/25 gvz	536945	●	18	19	125	16 - 25	155	24	10
FDA-A 16 x 125/50 gvz	536946	●	18	19	125	16 - 50	180	24	10
FDA-A 16 x 125/80 gvz	558966	●	18	19	125	16 - 80	210	24	10

Loads

Dynamic-Anchor FDA

Design values for cyclic fatigue loading[1] of a single anchor normal concrete of strength class C20/25[2].
For the design the complete current assessment ETA-20/0206 has to be considered.

Type	Material fixing element	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Installation torque T_{inst} [Nm]	Cracked and non-cracked concrete: Design values of tension ($\Delta N_{Ed,max}$) and shear loads ($\Delta V_{Ed,max}$); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads: $\Delta N_{Ed,max}$[3] [kN]	$\Delta V_{Ed,max}$[3][4] [kN]	s_{min}[4] [mm]	c_{min}[4] [mm]
FDA 12 x 100	gvz	100	130	40	10.8	5.0	100	200[5]
	gvz	100	200	40	10.8	5.0	100	100[5]
FDA 16 x 125	gvz	125	160	60	18.5	9.1	100	200[5]
	gvz	125	250	60	18.5	9.1	100	100

[1] The design values of the cyclic fatigue loading apply for load cycles ≥ 5 x 10^6 in accordance with design method I acc. to TR061 - for unknown static lower load. If the static lower load is known and / or for lower number of load cycles higher load values are possible. The partial safety factors as regulated in the design standard are considered. As a single anchor counts e.g. an anchor with a spacing s ≥ 3 x h_{ef} . The given load values apply for anchorages in dry and wet concrete and temperatures in the base material up to 50 °C (resp. short-term up to 80 °C) and drill hole cleaning acc. to assessment.
[2] For higher concrete strength classes up to C50/60 higher permissible loads may be possible, see assessment. The concrete is assumed to be standard-reinforced.
[3] In the case of combinations of tension loads, shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups) the design must be carried out in accordance with the provisions of the complete assessment.
[4] Valid for pulsating loads. For alternating loads see assessment.
[5] Without reduction of the tension and shear load. Details see assessment.

Epoxy mortar FIS EM Plus

The powerful injection mortar for rebar connections and cracked concrete

Rail fastenings

Rebar connections

Applications

- Post-installed rebar connections
- Jointers for concrete layers
- Rim beam anchorings
- Seismic applications
- Anchorings in diamond-drilled or in waterfilled drill holes
- Heavy steel constructions
- Silo installations
- Tall shelving
- Sound barriers
- Temporary or removable fixings (with internal threaded anchor RG M I)

Advantages

- The ETA assessment guarantees a service life of 100 years. The expert report of IEA Stuttgart even confirms a working life up to 120 years and thus underlines the reliability and durability of the FIS EM Plus.
- The optimised formulation of the epoxy resin mortar FIS EM Plus leads to improved load values in cracked and non-cracked concrete.
- The mortar can be used for rebar connections from diameter 8 to 40, including seismic applications.
- With the threaded rod FIS A, the loads to be applied can be designed variably by selecting the anchorage depth.The mortar is approved for diamond drilled and water-filled drillholes as well as seismic applications and thus offers safety under extreme conditions.
- For practical use on the building site, FIS EM Plus can be processed at low temperatures down to -5 °C.

Certificates

ETA-17/0979, for cracked concrete
ETA-17/1056, Post-installed rebar connections

Fire resistance classification R240

120 Years

Building materials

Approved for anchorings in:
- Concrete C20/25 to C50/60, cracked and non-cracked

Also suitable for:
- Natural stone with dense structure

Functioning

- The epoxy mortar FIS EM Plus combined with the FIS A threaded rod, is suitable for pre-positioned and push-through installation.
- Resin and hardener are stored in two separate chambers and are not mixed and activated until extrusion through the injection capsule in the static mixer.
- The mortar is injected bubble-free from the drill hole base.
- The mortar bonds the entire surface of the anchor with the drill hole wall and seals off the drill hole.
- The anchor is set manually by lightly rotating it until it reaches the drill hole base.
- During push-through installation, the annular gap between the threaded rod and attachment is filled with FIS EM Plus.

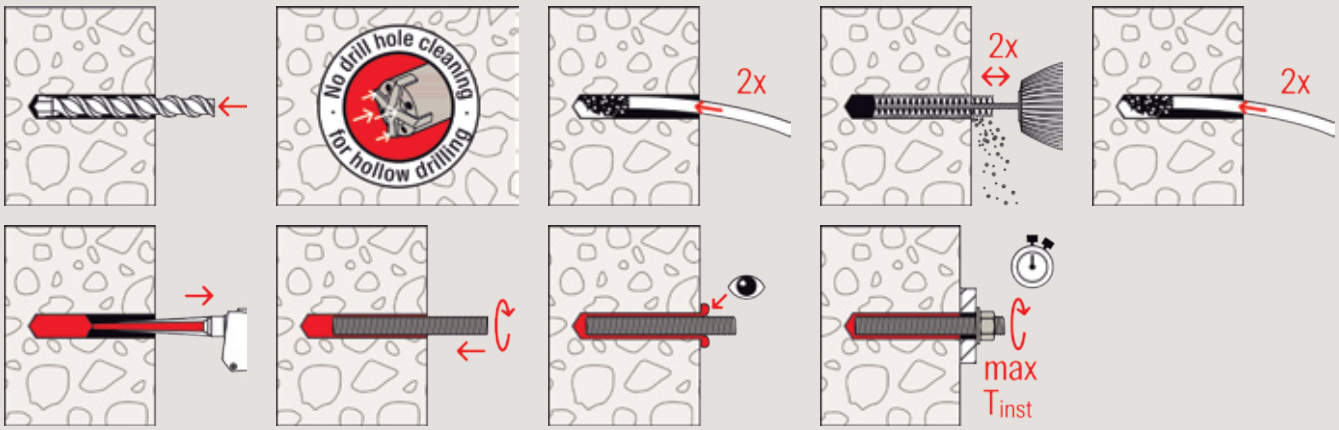
For use with

Anchors & sleeves page 71

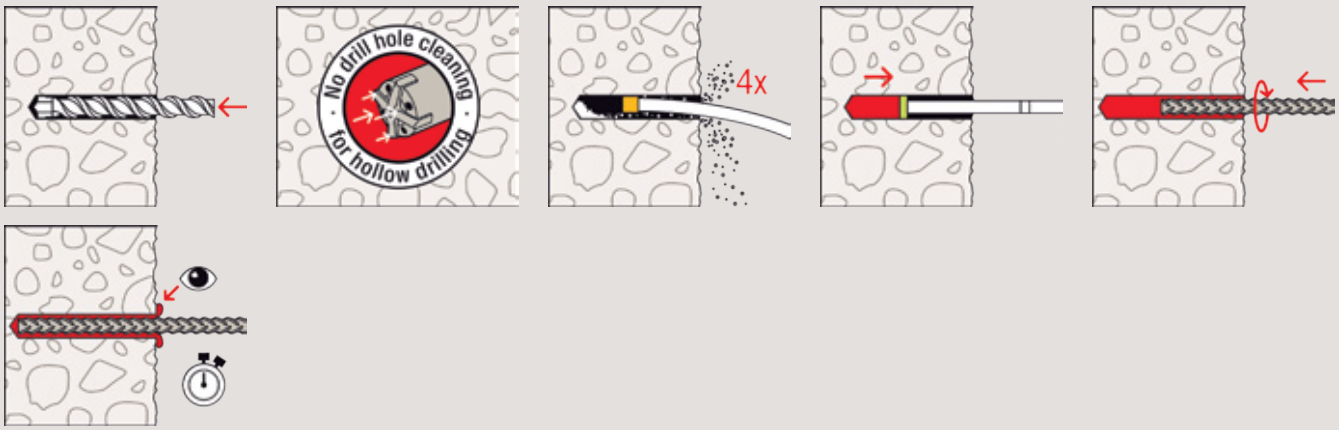
Dispenser page 87

Accessories page 89

Installation in concrete with FIS EM Plus and FIS A / RG M



Installation of post-installed rebar connections in concrete with FIS EM Plus in hammer drilled holes



Technical data

Epoxy mortar FIS EM Plus

FIS EM Plus 390 S FIS EM Plus 585 S FIS EM Plus 1500 S

Item	Item No.	Approval ETA	Approval ICC	Languages on the cartridge	Scale unit	Contents	Sales unit [pcs]
FIS EM Plus 390 S	**544154** [1]	●	●	DE, EN, FR, NL, ES, PT	180	1 cartridge 390 ml, 2 x FIS MR Plus	6
FIS EM Plus 585 S	**544165** [1]	●	●	EN, ZH, RU, KO, CS, PL	270	1 cartridge 585 ml + 2 x FIS UMR	6
FIS EM Plus 1500 S	**544173** [1]	●	●	EN, ES, PT, ZH, RU, PL	700	1 cartridge 1500 ml, 2 x FIS UMR	4

1) Dangerous goods - no express shipping possible.

Technical data

Static mixer

FIS MR Plus FIS UMR

Item	Item No.	Contents	Sales unit [pcs]
FIS MR Plus	**545853**	10 static mixer FIS MR Plus	10
FIS UMR	**520593**	10 static mixer for 585 ml and 1500 ml cartridges	10

Technical data

Epoxy mortar FIS EM Plus

FIS EM Plus 390 S in bucket

	Item No.	Approval		Languages on the cartridge	Contents	Sales unit [pcs]
Item		ETA	ICC			
FIS EM Plus 390 S in bucket	544172 [1]	●	●	DE, EN, FR, NL, ES, PT	20 cartridges 390 ml, 20 x FIS MR Plus	1

1) Dangerous goods - no express shipping possible.

2

Curing times

FIS EM Plus Temperature in anchoring base [°C]	Maximum processing time t_{work} [min.]	Minimum curing time [1] t_{cure} [hrs.]
-5 – 0	240	200
> 0 – +5	150	90
> +5 – +10	120	40
> -10 – +20	30	18
> +20 – +30	14	10
> +30 – +40	7	5

1) In wet concrete or water filled holes the curing times must be doubled.

Loads

Injection system FIS EM Plus with internal threaded anchor RG M I

Permissible loads of a single anchor[1) 2)] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-17/0979 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Screw material[3]	Effective anchorage depth	Minimum member thickness	Maximum installation-torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst,max}$ [Nm]	N_{perm} [4] [kN]	V_{perm} [4] [kN]	s_{min} [4] [mm]	c_{min} [4] [mm]	N_{perm} [4] [kN]	V_{perm} [4] [kN]	s_{min} [4] [mm]	c_{min} [4] [mm]
RG M8 I	5.8	90	120	10	9.0	5.3	55	55	9.0	5.3	55	55
	8.8	90	120	10	11.3	8.3	55	55	13.8	8.3	55	55
	R-70	90	120	10	9.9	5.9	55	55	9.9	5.9	55	55
RG M10 I	5.8	90	130	20	12.9	8.3	65	65	13.8	8.3	65	65
	8.8	90	130	20	12.9	13.3	65	65	20.0	13.3	65	65
	R-70	90	130	20	12.9	9.3	65	65	15.7	9.3	65	65
RG M12 I	5.8	125	170	40	20.2	12.1	75	75	20.5	12.1	75	75
	8.8	125	170	40	20.2	19.3	75	75	32.4	19.3	75	75
	R-70	125	170	40	20.2	13.5	75	75	22.5	13.5	75	75
RG M16 I	5.8	160	210	80	33.2	22.4	95	95	37.6	22.4	95	95
	8.8	160	210	80	33.2	30.9	95	95	47.4	30.9	95	95
	R-70	160	210	80	33.2	25.1	95	95	42.0	25.1	95	95
RG M20 I	5.8	200	260	120	46.4	35.4	125	125	58.6	35.4	125	125
	8.8	200	260	120	46.4	51.4	125	125	66.3	51.4	125	125
	R-70	200	260	120	46.4	39.4	125	125	66.7	39.4	125	125

[1)] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.
[2)] The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 72 °C). Drill hole cleaning as per specification in the ETA. The factor Ψ_{sus} for sustained load was taken into account with 1.0.
[3)] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).
[4)] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Loads

Injection system FIS EM Plus with threaded rod FIS A resp. RG M

Permissible loads of a single anchor[1) 2)] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-17/0979 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material/ surface[3)]	Effective anchorage depth	Minimum member thickness	Maximum installation-torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst,max}$ [Nm]	N_{perm} [4)] [kN]	V_{perm} [4)] [kN]	s_{min} [4)] [mm]	c_{min} [4)] [mm]	N_{perm} [4)] [kN]	V_{perm} [4)] [kN]	s_{min} [4)] [mm]	c_{min} [4)] [mm]
FIS A M 8	5.8	60	100	10	5.4	6.3	40	40	9.0	6.3	40	40
	5.8	80	110	10	7.2	6.3	40	40	9.0	6.3	40	40
	5.8	160	190	10	9.0	6.3	40	40	9.0	6.3	40	40
	R-70	60	100	10	5.4	6.0	40	40	9.9	6.0	40	40
	R-70	80	110	10	7.2	6.0	40	40	9.9	6.0	40	40
	R-70	160	190	10	9.9	6.0	40	40	9.9	6.0	40	40
FIS A M 10	5.8	60	100	20	6.7	9.7	45	45	10.9	9.7	45	45
	5.8	90	120	20	10.1	9.7	45	45	13.8	9.7	45	45
	5.8	200	230	20	13.8	9.7	45	45	13.8	9.7	45	45
	R-70	60	100	20	6.7	9.2	45	45	10.9	9.2	45	45
	R-70	90	120	20	10.1	9.2	45	45	15.7	9.2	45	45
	R-70	200	230	20	15.7	9.2	45	45	15.7	9.2	45	45
FIS A M 12	5.8	70	100	40	9.6	14.3	55	45	13.7	14.3	55	45
	5.8	110	140	40	17.8	14.3	55	45	20.5	14.3	55	45
	5.8	240	270	40	20.5	14.3	55	45	20.5	14.3	55	45
	R-70	70	100	40	9.6	13.7	55	45	13.7	13.7	55	45
	R-70	110	140	40	17.8	13.7	55	45	22.5	13.7	55	45
	R-70	240	270	40	22.5	13.7	55	45	22.5	13.7	55	45
FIS A M 16	5.8	80	120	60	11.7	23.5	65	50	16.8	26.9	65	50
	5.8	125	170	60	22.9	26.9	65	50	32.7	26.9	65	50
	5.8	320	360	60	37.6	26.9	65	50	37.6	26.9	65	50
	R-70	80	120	60	11.7	23.5	65	50	16.8	25.2	65	50
	R-70	125	170	60	22.9	25.2	65	50	32.7	25.2	65	50
	R-70	320	360	60	42.0	25.2	65	50	42.0	25.2	65	50
FIS A M 20	5.8	90	140	120	14.0	28.0	85	55	20.0	40.0	85	55
	5.8	170	220	120	36.3	42.3	85	55	51.9	42.3	85	55
	5.8	400	450	120	58.6	42.3	85	55	58.6	42.3	85	55
	R-70	90	140	120	14.0	28.0	85	55	20.0	39.4	85	55
	R-70	170	220	120	36.3	39.4	85	55	51.9	39.4	85	55
	R-70	400	450	120	65.7	39.4	85	55	65.7	39.4	85	55
FIS A M 24	5.8	96	160	150	15.4	30.8	105	60	22.0	44.1	105	60
	5.8	210	270	150	49.9	60.6	105	60	71.3	60.6	105	60
	5.8	480	540	150	84.3	60.6	105	60	84.3	60.6	105	60
	R-70	96	160	150	15.4	30.8	105	60	22.0	44.1	105	60
	R-70	210	270	150	49.9	56.8	105	60	71.3	56.8	105	60
	R-70	480	540	150	94.3	56.8	105	60	97.3	56.8	105	60
FIS A M 30	5.8	120	190	300	21.6	43.1	140	80	30.8	61.6	140	80
	5.8	280	350	300	76.8	96.0	140	80	109.8	96.0	140	80
	5.8	600	670	300	133.8	96.0	140	80	133.8	96.0	140	80
	R-70	120	190	300	21.6	43.1	140	80	30.8	61.6	140	80
	R-70	280	350	300	76.8	90.2	140	80	109.8	90.2	140	80
	R-70	600	670	300	150.1	90.2	140	80	150.1	90.2	140	80

[1)] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.

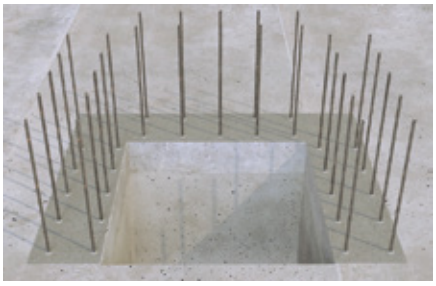
[2)] The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 72 °C). Drill hole cleaning as per specification in the ETA. The factor Ψ_{sus} for sustained load was taken into account with 1.0.

[3)] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

[4)] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Epoxy mortar FIS EB II

The Epoxy mortar for standard applications in concrete.



Post-installed rebar connections

Steel beams

Applications

- Heavy steel constructions
- Consoles
- Silo installations
- Tall shelving
- Post-installed rebar connections

Advantages

- The injection mortar FIS EB II has ETA assessments for anchorings in cracked concrete and for post-installed rebar connections.
- FIS EB II is the reliable system for fixing heavy loads indoors and outdoors.
- Due to the variable anchoring depths, the epoxy resin mortar is very versatile.
- The long processing time of FIS EB II is particularly suitable for applications in large and deep drillholes.

Certificates

ETA-21/0469, for cracked concrete
ETA-21/0470, for post-installed rebar connections

Building materials

Approved for anchorings in:
- Concrete C20/25 to C50/60, cracked and non-cracked

Functioning

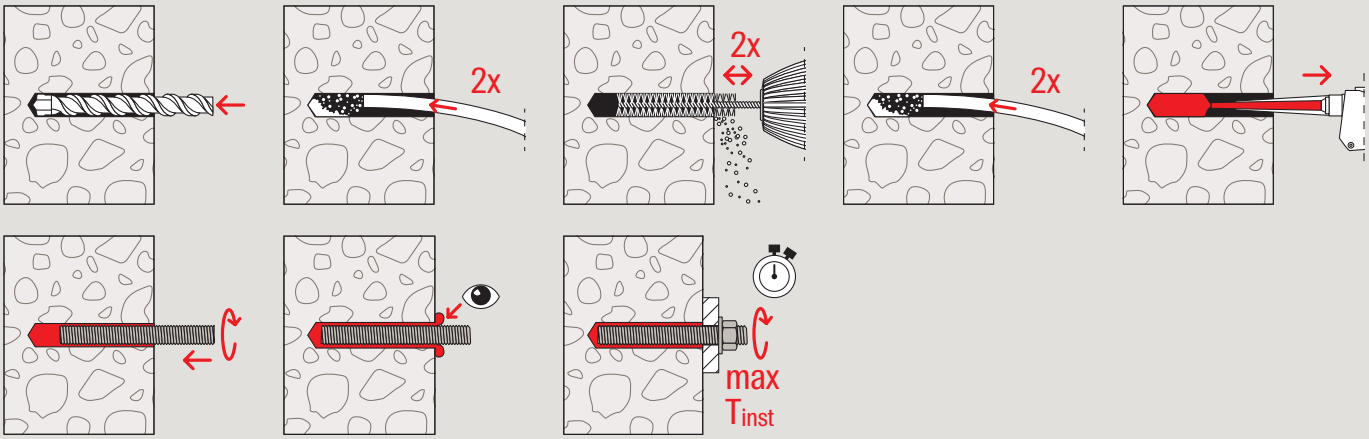
- The epoxy mortar FIS EB II in combination with the threaded rod FIS A and RG M is suitable for pre-positioned and push-through installation.
- Resin and hardener are stored in two separate chambers and are not mixed and activated until extrusion through the static mixer.
- The mortar is injected bubble-free from the drill hole base.
- The mortar bonds the entire surface of the threaded rod with the drill hole wall and seals off the drill hole.
- The threaded rod is set manually by slightly rotating it until it reached the drill hole base.
- During push-through installation, the annular gap between the threaded rod and the attachment is filled with FIS EB II.

For use with:
Threaded rods

For use with:
Dispensers

For use with:
Accessories

Installation in concrete with FIS EB II and FIS A / RG M



Epoxy mortar FIS EB II

Epoxy mortar FIS EB II

FIS EB II 390 S

FIS MR Plus

Item	Item no.	Approval ETA	Languages on the cartridge	Scale unit	Contents [ml]	Contents	Sales unit [pcs]
FIS EB II 390 S	**562629**	●	EN, ES, PT	190	390	1x cartridge 390ml, 2x FIS MR Plus	1
FIS MR Plus	**545853**	–	–	–	–	10 static mixer FIS MR Plus	10

Processing and curing times

FIS EB II Temperatures at anchoring base [°C]	Maximum processing time t_{work} [min.]	Minimum curing time t_{cure} [hrs.]
+5 – +10	180	96
> +10 – +15	90	60
> +15 – +20	60	36
> +20 – +30	30	24
> +30 – +40	15	12

Loads

Injection system FIS EB II with threaded rod FIS A resp. RG M

Permissible loads of a single anchor[1) 2)] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-21/0469 of 09.12.2021 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material / surface[3)]	Effective anchorage depth	Minimum member thickness	Maximum instal-lation torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst,max}$ [Nm]	N_{perm} [4)] [kN]	V_{perm} [4)] [kN]	s_{min} [4)] [mm]	c_{min} [4)] [mm]	N_{perm} [4)] [kN]	V_{perm} [4)] [kN]	s_{min} [4)] [mm]	c_{min} [4)] [mm]
FIS A M 8	5.8	60	100	10	3.6	6.3	40	40	5.4	6.3	40	40
	5.8	80	110	10	4.8	6.3	40	40	7.2	6.3	40	40
	5.8	160	190	10	9.0	6.3	40	40	9.0	6.3	40	40
	R-70	60	100	10	3.6	6.0	40	40	5.4	6.0	40	40
	R-70	80	110	10	4.8	6.0	40	40	7.2	6.0	40	40
	R-70	160	190	10	9.6	6.0	40	40	9.9	6.0	40	40
FIS A M 10	5.8	60	100	20	4.5	9.7	45	45	6.7	9.7	45	45
	5.8	90	120	20	6.7	9.7	45	45	10.1	9.7	45	45
	5.8	200	230	20	13.8	9.7	45	45	13.8	9.7	45	45
	R-70	60	100	20	4.5	9.2	45	45	6.7	9.2	45	45
	R-70	90	120	20	6.7	9.2	45	45	10.1	9.2	45	45
	R-70	200	230	20	15.0	9.2	45	45	15.7	9.2	45	45
FIS A M 12	5.8	70	100	40	6.3	14.3	55	55	9.4	14.3	55	55
	5.8	110	140	40	9.9	14.3	55	55	14.8	14.3	55	55
	5.8	240	270	40	20.5	14.3	55	55	20.5	14.3	55	55
	R-70	70	100	40	6.3	13.7	55	55	9.4	13.7	55	55
	R-70	110	140	40	9.9	13.7	55	55	14.8	13.7	55	55
	R-70	240	270	40	21.5	13.7	55	55	22.5	13.7	55	55
FIS A M 16	5.8	80	120	60	8.8	21.1	65	65	14.0	26.9	65	65
	5.8	125	170	60	13.7	26.9	65	65	22.4	26.9	65	65
	5.8	320	360	60	35.1	26.9	65	65	37.6	26.9	65	65
	R-70	80	120	60	8.8	21.1	65	65	14.0	25.2	65	65
	R-70	125	170	60	13.7	25.2	65	65	22.4	25.2	65	65
	R-70	320	360	60	35.1	25.2	65	65	42.0	25.2	65	65
FIS A M 20	5.8	90	140	120	11.7	28.0	85	85	16.7	40.0	85	85
	5.8	170	220	120	23.3	42.3	85	85	38.1	42.3	85	85
	5.8	400	450	120	54.9	42.3	85	85	58.6	42.3	85	85
	R-70	90	140	120	11.7	28.0	85	85	16.7	39.4	85	85
	R-70	170	220	120	23.3	39.4	85	85	38.1	39.4	85	85
	R-70	400	450	120	54.9	39.4	85	85	65.7	39.4	85	85
FIS A M 24	5.8	96	160	150	12.9	30.8	105	105	18.4	44.1	105	105
	5.8	210	270	150	34.6	60.6	105	105	53.4	60.6	105	105
	5.8	480	540	150	79.0	60.6	105	105	84.3	60.6	105	105
	R-70	96	160	150	12.9	30.8	105	105	18.4	44.1	105	105
	R-70	210	270	150	34.6	56.8	105	105	53.4	56.8	105	105
	R-70	480	540	150	79.0	56.8	105	105	94.3	56.8	105	105
FIS A M 30	5.8	120	190	300	18.0	43.1	140	140	25.7	61.6	140	140
	5.8	280	350	300	52.4	96.0	140	140	78.5	96.0	140	140
	5.8	600	670	300	112.2	96.0	140	140	133.8	96.0	140	140
	R-70	120	190	300	18.0	43.1	140	140	25.7	61.6	140	140
	R-70	280	350	300	52.4	90.2	140	140	78.5	90.2	140	140
	R-70	600	670	300	112.2	90.2	140	140	150.1	90.2	140	140

[1)] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of γ_L = 1.4 are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.

[2)] The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 72 °C). Higher loads are possible at lower temperatures. Drill hole cleaning as per specification in the ETA. The factor Ψ_{sus} for sustained load was taken into account with 1.0.

[3)] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

[4)] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Epoxy mortar FIS EP

The cost-efficient epoxy mortar for applications in concrete

Column bases

Steel girders

Applications

- Columns
- Beams
- Shear dowels
- Starter bars
- Polders

Advantages

- FIS EP is the economical epoxy resin mortar for applications in concrete that do not require approval.
- The epoxy mortar FIS EP can also be used in cracked concrete for construction site convenient installation.
- With the anchor rod FIS A, the loads to be introduced can be selected variably by choosing the anchorage depth.
- FIS EP can be used for smooth installation with the standard fischer accessories.

Building materials

Suitable for:

- Concrete C20/25 to C50/60, non-cracked and cracked

Functioning

- The epoxy mortar FIS EP combined with the FIS A threaded rod is suitable for pre-positioned and push-through installation.
- Resin and hardener are stored in two separate chambers, thus are not mixed and activated until extrusion through the static mixer.
- The mortar bonds the entire surface of the anchor with the drill hole wall and seals off the drill hole.
- The anchor is set manually by slightly rotating it until the anchor reaches the drill hole base.
- During push-through installation, the annular gap is filled with FIS EP.

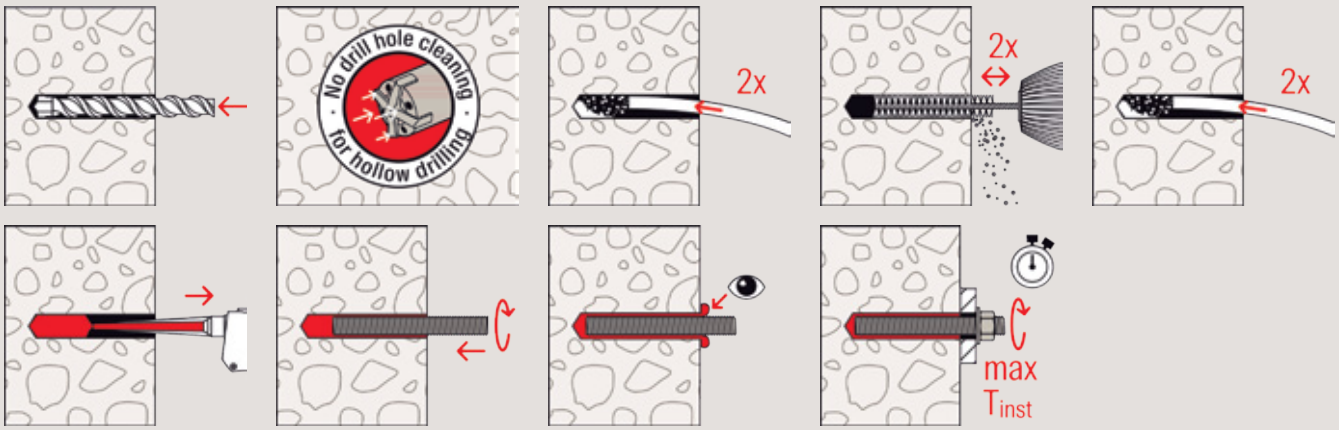
For use with

Anchors & sleeves page 71

Dispenser page 87

Accessories page 89

Installation in concrete with FIS EP and FIS A



2

Technical data

Epoxy mortar FIS EP

FIS EP 390 S

FIS MR Plus

Item	Item No.	Languages on the cartridge	Scale unit	Contents	Sales unit [pcs]
FIS EP 390 S	**553526**	AR, EN, ES, PT	180	1 cartridge 390 ml, 1 x FIS MR Plus	20
FIS MR Plus	**545853**	–	–	10 static mixer FIS MR Plus	10

Curing times

FIS EP Temperature at anchoring base [°C]	Maximum processing time t_{work} [min.]	Minimum curing time [1] t_{cure} [hrs.]
+5 – +10	180	96
>+10 – +15	90	48
>+15 – +20	60	36
>+20 – +30	30	24
>+30 – +40	15	12

1) In wet concrete or water filled holes the curing times must be doubled.

Loads

Injection system FIS EP with threaded rod FIS A resp. RGM

Recommended loads of a single anchor[1)2)] in normal concrete of strength class C20/25.

					Cracked concrete				Non-cracked concrete			
	Material / surface[3)]	Effective anchorage depth	Minimum member thickness	Maximum installation torque	Recommended tension- (N_{rec}) and shear loads (V_{rec}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Recommended tension- (N_{rec}) and shear loads (V_{rec}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst, max}$ [Nm]	N_{rec}[4)] [kN]	V_{rec}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]	N_{rec}[4)] [kN]	V_{rec}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]
FIS A M 8	5.8	60	100	10	-	-	-	-	5.4	5.1	40	40
	5.8	160	190	10	-	-	-	-	9.0	5.1	40	40
	R-70	60	100	10	-	-	-	-	5.4	6.0	40	40
	R-70	160	190	10	-	-	-	-	9.9	6.0	40	40
FIS A M 10	5.8	60	100	20	-	-	-	-	6.4	8.6	45	45
	5.8	200	230	20	-	-	-	-	13.8	8.6	45	45
	R-70	60	100	20	-	-	-	-	6.4	9.2	45	45
	R-70	200	230	20	-	-	-	-	15.7	9.2	45	45
FIS A M 12	5.8	70	100	40	4.2	10.1	55	55	8.4	12.0	55	55
	5.8	240	270	40	14.4	12.0	55	55	20.5	12.0	55	55
	R-70	70	100	40	4.2	10.1	55	55	8.4	13.7	55	55
	R-70	240	270	40	14.4	13.7	55	55	22.5	13.7	55	55
FIS A M 16	5.8	80	120	60	6.4	15.3	65	65	12.0	22.3	65	65
	5.8	320	360	60	25.5	22.3	65	65	37.6	22.3	65	65
	R-70	80	120	60	6.4	15.3	65	65	12.0	25.2	65	65
	R-70	320	360	60	25.5	25.2	65	65	42.0	25.2	65	65
FIS A M 20	5.8	90	140	120	9.0	21.5	85	85	15.7	34.9	85	85
	5.8	400	450	120	39.9	34.9	85	85	58.6	34.9	85	85
	R-70	90	140	120	9.0	21.5	85	85	15.7	37.7	85	85
	R-70	400	450	120	39.9	39.4	85	85	65.7	39.4	85	85
FIS A M 24	5.8	96	160	150	-	-	-	-	17.2	41.4	105	105
	5.8	480	540	150	-	-	-	-	84.3	50.9	105	105
	R-70	96	160	150	-	-	-	-	17.2	41.4	105	105
	R-70	480	540	150	-	-	-	-	86.2	56.8	105	105
FIS A M 30	5.8	120	190	300	-	-	-	-	24.7	59.2	140	140
	5.8	600	670	300	-	-	-	-	123.4	80.6	140	140
	R-70	120	190	300	-	-	-	-	24.7	59.2	140	140
	R-70	600	670	300	-	-	-	-	123.4	90.2	140	140

[1)] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance and a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As an single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$.

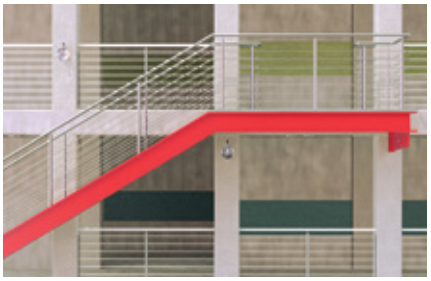
[2)] The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 43 °C (resp. short term up to 55 °C). Drill hole cleaning according to installation instructions. The factor Ψ_{sus} for sustained load was taken into account with 1.0.

[3)] For dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R). Further steel grades by request.

[4)] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance the provisions of the EN 1992-4:2018.

Injection mortar FIS V Plus

The powerful universal mortar for concrete and masonry



Steel constructions

Rescue ladders

Applications

Injection mortar for use with:
- Threaded rods FIS A, see page 71
- Internal threaded anchor RG MI, see page 77
- Rebar anchor FRA, see page 91
- Concrete steel bars, see page 83
- Injection anchor sleeves FIS H, see page 81
- Aerated concrete centring sleeve PBZ, see page 90
- Remedial wall tie VBS 8, see page 85

Advantages

- The FIS V Plus injection mortar has numerous system approvals, such as in cracked and non-cracked concrete, masonry and for special applications.
- The ETA assessment for a service life of 100 years offers permanent safety for all applications.
- The approved use in water-filled drill holes enables a wide range of applications, even under harsh environmental conditions.
- FIS VW Plus High Speed has a significantly shorter curing time than FIS V Plus, thus also ensuring swift work progress even at low temperatures.
- Due to the possible installation temperature of -10° to 40°C the universal mortar can be applied all year long.
- FIS VS Plus Low Speed with extended gelling time prevents premature curing of the mortar at higher temperatures and is ideally suited to large drill hole depths.
- The extensive range of accessories is ideally suited to the FIS V Plus injection mortar family, increases the great flexibility of the system and thus allows for a broad range of applications.

Certificates

ETA-20/0603, for concrete

ETA-20/0728, for post-installed rebar connections

ETA-20/0729, for masonry

Fire resistance classification R120

100 Years

Building materials

Approved for anchorings in:
- Concrete C20/25 to C50/60, cracked and non-cracked
- Hollow blocks made from lightweight concrete
- Hollow blocks made from concrete
- Vertically perforated brick
- Perforated sand-lime brick
- Solid sand-lime brick
- Aerated concrete
- Solid brick

Approved for:
- Rebar connections
- Remedial wall tie VBS 8
- Weather facing reconstruction system FWS II
- Stand-off installation TherMax

Functioning

- The FIS V Plus is a 2-component injection mortar based on vinyl ester hybrid.
- Resin and hardener are stored in two separate chambers and are not mixed and activated until extrusion through the static mixer.
- The injection cartridges are quick and easy to use with the fischer dispensers.
- Partially used cartridges can be reused, simply by changing the static mixer.

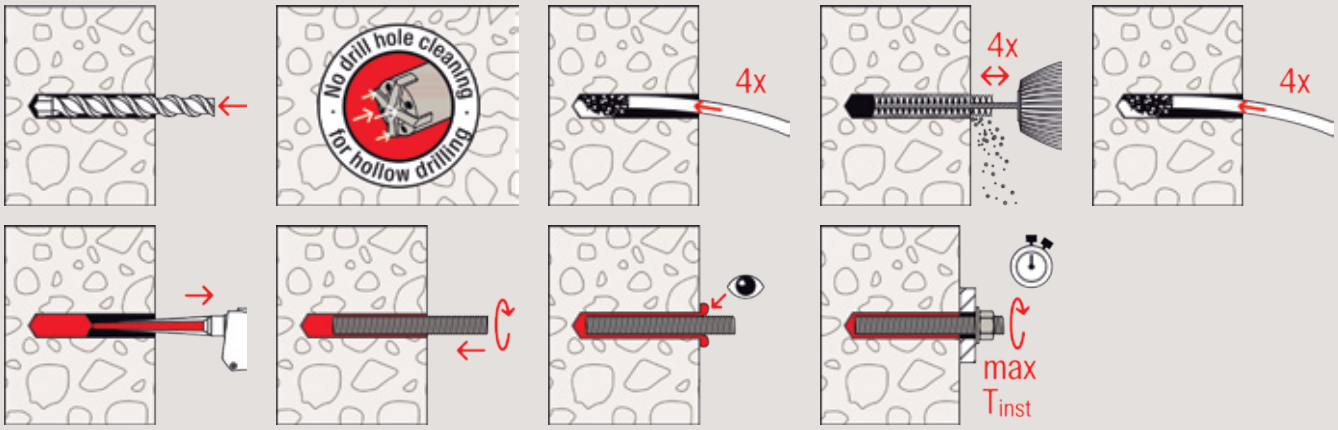
For use with

Anchors & sleeves page 71

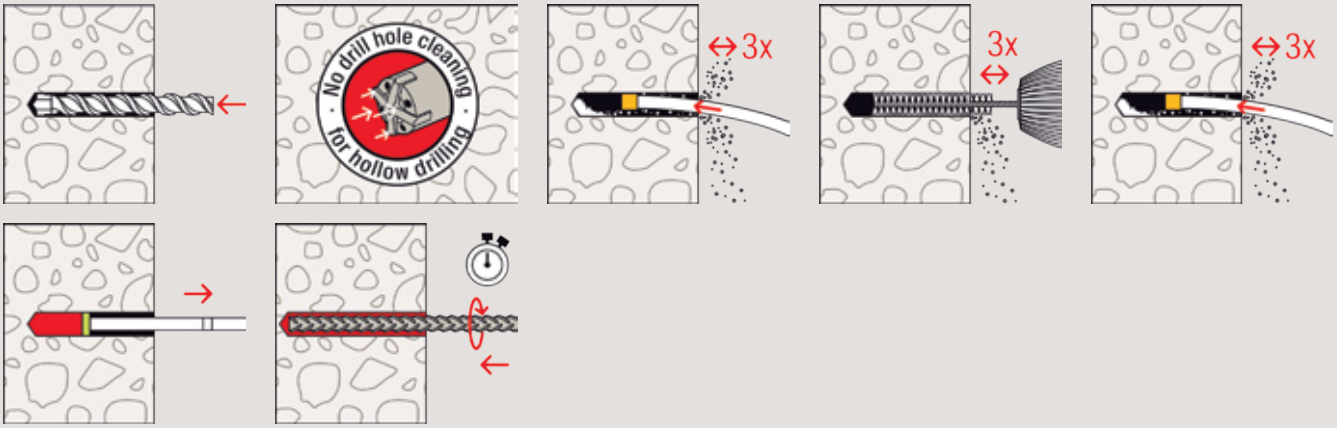
Dispenser page 87

Accessories page 89

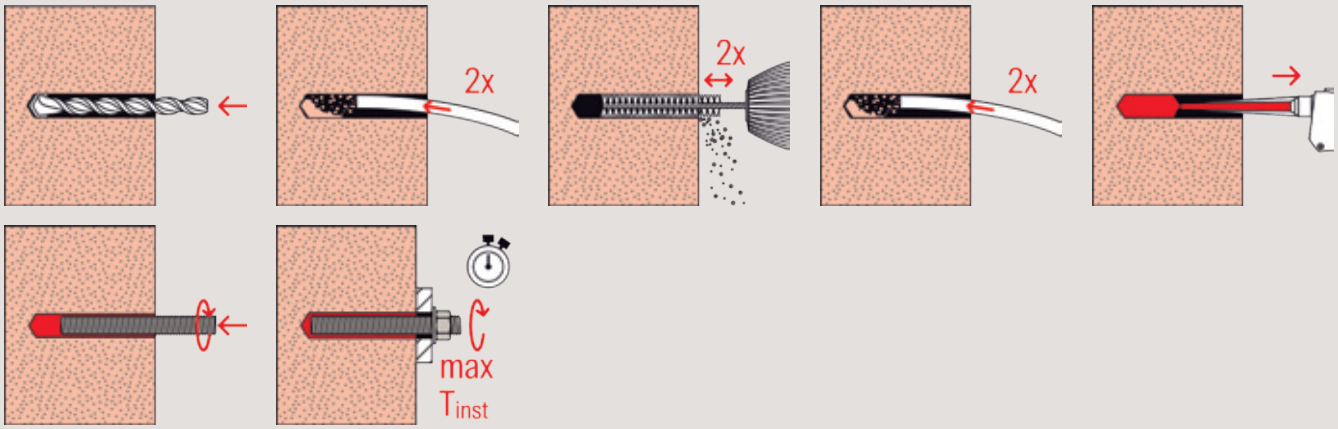
Installation in concrete with FIS V Plus and FIS A / RG M



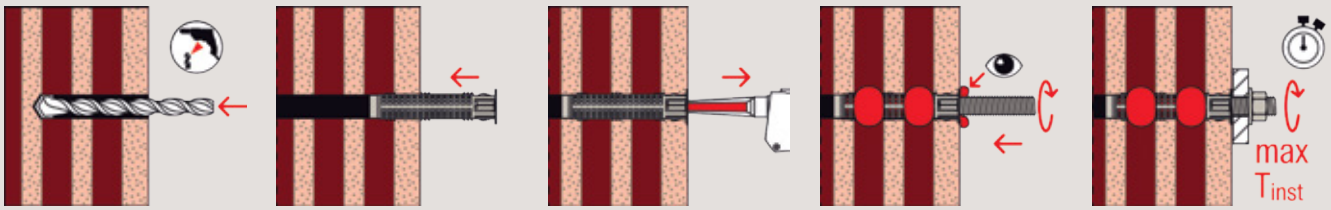
Installation of Rebar in concrete with FIS V Plus in hammer drilled holes



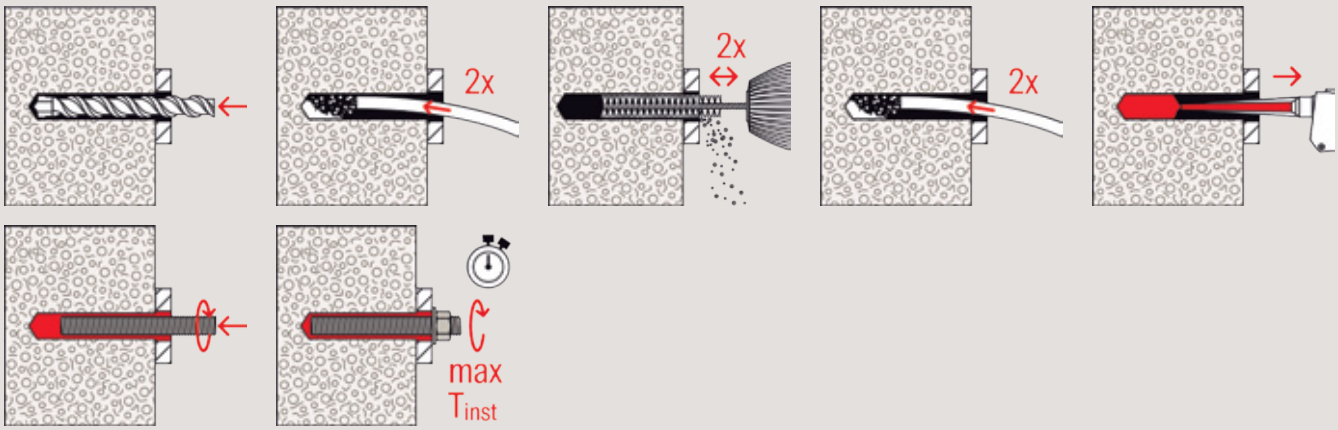
Installation in solid brick with FIS V Plus and FIS A



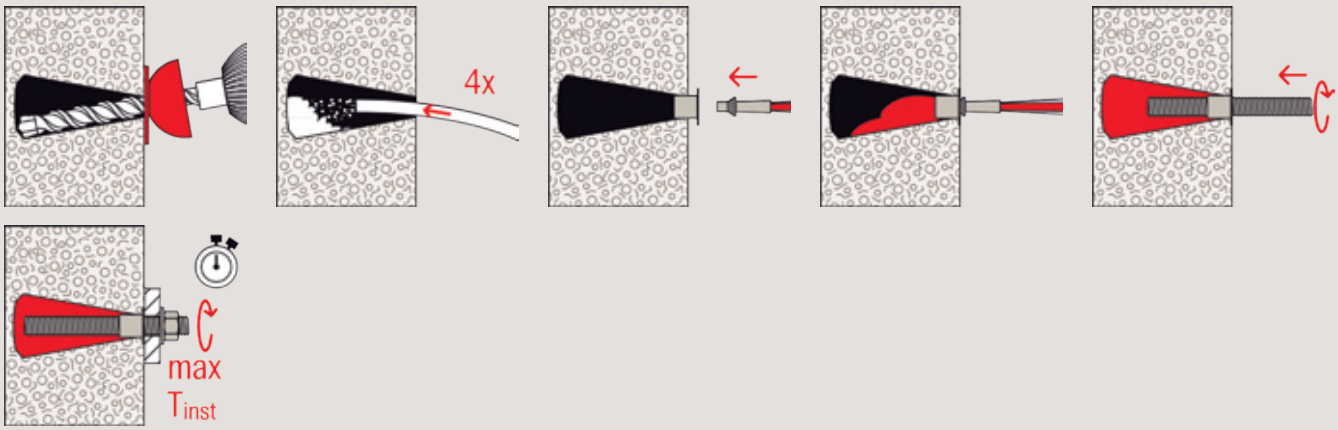
Installation in hollow blocks with FIS V Plus and FIS HK + FIS A



Installation in aerated concrete with FIS V Plus and FIS A / RG M



Installation in undercut drill hole in aerated concrete with FIS V Plus and FIS A / RG M



Technical data

Injection mortar FIS V Plus

FIS V Plus 360 S

Item	Item No.	Approval			Languages on the cartridge	Contents	Sales unit [pcs]
		DIBt	ETA	ICC			
FIS V Plus 360 S (AR,ZH,EN)	558747	●	●	●	AR, ZH, EN	1 cartridge 360 ml, 2 x FIS MR Plus	6

Technical data

Injection mortar FIS V Plus

FIS V Plus 360 S BT

Item	Item No.	Approval			Languages on the cartridge	Contents	Sales unit [pcs]
		DIBt	ETA	ICC			
FIS V Plus 360 S (AR,ZH,EN) BT	558751	●	●	●	AR, ZH, EN	20 cartridges 360 ml, 20 static mixer FIS MR Plus	1

Curing times

FIS VW Plus High Speed FIS V Plus FIS VS Plus Low Speed									
Temperature at anchoring base	Maximum processing time t_{work}			Minimum curing time t_{cure} [1]					
	FIS VW Plus High Speed	FIS V Plus	FIS VS Plus Low Speed	FIS VW Plus High Speed		FIS V Plus		FIS VS Plus Low Speed	
[°C]	[min.]	[min.]	[min.]	[hrs.]	[min.]	[hrs.]	[min.]	[hrs.]	[min.]
-10 – -5 [2]	–	–	–	12	–	–	–	–	–
> -5 – 0 [2]	5	–	–	3	–	24	–	–	–
> 0 – +5 [2]	5	13	–	3	–	3	–	6	–
> +5 – +10	3	9	20	–	50	–	90	3	–
> +10 – +20	1	5	10	–	50	–	60	2	–
> +20 – +30	–	4	6	–	–	–	45	–	60
> +30 – +40	–	2	4	–	–	–	35	–	30

1) In wet concrete or water filled holes the curing times must be doubled.
2) Minimal cartridge temperature +5 °C

Loads

Injection system FIS V Plus with threaded rod FIS A resp. RG M

Permissible loads of a single anchor[1) 2)] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-20/0603 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material / surface[3)]	Effective anchorage depth	Minimum member thickness	Maximum installation torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst,\,max}$ [Nm]	N_{perm}[4)] [kN]	V_{perm}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]	N_{perm}[4)] [kN]	V_{perm}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]
FIS A M 8	5.8	60	100	10	3.9	6.3	40	40	9.0	6.3	40	40
	5.8	80	110	10	5.3	6.3	40	40	9.0	6.3	40	40
	5.8	160	190	10	9.0	6.3	40	40	9.0	6.3	40	40
	R-70	60	100	10	3.9	6.0	40	40	9.9	6.0	40	40
	R-70	80	110	10	5.3	6.0	40	40	9.9	6.0	40	40
	R-70	160	190	10	9.9	6.0	40	40	9.9	6.0	40	40
FIS A M 10	5.8	60	100	20	5.4	9.7	45	45	10.9	9.7	45	45
	5.8	90	120	20	8.1	9.7	45	45	13.8	9.7	45	45
	5.8	200	230	20	13.8	9.7	45	45	13.8	9.7	45	45
	R-70	60	100	20	5.4	9.2	45	45	10.9	9.2	45	45
	R-70	90	120	20	8.1	9.2	45	45	15.7	9.2	45	45
	R-70	200	230	20	15.7	9.2	45	45	15.7	9.2	45	45
FIS A M 12	5.8	70	100	40	8.2	14.3	55	45	13.7	14.3	55	45
	5.8	110	140	40	12.8	14.3	55	45	20.5	14.3	55	45
	5.8	240	270	40	20.5	14.3	55	45	20.5	14.3	55	45
	R-70	70	100	40	8.2	13.7	55	45	13.7	13.7	55	45
	R-70	110	140	40	12.8	13.7	55	45	22.5	13.7	55	45
	R-70	240	270	40	22.5	13.7	55	45	22.5	13.7	55	45
FIS A M 16	5.8	80	120	60	11.5	23.0	65	50	16.8	26.9	65	50
	5.8	125	170	60	18.0	26.9	65	50	32.7	26.9	65	50
	5.8	320	360	60	37.6	26.9	65	50	37.6	26.9	65	50
	R-70	80	120	60	11.5	23.0	65	50	16.8	25.2	65	50
	R-70	125	170	60	18.0	25.2	65	50	32.7	25.2	65	50
	R-70	320	360	60	42.0	25.2	65	50	42.0	25.2	65	50
FIS A M 20	5.8	90	140	120	14.0	28.0	85	55	20.0	40.0	85	55
	5.8	170	220	120	28.0	42.3	85	55	51.9	42.3	85	55
	5.8	400	450	120	58.6	42.3	85	55	58.6	42.3	85	55
	R-70	90	140	120	14.0	28.0	85	55	20.0	39.4	85	55
	R-70	170	220	120	28.0	39.4	85	55	51.9	39.4	85	55
	R-70	400	450	120	65.7	39.4	85	55	65.7	39.4	85	55
FIS A M 24	5.8	96	160	150	15.4	30.8	105	60	22.0	44.1	105	60
	5.8	210	270	150	37.7	60.6	105	60	71.3	60.6	105	60
	5.8	480	540	150	84.3	60.6	105	60	84.3	60.6	105	60
	R-70	96	160	150	15.4	30.8	105	60	22.0	44.1	105	60
	R-70	210	270	150	37.7	56.8	105	60	71.3	56.8	105	60
	R-70	480	540	150	86.2	56.8	105	60	94.3	56.8	105	60
FIS A M 30	5.8	120	190	300	21.6	43.1	140	80	30.8	61.6	140	80
	5.8	280	350	300	56.5	96.0	140	80	109.8	96.0	140	80
	5.8	600	670	300	121.2	96.0	140	80	133.8	96.0	140	80
	R-70	120	190	300	21.6	43.1	140	80	30.8	61.6	140	80
	R-70	280	350	300	56.5	90.2	140	80	109.8	90.2	140	80
	R-70	600	670	300	121.2	90.2	140	80	150.1	90.2	140	80

[1)] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of γ_L = 1.4 are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.

[2)] The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 80 °C). Drill hole cleaning as per specification in the ETA. The factor Ψ'_{sus} for sustained load was taken into account with 1.0.

[3)] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

[4)] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Loads

Injection system FIS V Plus with threaded rod FIS A in solid and perforated masonry

Permissible loads[1) 2)] for a single anchor in masonry for pre-positioned installation.
For the design the complete current assessment ETA-20/0729 has to be considered.

Type	Compressive brick strength f_b [N/mm²]	Brick raw density ρ [kg/dm³]	Minimum brick dimensions[3)] (L x W x H) [mm]	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Maximum installation torque $T_{inst,max}$ [Nm]	Permissible tensile load[4)] N_{perm} [kN]	Permissible shear load[4)] V_{perm} [kN]	Minimum spacing[5)] $s_{min\parallel}$ / $s_{min\perp}$ [mm]	Characteristic resp. minimum edge distance[5)] $c_{cr} = c_{min}$ [mm]
Solid brick Mz, NF, acc. to EN 771-1										
M6	≥ 12	≥ 1.8	240 x 115 x 71	≥ 50	115	4	1.14	0.71	240 / 75	100
M8	≥ 12	≥ 1.8	240 x 115 x 71	≥ 50	115	10	1.14	0.71	240 / 75	100
M10	≥ 12	≥ 1.8	240 x 115 x 71	80	115	10	1.42	1.14	240 / 75	100
M10	≥ 12	≥ 1.8	240 x 115 x 71	200	240	10	3.43	2.43	240 / 75	100
M12	≥ 12	≥ 1.8	240 x 115 x 71	80	115	10	1.57	1.14	240 / 75	100
M12	≥ 12	≥ 1.8	240 x 115 x 71	200	240	10	2.29	3.28	240 / 75	100
Solid sand-lime brick KS, acc. to EN 771-2										
M6	≥ 12	≥ 1.8	240 x 115 x 71	50	115	3	1.14	0.42	80 / 150	60
M6	≥ 12	≥ 1.8	240 x 115 x 71	100	115	3	1.57	0.89	80 / 300	60
M8	≥ 12	≥ 1.8	240 x 115 x 71	50	115	5	1.14	0.42	80 / 150	60
M8	≥ 12	≥ 1.8	240 x 115 x 71	100	115	5	2.29	0.89	80 / 300	60
M10	≥ 12	≥ 1.8	240 x 115 x 71	100	115	15	1.57	0.57	80 / 300	60
M10	≥ 12	≥ 1.8	240 x 115 x 71	200	240	15	3.42	0.57	80 / 600	60
M12	≥ 12	≥ 1.8	240 x 115 x 71	100	115	15	1.28	0.57	80 / 300	60
M12	≥ 12	≥ 1.8	240 x 115 x 71	200	240	15	3.42	0.57	80 / 600	60
M16	≥ 12	≥ 1.8	240 x 115 x 71	100	115	25	1.57	0.57	80 / 300	60
M16	≥ 12	≥ 1.8	240 x 115 x 71	200	240	25	3.42	0.57	80 / 600	60
Vertically perforated brick Hlz, acc. to EN 771-1[3)]										
M6 / M8 with FIS H 12 x 85 K	≥ 12	≥ 1.0	370 x 240 x 237	85	240	2	0.34	0.43	100 / 100	100
M8 / M10 with FIS H 16 x 130 K	≥ 12	≥ 1.0	370 x 240 x 237	130	240	2	0.86	0.57	100 / 100	100
M12 / M16 with FIS H 20 x 130 K	≥ 12	≥ 1.0	370 x 240 x 237	130	240	2	1.14	0.57	100 / 100	100
Perforated sand-lime brick KSL, acc. to EN 771-2[3)]										
M6 / M8 with FIS H 12 x 85 K	≥ 12	≥ 1.4	240 x 175 x 113	85	175	2	0.71	0.71	100 / 115	60
M8 / M10 with FIS H 16 x 130 K	≥ 12	≥ 1.4	240 x 175 x 113	130	175	2	1.00	1.29	100 / 115	80
M12 / M16 with FIS H 20 x 85 K	≥ 12	≥ 1.4	240 x 175 x 113	85	175	2	1.00	1.14	100 / 115	80
Lightweight concrete hollow block Hbl, acc. EN 771-3[3)]										
M6 / M8 with FIS H 12 x 85 K	≥ 2	≥ 1.0	362 x 240 x 240	85	240	2	0.43	0.26	100 / 240	60
M6 / M8 with FIS H 12 x 85 K	≥ 4	≥ 1.0	362 x 240 x 240	85	240	2	0.86	0.57	100 / 240	60
M8 / M10 with FIS H 16 x 85 K	≥ 2	≥ 1.0	362 x 240 x 240	85	240	2	0.43	0.26	100 / 240	60
M8 / M10 with FIS H 16 x 85 K	≥ 4	≥ 1.0	362 x 240 x 240	85	240	2	0.86	0.57	100 / 240	60
M12 / M16 with FIS H 20 x 200 K	≥ 2	≥ 1.0	362 x 240 x 240	200	240	2	0.71	0.26	100 / 240	60
M12 / M16 with FIS H 20 x 200 K	≥ 4	≥ 1.0	362 x 240 x 240	200	240	2	1.57	0.57	100 / 240	60
Aerated concrete acc. to EN 771-4[6)]										
M8	≥ 2	≥ 0.35	-	100	130	1	0.54	0.43	250 / 250	100
M8	≥ 4	≥ 0.50	-	200	230	8	1.07	0.71	80 / 80	100
M10	≥ 2	≥ 0.35	-	100	130	2	0.54	0.43	250 / 250	100
M10	≥ 4	≥ 0.50	-	200	230	12	1.79	0.71	80 / 80	100
M12	≥ 2	≥ 0.35	-	100	130	2	0.71	0.54	250 / 250	100
M12	≥ 4	≥ 0.50	-	200	230	16	1.79	0.71	80 / 80	100
M16	≥ 2	≥ 0.35	-	100	130	2	0.71	0.43	250 / 250	100
M16	≥ 4	≥ 0.50	-	200	230	20	1.79	0.71	80 / 80	100

[1)] The required partial safety factors for material resistance as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. Load values are valid for zinc-plated steel, stainless steel R and highly corrosion-resistant steel HCR. In perforated bricks and hollow blocks threaded rod FIS A in combination with anchor sleeve FIS H K.

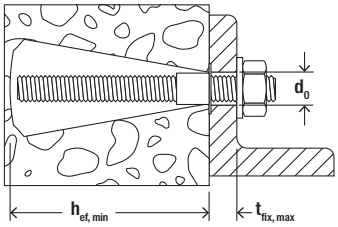
[2)] The given loads are valid for installation and use of fixations in dry masonry - use category d/d - for temperatures in the substrate up to 50 °C (resp. short term up to 80 °C) and drill hole cleaning according to assessment. The given brick types in combination with the permissible loads are an extract of the assessment.

[3)] More information about, e.g. hole patterns, assortment of anchor sleeves FIS H K see assessment.

[4)] In the case of combinations of tensile and shear loads, bending moments and reduced edge and axial spacings (anchor groups), the design must be carried out in accordance with the provisions of the complete assessment.

[5)] Minimum feasible spacing resp. edge distance. Details as well as to the distances to joints see assessment.

[6)] Cylindrical drill hole.



Technical data in undercut drill hole in aerated concrete

Threaded rod FIS A

FIS A

	Zinc plated, steel grade 5.8 Item No.	Zinc plated, steel grade 8.8 Item No.	Stainless steel Item No.	Approval	Drill hole diameter in aerated concrete in undercut drill hole [mm]	Min. / max. anchorage depth in aerated concrete in undercut drill hole h_{ef} [mm]	Min. / max. usable length in aerated concrete t_{fix} [mm]	Filling quantity for min. / max. anchorage depth in aerated concrete [scale units]	Sales unit [pcs]
Item	**gvz**	**gvz**	**R**	**ETA**					
FIS A M 8 x 90	**090274**	**519390**	**090440**	●	14	75 / 95	4 / -	15 / 20	10
FIS A M 8 x 110	**090275**	**519391**	**090441**	●	14	75 / 95	24 / 4	15 / 20	10
FIS A M 8 x 130	**090276**	**519392**	**090442**	●	14	75 / 95	44 / 24	15 / 20	10
FIS A M 8 x 140	**–**	**553763**	**–**	●	14	75 / 90	55 / 40	15 / 20	10
FIS A M 8 x 175	**090277**	**519393**	**090443**	●	14	75 / 95	89 / 69	15 / 20	10
FIS A M 10 x 110	**090278**	**–**	**090444**	●	14	75 / 95	22 / 2	15 / 20	10
FIS A M 10 x 130	**090279**	**524170**	**090447**	●	14	75 / 95	42 / 22	15 / 20	10
FIS A M 10 x 150	**090281**	**517935**	**090448**	●	14	75 / 95	62 / 42	15 / 20	10
FIS A M 10 x 170	**044969**	**519395**	**044973**	●	14	75 / 95	82 / 62	15 / 20	10
FIS A M 10 x 190	**–**	**517936**	**–**	●	14	75 / 95	102 / 82	15 / 20	10
FIS A M 10 x 200	**090282**	**519396**	**090449**	●	14	75 / 95	112 / 92	15 / 20	10
FIS A M 12 x 120	**044971**	**519397**	**044974**	●	14	75 / 95	29 / 9	15 / 20	10

Injection mortar FIS VL

The solid injection mortar for standard applications in cracked concrete and masonry

High-bay warehouses

Applications

- Cable trays
- Air conditioning units
- Consoles
- Gratings
- Satellite antennas

Advantages

- The FIS VL is approved for use in cracked concrete and masonry, and achieves a high load-bearing capacity in these conditions.
- The injection mortar, based on vinylester resin, allows for anchorings in water-filled drill holes (410 ml cartridges only), thus allowing for rapid progress.
- The temperature resistance of the FIS VL injection mortar of -40 °C to +120 °C allows for a solid load level even when subjected to high temperature demands, thus providing great flexibility.
- FIS VL HIGH SPEED has a significantly shorter curing time than FIS VL, thus also ensuring swift work progress even at low temperatures.

Certificates

ETA-10/0352, for cracked concrete

ETA-15/0263, for masonry

ETA-15/0539, Post-installed rebar connections

Fire resistance classification R120

Building materials

Approved for anchorings in:
- Concrete C20/25 to C50/60, cracked
- Hollow blocks made from lightweight concrete
- Vertically perforated brick
- Perforated sand-lime brick
- Solid sand-lime brick
- Solid brick
- Rebar connections
- Aerated concrete

Also suitable for:
- Concrete C12/15
- Hollow blocks made from concrete

Functioning

- The FIS VL is a 2-component injection mortar based on vinylester.
- Resin and hardener are stored in two separate chambers and are not mixed and activated until extrusion through the static mixer.
- The 410 ml coaxial cartridge can be easily used with the fischer FIS AC dispenser.
- Partially used cartridges can be reused, simply by changing the static mixer.
- Related accessories for use in concrete and masonry can be found on page 71.

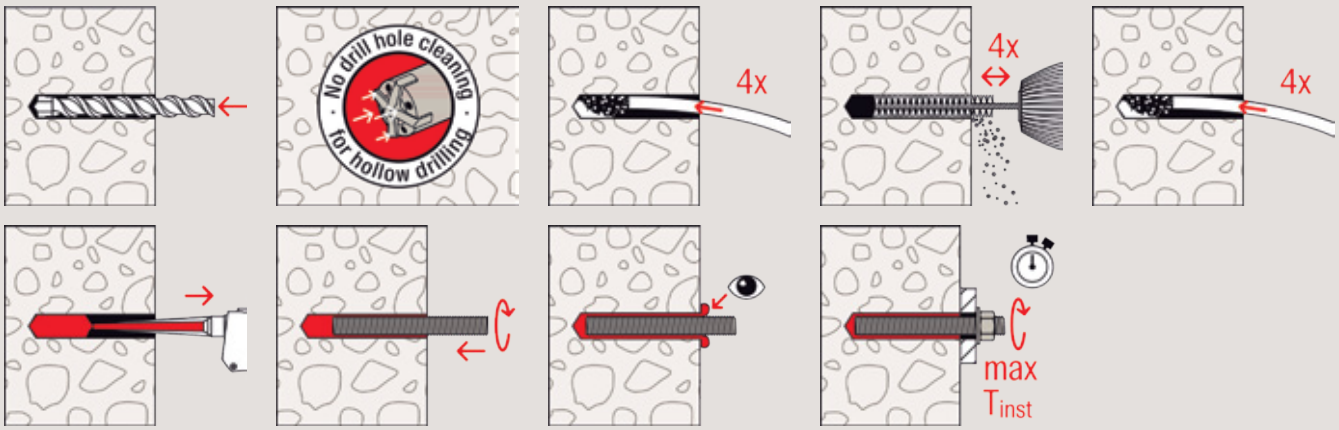
For use with

Anchors & sleeves page 71

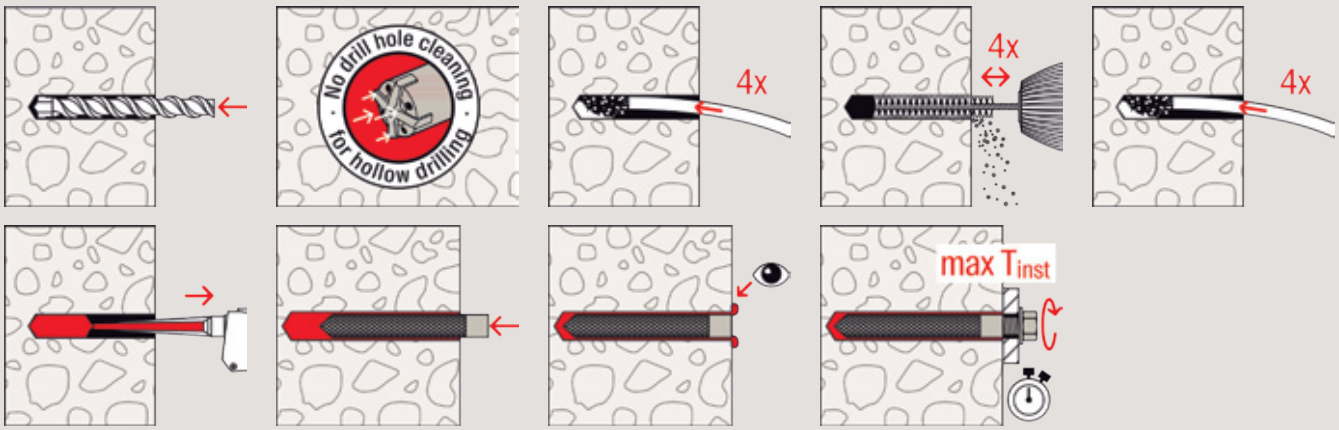
Dispenser page 87

Accessories page 89

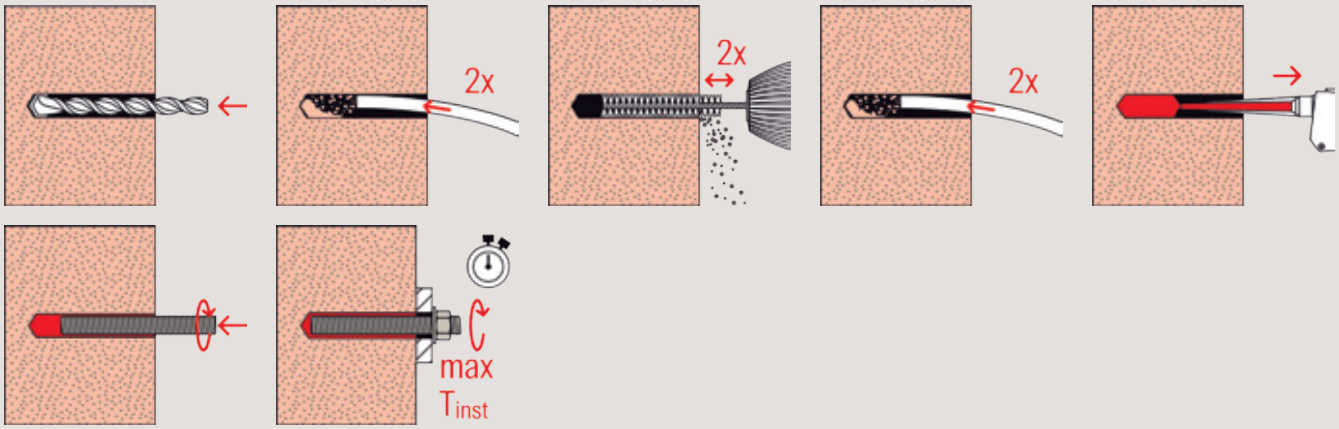
Installation in concrete with FIS VL and FIS A / RG M



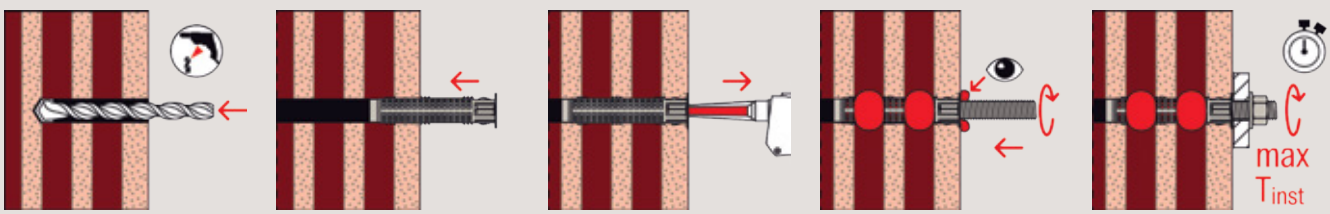
Installation in concrete with FIS VL and RG M I



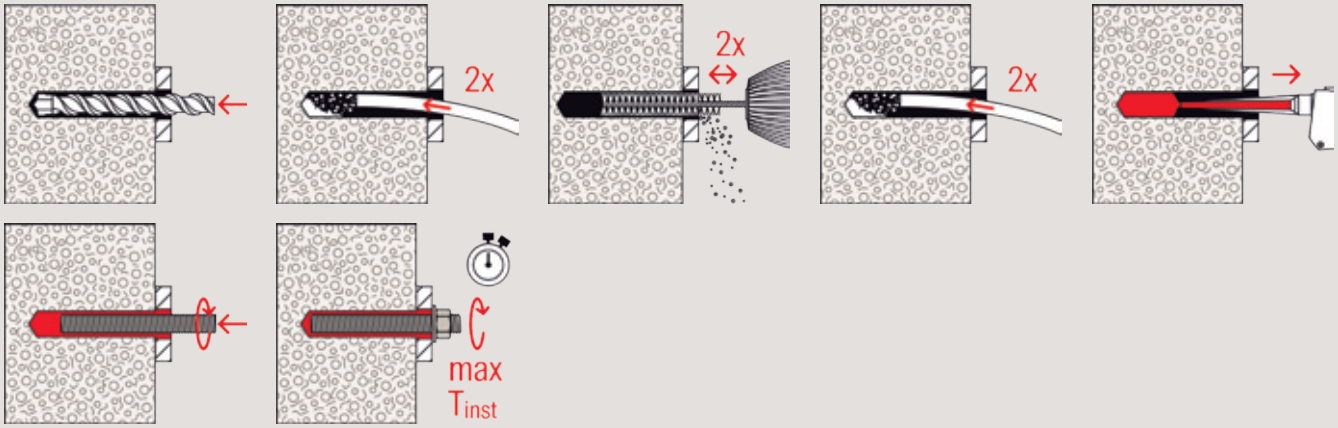
Installation in solid brick with FIS VL and FIS A / RG M



Installation in hollow blocks with FIS VL and FIS HK + FIS A / RG M



Installation in aerated concrete with FIS VL and FIS A / RG M



Technical data

Injection mortar FIS VL

FIS VL 360 S

FIS MR Plus

Item	Item No.	Approval ETA	Languages on the cartridge	Scale unit	Contents	Sales unit [pcs]
FIS VL 360 S	**558795**	●	EN, AR	180	1 cartridge 360 ml, 2 x FIS MR plus	6
FIS MR Plus	**545853**	–	–	–	10 static mixer FIS MR Plus	10

Curing times

FIS VL High Speed
FIS VL

Temperature at anchoring base	Maximum processing time t_{work}		Minimum curing time t_{cure} [1]			
	FIS VL High Speed	FIS VL	FIS VL High Speed		FIS VL	
[°C]	[min.]	[min.]	[hrs.]	[min.]	[hrs.]	[min.]
-10 – -5 [2]	–	–	12	–	–	–
> -5 – 0 [2]	5	–	3	–	24	–
> 0 – +5 [2]	5	13	3	–	3	–
> +5 – +10	3	9	–	50	–	90
> +10 – +20	1	5	–	30	–	60
> +20 – +30	–	4	–	–	–	45
> +30 – +40	–	2	–	–	–	35

1) In wet concrete or water filled holes the curing times must be doubled.
2) Minimal cartridge temperature +5 °C

Loads

Injection system FIS VL with threaded rod FIS A in solid and perforated masonry

Permissible loads[1) 2)] for a single anchor in masonry for pre-positioned installation.
For the design the complete current assessment ETA-15/0263 has to be considered.

Type	Compressive brick strength f_b [N/mm²]	Brick raw density ρ [kg/dm³]	Minimum brick dimensions[3)] (L x B x H) [mm]	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Maximum installation torque $T_{inst,max}$ [Nm]	Permissible tensile load[4)] N_{perm} [kN]	Permissible shear load[4)] V_{perm} [kN]	Minimum-spacing[5)] $s_{min\parallel}$ / $s_{min\perp}$ [mm]	Characteristic resp. minimum edge distance[5)] c_{cr} = c_{min} [mm]
Solid sand-lime brick KS, acc. to EN 771-2										
M8	≥ 12	≥ 1.8	240 x 115 x 71	≥ 50	115	5	1.14	0.43	80 / 150	60
M8	≥ 12	≥ 1.8	240 x 115 x 71	100	240	5	2.29	0.86	80 / 300	60
M10	≥ 12	≥ 1.8	240 x 115 x 71	100	240	15	1.57	0.57	80 / 300	60
M10	≥ 12	≥ 1.8	240 x 115 x 71	200	240	15	3.43	0.57	80 / 600	60
M12	≥ 12	≥ 1.8	240 x 115 x 71	100	240	15	1.29	0.57	80 / 300	60
M12	≥ 12	≥ 1.8	240 x 115 x 71	200	240	15	3.43	0.57	80 / 300	60
Perforated sand-lime brick KSL, acc. to EN 771-2[3)]										
M8 with FIS H 12 x 85 K	≥ 12	≥ 1.4	240 x 175 x 113	85	175	2	0.71	0.71	100 / 115	60
M8 / M10 with FIS H 16 x 85 K	≥ 12	≥ 1.4	240 x 175 x 113	85	175	2	0.86	1.29	100 / 115	80
M12 with FIS H 20 x 85 K	≥ 12	≥ 1.4	240 x 175 x 113	85	175	2	0.86	1.29	100 / 115	80
M8 / M10 with FIS H 16 x 130 K	≥ 12	≥ 1.4	240 x 175 x 113	130	175	2	0.86	1.29	100 / 115	80
Vertically perforated brick Hlz, acc. to EN 771-1[3)]										
M8 with FIS H 12 x 85 K	≥ 10	≥ 0.9	240 x 175 x 113	85	175	2	1.14	1.14	240 / 115	100
M8 / M10 with FIS H 16 x 85 K	≥ 10	≥ 0.9	240 x 175 x 113	85	175	2	1.00	1.57	240 / 115	100
M12 with FIS H 20 x 85 K	≥ 10	≥ 0.9	240 x 175 x 113	85	175	2	1.43	1.71	240 / 115	100
M8 / M10 with FIS H 16 x 130 K	≥ 10	≥ 0.9	240 x 175 x 113	130	175	2	1.43	1.57	240 / 115	100
M12 with FIS H 20 x 130 K	≥ 10	≥ 0.9	240 x 175 x 113	130	175	2	1.43	1.71	240 / 115	100
Aerated concrete acc. to EN 771-4[6)]										
M8	≥ 2	≥ 0.35	-	≥ 100	130	1	0.54	0.43	250 / 250	100
M8	≥ 4	≥ 0.50	-	200	230	8	1.07	0.71	80 / 80	100
M10	≥ 2	≥ 0.35	-	≥ 100	130	2	0.54	0.43	250 / 250	100
M10	≥ 4	≥ 0.50	-	200	230	12	1.79	0.71	80 / 80	100
M12	≥ 2	≥ 0.35	-	≥ 100	130	2	0.71	0.54	250 / 250	100
M12	≥ 4	≥ 0.50	-	200	230	16	1.79	0.71	80 / 80	100

[1)] The required partial safety factors for material resistance as well as a partial safety factor for load actions of γ_L = 1.4 are considered. Load values are valid for zinc-plated steel, stainless steel R and highly corrosion-resistant steel HCR. In perforated bricks and hollow blocks threaded rod FIS A in combination with anchor sleeve FIS H K.

[2)] The given loads are valid for installation and use of fixations in dry masonry - use category d/d - for temperatures in the substrate up to 50 °C (resp. short term up to 80 °C) and drill hole cleaning according to assessment. The given brick types in combination with the permissible loads are an extract of the assessment.

[3)] More information about, e.g. hole patterns, assortment of anchor sleeves FIS H K see assessment.

[4)] In the case of combinations of tensile and shear loads, bending moments and reduced edge and axial spacings (anchor groups), the design must be carried out in accordance with the provisions of the complete assessment.

[5)] Minimum feasible spacing resp. edge distance. Details as well as to the distances to joints see assessment.

[6)] Cylindrical drill hole.

Loads

Injection system FIS VL with threaded rod FIS A resp. RG M

Permissible loads of a single anchor[1) 2)] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-10/0352 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material / surface[3)]	Effective anchorage depth	Minimum member thickness	Maximum instal-lation torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst,\,max}$ [Nm]	N_{perm}[4)] [kN]	V_{perm}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]	N_{perm}[4)] [kN]	V_{perm}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]
FIS A M 8	5.8	60	100	10	-	-	-	-	6.6	6.3	40	40
	5.8	80	110	10	-	-	-	-	8.8	6.3	40	40
	5.8	160	190	10	-	-	-	-	9.0	6.3	40	40
	R-70	60	100	10	-	-	-	-	6.6	6.0	40	40
	R-70	80	110	10	-	-	-	-	8.8	6.0	40	40
	R-70	160	190	10	-	-	-	-	13.8	6.0	40	40
FIS A M 10	5.8	60	100	20	4.5	9.7	45	45	8.2	9.7	45	45
	5.8	90	120	20	6.7	9.7	45	45	12.3	9.7	45	45
	5.8	200	230	20	13.8	9.7	45	45	13.8	9.7	45	45
	R-70	60	100	20	4.5	9.2	45	45	8.2	9.2	45	45
	R-70	90	120	20	6.7	9.2	45	45	12.3	9.2	45	45
	R-70	200	230	20	15.0	9.2	45	45	15.7	9.2	45	45
FIS A M 12	5.8	70	100	40	6.3	14.3	55	55	11.4	14.3	55	55
	5.8	110	140	40	9.9	14.3	55	55	18.1	14.3	55	55
	5.8	240	270	40	20.5	14.3	55	55	20.5	14.3	55	55
	R-70	70	100	40	6.3	13.7	55	55	11.4	13.7	55	55
	R-70	110	140	40	9.9	13.7	55	55	18.1	13.7	55	55
	R-70	240	270	40	21.5	13.7	55	55	22.5	13.7	55	55
FIS A M 16	5.8	80	120	60	9.6	23.0	65	65	14.0	26.9	65	65
	5.8	125	170	60	15.0	26.9	65	65	24.9	26.9	65	65
	5.8	320	360	60	37.6	26.9	65	65	37.6	26.9	65	65
	R-70	80	120	60	9.6	23.0	65	65	14.0	25.2	65	65
	R-70	125	170	60	15.0	25.2	65	65	24.9	25.2	65	65
	R-70	320	360	60	38.3	25.2	65	65	42.0	25.2	65	65
FIS A M 20	5.8	90	140	120	11.7	28.0	85	85	16.7	40.0	85	85
	5.8	170	220	120	23.3	42.3	85	85	40.3	42.3	85	85
	5.8	400	450	120	54.9	42.3	85	85	58.6	42.3	85	85
	R-70	90	140	120	11.7	28.0	85	85	16.7	39.4	85	85
	R-70	170	220	120	23.3	39.4	85	85	40.3	39.4	85	85
	R-70	400	450	120	54.9	39.4	85	85	65.7	39.4	85	85
FIS A M 24	5.8	96	160	150	-	-	-	-	18.4	44.1	105	105
	5.8	210	270	150	-	-	-	-	56.5	60.6	105	105
	5.8	480	540	150	-	-	-	-	84.3	60.6	105	105
	R-70	96	160	150	-	-	-	-	18.4	44.1	105	105
	R-70	210	270	150	-	-	-	-	56.5	56.8	105	105
	R-70	480	540	150	-	-	-	-	94.3	56.8	105	105
FIS A M 30	5.8	120	190	300	-	-	-	-	25.7	61.6	140	140
	5.8	280	350	300	-	-	-	-	89.0	96.0	140	140
	5.8	600	670	300	-	-	-	-	133.8	96.0	140	140
	R-70	120	190	300	-	-	-	-	25.7	61.6	140	140
	R-70	280	350	300	-	-	-	-	89.0	90.2	140	140
	R-70	600	670	300	-	-	-	-	150.1	90.2	140	140

[1)] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.

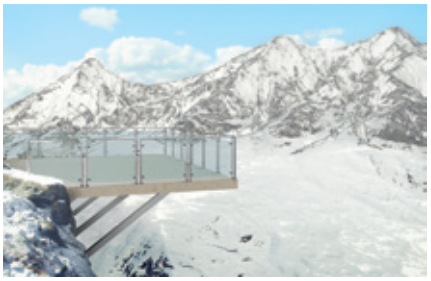
[2)] The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 80 °C). Drill hole cleaning as per specification in the ETA. The factor Ψ_{sus} for sustained load was taken into account with 1.0.

[3)] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

[4)] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Injection mortar FIS V Zero

Maximum safety for people and nature.



Outdoor fixings in sub-zero temperatures

Fixings in occupied rooms

Applications

- Steel constructions
- Guard rails
- Handrails
- Cable trays
- Satellite dishes
- Canopies
- Consoles
- Water-filled drill holes

Advantages

- The universal mortar FIS V Zero is free from dibenzoyl peroxide, which is classified as environmentally hazardous, sensitising and eye-irritating, thus enabling its users safe application.
- Thanks to the new formulation with innovative ingredients, the cartridge can be disposed of in the usual residual waste and thus avoids cost-intensive hazardous waste.
- Due to the non-labelled ingredients, FIS V Zero enables user-friendly and safe installation.
- The innovative formulation is approved for use in concrete and masonry, for post-installed rebar connections and for water-filled drill holes.
- The universal mortar FIS V Zero provides a secure hold in common building materials and at the same time enables environmentally friendly application and disposal.
- The possible installation temperatures of -10 to 40 °C allow all-season processing for universal use.

Certificates

ETA-20/0572, for cracked concrete
ETA-20/0574, for for post-installed rebars

3097 0044

Building materials

Approved for:

- Concrete C20/25 to C50/60, cracked and non-cracked
- Hollow blocks made from lightweight concrete
- Vertically perforated brick
- Perforated sand-lime brick
- Solid sand-lime brick
- Solid brick

Functioning

- Resin and hardener are stored in two separate chambers and are only mixed and activated in the static mixer when pressed out.
- The mortar needs to be injected from the bottom of the drill hole to avoid bubbles.
- The mortar bonds the fixing element to the drill hole wall over the entire surface and also seals it.
- The injection cartridges are quick and easy to use with the fischer dispensers.
- Opened cartridges can be reused by changing the static mixer. Simply dispose empty cartridges in household waste.

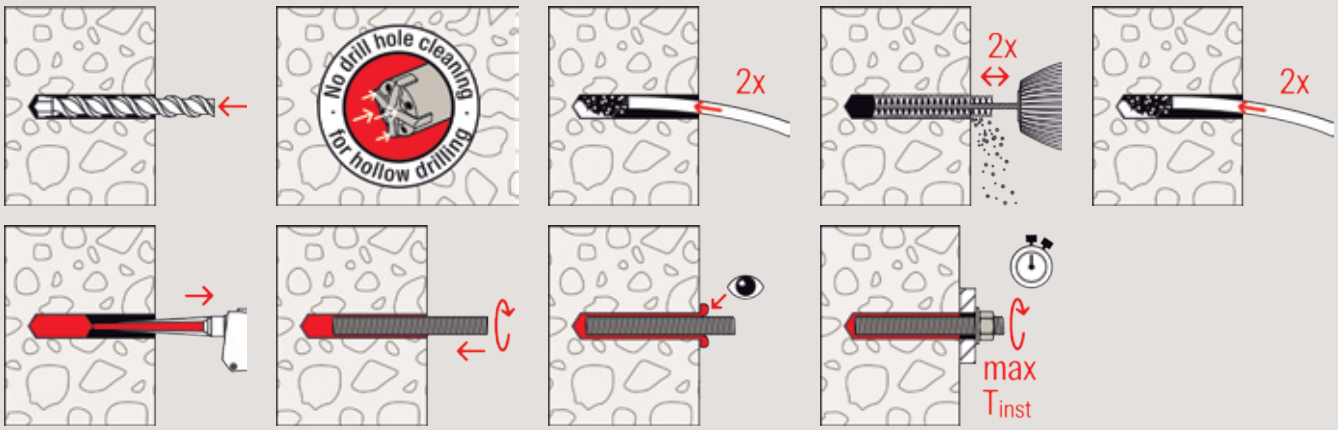
For use with

Anchors & sleeves page 71

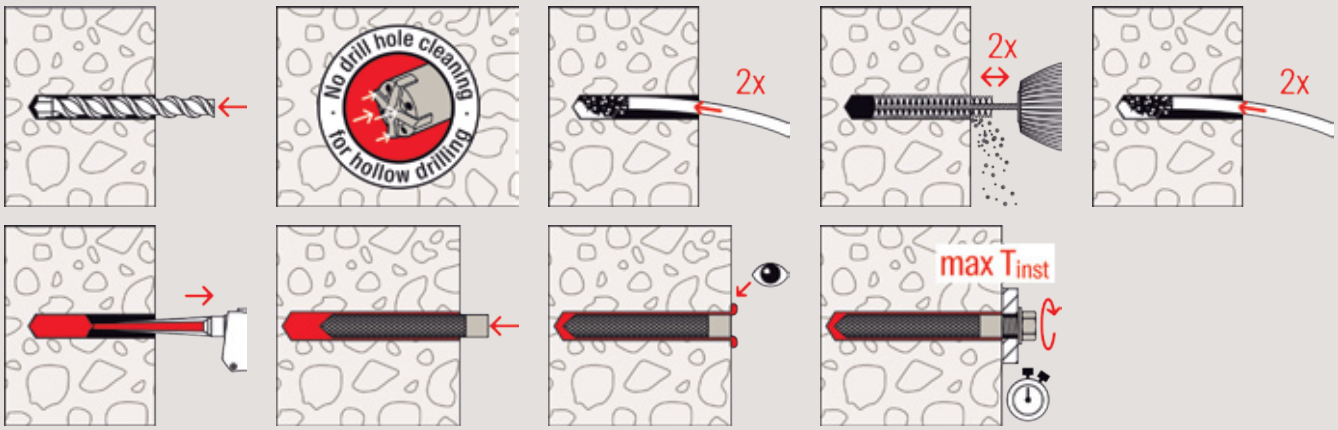
Dispenser page 87

Accessories page 89

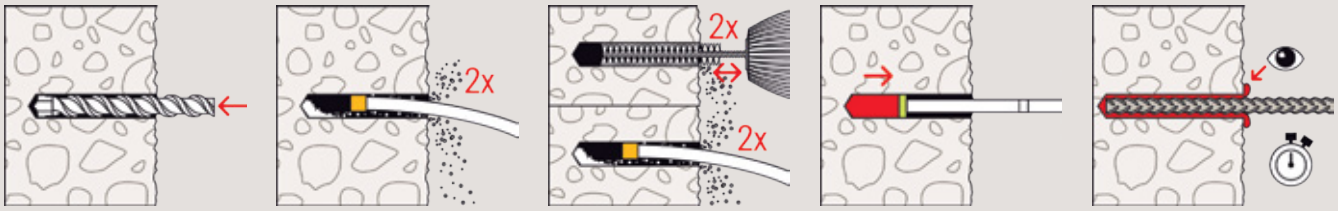
Installation in concrete with FIS V Zero and FIS A / RG M



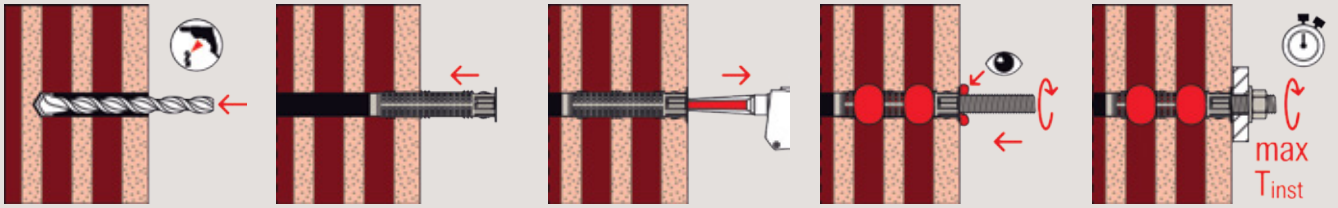
Installation in concrete with FIS V Zero and RG M I



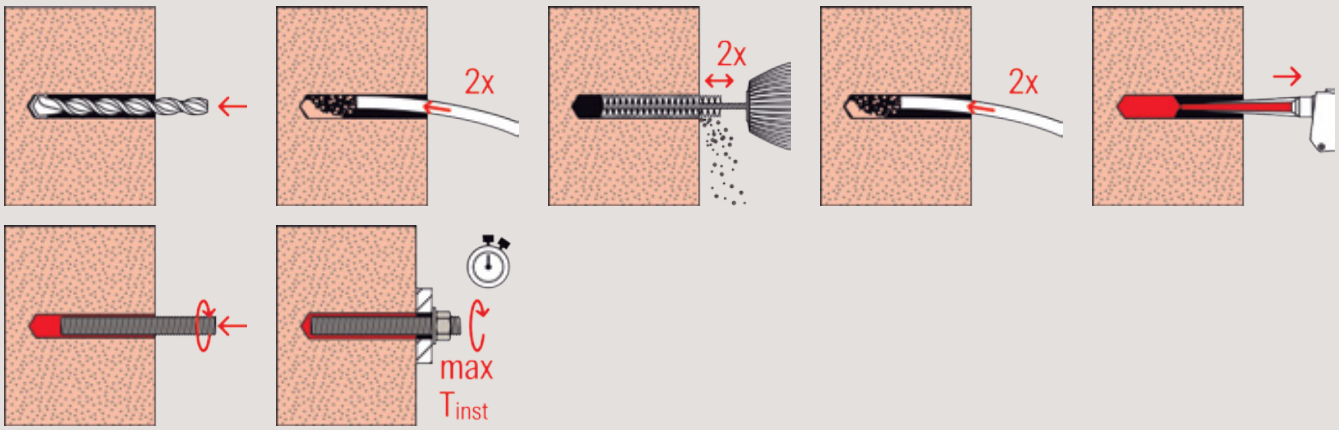
Installation in concrete witht FIS V Zero in hammerdrilled holes



Installation in hollow blocks with FIS V Zero and FIS HK + FIS A



Installation in solid brick with FIS V Zero and FIS A



Technical data

Injection mortar FIS V Zero

FIS V Zero 360 S

	Item No.	Approval	Languages on the cartridge	Contents	Sales unit [pcs]
Item		**ETA**			
FIS V Zero 360 S	**558954**	●	DE, EN, FR , ES, PT, PL, HU	1 cartridge 360 ml, 2 x FIS MR Plus	6

Curing times

FIS V Zero Temperature at anchoring base [°C]	Maximum processing time t_{work} [hrs.]	[min.]	Minimum curing time [1] t_{cure} [hrs.]	[min.]
-10 – -5[2]	6	–	72	–
> -5– 0[2]	2	–	24	–
> 0 – +5[2]	–	45	12	–
> +5 – +10	–	20	6	–
> +10 – +15	–	8	3	–
> +15 – +20	–	5	2	–
> +20 – +25	–	3	1	–
> +25 – +30	–	2	–	45
> +30 – +40	–	1	–	30

1) In wet concrete or water-filled holes the curing times must be doubled.

2) Minimum cartridge temperature +5 °C.

Loads

Injection system FIS V Zero with threaded rod FIS A

Permissible loads of a single anchor[1] [2] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-20/0572 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material/ surface[3]	Effective anchorage depth	Minimum member thickness	Maximum installation-torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst,max}$ [Nm]	N_{perm}[4] [kN]	V_{perm}[4] [kN]	s_{min}[4] [mm]	c_{min}[4] [mm]	N_{perm}[4] [kN]	V_{perm}[4] [kN]	s_{min}[4] [mm]	c_{min}[4] [mm]
FIS A M 8	5.8	60	100	10	2.1	5.7	40	40	5.1	6.3	40	40
	5.8	80	110	10	2.7	6.3	40	40	6.8	6.3	40	40
	5.8	160	190	10	5.5	6.3	40	40	9.0	6.3	40	40
	R-70	60	100	10	2.1	5.7	40	40	5.1	6.0	40	40
	R-70	80	110	10	2.7	6.0	40	40	6.8	6.0	40	40
	R-70	160	190	10	5.5	6.0	40	40	9.9	6.0	40	40
FIS A M 10	5.8	60	100	20	2.6	7.2	45	45	6.4	9.7	45	45
	5.8	90	120	20	3.8	9.7	45	45	9.6	9.7	45	45
	5.8	200	230	20	8.5	9.7	45	45	13.8	9.7	45	45
	R-70	60	100	20	2.6	7.2	45	45	6.4	9.2	45	45
	R-70	90	120	20	3.8	9.2	45	45	9.6	9.2	45	45
	R-70	200	230	20	8.5	9.2	45	45	15.7	9.2	45	45
FIS A M 12	5.8	70	100	40	3.6	10.1	55	55	9.0	14.3	55	55
	5.8	110	140	40	5.6	14.3	55	55	14.1	14.3	55	55
	5.8	240	270	40	12.3	14.3	55	55	20.5	14.3	55	55
	R-70	70	100	40	3.6	10.1	55	55	9.0	13.7	55	55
	R-70	110	140	40	5.6	13.7	55	55	14.1	13.7	55	55
	R-70	240	270	40	12.3	13.7	55	55	22.5	13.7	55	55
FIS A M 16	5.8	80	120	60	5.5	15.3	65	65	12.0	26.9	65	65
	5.8	125	170	60	8.5	23.9	65	65	21.4	26.9	65	65
	5.8	320	360	60	21.9	26.9	65	65	37.6	26.9	65	65
	R-70	80	120	60	5.5	15.3	65	65	12.0	25.2	65	65
	R-70	125	170	60	8.5	23.9	65	65	21.4	25.2	65	65
	R-70	320	360	60	21.9	25.2	65	65	42.0	25.2	65	65
FIS A M 20	5.8	90	140	120	7.7	21.5	85	85	14.3	40.0	85	85
	5.8	170	220	120	14.5	40.7	85	85	34.5	42.3	85	85
	5.8	400	450	120	34.2	42.3	85	85	58.6	42.3	85	85
	R-70	90	140	120	7.7	21.5	85	85	14.3	39.4	85	85
	R-70	170	220	120	14.5	39.4	85	85	34.5	39.4	85	85
	R-70	400	450	120	34.2	39.4	85	85	65.7	39.4	85	85
FIS A M 24	5.8	96	160	150	9.8	27.6	105	105	15.7	44.1	105	105
	5.8	210	270	150	21.5	60.3	105	105	45.8	60.6	105	105
	5.8	480	540	150	49.2	60.6	105	105	84.3	60.6	105	105
	R-70	96	160	150	9.8	27.6	105	105	15.7	44.1	105	105
	R-70	210	270	150	21.5	56.8	105	105	45.8	56.8	105	105
	R-70	480	540	150	49.2	56.8	105	105	94.3	56.8	105	105

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.

[2] The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 80 °C). Drill hole cleaning as per specification in the ETA. The factor Ψ_{sus} for sustained load was taken into account with 1.0.

[3] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

[4] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Loads

Injection system FIS V Zero with threaded rod FIS A in solid and perforated masonry

Permissible loads[1) 2)] for a single anchor in masonry for pre-positioned installation.
For the design the complete valid European Technical Assessment ETA-21/0267 has to be considered.

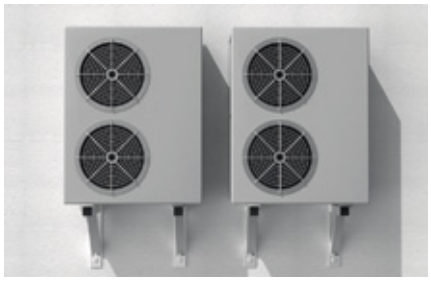
Type	Compressive brick strength f_b [N/mm²]	Brick raw density ρ [kg/dm³]	Minimum brick dimensions[3)] (L x W x H) [mm]	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Maximum installation torque $T_{inst,max}$ [Nm]	Permissible tensile load[4)] N_{perm} [kN]	Permissible shear load[4)] V_{perm} [kN]	Minimum spacing[5)] $s_{min\parallel}$ / $s_{min\perp}$ [mm]	Characteristic resp. minimum edge distance[5)] c_{cr} = c_{min} [mm]
Solid brick Mz, acc. to EN 771-1										
M8	≥ 36	≥ 2.0	230 x 108 x 55	50	108	10	0.43	0.71	100 / 100	100
M10	≥ 36	≥ 2.0	230 x 108 x 55	80	110	10	0.57	1.29	100 / 100	100
M12	≥ 48	≥ 2.0	230 x 108 x 55	80	110	10	0.71	1.43	100 / 100	100
M16	≥ 36	≥ 2.0	230 x 108 x 55	80	110	10	1.00	1.29	100 / 100	100
M16	≥ 48	≥ 2.0	230 x 108 x 55	80	110	10	1.14	1.43	100 / 100	100
Solid sand-lime brick KS, acc. to EN 771-2										
M8	≥ 12	≥ 2.0	240 x 115 x 71	80	115	8	0.43	1.00	100 /100	100
M10	≥ 12	≥ 2.0	240 x 115 x 71	80	115	10	0.86	1.29	100 /100	100
M12	≥ 12	≥ 2.0	240 x 115 x 71	80	115	10	0.86	1.14	100 /100	100
M16	≥ 12	≥ 2.0	240 x 115 x 71	80	115	10	0.43	1.14	100 /100	100
Vertically perforated brick Hlz, acc. to EN 771-1[3)]										
M8 with FIS H 12 x 85 K	≥ 16	≥ 1.6	230 x 108 x 55	85	115	5	0.43	1.43	100 / 60	100
M8 / M10 with FIS H 16 x 130 K	≥ 16	≥ 1.6	230 x 108 x 55	130	160	5	0.71	1.43	100 / 60	100
M12 / M16 with FIS H 20 x 130 K	≥ 16	≥ 1.6	230 x 108 x 55	130	160	5	0.71	1.43	100 / 60	100
Perforated sand-lime brick KSL, acc. to EN 771-2[3)]										
M8 with FIS H 12 x 85 K	≥ 16	≥ 1.6	240 x 175 x 113	85	175	8	0.34	1.00	100 / 100	100
M8 / M10 with FIS H 16 x 130 K	≥ 16	≥ 1.6	240 x 175 x 113	130	175	8 / 10	1.00	1.14	100 / 100	100
M12 / M16 with FIS H 20 x 85 K	≥ 16	≥ 1.6	240 x 175 x 113	85	175	10	0.43	1.86	100 / 100	100
Lightweight concrete hollow block Hbl, acc. EN 771-3[3)]										
M8 / M10 with FIS H 16 x 85 K	≥ 2	≥ 1.0	500 x 200 x 200	85	200	2	0.09	0.43	100 / 100	100
M12 / M16 with FIS H 20 x 130 K	≥ 4	≥ 1.0	500 x 200 x 200	130	200	2	0.17	0.57	100 / 100	100

1) The required partial safety factors for material resistance as well as a partial safety factor for load actions of γ_L = 1.4 are considered. Load values are valid for zinc-plated steel gvz, stainless steel R and highly corrosion-resistant steel HCR. In perforated bricks and hollow blocks threaded rod FIS A in combination with anchor sleeve FIS H K.
2) The given loads are valid for installation and use of fixations in dry masonry - use category d/d - for temperatures in the substrate up to 50 °C (resp. short term up to 80 °C) and drill hole cleaning according to assessment. The given brick types in combination with the permissible loads are an extract of the assessment.
3) More information about, e.g. hole patterns, assortment of anchor sleeves FIS H K see assessment.
4) In the case of combinations of tensile and shear loads, bending moments and reduced edge and axial spacings (anchor groups), the design must be carried out in accordance with the provisions of the complete assessment.
5) Minimum feasible spacing resp. edge distance. Details as well as to the distances to joints see assessment.

Injection mortar FIS P Plus

The approved injection mortar for anchorings in masonry and non-cracked concrete

Cable duct



Air conditioning units

Applications

Injection mortar for use in masonry and non-cracked concrete with:

- Threaded rods FIS A, see pages 71
- Injection anchor sleeves FIS H K, see page 81
- Injection push-through anchor sleeve FIS H K, see page 81

Advantages

- With FIS P Plus, anchorings in masonry and non-cracked concrete for which approval is relevant can be realised in a particularly economical manner.
- FIS P Plus 300 T can be used with stable, standard silicone injection dispensers. No special equipment is required. As a result, procurement costs can be reduced on the basis of polyester resin.

Assessment/Approval

ETA-11/0419, for masonry

ETA-18/0383, for non-cracked concrete

Building materials

- Concrete C20/25 to C50/60, non-cracked
- Vertically perforated brick
- Perforated sand-lime brick
- Solid sand-lime brick
- Perforated blocks made from lightweight concrete
- Solid brick
- Aerated concrete

Also suitable for:

- Solid brick made from lightweight concrete

Functioning

- FIS P Plus is a 2-component injection mortar based on polyester resin.
- Resin and hardener are stored in two separate chambers and are not mixed and activated until extrusion through the static mixer.
- Partially used cartridges can be reused, simply by changing the static mixer.
- Related accessories for use in masonry and non-cracked concrete can be found on page 71.

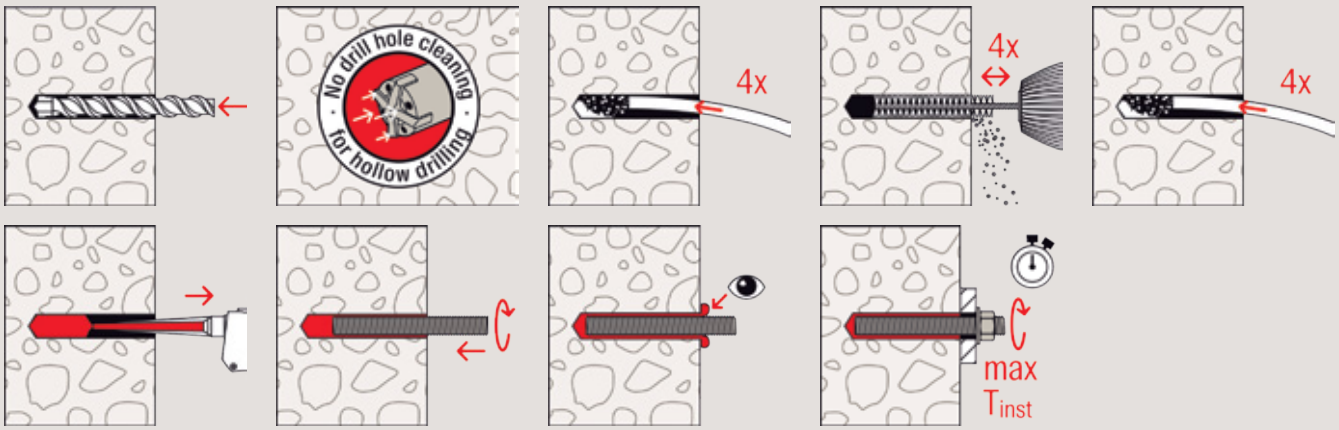
For use with

Anchors & sleeves page 71

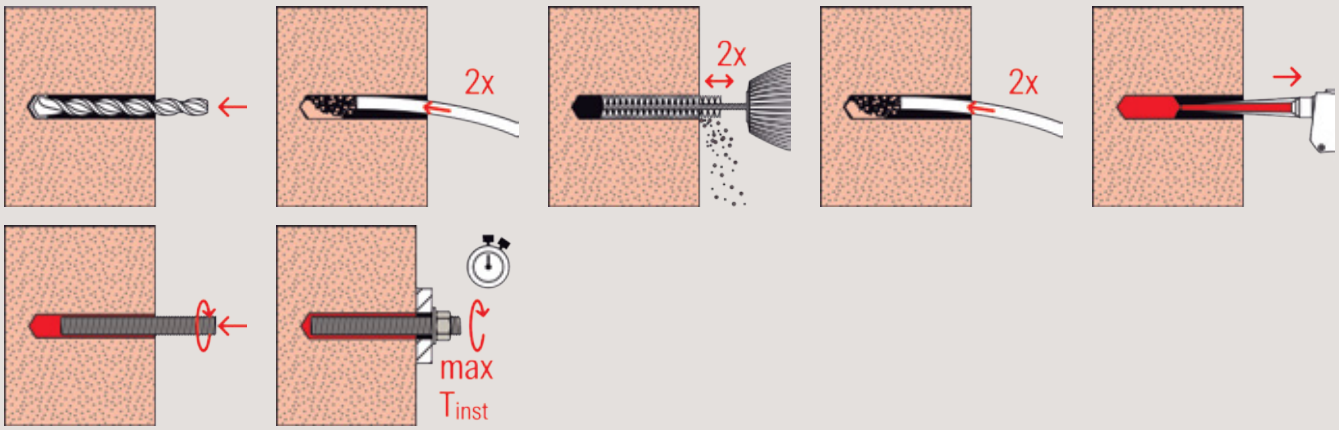
Dispenser page 87

Accessories page 89

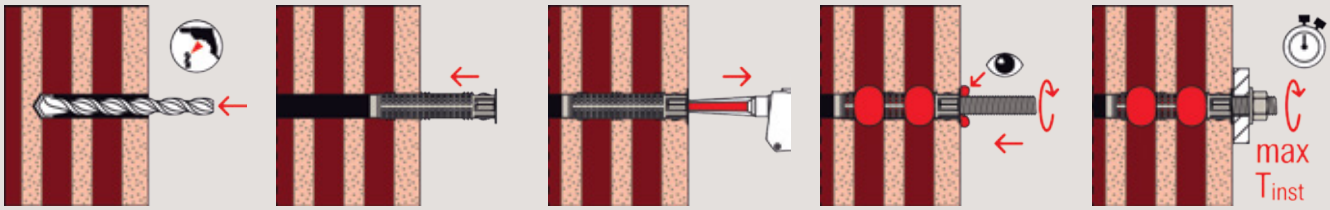
Installation in concrete with FIS P Plus and FIS A / RG M



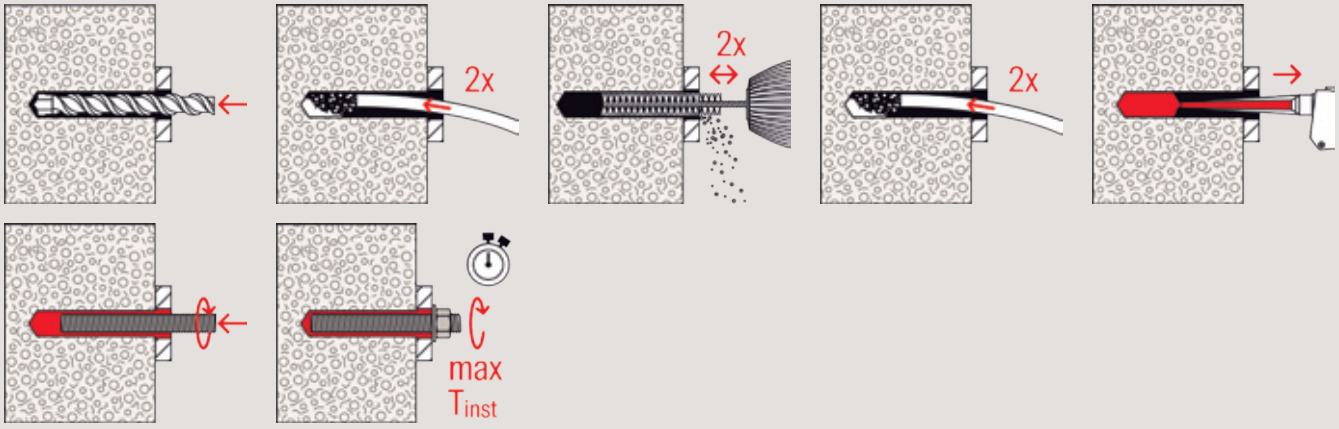
Installation in solid brick with FIS P Plus and FIS A / RG M



Installation in hollow blocks with FIS P Plus and FIS HK + FIS A / RG M



Installation in aerated concrete with FIS P Plus and FIS A / RG M



Technical data

Injection mortar FIS P Plus


FIS P Plus 300 T


FIS P Plus 380 C


FIS MR Plus

Item	Item No.	Approval	Languages on the cartridge	Scale unit	Contents	Sales unit [pcs]
		ETA				
FIS P Plus 300 T	**523226**	●	EN, ES, PT	150	1 cartridge 300 ml, 1 x FIS MR Plus	12
FIS P Plus 380 C	**522178**	●	EN, ES, PT	190	1 cartridge 380 ml, 2 x FIS MR Plus	12
FIS MR Plus	**545853**	–	–	–	10 static mixer FIS MR Plus	10

Curing times

FIS P Plus Temperature at anchoring base [°C]	Maximum processing time t_{work} [min.]	Minimum curing time [1] t_{cure} [hrs.]	[min.]
> 0 – +5	13	3	–
> +5 – +10	9	–	90
> -10 – +20	5	–	60
> +20 – +30	4	–	45
> +30 – +40	2	–	35

1) In wet concrete or water filled holes the curing times must be doubled.

Loads

Injection system FIS P Plus with threaded rod FIS A resp. RG M

Permissible loads of a single anchor[1) 2)] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-18/0383 has to be considered.

					Non-cracked concrete			
	Material / surface[3)]	Effective anchorage depth	Minimum member thickness	Maximum installation torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst,\,max}$ [Nm]	N_{perm}[4)] [kN]	V_{perm}[4)] [kN]	s_{min}[4)] [mm]	c_{min}[4)] [mm]
FIS A M 8	5.8	60	100	10	3.9	5.1	40	40
	5.8	80	110	10	5.2	5.1	40	40
	5.8	160	190	10	9.0	5.1	40	40
	R-70	60	100	10	3.9	6	40	40
	R-70	80	110	10	5.2	6	40	40
	R-70	160	190	10	9.9	6	40	40
FIS A M 10	5.8	60	100	20	4.9	8.6	45	45
	5.8	90	120	20	7.3	8.6	45	45
	5.8	200	230	20	13.8	8.6	45	45
	R-70	60	100	20	4.9	9.2	45	45
	R-70	90	120	20	7.3	9.2	45	45
	R-70	200	230	20	15.7	9.2	45	45
FIS A M 12	5.8	70	100	40	6.8	12.0	55	55
	5.8	110	140	40	10.7	12.0	55	55
	5.8	240	270	40	20.5	12.0	55	55
	R-70	70	100	40	6.8	13.7	55	55
	R-70	110	140	40	10.7	13.7	55	55
	R-70	240	270	40	22.5	13.7	55	55
FIS A M 16	5.8	80	120	60	10.4	22.3	65	65
	5.8	125	170	60	16.2	22.3	65	65
	5.8	320	360	60	37.6	22.3	65	65
	R-70	80	120	60	10.4	24.9	65	65
	R-70	125	170	60	16.2	25.2	65	65
	R-70	320	360	60	41.5	25.2	65	65
FIS A M 20	5.8	90	140	120	13.5	32.3	85	85
	5.8	170	220	120	25.4	34.9	85	85
	5.8	400	450	120	58.6	34.9	85	85
	R-70	90	140	120	13.5	32.3	85	85
	R-70	170	220	120	25.4	39.4	85	85
	R-70	400	450	120	59.8	39.4	85	85
FIS A M 24	5.8	96	160	150	17.2	41.4	105	105
	5.8	210	270	150	37.7	50.9	105	105
	5.8	480	540	150	84.3	50.9	105	105
	R-70	96	160	150	17.2	41.4	105	105
	R-70	210	270	150	37.7	56.8	105	105
	R-70	480	540	150	86.2	56.8	105	105

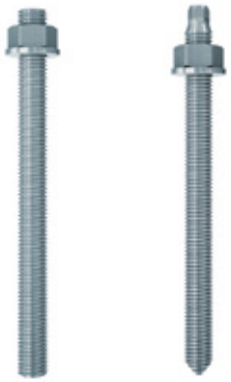
[1)] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.

[2)] The specified loads are valid for anchorages in dry and damp concrete. For temperatures in the anchoring substrate up to 50 °C (resp. short term up to 80 °C). Drill hole cleaning as per specification in the ETA. The factor Ψ_{sus} for sustained load was taken into account with 1.0.

[3)] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).

[4)] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Threaded rod FIS A / RG M



Bridges for traffic signs

Underwater applications

Advantages

- The system of anchor rod FIS A / RG M and an injection mortar for cracked concrete (M8 to M30) and non-cracked concrete (M6 to M30) can be individually selected based on requirements, thus allowing for a wide range of applications.
- Variable anchorage depths allow for ideal adaptation to the load to be applied, and ensure an optimised installation time and use of materials.
- Push-through installation is possible without any special parts through filling the annular gap with injection mortar.
- The wide range of approved steel types allows for use in all corrosion resistance classes and offers maximum application safety.

Versions

- Zinc-plated steel
- Stainless steel

Building materials

Approved for:
- Concrete C20/25 to C50/60, cracked and non-cracked

Also suitable for:
- Concrete C12/15

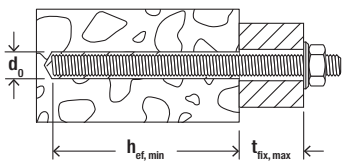
Also suitable for:
- Natural stone with dense structure

Functioning

- The system of threaded rod FIS A and RG M an injection mortar for cracked concrete (M8 to M30) and non-cracked concrete (M6 to M30) can be individually selected based on requirements, thus allowing for a wide range of applications.
- The mortar is extruded bubble free from the drill hole base.
- The mortar bonds the entire surface of the threaded rod with the drill hole wall and seals the drill hole.
- The threaded rod is set manually, by lightly rotating it until it reaches the drill hole base.
- Due to its oblique edge, the threaded rod RG M is particularly suitable for use in conjunction with resin capsules.

Threaded rod FIS A

	Zinc plated, steel grade 5.8 gvz Art.-No.	Zinc plated, steel grade 8.8 gvz Art.-No.	Stainless steel R Art.-No.	FIS SB	FIS EM Plus	FIS EB	FIS EP		FIS V Plus		FIS VL		FIS P Plus	
				Concrete	Concrete	Concrete	Con-crete	Mas-onry	Con-crete	Mas-onry	Con-crete	Mas-onry	Con-crete	Mas-onry
FIS A M 6 x 70	046204	–	–	–	–	–	(●)	(●)	●	●	●	–	–	–
FIS A M 6 x 75	090243	–	090437	–	–	–	(●)	(●)	●	●	●	–	–	–
FIS A M 6 x 85	090272	–	–	–	–	–	(●)	(●)	●	●	●	–	–	–
FIS A M 6 x 110	090273	–	090439	–	–	–	(●)	(●)	●	●	●	–	–	–
FIS A M 8 x 90	090274	519390	090440	●	●	●	(●)	(●)	●	●	●	●	●	●
FIS A M 8 x 110	090275	519391	090441	●	●	●	(●)	(●)	●	●	●	●	●	●
FIS A M 8 x 130	090276	519392	090442	●	●	●	(●)	(●)	●	●	●	●	●	●
FIS A M 8 x 175	090277	519393	090443	●	●	●	(●)	(●)	●	●	●	●	●	●
FIS A M 8 x 1000	509214 [1]	–	509230 [1]	●	●	●	(●)	(●)	●	●	●	●	●	●
FIS A M 10 x 110	090278	–	090444	●	●	●	–	–	●	●	●	●	●	●
FIS A M 10 x 130	090279	–	090447	●	●	●	–	–	●	●	●	●	●	●
FIS A M 10 x 130	–	524170	–	●	●	●	–	–	●	●	●	●	●	●
FIS A M 10 x 150	090281	517935	090448	●	●	●	–	–	●	●	●	●	●	●
FIS A M 10 x 170	044969	519395	044973	●	●	●	–	–	●	●	●	●	●	●
FIS A M 10 x 190	–	517936	–	●	●	●	–	–	●	●	●	●	●	●
FIS A M 10 x 200	090282	519396	090449	●	●	●	–	–	●	●	●	●	●	●
FIS A M 10 x 1000	509215 [1]	509223 [1]	509231 [1]	●	●	●	–	–	●	●	●	●	●	●
FIS A M 12 x 120	044971	519397	044974	●	●	●	–	–	●	●	●	●	●	●
FIS A M 12 x 140	090283	519398	090450	●	●	●	–	–	●	●	●	●	●	●
FIS A M 12 x 160	090284	517937	090451	●	●	●	–	–	●	●	●	●	●	●
FIS A M 12 x 180	090285	519399	090452	●	●	●	–	–	●	●	●	●	●	●
FIS A M 12 x 200	–	517938	519421	●	●	●	–	–	●	●	●	●	●	●
FIS A M 12 x 210	090286	–	090453	●	●	●	–	–	●	●	●	●	●	●
FIS A M 12 x 260	090287	–	090454	●	●	●	–	–	●	●	●	●	●	●
FIS A M 12 x 280	–	–	547703	●	●	●	–	–	●	●	●	●	●	●
FIS A M 12 x 1000	509216 [1]	509224 [1]	509232 [1]	●	●	●	–	–	●	●	●	●	●	●
FIS A M 16 x 130	044972	519400	044975	●	●	●	–	–	●	●	●	–	●	–
FIS A M 16 x 175	090288	519401	090455	●	●	●	–	–	●	●	●	–	●	–
FIS A M 16 x 200	090289	517939	090456	●	●	●	–	–	●	●	●	–	●	–
FIS A M 16 x 250	090290	517940	090457	●	●	●	–	–	●	●	●	–	●	–
FIS A M 16 x 300	090291	519402	090458	●	●	●	–	–	●	●	●	–	●	–
FIS A M 16 x 1000	509217 [1]	509225 [1]	509233 [1]	●	●	●	–	–	●	●	●	–	●	–
FIS A M 20 x 245	090292	519404	090459	●	●	●	–	–	●	–	●	–	●	–
FIS A M 20 x 290	090293	519406	090460	●	●	●	–	–	●	–	●	–	●	–
FIS A M 20 x 1000	–	519410 [1]	519427 [1]	●	●	●	–	–	●	–	●	–	●	–
FIS A M 24 x 290	090294	–	090461	●	●	●	–	–	●	–	●	–	●	–
FIS A M 24 x 380	090295	–	090462	●	●	●	–	–	●	–	●	–	●	–
FIS A M 24 x 1000	533881	551771	–	●	●	●	–	–	●	–	●	–	●	–
FIS A M 30 x 430	090297	–	090464	●	●	●	–	–	●	–	●	–	–	–
FIS A M 30 x 1000	–	552728	–	●	●	●	–	–	●	–	●	–	●	–



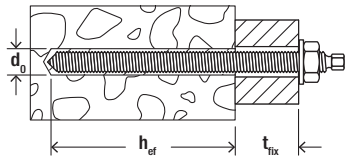
Technical data in concrete

Threaded rod FIS A

FIS A

	Zinc plated, steel grade 5.8	Zinc plated, steel grade 8.8	Stainless steel	Approval		Drill hole diameter d_0	Min. / max. anchorage depth	Min. / max. usable length	Min. / max. filling quantity FIS SB	Sales unit
	Item No.	Item No.	Item No.			[mm]	[mm]	[mm]	[scale units]	[pcs]
Item	gvz	gvz	R	ETA	ICC					
FIS A M 8 x 90	090274	519390	090440	●	●	10	60 / 78	1 / 19	2 / 3	10
FIS A M 8 x 110	090275	519391	090441	●	●	10	60 / 98	1 / 39	2 / 3	10
FIS A M 8 x 130	090276	519392	090442	●	●	10	60 / 118	1 / 59	2 / 4	10
FIS A M 8 x 140	–	553763	–	●	●	10	60 / 129	1 / 70	2 / 2	10
FIS A M 8 x 175	090277	519393	090443	●	●	10	60 / 160	4 / 104	2 / 5	10
FIS A M 8 x 1000	509214 [1]	509222 [1]	509230 [1]	●	●	10	60 / 160	–	2 / 5	10
FIS A M 10 x 110	090278	–	090444	●	●	12	60 / 96	1 / 37	3 / 4	10
FIS A M 10 x 130	090279	524170	090447	●	●	12	60 / 116	1 / 57	3 / 5	10
FIS A M 10 x 150	090281	517935	090448	●	●	12	60 / 136	1 / 77	3 / 5	10
FIS A M 10 x 170	044969	519395	044973	●	●	12	60 / 156	1 / 97	3 / 6	10
FIS A M 10 x 190	–	517936	–	●	●	12	60 / 176	1 / 117	3 / 7	10
FIS A M 10 x 200	090282	519396	090449	●	●	12	60 / 186	1 / 127	3 / 7	10
FIS A M 10 x 1000	509215 [1]	509223 [1]	509231 [1]	●	●	12	60 / 200	–	3 / 7	10
FIS A M 12 x 120	044971	519397	044974	●	●	14	70 / 103	1 / 34	3 / 5	10
FIS A M 12 x 140	090283	519398	090450	●	●	14	70 / 123	1 / 54	3 / 6	10
FIS A M 12 x 160	090284	517937	090451	●	●	14	70 / 143	1 / 74	3 / 7	10
FIS A M 12 x 180	090285	519399	090452	●	●	14	70 / 163	1 / 94	3 / 7	10
FIS A M 12 x 200	–	517938	–	●	●	14	70 / 183	1 / 114	3 / 8	10
FIS A M 12 x 210	090286	–	090453	●	●	14	70 / 193	1 / 124	3 / 9	10
FIS A M 12 x 260	090287	–	090454	●	●	14	70 / 240	4 / 174	3 / 10	10
FIS A M 12 x 1000	509216 [1]	509224 [1]	509232 [1]	●	●	14	70 / 240	–	3 / 10	10
FIS A M 16 x 130	044972	519400	044975	●	●	18	80 / 109	1 / 30	5 / 7	10
FIS A M 16 x 175	090288	519401	090455	●	●	18	80 / 154	1 / 75	5 / 10	10
FIS A M 16 x 200	090289	517939	090456	●	●	18	80 / 179	1 / 100	5 / 11	10
FIS A M 16 x 250	090290	517940	090457	●	●	18	80 / 229	1 / 150	5 / 14	10
FIS A M 16 x 300	090291	519402	090458	●	●	18	80 / 279	1 / 200	5 / 17	10
FIS A M 16 x 350	–	558865	–	●	●	18	80 / 320	10 / 250	4 / 16	10
FIS A M 16 x 1000	509217 [1]	509225 [1]	509233 [1]	●	●	18	80 / 320	–	5 / 19	10
FIS A M 20 x 245	090292	519404	090459	●	●	24	90 / 220	1 / 131	11 / 28	10
FIS A M 20 x 290	090293	519406	090460	●	●	24	90 / 265	1 / 176	11 / 32	10
FIS A M 20 x 350	–	559627	–	●	●	20	90 / 320	6 / 236	24 / 120	10
FIS A M 20 x 400	–	558866	–	●	●	20	90 / 375	1 / 286	10 / 42	10
FIS A M 20 x 1000	–	519410 [1]	519427 [1]	●	●	24	90 / 400	–	11 / 48	10
FIS A M 24 x 290	090294	–	090461	●	●	28	96 / 260	1 / 165	15 / 39	5
FIS A M 24 x 380	090295	–	090462	●	●	28	96 / 350	1 / 255	15 / 52	5
FIS A M 24 x 650	–	558868	–	●	●	28	90 / 480	141 / 525	13 / 63	5
FIS A M 24 x 450	–	558867	–	●	●	30	96 / 420	1 / 325	13 / 63	5
FIS A M 30 x 430	090297	–	090464	●	●	35	120 / 394	1 / 275	27 / 88	5
FIS A M 30 x 550	–	558869	–	●	●	35	120 / 515	1 / 396	24 / 120	5
FIS A M 30 x 650	–	558870	–	●	●	35	120 / 600	16 / 496	24 / 120	5
FIS A M 30 x 750	–	558871	–	●	●	35	120 / 600	116 / 596	24 / 120	5
FIS A M 6 x 70	046204	–	–	●		8	50	11	2	10
FIS A M 6 x 75	090243	–	090437	●		8	50	17	2	20
FIS A M 6 x 85	090272	–	–	●		8	50	27	2	20
FIS A M 6 x 110	090273	–	090439	●		8	50	50	2	20

1) Order washer and nut separately.



Technical data in concrete

Threaded rod RG M

RG M

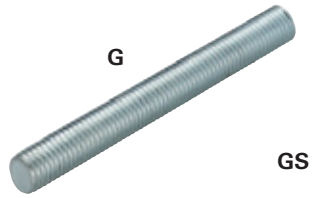
2

	Zinc plated, steel grade 5.8 Item No.	Zinc plated, steel grade 8.8 Item No.	Stainless steel Item No.	Approval	Drill hole diameter d_0 [mm]	Anchorage depth (short/standard/large) h_{ef} [mm]	Usable length (short/standard/large) t_{fix} [mm]	Fits capsule RSB	Sales unit [pcs]
Item	**gvz**	**gvz**	**R**	**ETA**					
RG M 8 x 110	**050256**	–	**050263**	●	10	- / 80 / -	- / 14 / -	1 x RSB 8	10
RG M 8 x 150	**095698**	**519443**	**050293**	●	10	- / 80 / -	- / 54 / -	1 x RSB 8	10
RG M 10 x 110	**535007**	–	**535009**	●	12	75 / - / -	15 / - / -	1 x RSB 10 Mini	10
RG M 10 x 130	**050257**	–	**050264**	●	12	75 / 90 / -	35 / 20 / -	1 x RSB 10 mini 1 x RSB 10	10
RG M 10 x 165	**050280**	–	**050294**	●	12	75 / 90 / -	70 / 55 / -	1 x RSB 10 mini 1 x RSB 10	10
RG M 10 x 190	**050281**	–	**050296**	●	12	75 / 90 / 150	95 / 80 / 20	1 x RSB 10 mini 1 x RSB 10 2 x RSB 10 mini	10
RG M 10 x 220	–	**519444**	–	●	12	75 / 90 / 150	125 / 110 / 50	1 x RSB 10 mini 1 x RSB 10 2 x RSB 10 mini	10
RG M 10 x 250	**095703**	–	**095701**	●	12	75 / 90 / 150	155 / 140 / 80	1 x RSB 10 mini 1 x RSB 10 2 x RSB 10 mini	10
RG M 10 x 350	**095718**	–	**095709**	●	12	75 / 90 / 150	255 / 240 / 180	1 x RSB 10 mini 1 x RSB 10 2 x RSB 10 mini	10
RG M 12 x 120	**535010**	–	**535011**	●	14	75 / - / -	21 / - / -	1 x RSB 12 mini	10
RG M 12 x 160	**050258**	–	**050265**	●	14	75 / 110 / -	61 / 26 / -	1 x RSB 12 mini 1 x RSB 12	10
RG M 12 x 180	**512248**	–	**512249**	●	14	75 / 110 / 150	81 / 46 / 6	1 x RSB 12 mini 1 x RSB 12 2 x RSB 12 mini	10
RG M 12 x 200	–	–	**050576**	●	14	75 / 110 / 150	101 / 66 / 26	1 x RSB 12 mini 1 x RSB 12 2 x RSB 12 mini	10
RG M 12 x 220	**050283**	**519445**	**050297**	●	14	75 / 110 / 150	121 / 86 / 46	1 x RSB 12 mini 1 x RSB 12 2 x RSB 12 mini	10
RG M 12 x 250	**050284**	–	**095702**	●	14	75 / 110 / 150	151 / 116 / 76	1 x RSB 12 mini 1 x RSB 12 2 x RSB 12 mini	10
RG M 12 x 300	**050285**	–	**095705**	●	14	75 / 110 / 150	201 / 166 / 126	1 x RSB 12 mini 1 x RSB 12 2 x RSB 12 mini	10
RG M 12 x 380	**095720** [2]	–	**095710** [1]	●	14	75 / 110 / 150	281 / 246 / 206	1 x RSB 12 mini 1 x RSB 12 2 x RSB 12 mini	10
RG M 16 x 140	**542407**	–	–	●	18	95 / - / -	13 / - / -	1 x RSB 16 mini 1 x RSB 16	10
RG M 16 x 165	**050287**	–	**095704**	●	18	95 / 125 / -	38 / 8 / -	1 x RSB 16 mini 1 x RSB 16	10
RG M 16 x 190	**050259**	–	**050266**	●	18	95 / 125 / -	63 / 33 / -	1 x RSB 16 mini 1 x RSB 16	10
RG M 16 x 250	**050288**	–	**050298**	●	18	95 / 125 / 190	123 / 93 / 28	1 x RSB 16 mini 1 x RSB 16 2 x RSB 16 mini	10
RG M 16 x 270	–	**519446**	–	●	18	95 / 125 / 190	143 / 113 / 48	1 x RSB 16 mini 1 x RSB 16 2 x RSB 16 mini	10

1) Straight cut, additional setting tool required

2) Straight cut, setting tool is enclosed.

Threaded rod G / Threaded stud GS



Properties Threaded Rod G

- Material (G 6 – G 24): DIN 976 Steel 4.8 acc. to DIN EN ISO 898-1
- Material (G 1/2" – G 3/4"): Steel S235 JR (material no. 1.0037) acc. to
- DIN EN 10025 Zinc plating: Electro zinc plated, 5 - 8 m

Properties Threaded Stud Gs

- Material: DIN 976 Steel 4.6 acc. to DIN EN ISO 898-1
- Zinc plating: Electro zinc plated, 3 - 8 m

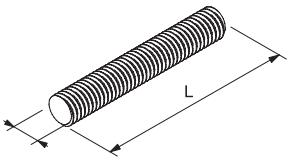
Properties Threaded Stud Gs A4

- Material A4: Stainless steel of the corrosion resistance class III, e.g. A4

Properties Threaded Rod G A2/a4

- Material A2: Stainless steel of the corrosion resistance class II, e.g. A2
- Material A2: Stainless steel of the corrosion resistance class III, e.g. A4

Technical data



Item	Art No.	Qty. per box (pcs.)	Length L (mm)	Thread M
Threaded rod G				
G 6	020956	50	1000	M 6
G 8	079740	25	1000	M 8
G 10	079744	25	1000	M 10
G 12	020957	20	1000	M 12
G 16	020958	10	1000	M 16
G 20	557295	5	1000	M 20
G 24	557270	5	1000	M 24
G 8/2	079741	25	2000	M 8
G 10/2	079745	25	2000	M 10
G 12/2	579746	25	2000	M 12
G 10/3	557092	5	3000	M 10
G 12/3	064056	5	3000	M 12
G 1/2"	064093	10	2000	1/2"
G 3/4"	077580	5	2000	3/4"
Stainless Steel A2				
G 8 A2	77644	5	1000	M 8
G 10 A2	65173	5	1000	M 10
Stainless Steel A4				
G 8 A4	77645	5	1000	M 8
G 10 A4	65174	5	1000	M 10

Item	Art No.	Qty. per box (pcs.)	Length L (mm)	Thread M
Threaded stud GS A4				
GS 8/40 A4	505536	100	40	M 8
GS 8/60 A4	505537	100	60	M 8
GS 10/40 A4	505538	100	40	M 10
GS 10/60 A4	505539	100	60	M 10
Threaded stud GS				
G S 8/25	079750	100	25	M 8
GS 8/40	079751	100	40	M 8
GS 8/50	079752	100	50	M 8
GS 8/60	079753	100	60	M 8
GS 8/70	079754	100	70	M 8
GS 8/80	079755	100	80	M 8
GS 8/100	079757	100	100	M 8
GS 8/150	079758	50	150	M 8
GS 8/200	079759	50	200	M 8
GS 10/25	079765	100	25	M 10
GS 10/40	079766	100	40	M 10
GS 10/60	079767	100	60	M 10
GS 10/80	079768	100	80	M 10
GS 10/100	079769	100	100	M 10
GS 10/120	079770	50	120	M 10
GS 10/150	079771	50	150	M 10
GS 10/200	079772	50	200	M 10
GS 12/40	091442	100	40	M 12
GS 12/60	091443	100	60	M 12
GS 12/80	091444	100	80	M 12
GS 12/100	091461	100	100	M 12
GS 12/120	091462	50	120	M 12
GS 12/150	091463	50	150	M 12
GS 12/200	091464	50	200	M 12

Loads

Technical Data - Threaded Rod GS

Item	Weight (kg/m[1])	Stressed (mm^2)	Moment of inertia (mm^4)	Section modulus (mm^2)	Permissible tensile force (kN)
Threaded rod G					
GS 8	0.39	37	201	50	5.3
GS 10	0.61	58	491	98	8.4
GS 12	0.88	84	1018	170	12.1

(1) - Yield strength = 240 Mpa (2) -Material safety factor = 1.2 & Load safety factor 1.4 are included

Technical Data - Threaded Rod G

Item	Weight (kg/m[1])	Stressed (mm^2)	Moment of inertia (mm^4)	Section modulus (mm^2)	Permissible tensile force (kN)
Threaded rod G					
G 6	0.22	20	64	21	3.9
G 8	0.39	37	201	50	7.0
G 10	0.61	58	491	98	11.1
G 12	0.88	84	1018	170	16.2
G 14	1.20	115	1885	269	22.2
G 16	1.57	157	3216	402	30.1
G 18	1.99	192	5152	572	37.0
G 20	2.45	245	7853	785	47.0
G 22	2.97	303	11497	1045	58.3
G 24	3.53	353	16283	1357	67.7

(1) - Yield strength = 320 Mpa (2) -Material safety factor = 1.2 & Load safety factor 1.4 are included

Internal-threaded anchor RG M I

Column bases

Pumps

Advantages

- The system internal threaded anchor RG M I and an injection mortar for concrete can be individually selected based on requirements, thus allowing for a wide range of applications.
- The internal threaded anchor RG M I allows for surface flush removal and reuse of the fixing point, and therefore offers the best possible flexibility.
- The metric internal thread allows for the use of standard screws or threaded rods for the ideal adaptation to suit the intended use.

Versions

- Zinc-plated steel
- Stainless steel

Building materials

Approved for:
- Concrete C20/25 to C50/60, non-cracked

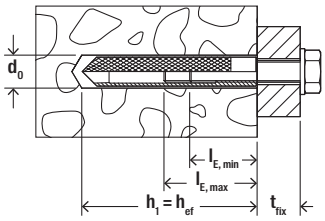
Also suitable for:
- Concrete C12/15, non-cracked

Functioning

- The injection system is suitable for pre-positioned installation when combined with the internal threaded anchor RG M I.
- The mortar is extruded bubble free from the drill hole base.
- The mortar bonds the entire surface of the internal threaded anchor with the drill hole wall and seals the drill hole.
- The internal threaded anchor is set manually, by lightly rotating it until it reaches the drill hole base.

Threaded rod RG M I

	Zinc plated, steel grade 5.8 gvz Art.-No.	Stainless steel R Art.-No.	 FIS SB Concrete	 FIS EM Plus Concrete	 FIS V Plus Concrete	 FIS V Concrete	 FIS VL Concrete	 FIS Green Concrete	 RSB Concrete	 RM II Concrete
RG 8 x 75 M 5 I	48221	–	–	–	–	–	–	–	–	–
RG 10 x 75 M 6 I	48222	–	–	–	–	–	–	–	–	–
RG 12 x 90 M8 I	50552	50565	●	●	●	●	●	●	●	●
RG 16 x 90 M10 I	50553	50566	●	●	●	●	●	●	●	●
RG 18 x 125 M12 I	50562	50567	●	●	●	●	●	●	●	●
RG 22 x 160 M16 I	50563	50568	●	●	●	●	●	●	●	●
RG 28 x 200 M20 I	50564	50569	●	●	●	●	●	●	●	●



Technical data

Internal-threaded anchor RG M I

2

RG M I

	Zinc-plated steel Item No.	Stainless steel Item No.	Drill hole diameter d_0 [mm]	Effect. anchorage depth h_{ef} [mm]	Min. bolt penetration $l_{E,min}$ [mm]	Max. bolt penetration $l_{E,max}$ [mm]	Fits capsules	Sales unit [pcs]
Item	**gvz**	**R**						
RG 8 x 75 M 5 I	**048221** 1)	–	10	75	8	14	539796 RM II 8	10
RG 10 x 75 M 6 I	**048222** 1)	–	12	75	10	16	539797 RM II 10	10
RG 12 x 90 M8 I	**050552** 1)	**050565** 1)	14	90	8	18	539797 RM II 10	10
RG 16 x 90 M10 I	**050553** 1)	**050566** 1)	18	90	10	23	539798 RM II 12	10
RG 18 x 125 M12 I	**050562** 1)	**050567** 1)	20	125	12	26	539800 RM II 16	10
RG 22 x 160 M16 I	**050563** 1)	**050568** 1)	24	160	16	35	539801 RM II 16 E	5
RG 28 x 200 M20 I	**050564** 1)	**050569** 1)	32	200	20	45	539803 RM II 24	5

1) Setting tool is included in each package.

Approval Seismic C1/C2 only with maximum embedment depth

Internal threaded sockets FIS E

Cable duct

Advantages

- The fixing system threaded rod FIS A and an injection mortar can be individually selected based on requirements, thus allowing for a wide range of applications.
- The wide range of approved threaded rods FIS A from M6 to M16 allows for various applications.
- The internal threaded anchor FIS E allows for surface flush removal and reuse of the fixing point, and therefore offers the best possible flexibility.

Versions

- Zinc-plated steel
- Stainless steel

Building materials

Approved for:
- Solid sand-lime brick
- Solid brick

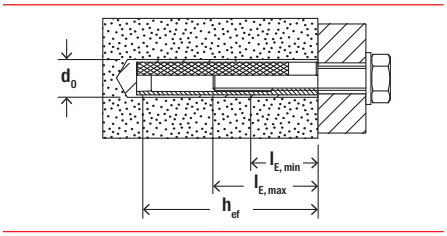
Also suitable for:
- Solid and lightweight concrete blocks
- Solid pumice and other solid building materials

Functioning

- FIS E is suitable for pre-positioned installation, whilst FIS A is suitable for pre-positioned and push-through installation.
- The mortar bonds the entire surface of the anchor with the drill hole wall and seals the drill hole.
- The anchor is set manually, by lightly rotating it until it reaches the drill hole base.

Internal threaded sockets FIS E

	Zinc plated, steel grade 5.8 gvz Art.-No.	Stainless steel R Art.-No.	FIS V Plus	FIS VL	FIS P Plus
FIS E 11 x 85 M6	43631	–	●	●	●
FIS E 11 x 85 M8	43632	562060	●	●	●
FIS E 15 x 85 M10	43633	562061	●	●	●
FIS E 15 x 85 M12	43634	–	●	●	●



Technical data in solid brick masonry

Internal threaded sockets FIS E

2

FIS E

	Zinc-plated steel	Stainless steel	Approval	Drill hole diameter	Effect. anchorage depth	Min. bolt penetration	Max. bolt penetration	Fill quantity for effect. anchorage depth in solid brick masonry	Sales unit
	Item No.	Item No.		d_0 [mm]	h_{ef} [mm]	$l_{E,min}$ [mm]	$l_{E,max}$ [mm]	[scale units]	[pcs]
Item	gvz	R	ETA						
FIS E 11 x 85 M6	043631	–	●	14	85	6	60	4	10
FIS E 11 x 85 M8	043632	562060	●	14	85	8	60	4	10
FIS E 15 x 85 M10	043633	562061	●	18	85	10	60	5	10
FIS E 15 x 85 M12	043634	–	●	18	85	12	60	5	10

Injection anchor sleeves

FIS H K

Advantages

- The grating structure of the FIS H K anchor sleeve is adapted for the injection mortars FIS V Plus, FIS V, FIS VL, FIS GREEN, FIS P Plus and FIS P, and ensures sparing mortar use with the best interlock.
- The centring blades perfectly align the anchor in the anchor sleeve, and allow for use with various threaded rod diameters.
- The barbed hooks secure the anchor sleeve in the drill hole and allow for a trouble-free overhead installation.
- The geometry of the anchor sleeves allows for the bridging of non-bearing layers for a simple and convenient installation.

Functioning

- The system can be used with any of the following injection mortars: FIS V Plus, FIS VW Plus High Speed, FIS VS Plus Low Speed, [... FIS V], FIS VL, FIS GREEN or FIS P Plus. FIS P can be used but does not have approvals.
- The system is suitable for pre-positioned installation when combined with injection anchor sleeves and threaded rods FIS A or internal threaded anchors FIS E.
- The anchor sleeve is placed in the drill hole, and filled with injection mortar from the anchor sleeve base.
- Turning in the anchor causes the mortar to be pushed through the anchor sleeve's grating structure, so that it fits the base material perfectly. The load is borne by the interlock.

FIS H L

Advantages

- The metal anchor sleeve can be cut to the required length and thus allows for a range of usable lengths with just one produce, providing flexibility and cost-effectiveness.
- The grating structure of the anchor sleeve allows for uniform distribution of mortar in the drill hole and thus for secure hold.

Functioning

- The anchor sleeve is at first cut to the required length.
- The anchor sleeve is placed in the drill hole, and filled with injection mortar from the anchor sleeve base.
- Turning in the anchor causes the mortar to be pushed through the anchor sleeve's grating structure, so that it fits the base material perfectly.
- The load is borne by the interlock.

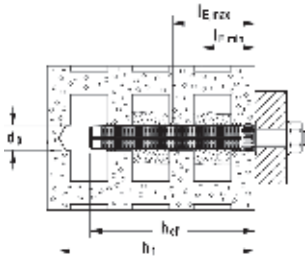
FIS H N

Advantage

- The net structure of the anchor sleeve allows for uniform distribution of mortar in the drill hole and thus for secure hold.

Functioning

- The anchor sleeve is placed in the drill hole, and filled with injection mortar from the anchor sleeve base.
- Turning in the anchor causes the mortar to be pushed through the anchor sleeve's grating structure, so that it fits the base material perfectly.
- The load is borne by the interlock.



Technical data

Injection anchor sleeves FIS H K

FIS H K

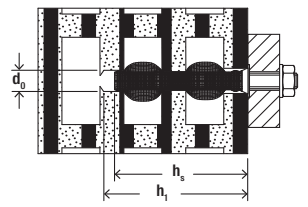
Item	Item No.	Approval ETA	Drill hole diameter d_0 [mm]	Drill hole depth acc. ETA [mm]	Effect. anchorage depth h_{ef} [mm]	Match	Fill quantity per sleeve [scale units]	Sales unit [pcs]
FIS H 12 x 50 K	041900	●	12	55	50	FIS A M6-M8	5	50
FIS H 12 x 85 K	041901	●	12	90	85	FIS A M6-M8	10	50
FIS H 16 x 85 K	041902	●	16	90	85	FIS A M8-M10, FIS E M6-M8	12	50
FIS H 16 x 130 K	041903	●	16	135	110	FIS A M8-M10	15	20
FIS H 20 x 85 K	041904	●	20	90	85	FIS A M12-M16, FIS E M10-M12	15	20
FIS H 20 x 130 K	046703	●	20	135	110	FIS A M12-M16	25	20
FIS H 20 x 200 K	046704	●	20	205	180	FIS A M12-M16	40	20

Technical data

Injection anchor sleeves FIS H L

FIS H L

Item	Item No.	Drill hole diameter d_0 [mm]	Total length l [mm]	Match	Fill quantity per 10 cm	Sales unit [pcs]
FIS H 12 x 1000 L	050598	12	1000	Ø6/M6 - Ø8/M8	12	10
FIS H 16 x 1000 L	050599	16	1000	Ø8/M8 - Ø10/M10	14	10
FIS H 22 x 1000 L	045301	22	1000	Ø12/M12 - Ø16/M16	20	6
FIS H 30 x 1000 L	000645	30	1000	Ø16/M16 - Ø22/M22	26	4



Technical data

Injection anchor sleeve with net FIS H N

FIS H N

Item	Item No.	Drill hole diameter d_0 [mm]	Min. drill hole depth h_1 [mm]	Min. anchorage depth anchor h_v [mm]	Fill quantity per sleeve [scale units]	Match	Sales unit [pcs]
FIS H 16 x 85 N	050470	16	95	85	15	Ø8/M8	20
FIS H 18 x 85 N	050472	18	95	85	17	Ø10/M10	20
FIS H 20 x 85 N	050474	20	95	90	18	Ø12/M12	20

Concrete-concrete shear connector FCC

The approved system for building renovation

Upgrade of bridges

Reinforcement of ceilings

Applications

- Bridge repairs
- Increasing load capacity of bridges
- Increasing loads of ceilings during conversion, for example
- Reinforcement of foundations, piers, columns and walls
- Renovation of car park ceilings following corrosion damage

Certificates

Advantages

- Due to its geometry and ease of installation, FCC is the rapid and economic alternative compared to the conventional installation method with bent iron.
- Dimensioning of the anchorage is possible thanks to the building approval. Thus, the system offers maximum security.
- Variable anchoring depths allow for ideal adaptation to the load to be applied, and ensure an optimised installation time and use of materials.
- Depending on site conditions, the FCC can be anchored, in compliance with the approval, with the injection mortars FIS SB or FIS EM Plus.
- In conjunction with FIS EM Plus, FCC is also approved for use in diamond-drilled drill holes.

Building materials

Approved for:

- Concrete C20/25 to C50/60, cracked and non-cracked
- Fixing in old concrete B 25 to B 55

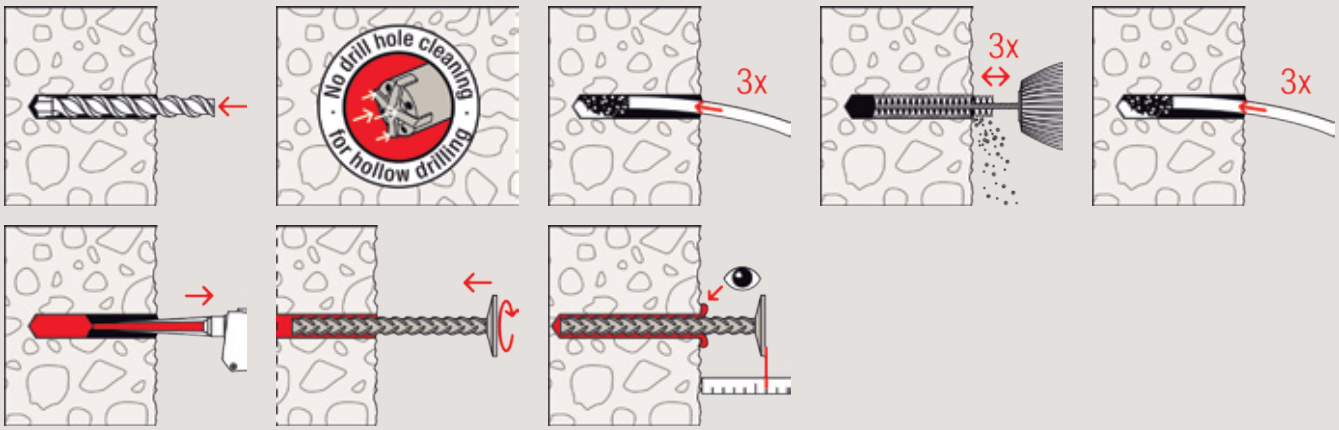
Versions

- Zinc-plated concrete steel bar B500B

Functioning

- The system consists of injection mortar (FIS SB or FIS EM Plus) and the concrete-concrete shear connector FCC.
- The mortar is injected bubble-free from the drill hole base.
- The mortar adheres the drill hole wall to the shear connector FCC.
- The shear connector is set manually, by lightly rotating it until it reaches the drill hole base.
- The tensile and shear forces arising in the joints between the old and new concrete are absorbed by the FCC-H and safely redirected.

Installation in concrete with FIS SB or FIS EM Plus and FCC-H



Technical data

Concrete-concrete shear connector FCC

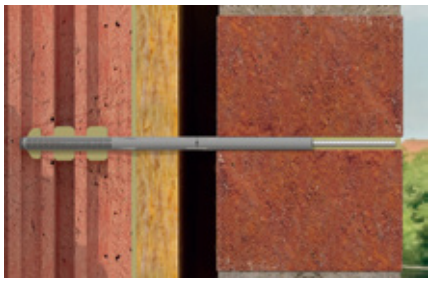
FCC-H

Item	Item No.	Approval	Drill hole diameter d_0 [mm]	Rebar diameter [mm]	Anchor length [mm]	Min. / standard anchorage depth [mm]	Min. / standard fill quantity e.g. FIS SB [scale units]	Sales unit [pcs]
		DIBt						
FCC-H 10 x 180	520081	●	12	10	180	60/120	2/4	100
FCC-H 12 x 230	520082 [1)]	●	14	12	230	70/155	3/7	50
FCC-H 14 x 290	520083 [1)]	●	18	14	290	75/195	6/14	50
FCC-H 16 x 360	520085 [1)]	●	20	16	360	80/240	7/20	25

1) Delivery time on request.

Remedial wall tie VBS 8

The professional façade repair for two-leaf cavity walls



Detail: Repairing outer leafs

Applications

- Post-installation needling of two-skin cavity walls

Advantages

- The expansion-force-free fixing prevents splitting and cracks. This means that VBS 8 can be used even in old and sensitive masonry.
- The drill bit diameter of just 8 mm means that a minimal amount of mortar is required for each fixing point. Thus VBS 8 is particularly economical.
- The installation is approved anywhere along the entire bed joint, thus ensuring a high level of installation safety.
- The grey colour of the injection mortar is similar to the colour of the bed joint. This means that the fixing is almost invisible to the eye.

Certificates

Building materials

- Facing masonry with and without an air layer

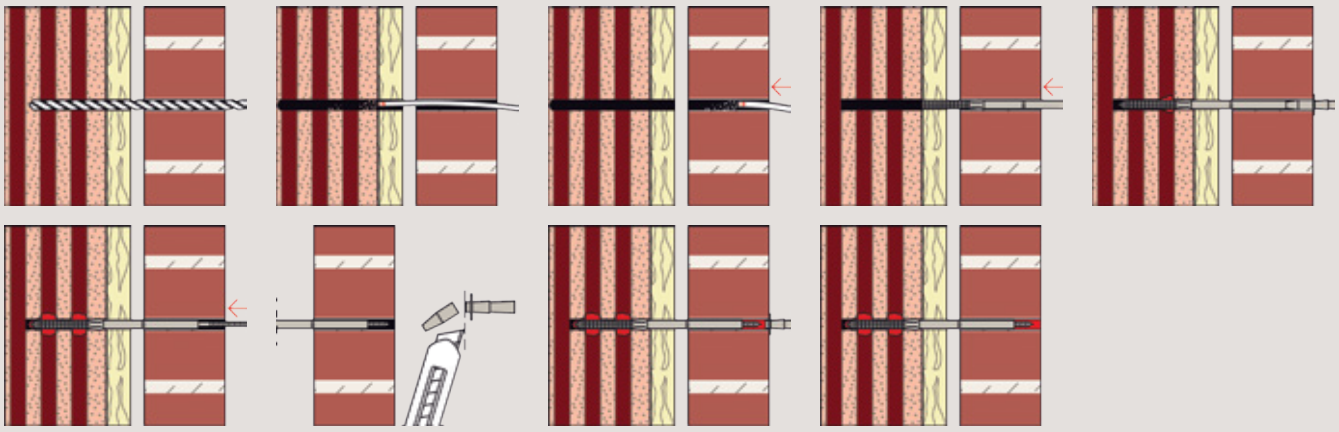
Versions

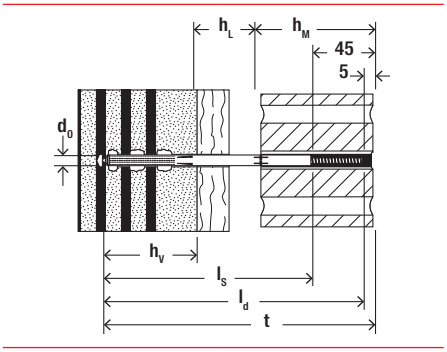
- Stainless steel

Functioning

- The remedial wall tie VBS 8 comprises a perforated plastic sleeve and a profiled stainless steel tie Ø 4 mm.
- VBS 8 is used together with the injection mortar FIS V Plus.
- The anchor is inserted in the bed joint of the outer leaf using push-through installation.

Installation in facing masonry with FIS V Plus and VBS 8





Technical data

Remedial wall tie VBS 8

VBS 8

Item	Stainless steel Item No. R	Approval DIBt	Cavity or insulation h_L [mm]	Drill hole diameter d_0 [mm]	Outer leaf [mm]	Depth = embedment depth $h_0 = h_s$ [mm]	Fixing length l [mm]	Anchorage depth h_v [mm]	Fill quantity FIS V bearing wall [scale units]	Sales unit [pcs]
VBS 8/20	**078763** 1)2)	●	0 - 20	8	≥ 90	195	188	>60	4	100
VBS 8/50	**078799** 1)2)	●	20 - 50	8	≥ 90	225	218	>60	4	100
VBS 8/80	**078800** 1)2)	●	50 - 80	8	≥ 90	255	248	>60	4	100
VBS 8/120	**078801** 1)2)	●	80 - 120	8	≥ 90	295	288	>60	6	100
VBS 8/150	**078802** 1)2)	●	120 - 150	8	≥ 90	325	318	>60	6	100

1) Product consisting of perforated plastic sleeve, profiled wire R and injection nozzle.

2) For the closing of the curtain walling about 2-3 additional scale units of mortar are required.

Accessories

Accessories (Remedial wall tie VBS 8)

Compressed-air cleaning tool

SDS-Plus Pointer, DIN 8039

Item	Item No.	Technical details	Sales unit [pcs]
VBS 8 cleaning set	**090241**	content: cleaning brush and extension tube for blow-out pump	1
Compressed-air cleaning tool	**093286**	for professional cleaning of the drill hole	1
SDS-Plus Pointer 8,0 / 460 mm	**074330**	Hammer drill with self-centring drill bit and relief-ground drill grooving	1

Dispenser

FIS DMS (511118)

Applications

- Shuttle cartridges with 360 and 390 ml content
- Cartridges with 150 ml content
- Multibond cartridges with 300 ml content
- Standard silicone cartridges

Advantages

- The 3-fold push rod distributes the extrusion forces equal over the cartridge and prevents the cartridge from tearing up.
- The robust glass fiber reinforced plastic housing increases the breaking strength of the dispenser and offers a long service life.
- The ergonomic design of the FIS DM S ensures a good balance and allows fatigue-free working.

FIS AM (58000)

Applications

- Shuttle cartridges with 360 and 390 ml content
- Cartridges with 150 ml content
- Multibond cartridges with 300 ml content
- Standard silicone cartridges

Advantages

- The robust design can withstand the high requirements of the job site and thus offers a long life.
- The infinitely variable feed allows the exact dosing and thus ensures easy handling.

FIS AC (96497)

Applications

- Coaxial cartridges with 380 and 410 ml content

Advantages

- The robust design can withstand the high requirements of the job site and thus offers a long life.
- The infinitely variable feed allows the exact dosing and thus ensures easy handling.

Battery-operated dispenser

Applications

- Energy-saving injection cartridge dispensing

Advantages

- The dosing function enables the efficient adjustment of the mortar quantity to match the drill hole size.
- The detachable handle and belt hook ensure particularly ergonomic use.
- The FIS DB S Pro battery dispenser can be universally used with the cartridge sizes 150ml, 300ml, 360ml and 390ml.
- The dispensing speed can be adjusted to the application via a controller.
- The sturdy design of the device guarantees reliable and long-lasting processing under demanding building site conditions.
- The 18V technology provides for the necessary dispensing power. Furthermore, the battery is compatible with all Cordless Alliance System (CAS) power tools and chargers worldwide.

Technical data

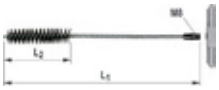
Battery-operated dispenser

Item	Art.-No.	Amount (pcs)	GTIN (EAN-Code)
Battery pack	1	1	4048962123296

Accessories

Accessories for drill hole cleaning

Cleaning brushes


BS


SDS-Adapter M8


Brush extension


Compressed air nozzle

Item	Item No.	Length [mm]	Length [mm]	Brush diameter [mm]	For drill diameter [mm]	Sales unit [pcs]
BS ø 8	**078177**	120	50	9	8	1
BS ø 10	**078178**	120	50	11	10	1
BS ø 12	**078179**	150	80	13	12	1
BS ø 14	**078180**	250	80	16	14	1
BS ø 16/18	**078181**	250	80	20	16/18	1
BS ø 20/22	**052277**	180	80	25	20/22	1
BS ø 24	**078182**	300	100	26	24	1
BS ø 25	**097806**	300	100	27	25	1
BS ø 28	**078183**	350	100	30	28	1
BS ø 30/32/35	**078184**	400	100	40	30/32/35	1
FIS brush extension	**508791**	410	–	–	–	1
Compressed air nozzle D16-D19	**511957**	–	–	–	–	2
Compressed air nozzle D20-D25	**511958**	–	–	–	–	2

Accessories

Drill hole cleaning (air)


Compressed-air cleaning tool


AB G


Centring wedge

Item	Item No.	Contents	Total length [mm]	Sales unit [pcs]
Compressed-air cleaning tool	**093286**	–	–	1
Blow-out pump AB G	**089300**	–	370	1
Centring wedge	**093076**	10 wedges for overhead installation, from M16	–	1

Accessories

Adapters and setting tools


RA-SDS


SK SW 8 1/2" VK


SDS plus 1/2" VK


SDS max 1/2" VK


SDS max 3/4" VK

Item	Item No.	Match	Sales unit [pcs]
RA-SDS	**062420**	Adapter suitable fits set screw	1
SK SW 8 1/2	**001536**	Adapter suitable fits threaded rods M8 - M22	1
SDS plus 1/2	**001537**	Adapter suitable fits threaded rods M8 - M16	1
SDS max 1/2	**001538**	Adapter suitable fits threaded rods M16 - M20	1
SDS max 3/4	**001539**	Adapter suitable fits threaded rods M20 - M30	1

Technical data

Conical drill bit

PBB

PBZ

	Item No.	Approval	Match	Contents	Sales unit [pcs]
Item		**ETA**			
Cone drill PBB	**090634**	●	M8 - M12; FIS E	1x cone drill PBB	1
Centring sleeve PBZ	**090671**	●	M8 - M12; FIS E	10x centring sleeve PBZ, 5x injection adapter	10

2

Accessories

Hexagonal nut and washer

Hexagonal nut and washer

	Zinc plated, steel grade 8.8 Item No.	Stainless steel Item No.	Width across nut SW [mm]	Washer (outer diameter x thickness) [mm]	Match [mm]	Sales unit [pcs]
Item	**gvz**	**R**				
Nut & washer M8	**510509**	**–**	13	16 x 1,6	FIS A M8	50
Nut & washer M10	**510510**	**–**	17	20 x 2	FIS A M10	50
Nut & washer M12	**510511**	**–**	19	24 x 2,5	FIS A M12	25
Nut & washer M16	**510512**	**–**	24	30 x 3	FIS A M16	20
Nut & washer M20	**519737**	**–**	30	37 x 3	FIS A M20	10
Nut & washer M24	**552110**	**–**	36	56 x 4	FIS A M24	5
Nut & washer M30	**559124**	**–**	46	56 x 4	FIS A M30	5
Nut & washer M8	**–**	**510513**	13	16 x 1,6	FIS A M8 R	50
Nut & washer M10	**–**	**510514**	17	20 x 2	FIS A M10 R	50
Nut & washer M12	**–**	**510515**	19	24 x 2,5	FIS A M12 R	25
Nut & washer M16	**–**	**510516**	24	30 x 3	FIS A M16 R	20
Nut & washer M20	**–**	**519738**	30	37 x 3	FIS A M20 R	10
Nut & washer M24	**–**	**552111**	36	56 x 4	FIS A M24 R	5

Accessories

Filling set

Filling sets for subsequent filling of the annular gap

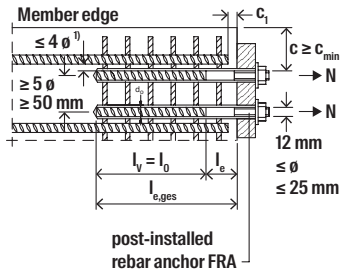
	Item No.	For use with injection mortar	Match	Sales unit [pcs]
Item				
Filling set M 12	**537218**	FIS SB, FIS EM Plus, FIS V	FIS A/RG M 12	10
Filling set M 16	**537219**	FIS SB, FIS EM Plus, FIS V	FIS A/RG M 16	10
Filling set M 20	**537220**	FIS SB, FIS EM Plus, FIS V	FIS A/RG M 20	10

Accessories

Filling set

Filling sets for subsequent filling of the annular gap

Item	Item No.	Match	Sales unit [pcs]
Filling set M 12	**537218**	FIS A/RG M 12	10
Filling set M 16	**537219**	FIS A/RG M 16	10
Filling set M 12 R	**557875**	FIS A/RG M 12 R	10
Filling set M 16 R	**557876**	FIS A/RG M 16 R	10
Filling set M 20 R	**557877**	FIS A/RG M 20 R	10
Filling set M 24 R	**557878**	FIS A/RG M 24 R	10
Filling set M 20 R push-through	**557879**	FIS A/RG M 20 R	10
Filling set M 24 R push-through	**557880**	FIS A/RG M 24 R	10



1) If the clear distance of the lapped bars is larger than 4 x ø, EC2 must be applied.

Technical data

Rebar anchor FRA

FRA

Item	Combi-nation of materials Item No.	Approval ETA	Total length l [mm]	Max. fixing thickness t_{fix} [mm]	Drill hole d_0 [Ø mm]	Fill quantity [scale units]	Sales unit [pcs]
FRA 12/900 M12-60	**505529** 1)	●	975	60	16	50	8
FRA 16/1100 M16-60	**505533** 1)	●	1180	60	20	81	8
FRA 20/1400 M20-60	**505534** 1)	●	1485	60	25	160	4

1) Further dimensions up to max. 1800 mm total length on request.

Technical data

FIS-Rebar case

FIS-Rebar Case for reinforcement connection

Item	Item No.	Approval	Contents	Sales unit [pcs]
		ETA		
FIS-Rebar case D	505941	●	8 x Cleaning brush BSB, 5 x Extensions for cleaning brushes à 40 cm, 1 x SDS Chuck with internal thread M 8, 24 x Injection adapter, 1 x Cleaning hose complete, 1 x Brush control template, 8 x Cleaning nozzle, 1 x Marker tape, 1 x Digital thermometer, 1 x Protective goggles, 1 x Installation instructions (german), 10 x Installation report, 2 x Flat spanner SW 7 and the relevant approvals	1
FIS-Rebar case Int	505942	●	8 x Cleaning brush BSB, 5 x Extensions for cleaning brushes à 40 cm, 1 x SDS Chuck with internal thread M 8, 24 x Injection adapter, 1 x Cleaning hose complete, 1 x Brush control template, 8 x Cleaning nozzle, 1 x Marker tape, 1 x Digital thermometer, 1 x Protective goggles, 1 x Installation instructions (german, english, french, italian, spanish), 10 x Installation report, 2 x Flat spanner SW 7 and the relevant approvals	1

Accessories

Cleaning brushes

Cleaning brush with thread M 8

Item	Item No.	Colour	Length [mm]	Sales unit [pcs]
BSB for drill-Ø 12 mm	001490	white	180	1
BSB for drill-Ø 14 mm	001491	blue	180	1
BSB for drill-Ø 16 mm	001492	red	180	1
BSB for drill-Ø 18 mm	001493	yellow	180	1
BSB for drill-Ø 20 mm	001494	green	180	1
BSB for drill-Ø 25 mm	001495	black	180	1
BSB for drill-Ø 30 mm	090063	grey	180	1
BSB for drill-Ø 35 mm	090071	brown	180	1
BSB for drill-Ø 40 mm	505061	–	180	1
BSB for drill-Ø 45 mm	506254	–	180	1
BSB for drill-Ø 55 mm	505062	–	180	1
SDS Chuck	530332	–	–	1
FIS brush extension	508791	–	420	1

Accessories

Injection adapter

Injection adapter for drill Ø 12 - 25 mm

Injection adapter for drill Ø 30 - 55 mm

Extension tube

Item	Item No.	Colour	Length [mm]	Sales unit [pcs]
Injection-adapter (Ø 9) for drill-Ø 12 mm	**001497**	ecru	–	10
Injection-adapter (Ø 9 for drill-Ø 14 mm	**001498**	blue	–	10
Injection-adapter (Ø 9) for drill-Ø 16 mm	**001499**	red	–	10
Injection-adapter (Ø 9) for drill-Ø 18 mm	**001483**	yellow	–	10
Injection-adapter (Ø 9 for drill-Ø 20 mm	**001506**	green	–	10
Injection-adapter (Ø 9) for drill-Ø 25 mm	**001507**	black	–	10
Injection-adapter (Ø 9) for drill-Ø 30 mm	**090689**	grey	–	10
Injection-adapter (Ø 9) for drill-Ø 35 mm	**090699**	brown	–	10
Injection-adapter (Ø 9) for drill-Ø 40 mm	**505077**	red	–	10
Injection-adapter (Ø 9) for drill-Ø 45 mm	**508909**	yellow	–	10
Injection-adapter (Ø 9) for drill-Ø 55 mm	**505078**	ecru	–	10
Injection-adapter (Ø 15) for drill-Ø 20 mm	**001508**	green	–	10
Injection-adapter (Ø 15) for drill-Ø 25 mm	**001509**	black	–	10
Injection-adapter (Ø 15) for drill-Ø 30 mm	**090700**	grey	–	10
Injection-adapter (Ø 15) for drill-Ø 35 mm	**090701**	brown	–	10
Injection-adapter (Ø 15) for drill-Ø 40 mm	**505079**	red	–	10
Injection-adapter (Ø 15) for drill-Ø 45 mm	**508910**	yellow	–	10
Injection-adapter (Ø 15) for drill-Ø 55 mm	**505080**	ecru	–	10
FIS Extension tube	**048983**	–	1000	10
FIS EXT Ø 15	**530800**	transparent	10000	1

Accessories

Drilling aid / scrabbeling tool

Drilling aid

SDS-max scrabbeling tool

Item	Item No.	Match	Dimensions [mm]	Sales unit [pcs]
Drilling aid 3pcs.	**090819** [1)]	–	–	1
Scrabbeling tool	**001253**	Chuck type SDS max	45 x 240	1

1) delivery on request

Accessories

Compressed air nozzles

Compressed air nozzle

Item	Item No.	Match	Sales unit [pcs]
Compressed air nozzle D12-D15	**511956**	Drill diameter Ø 12 - 15 mm	2
Compressed air nozzle D16-D19	**511957**	Drill diameter Ø 16 - 19 mm	2
Compressed air nozzle D20-D25	**511958**	Drill diameter Ø 20 - 25 mm	2
Compressed air nozzle D30-D35	**511959**	Drill diameter Ø 30 - 35 mm	2
Compressed air nozzle D40-D55	**511960** [1)]	Drill diameter Ø 40 - 45 mm	2

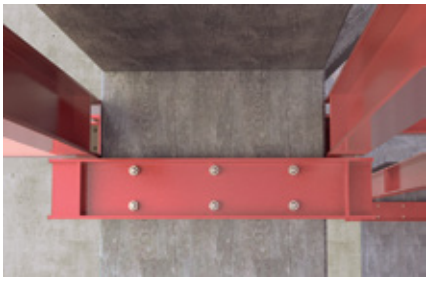
1) Delivery time on request.

3
High performance steel anchors

Bolt anchor FAZ II

For highest demands. Powerful and flexible.

Balcony railings



Steel girders

Applications

- Steel constructions
- Guard rails
- Consoles
- Ladders
- Cable trays
- Machines
- Staircases
- Gates
- Façades
- Timber constructions

Advantages

- According to the new assessment (ETA) the tensile load capacities are decisively increased. This requires less anchors.
- The variable anchorage depths for the sizes M8 to M16 allow for the first time a millimeter-accurate adjustment to the loads.
- The design with cap nut offers a visually attractive anchoring and protects against injuries due to the round head shape.
- The first bolt anchor M6 with ETA Assessment for Option 1, for secure and approved anchorage.
- The international approvals guarantees maximum safety and the best performance.
- Approved for diamond-drilled holes.

Certificates

ETA-05/0069, for cracked concrete

from M10

ICC ESR-2948

Fire resistance classification R120

INOX STAINLESS STEEL

ZTV

Building materials

Approved for:
- Concrete C20/25 to C50/60, cracked and non-cracked

Also suitable for:
- Concrete C12/15
- Concrete C80/95
- Natural stone with dense structure

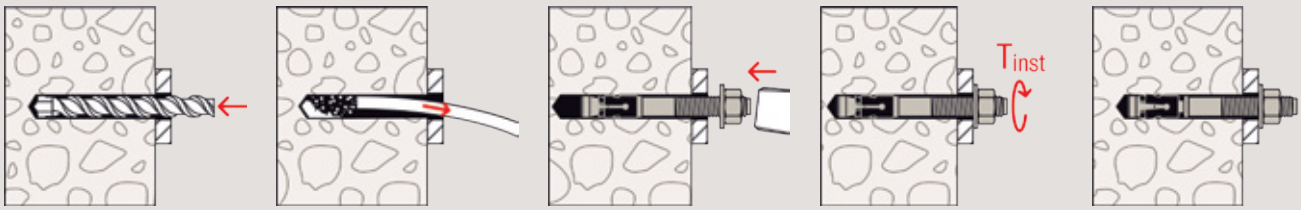
Versions

- Zinc-plated steel
- Stainless steel R
- Highly corrosion-resistant steel HCR

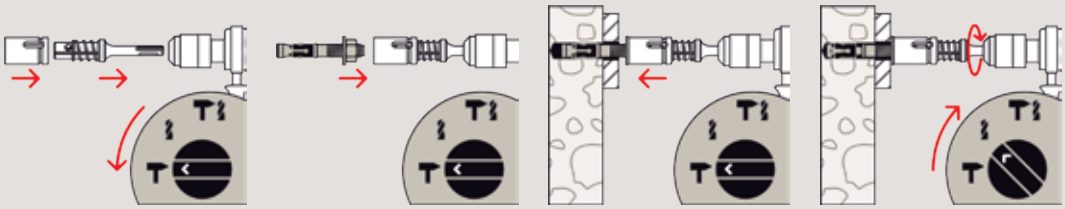
Functioning

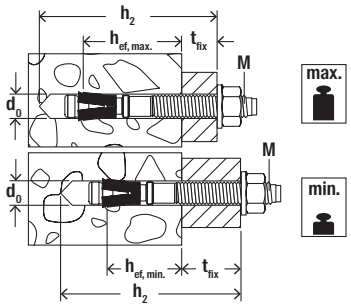
- The FAZ II is suitable for pre-positioned and push-through installation and is also ideal for stand-off installation thanks to the long thread.
- When applying the torque, the cone bolt is pulled into the expansion sleeve and expand it against the drill hole wall.
- The anchor is set in line with the approval once the preset installation torque is achieved.
- In the case of series installation, we recommend using the FABS anchor bolt setting tool or our setting tool FA-ST.

Push-through installation with hexagon nut



Installation with setting tool





Technical data

3

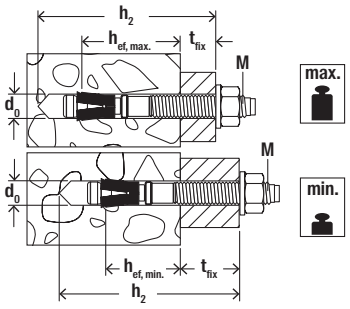
Bolt anchor FAZ II

FAZ II

	Zinc-plated steel	Stainless steel	Highly corrosion resistant steel	Approval		Seismic-Approval	Drill hole diameter	Min. drill hole depth for through fixings	Max. usable length hef,max./ hef,min.	Anchor length	Thread	Width across nut	Sales unit
	Item No.	Item No.	Item No.				d_0	h_2	t_{fix}	l	Ø x length	SW	
Item	gvz	R	HCR	ETA	ICC		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[pcs]
FAZ II 6/10	542621	542623	–	●	–	–	6	60	10/-	65	M 6 x 25	10	50
FAZ II 6/20	542622	542624	–	●	–	–	6	70	20/-	75	M 6 x 35	10	50
FAZ II 8/10	094871 [1)]	501396 [1)]	–	●	●	C1	8	65	10/20	75	M 8 x 38	13	50
FAZ II 8/10	–	–	501428 [1)]	●	●	C1	8	65	10/20	75	M 8 x 38	13	10
FAZ II 8/30	094877 [1)]	501399 [1)]	–	●	●	C1	8	85	30/40	95	M 8 x 58	13	50
FAZ II 8/30	–	–	501429 [1)]	●	●	C1	8	85	30/40	95	M 8 x 58	13	10
FAZ II 8/50	094878 [1)]	501401	–	●	●	C1	8	105	50/60	115	M 8 x 78	13	50
FAZ II 8/100	094879 [1)]	–	–	●	●	C1	8	155	100/110	165	M 8 x 128	13	25
FAZ II 8/160	503251 [1)]	–	–	●	●	C1	8	215	160/170	225	M 8 x 100	13	20
FAZ II 10/10	094981	501403	–	●	●	C1 / C2	10	85	10/30	95	M 10 x 53	17	50
FAZ II 10/10	–	–	501430	●	●	C1	10	85	10/30	95	M 10 x 53	17	10
FAZ II 10/20	094982	–	–	●	●	C1 / C2	10	95	20/40	105	M 10 x 63	17	25
FAZ II 10/20	–	501406	–	●	●	C1 / C2	10	95	20/40	105	M 10 x 63	17	50
FAZ II 10/30	094983	–	–	●	●	C1 / C2	10	105	30/50	115	M 10 x 73	17	25
FAZ II 10/30	–	501407	–	●	●	C1 / C2	10	105	30/50	115	M 10 x 73	17	50
FAZ II 10/30	–	–	503185	●	●	C1	10	105	30/50	115	M 10 x 73	17	10
FAZ II 10/50	094984	501409	–	●	●	C1 / C2	10	125	50/70	135	M 10 x 93	17	20
FAZ II 10/70	–	501410	–	●	●	C1 / C2	10	145	70/90	155	M 10 x 113	17	20
FAZ II 10/80	094985	–	–	●	●	C1 / C2	10	155	80/100	165	M 10 x 123	17	20
FAZ II 10/100	–	501411	–	●	●	C1 / C2	10	175	100/120	185	M 10 x 100	17	20
FAZ II 10/100	094986	–	–	●	●	C1 / C2	10	175	100/120	185	M 10 x 143	17	20
FAZ II 10/160	–	501412	–	●	●	–	10	235	160/180	245	M 10 x 100	17	20
FAZ II 10/160	503252	–	–	●	●	–	10	235	160/180	245	M 10 x 193	17	20
FAZ II 12/10	095419	501413	–	●	●	C1 / C2	12	100	10/30	110	M 12 x 61	19	20
FAZ II 12/10	–	–	503186	●	●	C1	12	100	10/30	110	M 12 x 61	19	10
FAZ II 12/20	095420	501415	–	●	●	C1 / C2	12	110	20/40	120	M 12 x 71	19	20
FAZ II 12/30	095421	501416	–	●	●	C1 / C2	12	120	30/50	130	M 12 x 81	19	20
FAZ II 12/30	–	–	501431	●	●	C1	12	120	30/50	130	M 12 x 81	19	10
FAZ II 12/50	095446	501419	–	●	●	C1 / C2	12	140	50/70	150	M 12 x 101	19	20
FAZ II 12/60	–	501420	–	●	●	C1 / C2	12	150	60/80	160	M 12 x 111	19	20
FAZ II 12/80	095454	–	–	●	●	C1 / C2	12	170	80/100	180	M 12 x 131	19	20
FAZ II 12/100	095470	501421	–	●	●	C1 / C2	12	190	100/120	200	M 12 x 151	19	20
FAZ II 12/160	503253	–	–	●	●	–	12	250	160/180	260	M 12 x 186	19	10
FAZ II 12/160	–	503180	–	●	●	–	12	250	160/180	260	M 12 x 100	19	20
FAZ II 12/200	095605	–	–	●	●	–	12	290	200/220	300	M 12 x 186	19	10
FAZ II 16/5	522124	–	–	●	●	C1 / C2	16	115	5/25	128	M 16 x 64	24	10
FAZ II 16/5	–	522125	–	●	●	C1 / C2	16	115	5/25	128	M 16 x 64	24	20
FAZ II 16/25	–	501423	–	●	●	C1 / C2	16	135	25/45	148	M 16 x 84	24	20

1) With minimum embedment depth only for statically interdeterminate systems

Approval Seismic C1/C2 only with maximum embedment depth



Technical data

Bolt anchor FAZ II

FAZ II

	Zinc-plated steel	Stainless steel	Highly corrosion resistant steel	Approval		Seismic-Approval	Drill hole diameter	Min. drill hole depth for through fixings	Max. usable length hef,max./ hef,min.	Anchor length	Thread	Width across nut	Sales unit
	Item No.	Item No.	Item No.				d_0	h_2	t_{fix}	l	Ø x length	SW	
Item	gvz	R	HCR	ETA	ICC		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[pcs]
FAZ II 16/25	–	–	501432	●	●	C1	16	135	25/45	148	M 16 x 84	24	10
FAZ II 16/25	095836	–	–	●	●	C1 / C2	16	135	25/45	148	M 16 x 84	24	10
FAZ II 16/50	095864	–	–	●	●	C1 / C2	16	160	50/70	173	M 16 x 109	24	10
FAZ II 16/50	–	–	503187	●	●	C1	16	160	50/70	173	M 16 x 109	24	10
FAZ II 16/50	–	501424	–	●	●	C1 / C2	16	160	50/70	173	M 16 x 109	24	20
FAZ II 16/100	095865	501425	–	●	●	C1 / C2	16	210	100/120	223	M 16 x 159	24	10
FAZ II 16/160	503254	–	–	●	●	C1 / C2	16	270	160/180	283	M 16 x 189	24	10
FAZ II 16/200	095967	–	–	●	●	–	16	310	200/220	323	M 16 x 189	24	10
FAZ II 16/250	095968	–	–	●	●	–	16	360	250/270	373	M 16 x 100	24	10
FAZ II 16/300	096188	–	–	●	●	–	16	410	300/320	423	M 16 x 100	24	10
FAZ II 20/30	046632	–	–	●	●	C1 / C2	20	155	30/-	172	M 20 x 54	30	5
FAZ II 20/30	–	501426	–	●	●	C1 / C2	20	155	30/-	172	M 20 x 54	30	4
FAZ II 20/60	046633	–	–	●	●	C1 / C2	20	185	60/-	202	M 20 x 84	30	5
FAZ II 20/60	–	503183	–	●	●	C1 / C2	20	185	60/-	202	M 20 x 84	30	4
FAZ II 20/160	503255	–	–	●	●	C1 / C2	20	285	160/-	302	M 20 x 100	30	5
FAZ II 24/30	046635	–	–	●	●	C1	24	185	30/-	205	M 24 x 58	36	5
FAZ II 24/30	–	501427	–	●	●	C1	24	185	30/-	205	M 24 x 58	36	4
FAZ II 24/60	046636	–	–	●	●	C1	24	215	60/-	235	M 24 x 88	36	5
FAZ II 24/60	–	503184	–	●	●	C1	24	215	60/-	235	M 24 x 88	36	4

1) With minimum embedment depth only for statically interdeterminate systems

Approval Seismic C1/C2 only with maximum embedment depth

Accessories

Bolt anchor setting tool FA-ST II

FA-ST II

FA-ST II Set

Replacement spring

Item	Item No.	Contents	Matching anchor type	Sales unit [pcs]
FABS	**077937**	–	FAZ II, FBZ, FBN II for diameter from M6 - M12	1
FA-ST II M10	**558790**	SDS adapter; socket SW17	FAZ II M10, FBZ M10, FBN II M10, EXA M10	1
FA-ST II M12	**558791**	SDS adapter; socket SW19	FAZ II M12, FBZ M12, FBN II M12, EXA M12	1
FA-ST II M16	**558792**	SDS adapter; socket SW24	FAZ II M16, FBZ M16, FBN II M16, EXA M16	1
FA-ST II Set	**558789**	SDS adapter; socket SW17, SW19, SW24	FAZ II M10/M12/M16, FBZ M10/M12/M16, FBN II M10/M12/M16, EXA M10/M12/M16	1
FA-ST II spring	**558793**	Replacement spring	FA-ST II M10/M12/M16	5

Loads

Bolt anchor FAZ II

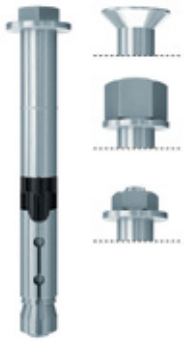
Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-05/0069 has to be considered.

					Cracked concrete				Non-cracked concrete			
					Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type	Material/ surface[2]	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Instal-lation torque T_{inst} [Nm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
FAZ II 6	gvz	40	90	8	0.7	3.4	35	45	3.6	3.4	35	45
	R	40	90	8	0.7	5.0	35	45	5.0	5.0	35	45
FAZ II 8	gvz	35	80	20	2.6	7.8	35	40	4.9	7.8	40	40
	gvz	45	90	20	3.8	7.8	35	40	6.7	7.8	40	40
	R	35	80	20	2.6	8.5	35	40	4.9	9.6	40	40
	R	45	90	20	3.8	9.6	35	40	6.7	9.6	40	40
FAZ II 10	gvz	40	90	45	4.1	10.8	40	45	5.9	12.2	40	45
	gvz	60	110	45	6.2	12.2	40	45	9.5	12.2	40	45
	R	40	90	45	4.1	12.2	40	45	5.9	15.1	40	45
	R	60	110	45	6.2	15.1	40	45	9.5	15.1	40	45
FAZ II 12	gvz	50	100	60	5.8	17.5	50	55	8.3	17.5	50	55
	gvz	70	120	60	9.5	17.5	50	55	10.5	17.5	50	55
	R	50	100	60	5.8	18.0	50	55	8.3	21.9	50	55
	R	70	120	60	9.5	21.9	50	55	10.5	21.9	50	55
FAZ II 16	gvz	65	140	110	8.6	27.5	65	65	12.3	31.4	65	65
	gvz	85	140	110	12.9	31.4	65	65	18.4	31.4	65	65
	R	65	140	110	8.6	27.5	65	65	12.3	36.8	65	65
	R	85	140	110	12.9	38.6	65	65	18.4	39.9	65	65
FAZ II 20	gvz	100	170	200	16.4	42.6	95	85	23.4	46.5	95	95
	R	100	170	200	16.4	42.6	95	85	23.4	60.7	95	95
FAZ II 24	gvz	125	210	270	22.9	55.0	100	100	32.7	62.9	100	135
	R	125	210	270	22.9	55.0	100	100	32.7	78.6	100	135

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of γ_L = 1.4 are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.
[2] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

High performance anchor FH II

Strong, secure and aesthetic anchoring



Steel girders

Banisters

Applications

- Guard rails
- Staircases
- Consoles
- Steel constructions
- Ladders
- Cable trays
- Machines
- Gates
- Façades
- Gratings

Advantages

- The international approvals guarantee maximum safety and the best performance. These approvals even cover use in earthquake zones (seismic C1 and C2).
- The anchor is designed with different head styles for fixing points with aesthetic design.
- The design between the bolt and the sleeve ensures high shear load-bearing capacity. Thus, fewer fixing points are required.
- The optimised geometry minimises the energy required for installation and thus allows for fast installation.
- The use of hollow drills is included in the approval.

Certificates

ETA-07/0025, for cracked concrete

from M10

Fire resistance classification R120

ICC ESR-2691

INOX STAINLESS STEEL

M8 - M20

Building materials

- Concrete C20/25, cracked and non-cracked

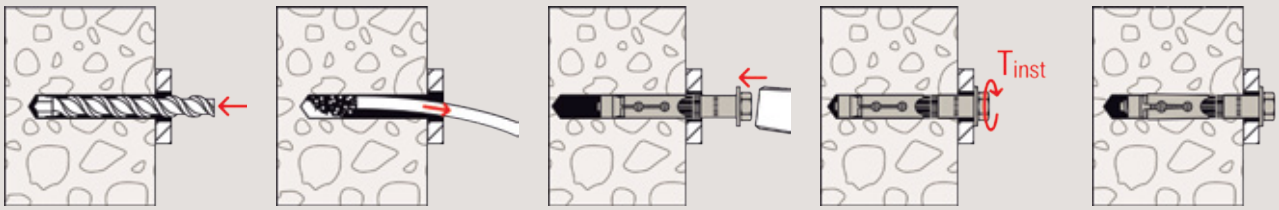
Versions

- Zinc-plated steel
- Stainless steel R

Functioning

- The FH II is suitable for push-through installation.
- When the torque is applied, the cone is pulled into the expansion sleeve which is forced against the drill hole wall.
- The black plastic ring prevents rotation when tightening the anchor and acts as a crumple zone to take the torque slippage, so that the fixture of pulled onto the substrate.
- Alternative head designs for flexible design solutions:
  Hexagon head (type S), countersunk head (type SK), bolt version with nut and washer (type B) and cap nut (type H).

Installation FH II



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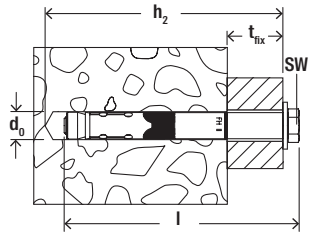
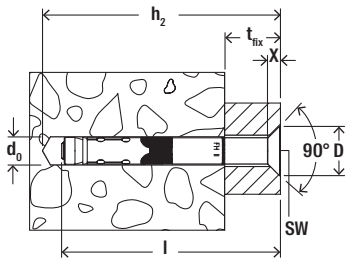


Technical data

High performance anchor FH II-S

FH II-S with hexagonal head

Item	Zinc-plated steel Item No. gvz	Stainless steel Item No. R	Approval ETA	 ICC	Seis-mic-Ap-proval	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Anchor length l [mm]	Max. fixture thickness t_{fix} [mm]	Thread M	Width across nut SW [mm]	Sales unit [pcs]
FH II 10/10 S	503133	–	●	–	–	10	65	70	10	M 6	10	50
FH II 10/10 S	–	510923	●	–	–	10	65	69	10	M 6	10	50
FH II 10/25 S	503134	–	●	–	–	10	80	75	25	M 6	10	50
FH II 10/25 S	–	510924	●	–	–	10	80	84	25	M 6	10	50
FH II 10/50 S	503135	–	●	–	–	10	105	110	50	M 6	10	50
FH II 12/10 S	044884	–	●	●	C1 / C2	12	90	90	10	M 8	13	50
FH II 12/10 S	–	510925	●	●	C1 / C2	12	90	90	10	M 8	13	50
FH II 12/25 S	044885	–	●	●	C1 / C2	12	105	105	25	M 8	13	50
FH II 12/25 S	–	510926	●	●	C1 / C2	12	105	105	25	M 8	13	20
FH II 12/50 S	044886	–	●	●	C1 / C2	12	130	130	50	M 8	13	25
FH II 15/10 S	044887	–	●	●	C1 / C2	15	100	106	10	M 10	17	25
FH II 15/10 S	–	510927	●	●	C1 / C2	15	100	107	10	M 10	17	50
FH II 15/25 S	044888	–	●	●	C1 / C2	15	115	121	25	M 10	17	25
FH II 15/25 S	–	510928	●	●	C1 / C2	15	115	122	25	M 10	17	20
FH II 15/50 S	044889	–	●	●	C1 / C2	15	140	146	50	M 10	17	25
FH II 18/10 S	046847	–	●	●	C1 / C2	18	115	118	10	M 12	19	20
FH II 18/25 S	044894	–	●	●	C1 / C2	18	130	132	25	M 12	19	20
FH II 18/25 S	–	510929	●	●	C1 / C2	18	130	133	25	M 12	19	10
FH II 18/50 S	044896	–	●	●	C1 / C2	18	155	157	50	M 12	19	20
FH II 24/25 S	044898	–	●	●	C1 / C2	24	150	160	25	M 16	24	10
FH II 24/25 S	–	502711	●	●	C1 / C2	24	150	160	25	M 16	24	8
FH II 24/50 S	044900	–	●	●	C1 / C2	24	175	185	50	M 16	24	10
FH II 28/30 S	044901	–	●	●	C1 / C2	28	185	192	30	M 20	30	4
FH II 28/60 S	044902	–	●	●	C1 / C2	28	215	222	60	M 20	30	4
FH II 32/30 S	044903	–	●	●	C1 / C2	32	210	215	30	M 24	36	4
FH II 32/60 S	044904	–	●	●	C1 / C2	32	240	245	60	M 24	36	4



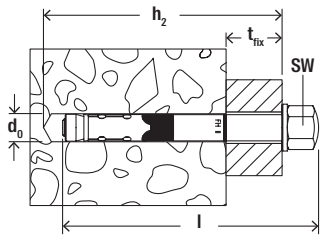
	X [mm]	Ø D [mm]
FH II 10/... SK	5,0	19,5
FH II 12/... SK	5,8	22
FH II 15/... SK	5,8	25
FH II 18/... SK	8,0	32

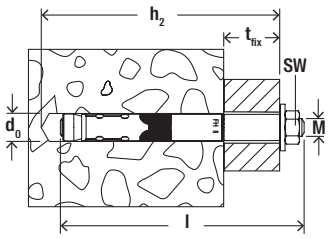
Technical data

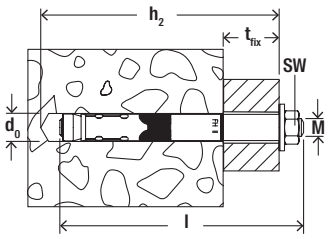
High performance anchor FH II-SK

FH II-SK with countersunk head

	Zinc-plated steel	Stainless steel	Approval		Seis-mic-Ap-proval	Drill hole diameter	Min. drill hole depth for through fixings	Anchor length	Max. fixture thickness	Thread	Width across nut (hexagon socket)	Sales unit
	Item No.	Item No.				d_0	h_2	l	t_{fix}	M	SW	
Item	gvz	R	ETA	ICC		[mm]	[mm]	[mm]	[mm]		[mm]	[pcs]
FH II 10/15 SK	503136	–	●	–	–	10	70	65	15	M 6	4	50
FH II 10/25 SK	503137	–	●	–	–	10	80	75	25	M 6	4	50
FH II 10/50 SK	503138	–	●	–	–	10	105	100	50	M 6	4	50
FH II 12/15 SK	044917	510931	●	–	C1 / C2	12	95	90	15	M 8	5	25
FH II 12/25 SK	044918	–	●	–	C1 / C2	12	105	100	25	M 8	5	25
FH II 12/30 SK	–	510932	●	–	C1 / C2	12	110	105	30	M 8	5	25
FH II 12/50 SK	044919	510933	●	–	C1 / C2	12	130	125	50	M 8	5	25
FH II 15/15 SK	044920	510934	●	●	C1 / C2	15	105	100	15	M 10	6	25
FH II 15/25 SK	044921	–	●	●	C1 / C2	15	115	110	25	M 10	6	25
FH II 15/50 SK	044922	–	●	●	C1 / C2	15	140	135	50	M 10	6	25
FH II 18/15 SK	044923	–	●	●	C1 / C2	18	120	115	15	M 12	8	20
FH II 18/25 SK	044924	–	●	●	C1 / C2	18	130	125	25	M 12	8	20
FH II 18/30 SK	–	510935	●	●	C1 / C2	18	135	130	30	M 12	8	20
FH II 18/50 SK	044925	–	●	●	C1 / C2	18	155	150	50	M 12	8	20







Technical data

3

High performance anchor FH II-H

FH II-H with cap nut

High performance anchor FH II-B

FH II-B with hexagon nut and threaded bolt

High performance anchor FH II-B

FH II-B with hexagon nut and threaded bolt

	Zinc-plated steel	Approval		Seismic-Ap-proval	Drill hole diameter	Min. drill hole depth for through fixings	Anchor length	Max. fixture thickness	Thread	Width across nut	Sales unit
	Item No.				d_0 [mm]	h_2 [mm]	l [mm]	t_{fix} [mm]	M	SW [mm]	[pcs]
Item	gvz	ETA	ICC								
FH II 10/10 H	503139	●	–	–	10	65	75	10	M 6	13	50
FH II 10/25 H	503140	●	–	–	10	80	90	25	M 6	13	50
FH II 10/50 H	503141	●	–	–	10	105	115	50	M 6	13	50
FH II 12/10 H	044905	●	–	C1 / C2	12	90	100	10	M 8	17	50
FH II 12/25 H	044906	●	–	C1 / C2	12	105	115	25	M 8	17	50
FH II 12/50 H	044907	●	–	C1 / C2	12	130	140	50	M 8	17	25
FH II 15/10 H	044908	●	●	C1 / C2	15	100	115	10	M 10	17	25
FH II 15/25 H	044909	●	●	C1 / C2	15	115	130	25	M 10	17	25
FH II 15/50 H	044910	●	●	C1 / C2	15	140	155	50	M 10	17	25
FH II 18/25 H	044915	●	●	C1 / C2	18	130	145	25	M 12	19	20
FH II 18/50 H	044916	●	●	C1 / C2	18	155	170	50	M 12	19	20
FH II 10/10 B	503142	●	–	–	10	65	70	10	M 6	10	50
FH II 10/25 B	503143	●	–	–	10	80	75	25	M 6	10	50
FH II 10/50 B	503144	●	–	–	10	105	110	50	M 6	10	50
FH II 12/10 B	048773	●	●	C1 / C2	12	90	95	10	M 8	13	50
FH II 12/100 B	046832	●	●	C1 / C2	12	180	185	100	M 8	13	25
FH II 12/25 B	048774	●	●	C1 / C2	12	105	110	25	M 8	13	50
FH II 12/50 B	048775	●	●	C1 / C2	12	130	135	50	M 8	13	25
FH II 15/10 B	048776	●	●	C1 / C2	15	100	110	10	M 10	17	25
FH II 15/100 B	046835	●	●	C1 / C2	15	190	200	100	M 10	17	20
FH II 15/25 B	048777	●	●	C1 / C2	15	115	125	25	M 10	17	25
FH II 15/50 B	048778	●	●	C1 / C2	15	140	150	50	M 10	17	25
FH II 18/100 B	046841	●	●	C1 / C2	18	205	215	100	M 12	19	10
FH II 18/25 B	048779	●	●	C1 / C2	18	130	140	25	M 12	19	20
FH II 18/50 B	048780	●	●	C1 / C2	18	155	165	50	M 12	19	20
FH II 24/100 B	046842	●	●	C1 / C2	24	225	242	100	M 16	24	5
FH II 24/25 B	048886	●	●	C1 / C2	24	150	167	25	M 16	24	10
FH II 24/50 B	048887	●	●	C1 / C2	24	175	192	50	M 16	24	10
FH II 28/100 B	506630 [1)]	●	●	–	28	255	271	100	M 20	30	4
FH II 28/30 B	047547	●	●	C1 / C2	28	185	199	30	M 20	30	4
FH II 28/60 B	047548	●	●	C1 / C2	28	215	229	60	M 20	30	4
FH II 32/30 B	047549	●	●	C1 / C2	32	210	231	30	M 24	36	4
FH II 32/60 B	047550	●	●	C1 / C2	32	240	261	60	M 24	36	4

1) Delivery time on request.

Loads

High performance anchor FH II

Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-07/0025 has to be considered.

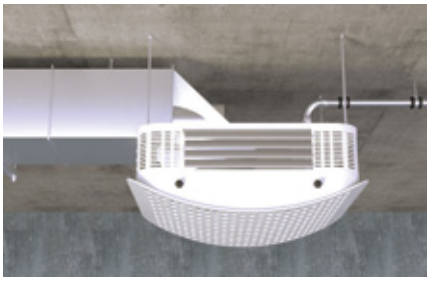
					Cracked concrete				Non-cracked concrete			
	Material/ surface[2]	Effective anchorage depth	Minimum member thickness	Instal-lation torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	T_{inst} [Nm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
FH II 10 S	gvz	40	80	10	3.6	4.1	40	40	5.9	5.9	40	40
	R	40	80	15	3.6	4.1	40	40	5.9	5.9	40	40
FH II 12 S	gvz	60	120	22.5	5.7	15.2	50	50	10.9	18.9	60	60
	R	60	120	25	5.7	15.2	50	50	9.5	17.7	60	60
FH II 15 S	gvz	70	140	40	7.6	19.2	60	60	13.7	27.4	70	70
	R	70	140	40	7.6	19.2	60	60	13.7	27.4	70	70
FH II 18 S	gvz	80	160	80	11.7	23.5	70	70	16.8	33.5	80	80
	R	80	160	100	11.7	23.5	70	70	16.8	33.5	80	80
FH II 24 S	gvz	100	200	160	16.4	32.8	80	80	23.4	46.9	100	100
	R	100	200	160	16.4	32.8	80	80	23.4	46.9	100	100
FH II 28 S	gvz	125	250	180	22.9	45.8	100	100	32.8	65.9	120	120
FH II 32 S	gvz	150	300	200	30.1	60.2	120	120	43.0	86.1	160	180
FH II 10 SK	gvz	40	80	10	3.6	4.1	40	40	5.9	5.9	40	40
FH II 12 SK	gvz	60	120	22.5	5.7	15.2	50	50	10.9	18.9	60	60
	R	60	120	25	5.7	15.2	50	50	10.9	18.9	60	60
FH II 15 SK	gvz	70	140	40	7.6	19.2	60	60	13.7	27.4	70	70
	R	70	140	40	7.6	19.2	60	60	13.7	27.4	70	70
FH II 18 SK	gvz	80	160	80	11.7	23.5	70	70	16.8	33.5	80	80
	R	80	160	100	11.7	23.5	70	70	16.8	33.5	80	80
FH II 10 H	gvz	40	80	10	3.6	4.1	40	40	5.9	5.9	40	40
FH II 12 H	gvz	60	120	22.5	5.7	15.2	50	50	10.9	15.5	60	60
FH II 15 H	gvz	70	140	40	7.6	19.2	60	60	13.7	24.5	70	70
FH II 18 H	gvz	80	160	80	11.7	23.5	70	70	16.8	33.5	80	80
FH II 10 B	gvz	40	80	10	3.6	4.1	40	40	5.9	5.9	40	40
FH II 12 B	gvz	60	120	17.5	5.7	15.2	50	50	10.9	15.5	60	60
FH II 15 B	gvz	70	140	38	7.6	19.2	60	60	13.7	24.5	70	70
FH II 18 B	gvz	80	160	80	11.7	23.5	70	70	16.8	33.5	80	80
FH II 24 B	gvz	100	200	120	16.4	32.8	80	80	23.4	46.9	100	100
FH II 28 B	gvz	125	250	180	22.9	45.8	100	100	32.7	65.5	120	120
FH II 32 B	gvz	150	300	200	30.1	60.2	120	120	43.0	86.1	160	180

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.
[2] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

High performance anchor FH II-I

Strong, secure and aesthetic with internal thread for the removal option of the attachment

Stadium seating



Air conditioning units

Applications

- Steel constructions
- Guard rails
- Consoles
- Ladders
- Cable trays
- Machines
- Staircases
- Pipeline routes
- Ventilation systems
- Sprinkler systems

Advantages

- The international approvals guarantee maximum safety and the best performance.
- The internal threaded anchor allows the removal of the attachment and the fixing point can be reused.
- The design between the bolt and the sleeve ensures high shear load-bearing capacity. Thus, fewer fixing points are required.
- The optimised geometry intelligently reduces the energy required for assembly.
- The approval regulates the use of hollow drills.

Certificates

ETA-07/0025, for cracked concrete

Fire resistance classification R120

INOX STAINLESS STEEL

M8 - M12

Building materials

Approved for:
- Concrete C20/25 to C50/60, cracked and non-cracked

Also suitable for:
- Concrete C12/15
- Natural stone with dense structure

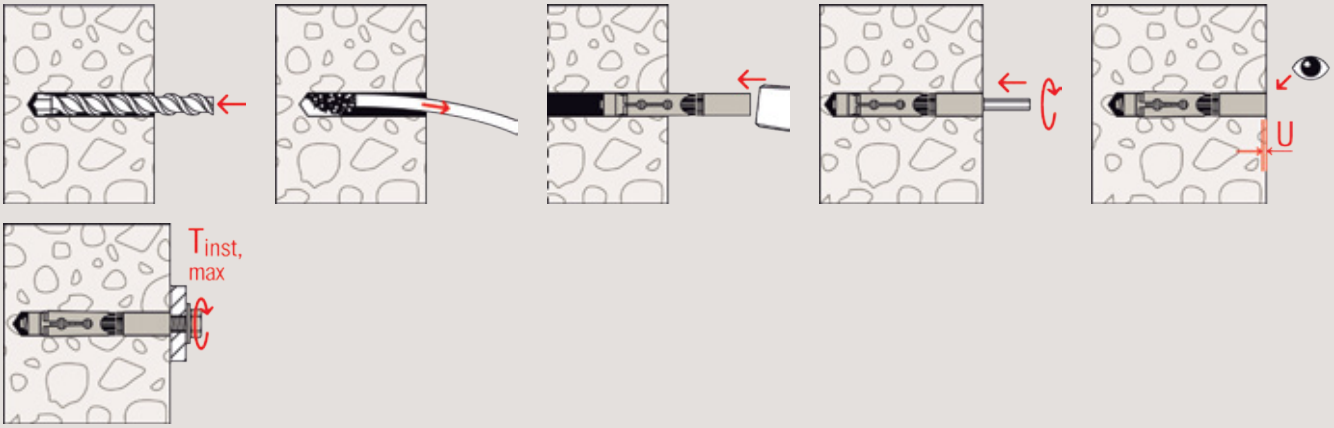
Versions

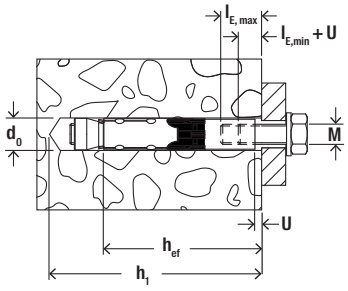
- Zinc-plated steel
- Stainless steel R

Functioning

- The FH II-I is suitable for pre-positioned installation.
- When a hexagon wrench is used for installation, the internal thread bolt starts to rotate. This pulls the cone into the expansion sleeve and expands it against the drill-hole wall. At the same time, the anchor is tightened through compression of the black plastic ring. A gap U to the concrete surface is created (see image 4).
- The anchor is set according to the approval when the gap U is 3-5 mm. Alternatively, an installation torque of T_{inst} can also be applied.

Installation FH II-I





Technical data

High performance anchor FH II-I

FH II-I

	Zinc plated, steel grade 8.8	Stainless steel	Approval	Drill hole diameter	Min. drill hole depth for pre-positioned installation	Anchor length	Thread	Min. bolt penetration	Max. bolt penetration	Sales unit
	Item No.	Item No.		d_0 [mm]	h_1 [mm]	l [mm]	M	$l_{E,min}$ [mm]	$l_{E,max}$ [mm]	[pcs]
Item	gvz	R	ETA							
FH II 12/M6 I	520358	520360	●	12	85	77.5	M 6	11 + U	25	25
FH II 12/M8 I	520359	520361	●	12	85	77.5	M 8	13 + U	25	25
FH II 15/M10 I	519014	519018	●	15	95	90	M 10	10 + U	25	25
FH II 15/M12 I	519015	519019	●	15	95	90	M 12	12 + U	25	20

Technical data

Setting tool FH II-I

Setting tool FH II-I

	Item No.	Matching anchor type	Sales unit
Item			[pcs]
Setting tool FH II-I M6-M10	532780	FH II 12/M6 I, FH II 15/M 10 I	10
Setting tool FH II-I M8-M12	532781	FH II 12/M8 I, FH II 15/M 12 I	10

Loads

High performance anchor FH II-I

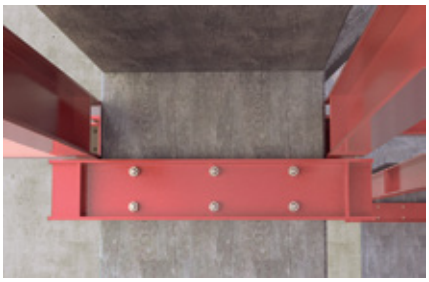
Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-07/0025 has to be considered.

						Cracked concrete				Non-cracked concrete			
	Material/surface[2]	Screw material[2]	Effective anchorage depth	Minimum member thickness	Installation torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type			h_{ef} [mm]	h_{min} [mm]	T_{inst} [Nm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
FH II 12 / M6 I	gvz	5.8	60	125	15	4.3	2.9	50	50	4.8	2.9	60	60
	gvz	8.8	60	125	15	4.3	4.6	50	50	7.6	4.6	60	60
	R	A4-70	60	125	15	4.3	3.2	50	50	5.3	3.2	60	60
FH II 12 / M8 I	gvz	5.8	60	125	15	4.3	5.1	50	50	9.0	5.1	60	60
	gvz	8.8	60	125	15	4.3	8.0	50	50	9.5	8.0	60	60
	R	A4-70	60	125	15	4.3	6.0	50	50	9.5	6.0	60	60
FH II 15 / M10 I	gvz	5.8	70	150	25	5.7	8.6	60	60	13.7	8.6	70	70
	gvz	8.8	70	150	25	5.7	13.1	60	60	13.7	13.1	70	70
	R	A4-70	70	150	25	5.7	9.2	60	60	13.7	9.2	70	70
FH II 15 / M12 I	gvz	5.8	70	150	25	5.7	12.0	60	60	13.7	12.0	70	70
	gvz	8.8	70	150	25	5.7	13.7	60	60	13.7	13.7	70	70
	R	A4-70	70	150	25	5.7	13.7	60	60	13.7	13.7	70	70

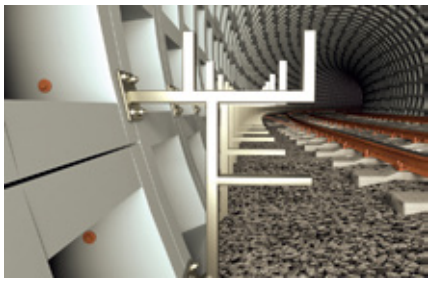
[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.
[2] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

ZYKON undercut anchor FZA

The fixing system with the highest safety in cracked concrete



Steel girders



Installations in tunnels

Applications

- Steelwork constructions
- Guard rails
- Consoles
- Step irons (FZA-ST)
- Ladders
- Cable trays
- Machines
- Staircases
- Gates
- Façades

Advantages

- The special ZYKON undercut technology allows for a positive fit connection and ensures maximum safety, even in large cracks.
- The almost expansion-free installation of the anchor allows small edge distances and axial spacing, and thereby enables flexible use.
- The FZUB special drill allows for a fast installation by creating the undercut without having to change tools.
- The drill hole geometry allows for a very low setting energy, thus reducing the energy required for installation.
- The ideal interaction of threaded bolts and sleeve with FZA-D allows for a high shear load and therefore fewer fixing points.

Certificates

ETA-98/0004, for cracked concrete

Fire resistance classification R120

INOX STAINLESS STEEL

from M8

from M10

Building materials

Approved for:
- Concrete C20/25 to C50/60, cracked and non-cracked

Also suitable for:
- Concrete C12/15
- Natural stone with dense structure

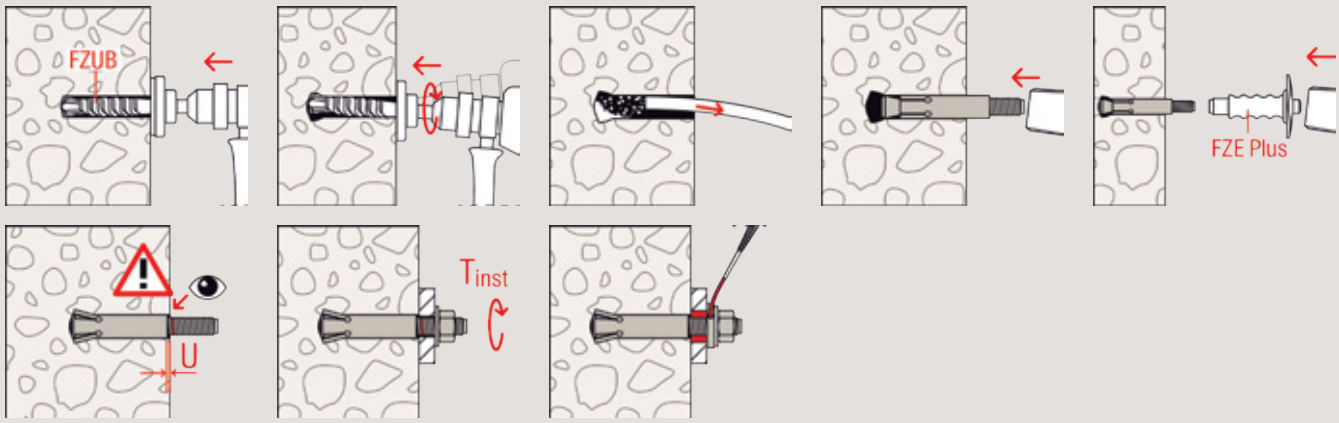
Versions

- Zinc-plated steel
- Stainless steel R

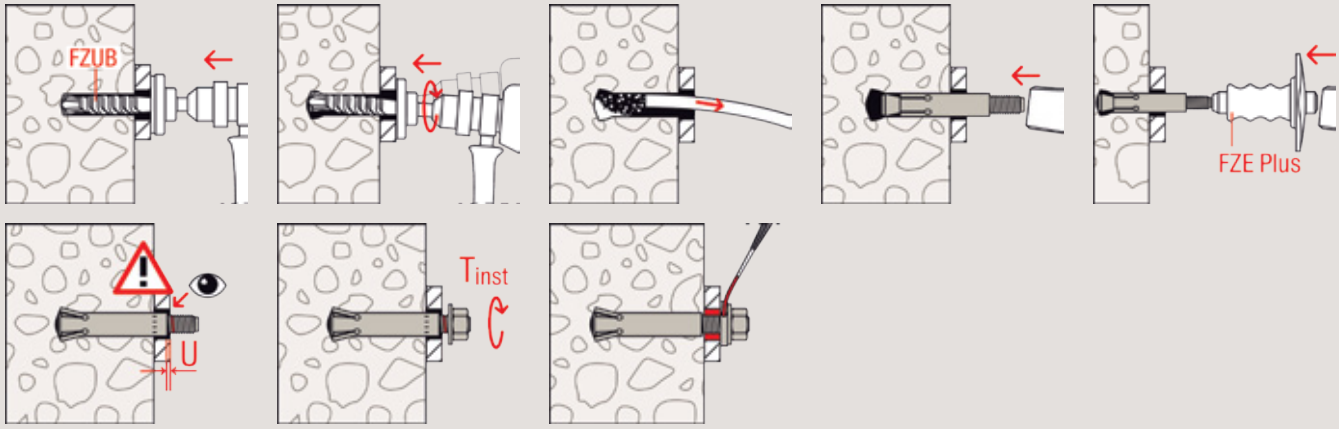
Functioning

- The FZA and FZA-I is suitable for pre-positioned installation, whereas the FZA-D is suitable for push-through installation.
- The undercut drill hole is created using the special FZUB drill.
- Once the anchor has been placed in the drill hole, the expansion sleeve is driven over the cone using the FZE Plus setting tool, and the undercut drill hole is filled with a positive fit.

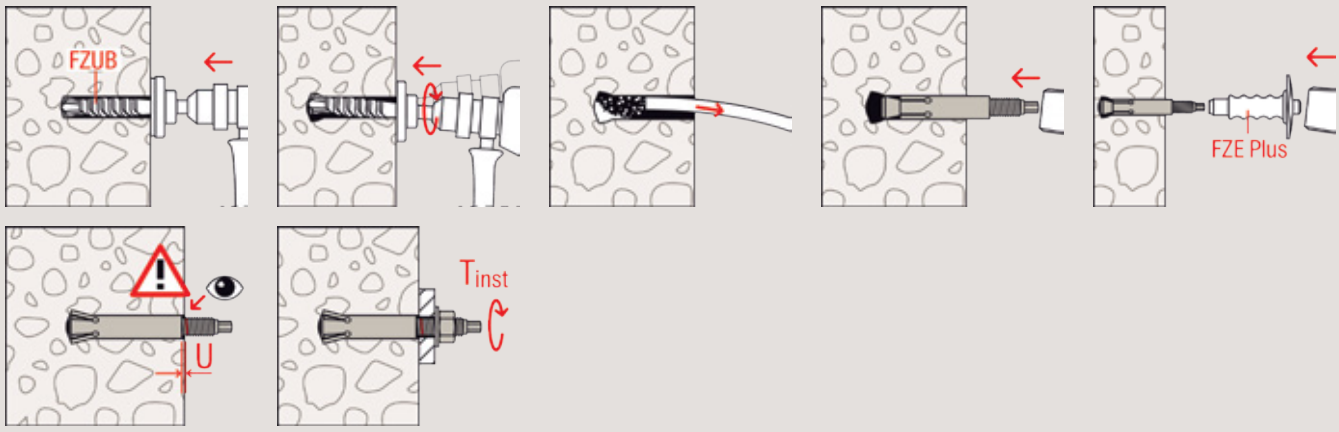
Pre-positioned installation FZA



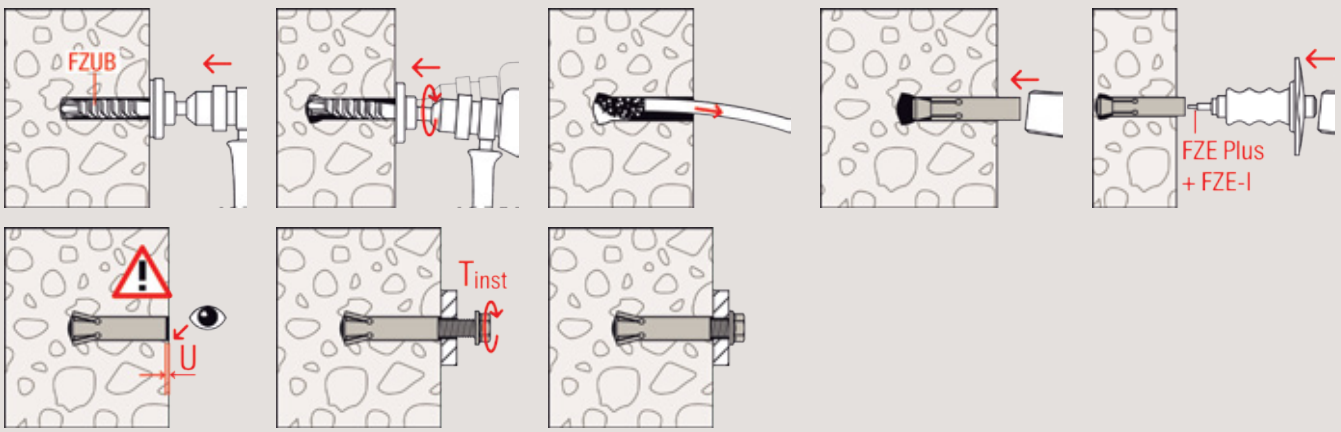
Push-through installation FZA-D

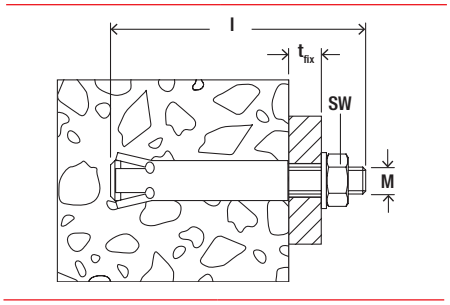


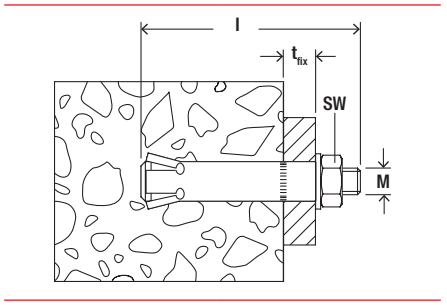
Installation FZA-ST



Installation FZA-I







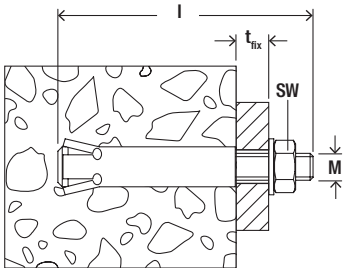
Technical data

ZYKON undercut anchor FZA ZYKON undercut anchor FZA-D

FZA

FZA-D

	Zinc-plated steel	Stainless steel	Approval	Seis-mic-Ap-proval	Required drill bit FZUB	Required setting tool FZE plus	Bolt length	Max. fixture thickness	Thread	Width across nut	Sales unit
	Item No.	Item No.					l [mm]	t_{fix} [mm]	M	SW [mm]	[pcs]
Item	**gvz**	**R**	**ETA**								
FZA 10 x 40 M6/10	**060712**	**060772**	●	–	10 x 40	FZE 10 plus	60	10	M 6	10	25
FZA 12 x 40 M 8/15	**060715**	**060775**	●	–	12 x 40	FZE 12 plus	69	15	M 8	13	25
FZA 12 x 50 M 8/15	**060716**	**060776**	●	–	12 x 50	FZE 12 plus	79	15	M 8	13	20
FZA 12 x 50 M 8/50	**–**	**060774**	●	–	12 x 50	FZE 12 plus	114	50	M 8	13	20
FZA 14 x 40 M10/25	**060718**	**–**	●	C2	14 x 40	FZE 14 plus	79	25	M 10	17	25
FZA 14 x 40 M10/25	**–**	**060778**	●	C2	14 x 40	FZE 14 plus	79	25	M 10	17	20
FZA 14 x 60 M10/25	**060719**	**060779**	●	C2	14 x 60	FZE 14 plus	102	25	M 10	17	10
FZA 14 x 60 M10/50	**–**	**060766**	●	C2	14 x 60	FZE 14 plus	126	50	M 10	17	10
FZA 18 x 80 M12/25	**060721**	**060781**	●	C2	18 x 80	FZE 18 plus	126	25	M 12	19	10
FZA 18 x 80 M12/55	**–**	**060767**	●	C2	18 x 80	FZE 18 plus	156	55	M 12	19	10
FZA 22 x 100 M16/60	**060724**	**060782**	●	C2	22 x 100	FZE 22 plus	184	60	M 16	24	10
FZA 22 x 125 M16/60	**060725**	**060768**	●	C2	22 x 125	FZE 22 plus	209	60	M 16	24	6
FZA 12 x 50 M 8 D/10	**060652**	**060664**	●	–	12 x 50	FZE 12 plus	69	10	M 8	13	25
FZA 12 x 60 M 8 D/10	**060653**	**060665**	●	–	12 x 60	FZE 12 plus	79	10	M 8	13	25
FZA 12 x 80 M 8 D/30	**060654**	**060666**	●	–	12 x 80	FZE 12 plus	99	30	M 8	13	25
FZA 14 x 80 M10 D/20	**060657**	**060669**	●	C2	14 x 80	FZE 14 plus	102	20	M 10	17	10
FZA 14 x 100 M 8 D/30	**060658**	**060670**	●	C2	14 x 100	FZE 14 plus	126	30	M 10	17	10
FZA 18 x 100 M12 D/20	**060684**	**060672**	●	C2	18 x 100	FZE 18 plus	126	20	M 12	19	10
FZA 18 x 130 M12 D/50	**060685**	**060673**	●	C2	18 x 130	FZE 18 plus	156	50	M 12	19	10
FZA 22 x 125 M16 D/25	**060663**	**060675**	●	C2	22 x 125	FZE 22 plus	156	25	M 16	24	10



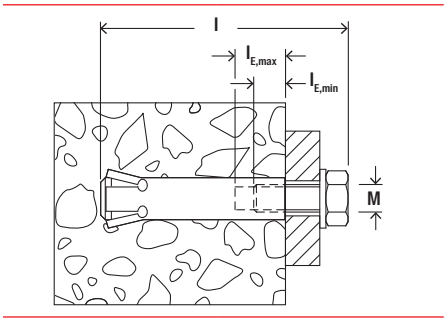
Technical data

ZYKON anchor for fixing step irons FZA-ST R

FZA ST R

	Item No.	Required drill bit FZUB	Required setting tool FZE plus	Max. fixture thick-ness t_{fix} [mm]	Thread M	Width across nut SW [mm]	Sales unit [pcs]
Item	**R**						
FZA 14 x 40 ST R	**060686** [1]	14 x 40	FZE 14 plus	30	M 10	16	20
FZA 14 x 60 ST R	**060687** [1]	14 x 60	FZE 14 plus	30	M 10	16	20

1) According to DIN 1211GS/1212GS.



Technical data

ZYKON undercut anchor FZA-I

FZA-I

	Zinc-plated steel Item No.	Stainless steel Item No.	Approval	Required drill bit FZUB	Required setting tool FZE plus	Internal thread M	Min. bolt penetration $l_{E,min}$ [mm]	Max. bolt penetration $l_{E,max}$ [mm]	Sales unit [pcs]
Item	**gvz**	**R**	**ETA**						
FZA 12 x 40 M6 I	**060758**	**060783**	●	12 x 40	FZE 12 plus	M 6	10	15	25
FZA 12 x 50 M6 I	**–**	**060784**	●	12 x 50	FZE 12 plus	M 6	10	15	25
FZA 14 x 60 M8 I	**060760**	**060786**	●	14 x 60	FZE 14 plus	M 8	11	17	20
FZA 18 x 80 M10 I	**060761**	**060787**	●	18 x 80	FZE 18 plus	M 10	13	21	10
FZA 22 x 100 M12 I	**060763**	**060788**	●	22 x 100	FZE 22 plus	M 12	15	25	10
FZA 22 x 125 M12 I	**060769**	**060770** [1]	●	22 x 125	FZE 22 plus	M 12	15	25	10

1) Delivery time on request.

Technical data

Drill bit FZUB | **Setting tool FZE plus**

FZUB

FZE plus

	Item No.	fits anchor bolt anchor	push-through anchor	internal thread anchor	Sales unit [pcs]
Item					
FZUB 10 x 40	**060622**	FZA 10 x 40 M6			1
FZUB 12 x 40	**060623**	FZA 12 x 40 M8		FZA 12 x 40 M6 I	1
FZUB 14 x 40	**060624**	FZA 14 x 40 M10			1
FZUB 12 x 60	**060625**		FZA 12 x 60 M8 D/10		1
FZUB 12 x 80	**060626**		FZA 12 x 80 M8 D/30		1
FZUB 12 x 50	**060627**	FZA 12 x 50 M8	FZA 12 x 50 M8 D/10	FZA 12 x 50 M6 I	1
FZUB 14 x 60	**060628**	FZA 14 x 60 M10		FZA 14 x 60 M8 I	1
FZUB 14 x 80	**060629**		FZA 14 x 80 M10 D/20		1
FZUB 14 x 100	**060630**		FZA 14 x 100 M10 D/40		1
FZUB 18 x 100	**060632**		FZA 18 x 100 M12 D/20		1
FZUB 18 x 130	**060633**		FZA 18 x 130 M12 D/50		1
FZUB 18 x 80	**060634**	FZA 18 x 80 M12		FZA 18 x 80 M10I	1
FZUB 22 x 100	**060636**	FZA 22 x 100 M16		FZA 22 x 100 M12 I	1
FZUB 22 x 125	**060638**	FZA 22 x 125 M16	FZA 22 x 125 M16 D/25	FZA 22 x 125 M12 I	1
FZE 10 plus	**044637** [1]	FZA 10 x ... M6			1
FZE 12 plus	**044638**	FZA 12 x ... M8	FZA 12 x ... M8 D	FZA 12 x ... M6 I	1
FZE 14 plus	**044639**	FZA 14 x ... M10	FZA 14 x ... M10 D	FZA 14 x ... M8 I	1
FZE 18 plus	**044640**	FZA 18 x ... M12	FZA 18 x ... M12 D	FZA 18 x ... M10 I	1
FZE 22 plus	**044641**	FZA 22 x ... M16	FZA 22 x ... M16 D	FZA 22 x ... M12 I	1

1) Without centring pin.

Loads

ZYKON undercut anchor FZA

Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-98/0004 has to be considered.

					Cracked concrete				Non-cracked concrete			
					Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type	Material/ surface[2]	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Installation torque T_{inst} [Nm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
FZA 10 x 40 M6	gvz	40	100	8.5	2.4	5.0	40	35	4.8	5.0	40	35
	R	40	100	8.5	2.4	4.2	40	35	4.8	4.2	40	35
FZA 12 x 40 M8	gvz	40	100	20	2.4	5.4	40	40	4.8	7.7	40	40
	R	40	100	20	2.4	5.4	40	40	4.8	7.6	40	40
FZA 12 x 50 M8	gvz	50	110	20	4.3	7.5	50	45	8.3	9.2	50	45
	R	50	110	20	4.3	7.5	50	45	8.3	7.6	50	45
FZA 14 x 40 M10	gvz	40	100	40	2.4	10.0	70	70	4.8	14.2	70	70
	R	40	100	40	2.4	10.0	70	70	4.8	12.1	70	70
FZA 14 x 60 M10	gvz	60	130	40	5.7	14.6	60	55	10.9	14.6	60	55
	R	60	130	40	5.7	12.1	60	55	10.9	12.1	60	55
FZA 18 x 80 M12	gvz	80	160	60	11.4	21.2	80	70	16.8	21.2	80	70
	R	80	160	60	11.4	17.6	80	70	16.8	17.6	80	70
FZA 22 x 100 M16	gvz	100	200	100	16.4	39.5	100	100	23.4	39.5	100	100
	R	100	200	100	16.4	35.2	100	100	23.4	35.2	100	100
FZA 22 x 125 M16	gvz	125	250	100	19.0	39.5	125	125	32.7	39.5	125	125
	R	125	250	100	19.0	35.2	125	125	32.7	35.2	125	125

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.
[2] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Loads

ZYKON internally-threaded anchor FZA-I

Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-98/0004 has to be considered.

						Cracked concrete				Non-cracked concrete			
						Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type	Material/ surface[2]	Screw material	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Installation torque T_{inst} [Nm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
FZA 12 x 40 M6 I	gvz	8.8	40	100	8.5	2.4	4.1	40	35	4.8	4.1	40	35
	R	A4-70	40	100	8.5	2.4	3.2	40	35	4.8	3.2	40	35
FZA 12 x 50 M6 I	R	A4-70	50	110	8.5	4.3	3.2	50	45	5.4	3.2	50	45
FZA 14 x 60 M8 I	gvz	8.8	60	130	15	5.7	5.4	60	55	9.3	5.4	60	55
	R	A4-70	60	130	15	5.7	4.3	60	55	7.1	4.3	60	55
FZA 18 x 80 M10 I	gvz	8.8	80	160	30	9.6	5.6	80	70	9.6	5.6	80	70
	R	A4-70	80	160	30	9.0	5.4	80	70	9.0	5.4	80	70
FZA 22 x 100 M12 I	gvz	8.8	100	200	60	16.4	13.2	100	100	22.5	13.2	100	100
	R	A4-70	100	200	60	16.4	12.7	100	100	21.1	12.7	100	100
FZA 22 x 125 M12 I	gvz	8.8	125	250	60	19.0	13.2	125	125	22.5	13.2	125	125
	R	A4-70	125	250	60	19.0	12.7	125	125	21.1	12.7	125	125

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.
[2] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Loads

ZYKON undercut anchor FZA-D

Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-98/0004 has to be considered.

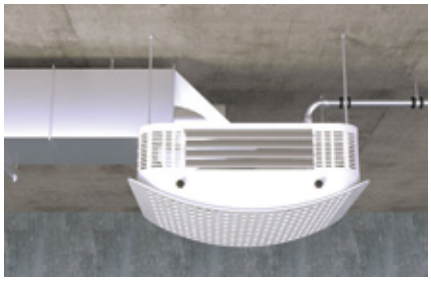
					Cracked concrete				Non-cracked concrete			
	Material/ surface[2]	Effective anchorage depth	Minimum member thickness	Instal-lation torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{ef} [mm]	h_{min} [mm]	T_{inst} [Nm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
FZA 12 x 50 M8 D	gvz	40	100	20	2.4	5.4	40	35	4.8	7.7	40	35
	R	40	100	20	2.4	5.4	40	35	4.8	7.7	40	35
FZA 12 x 60 M8 D	gvz	50	110	20	4.3	7.5	50	45	8.3	10.8	50	45
	R	50	110	20	4.3	7.5	50	45	8.3	10.8	50	45
FZA 14 x 80 M10 D	gvz	60	130	40	5.7	23.5	60	55	10.9	23.5	60	55
	R	60	130	40	5.7	16.1	60	55	10.9	16.1	60	55
FZA 18 x 100 M12 D	gvz	80	160	60	11.4	36.4	80	70	16.8	36.8	80	70
	R	80	160	60	11.4	36.4	80	70	16.8	40.4	80	70
FZA 22 x 125 M16 D	gvz	100	200	100	16.4	50.8	100	100	23.4	59.4	100	100
	R	100	200	100	16.4	50.8	100	100	24.4	64.6	100	100

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.
[2] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

ZYKON hammerset anchor FZEA II

The internally threaded anchor with low anchoring depth for individual fixings in cracked concrete

Emergency exit signs in tunnels



Air conditioning units

Applications

- Pipelines
- Ventilation systems
- Sprinkler systems
- Cable trays
- Suspended ceilings

Advantages

- Hammerset anchor with Zykon undercut technology for individual fixings in cracked and non-cracked concrete.
- The combination of hammerset and ZYKON undercut anchor allows for individual fixings in cracked concrete.
- The special ZYKON undercut technology reduces the energy required for installation.
- The FZUB special drill allows for a fast installation by creating the undercut without having to change tools.
- The embossing that is applied when expanding the anchor secures the simple control of the anchoring.
- The almost expansion-free installation of the anchor allows small edge distances and axial spacing, thereby enabling flexible use.

Certificates

ETA-06/0271, for cracked concrete

Fire resistance classification R120

from M10

INOX STAINLESS STEEL

M8 - M20

Building materials

Approved for:
- Concrete C20/25 to C50/60, cracked and non-cracked

Also suitable for:
- Concrete C12/15
- Natural stone with dense structure

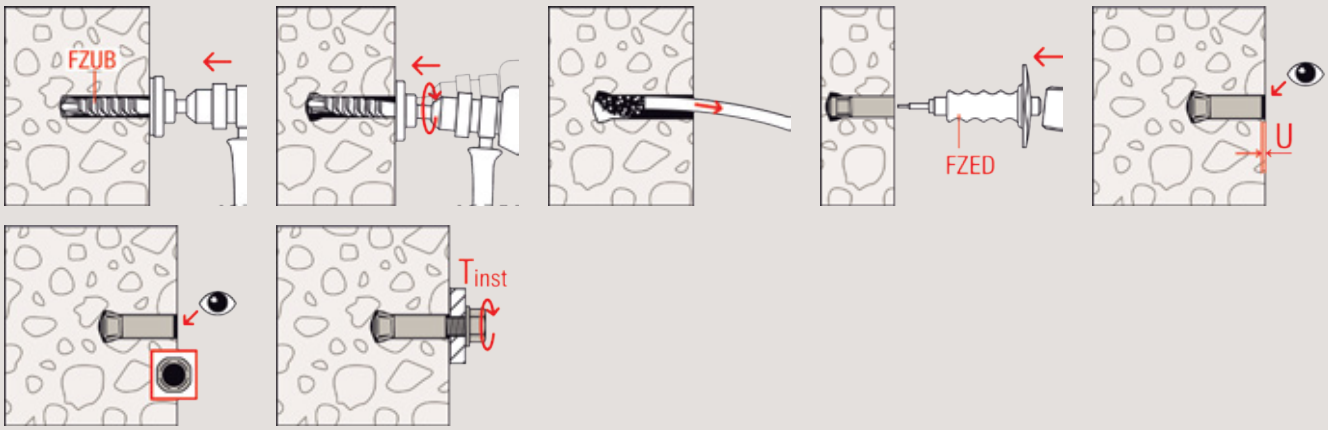
Versions

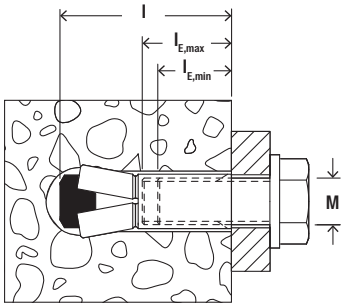
- Zinc-plated steel
- Stainless steel R
- Highly corrosion-resistant steel HCR

Functioning

- The FZEA II is suitable for pre-positioned installation.
- The undercut drill hole is created using the special FZUB drill.
- Once the anchor has been placed in the drill hole, the expansion sleeve is expanded by the driving in of the internal expansion pin with the FZED Plus setting tool, and the undercut drill hole is filled with a positive fit.

Installation FZEA II





Technical data

ZYKON hammerset anchor FZEA II

FZEA II

	Zinc-plated steel Item No.	Stainless steel Item No.	Highly corrosion resistant steel Item No.	Approval	Required drill bit FZUB	Required setting tool FZED plus	Length L [mm]	Internal thread A1	Max. bolt penetration $l_{E,max}$ [mm]	Min. bolt penetration $l_{E,min}$ [mm]	Sales unit [pcs]
Item	**gvz**	**R**	**HCR**	**ETA**							
FZEA II 10 x 40 M 8	**047303**	**047306**	**047309** [1]	●	10 x 40	FZED 10 plus	43	M 8	17	11	100
FZEA II 12 x 40 M10	**047304**	**047307**	**047310** [1]	●	12 x 40	FZED 12 plus	43	M 10	19	13	100
FZEA II 14 x 40 M12	**047305**	**047308**	–	●	14 x 40	FZED 14 plus	43	M 12	21	15	50

1) Delivery on request.

Technical data

Drill bit FZUB **Setting tool FZED plus**

FZUB

FZED plus

	Item No.	Matching anchor type	Sales unit [pcs]
Item			
FZUB 10 x 40	**060622**	FZEA II 10 x 40, FZA 10 x 40 M6	1
FZUB 12 x 40	**060623**	FZEA II 12 x 40, FZA 12 x 40 M8	1
FZUB 14 x 40	**060624**	FZEA II 14 x 40, FZA 14 x 40	1
FZED 10 plus	**044642**	FZEA II 10 x 40 M8	1
FZED 12 plus	**044643**	FZEA II 12 x 40 M10	1
FZED 14 plus	**044644**	FZEA II 14 x 40 M12	1

Loads

ZYKON hammerset anchor FZEA II

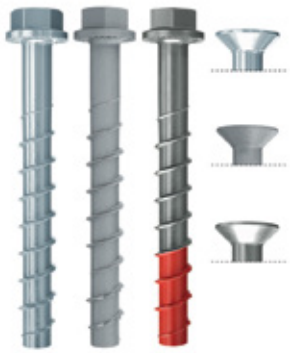
Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-06/0271 has to be considered.

						Cracked concrete				Non-cracked concrete			
	Material/ surface[2]	Screw material	Effective anchor-age depth	Mini-mum member thick-ness	Maxi-mum instal-lation torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type			h_{ef} [mm]	h_{min} [mm]	$T_{inst,max}$ [Nm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
FZEA II 10 x 40 M8	gvz	5.8	40	80	10	1.6	4.1	40	40	3.6	4.7	40	40
	gvz	8.8	40	80	10	1.6	4.1	40	40	3.6	4.7	40	40
	R	A4-70	40	80	15	1.6	4.1	40	40	3.6	4.6	40	40
FZEA II 12 x 40 M10	gvz	5.8	40	80	15	3.0	4.1	45	45	3.6	5.9	45	45
	gvz	8.8	40	80	15	3.0	4.1	45	45	3.6	5.9	45	45
	R	A4-70	40	80	20	3.0	4.1	45	45	3.6	5.9	45	45
FZEA II 14 x 40 M12	gvz	5.8	40	80	20	3.5	4.1	50	50	3.6	5.9	50	50
	gvz	8.8	40	80	20	3.5	4.1	50	50	3.6	5.9	50	50
	R	A4-70	40	80	40	3.5	4.1	50	50	3.6	5.9	50	50

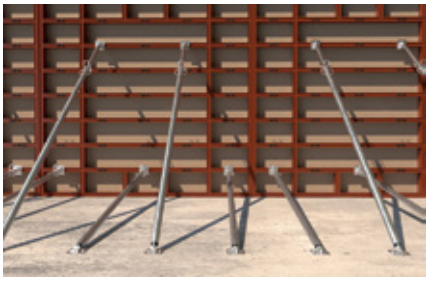
[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.
[2] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (gvz); for damp interiors and for outdoor use, stainless steel (R).
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Concrete screw UltraCut FBS II 8-14

The high-performance concrete screw for absolute installation ease



Banisters



Inclined supports

Applications

- Guard rails
- Consoles/base plates
- Metal profiles
- Steel constructions
- Façades
- Protection barriers
- Results/beam anchors
- Shuttering props (only FBS II zinc-plated steel)
- Temporary anchoring, e.g. of building site equipment (only FBS II zinc-plated steel)
- Concrete-concrete connections (e.g. strengthening of bridges, parking garages or renovation of buildings)

Advantages

- With up to 3 embedment depths, the UltraCut FBS II allows for the same screw to be used for different component thicknesses.
- Unique saw-tooth geometry cuts quickly into the concrete - also in multiple use and reinforced concrete.
- The performance categories seismic C1 and C2 ensure that the strictest of safety standards and earthquake specifications can be fulfilled.
- In comparison to the usually available systems (with mortar) for the reinforcement of existing concrete structures, the ETA-certified FBS II system with the optional setting tool SC-ST saves time and costs.
- The high coating quality of the FBS II CP is prooved through the salt spray chamber test over 2,000h.
- For the zinc-plated steel version the checking gauge allows for reuse covered by the approval.
- The specially hardened red tip of the stainless steel R version provides faster and more secure installation.

Certificates

ETA-15/0352, for cracked concrete
ETA-17/0740, for cracked concrete
ETA-20/0321, for strengthening of existing concrete structures by concrete overlay

Fire resistance classification R120

INOX STAINLESS STEEL

Building materials

Approved for:
- Concrete C20/25 to C50/60, cracked and non-cracked
- Strengthening of existing concrete structures with top layer concrete

Also suitable for:
- Concrete C12/15
- Solid building materials
- Masonry with dense structure

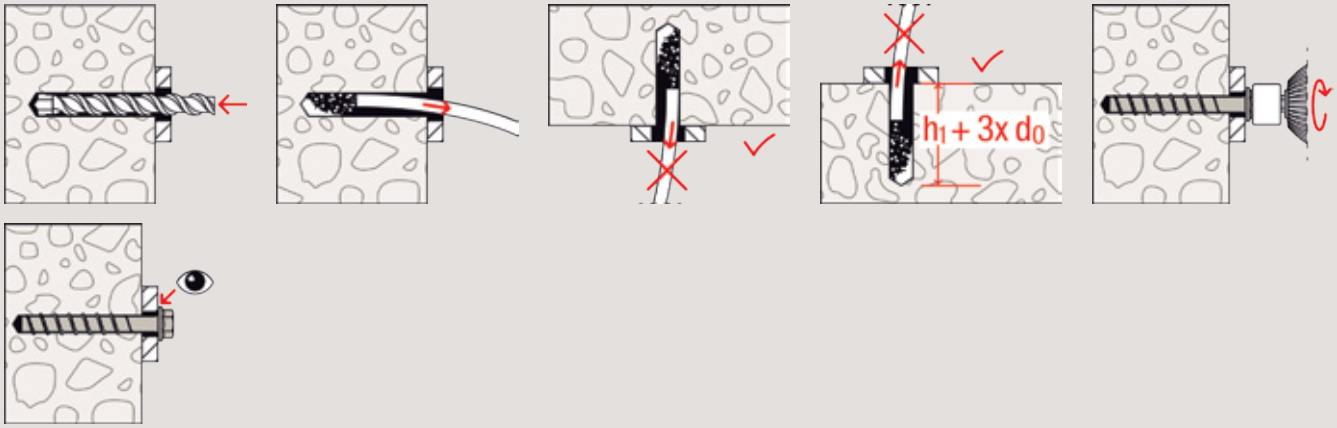
Versions

- Zinc-plated steel
- Stainless steel R
- Corrosion protection coating (CP)

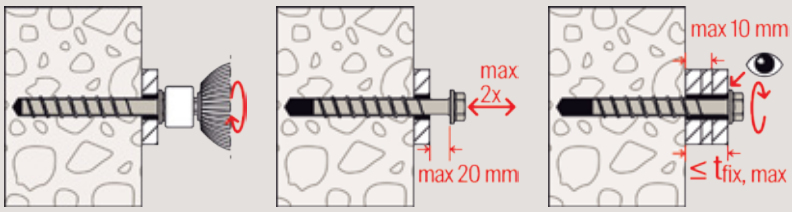
Functioning

- The UltraCut FBS II is recommended for the push-through installation.
- Drill holes do not need to be cleaned during vertical installation (ceiling and floor). For floor fixings the hole must be drilled 3x drill hole diameter deeper.
- The approved adjustment for the concrete screws allows the screw to be unscrewed twice for a total length of 20 mm, to place maximum 10 mm packing below the base plates or to align the attached part.
- We recommend using the fischer impact wrench FSS 18V with a suitable impact screwdriver socket or an internal torx drive.
- The screw is installed correctly when the screw head sits flush on the fixture (visual setting control).
- For the installation of restructuring of existing concrete structures by concrete overlay, the setting tool SC-ST can be used for a faster installation.

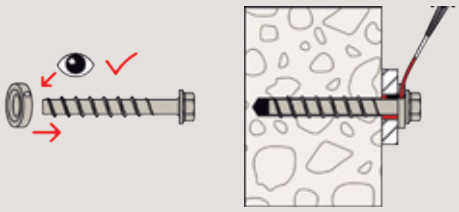
Installation UltraCut FBS II



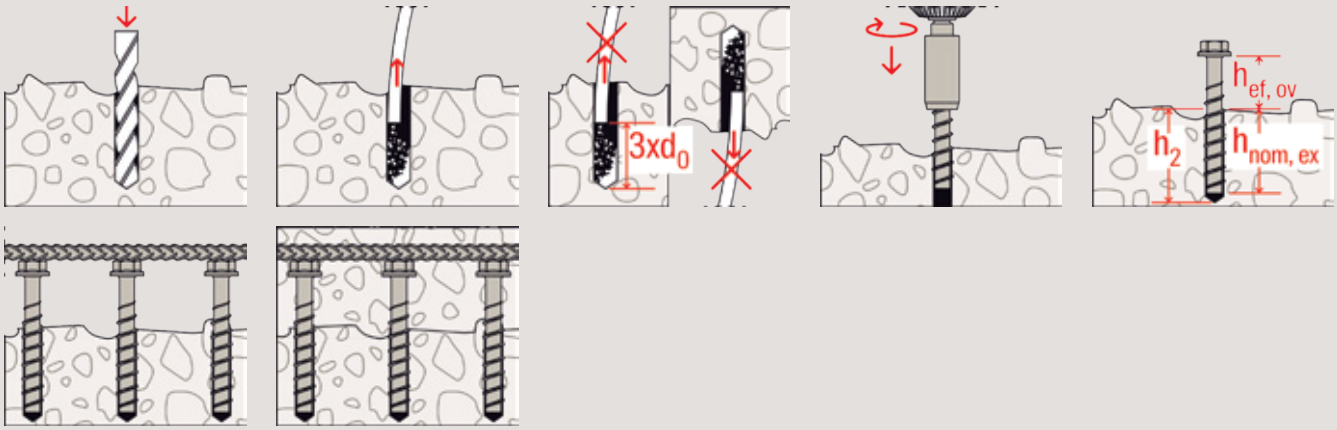
Fixture adjustment

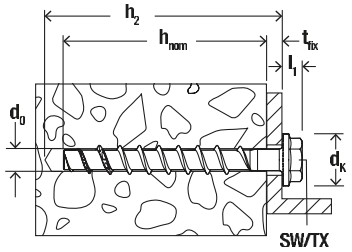


Additional for seismic applications



Installation UltraCut FBS II (concrete-concrete connection)





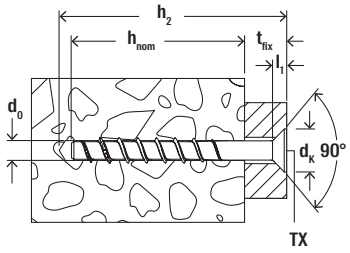
Technical data

Concrete screw UltraCut FBS II US

UltraCut FBS II US

UltraCut FBS II CP US

	Zinc-plated steel	Corrosion protection coating	Approval	Drill hole diameter	Min. drill hole depth for through fixings	Screw	Screw-in depth with fixture thickness	Screw-in depth with fixture thickness	Screw-in depth with fixture thickness	Drive	Sales unit
	Item No.	Item No.		d_0	h_2	$d_a \times l_s$	h_{nom1} / t_{fix}	h_{nom2} / t_{fix}	h_{nom3} / t_{fix}		[pcs]
Item	gvz	CP	ETA	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		
FBS II 8x55 5/- US TX	536851	557781	●	8	65	10 x 55	50 / 5	- / -	- / -	TX40/SW13	50
FBS II 8x70 20/5 US TX	536852	557782	●	8	80	10 x 70	50 / 20	- / -	65 / 5	TX40/SW13	50
FBS II 8x80 30/15 US TX	536853	557783	●	8	90	10 x 80	50 / 30	- / -	65 / 15	TX40/SW13	50
FBS II 8x90 40/25 US TX	536854	557784	●	8	100	10 x 90	50 / 40	- / -	65 / 25	TX40/SW13	50
FBS II 8x100 50/35 US TX	536855	557785	●	8	110	10 x 100	50 / 50	- / -	65 / 35	TX40/SW13	50
FBS II 8x110 60/45 US TX	536856	–	●	8	120	10 x 110	50 / 60	- / -	65 / 45	TX40/SW13	50
FBS II 8x130 80/65 US TX	536857	–	●	8	140	10 x 130	50 / 80	- / -	65 / 65	TX40/SW13	50
FBS II 8x150 100/85 US TX	558219	–	●	8	160	10 x 150	50 / 100	- / -	65 / 85	TX40/SW13	50
FBS II 8x170 120/105 US TX	558220	–	●	8	180	12 x 60	50 / 120	- / -	65 / 105	TX40/SW13	50
FBS II 8x190 140/125 US TX	558221	–	●	8	200	10 x 190	50 / 140	- / -	65 / 125	TX40/SW13	50
FBS II 10x60 5/-/- US	536858	557786	●	10	70	12 x 60	55 / 5	- / -	- / -	SW 15	50
FBS II 10x70 15/5/- US	536859	557787	●	10	80	12 x 70	55 / 15	65 / 5	- / -	SW 15	50
FBS II 10x80 25/15/- US	536860	557788	●	10	90	12 x 80	55 / 25	65 / 15	- / -	SW 15	50
FBS II 10x90 35/25/5 US	536861	557789	●	10	100	12 x 90	55 / 35	65 / 25	85 / 5	SW 15	50
FBS II 10x100 45/35/15 US	536862	557790	●	10	110	12 x 100	55 / 45	65 / 35	85 / 15	SW 15	50
FBS II 10x120 65/55/35 US	536863	557791	●	10	130	12 x 120	55 / 65	65 / 55	85 / 35	SW 15	50
FBS II 10x140 85/75/55 US	536864	557792	●	10	150	12 x 140	55 / 85	65 / 75	85 / 55	SW 15	50
FBS II 10x160 105/95/75 US	536865	557793	●	10	170	12 x 160	55 / 105	65 / 95	85 / 75	SW 15	50
FBS II 10x200 145/135/115 US	536866	–	●	10	210	12 x 200	55 / 145	65 / 135	85 / 115	SW 15	20
FBS II 10x230 175/165/145 US	536867	–	●	10	240	12 x 230	55 / 175	65 / 165	85 / 145	SW 15	20
FBS II 10x260 205/195/175 US	536868	–	●	10	270	12 x 260	55 / 205	65 / 195	85 / 175	SW 15	20
FBS II 10x280 225/215/195 US	558222	–	●	10	290	12 x 280	55 / 225	65 / 215	85 / 195	SW 15	20
FBS II 12x70 10/-/- US	536869	–	●	12	80	14 x 70	60 / 10	- / -	- / -	SW 17	20
FBS II 12x85 25/10/- US	536870	557794	●	12	95	14 x 85	60 / 25	75 / 10	- / -	SW 17	20
FBS II 12x110 50/35/10 US	536871	557795	●	12	120	14 x 110	60 / 50	75 / 35	100 / 10	SW 17	20
FBS II 12x130 70/55/30 US	536872	–	●	12	140	14 x 130	60 / 70	75 / 55	100 / 30	SW 17	20
FBS II 12x150 90/75/50 US	536873	–	●	12	160	14 x 150	60 / 90	75 / 75	100 / 50	SW 17	20
FBS II 12x170 110/95/70 US	558223	–	●	12	180	14 x 170	60 / 110	75 / 95	100 / 70	SW 17	20
FBS II 12x190 130/115/90 US	558224	–	●	12	200	14 x 190	60 / 130	75 / 115	100 / 90	SW 17	20
FBS II 12x210 150/135/110 US	558225	–	●	12	220	14 x 210	60 / 150	75 / 135	100 / 110	SW 17	20
FBS II 14x75 10/-/- US	536874	557796	●	14	90	16 x 75	65 / 10	- / -	- / -	SW 21	20
FBS II 14x95 30/10/- US	536875	557797	●	14	110	16 x 95	65 / 30	85 / 10	- / -	SW 21	20
FBS II 14x100 35/15/- US	536876	557798	●	14	115	16 x 100	65 / 35	85 / 15	- / -	SW 21	20
FBS II 14x125 60/40/10 US	536877	557799	●	14	140	16 x 125	65 / 60	85 / 40	115 / 10	SW 21	10
FBS II 14x150 85/65/35 US	536878	–	●	14	165	16 x 150	65 / 85	85 / 65	115 / 35	SW 21	10
FBS II 14x180 115/85/65 US	558226	–	●	14	192	16 x 180	65 / 115	85 / 95	115 / 65	SW 21	10
FBS II 14x210 145/125/95 US	558227	–	●	14	225	16 x 210	65 / 145	85 / 125	115 / 95	SW 21	10
FBS II 14x240 175/155/125 US	558228	–	●	14	255	16 x 240	65 / 175	85 / 155	115 / 125	SW 21	10



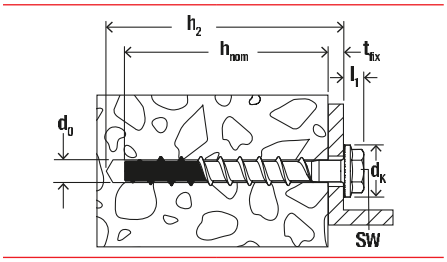
Technical data

Concrete screw UltraCut FBS II SK

UltraCut FBS II SK

UltraCut FBS II CP SK

Item	Zinc-plated steel Item No.	Corrosion protection coating Item No.	ETA Approval	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Screw $d_a \times l_s$ [mm]	Screw-in depth with fixture thickness h_{nom1} / t_{fix} [mm]	Screw-in depth with fixture thickness h_{nom2} / t_{fix} [mm]	Screw-in depth with fixture thickness h_{nom3} / t_{fix} [mm]	Drive	Sales unit [pcs]
FBS II 8x60 10/- SK	**536880**	**557800**	●	8	70	10 x 60	50 / 10	- / -	- / -	TX40	50
FBS II 8x80 30/15 SK	**536881**	**557801**	●	8	90	10 x 80	50 / 30	- / -	65 / 15	TX40	50
FBS II 8x90 40/25 SK	**536882**	**557802**	●	8	100	10 x 90	50 / 40	- / -	65 / 25	TX40	50
FBS II 8x100 50/35 SK	**558229**	–	●	8	110	10 x 100	50 / 50	- / -	65 / 35	TX40	50
FBS II 8x110 60/45 SK	**558230**	–	●	8	120	10 x 110	50 / 60	- / -	65 / 45	TX40	50
FBS II 8x120 70/55 SK	**558231**	–	●	8	130	10 x 120	50 / 70	- / -	65 / 55	TX40	50
FBS II 8x140 90/75 SK	**558232**	–	●	8	150	10 x 130	50 / 90	- / -	65 / 75	TX40	50
FBS II 8x160 110/95 SK	**558233**	–	●	8	170	10 x 150	50 / 110	- / -	65 / 95	TX40	50
FBS II 8x180 130/115 SK	**558234**	–	●	8	190	10 x 170	50 / 130	- / -	65 / 115	TX40	50
FBS II 8x200 150/135 SK	**558235**	–	●	8	210	10 x 190	50 / 150	- / -	65 / 135	TX40	50
FBS II 10x65 10/-/- SK	**536884**	**557803**	●	10	75	12 x 65	55 / 10	- / -	- / -	TX50	50
FBS II 10x80 25/15/- SK	**536885**	**557804**	●	10	90	12 x 80	55 / 25	65 / 15	- / -	TX50	50
FBS II 10x95 40/30/10 SK	**536886**	–	●	10	105	12 x 95	55 / 40	65 / 30	85 / 10	TX50	50
FBS II 10x100 45/35/15 SK	**536887**	**557805**	●	10	110	12 x 100	55 / 45	65 / 35	85 / 15	TX50	50
FBS II 10x120 65/55/35 SK	**536888**	–	●	10	130	12 x 120	55 / 65	65 / 55	85 / 35	TX50	50
FBS II 10x140 85/75/55 SK	**558236**	–	●	10	150	12 x 140	55 / 85	65 / 75	85 / 55	TX50	50
FBS II 10x160 105/95/75 SK	**558237**	–	●	10	170	12 x 160	55 / 105	65 / 95	85 / 75	TX50	50
FBS II 10x180 125/115/95 SK	**558238**	–	●	10	180	12 x 180	55 / 125	65 / 115	65 / 95	TX50	20



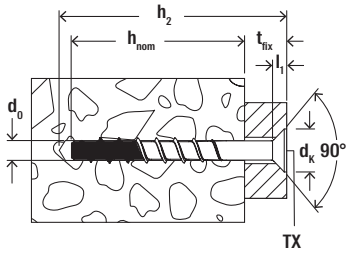
Technical data

Concrete screw UltraCut FBS II US R

UltraCut FBS II US R hexagon head with molded washer, stainless steel R

3

	Stainless steel Item No.	Approval	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Screw length l_s [mm]	Screw-in depth with fixture thickness h_{nom1} / t_{fix} [mm]	Screw-in depth with fixture thickness h_{nom2} / t_{fix} [mm]	Screw-in depth with fixture thickness h_{nom3} / t_{fix} [mm]	Drive	Sales unit [pcs]
Item		**ETA**								
FBS II 8x60 10/- US R	**543565**	●	8	70	60	50 / 10	- / -	- / -	SW 13	50
FBS II 8x70 20/5 US R	**543566**	●	8	80	70	50 / 20	- / -	65 / 5	SW 13	50
FBS II 8x80 30/15 US R	**543567**	●	8	90	80	50 / 30	- / -	65 / 15	SW 13	50
FBS II 8x90 40/25 US R	**543568**	●	8	100	90	50 / 40	- / -	65 / 25	SW 13	50
FBS II 8x100 50/35 US R	**558239**	●	8	110	100	50 / 50	- / -	65 / 35	SW 13	50
FBS II 8x120 70/55 US R	**558240**	●	8	130	120	50 / 70	- / -	65 / 55	SW 13	50
FBS II 8x140 90/75 US R	**558241**	●	8	150	140	50 / 90	- / -	65 / 75	SW 13	50
FBS II 8x160 110/95 US R	**558242**	●	8	170	160	50 / 110	- / -	65 / 95	SW 13	50
FBS II 10x60 5/-/- US R	**543569**	●	10	70	60	55 / 5	- / -	- / -	SW 15	50
FBS II 10x70 15/5/- US R	**543570**	●	10	80	70	55 / 15	65 / 5	- / -	SW 15	50
FBS II 10x80 25/15/- US R	**543571**	●	10	90	80	55 / 25	65 / 15	- / -	SW 15	50
FBS II 10x90 35/25/5 US R	**543572**	●	10	100	90	55 / 35	65 / 25	85 / 5	SW 15	50
FBS II 10x100 45/35/15 US R	**543573**	●	10	110	100	55 / 45	65 / 35	85 / 15	SW 15	50
FBS II 10x120 65/55/35 US R	**543574**	●	10	130	120	55 / 65	65 / 55	85 / 35	SW 15	50
FBS II 10x140 85/75/55 US R	**558243**	●	10	150	140	55 / 85	65 / 75	85 / 55	SW 15	50
FBS II 10x160 105/95/75 US R	**558244**	●	10	170	160	55 / 105	65 / 95	85 / 75	SW 15	50
FBS II 12x70 10/-/- US R	**543575**	●	12	80	70	60 / 10	- / -	- / -	SW 17	20
FBS II 12x85 25/10/- US R	**543576**	●	12	95	85	60 / 25	75 / 10	- / -	SW 17	20
FBS II 12x110 50/35/10 US R	**543577**	●	12	120	110	60 / 50	75 / 35	100 / 10	SW 17	20
FBS II 12x130 70/55/30 US R	**543578**	●	12	140	130	60 / 70	75 / 55	100 / 30	SW 17	20
FBS II 12x160 100/85/60 US R	**558245**	●	12	170	160	60 / 100	75 / 95	100 / 60	SW 17	20



Technical data

Concrete screw UltraCut FBS II SK R

UltraCut FBS II SK R countersunk head, stainless steel R

Item	Stainless steel Item No.	Approval ETA	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Screw length l_s [mm]	Screw-in depth with fixture thickness h_{nom1} / t_{fix} [mm]	Screw-in depth with fixture thickness h_{nom2} / t_{fix} [mm]	Screw-in depth with fixture thickness h_{nom3} / t_{fix} [mm]	Drive	Sales unit [pcs]
FBS II 8x60 10/- SK R	543579	●	8	70	60	50 / 10	- / -	- / -	TX40	50
FBS II 8x80 30/15 SK R	543580	●	8	90	80	50 / 30	- / -	65 / 15	TX40	50
FBS II 8x90 40/25 SK R	543581	●	8	100	90	50 / 40	- / -	65 / 25	TX40	50
FBS II 8x100 50/35 SK R	558246	●	8	110	100	50 / 50	- / -	65 / 35	TX40	50
FBS II 10x65 10/-/- SK R	543582	●	10	75	65	55 / 10	- / -	- / -	TX50	50
FBS II 10x80 25/15/- SK R	543583	●	10	90	80	55 / 25	65 / 15	- / -	TX50	50
FBS II 10x95 40/30/10 SK R	543584	●	10	105	95	55 / 40	65 / 30	85 / 10	TX50	50
FBS II 10x100 45/35/15 SK R	543585	●	10	110	100	55 / 45	65 / 35	85 / 15	TX50	50
FBS II 10x120 65/55/35 SK R	543586	●	10	130	120	55 / 65	65 / 55	85 / 35	TX50	50

Technical data

Accessories UltraCut FBS II

FUP

Nut SW

Nut TX 1/2" - 1/4"

FMB TX

FPB ProfiBit TX 50 5/16"

Setting tool SC-ST

Item	Item No.	Internal diameter D [mm]	Drive	Match	Sales unit [pcs]
FUP 8	537200	9,9	–	FBS II 8	1
FUP 10	537201	12,0	–	FBS II 10	1
FUP 12	537202	13,0	–	FBS II 12	1
FUP 14	537203	15,0	–	FBS II 14	1
Nut SW 10	538577	–	1/2" / SW10	FBS II 6	1
Nut SW 13	538578	–	1/2" / SW13	FBS II 8	1
Nut SW 15	538579	–	1/2" / SW15	FBS II 10	1
Nut SW 17	538580	–	1/2" / SW17	FBS II 12	1
Nut SW 21	538581	–	1/2" / SW21	FBS II 14	1
Nut 1/2" - 1/4"	553928	–	1/2" / 1/4"	FBS II 6 / FBS II 8 / FBS II 8 SK	1
Nut 1/2" - TX 50	553929	–	1/2" / TX50	FBS II 10 / FBS II 10 SK	1
FMB TX30 MaxxBit W 5	533158	–	TX30	FBS II 6	1
FMB TX40 MaxxBit W 5	533159	–	TX40	FBS II 6 / FBS II 8 / FBS II 8 SK	1
FPB TX 50 5/16" ProfiBit	557844	–	TX50	FBS II 10 SK	1
Setting tool SC-ST 8	557872	–	–	FBS II 8	1
Setting tool SC-ST 10	557874	–	–	FBS II 10	1

Technical data

Accessories UltraCut FBS II

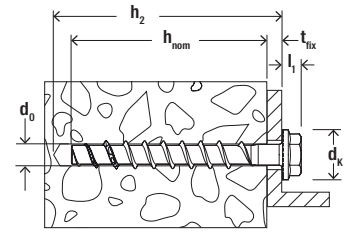

FFD


FSW 10

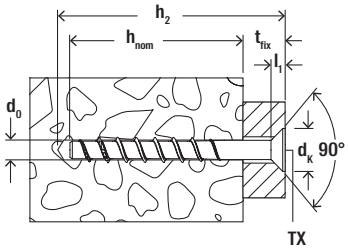

Washer U

Item	Item No.	Internal diameter D [mm]	External-Ø d [mm]	Match	Sales unit [pcs]
Filling disc FFD 22 x 9 x 6	**547515**	9,0	22	FBS II 6	4
Filling disc FFD 26 x 12 x 6	**538458**	12,0	26	FBS II 8	4
Filling disc FFD 26 x 12 x 6 R	**541986**	12,0	26	FBS II 8 R / FBS II 10 R	4
Filling disc FFD 30 x 14 x 6	**538459**	14,0	30	FBS II 10 / FBS II 12	4
Filling disc FFD 30 x 14 x 6 R	**541987**	14,0	30	FBS II 10 R / FBS II 12 R	4
Filling disc FFD 38 x 19 x 7	**538460**	19	38	FBS II 14	4
Adjusting washer FSW 10	**557276**	17,5	44	FBS II 10 US	40
Washer for FBS 10	**520471**	13,5	44	FBS II 10 US	50

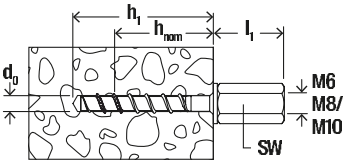
Installation data - concrete C20/25 - C50/60



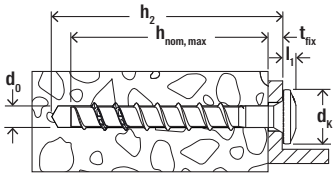
Type US



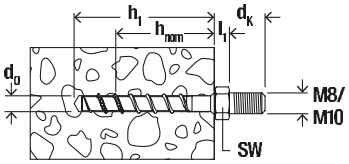
Type SK



Type I



Type P / Typ LP



Type M8 / M10

UltraCut		FBS II 8		FBS II 10		FBS II 6				FBS II M8/M10	FBS II 6 I, M8/M10, M6
		SK	SK R	SK	SK R	SK	P	LP	US		
l_1	[mm]	6,0	7,0	7,0	7,0	6,0	3,9	3,6	6,2	3,6/5	15/16
d_K	[mm]	20,0	23,0	23,0	25,0	13,5	14,4	17,5	17,0	37,0/32	-

Concrete screw UltraCut FBS II 6-14 gvz / R			6	8	10	12	14
Drill hole diameter	d_0	[mm]	6	8	10	12	14
Nominal screw-in depth	$h_{nom\,1}$	[mm]	25 - 55	50	55	60	65
	$h_{nom\,2}$	[mm]	25 - 55	-	65	75	85
	$h_{nom\,3}$	[mm]	25 - 55	65	85	100	115
Drill hole depth (push-trough installation)	$h_2 \geq$	[mm]	l + 10	l + 10	l + 10	l + 10	l + 15
Clearance hole diameter	d_f	[mm]	≤ 8	10,6 - 12	12,8 - 14	14,8 - 16	16,9 - 18
Maximum torque for installation with impact screw driver in concrete[3]	$t_{imp,\,max\,gvz}$	[Nm]	450[1]	600	650	650	650
	$t_{imp,\,max\,R}$	[Nm]	-	450	450	650	-
Width across flat	SW		10[2]	13	15	17	21
Drive	TX		T30	T40 (SK u. US)	T50 (SK)	-	-

1) Screw-in depth < 35 mm 80 Nm

2) SW 13 for FBS II ... M10 and FBS II ... M8/M10 I

3) The values apply to concrete strength of approx. 40 N/mm², for other concrete strength classes the values may differ. The conversion of nominal output into effective tightening torque varies from machine to machine - always therefore use torque control.

Installation data masonry

Concrete screw ULTRACUT FBS II 8-14					
Building material	**Compressive strength class**	**Size**	**[mm]**	8	10
	[N/mm²]	**h_{nom}**	**[mm]**	65	85
Solid clay brick (EN771-1)	≥ 12	T_{inst}	l + 10	10	10
Solid sand-lime brick (EN771-2)	≥ 12	T_{instt}	≤ 8	15	15
Aerated concrete (EN771-4)	≥ 6	T_{ins}	T30	5	5

Loads

Concrete screw Ultracut FBS II US hexagon head with integral washer and FBS II SK countersunk head

Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-15/0352 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material/ surface	**Screw-in depth**	**Minimum member thickness**	**Instal-lation torque**	**Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads**				**Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads**			
Type		h_{nom} **[mm]**	h_{min} **[mm]**	$T_{imp,\,max}$[2] **[Nm]**	N_{perm}[3] **[kN]**	V_{perm}[3] **[kN]**	s_{min}[3] **[mm]**	c_{min}[3] **[mm]**	N_{perm}[3] **[kN]**	V_{perm}[3] **[kN]**	s_{min}[3] **[mm]**	c_{min}[3] **[mm]**
FBS II 6	gvz	40	80	450	1.2	4.3	35	35	3.8	4.3	35	35
	gvz	45	90	450	1.7	4.3	35	35	4.8	4.3	35	35
	gvz	50	90	450	1.9	4.3	35	35	5.7	4.3	35	35
	gvz	55	100	450	2.4	6.3	35	35	6.4	6.3	35	35
FBS II 8	gvz / CP	50	100	600	2.9	4.1	35	35	5.9	5.9	35	35
	gvz / CP	65	120	600	5.7	9.0	35	35	8.8	9.0	35	35
FBS II 10	gvz / CP	55	100	650	4.3	4.6	40	40	6.6	6.6	40	40
	gvz / CP	65	120	650	5.7	11.9	40	40	8.5	14.0	40	40
	gvz / CP	85	140	650	9.2	16.6	40	40	13.1	16.6	40	40
FBS II 12	gvz / CP	60	110	650	5.3	10.6	50	50	7.5	15.1	50	50
	gvz / CP	75	130	650	7.6	15.2	50	50	10.9	15.2	50	50
	gvz / CP	100	150	650	12.0	20.3	50	50	17.1	20.3	50	50
FBS II 14	gvz / CP	65	120	650	5.8	11.6	60	60	8.3	16.6	60	60
	gvz / CP	85	140	650	9.0	18.0	60	60	12.8	22.1	60	60
	gvz / CP	115	180	650	14.7	29.4	60	60	21.0	29.4	60	60

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of γ_L = 1.4 are considered. As a single anchor counts e.g. an anchor with a spacing s ≥ 3 x h_{ef} and an edge distance c ≥ 1.5 x h_{ef}. Accurate data see ETA.
[2] Maximum allowable torque for installation with any tangential impact screw driver. Further technical data see ETA.
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Loads

Concrete screw UltraCut FBS II US R hexagon head with integral washer and FBS II SK R countersunk head

Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-17/0740 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material/ surface	Screw-in depth	Minimum member thickness	Maximum installation torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{nom} [mm]	h_{min} [mm]	$T_{imp,\,max}$[2] [Nm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
FBS II 8	R	50	100	450	1.9	4.1	35	35	3.3	5.9	35	35
FBS II 8	R	65	120	450	4.3	6.1	35	35	6.7	8.8	35	35
FBS II 10	R	55	100	450	2.1	4.6	40	40	4.0	6.6	40	40
FBS II 10	R	65	120	450	2.9	6.0	40	40	6.7	8.5	40	40
FBS II 10	R	85	140	450	7.6	18.4	40	40	13.1	20.9	40	40
FBS II 12	R	60	110	650	2.1	5.3	50	50	4.8	7.5	50	50
FBS II 12	R	75	130	650	5.2	15.2	50	50	5.7	21.8	50	50
FBS II 12	R	100	150	650	12.0	23.9	50	50	17.1	26.2	50	50

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.
[2] Maximum allowable torque for installation with any tangential impact screw driver. Further technical data see ETA.
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Loads

Concrete srew UltraCut FBS II

Recommended loads[1] [3] for a single anchor or a fixing point[4] [5] [6] in solid brick masonry.

Type			FBS II 8	FBS II 10
Anchorage depth	h_{nom}	[mm]	65	85
Recommended loads (F_{rec}) in the respective base material [2][3]				
Solid clay brick (EN771-1) ≥ 240 x 113 x 115 mm	$f_b \geq 12$	[kN]	1.1[10]	1.4[10]
Solid clay brick (EN771-1) ≥ 240 x 113 x 115 mm	$f_b \geq 20$	[kN]	1.6[7][10]	1.6[7][10]
Solid sand-lime brick (EN771-2) ≥ 240 x 71 x 115 mm	$f_b \geq 12$	[kN]	1.2[7][10]	1.2[7][10]
Aerated concrete (EN771-4) ≥ 499 x 249 x 120 mm	$f_b \geq 6$	[kN]	0.7	0.9
Minimum spacing (s_{min}) and edge distances (c_{min})				
Minimum spacing within anchor groups of 2 or 4 anchors	s_{min}	[mm]	80	80
Minimum spacing between single anchors or anchor groups	s_{min}	[mm]	80	80
Minimum distance to the horizontal joint	$c_{min,v}$[8]	[mm]	20	20
Minimum distance to the vertical joint	$c_{min,h}$[8]	[mm]	40	40
Minimum distance to the free edge	$c_{min,\,free\,edge}$[8]	[mm]	200	200
Tightening torque[9] ($T_{tighten}$) in respective base material				
Solid clay brick[10]	$T_{tighten}$	[Nm]	10	10
Solid sandlime brick[10]	$T_{tighten}$	[Nm]	15	15
Aerated concrete	$T_{tighten}$	[Nm]	5	5

[1] An appropriate safety factor is considered.
[2] The given loads apply to the given brick measures for masonry with superimposed load. Larger brick formats are at least equivalent in case of the loads. Base material f_b in [N/mm²].
[3] The loads only apply to multiple fixings of non-load-bearing systems and are valid for tensile load, shear load and oblique load under any angle.
[4] To confirm the given technical data, it is recommended to carry out tests on the construction site. In case of not visible joints a 100% testing of the anchors is recommended as the concrete screws only work in the brick but not in mortar joints.
[5] A fixing point can be a single anchor, 2 anchors or 4 anchors with a minimum spacing s_{min}. Anchor groups of 4 anchors are arranged in rectangular disposition.
[6] The fixing points have to be arranged in this way that there will be always maximum one fixing point arranged in one brick.
[7] Brick pull-out is decisive.
[8] The values $c_{min,v}$ and $c_{min,h}$ are only valid if the mortar joints are filled proper. Otherwise the joints has to be considered as free edges and $c_{min,free\,edge}$ is decisive. Minimum mortar strenght is M 2.5.
[9] The screw is screwed in with a cordless screwdriver, an impact screwdriver or by hand. The screwing process must be finished immediately when the screw head is in contact with the assembled object. The specified tightening torque must then be applied with a torque wrench.
[10] The values are valid for unperforated solid bricks.

Loads

Concrete screw UltraCut FBS II for temporary fastening

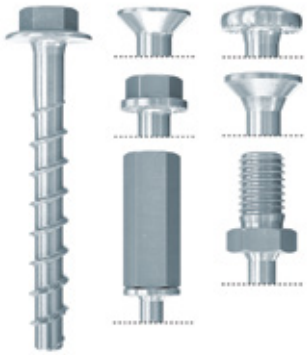
Permissible loads of a single anchor[1] in normal concrete of strength class C20/25 to C50/60.
For the design the complete current assessment Z-21.8-2049 has to be considered.

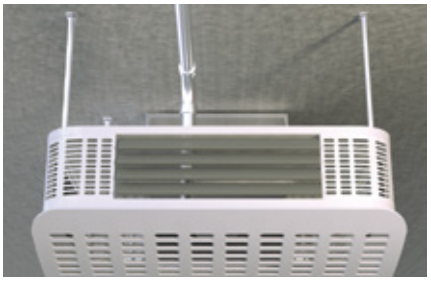
							Cracked and non-cracked concrete			
	Material/ surface	Screw-in depth	Minimum member thickness	Maximum installation torque	Minimum spacing (s_{min}) and edge distances (c_{min})		Permissible load F_{perm}[4]			
Type		h_{nom} [mm]	h_{min} [mm]	$T_{imp,\,max}$[2] [Nm]	s_{min} [mm]	c_{min}[3] [mm]	$f_{c,cube} \geq 10$ N/mm² [kN]	$f_{c,cube} \geq 15$ N/mm² [kN]	$f_{c,cube} \geq 20$ N/mm² [kN]	$f_{c,cube} \geq 25$ N/mm² [kN]
FBS II 8	gvz	50	100	400	200	65	1.9	2.3	2.6	2.9
	gvz	65	150	400	300	100	3.6	4.4	5.1	5.6
FBS II 10	gvz	55	105	400	210	70	2.2	2.7	3.1	3.5
	gvz	65	130	400	260	85	2.9	3.5	4.1	4.5
	gvz	85	205	650	410	135	5.8	7.1	8.1	9.1
FBS II 12	gvz	60	120	400	240	80	2.8	3.4	3.9	4.4
	gvz	75	150	400	300	100	4.0	4.9	5.6	6.1
	gvz	100	240	650	480	160	7.6	9.3	10.8	12.0
FBS II 14	gvz	65	115	400	230	75	2.3	2.8	3.2	3.6
	gvz	85	150	400	300	100	3.6	4.4	5.0	5.6
	gvz	115	255	650	510	170	8.9	10.9	12.6	14.0

[1] Material safety factor as well as a partial safety factor for load actions of $\gamma_L = 1.4$ is considered. The screw may be used in the concrete member before the characteristic compressive strength $f_{ck,cube}$ is reached. In this case, the concrete compressive strength $f_{c,cube}$ must have reached a value of at least 10 N/mm². Only intended for temporary use and one-time screwing into the same drill hole. Conditions for reuse of the screw see, approval.
[2] Values for impulse wrenches with tangential impact and automatic stop device.
[3] In case of combined action of shear load and installation close to the edge, the edge distance must be ≥ c_{min} x 1.5. Detail see approval.
[4] Values valid for all load directions.

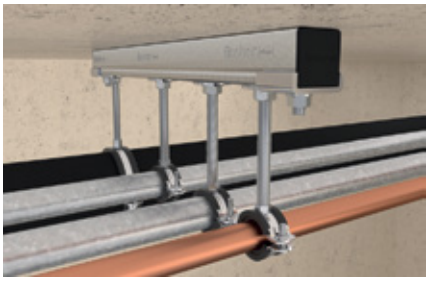
Concrete screw UltraCut FBS II 6 / FBS II CP

The high-performance concrete screw for absolute installation ease





Suspended air-conditioners



Light, suspended pipelines

Applications

- Pipeline routes
- Suspension for individual pipes
- Suspended mounting rails
- Prestressed concrete hollow core ceilings
- Cable trays
- Ventilation ducts
- Perforated tapes
- Air conditioning units

Advantages

- The first concrete screw with diameter 6 with variable embedment depth offers a flexible adaption of the embedment depth to the loads.
- The ETA assessment includes the use in cracked and non-cracked concrete for highest safety requirements.
- The first 6 mm diameter concrete screw with an ETA for the C1 seismic performance category for additional safety standards.
- Different head designs offer a maximum of flexibility and a perfect adaptation to the application.
- The UltraCut FBS II 6 is approved for multiple use of non-load bearing systems and thereby ideal for the installation of pipe routes, cable trays and prestressed hollow concrete ceilings.

Certificates

ETA-15/0352, for cracked concrete
ETA-18/0242, for non-structural applications in concrete

Fire resistance classification R120

Building materials

Approved for:
- Concrete C20/25 to C50/60, cracked and non-cracked
- Prestressed hollow concrete ceilings C30/37 to C50/60 for the multiple use of non-load bearing systems

Also suitable for:
- Concrete C12/15
- Solid building materials
- Masonry with dense structure

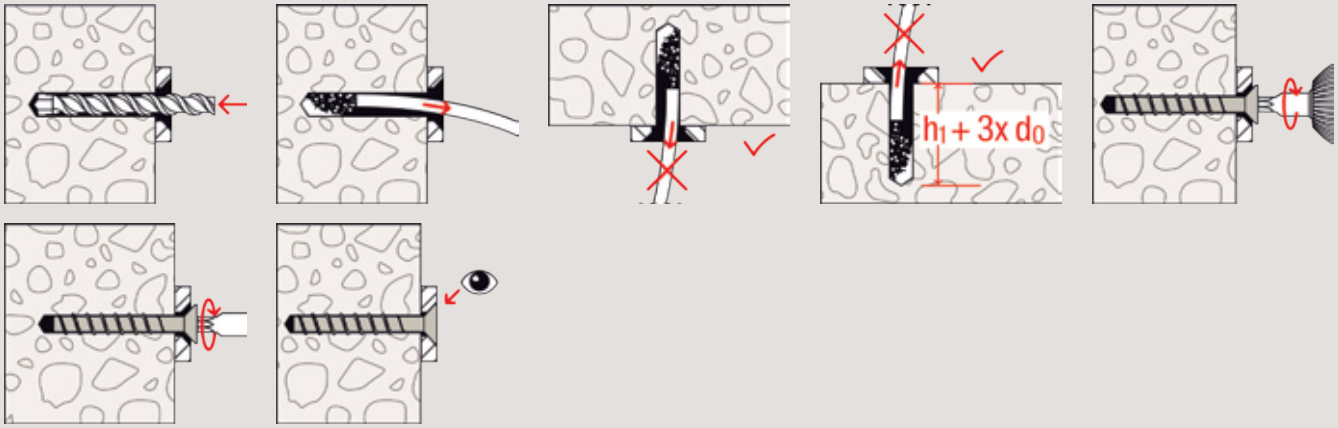
Versions

- Zinc-plated steel

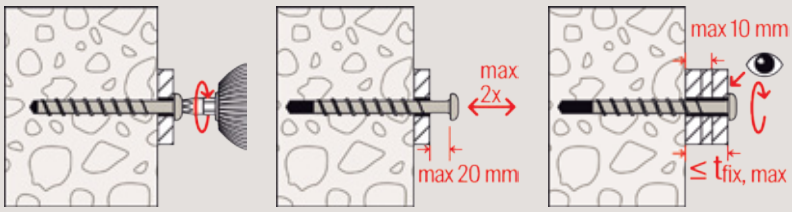
Functioning

- The UltraCut FBS II is recommended for the push-through / pre-positioned installation.
- Drill holes do not need to be cleaned during vertical installation (ceiling and floor). For floor fixings the hole must be drilled 3x drill hole diameter deeper.
- The approved adjustment for the concrete screws allows the screw to be unscrewed twice for a total length of 20 mm, to place maximum 10 mm packing below the base plates or to align the attached part, and then to tighten the screw again.
- We recommend using a fischer impact wrench FSS 18V with a suitable impact screwdriver socket or an internal torx drive.
- The screw is installed correctly when the screw head sits flush on the fixture (visual setting control).

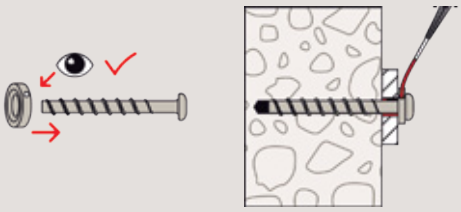
Installation UltraCut FBS II 6

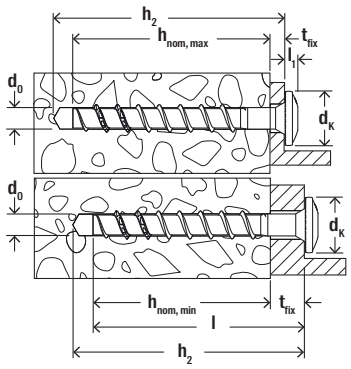


Fixture adjustment



Additional for seismic applications





Technical data

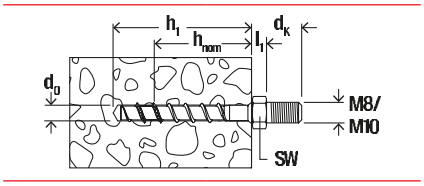
Concrete screw UltraCut FBS II 6

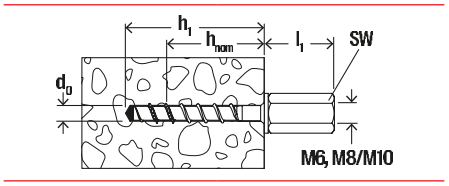
UltraCut FBS II 6 P panhead

UltraCut FBS II 6 SK countersunk head

UltraCut FBS II 6 US hexagonal head with molded washer

Item	Item No.	Approval	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Screw length l_s [mm]	Head-Ø d_K [mm]	Screw-in depth Multiple fixing ETA-18/0242 $h_{nom,min}$ - $h_{nom,max}$ [mm]	Screw-in depth Single point fixing ETA-15/0352 $h_{nom,min}$ - $h_{nom,max}$ [mm]	Usable length $t_{fix,min}$ - $t_{fix,max}$ [mm]	Drive	Sales unit [pcs]
FBS II 6 x 30/5 P	**546377**	●	6	40	30	14.4	25	–	Screw length - h_{nom}	T30	100
FBS II 6 x 40/5 P	**546378**	●	6	50	40	14.4	25 - 35	–	Screw length - h_{nom}	T30	100
FBS II 6 x 40/5 LP	**546379**	●	6	50	40	17.5	25 - 35	–	Screw length - h_{nom}	T30	100
FBS II 6 x 60/5 P	**546380**	●	6	70	60	14.4	25 - 55	40 - 55	Screw length - h_{nom}	T30	100
FBS II 6 x 80/25 P	**546381**	●	6	90	80	14.4	25 - 55	40 - 55	Screw length - h_{nom}	T30	100
FBS II 6 x 30/5 SK	**546382**	●	6	40	30	13.5	25	–	Screw length - h_{nom}	T30	100
FBS II 6 x 40/5 SK	**546383**	●	6	50	40	13.5	25 - 35	–	Screw length - h_{nom}	T30	100
FBS II 6 x 60/5 SK	**546384**	●	6	70	60	13.5	25 - 55	40 - 55	Screw length - h_{nom}	T30	100
FBS II 6 x 80/25 SK	**546385**	●	6	90	80	13.5	25 - 55	40 - 55	Screw length - h_{nom}	T30	100
FBS II 6 x 100/45 SK	**546386**	●	6	110	100	13.5	25 - 55	40 - 55	Screw length - h_{nom}	T30	100
FBS II 6 x 120/65 SK	**546387**	●	6	130	120	13.5	25 - 55	40 - 55	Screw length - h_{nom}	T30	100
FBS II 6 x 140/85 SK	**546388**	●	6	150	140	13.5	25 - 55	40 - 55	Screw length - h_{nom}	T30	100
FBS II 6 x 160/105 SK	**546389**	●	6	170	160	13.5	25 - 55	40 - 55	Screw length - h_{nom}	T30	100
FBS II 6 x 40/5 US	**546390**	●	6	50	40	17	25 - 35	–	Screw length - h_{nom}	SW 10	100
FBS II 6 x 60/5 US	**546391**	●	6	70	60	17	25 - 55	40 - 55	Screw length - h_{nom}	SW 10	100
FBS II 6 x 80/25 US	**546392**	●	6	90	80	17	25 - 55	40 - 55	Screw length - h_{nom}	SW 10	100
FBS II 6 x 100/45 US	**546393**	●	6	110	100	17	25 - 55	40 - 55	Screw length - h_{nom}	SW 10	100
FBS II 6 x 120/65 US	**546394**	●	6	130	120	17	25 - 55	40 - 55	Screw length - h_{nom}	SW 10	100





Technical data

Concrete screw UltraCut FBS II 6 M8/M10

UltraCut FBS II M8/M10
outside thread

UltraCut FBS II M6, M8/M10 I
internal thread

	Item No.	Approval	Drill hole diameter d_0 [mm]	Min. drill hole depth for pre-positioned installation h_1 [mm]	Screw diameter d_s [mm]	Screw length l_s [mm]	Screw-in depth Multiple fixing ETA-18/0242 $h_{nom,min}$ - $h_{nom,max}$ [mm]	Screw-in depth Single point fixing ETA-15/0352 $h_{nom,min}$ - $h_{nom,max}$ [mm]	Drive	Sales unit [pcs]
Item		**ETA**								
FBS II 6 x 25 M8/19	**546395**	●	6	30	7,5	25	25	–	SW 10	100
FBS II 6 x 35 M8/19	**546396**	●	6	40	7,5	35	35	–	SW 10	100
FBS II 6 x 55 M8/19	**546397**	●	6	60	7,5	55	55	55	SW 10	100
FBS II 6 x 35 M10/21	**546398**	●	6	40	7,5	35	35	–	SW 13	100
FBS II 6 x 55 M10/21	**546399**	●	6	60	7,5	55	55	55	SW 13	100
FBS II 6 x 35 M6 I	**554065**	●	6	40	7,5	35	35	–	SW 13	100
FBS II 6 x 55 M6 I	**554066**	●	6	60	7,5	55	55	55	SW 13	100
FBS II 6 x 35 M8/M10 I	**546400**	●	6	40	7,5	35	35	–	SW 13	100
FBS II 6 x 55 M8/M10 I	**546401**	●	6	60	7,5	55	55	55	SW 13	100

Loads

Concrete screw UltraCut FBS II 6

Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-15/0352 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material/ surface	Screw-in depth	Minimum member thickness	Maximum installation torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{nom} [mm]	h_{min} [mm]	$T_{imp,max}$[2] [Nm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
FBS II 6	gvz	40	80	450	1.2	4.3	35	35	3.8	4.3	35	35
	gvz	45	90	450	1.7	4.3	35	35	4.8	4.3	35	35
	gvz	50	90	450	1.9	4.3	35	35	5.7	4.3	35	35
	gvz	55	100	450	2.4	6.3	35	35	6.4	6.3	35	35

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of γ_L = 1.4 are considered. As a single anchor counts e.g. an anchor with a spacing s ≥ 3 x h_{ef} and an edge distance c ≥ 1.5 x h_{ef}. Accurate data see ETA.
[2] Maximum allowable torque for installation with any tangential impact screw driver. Further technical data see ETA.
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Loads

Concrete screw UltraCut FBS II 6

Permissible loads for a single anchor[1] for multiple use of redundant non-structural applications* in normal concrete C20/25.
For the design the complete current assessment ETA - 18/0242 has to be considered.

					Cracked concrete				Non-cracked concrete			
	Material/ surface	Screw-in depth	Minimum member thickness	Maximum installation torque	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{nom} [mm]	h_{min} [mm]	$T_{inst,max}$ [2] [Nm]	N_{perm} [3] [kN]	V_{perm} [3] [kN]	s_{min} [3] [mm]	c_{min} [3] [mm]	N_{perm} [3] [kN]	V_{perm} [3] [kN]	s_{min} [3] [mm]	c_{min} [3] [mm]
FBS II 6	gvz	25	80	≤ 5	0.7	1.8	35	35	1.4	2.3	35	35
	gvz	30	80	≤ 5	1.2	2.3	35	35	2.4	2.3	35	35
	gvz	35	80	≤ 5	1.7	4.3	35	35	3.1	4.3	35	35
	gvz	40	80	≤ 10	2.4	4.3	35	35	3.8	4.3	35	35
	gvz	45	90	≤ 10	2.9	4.3	35	35	4.8	4.3	35	35
	gvz	50	90	≤ 10	3.6	4.3	35	35	5.7	4.3	35	35
	gvz	55	100	≤ 10	4.0	6.3	35	35	6.4	6.3	35	35

* In addition to the load table above, the following must be considered for multiple fastening of non-structural redundant systems:
A multiple fixing (redundant system) according to EN 1992-4 and CEN/TR 17079 is defined by
- at least 3 fixing points (per attached element) with at least one anchor at each fixing point and a permissible load per fixing point of 1.4 kN
- or by at least 4 fixing points with at least one anchor each fixing point and a permissible load per fixing point of 2.1 kN
- Additionally, it has to be proven that the stiffness of the attached element shall be large enough to ensure that in case of excessive slip or failure of a fastener the load on this fastener or fixing point can be transferred to neighbouring fixing points without significantly violating the requirements on the attached element in the serviceability and ultimate limit state.

For further details see EN 1992-4 section 7.3 and CEN/TR 17079.

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of γ_L = 1.4 are considered.
[2] Further technical information for installation see ETA.
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimal edge and axial spacings (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018.

Loads

Concrete screw UltraCut FBS II 6

Permissible loads for a single anchor[1] for multiple use of redundant non-structural applications* in pre-stressed hollow-core concrete slabs of concrete strength C30/37.
For the design the complete current assessment ETA - 18/0242 has to be considered.

Type			FBS II 6 gvz						
Screw-in depth		h_{nom}	25	30	35	40	45	50	55
Permissible load F_{perm} [3] in the respective bottom flange thickness									
d_b ≥ 25 mm		[kN]	0.2	0.5	0.5	0.5	0.5	0.5	0.5
d_b ≥ 30 mm		[kN]	1.7	1.7	1.7	1.7	1.7	1.7	1.7
d_b ≥ 35 mm		[kN]	1.7	1.9	2.1	2.4	2.6	2.9	3.1
d_b ≥ 40 mm		[kN]	1.7	2.3	2.6	2.9	3.3	3.6	3.8
d_b ≥ 50 mm		[kN]	1.7	2.3	3.3	3.8	4.3	4.3	5.7
Installation torque	$T_{inst,max}$	[Nm]	5.0	5.0	10	10	10	10	10
Minimum spacing	$s_{1,s2}$ [2]	[mm]	100	100	100	100	100	100	100
Minimum edge distance	$c_{1,c2}$ [2]	[mm]	100	100	100	100	100	100	100

* In addition to the load table above, the following must be considered for multiple fastening of non-structural redundant systems:
A multiple fixing (redundant system) according to EN 1992-4 and CEN/TR 17079 is defined by
- at least 3 fixing points (per attached element) with at least one anchor at each fixing point and a permissible load per fixing point of 1.4 kN
- or by at least 4 fixing points with at least one anchor each fixing point and a permissible load per fixing point of 2.1 kN
- Additionally, it has to be proven that the stiffness of the attached element shall be large enough to ensure that in case of excessive slip or failure of a fastener the load on this fastener or fixing point can be transferred to neighbouring fixing points without significantly violating the requirements on the attached element in the serviceability and ultimate limit state.

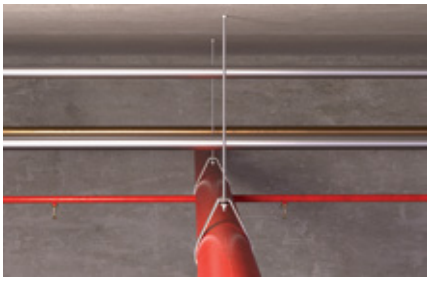
For further details see EN 1992-4 section 7.3 and CEN/TR 17079.

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of γ_L = 1.4 are considered.
[2] Further technical information for installation see ETA.
[3] Valid for tensile load, shear load and oblique load under any angle. In the case of combinations of tensile, shear loads and bending moments, the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018.

Hammerset anchor EA II

The internally threaded anchor with rim for simple hammerset installation

Pipelines



Sprinklers

Applications

- Pipelines and ventilation ducts
- Sprinkler systems
- Cable conduits and wires
- Gratings
- Steel constructions
- Machines
- Consoles
- Shuttering props
- Diamond or core drilling devices (EA II M12 D)

Advantages

- The embossed rim prevents the anchor sleeve from slipping, thus ensuring a trouble-free hammerset installation.
- The metric internal thread means that it is possible to use standard screws or threaded rods for the ideal adaptation to suit the intended use.
- The EMS machine setting tool allows for effortless installation, particularly in the case of series installations.
- The embossing that is applied when expanding with the EHS Plus setting tool offers a simple control of the anchoring and provides increased safety.
- Fixing point at h_{ef} 25 mm prevents anchor of falling out of the drill hole before being expanded.
- The black fixing point prevents the anchor from falling out of the drill hole during overhead installation.

Certificates

ETA-07/0135, for non-cracked concrete
ETA-07/0142, for non-structural applications in concrete

Fire resistance classification R120

from M10

INOX STAINLESS STEEL

from M8

Building materials

Approved for:
- Concrete C20/25 to C50/60, cracked, for the multiple fixings of non-load-bearing systems
- Concrete C20/25 to C50/60, non-cracked

Also suitable for:
- Concrete C12/15
- Natural stone with dense structure

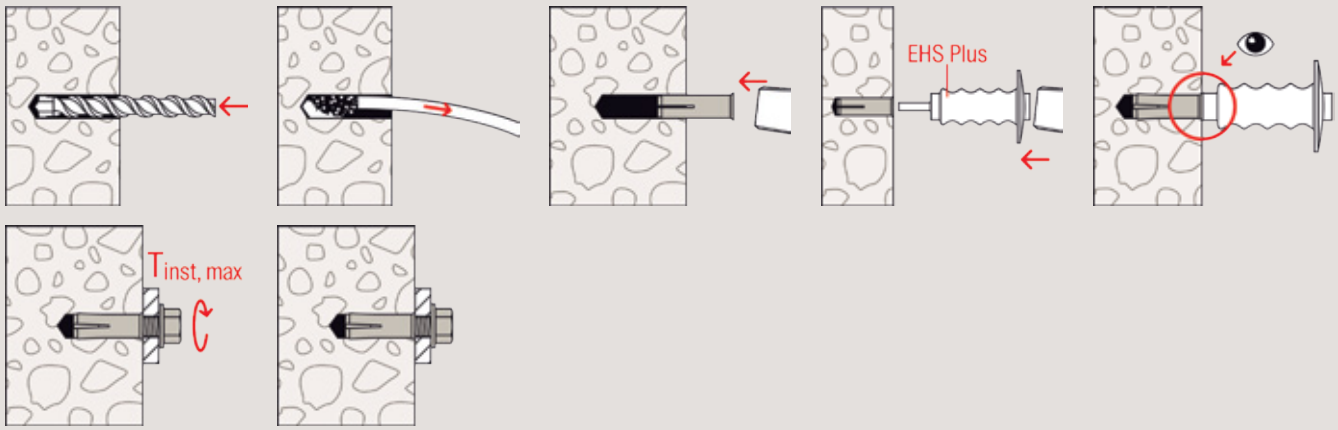
Versions

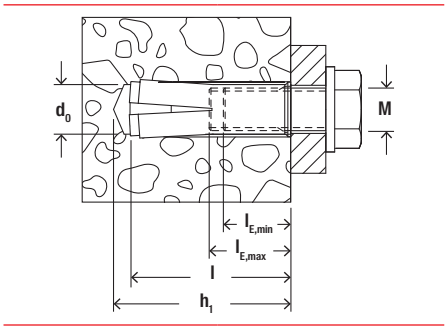
- Zinc-plated steel
- Stainless steel R

Functioning

- The EA II is suitable for pre-positioned installation.
- Position the hammerset anchor in the drill hole and drive in flush to the surface of the anchor base using the hammer.
- The sleeve is then expanded by driving in the internal bolt with the EHS Plus setting tool (alternative: EMS machine setting tool), and expanded against the drill hole wall.
- The setting tools must sit on the rim of the anchor to ensure correct expansion.
- Use the special EA II M12 x 50 D / EA M 12 x 50 N D with thicker sleeve for fixing diamond and core drilling devices.

Installation EA II





Technical data

Hammerset anchor EA II

EA II with reduced anchorage depth h_{ef} = 25 mm and a black fixing point which prevents the anchor from falling out of the drill hole

EA II not suitable for diamond drilling appliances and diamond saws

Item	Zinc-plated steel Item No. pg	Stainless steel Item No. R	Approval ETA	Drill hole diameter d_0 [mm]	Min. drill hole depth for pre-positioned installation h_1 [mm]	Anchor length l [mm]	Internal thread M	Min. bolt penetration $l_{E,min}$ [mm]	Max. bolt penetration $l_{E,max}$ [mm]	Sales unit [pcs]
EA II M 6 x 25	**560960**	**–**	●	8	27	25	M 6	6	14	100
EA II M 6 x 30	**560961**	**048410**	●	8	32	30	M 6	6	14	100
EA II M 8 x 25	**560962**	**–**	●	10	27	25	M 8	8	14	100
EA II M 8 x 30	**560963**	**048411**	●	10	33	30	M 8	8	14	100
EA II M 8 x 40	**560964**	**048412**	●	10	43	40	M 8	8	14	50
EA II M 10 x 25	**560965**	**–**	●	12	27	25	M 10	10	14	50
EA II M 10 x 30	**560966**	**–**	●	12	33	30	M 10	10	14	50
EA II M 10 x 40	**560967**	**048414**	●	12	43	40	M 10	10	17	50
EA II M 12 x 25	**560968**	**–**	●	15	27	25	M 12	12	14	25
EA II M 12 x 50	**560969**	**048415**	●	15	54	50	M 12	12	22	25
EA II M 16 x 65	**048408**	**048416**	●	20	70	65	M 16	16	28	20
EA II M 20 x 80	**048409**	**048417**	●	25	85	80	M 20	20	34	10

Technical data

Hammerset anchor EA II D

EA II M 12 x 50 D suitable for diamond drilling appliances and diamond saws

Hammerset anchor EA M 12 x 50 N D. Suitable for diamond drilling machines and diamond saws.

Item	Zinc-plated steel Item No. pg	Approval ETA	Drill hole diameter d_0 [mm]	Min. drill hole depth h_1 [mm]	Anchor length l [mm]	Internal thread M	Min. bolt penetration $l_{E,min}$ [mm]	Max. bolt penetration $l_{E,max}$ [mm]	Sales unit [pcs]
EA M 12 x 50 N D	**500872**	–	16	54	50	M 12	12	22	50
EA II M 12 x 50 D	**048407**	●	16	54	50	M 12	12	22	25

Technical data

Stop drill EBB

EBB

Item	Item No.	Tool holder	Drill hole diameter d_0 [mm]	Drill hole depth h_0 [mm]	Match	Sales unit [pcs]
EBB 8 x 25	**532607**	SDS plus	8	27	EA II M 6 x 25	1
EBB 10 x 25	**532608**	SDS plus	10	27	EA II M 8 x 25	1
EBB 12 x 25	**532609**	SDS plus	12	27	EA II M 10 x 25	1
EBB 15 x 25	**532610**	SDS plus	15	27	EA II M 12 x 25	1

Technical data

Machine setting tool EMS

EMS

Item	Item No.	Tool holder	Match	Sales unit [pcs]
EMS M 6 x 25/30	**048065**	SDS plus	EA II M 6 x 25, EA II M 6 x 30	1
EMS M 8 x 25/30	**048066**	SDS plus	EA II M 8 x 25, EA II M 8 x 30	1
EMS M 8 x 40	**048067**	SDS plus	EA II M 8 x 40	1
EMS M 10 x 25/30	**048068**	SDS plus	EA II M 10 x 25, EA II M 10 x 30	1
EMS M 10 x 40	**048070**	SDS plus	EA II M 10 x 40	1
EMS M 12 x 50	**048071**	SDS plus	EA II M 12 x 50 D, EA II M 12 x 50, EA M 12 x 50 N D	1
EMS M 16 x 65	**048072** [1)]	SDS max	EA II M 16 x 65	1
EMS M 20 x 80	**048073** [1)]	SDS max	EA II M 20 x 80	1

[1)] Delivery time on request.

Technical data

Setting tool EMS Plus

EHS Plus with hand impact protection for your safety and embossing tool

EA-ST

Item	Item No.	Match	Sales unit [pcs]
EHS M 6 x 25/30 Plus	**044630**	EA II M 6 x 25, EA II M 6 x 30	1
EHS M 8 x 25/30 Plus	**044631**	EA II M 8 x 25, EA II M 8 x 30	1
EHS M 8 x 40 Plus	**044632**	EA II M 8 x 40	1
EHS M 10 x 25/30 Plus	**048487**	EA II M 10 x 25, EA II M 10 x 30	1
EHS M 12 x 25 Plus	**532568**	EA II M 12 x 25	1
EHS M 10 x 40 Plus	**044633**	EA II M 10 x 40	1
EHS M 12 x 50 Plus	**044634**	EA II M 12 x 50, EA II M 12 x 50 D	1
EHS M 16 x 65 Plus	**044635**	EA II M 16 x 65	1
EHS M 20 x 80 Plus	**044636**	EA II M 20 x 80	1
EA-ST 12	**504585**	EA M 12 x 50 N D	1

Loads

Hammerset anchor EA II

Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-07/0135 has to be considered.

						Non-cracked concrete			
						Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type	Material/surface[2]	Screw material	Effective anchorage depth h_{ef} [mm]	Member thickness h_{req} [mm]	Maximum installation torque $T_{inst,max}$ [Nm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
EA II M8 x 40	pg	5.8	40	100	8	5.9	4.9	70	115
	pg	8.8	40	100	8	5.9	4.9	70	115
	R	A4-70	40	100	8	5.9	5.6	70	115
EA II M10 x 40	pg	5.8	40	120	15	5.9	6.2	95	150
	pg	8.8	40	120	15	5.9	6.2	95	150
	R	A4-70	40	120	15	5.9	7.1	95	150
EA II M12 x 50	pg	5.8	50	120	35	8.3	11.3	145	200
	pg	8.8	50	120	35	8.3	11.3	145	200
	R	A4-70	50	120	35	8.3	12.9	145	200
EA II M16 x 65	pg	5.8	65	160	60	12.3	18.3	180	240
	pg	8.8	65	160	60	12.3	18.3	180	240
	R	A4-70	65	160	60	12.3	21.1	180	240
EA II M20 x 80	pg	5.8	80	200	120	16.8	29.1	190	280
	pg	8.8	80	200	120	16.8	29.1	190	280
	R	A4-70	80	200	120	16.8	33.5	190	280

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.
[2] For technical data on steel grade and variants, see ETA.
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Hammerset anchor EA II

Permissible loads for a single anchor[1] for multiple use of redundant non-structural applications* in normal concrete C20/25 up to C50/60.
For the design the complete current assessment ETA-07/0142 has to be considered.

Type	Material/ surface[2]	Screw material	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min}[3] [mm]	Maximum installation torque $T_{inst,max}$ [Nm]	Cracked and non-cracked concrete: Permissible load (F_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads		
						F_{perm}[4] [kN]	s_{min} [mm]	c_{min} [mm]
EA II M6 x 25	pg	4.6	25	80	4	1.0	30	60
EA II M6 x 30	pg	4.6	30	80	4	1.2	70	150
EA II M8 x 25	pg	4.6	25	80	8	1.4	70	100
EA II M8 x 30	pg	4.6	30	80	8	2.0	110	150
EA II M8 x 40	pg	4.6	40	80	8	2.0	200	150
EA II M10 x 25	pg	4.6	25	80	15	1.9	80	120
EA II M10 x 30	pg	4.6	30	80	15	2.0	200	150
EA II M10 x 40	pg	4.6	40	80	15	3.0	200	150
EA II M12 x 25	pg	4.6	25	80	35	1.9	100	130
EA II M12 x 50	pg	4.6	50	100	35	4.3	200	200

* In addition to the load table above, the following must be considered for multiple fastening of non-structural redundant systems:
A multiple fixing (redundant system) according to EN 1992-4 and CEN/TR 17079 is defined by
- at least 3 fixing points (per attached element) with at least one anchor at each fixing point and a permissible load per fixing point of 1.4 kN
- or by at least 4 fixing points with at least one anchor each fixing point and a permissible load per fixing point of 2.1 kN
- Additionally, it has to be proven that the stiffness of the attached element shall be large enough to ensure that in case of excessive slip or failure of a fastener the load on this fastener or fixing point can be transferred to neighbouring fixing points without significantly violating the requirements on the attached element in the serviceability and ultimate limit state.

For further details see EN 1992-4 section 7.3 and CEN/TR 17079.

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered.
[2] For details of steel grade, variants and further concrete classes, see ETA.
[3] Minimum possible member thickness while increasing the spacing and edge distances at the same time. The combination of minimum spacing and edge distances with the minimum member thickness is not possible. Exact data see ETA.
[4] Valid for tensile load, shear load and oblique load under any angle. In the case of combinations of tensile, shear loads and bending moments, the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018.

Loads

Hammerset anchor EA II

Permissible loads for a single anchor[1] for multiple use of redundant non-structural applications* in pre-stressed hollow core slabs of concrete C30/37 up to C50/60.
For the design the complete current assessment ETA-07/0142 has to be considered.

Type	Material/ surface[2]	Screw material	Effective anchorage depth h_{ef} [mm]	Bottom flange thickness[4] d_b [mm]	Maximum installation torque $T_{inst,max}$ [Nm]	Cracked and non-cracked concrete: Permissible load (F_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads		
						F_{perm}[3] [kN]	s_{min} [mm]	c_{min} [mm]
EA II M6 x 25	pg	4.6	25	≥ 35	4	1.0	200	150
EA II M8 x 25	pg	4.6	25	≥ 35	8	1.4	200	150
EA II M10 x 25	pg	4.6	25	≥ 35	15	1.9	200	150
EA II M12 x 25	pg	4.6	25	≥ 35	35	1.9	200	150

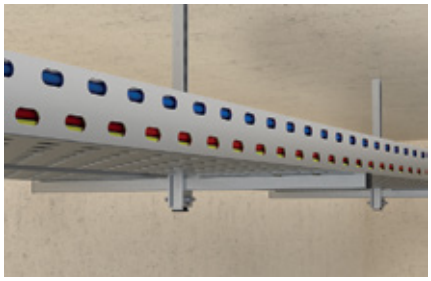
* In addition to the load table above, the following must be considered for multiple fastening of non-structural redundant systems:
A multiple fixing (redundant system) according to EN 1992-4 and CEN/TR 17079 is defined by
- at least 3 fixing points (per attached element) with at least one anchor at each fixing point and a permissible load per fixing point of 1.4 kN
- or by at least 4 fixing points with at least one anchor each fixing point and a permissible load per fixing point of 2.1 kN
- Additionally, it has to be proven that the stiffness of the attached element shall be large enough to ensure that in case of excessive slip or failure of a fastener the load on this fastener or fixing point can be transferred to neighbouring fixing points without significantly violating the requirements on the attached element in the serviceability and ultimate limit state.

For further details see EN 1992-4 section 7.3 and CEN/TR 17079.

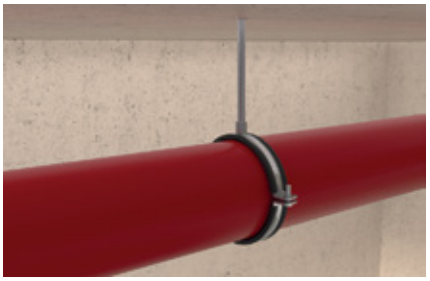
[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered.
[2] For details of steel grade and variants, see ETA.
[3] Valid for tensile load, shear load and oblique load under any angle. In the case of combinations of tensile, shear loads and bending moments, the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018.
[4] The anchor may be used in a flange thickness $d_b = 30$ mm with the same characteristic resistance, but the drill hole must not cut a cavity.

Hammerset anchor EA Plus

The cost-efficient and certified hammerset anchor for simple installation



Cable duct



Light pipeline routes

Applications

- Light pipeline routes
- Cable ducts
- Pipeline routes

Advantages

- The ETA-certified hammerset anchor EA Plus offers a high degree of safety in the non-cracked concrete.
- The EA-ST Plus setting tool guarantees a simple and quick installation.
- The hammerset anchor with internal thread enables an easy pre-positioned installation.
- The metric thread of the EA Plus allows the usage of all standard screws and therefore offers high flexibility.
- The large range of internal thread diameters of 6 to 12 mm offers a wide range of different applications.
- The EA Plus has an ETA assessment for multiple fixing. This ensures a safe installation of pipe routes or cable trays.

Certificates

ETA 19/0168, for non-cracked concrete

ETA 19/0169, for redundant non-structural systems in concrete

Fire resistance classification R120

Building materials

- Concrete C20/25 to C50/60, non-cracked

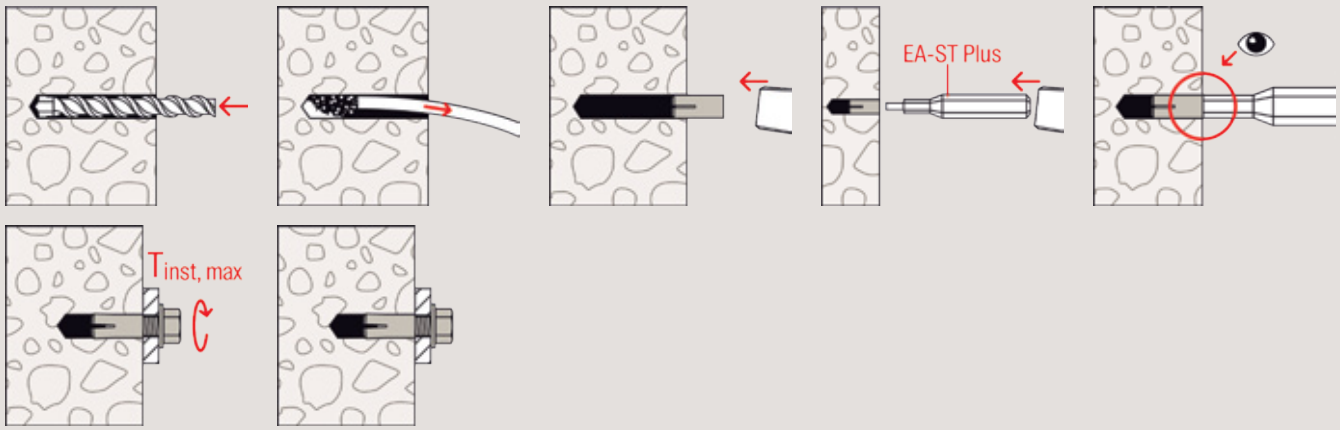
Version

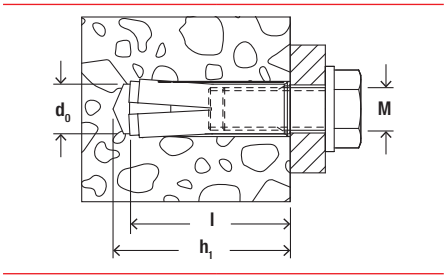
- Zinc-plated steel

Funktionsweise

- Position the hammerset anchor in the drill hole and drive in the anchor flush to the surface of the base material by using the hammer.
- The fischer setting tool EA-ST Plus is then used to expand the sleeve against the drill hole wall by driving in the internal pin.
- The setting tool must sit on the edge of the anchor to ensure correct expansion.

Installation EA Plus





Technical data

Hammerset anchor EA Plus

EA Plus M 6 + M 8

EA Plus M 10 + M 12

Item	Item No. gvz	Approval ETA	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Anchor length l [mm]	Required torque [Nm]	Thread M	Required setting tool	Sales unit [pcs]
EA Plus M 6 x 25	**551788**	●	8	25	25	4	M 6	EA-ST-Plus M 6 x 25	100
EA Plus M 8 x 30	**551789**	●	10	30	30	8	M 8	EA-ST-Plus M 8 x 30	100
EA Plus M 10 x 40	**551790**	●	12	40	40	15	M 10	EA-ST-Plus M 10 x 40	50
EA Plus M 12 x 50	**551791**	●	15	50	50	35	M 12	EA-ST-Plus M 12 x 50	50

Technical data

Setting tool EA-ST

EA-ST Plus

Item	Item No. gvz	Sales unit [pcs]
Setting tool EA-ST PLUS M 6 x 25	**551792**	1
Setting tool EA-ST PLUS M 8 x 30	**551793**	1
Setting tool EA-ST PLUS M 10 x 40	**551794**	1
Setting tool EA-ST PLUS M 12 x 50	**551795**	1

Loads

Hammerset anchor EA Plus

Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-19/0168 has to be considered.

Type	Material/surface[2]	Screw material	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Installation torque T_{inst} [Nm]	Non-cracked concrete: Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
						N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
EA PLUS M8 x 30	gvz	C8C	30	100	8	1.7	2.6	90	120
EA PLUS M10 x 40	gvz	C8C	40	120	15	2.8	3.3	120	140
EA PLUS M12 x 50	gvz	C8C	50	140	35	4.0	3.6	150	175

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of γ_L = 1.4 are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.
[2] For details of steel grade and variants, see ETA.
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimal edge and axial spacings (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018.

Loads

Hammerset anchor EA Plus

Permissible loads for a single anchor[1] for multiple use of redundant non-structural applications* in normal concrete C20/25 up to C50/60.
For the design the complete current assessment ETA-19/0169 has to be considered.

Type	Material/surface[2]	Screw material	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Maximum torque moment $T_{inst,max}$ [Nm]	Cracked and non-cracked concrete: Permissible load (F_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads		
						F_{perm}[3] [kN]	s_{min} [mm]	c_{min} [mm]
EA PLUS M6 x 25	gvz	C8C	25	100	4	0.8	120	110
EA PLUS M8 x 25	gvz	C8C	25	100	8	0.3	100	50
EA PLUS M8 x 30	gvz	C8C	30	100	8	0.8	130	140
EA PLUS M8 x 40	gvz	C8C	40	100	15	0.5	120	80
EA PLUS M10 x 25	gvz	C8C	25	100	15	0.6	110	55
EA PLUS M10 x 30	gvz	C8C	30	100	15	1.0	150	60
EA PLUS M10 x 40	gvz	C8C	40	120	15	1.6	120	90
EA PLUS M12 x 25	gvz	C8C	25	100	35	0.7	200	100
EA PLUS M12 x 50	gvz	C8C	50	140	35	1.2	130	140
EA PLUS M16 x 65	gvz	C8C	65	160	60	2.9	140	125

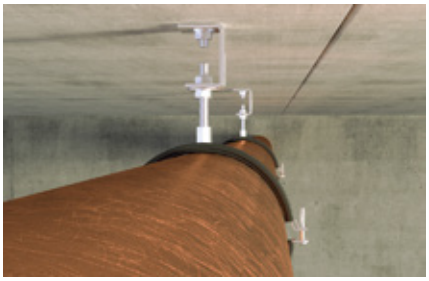
* In addition to the load table above, the following must be considered for multiple fastening of non-structural redundant systems:
A multiple fixing (redundant system) according to EN 1992-4 and CEN/TR 17079 is defined by
- at least 3 fixing points (per attached element) with at least one anchor at each fixing point and a permissible load per fixing point of 1.4 kN
- or by at least 4 fixing points with at least one anchor each fixing point and a permissible load per fixing point of 2.1 kN
- Additionally, it has to be proven that the stiffness of the attached element shall be large enough to ensure that in case of excessive slip or failure of a fastener the load on this fastener or fixing point can be transferred to neighbouring fixing points without significantly violating the requirements on the attached element in the serviceability and ultimate limit state.

For further details see EN 1992-4 section 7.3 and CEN/TR 17079.

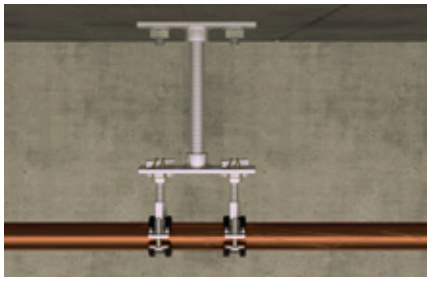
[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of γ_L = 1.4 are considered.
[2] For details of steel grade and variants, see ETA.
[3] Valid for tensile load, shear load and oblique load under any angle. In the case of combinations of tensile, shear loads and bending moments, the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018.

Hammerset anchor EA-N

The cost-efficient hammerset anchor for an easy installation



Height adjustable pipe installation



Pipelines

Applications

- Pipeline routes
- Cable trays
- Consoles

Advantages

- The hammerset anchor with internal thread is suitable for pre-positioned installation.
- The EA-N fits for all standard screws with metric/inch – thread.
- The available internal thread diameter from 6 mm to 20 mm provides flexibility in the application.

Building materials

- Concrete C12/15 to C50/60, non-cracked

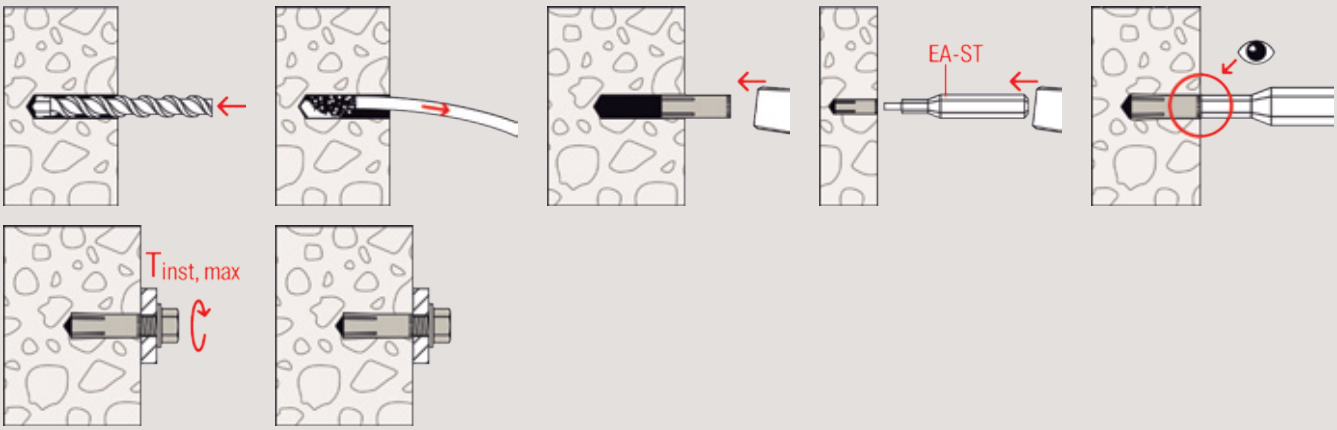
Versions

- Zinc-plated steel

Functioning

- Put the hammerset anchor in the drill hole and get it flush to the surface by hammering in.
- With the hammerset tool EA-ST the capsule will spread due to hammering in the internal bolt and tensed up against the drill hole wall.
- The hammerset tools must be set up on the edge of the anchor for a correct expansion.

Installation EA-N



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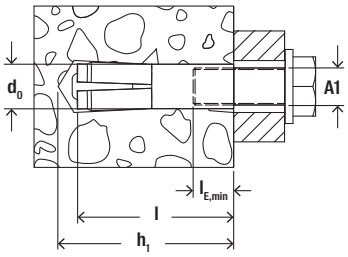


Technical data

Hammerset anchor EA N (metric)

EA-N Metric

Item	Item No.		Min. drill hole depth for pre-positioned installation h_1 [mm]	Anchor length l [mm]	Internal thread A1	Min. bolt penetration $l_{E,min}$ [mm]	Sales unit [pcs]
EA M 6 x 25 N gvz	090159	8	25	25	M 6	6	100
EA M 8 x 30 N gvz	090160	10	30	30	M 8	8	100
EA M10 x 40 N gvz	090161	12	40	40	M 10	10	50
EA M 12 x 50 N gvz	090162	15	50	50	M 12	12	50
EA M 16 x 65 N gvz	090163	20	65	65	M 16	16	25
EA M 20 x 80 N gvz	090164	25	80	80	M 20	20	25
EA M 12 x 50 N D gvz	500872	16	50	50	M 12	12	50

Technical data

EA N (imperial - metric)

EA-N Inch-metric

Item	Item No.	Drill hole diameter d_0 [mm]	Min. drill hole depth for pre-positioned installation h_1 [mm]	Anchor length l [mm]	Internal thread A1	Min. bolt penetration $l_{E,min}$ [mm]	Sales unit [pcs]
EA IM 1/4 x 25 N gvz	**048103**	8	25	25	1/4"	6	100
EA IM 5/16 x 30 N gvz	**048104**	10	30	30	5/16"	8	100
EA IM 3/8 x 40 N gvz	**048105**	12	40	40	3/8"	10	50
EA IM 1/2 x 50 N gvz	**048106**	16	50	50	1/2"	12	50
EA IM 5/8 x 65 N gvz	**048107**	20	65	65	5/8"	16	25
EA IM 3/4 x 80 N gvz	**048108**	25	80	70	3/4"	20	25

Technical data

Hammerset anchor EA N (imperial)

EA-N Inch

Item	Item No.	Drill diameter d_0 [inch]	Min. drill hole depth for pre-positioned installation h_1 [inch]	Total length l [inch]	Internal thread A1 [inch]	Min. bolt penetration $l_{E,min}$ [inch]	Sales unit [pcs]
EA I 1/4 x 1" N gvz	**049185**	3/8	1	1	1/4	1/4	100
EA I 5/16 x 13/16" N gvz	**049194**	3/8	1 1/4	1 1/4	5/16	5/16	100
EA I 3/8 x 19/16" N gvz	**049195**	1/2	1 9/16	1 5/8	3/8	3/8	50
EA I 1/2 x 2" N gvz	**049197**	5/8	2	2	1/2	1/2	50
EA I 5/8 x 2 1/2" N gvz	**049198**	3/4	2 3/8	2 1/2	5/8	5/8	20

Technical data

Setting tool EA-ST

EA-ST

Item	Item No.	Match	Sales unit [pcs]
EA-ST 6	**504573**	EA N M6	1
EA-ST 8	**504576**	EA N M8	1
EA-ST 10	**504584**	EA N M10	1
EA-ST 12	**504585**	EA N M12	1
EA-ST 16	**504586**	EA N M16	1
EA-ST 20	**504587**	EA N M20	1

Loads

Hammerset anchor EA-N

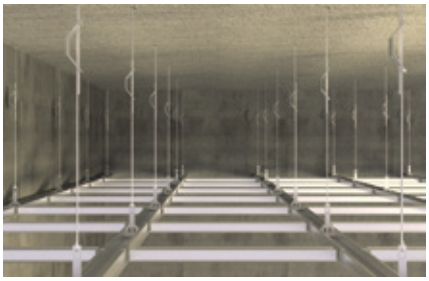
Recommended loads[1] of a single anchor in normal concrete of strength class C20/25.

Type	Material/ surface[2]	Screw material	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Maximum installation torque $T_{inst,max}$ [Nm]	Non-cracked concrete: Recommended tension load (N_{rec}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads		
						N_{rec} [kN]	s_{min}[2] [mm]	c_{min}[2] [mm]
EA M6 x 25 N[3]	gvz	≥ 4.6	25	100	4	2.0	65	115
EA M8 x 30 N[3]	gvz	≥ 4.6	30	100	8	2.5	95	140
EA M10 x 40 N	gvz	≥ 4.6	40	100	15	4.5	150	180
EA M12 x 50 N	gvz	≥ 4.6	50	120	35	6.0	145	200
EA M12 x 50 N D	gvz	≥ 4.6	50	120	35	6.0	145	200
EA M16 x 65 N	gvz	≥ 4.6	65	160	60	11.5	180	240
EA M20 x 80 N	gvz	≥ 4.6	80	200	120	16.0	190	280

[1] Required safety factors are considered.
[2] Minimum possible axial spacings resp. edge distance while reducing the recommended load.
[3] Only suitable for statically intederminate systems.

Nail anchor FNA II

The installation-friendly hammerset anchor for multiple fixings



Suspended ceilings

Fire protection boards

Applications

- Fire protection plates
- Fire protection boards
- Ventilation systems
- Wire and nonious hangers
- Mounting rails
- Metal clamps
- Substructures made of wood and metal

Advantages

- The special active principle allows for a simple hammerset installation and, therefore, a short processing time.
- The extremely short anchor depth prevents reinforcement hits, and creates the conditions for a trouble-free installation.
- The optimised expansion clip ensures hold when placing in the drill hole, and prevents it falling out during overhead installations.
- The massive shaft cross-section guarantees a high load-bearing capacity, thus offering an extremely high level of safety.
- A range of head shapes allows for the fixing of wide-ranging fixtures, and for the ideal adaptation to suit the intended use.

Certificates

ETA-16/0175, for non-structural applications in concrete

Fire resistance classification R120

RWS

ZTV

INOX STAINLESS STEEL

Building materials

Approved for:
- Concrete C12/15 to C50/60, cracked, for multiple fixings of non-structural applications

Also suitable for:
- Solid sand-lime brick
- Natural stone with dense structure
- Prestressed hollow-core concrete slabs

Versions

- Zinc-plated steel
- Stainless steel
- Highly corrosion-resistant steel

Functioning

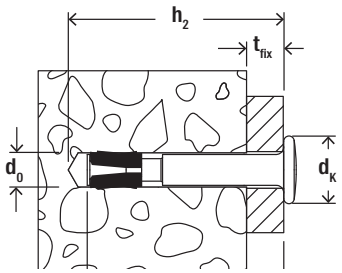
- The FNA II with nail head is suitable for push-through installation. The FNA II M6 is suitable for pre-positioned and push-through installation. The FNA II OE and H are suitable for pre-positioned installation.
- The installed FNA II nail anchor expands automatically under load. The cone is pulled into the expansion clip and expands it against the drill hole wall.
- Available setting tools:
  FNA S-SBO to slip onto the drill,
  FNA S-SDS for series installation with a drilling hammer,
  FNA S-H for the manual installation of mounting rails.

Installation FNA II

Pre-positioned installation FNA II M6

Push-through installation FNA II M6

Installation FNA II OE



Technical data

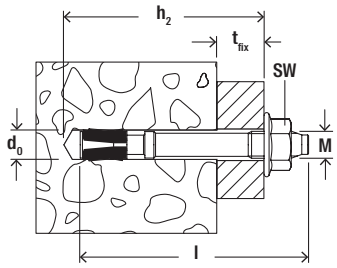
Nail anchor FNA II

FNA II with nail head

	Zinc-plated steel	Stainless steel	Highly corrosion resistant steel	Approval	Drill hole diameter	Min. drill hole depth for through fixings	Anchor length	Max. fixture thickness	Head-Ø	Sales unit
	Item No.	Item No.	Item No.		d_0 [mm]	h_2 [mm]	l [mm]	t_{fix} [mm]	d_K [mm]	[pcs]
Item	**gvz**	**R**	**HCR**	**ETA**						
FNA II 6 x 25/5	**044121** [1]	**–**	**–**	●	6	40	37.5	5	13.0	100
FNA II 6 x 30/5	**044115** [1]	**044122**	**–**	●	6	45	42.5	5	13.0	100
FNA II 6 x 30/5	**–**	**–**	**044124**	●	6	45	42.5	5	13.0	25
FNA II 6 x 30/15	**530419**	**–**	**–**	●	6	55	52.5	15	13.0	50
FNA II 6 x 30/30	**044116**	**044123**	**–**	●	6	70	67.5	30	13.0	50
FNA II 6 x 30/30	**–**	**–**	**044125**	●	6	70	67.5	30	13.0	25
FNA II 6 x 30/40	**–**	**046023**	**–**	●	6	80	77.5	40	13.0	50
FNA II 6 x 30/50	**044117**	**046024**	**500569**	●	6	90	87.5	50	13.0	50
FNA II 6 x 30/60	**–**	**046025**	**–**	●	6	100	97.5	60	13.0	50
FNA II 6 x 30/75	**044118**	**–**	**500573** [2]	●	6	115	112.5	75	13.0	50
FNA II 6 x 30/100	**044119**	**–**	**500574** [2]	●	6	140	137.5	100	13.0	50
FNA II 6 x 30/120	**044120**	**–**	**500575** [2]	●	6	160	157.5	120	13.0	50

1) With hexagon below the nail head for anti-rotation lock of hole and wire hangers (for example) and centring for optional setting tool FNA II S.

2) Delivery time on request.



Technical data

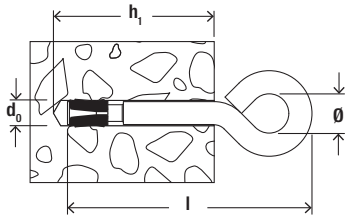
Nail anchor FNA II M6

FNA II M6 with thread and flange nut

	Zinc-plated steel	Stainless steel	Highly corrosion resistant steel	Approval	Drill hole diameter	Min. drill hole depth for through fixings	Anchor length	Max. fixture thickness	Thread	Width across nut	Sales unit
	Item No.	Item No.	Item No.		d_0 [mm]	h_2 [mm]	l [mm]	t_{fix} [mm]	M	SW [mm]	[pcs]
Item	**gvz**	**R**	**HCR**	**ETA**							
FNA II 6 x 25 M6/5	**044111**	**–**	**–**	●	6	40	45	5	M 6	10	100
FNA II 6 x 30 M6/5	**044109**	**–**	**–**	●	6	45	50	5	M 6	10	100
FNA II 6 x 30 M6/5	**–**	**044112** [2)]	**–**	●	6	45	50	5	M 6	10	50
FNA II 6 x 30 M6/5	**–**	**–**	**044113** [2)]	●	6	45	50	5	M 6	10	25
FNA II 6 x 30 M6 x 41	**044110** [1)]	**–**	**–**	●	6	40	41	–	M 6	10	100
FNA II 6 x 30 M6/10	**046022**	**–**	**–**	●	6	45	55	10	M 6	10	100
FNA II 6 x 30 M8/5	**044114**	**–**	**–**	●	6	45	51	5	M 8	13	50

1) without nut; e.g. for fixing of pipe clamps

2) with nut and washer (no flange nut)



Technical data

Nail anchor FNA II-H / FNA II-OE

FNA II-H with hook

FNA II-OE with eye

		Approval	Drill hole diameter	Anchor length	Min. drill hole depth	Inner diameter of the hook/eye	Sales unit
	Item No.		d_0 [mm]	l [mm]	h_1 [mm]	[Ø mm]	[pcs]
Item		**ETA**					
FNA II 6 x 25 H	**044126**	**–**	6	54	35	10	50
FNA II 6 x 25 OE	**044127**	●	6	54	35	10	50

Technical data

Setting tools for FNA II


FNA II S-SDS


FNA II S-SBO


FNA II S-H

Item	Item No.	fits anchor		Sales unit
FNA II S-SDS	**061547**	for all FNA II with nail head	The ideal setting tool for the serial installation with SDS-plus adapter for driving in FNA II with nail head using a hammer drill.	1
FNA II S-SBO	**061548**	for all FNA II with nail head	For a power saving and fast installation to be placed on the drill.	1
FNA S-H	**095990**	for FNA II with metric thread M6	E.g. for the fixing of installation of mounting rails. Chuck with outer diameter of 15 mm for the installation of FNA II M6 by hand.	1

Loads

Nail anchor FNA II

Permissible loads for a single anchor[1] for multiple use of redundant non-structural applications* in normal concrete C20/25 up to C50/60[2].
For the design the complete current assessment ETA-06/0175 has to be considered.

					Cracked and non-cracked concrete		
	Material/ surface	Effective anchorage depth	Minimum member thickness	Maximum installation torque	Permissible load (F_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads		
Type		h_{ef} [mm]	h_{min} [mm]	$T_{inst,max}$ [Nm]	F_{perm}[3] [kN]	s_{min} [mm]	c_{min} [mm]
FNA II 6 x 25	gvz	25	80	-	1.4	40	40
FNA II 6 x 30	gvz	30	80	-	2.4	40	40
	R	30	80	-	2.4	40	40
	HCR	30	80	-	2.4	40	40
FNA 6 x 25 M6	gvz	25	80	4	1.4	40	40
FNA 6 x 30 M6	gvz	30	80	4	2.4	40	40
	R	30	80	4	2.4	40	40
	HCR	30	80	4	2.4	40	40
FNA II 6 x 30 M8	gvz	30	80	4	2.4	40	40
FNA II 6 x 25 OE	gvz	25	80	-	0.7	40	40

* In addition to the load table above, the following must be considered for multiple fastening of non-structural redundant systems:
A multiple fixing (redundant system) according to EN 1992-4 and CEN/TR 17079 is defined by
- at least 3 fixing points (per attached element) with at least one anchor at each fixing point and a permissible load per fixing point of 1.4 kN
- or by at least 4 fixing points with at least one anchor each fixing point and a permissible load per fixing point of 2.1 kN
- Additionally, it has to be proven that the stiffness of the attached element shall be large enough to ensure that in case of excessive slip or failure of a fastener the load on this fastener or fixing point can be transferred to neighbouring fixing points without significantly violating the requirements on the attached element in the serviceability and ultimate limit state.

For further details see EN 1992-4 section 7.3 and CEN/TR 17079.

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered.
[2] For concrete strength class C12/15 see ETA.
[3] Valid for tensile load, shear load and oblique load under any angle. In the case of combinations of tensile, shear loads and bending moments, the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018.

Nail anchor FNA II RB

The easy-to-assemble fixing solution for removable fire protection panel

Fire protection boards

Fire protection boards

Applications

- Fixing of fire protection panel in tunnel construction.
- For fixing of one and more layers of fire protection panel of all manufacturers e.g. Aestuver and Promat.

Advantages

- Easy removal of fire protection panel without damage.
- Reusability of removed fire protection panel.
- Secure fixing, particularly when exposed to vibration, wind and pushing/pulling effects.
- Easy-to-assemble solution.
- Low anchoring depth (30 mm).
- Convenient assembly without torque-controlled setting tool.
- Approved system which has proven itself one million times over.
- Large range of anchor lengths possible.

Certificates

ETA-16/0175, for non-structural applications in concrete

Fire resistance classification R120

RWS

ZTV

INOX STAINLESS STEEL

Building materials

- Concrete C12/15 to C50/60, cracked and non-cracked, for multiple fixings of non-structural applications

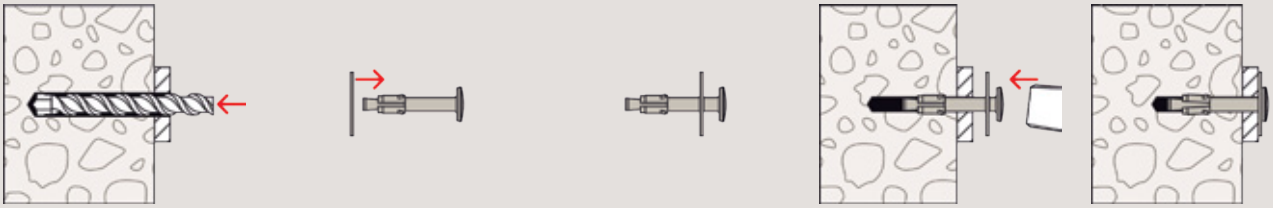
Versions

- Stainless steel R
- Highly corrosion-resistant steel HCR

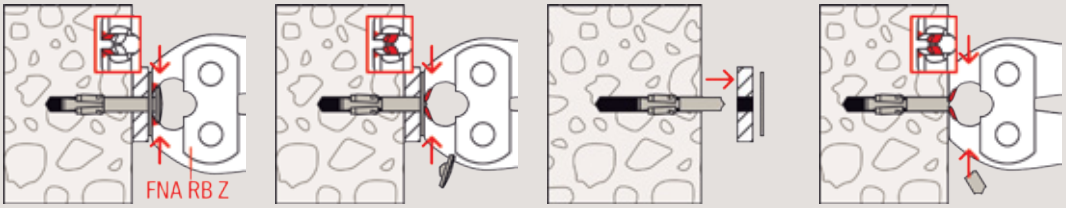
Functioning

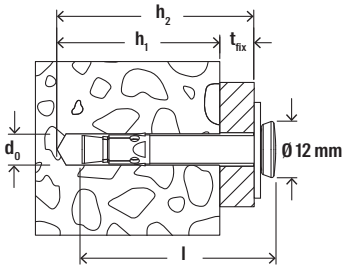
- Nail anchor with low anchoring depth.
- The washer increases the pull through forces significantly and provides the damage of the panel during dismantling.
- Mounting: Drill, hammer in, and you're done!
- Easy pinching off of nail head thanks to special 2-stage pliers.
- For a fast assembly process, we recommend the fischer compressed air setting device (item no. 093731).

Installation FNA II RB



Deinstallation





Technical data

Nail anchor FNA II RB

FNA II RB

	Stainless steel Item No.	Approval	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Min. drill hole depth for pre-positioned installation h_1 [mm]	Anchorage depth h_{ef} [mm]	Anchor length l [mm]	Max. usable length t_{fix} [mm]	Sales unit [pcs]
Item	**R**	**ETA**							
FNA II 6 x30/30 RB	**530798** [1]	●	6	66	36	30	68	30	200
FNA II 6 x30/30 RB	**530674** [1]	●	6	66	36	30	68	30	50

1) delivery on request

Technical data

Washer (FNA II RB)

Washer 30/1,5/7,5

	Stainless steel Item No.	Highly corrosion resistant steel Item No.	Internal diameter D [mm]	External-Ø d [mm]	Thickness S [mm]	Sales unit [pcs]
Item	**R**	**HCR**				
Washer 30/1,5/7,5	**531161**	**531162**	7,5	30	1.5	100

3

Technical data

2-stage plier (FNA II RB)

FNA RB Z 2-stage plier

	Item No.	Adapted for	Sales unit [pcs]
Item			
FNA RB Z	**531142**	Plier for removal of FNA II RB	1

Technical data

Air compressed setting tool (FNA II)

Air compressed setting tool

	Item No.	Match	Required for	Sales unit [pcs]
Item				
Air compressed setting tool	**093731**	for FNA II + FNA II RB	–	1
Drop in element	**093729**	–	Air compressed setting tool Art No. 93731	1
Stop ring	**093730**	–	Air compressed setting tool Art No. 93731	1
Fitting	**093732**	–	Air compressed setting tool Art No. 93731	1

Loads

Nail anchor FNA II RB

Permissible loads for a single anchor[1] for multiple use of redundant non-structural applications* in normal concrete C20/25 up to C50/60[2].
For the design the complete current assessment ETA-06/0175 has to be considered.

				Cracked and non-cracked concrete		
	Material/ surface	Effective anchorage depth	Minimum member thickness	Permissible load (F_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads		
Type		h_{ef} [mm]	h_{min} [mm]	F_{perm} [3] [kN]	s_{min} [mm]	c_{min} [mm]
FNA II 6 x 30 RB	R	30	80	2.4	40	40
	HCR	30	80	2.4	40	40

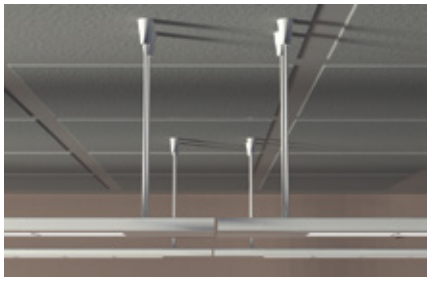
* In addition to the load table above, the following must be considered for multiple fastening of non-structural redundant systems:
A multiple fixing (redundant system) according to EN 1992-4 and CEN/TR 17079 is defined by
- at least 3 fixing points (per attached element) with at least one anchor at each fixing point and a permissible load per fixing point of 1.4 kN
- or by at least 4 fixing points with at least one anchor each fixing point and a permissible load per fixing point of 2.1 kN
- Additionally, it has to be proven that the stiffness of the attached element shall be large enough to ensure that in case of excessive slip or failure of a fastener the load on this fastener or fixing point can be transferred to neighbouring fixing points without significantly violating the requirements on the attached element in the serviceability and ultimate limit state.

For further details see EN 1992-4 section 7.3 and CEN/TR 17079.

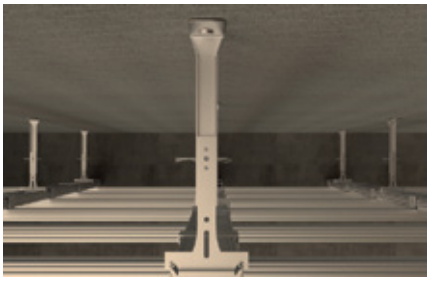
[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered.
[2] For concrete strength class C12/15 see ETA.
[3] Valid for tensile load, shear load and oblique load under any angle. In the case of combinations of tensile, shear loads and bending moments, the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018.

Ceiling nail FDN II

The installation-friendly push-through anchor for multiple fixings



Suspended ceilings



Suspended ceilings with Nonius hangers

Applications

- Wire and Nonius hangers
- Ventilation systems
- Slats
- Metal profiles
- Perforated tapes
- Sub-structures made of metal

Certificates

ETA-17/0736, for non-structural applications in concrete

Fire resistance classification R120

Advantages

- The simple active principle allows for cost-efficient hammerset installation.
- The new short version FDN II K with reduced anchorage depth ist faster to install and reduces reinforcement hits.
- The flush-sunk expansion nail signifies the complete expansion of the anchor, and thereby ensures minimum movement when under load.
- The fischer FDN II can be installed without cleaning of the drill hole.
- The head embossing offers a simple control of the anchoring, and thus saves time.

Building materials

Approved for:
- Concrete C12/15 to C50/60
- Concrete C20/25 to C50/60, cracked, for the multiple fixings of non-load-bearing systems

Also suitable for:
- Natural stone with dense structure

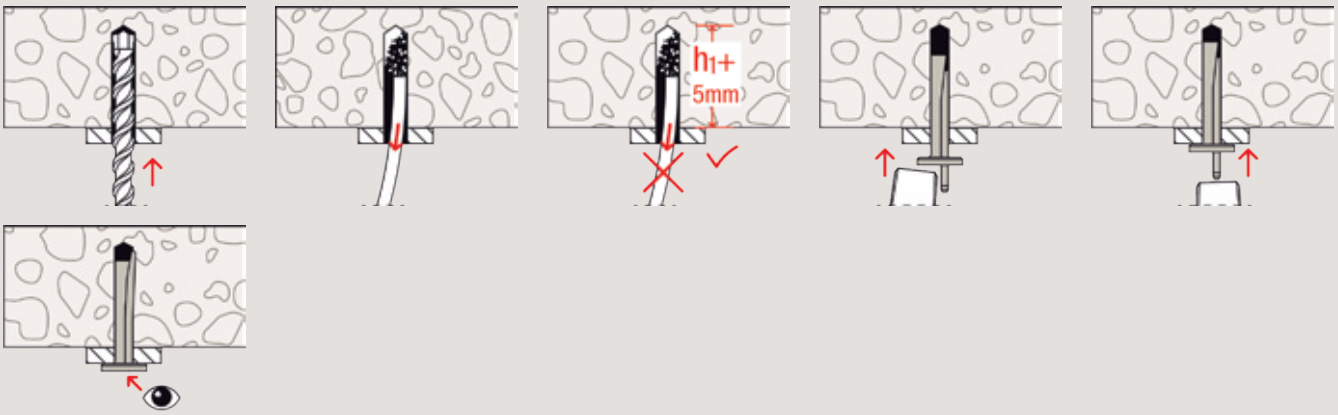
Versions

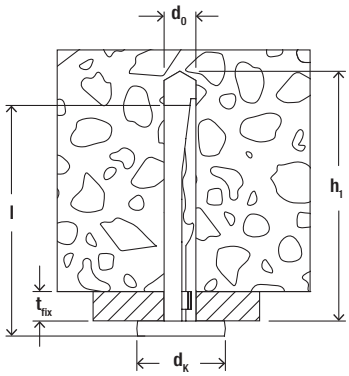
- Zinc-plated steel

Functioning

- The FDN II is suitable for push-through installation.
- The FDN II ceiling nail is driven into the drill hole with a hammer until it is firmly in position. Do not hit the expansion wedge at this stage.
- Then, drive the expansion wedge in flush to the nail head. This causes the FDN II to expand against the drill hole wall.

Installation FDN II





Technical data

Ceiling nail FDN II

FDN II

Item	Item No.	Approval	Drill diameter d_0 [mm]	Anchor length l [mm]	Max. usable length t_{fix} [mm]	Min. drill hole depth without cleaning h_1 [mm]	Min. drill hole depth with cleaning h_1 [mm]	Head-Ø d_K [mm]	Sales unit [pcs]
FDN II 6/5	**545636**	●	6	40	5	47	42	15	100
FDN II 6/35	**545637**	●	6	70	35	77	72	15	100
FDN II 6/5 K	**545638**	●	6	33	5	40	35	15	100
FDN II 6/35 K	**545639**	●	6	64	35	70	65	15	100

Loads

Ceiling Anchor FDN II

Permissible loads for a single anchor[1] for multiple use of redundant non-structural applications* in normal concrete C20/25 up to C50/60[2].
For the design the complete current assessment ETA-17/0736 has to be considered.

				Cracked and non-cracked concrete		
	Material/ surface	Effective anchorage depth	Minimum member thickness	Permissible load (F_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads		
Type		h_{ef} [mm]	h_{min} [mm]	F_{perm} [3] [kN]	s_{min} [mm]	c_{min} [mm]
FDN II 6/5 K	gvz	25	80	1.2	60	70
FDN II 6/35 K	gvz	25	80	1.2	60	70
FDN II 6/5	gvz	32	80	1.7	50	60
FDN II 6/35	gvz	32	80	1.7	50	60

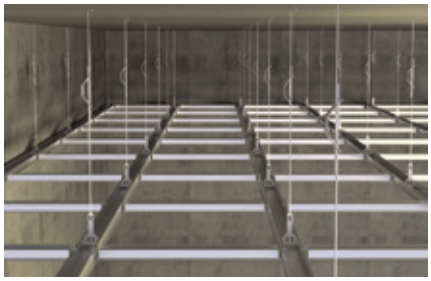
* In addition to the load table above, the following must be considered for multiple fastening of non-structural redundant systems:
A multiple fixing (redundant system) according to EN 1992-4 and CEN/TR 17079 is defined by
- at least 3 fixing points (per attached element) with at least one anchor at each fixing point and a permissible load per fixing point of 1.4 kN
- or by at least 4 fixing points with at least one anchor each fixing point and a permissible load per fixing point of 2.1 kN
- Additionally, it has to be proven that the stiffness of the attached element shall be large enough to ensure that in case of excessive slip or failure of a fastener the load on this fastener or fixing point can be transferred to neighbouring fixing points without significantly violating the requirements on the attached element in the serviceability and ultimate limit state.

For further details see EN 1992-4 section 7.3 and CEN/TR 17079.

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered.
[2] For concrete strength class C12/15 see ETA.
[3] Valid for tensile load, shear load and oblique load under any angle. In the case of combinations of tensile, shear loads and bending moments, the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018.

Ceiling nail FDZ

The cost-efficient push-through anchor for multiple fixings



Suspended ceilings with Nonius hangers

Drywall profiles

Applications

- Drywall profiles
- Wire and Nonius hangers
- Ventilation systems
- Slats
- Metal profiles
- Perforated tapes
- Sub-structures made of metal

Certificates

ETA-17/0737, for non-structural applications in concrete

Fire resistance classification R120

Advantages

- The simple active principle allows for fast hammerset installation.
- The efficient anchor offers the perfect price-performance ratio for an economical installation.
- The flush-sunk expansion nail signifies the complete expansion of the anchor, and thereby ensures minimum movement when under load.
- The head embossing offers a simple control of the anchoring, and thus saves time.

Building materials

Approved for:
- Concrete C20/25 to C50/60, cracked, for the multiple fixings of non-load-bearing systems

Also suitable for:
- Concrete C12/15
- Natural stone with dense structure

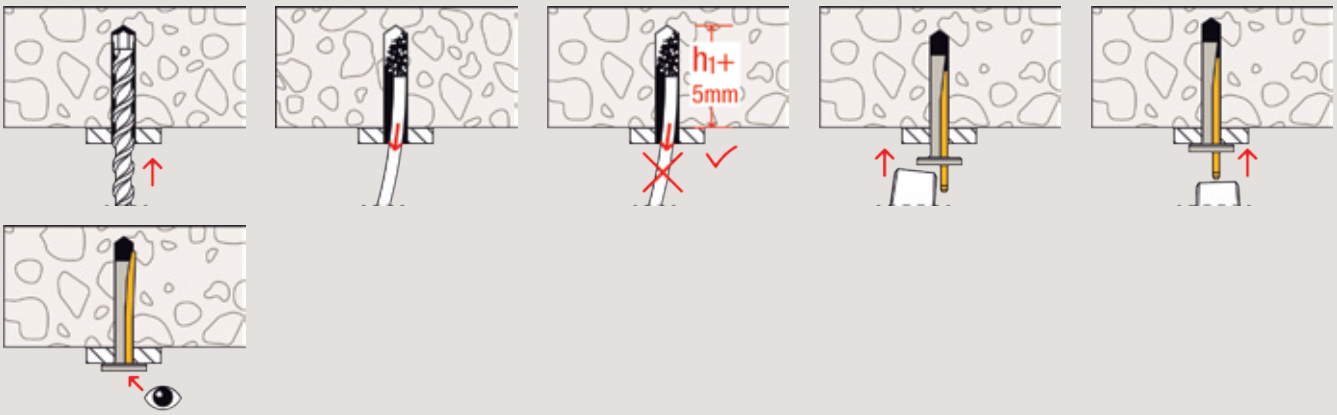
Versions

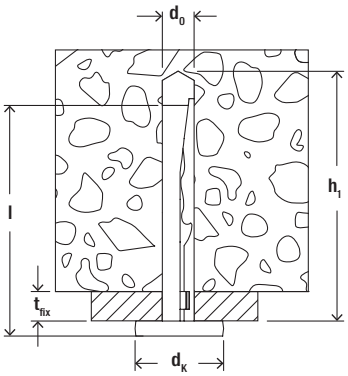
- Zinc-plated steel

Functioning

- The FDZ is suitable for push-through installation.
- The FDZ ceiling nail is driven into the drill hole with a hammer until it is firmly in position. Do not hit the expansion wedge at this stage.
- Then, drive the expansion wedge in flush to the nail head. This causes the FDZ to expand against the drill hole wall.

Installation FDZ





Technical data

Ceiling nail FDZ

FDZ

Item	Item No.	Approval	Drill diameter d_0 [mm]	Anchor length l [mm]	Max. usable length t_{fix} [mm]	Min. drill hole depth without cleaning h_1 [mm]	Min. drill hole depth with cleaning h_1 [mm]	Head-Ø d_K [mm]	Sales unit [pcs]
FDZ 6/5	**554899**	●	6	40	5	47	42	15	100
FDZ 6/35	**554898**	●	6	70	35	77	72	15	100

Loads

Ceiling nail FDZ

Permissible loads for a single anchor[1] for multiple use of redundant non-structural applications* in normal concrete C20/25 up to C50/60[2].
For the design the complete current assessment ETA-17/0737 has to be considered.

				Cracked and non-cracked concrete		
	Material/ surface	Effective anchorage depth	Minimum member thickness	Permissible load (F_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads		
Type		h_{ef} [mm]	h_{min} [mm]	F_{perm} [3] [kN]	s_{min} [mm]	c_{min} [mm]
FDZ 6	gvz	25	80	0.7	60	70
FDZ 6	gvz	32	80	1.0	50	60

* In addition to the load table above, the following must be considered for multiple fastening of non-structural redundant systems:
A multiple fixing (redundant system) according to EN 1992-4 and CEN/TR 17079 is defined by
- at least 3 fixing points (per attached element) with at least one anchor at each fixing point and a permissible load per fixing point of 1.4 kN
- or by at least 4 fixing points with at least one anchor each fixing point and a permissible load per fixing point of 2.1 kN
- Additionally, it has to be proven that the stiffness of the attached element shall be large enough to ensure that in case of excessive slip or failure of a fastener the load on this fastener or fixing point can be transferred to neighbouring fixing points without significantly violating the requirements on the attached element in the serviceability and ultimate limit state.

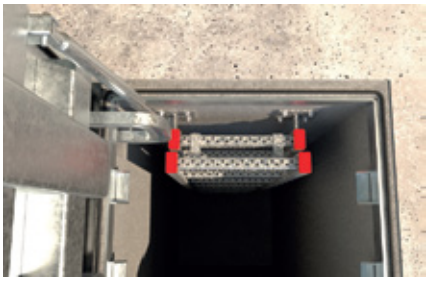
For further details see EN 1992-4 section 7.3 and CEN/TR 17079.

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered.
[2] For concrete strength class C12/15 see ETA.
[3] Valid for tensile load, shear load and oblique load under any angle. In the case of combinations of tensile, shear loads and bending moments, the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018.

Bolt anchor FBN II

The cost-efficient fixing for flexible use in non-cracked concrete

Column bases



Stormwater overflow tank manholes

Applications

- Steel constructions
- Guard rails
- Consoles
- Ladders
- Cable trays
- Machines
- Staircases
- Gates
- Façades

Advantages

- The standard anchorage depth achieves the maximum load-bearing capacities.
- The reduced anchorage depth reduces the drill hole depth. This minimises the amount of time needed for installation whilst increasing flexibility.
- Additional short version “K” with short anchoring depth.
- The long thread balances component tolerances and allows for stand-off installations, thus increasing flexibility.
- Few hammer blows and the minimal torque slippage allow for a noticeably simpler installation.
- The drive-in pin protects the thread from damage, and thus ensures a faster installation and dismantling of the attachment.
- The larger washer included with the FBN II GS creates a larger supporting surface and, as such, allows for the fixing of wood constructions.
- When using hollow drills with suction is no drill hole cleaning required.
- New ETA assessment for hot-dip galvanised version for variable working life in outdoor areas.

Certificates

ETA-07/0211, for non-cracked concrete
ETA-18/0101, for non-cracked concrete and variable working life for outdoor areas

INOX STAINLESS STEEL

Building materials

Approved for:
- Concrete C20/25 to C50/60, non-cracked

Also suitable for:
- Concrete C12/15
- Natural stone with dense structure

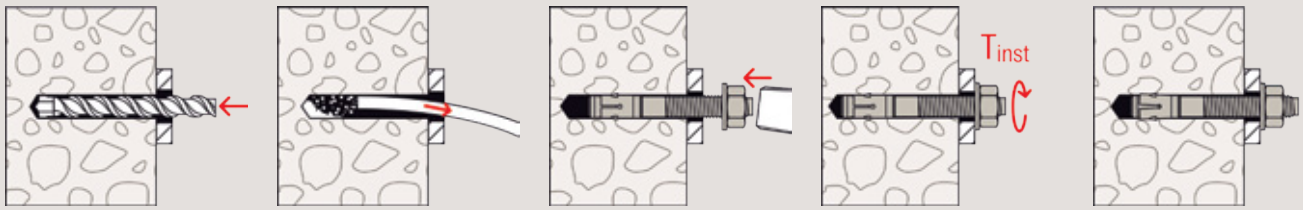
Versions

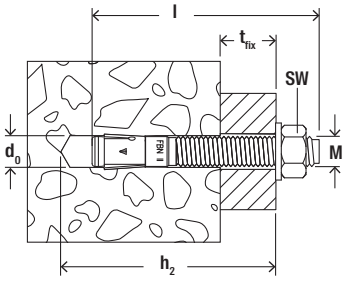
- Zinc-plated steel
- Stainless steel R
- Hot-dip galvanised steel (with variable working life for outdoor areas)

Functioning

- The FBN II is suitable for pre-positioned and push-through installation; also suitable for stand-off installation under certain conditions.
- Prior to installation, place the hexagon nut in the optimal position (the drive-in pin projects by approx. 3 mm out of the hexagon nut).
- When applying the torque, the cone bolt is pulled into the expansion clip and expands it against the drill hole wall.
- The head embossing offers a simple control of the anchoring.
- In the case of series installation, we recommend using the FABS bolt anchor setting tool.

Installation FBN II





Technical data

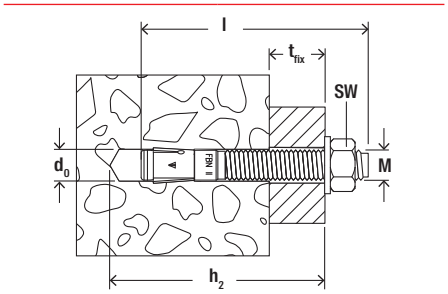
Bolt anchor FBN II

FBN II

Item	Zinc-plated steel Item No. pg	Stainless steel Item No. R	Hot-dip galvanised steel Item No. hdg	Approval ETA	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Anchor length l [mm]	Max. usable length $h_{ef,max.}/h_{ef,min.}$ t_{fix} [mm]	Thread ø x length [mm]	Width across nut SW [mm]	Sales unit [pcs]
FBN II 6/5	505526 [1)2)]	–	–	●	6	45	50	5/-	M 6 x 12	10	100
FBN II 6/10	505527 [1)2)]	505532 [1)2)]	–	●	6	50	55	10/-	M 6 x 17	10	100
FBN II 6/30	505528 [1)2)]	505535 [1)2)]	–	●	6	70	75	30/-	M 6 x 35	10	100
FBN II 8/5	560915	–	–	●	8	61	65	5/15	M 8 x 34	13	50
FBN II 8/10	560916	507555	–	●	8	66	70	10/20	M 8 x 39	13	50
FBN II 8/10	–	–	507575	●	8	66	71	10/20	M 8 x 39	13	50
FBN II 8/20	560917	–	–	●	8	76	80	20/30	M 8 x 49	13	50
FBN II 8/30	560918	507556	–	●	8	86	90	30/40	M 8 x 59	13	50
FBN II 8/30	–	–	507576	●	8	86	91	30/40	M 8 x 59	13	50
FBN II 8/50	560919	507557	–	●	8	106	110	50/60	M 8 x 79	13	50
FBN II 8/50	–	–	507577	●	8	106	111	50/60	M 8 x 79	13	50
FBN II 8/70	560920	–	–	●	8	126	130	70/80	M 8 x 99	13	20
FBN II 8/70	–	–	507578	●	8	126	131	70/80	M 8 x 99	13	20
FBN II 8/100	560921	–	–	●	8	156	160	100/110	M 8 x 129	13	20
FBN II 10/10	560924	507558	–	●	10	78	85	10/20	M 10 x 46	17	50
FBN II 10/10	–	–	507579	●	10	78	86	10/20	M 10 x 46	17	50
FBN II 10/20	560925	507559	–	●	10	88	95	20/30	M 10 x 56	17	50
FBN II 10/30	560926	507560	–	●	10	98	105	30/40	M 10 x 66	17	50
FBN II 10/30	–	–	507580	●	10	98	106	30/40	M 10 x 66	17	50
FBN II 10/50	560927	507561	–	●	10	118	125	50/60	M 10 x 86	17	20
FBN II 10/50	–	–	507582	●	10	118	126	50/60	M 10 x 86	17	20
FBN II 10/70	560928	–	–	●	10	138	145	70/80	M 10 x 106	17	20
FBN II 10/100	560929	507562	–	●	10	168	175	100/110	M 10 x 136	17	20
FBN II 10/100	–	–	507583	●	10	168	176	100/110	M 10 x 136	17	20
FBN II 10/140	040944	–	–	●	10	208	215	140/150	M 10 x 176	17	20

[1)] Use restricted to anchoring of structural components which are statically indeterminate.

[2)] Nut and washer not pre-assembled/supplied loose.



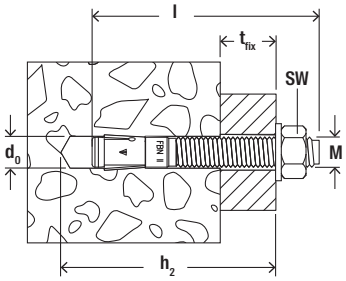
Technical data

3

Bolt anchor FBN II

FBN II

Item	Zinc-plated steel Item No. pg	Stainless steel Item No. R	Hot-dip galvanised steel Item No. hdg	Approval ETA	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Anchor length l [mm]	Max. usable length $h_{ef,max.}/h_{ef,min.}$ t_{fix} [mm]	Thread ø x length [mm]	Width across nut SW [mm]	Sales unit [pcs]
FBN II 10/160	040945	–	–	●	10	228	235	160/170	M 10 x 196	17	20
FBN II 12/10	560933	507563	–	●	12	95	104	10/25	M 12 x 59	19	20
FBN II 12/10	–	–	507589	●	12	95	106	10/25	M 12 x 59	19	20
FBN II 12/20	560934	507564	–	●	12	105	114	20/35	M 12 x 69	19	20
FBN II 12/30	560935	507565	–	●	12	115	124	30/45	M 12 x 79	19	20
FBN II 12/30	–	–	507591	●	12	115	126	30/45	M 12 x 79	19	20
FBN II 12/50	560936	507566	–	●	12	135	144	50/65	M 12 x 99	19	20
FBN II 12/50	–	–	507592	●	12	135	146	50/65	M 12 x 99	19	20
FBN II 12/80	045265	–	–	●	12	165	174	80/95	M 12 x 129	19	20
FBN II 12/100	045266	507567	–	●	12	185	194	100/115	M 12 x 149	19	20
FBN II 12/100	–	–	507596	●	12	185	196	100/115	M 12 x 149	19	20
FBN II 12/120	045267	–	–	●	12	205	214	120/135	M 12 x 169	19	20
FBN II 12/140	045268	–	–	●	12	225	234	140/155	M 12 x 189	19	20
FBN II 12/160	045269	–	–	●	12	245	254	160/175	M 12 x 189	19	20
FBN II 16/10	–	507568	–	●	16	114	128	10/25	M 16 x 74	24	10
FBN II 16/25	–	–	507598	●	16	129	145	25/40	M 16 x 89	24	10
FBN II 16/25	560939	507569	–	●	16	129	143	25/40	M 16 x 89	24	10
FBN II 16/50	–	–	507553	●	16	154	170	50/65	M 16 x 105	24	10
FBN II 16/50	045565	507570	–	●	16	154	168	50/65	M 16 x 105	24	10
FBN II 16/80	045566	–	–	●	16	184	198	80/95	M 16 x 144	24	10
FBN II 16/100	045567	–	–	●	16	204	218	100/115	M 16 x 164	24	10
FBN II 16/100	–	–	507554	●	16	204	220	100/115	M 16 x 164	24	10
FBN II 16/140	045568	–	–	●	16	244	258	140/155	M 16 x 184	24	10
FBN II 16/160	045569	–	–	●	16	264	278	160/175	M 16 x 184	24	10
FBN II 16/200	045570	–	–	●	16	304	318	200/215	M 16 x 184	24	10
FBN II 20/30	045573	507571	508015	●	20	165	187	30/55	M 20 x 90	30	10
FBN II 20/60	045574	507572	–	●	20	195	217	60/85	M 20 x 90	30	10
FBN II 20/80	045575	547590	–	●	20	215	237	80/105	M 20 x 90	30	10
FBN II 20/120	045576	–	–	●	20	255	277	120/145	M 20 x 90	30	10



Technical data

Bolt anchor FBN II K

FBN II K

Item	Zinc-plated steel, short version Item No. pg	Stainless steel, short version Item No. R	Hot-dip galvanised steel, short version Item No. hdg	Approval ETA	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Anchor length l [mm]	Max. usable length $h_{ef,max.}/h_{ef,min.}$ t_{fix} [mm]	Thread ø x length [mm]	Width across nut SW [mm]	Sales unit [pcs]
FBN II 8/5 K	–	–	508012	●	8	51	56	–/5	M 8 x 24	13	50
FBN II 8/5 K	560913	508007	–	●	8	51	55	–/5	M 8 x 24	13	50
FBN II 8/10 K	560914	–	–	●	8	56	60	–/10	M 8 x 29	13	50
FBN II 10/5 K	560922	508010	–	●	10	63	70	–/5	M 10 x 31	17	50
FBN II 10/5 K	–	–	508013	●	10	63	71	–/5	M 10 x 31	17	50
FBN II 10/10 K	560923	–	–	●	10	68	75	–/10	M 10 x 36	17	50
FBN II 12/5 K	560930	508011	–	●	12	75	84	–/5	M 12 x 39	19	20
FBN II 12/5 K	–	–	508014	●	12	75	86	–/5	M 12 x 39	19	20
FBN II 12/10 K	560931	–	–	●	12	80	89	–/10	M 12 x 44	19	20
FBN II 12/30 K	560932	–	–	●	12	100	109	–/30	M 12 x 64	19	20
FBN II 16/15 K	560937	508745	–	●	16	104	118	–/15	M 16 x 64	24	10
FBN II 16/15 K	–	–	507597	●	16	104	120	–/15	M 16 x 64	24	10
FBN II 16/25 K	560938	–	–	●	16	114	128	–/25	M 16 x 74	24	10
FBN II 20/10 K	045577	–	543973	●	20	120	142	–/10	M 20 x 50	30	10

Accessories

Bolt anchor setting tool


FABS


FA-ST II


FA-ST II Set


Replacement spring

Item	Item No.	Contents	Matching anchor type	Sales unit [pcs]
FABS	**077937**	–	FAZ II, FBZ, FBN II for diameter from M6 - M12	1
FA-ST II Set	**558789**	SDS adapter; socket SW17, SW19, SW24	FAZ II M10/M12/M16, FBZ M10/M12/M16, FBN II M10/M12/M16, EXA M10/M12/M16	1
FA-ST II M10	**558790**	SDS adapter; socket SW17	FAZ II M10, FBZ M10, FBN II M10, EXA M10	1
FA-ST II M12	**558791**	SDS adapter; socket SW19	FAZ II M12, FBZ M12, FBN II M12, EXA M12	1
FA-ST II M16	**558792**	SDS adapter; socket SW24	FAZ II M16, FBZ M16, FBN II M16, EXA M16	1
FA-ST II spring	**558793**	Replacement spring	FA-ST II M10/M12/M16	5

Bolt anchor FBN II

Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current assessment ETA-07/0211 has to be considered.

					Non-cracked concrete			
					Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type	Material/ surface[2]	Effective anchorage depth h_{ef} [mm]	Minimum member thickness h_{min} [mm]	Installation torque T_{inst} [Nm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
FBN II 8	pg	30	100	15	2.9	6.9	40	40
	pg	40	100	15	5.9	7.6	40	40
	R	30	100	10	2.9	6.9	50	45
	R	40	100	10	5.9	7.3	40	45
FBN II 10	pg	40	100	30	5.9	12.0	50	80
	pg	50	100	30	8.3	12.0	50	50
	R	40	100	20	5.9	11.6	50	80
	R	50	100	20	8.3	11.6	70	55
FBN II 12	pg	50	100	50	8.3	17.9	70	100
	pg	65	120	50	12.3	17.9	70	70
	R	50	100	35	8.3	15.7	70	100
	R	65	120	35	12.3	15.7	70	70
FBN II 16	pg	65	120	100	12.3	28.2	90	120
	pg	80	160	100	16.8	31.5	90	90
	R	65	120	80	12.3	28.2	90	120
	R	80	160	80	16.8	29.1	120	80
FBN II 20	pg	80	160	200	16.8	38.3	120	120
	pg	105	200	200	25.2	38.3	120	120
	R	80	160	150	16.8	38.6	140	120
	R	105	200	150	25.2	49.1	120	120

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$. Accurate data see ETA.
[2] Further steel grades, versions and technical data see ETA, e.g. for dry internal conditions, galvanised steel (pg); for damp interiors and for outdoor use, stainless steel (R).
[3] In the case of combinations of tension and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete ETA and the provisions of the EN 1992-4:2018. We recommend using our anchor design software C-FIX.

Hollow-ceiling anchor FHY

The installation-friendly internally threaded anchor for fixings in pre-stressed hollow-core concrete slabs

Air conditioning units in pre-stressed hollow-core concrete slabs

Cable trays in pre-stressed hollow-core concrete

Applications

- Pipelines
- Cable trays
- Ventilation systems
- Sprinkler systems
- Suspended ceilings
- Consoles
- Steel constructions
- Timber constructions

Advantages

- The active principle of the anchor means that the FHY can be used in cavities or in solid materials up to 5 cm from the tensioning wire. This ensures the highest flexibility and user-friendly installation.
- The embossed edge prevents the anchor sleeve from slipping in the cavity. The optimised geometry minimises setting energy and allows for use in extremely narrow spaces.
- The metric internal thread means that it is possible to use standard screws or threaded rods for the ideal adaptation to suit the intended use.
- External report for the usage of the FHY in seismic conditions.
- In the stainless steel version, the FHY is also suitable for outdoor fixings.
- The ETA approval of the FHY for multiple fixing and general construction technique permit for individual fixing provides an additional plus in safety.

Certificates

ETA-21/0857, for redundant non-structural systems in concrete

R 120

Inox Stainless Steel

from M8

Building materials

Approved for:

- Pre-stressed hollow-core concrete slabs ≥ C45/55
- Concrete C20/25 to C50/60

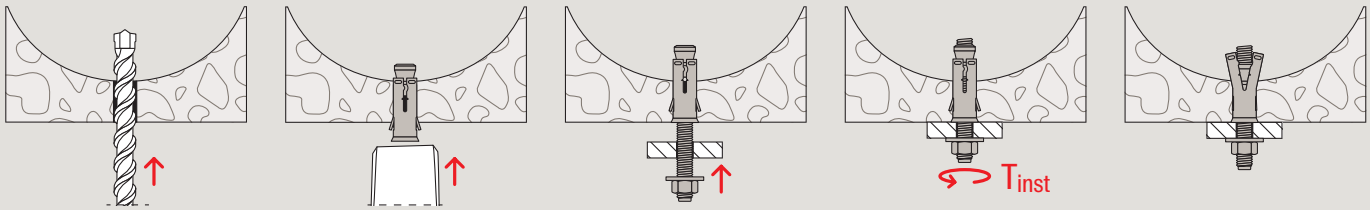
Versions

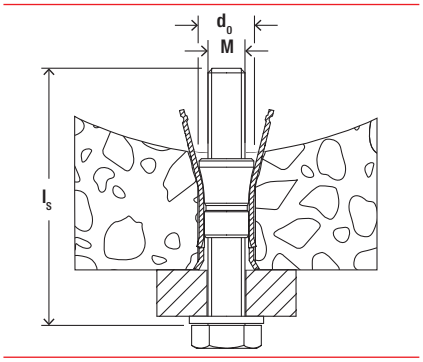
- Galvanised steel
- Stainless steel R

Functioning

- The FHY is suitable for pre-positioned installation.
- Position the FHY hollow-ceiling anchor in the drill hole and drive in flush to the surface of the anchor base using the hammer.
- The FHY pre-positioned anchor must be able to be supported on the attachment for expansion.
- When applying the torque, the cone is pulled into the expansion sleeve and expands it into the cavity or expands it in the solid material against the drill hole wall.
- Screw length ls =
  Minimum screw-in depth e_2
  + Thickness of fixture t_{fix}
  + Thickness of washer
  (with threaded rod: + height of nut)

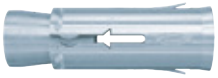
Installation FHY





Technical data

Hollow-ceiling anchor FHY



FHY

	Galvanised steel	Stainless steel	Approval		Drill diameter	Anchor length	Internal thread	Min. drill hole depth	Min. bolt penetration	Sales unit
	Item no.	Item no.	ETA	DIBt	d_0 [mm]	L [mm]	M	h_1 [mm]	$l_{E,min}$ [mm]	[pcs]
Item	gvz	R								
FHY M6	566667	566671	●	●	10	37	M6	50	37	50
FHY M8	566668	566672	●	●	12	43	M8	60	43	25
FHY M10	566669	566673	●	●	16	52	M10	65	52	20
FHY M12	566670	566674	●	–	18	55	M12	70	55	25

Loads

Hollow-ceiling anchor FHY

Permissible loads[1] for multiple use of redundant non-structural applications* in pre-stressed hollow-core concrete slabs of strength class ≥ C45/55.
For the design the complete current assessment ETA-21/0857 of 30.08.2022 has to be considered.

						Spannbeton-Hohlplattendecke		
	Material/ surface	Screw material[2]	Bottom flange thickness	Installation torque	Required edge distance (with one edge) for max. load	Permissible load (F_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads		
Type			d_b [mm]	T_{inst} [Nm]	c_{cr} [mm]	F_{perm}[3] [kN]	s_{min}[4] [mm]	c_{min}[4] [mm]
FHY M6	gvz	8.8	25 - 29	8	100	2.4	70	100
	gvz	8.8	30 - 39	8	100	2.4	70	100
	gvz	8.8	≥ 40	8	100	2.4	70	100
FHY M8	gvz	4.6	25 - 29	10	100	3.3	70	100
	gvz	4.6	30 - 39	10	100	3.3	70	100
	gvz	4.6	≥ 40	10	105	3.3	70	100
FHY M10	gvz	4.6	25 - 29	20	100	3.8	80	100
	gvz	4.6	30 - 39	20	100	4.8	80	100
	gvz	4.6	≥ 40	20	120	4.8	80	100
FHY M12	gvz	4.6	25 - 29	30	150	4.3	80	150
	gvz	4.6	30 - 39	30	150	4.3	80	150
	gvz	4.6	≥ 40	30	150	4.8	80	150

Loads

Hollow-ceiling anchor FHY

Permissible loads[1] for multiple use of redundant non-structural applications* in pre-stressed hollow-core concrete slabs of strength class ≥ C45/55.
For the design the complete current assessment ETA-21/0857 of 30.08.2022 has to be considered.

						Spannbeton-Hohlplattendecke		
	Material/ surface	Screw material[2]	Bottom flange thickness	Installation torque	Required edge distance (with one edge) for max. load	Permissible load (F_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads		
Type			d_b [mm]	T_{inst} [Nm]	c_{cr} [mm]	F_{perm}[3] [kN]	s_{min}[4] [mm]	c_{min}[4] [mm]
FHY M6 R	R	≥ A4-70	25 - 29	15	100	2.4	70	100
	R	≥ A4-70	30 - 39	15	100	2.4	70	100
	R	≥ A4-70	≥ 40	15	100	2.4	70	100
FHY M8 R	R	≥ A4-70	25 - 29	20	100	3.3	70	100
	R	≥ A4-70	30 - 39	20	100	3.3	70	100
	R	≥ A4-70	≥ 40	20	105	3.3	70	100
FHY M10 R	R	≥ A4-70	25 - 29	40	100	3.8	80	100
	R	≥ A4-70	30 - 39	40	100	4.8	80	100
	R	≥ A4-70	≥ 40	40	120	4.8	80	100
FHY M12 R	R	≥ A4-70	25 - 29	50	150	4.3	80	150
	R	≥ A4-70	30 - 39	50	150	4.3	80	150
	R	≥ A4-70	≥ 40	50	150	4.8	80	150

* In addition to the load table above, the following must be considered for multiple fastening of non-structural redundant systems:
A multiple fixing (redundant system) according to EN 1992-4 and CEN/TR 17079 is defined by
- at least 3 fixing points (per attached element) with at least one anchor at each fixing point and a permissible load per fixing point of 1.4 kN
- or by at least 4 fixing points with at least one anchor each fixing point and a permissible load per fixing point of 2.1 kN
- Additionally, it has to be proven that the stiffness of the attached element shall be large enough to ensure that in case of excessive slip or failure of a fastener the load on this fastener or fixing point can be transferred to neighbouring fixing points without significantly violating the requirements on the attached element in the serviceability and ultimate limit state.

For further details see EN 1992-4 section 7.3 and CEN/TR 17079.

[1] The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered.
[2] Further steel grades, versions and technical data see ETA.
[3] Maximum load for char. spacing and edge distances. Valid for tensile load, shear load and oblique load under any angle. In the case of shear loads with lever arm (bending) as well as reduced/minimum spacing or edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete technical permit.
[4] Minimum possible axial spacings resp. edge distance while reducing the permissible load.

Loads

Hollow-ceiling anchor FHY

Permissible loads[1] of a single anchor in pre-stressed hollow-core concrete slabs of strength class ≥ C45/55.
For the design the complete general construction technique permit Z-21.1-1711 from 05.12.2022 has to be considered.

						Spannbeton-Hohlplattendecke		
	Material/ surface	Screw material[2]	Bottom flange thickness	Installation torque	Required edge distance (with one edge) for max. load	Permissible load (F_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads		
Type			d_b [mm]	T_{inst} [Nm]	c_{cr} [mm]	F_{perm}[3] [kN]	s_{min}[4] [mm]	c_{min}[4] [mm]
FHY M6	gvz	8.8	25 - 29	8	150	0.7	70	100
	gvz	8.8	30 - 39	8	150	0.9	80	100
	gvz	8.8	≥ 40	8	150	2.0	100	100
	R	A4 - 70	25 - 29	15	150	0.7	70	100
	R	A4 - 70	30 - 39	15	150	0.9	80	100
	R	A4 - 70	≥ 40	15	150	2.0	100	100
FHY M8	gvz	4.6	25 - 29	10	150	0.7	70	100
	gvz	4.6	30 - 39	10	150	0.9	80	100
	gvz	4.6	≥ 40	10	150	2.0	100	100
	R	A4 - 70	25 - 29	20	150	0.7	70	100
	R	A4 - 70	30 - 39	20	150	0.9	80	100
	R	A4 - 70	≥ 40	20	150	2.0	100	100
FHY M10	gvz	4.6	30 - 39	20	150	1.2	80	100
	gvz	4.6	≥ 40	20	150	3.0	100	100
	R	A4 - 70	30 - 39	40	150	1.2	80	100
	R	A4 - 70	≥ 40	40	150	3.0	100	100

[1] The partial safety factors for material resistance as regulated in the ETA as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered.
[2] Further steel grades, versions and technical data see approval.
[3] Maximum load for char. spacing and edge distances. Valid for tensile load, shear load and oblique load under any angle. In the case of shear loads with lever arm (bending) as well as reduced/minimum spacing or edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete technical permit.
[4] Minimum possible axial spacings resp. edge distance while reducing the permissible load.

Aircrete anchor FPX-I

The strong internally threaded anchor with unique 4-way expansion for fixings in aerated concrete

Air conditioning units

Rail fixing

Applications

- Suspended ceilings
- Cable trays
- Pipelines
- Ventilation ducts
- Guard rails/hand rails
- TV consoles
- Kitchen cupboards
- Stand-off installations

Advantages

- The FPX-I enables easy tightening via the hexagon wrench using a cordless screwdriver or ratchet and therefore offers top installation comfort.
- The deformation-controlled expansion of the anchor with the hexagon wrench ensures safe, even and gentle installation.
- The unique 4-way expansion of the FPX-I with a square expansion sleeve prevents the rotation of the anchor in the drill hole and ensures high tension and shear loads, which means fewer fixing points.
- The releasing of the hexagonal wrench guarantees an automatical setting control for each installation process.
- The first steel anchor with an ETA-Approval and fire protection certificate for fixings in aerated concrete enables use for safety-relevant fixings, too.

Certificates

ETA-12/0456, for autoclaved aerated concrete

Fire resistance classification R120

M8 - M12

Building materials

Approved for:

- Aerated concrete with compressive strength 2 to 7 N/mm²
- Aerated concrete wall or ceiling boards with compressive strength 3.3 to 4.4 N/mm²
- Planked aerated concrete masonry, e.g. plastered, tiled, papered etc.

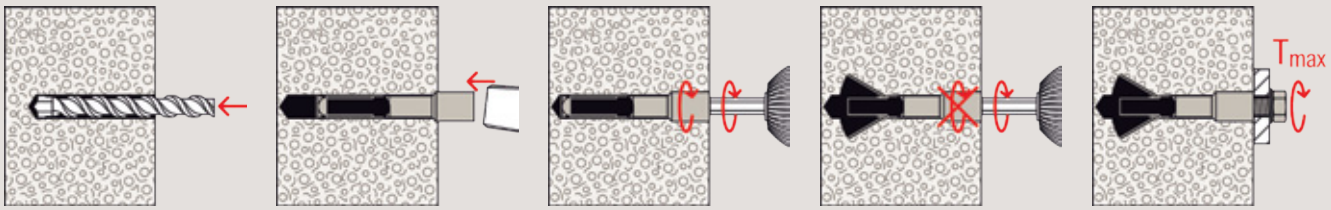
Versions

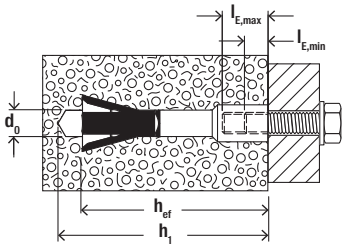
- Zinc-plated steel

Functioning

- The FPX-I with internal thread is suitable for pre-positioned installation.
- Pre-drilling enables easy hammering in, even in high-strength aerated concrete. There is no need to clean the drill hole.
- When the anchor is tightened with the hexagon wrench, the internal thread sleeve starts to rotate and the cone is pulled into the square expansion sleeve. The aerated concrete is compressed on the four sides and generates an undercut in the drill hole.
- When reached the optimum expansion, the hexagon wrench is released automatically from the anchor.

Installation FPX-I





Technical data

Aircrete anchor FPX-I

FPX-I

Item	Item No.	Approval	Drill diameter d_0 [mm]	Min. drill hole depth for pre-positioned installation h_1 [mm]	Anchor length l [mm]	Effect. anchorage depth h_{ef} [mm]	Min. bolt penetration $l_{E,min}$ [mm]	Max. bolt penetration $l_{E,max}$ [mm]	Sales unit [pcs]
FPX M6-I	**519021**	●	10	95	75	70	10	15	25
FPX M8-I	**519022**	●	10	95	75	70	8	15	25
FPX M10-I	**519023**	●	10	95	75	70	10	15	25
FPX M12-I	**519024**	●	10	95	75	70	12	15	25

Technical data

Setting tool FPX-I

Setting tool FPX M6 I

Setting tool FPX M8-M12 I

Item	Item No.	Matching anchor type	Sales unit [pcs]
Setting tool FPX M6 I	**522517**	FPX M6-I	10
Setting tool FPX M8-M12 I	**522518**	FPX M8-I - FPX M12-I	10

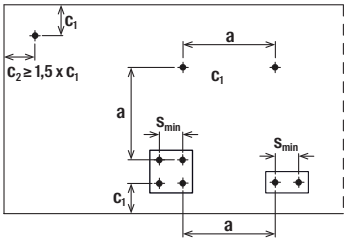
Loads

Aircrete anchor FPX-I

Permissible loads[1] and required component dimensions in cracked and non-cracked aerated concrete wall and slab plates.
For the design the complete current assessment ETA-12/0456 has to be considered.

Type			FPX-I M6 , M8 , M10 , M12	
Effective anchorage depth	h_{ef}	**[mm]**	70	
Permissible load[2] (F_{perm}) per anchor in cracked AAC-slabs				
$f_{AAC} \geq 3{,}3$ N /mm² / $\rho_m \geq 0{,}50$ kg/dm³	F_{perm}	**[kN]**	0.62	
$f_{AAC} \geq 4{,}4$ N /mm² / $\rho_m \geq 0{,}55$ kg/dm³	F_{perm}	**[kN]**	0.83	
Permissible load[2] (F_{perm}) per anchor in uncracked AAC-slabs				
$f_{AAC} \geq 3{,}3$ N /mm² / $\rho_m \geq 0{,}50$ kg/dm³	F_{perm}	**[kN]**	0.83	
$f_{AAC} \geq 4{,}4$ N /mm² / $\rho_m \geq 0{,}55$ kg/dm³	F_{perm}	**[kN]**	1.24	
Component dimensions				
Minimum member thickness with drill hole cleaning	h_{min}	**[mm]**	100	
Minimum member thickness without drill hole cleaning	h_{min}	**[mm]**	120	
Single anchor				
Minimum spacing	a	**[mm]**	600	
Minimum edge distance	c_1	**[mm]**	125 / 150[3]	
Minimum edge distance orthogonal to c_1	c_2	**[mm]**	190	
Anchor groups[4] with 2 or 4 ancors				
Actions			**shear and oblique tension**	**only axial tension**
Minimum spacing between anchor group and 2 single anchors	s_{min}	**[mm]**	100	100
Minimum edge distance	c_1	**[mm]**	250	125 / 150[3]
Minimum spacing	a	**[mm]**	750	600
Minimum edge distance orthogonal to c_1	c_2	**[mm]**	375	190

[1] Permissible loads of a single anchor for all load directions. The required partial safety factors for material resistance as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered.
[2] Grade of the screw resp. threaded rod ≥ 4.8.
[3] In case of reinforced plates with a width ≤ 700 mm.
[4] $F_{perm,group} = 2 \times F_{perm,single\ anchor}$ valid in case of anchor groups with 2 or 4 anchors. Accurate deta see ETA.



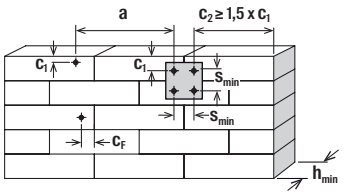
Loads

Aircrete anchor FPX-I

Permissible loads[1] and required component dimensions in aerated concrete masonry.
For the design the complete current assessment ETA-12/0456 has to be considered.

Type			**FPX-I M6 , M8 , M10 , M12**	
Effective anchorage depth	h_{ef}	**[mm]**	70	
Permissible load[2] (F_{perm}) per anchor				
$f_{AAC} \geq 1{,}6$ N /mm² / $\rho_m \geq 0{,}25$ kg/dm³	F_{perm}	**[kN]**	0.32	
$f_{AAC} \geq 2{,}0$ N /mm² / $\rho_m \geq 0{,}35$ kg/dm³	F_{perm}	**[kN]**	0.43	
$f_{AAC} \geq 4{,}0$ N /mm² / $\rho_m \geq 0{,}50$ kg/dm³	F_{perm}	**[kN]**	0.89	
$f_{AAC} \geq 6{,}0$ N /mm² / $\rho_m \geq 0{,}65$ kg/dm³	F_{perm}	**[kN]**	1.43	
Component dimensions				
Minimum member thickness with drill hole cleaning	h_{min}	**[mm]**	100	
Minimum member thickness without drill hole cleaning	h_{min}	**[mm]**	120	
Single anchor				
Minimum spacing	a	**[mm]**	375	
Minimum edge distance	c_1	**[mm]**	125	
Minimum distance to joints	c_F[3]	**[mm]**	75[4] / 125	
Minimum edge distance orthogonal to c_1	c_2	**[mm]**	190	
Anchor groups[5] with 2 or 4 ancors				
Actions			**shear and oblique tension**	**only axial tension**
Minimum spacing between anchor group and 2 single anchors	s_{min}	**[mm]**	100	100
Minimum edge distance	c_1	**[mm]**	250	125
Minimum spacing	a	**[mm]**	750	375
Minimum edge distance orthogonal to c_1	c_2	**[mm]**	375	190

[1] Permissible loads of a single anchor for all load directions. The required partial safety factors for material resistance as well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered.
[2] Grade of the screw resp. threaded rod ≥ 4.8.
[3] In case of non visible joints F_{perm} has to be divided in halve. Accurate data see ETA.
[4] c_F for tensile load and/or shear load parallel to the joint which is not filled with mortar with width ≤ 2 mm.
[5] $F_{perm,group} = 2 \times F_{perm,single\ anchor}$ valid in case of anchor groups with 2 or 4 anchors. Accurate deta see ETA.



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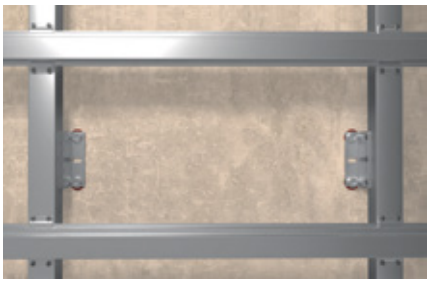
4

Frame fixings / Stand-off installation

Frame fixing DuoXpand

Anchor with a smart bite.



Façade substructures

Timber constructions

Applications

- Façade, ceiling and roof substructures made of wood and metal
- Windows
- Gates and doors
- Wardrobes
- Kitchen hanging cabinets
- Squared timbers
- Beams
- TV consoles
- Wall covering
- Metal brackets

Advantages

- The combination of design and material adapts to all building materials and enables universal use.
- The special lamella geometry expands gently in the respective building material. This avoids fractures in porous building materials and enables anchoring close to the edge.
- The grey main body made of high-quality nylon provides the strength, while the red material component ensures flexibility and optimal spreading.
- The European Technical Assessment (ETA) ensures secure hold in all building material classes.
- The pre-mounted safety screw is perfectly matched to the plug and ensures time savings during installation.

Certificates

ETA-21/0324, multiple use for non-structural applications

INOX STAINLESS STEEL

Building materials

Approved for:
- Concrete ≥ C12/15
- Solid brick
- Solid sand-lime brick
- Solid block made from lightweight and normal weight concrete
- Vertically perforated brick
- Perforated sand-lime brick
- Hollow blocks made from lightweight concrete
- Aerated concrete

Also suitable for:
- Natural stone with dense structure
- Solid panel made from gypsum

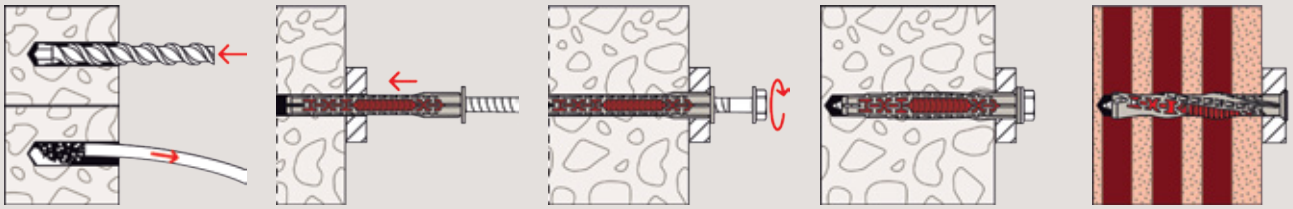
Versions

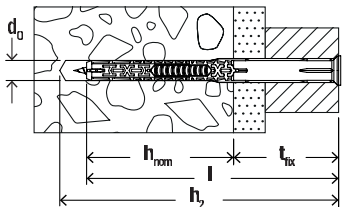
- Zinc-plated steel
- Stainless steel

Functioning

- The DuoXpand is suitable for push-through installation.
- In solid building materials, the product design guarantees equal load distribution into the substrate.
- In perforated bricks, the lamellas expand at the stone web and form an undercut in the cavity. The anchor geometry ensures that the force is transferred evenly to the material, so that porous stone webs are not destroyed.
- The version with countersunk screw is particularly suitable for fastening timber to concrete and masonry. For fixing metal constructions, the version with a wide sleeve rim and a hexagon head screw with moulded washer is recommended.

Installation DuoXpand



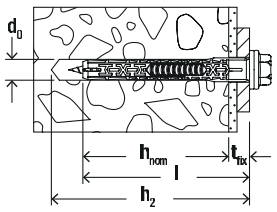


Technical data

Frame fixing DuoXpand

DuoXpand-T – with fischer countersunk head safety screw

	Zinc-plated steel	Stainless steel	Approval	Drill hole diameter	Min. drill hole depth for through fixings	Usable length at anchorage depth 50mm	Usable length at anchorage depth 70mm	Usable length at anchorage depth 140 mm	Usable length at anchorage depth 160 mm	Anchor length	Drive	Sales unit
	Item No.	Item No.		d_0 [mm]	h_2 [mm]	t_{fix} [mm]	t_{fix} [mm]	t_{fix} [mm]	t_{fix} [mm]	l [mm]		[pcs]
Item	**gvz**	**R**	**ETA**									
DuoXpand 8x80 T	**562149**	–	●	8	90	30	10	–	–	80	T30	50
DuoXpand 8x100 T	**562150**	–	●	8	110	50	30	–	–	100	T30	50
DuoXpand 8x120 T	**562151**	–	●	8	130	70	50	–	–	120	T30	50
DuoXpand 10x80 T	**562155**	**562163**	●	10	90	30	10	–	–	80	T40	50
DuoXpand 10x100 T	**562156**	**562164**	●	10	110	50	30	–	–	100	T40	50
DuoXpand 10x120 T	**562157**	**562165**	●	10	130	70	50	–	–	120	T40	50
DuoXpand 10x140 T	**562158**	**562166**	●	10	150	90	70	–	–	140	T40	50
DuoXpand 10x160 T	**562159**	–	●	10	170	110	90	20	–	160	T40	50
DuoXpand 10x180 T	**562160**	–	●	10	190	130	110	40	20	180	T40	50
DuoXpand 10x200 T	**562161**	–	●	10	210	150	130	60	40	200	T40	50
DuoXpand 10x230 T	**562162**	–	●	10	240	180	160	90	70	230	T40	50



Technical data

Frame fixing DuoXpand

DuoXpand-FUS – with fischer hexagon head safety screw with moulded washer

	Zinc-plated steel	Stainless steel	Approval	Drill hole diameter	Min. drill hole depth for through fixings	Usable length at anchorage depth 50mm	Usable length at anchorage depth 70mm	Usable length at anchorage depth 140 mm	Usable length at anchorage depth 160 mm	Anchor length	Drive	Sales unit
	Item No.	Item No.		d_0 [mm]	h_2 [mm]	t_{fix} [mm]	t_{fix} [mm]	t_{fix} [mm]	t_{fix} [mm]	l [mm]		[pcs]
Item	**gvz**	**R**	**ETA**									
DuoXpand 8x80 FUS	**562152**	–	●	8	90	30	10	–	–	80	T30/SW10	50
DuoXpand 8x100 FUS	**562153**	–	●	8	110	50	30	–	–	100	T30/SW10	50
DuoXpand 8x120 FUS	**562154**	–	●	8	130	70	50	–	–	120	T30/SW10	50
DuoXpand 10x80 FUS	**562167**	**562175**	●	10	90	30	10	–	–	80	T40/SW13	50
DuoXpand 10x100 FUS	**562168**	**562176**	●	10	110	50	30	–	–	100	T40/SW13	50
DuoXpand 10x120 FUS	**562169**	**562177**	●	10	130	70	50	–	–	120	T40/SW13	50
DuoXpand 10x140 FUS	**562170**	**562178**	●	10	150	90	70	–	–	140	T40/SW13	50
DuoXpand 10x160 FUS	**562171**	–	●	10	170	110	90	20	–	160	T40/SW13	50
DuoXpand 10x180 FUS	**562172**	–	●	10	190	130	110	40	20	180	T40/SW13	50
DuoXpand 10x200 FUS	**562173**	–	●	10	210	150	130	60	40	200	T40/SW13	50
DuoXpand 10x230 FUS	**562174**	–	●	10	240	180	160	90	70	230	T40/SW13	50

Loads

Frame fixing DuoXpand

Permissible loads[1)2)3)] of a single anchor as part of a multiple fixing of non-structural systems.
For the design the complete current assessment ETA-21/0324 has to be considered.

Type			DuoXpand 8		DuoXpand 10			
Anchor diameter	d	[mm]						
Anchorage in concrete ≥ C16/20[4)]								
Anchorage depth	h_{nom} ≥	[mm]	50	70	50	70	–	–
Permissible tensile load N_{perm}		[kN]	1.39	1.59	1.59	1.79	–	–
Permissible shear load V_{perm}	zinc coated screws (gvz)	[kN]	4.23	4.23	5.98	5.98	–	–
	stainless steel screw (R)	[kN]	3.93	3.93	5.98	5.98	–	–
Minimum member thickness	h_{min}	[mm]	80	100	80	100	–	–
Characteristic edge distance	$c_{cr,N}$	[mm]	50	50	50	50	–	–
Characteristic spacing	a resp. $s_{cr,N}$	[mm]	65	70	70	80	–	–
Minimum spacing	s_{min}	[mm]	50	50	50	50	–	–
with an edge distance	c ≥	[mm]	100	100	100	100	–	–
Minimum edge distance	c_{min}	[mm]	50	50	50	50	–	–
with a spacing	s ≥	[mm]	100	100	100	100	–	–
Anchorage in masonry[5)6)]								
Anchorage depth	h_{nom}	[mm]	50	70	50	70	140	160
Permisible load F_{perm} in solid brick Mz,	≥ NF; ≥ 10 [N/mm²] / ρ ≥ 1.8 [kg/dm³]	[kN]	0.43	0.43	0.26	0.26	–	–
e.g. Ziegelwerk Nordhausen	≥ NF; ≥ 20 [N/mm²] / ρ ≥ 1.8 [kg/dm³]	[kN]	0.86	1.00	0.57	0.57	–	–
Permissible load F_{perm} in solid sand-lime brick KS,	≥ NF; ≥ 10 [N/mm²] / ρ ≥ 2.0 [kg/dm³]	[kN]	0.43	0.57	0.57	0.57	–	–
e.g. Wemding	≥ NF; ≥ 20 [N/mm²] / ρ ≥ 2.0 [kg/dm³]	[kN]	1.00	1.14	1.14	1.14	–	–
Permissible load[7)] F_{perm} in lightweight concrete	≥ 2 DF; ≥ 2 [N/mm²] / ρ ≥ 1.4 [kg/dm³]	[kN]	0.11	0.17	0.09	0.17	–	–
block Vbl, e.g. KLB	≥ 2 DF; ≥ 4 [N/mm²] / ρ ≥ 1.4 [kg/dm³]	[kN]	0.21	0.34	0.17	0.34	–	–
Permissible load[7)] F_{perm} in vertically perforated	3 DF; ≥ 10 [N/mm²] / ρ ≥ 0.9 [kg/dm³]	[kN]	0.21	0.34	0.21	0.34	–	–
brick HLz, e.g. Schlagmann	3 DF; ≥ 12 [N/mm²] / ρ ≥ 0.9 [kg/dm³]	[kN]	0.26	0.43	0.26	0.43	–	–
Permissible load F_{perm} in perforated sand-lime	3 DF; ≥ 8 [N/mm²] / ρ ≥ 1.4 [kg/dm³]	[kN]	0.26	0.21	0.17	0.26	–	–
brick KSL, e.g. Wemding	3 DF; ≥ 16 [N/mm²] / ρ ≥ 1.4 [kg/dm³]	[kN]	0.43	0.43	0.34	0.57	–	–
Permissible load[7)] F_{perm} in hollow lightweight	16 DF; ≥ 2 [N/mm²] / ρ ≥ 0.7 [kg/dm³]	[kN]	0.14	0.14	0.21	0.21	–	–
concrete blocks Hbl, e.g Knobel, DE	16 DF; ≥ 4 [N/mm²] / ρ ≥ 0.7 [kg/dm³]	[kN]	0.26	0.26	0.43	0.43	–	–
Permissible load[7)] F_{perm} in hollow lightweight	≥ 2 [N/mm²] / ρ ≥ 1.0 [kg/dm³]	[kN]	0.09	–	0.14	0.14	–	0.09
concrete blocks Hbl, eg. Sepa Parpaing, FR	≥ 4 [N/mm²] / ρ ≥ 1.0 [kg/dm³]	[kN]	0.21	0.14	0.26	0.26	0.14	0.14
Minimum member thickness	h_{min}	[mm]	115	115	115	115	200	200
Minimum spacing (single anchor)	a_{min}	[mm]	250	250	250	250	250	250
Minimum spacing (anchor group)	s_{min}	[mm]	100	100	100	100	100	100
Minimum edge distance (anchor group)	c_{min}	[mm]	100	100	100	100	100	100
Anchorage in aerated concrete[6)]								
Anchorage depth	h_{nom} ≥	[mm]	70	–	70	–	–	–
Permissible load Fperm in aerated concrete,	AAC 2	[kN]	0.11	–	0.14	–	–	–
acc.to EN 771-4:2011+A1:2015	AAC 4	[kN]	0.27	–	0.21	–	–	–
	AAC 6	[kN]	0.54	–	0.32	–	–	–
Permissible load F_{perm} in reinforced aerated	AAC 4; f_{ck} ≥ 4 N/mm²	[kN]	–	–	0.18	–	–	–
concrete, acc. to EN 12602:2016	AAC 6; f_{ck} ≥ 6 N/mm²	[kN]	–	–	0.32	–	–	–
Minimum member thickness	h_{min}	[mm]	100 / 175[8)]	–	100 / 175[8)]	–	–	–
Minimum spacing (single anchor)	a_{min}	[mm]	250	–	250	–	–	–
Minimum spacing (anchor group)	s_{min}	[mm]	100 / 80[8)]	–	100 / 80[8)]	–	–	–
Minimum edge distance (anchor group)	c_{min}	[mm]	100	–	100	–	–	–

1) Valid for zinc coated screws (gvz) and for screws made of stainless steel (R). For exterior use of the zinc coated screws measures against incoming humidity according to assessment have to be taken.
2) The required partial safety factors for material resistance as well as a partial safety factor for load actions γ_L = 1.4 are considered.
As a single anchor counts e.g. an anchor with a minimum spacing a according to the ETA.
3) Valid for temperatures in the substrate up to +50 °C (resp. short term up to +80 °C). For long term temperatures up to +30 °C higher permissible loads may be possible.
4) For concrete specifications in C12/15, see ETA.
5) Stone property data in min. compressive strength [N/mm²] and bulk density [kg/dm³]. Corresponding mean compressive strengths according to EN 771 and other brick variants or brick geometries are listed in the ETA.
6) Load data are valid for tensile load, shear load and oblique load under any angle. For bending moments and invisible or not mortar-filled joints the design specifications of the ETA must be observed.
7) Rotary drilling method.
8) Only valid for groups of anchors in AAC with compression strength ≥ 6 N/mm².

Frame fixing SXRL

The versatile with multiple anchorage depth

Timber substructures

Wall consoles

Applications

- Façade, ceiling and roof substructures made of wood and metal
- Facade substructures under compression load (e.g. distance installation without a wall bracket)
- Windows
- Gates and doors
- Wardrobes
- Kitchen hanging cabinets
- Squared timbers
- Beams
- TV consoles
- Wall covering
- Metal brackets
- Metal supports
- Cable ducts
- Cable trays

Advantages

- The long expansion element with multiple anchorage depths of 50, 70 or 90 mm for SXRL 8 and SXRL 10 and 70 or 90 mm for SXRL 14 makes the SXRL a versatile applicable product.
- Through the special geometry of the plug, the loads are evenly distributed in the drill hole.
- When the plug is to be set below the plaster, the longer ribs prevent plug rotation during installation.
- The approval for single-point fixing in cracked concrete makes the SXRL the designated specialist in concrete particularly for tasks such as the installation of awning roofs and outdoor railings compared to steel anchors.
- SXRL 14 is approved for the application under compression load and is thus for example useable for facade substructures that are mounted at a distance without wall brackets.
- Complete range available with diameters of 8, 10 and 14 mm and usable lengths up to 290 mm.

Certificates

ETA-07/0121, multiple use for non-structural applications

Fire resistance classification R90

INOX STAINLESS STEEL

Building materials

Approved for:
- Vertically perforated brick
- Aerated concrete
- Hollow blocks made from lightweight concrete
- Perforated sand-lime brick
- Thermal insulation blocks
- Solid block made from lightweight and normal weight concrete
- Solid brick
- Solid sand-lime brick
- Concrete ≥ C12/15

Also suitable for:
- Natural stone with dense structure
- Solid panel made from gypsum

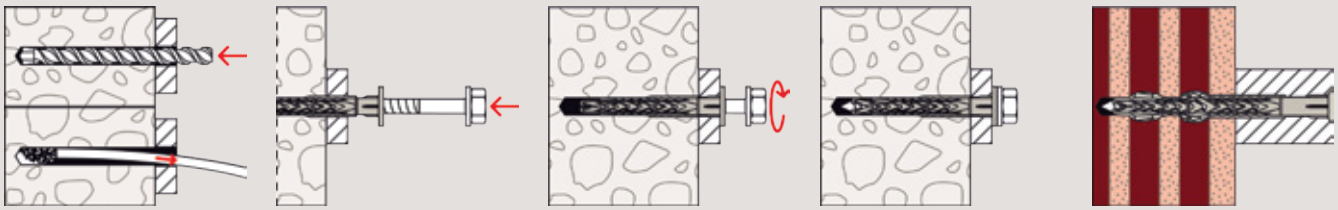
Versions

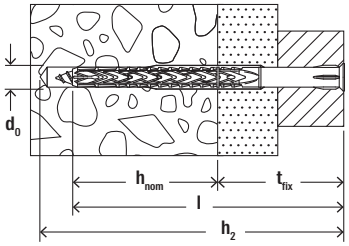
- Zinc-plated steel
- Stainless steel

Functioning

- In hollow building materials, the two expansion zones ensure that the introduction of force is gentle on the substrate. The porous block fillets are not crushed by the second expansion zone and therefore serve to transmit the force
- In aerated concrete and solid building material, the two expansion zones combine to form one long expansion element, thus providing for a uniform and flat distribution of the load into substrate.
- SXRL-T with countersunk head screw is recommended for the installation of timber constructions; in the case of metal constructions, use SXRL-FUS with a wide sleeve rim and a moulded washer on the screw, which also features an integrated hexagon socket.

Installation SXRL





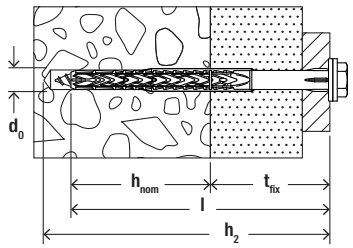
Technical data

Frame fixing SXRL-T

SXRL-T with fischer countersunk head safety screw

Item	Zinc-plated steel Item No. gvz	Stainless steel Item No. R	Approval ETA	 DIBt	Drill diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Usable length at anchorage depth 50mm t_{fix} [mm]	Usable length at anchorage depth 70mm t_{fix} [mm]	Usable length at anchorage depth 90mm t_{fix} [mm]	Anchor length l [mm]	Drive	Sales unit [pcs]
SXRL 8 x 60 T	540113	540119	●	–	8	70	10	–	–	60	T30	50
SXRL 8 x 80 T	540114	540121	●	–	8	90	30	10	–	80	T30	50
SXRL 8 x 100 T	540115	540123	●	–	8	110	50	30	10	100	T30	50
SXRL 8 x 120 T	540116	540124	●	–	8	130	70	50	30	120	T30	50
SXRL 8 x 140 T	540117	540125	●	–	8	150	90	70	50	140	T30	50
SXRL 8 x 160 T	540118	540126	●	–	8	170	110	90	70	160	T30	50
SXRL 10 x 60 T	546477	546505	●	●	10	70	10	–	–	60	T40	50
SXRL 10 x 80 T	522698	522709	●	●	10	90	30	10	–	80	T40	50
SXRL 10 x 100 T	522699	522710	●	●	10	110	50	30	10	100	T40	50
SXRL 10 x 120 T	522700	522711	●	●	10	130	70	50	30	120	T40	50
SXRL 10 x 140 T	522701	522712	●	●	10	150	90	70	50	140	T40	50
SXRL 10 x 160 T	522703	522713	●	●	10	170	110	90	70	160	T40	50
SXRL 10 x 180 T	522704	522714	●	●	10	190	130	110	90	180	T40	50
SXRL 10 x 200 T	522705	522715	●	●	10	210	150	130	110	200	T40	50
SXRL 10 x 230 T	522706	522716	●	●	10	240	180	160	140	230	T40	50
SXRL 10 x 260 T	522707 [1)]	522717 [1)]	●	●	10	270	210	190	170	260	T40	50
SXRL 10 x 290 T	522708 [1)]	522718 [1)]	●	●	10	300	240	220	200	290	T40	50
SXRL 14 x 80 T	530920	530932	●	●	14	95	–	10	–	80	T50	50
SXRL 14 x 100 T	530921	530933	●	●	14	115	–	30	10	100	T50	50
SXRL 14 x 120 T	530922	530934	●	●	14	135	–	50	30	120	T50	50
SXRL 14 x 140 T	530923	530935	●	●	14	155	–	70	50	140	T50	50
SXRL 14 x 160 T	530924	530936	●	●	14	175	–	90	70	160	T50	50
SXRL 14 x 180 T	530925	530937	●	●	14	195	–	110	90	180	T50	50
SXRL 14 x 200 T	530926	530938	●	●	14	215	–	130	110	200	T50	50
SXRL 14 x 230 T	530927	530939	●	●	14	245	–	160	140	230	T50	50
SXRL 14 x 260 T	530928	530940	●	●	14	275	–	190	170	260	T50	50
SXRL 14 x 300 T	530929 [1)]	530941 [1)]	●	●	14	315	–	230	210	300	T50	20
SXRL 14 x 330 T	530930 [1)]	530942 [1)]	●	●	14	345	–	260	240	330	T50	20
SXRL 14 x 360 T	530931 [1)]	530943 [1)]	●	●	14	375	–	290	270	360	T50	20

1) not pre-assembled



Technical data

Frame fixing SXRL-FUS

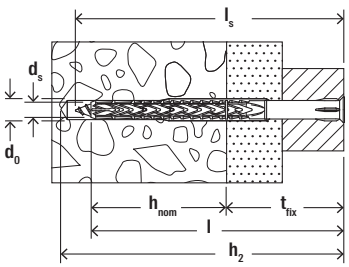
SXRL-FUS with fischer hexagon head safety screw, moulded washer and integrated bit recess

4

	Zinc-plated steel	Stainless steel	Approval		Drill diameter	Min. drill hole depth for through fixings	Usable length at anchorage depth 50mm	Usable length at anchorage depth 70mm	Usable length at anchorage depth 90mm	Anchor length	Drive	Sales unit
	Item No.	Item No.			d_0 [mm]	h_2 [mm]	t_{fix} [mm]	t_{fix} [mm]	t_{fix} [mm]	l [mm]		[pcs]
Item	gvz	R	ETA	DIBt								
SXRL 8 x 60 FUS	540127	540135	●	–	8	70	10	–	–	60	T30/SW10	50
SXRL 8 x 80 FUS	540129	540136	●	–	8	90	30	10	–	80	T30/SW10	50
SXRL 8 x 100 FUS	540130	540137	●	–	8	110	50	30	10	100	T30/SW10	50
SXRL 8 x 120 FUS	540131	–	●	–	8	130	70	50	30	120	T30/SW10	50
SXRL 8 x 140 FUS	540133	–	●	–	8	150	90	70	50	140	T30/SW10	50
SXRL 8 x 160 FUS	540134	–	●	–	8	170	110	90	70	160	T30/SW10	50
SXRL 10 x 60 FUS	546506	546507	●	●	10	70	10	–	–	60	T40/SW13	50
SXRL 10 x 80 FUS	522719	522730	●	●	10	90	30	10	–	80	T40/SW13	50
SXRL 10 x 100 FUS	522720	522731	●	●	10	110	50	30	10	100	T40/SW13	50
SXRL 10 x 120 FUS	522721	522732	●	●	10	130	70	50	30	120	T40/SW13	50
SXRL 10 x 140 FUS	522723	522733	●	●	10	150	90	70	50	140	T40/SW13	50
SXRL 10 x 160 FUS	522724	522734	●	●	10	170	110	90	70	160	T40/SW13	50
SXRL 10 x 180 FUS	522725	522735	●	●	10	190	130	110	90	180	T40/SW13	50
SXRL 10 x 200 FUS	522726	522736	●	●	10	210	150	130	110	200	T40/SW13	50
SXRL 10 x 230 FUS	522727	522737	●	●	10	240	180	160	140	230	T40/SW13	50
SXRL 10 x 260 FUS	522728 [1]	522738 [1]	●	●	10	270	210	190	170	260	T40/SW13	50
SXRL 10 x 290 FUS	522729 [1]	522739 [1]	●	●	10	300	240	220	200	290	T40/SW13	50
SXRL 14 x 80 FUS	530946	–	●	●	14	95	–	10	–	80	T50/SW17	50
SXRL 14 x 80 FUS	–	530955 [2]	●	●	14	95	–	10	–	80	SW17	50
SXRL 14 x 100 FUS	530947	–	●	●	14	115	–	30	10	100	T50/SW17	50
SXRL 14 x 100 FUS	–	530956 [2]	●	●	14	115	–	30	10	100	SW17	50
SXRL 14 x 120 FUS	530948	–	●	●	14	135	–	50	30	120	T50/SW17	50
SXRL 14 x 120 FUS	–	530957 [2]	●	●	14	135	–	50	30	120	SW17	50
SXRL 14 x 140 FUS	530949	–	●	●	14	155	–	70	50	140	T50/SW17	50
SXRL 14 x 140 FUS	–	530958 [2]	●	●	14	155	–	70	50	140	SW17	50
SXRL 14 x 160 FUS	530950	–	●	●	14	175	–	90	70	160	T50/SW17	50
SXRL 14 x 160 FUS	–	530959 [2]	●	●	14	175	–	90	70	160	SW17	50
SXRL 14 x 180 FUS	530951	–	●	●	14	195	–	110	90	180	T50/SW17	50
SXRL 14 x 180 FUS	–	530960 [2]	●	●	14	195	–	110	90	180	SW17	50
SXRL 14 x 200 FUS	530952	–	●	●	14	215	–	130	110	200	T50/SW17	50
SXRL 14 x 200 FUS	–	530961 [2]	●	●	14	215	–	130	110	200	SW17	50
SXRL 14 x 230 FUS	530953	–	●	●	14	245	–	160	140	230	T50/SW17	50
SXRL 14 x 230 FUS	–	530962 [2]	●	●	14	245	–	160	140	230	SW17	50
SXRL 14 x 260 FUS	530954	–	●	●	14	275	–	190	170	260	T50/SW17	50
SXRL 14 x 260 FUS	–	530963 [2]	●	●	14	275	–	190	170	260	SW17	50

1) not pre-assembled

2) without integrated bit recess T50



Technical data

Frame fixing SXRL

SXRL without screw

Item	Item No.	Drill diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Usable length at anchorage depth 50mm t_{fix} [mm]	Usable length at anchorage depth 70mm t_{fix} [mm]	Usable length at anchorage depth 90mm t_{fix} [mm]	Anchor length l [mm]	Screw diameter d_s [mm]	Min. screw length l_s [mm]	Sales unit [pcs]
SXRL 8 x 60	**540879**	8	70	10	–	–	60	5,5 - 6,0	65	100
SXRL 8 x 80	**540880**	8	90	30	10	–	80	5,5 - 6,0	85	100
SXRL 8 x 100	**540881**	8	110	50	30	10	100	5,5 - 6,0	105	100
SXRL 8 x 120	**540882**	8	130	70	50	30	120	5,5 - 6,0	125	100

Accessories

Washer U

U

Item	Item No.	External-Ø d [mm]	Hole-Ø D [mm]	Thickness S [mm]	Matching anchor type	Sales unit [pcs]
U 11,5 x 21 x 1,5 DIN 522 A2	**010026**	21	11.5	1.5	SXR 10, SXRL 10, FUR 10	500

Loads

Frame fixing SXRL 10

Permissible loads of a single anchor[1] in normal concrete of strength class C20/25.
For the design the complete current general construction technique permit Z-21.2-2092 has to be considered.

			Cracked concrete					Non-cracked concrete				
	Material/ surface[2]	Nominal anchorage depth	Minimum member thickness	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads				Minimum member thickness	Permissible tension (N_{perm}) and shear loads (V_{perm}); minimum spacing (s_{min}) and edge distances (c_{min}) with reduced loads			
Type		h_{nom} [mm]	h_{min} [mm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]	h_{min} [mm]	N_{perm}[3] [kN]	V_{perm}[3] [kN]	s_{min}[3] [mm]	c_{min}[3] [mm]
SXRL 10	gvz	70	100	1.5	3.6	50	50	110	2.6	6.0	80	80
	R	70	100	1.5	3.6	50	50	110	2.6	6.0	80	80

[1] Design according to EN 1992-4:2018 (for static resp. quasi-static loads). The partial safety factors for material resistance well as a partial safety factor for load actions of $\gamma_L = 1.4$ are considered. As a single anchor counts e.g. an anchor with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times hef$. Accurate data see approval.
[2] Further steel grades, versions and technical data see current general construction technique permit.
[3] In the case of combinations of tensile and shear loads, bending moments with reduced or minimum spacing and edge distances (anchor groups), the design must be carried out in accordance with the provisions of the complete approval and the provisions of the EN 1992-4:2018. The given loads are valid for temperature range II. We recommend using our anchor design software C-FIX.

4

Loads

Frame fixing SXRL 8

Recommended loads[1][2][3] for a single anchor as part of a multiple fixing of non-structural systems.
The given loads are valid for wood screws with the specified diameter.

Type			SXRL 8		
Screw diameter		[mm]	6.0	6.0	6.0
Anchorage depth	h_{nom}	[mm]	50	70	90
Minimum edge distance concrete	c_{min}	[mm]	60	80	100
Recommended loads in the respective base material F_{rec}[2]					
Concrete	≥ C20/25	[kN]	0.60	1.00	1.00
Solid brick	≥ Mz 12	[kN]	0.45	0.60	0.60
Solid sand-lime brick	≥ KS 12	[kN]	0.40	0.50	0.50
Vertically perforated brick	≥ Hlz 12; $\rho \geq 1.0$ [kg/dm³]	[kN]	0.15	0.15	0.15
Perforated sand-lime brick	≥ KSL 12	[kN]	0.10	0.40	0.40
Aerated concrete	AAC 2	[kN]	–	0.10	0.10
Aerated concrete	AAC 4	[kN]	–	0.15	0.20

[1] Required safety factors are considered.
[2] Valid for tensile load, shear load and oblique load under any angle.
[3] Valid for zinc coated screws (gvz) and for screws made of stainless steel (R).
For exterior use of the zinc coated screws measures against incoming humidity have to be taken.

Loads

Frame fixing SXRL

Permissible loads[1)2)3)] of a single anchor as part of a multiple fixing of non-structural systems.
For the design the complete current assessment ETA-07/0121 has to be considered.

Type			SXRL 8			SXRL 10			SXRL 14	
Anchor diameter		**[mm]**	8	8	8	10	10	10	14	14
Anchorage depth	h_{nom}	**[mm]**	50	70	90	50	70	90	70	90
Anchorage in concrete ≥ C12/15										
Permissible tensile load N_{perm}		**[kN]**	1.59	1.98	1.98	2.18	2.58	2.58	3.37	3.37
Permissible shear load V_{perm}	zinc coated screws (gvz)	**[kN]**	4.23	4.23	4.23	5.98	5.98	5.98	12.40	12.40
	stainless steel screw (R)	**[kN]**	3.93	3.93	3.93	5.98	5.98	5.98	11.63	11.63
Minimum member thickness	h_{min}	**[mm]**	80	100	120	100	100	120	110	130
Characteristic edge distance	$c_{cr,N}$	**[mm]**	85	85	85	140	140	140	140	140
Characteristic spacing	a resp. $s_{cr,N}$	**[mm]**	90	105	105	120	120	120	135	135
Minimum spacing	s_{min}	**[mm]**	85	85	85	70	70	70	85	85
with an edge distance	c ≥	**[mm]**	85	85	85	140	140	140	140	140
Minimum edge distance	c_{min}	**[mm]**	85	85	85	70	70	70	85	85
with a spacing	s ≥	**[mm]**	85	85	85	175	175	175	175	175
Anchorage in narrow concrete members (h ≥ 40 mm) made of concrete ≥ C12/15, e.g. weather shells of triple-skin outer wall panels										
Permissible tensile load N_{perm}		**[kN]**	–	–	–	0.99	–	–	–	–
Permissible shear load V_{perm}		**[kN]**	–	–	–	5.98	–	–	–	–
Anchorage in pre-stressed hollow-core concrete slabs (mirror thickness d_b ≥ 30 mm) made of concrete ≥ C45/55										
Permissible tensile load N_{perm}		**[kN]**	–	–	–	1.39	–	–	–	–
Permissible shear load V_{perm}		**[kN]**	–	–	–	5.98	–	–	–	–
Anchorage in masonry										
Permissible load[4)] F_{perm} in	≥ Mz 12/1.8; ≥ NF	**[kN]**	0.57	0.71	0.71	0.57	1.14	–	0.86	0.86
solid brick	≥ Mz 20/1.8; ≥ NF	**[kN]**	0.86	1.14	1.14	1.00	1.14	–	1.14	1.14
Permissible load[4)] F_{perm} in	≥ KS 10/1.8; ≥ NF	**[kN]**	0.57	0.57	0.57	–	0.71	–	0.86	0.86
solid sand-lime brick	≥ KS 20/1.8; ≥ NF	**[kN]**	0.71	0.86	0.86	–	1.00	–	1.29	1.29
Permissible load[4)] F_{perm} in	≥ Vbl 2; ρ ≥ 1.2 kg/dm³	**[kN]**	0.11	0.26	0.26	0.11	0.11	–	0.26	0.26
lightweight concrete block	≥ Vbl 6; ρ ≥ 1.6 kg/dm³	**[kN]**	0.34	0.57	0.57	0.57	1.29	–	0.57	0.57
Permissible load[4)5)] F_{perm} in	≥ HLz 10; ρ ≥ 1.2 kg/dm³	**[kN]**	0.17	0.17	0.17	–	–	–	–	–
vertically perforated brick	≥ HLz 12; ρ ≥ 1.0 kg/dm³	**[kN]**	–	–	–	–	0.21	–	0.57	0.71
Permissible load[4)] F_{perm} in perforated sand-lime brick	≥ KSL 12; ρ ≥ 1.4 kg/dm³	**[kN]**	0.34	0.43	0.43	–	0.71	–	0.43	0.71
Permissible load[4)5)] F_{perm} in hollow lightweight concrete blocks	≥ Hbl 2; ρ ≥ 0.7 kg/dm³	**[kN]**	0.43	0.57	0.43	0.57	0.71	–	0.34	0.21
Permissible load[4)5)] F_{perm} in ceilings made of vertically perforated bricks	f_b ≥ 10 N/mm²; ρ ≥ 0.7 kg/dm³	**[kN]**	–	–	–	–	0.57	–	–	–
Minimum member thickness	h_{min}	**[mm]**	115	115	115	110	110	110	115	115
Minimum spacing (single anchor)	a_{min}	**[mm]**	250	250	250	250	250	250	250	250
Minimum spacing (anchor group)	s_{min}	**[mm]**	100	100	100	100	100	100	100	100
Minimum edge distance (anchor group)	c_{min}	**[mm]**	100	100	100	100	100	100	100	100
Anchorage in aerated concrete										
Permissible load[4)] F_{zul} in aerated concrete	AAC ≥ 2 N/mm²	**[kN]**	–	0.14	0.21	–	0.18	0.21	0.32	0.43
	AAC ≥ 4 N/mm²	**[kN]**	–	0.32	0.43	–	0.43	0.54	0.89	1.07
	AAC ≥ 6 N/mm²	**[kN]**	–	0.54	0.71	–	0.71	0.89	1.43	1.79
Minimum member thickness	h_{min}	**[mm]**	–	175	175	–	100	120	175[6)]/300[7)]	175[6)]/300[7)]
Minimum spacing (single anchor)	a_{min}	**[mm]**	–	250	250	–	250	250	250	250
Minimum spacing (anchor group)	s_{min}	**[mm]**	–	80[6)]/110[8)]	80[6)]/110[8)]	–	100[6)]/120[8)]	100[6)]/120[8)]	80	100[6)]/125[7)]
Minimum edge distance (anchor group)	c_{min}	**[mm]**	–	90[6)]/110[8)]	90[6)]/110[8)]	–	120	120	120	120[6)]/150[7)]

[1)] Valid for zinc coated screws (gvz) and for screws made of stainless steel (R). For exterior use of the zinc coated screws measures against incoming humidity according to assessment have to be taken.
[2)] The required partial safety factors for material resistance as well as a partial safety factor for load actions γ_L = 1.4 are considered.
As a single anchor counts e.g. an anchor with a minimum spacing a according to Annex B 4 of the assessment.
[3)] Valid for temperatures in the substrate up to +50 °C (resp. short term up to +80 °C). For long term temperatures up to +30 °C higher permissible loads may be possible.
[4)] Valid for tensile load, shear load and oblique load under any angle. For combinations of tensile loads, shear loads and bending moments see assessment.
[5)] Rotary drilling.
[6)] Only valid for AAC with compression strength ≥ 2 to < 4 N/mm².
[7)] Only valid for AAC with compression strength ≥ 4 N/mm².
[8)] Only valid for AAC with compression strength ≥ 6 N/mm².

Anti-corrosion spray FTC-CP

The elastic protective coating for use with frame fixings

Sealing of the screw heads

Sealing of the screw heads

Applications

- Façade anchorings in line with the assessments for frame fixings, e.g. SXR, SXRL and FUR.
- For all substructures, e.g. made from wood, aluminium, metal.

Advantages

- FTC-CP professionally prevents the penetration of moisture into the anchor shaft and securely protects the connection from corrosion - as required in the ETA assessments.
- Once dry, the optimised formulation provides a long-lasting, elastic protective coating with a secure hold and a high abrasion resistance.
- The thixotropic anti-corrosion agent is also ideally suited to other corrosion protection applications and thus offers a wide range of uses.

Building materials

- Zinc-plated frame fixings
- Corrosive metals

Functioning

- Thixotropic, bitumen-based anti-corrosion agent.
- Good stability under load; non-drip, no spray mist.
- Shake canister for at least 2 minutes from the time the mixing balls can be heard.
- Spray as evenly as possible from a distance of 15 to 20 cm.
- Ideal processing temperature +16 °C to +25 °C.
- Quick-drying (dried through after 3-4 hours at 600 mµ and 20 °C).
- Temperature-resistant from -25 °C to 80 °C.
- Salt and water-resistant, and resistant to abrasion.
- With one can about 300 screw heads can be coated.

Technical data

Anti-corrosion spray FTC-CP				
	Item No.	Colour	Content per can [ml]	Sales unit [pcs]
Item				
FTC-CP	511440 [1)]	black	500	1

1) Dangerous goods - no express shipping possible.

Nail sleeve FNH

The user-friendly spring sleeve for light fixings in solid building materials

Timber substructures

Applications

- Squared timbers
- Substructures made of wood and metal
- Metal profiles

Advantages

- No plugs or screws are required for the one-piece nail sleeve. This guarantees a simple and easy installation.
- The geometry of the nail sleeve makes it easy to push it into the drill hole. This saves time and money.

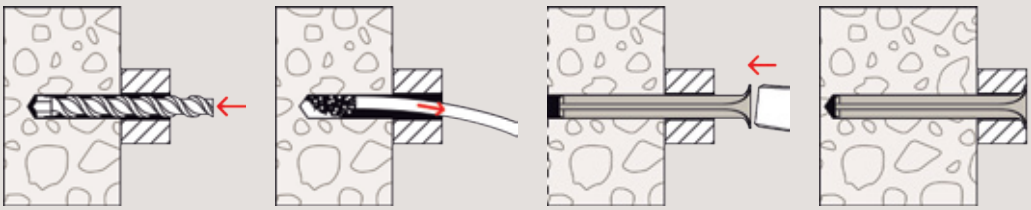
Building materials

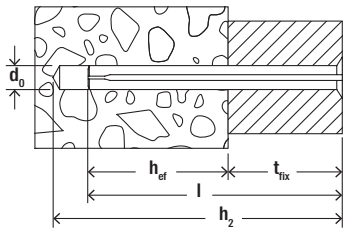
- Concrete
- Solid sand-lime brick
- Natural stone with dense structure
- Solid brick

Functioning

- The FNH nail sleeve is suitable for push-through installation.
- The nail sleeve is hammered in and expands its entire length in the hole.
- FNH is suitable for interior applications and for temporary external fixings.

Installation FNH





Technical data

Nail sleeve FNH

FNH

Item	Item No.	Drill hole diameter d_0 [mm]	Effect. anchorage depth h_{ef} [mm]	Anchor length l [mm]	Max. fixture thickness t_{fix} [mm]	Min. drill hole depth for through fixings h_2 [mm]	Sales unit [pcs]
FNH 5/50	**541893**	5	20	50	30	60	100
FNH 6/30	**541894**	6	30	30	–	40	100
FNH 6/40	**541895**	6	30	40	10	50	100
FNH 6/50	**541896**	6	30	50	20	60	100
FNH 6/60	**541897**	6	30	60	30	70	100
FNH 6/80	**541898**	6	30	80	50	90	100
FNH 8/70	**541899**	8	40	70	30	80	100
FNH 8/90	**541905**	8	40	90	50	100	50
FNH 8/110	**541906**	8	40	110	70	120	50
FNH 8/130	**541907**	8	40	130	90	140	50
FNH 8/150	**541908**	8	40	150	110	160	50
FNH 8/180	**541909**	8	40	180	140	190	50

Loads

Nail sleeve FNH

Recommended loads[1] of a single anchor as part of a multiple fixing of non-structural systems.

Type		FNH 5	FNH 6	FNH 8
Minimum member thickness	**[mm]**	50	60	70
Anchorage in concrete ≥ C20/25				
Recommended tension load N_{rec}	**[kN]**	0.10	0.50	0.70
Recommended shear load V_{rec}	**[kN]**	0.40	1.40	2.00

[1] Required safety factors are considered.

Window frame fixing F-S

The nylon fixing for stress-free stand-off installation of window and door frames

Window frames

Applications

- Window frames
- Door frames

Advantages

- The operating principle of the plug prevents the frame from being pulled against the substrate, and ensures a stress-free and long-lasting fixing of the frame.
- The special plug geometry anchors the metal and plastic profiles against compressive and tensile loads, and allows for a secure hold of the window frame.
- The cover cap (available separately) can be used to discreetly cover the screw head.

Certificates

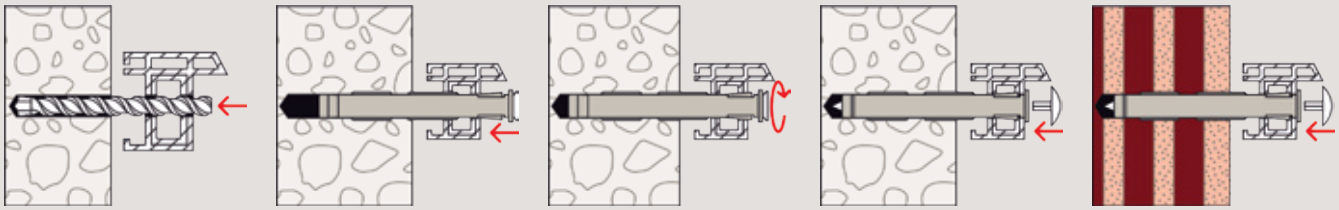
Building materials

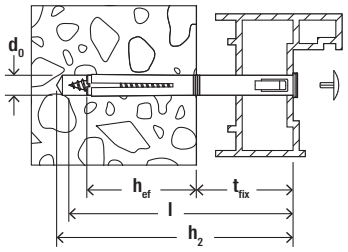
- Concrete
- Vertically perforated brick
- Hollow blocks made from lightweight concrete
- Perforated sand-lime brick
- Solid sand-lime brick
- Aerated concrete
- Solid brick made from lightweight concrete
- Solid brick

Functioning

- The F-S is suitable for push-through installation.
- By tightening the screw, the glass-fibre-reinforced plastic cone is drawn into the sleeve, whereby it is expanded and wedged inside the drill hole. The window frames are thus fixed in a stress-free manner.
- The maximum installation torque is 3 Nm for F 8 S and 6 Nm for F 10 S.

Installation F-S





Technical data

Window frame fixing F-S

F-S - with zinc-plated countersunk screw and cross drive Z3

	Item No.	Drill hole diameter d_0 [mm]	Effect. anchorage depth h_{ef} [mm]	Anchor length l [mm]	Max. fixture thickness t_{fix} [mm]	Min. drill hole depth for through fixings h_2 [mm]	Max. installation torque T_{inst} [Nm]	Sales unit [pcs]
Item								
F 10 S 75	**088625**	10	50	75	15	90	6	50
F 10 S 100	**088626**	10	50	100	40	115	6	50
F 10 S 120	**088627**	10	50	120	60	135	6	50
F 10 S 140	**088628**	10	50	140	80	155	6	50
F 10 S 165	**088629**	10	50	165	105	180	6	50

Accessories

Cover cap ADF (F-S)

ADF

	Item No.	Diameter d [mm]	Colour	Sales unit [pcs]
Item				
ADF 12 W	**060275**	12	white	100

Loads

Window frame F-S				
Recommended loads[1] of a single anchor as part of a multiple fixing of non-structural systems.				
Type			**F 8 S**	**F 10 S**
Recommended loads in the respective base material F_{rec}[2]				
Concrete	≥ C20/25	**[kN]**	0.78	1.48
Solid brick	≥ Mz 12	**[kN]**	0.90	1.25
Solid sand-lime brick	≥ KS 12	**[kN]**	0.90	1.25
Solid brick of lightweight aggregate concrete	≥ V 2	**[kN]**	0.25	-
Perforated sand-lime brick	≥ KSL 6	**[kN]**	0.25	-

[1] Required safety factors are considered.
[2] Valid for tensile load, shear load and oblique load under any angle.

Metal frame fixing F-M

The fixing for stress-free installation of window and door frames with fire classification

Fire protection doors

Applications

- Window frames
- Door frames
- Squared timbers

Advantages

- The F-M metal frame plug achieves fire resistance R 120. This allows for use in areas where fire resistance is relevant.
- The operating principle prevents the window frame from being pulled against the substrate, and ensures a stress-free and long-lasting fixing of the frame.
- The special plug geometry anchors the metal and plastic profiles against compressive and tensile loads, and allows for a secure hold of the window frame.
- The cover caps (available separately) can be used to discreetly cover the screw heads.

Certificates

Fire resistance classification
R120

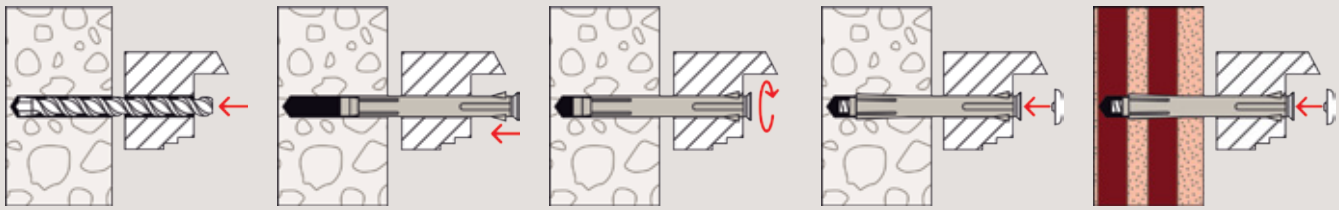
Building materials

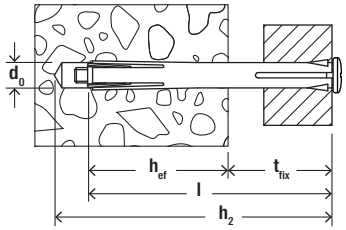
- Concrete
- Vertically perforated brick
- Hollow blocks made from lightweight concrete
- Perforated sand-lime brick
- Solid sand-lime brick
- Aerated concrete
- Solid brick made from lightweight concrete
- Solid brick

Functioning

- The F-M is suitable for push-through installation.
- By tightening the screw, the cone is drawn into the sleeve and the fixing is expanded which wedges it inside the drill hole. The window frames are thus fixed in a stress-free manner.
- The maximum installation torque is 5 Nm.

Installation F-M





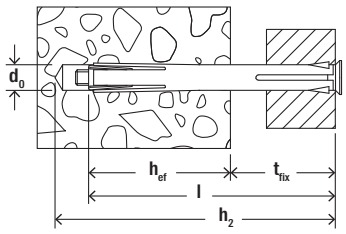
Technical data

Metal frame fixing F-M

F 8 M - with zinc-plated raised countersunk screw and cross drive PZ2

Item	Item No.	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Effect. anchorage depth h_{ef} [mm]	Anchor length l [mm]	Max. fixture thickness t_{fix} [mm]	Drive	Sales unit [pcs]
F 8 M 72	**088660** 1)	8	90	30	72	42	PZ2	100
F 8 M 92	**088662** 1)	8	110	30	92	62	PZ2	100
F 8 M 112	**088664** 1)	8	130	30	112	82	PZ2	100
F 8 M 132	**088666** 1)	8	150	30	132	102	PZ2	100

1) Screw head Ø 10 mm



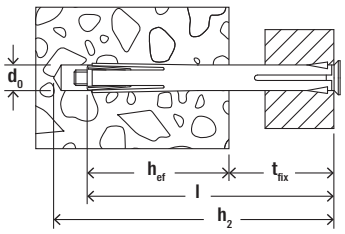
Technical data

Metal frame fixing F-M

F 10 M - with zinc-plated countersunk head screw and cross drive PZ3

Item	Item No.	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Effect. anchorage depth h_{ef} [mm]	Anchor length l [mm]	Max. fixture thickness t_{fix} [mm]	Drive	Sales unit [pcs]
F 10 M 72	**088670** 1)	10	90	30	72	42	PZ3	100
F 10 M 92	**088672** 1)	10	110	30	92	62	PZ3	100
F 10 M 112	**088674** 1)	10	130	30	112	82	PZ3	100

1) Screw head Ø 13 mm



Technical data

Metal frame fixing F-M

F 10 M - with zinc-plated countersunk head screw and cross drive PZ3

4

	Item No.	Drill hole diameter d_0 [mm]	Min. drill hole depth for through fixings h_2 [mm]	Effect. anchorage depth h_{ef} [mm]	Anchor length l [mm]	Max. fixture thickness t_{fix} [mm]	Drive	Sales unit [pcs]
Item								
F 10 M 132	**088676** [1]	10	150	30	132	102	PZ3	100
F 10 M 152	**088678** [1]	10	170	30	152	122	PZ3	100
F 10 M 182	**088680** [1]	10	200	30	182	152	PZ3	50
F 10 M 202	**061064** [1]	10	220	30	202	172	PZ3	50

1) Screw head Ø 13 mm

Accessories

Cover cap (F-M)

ADM 10 W

	Item No.	Colour	Cap height [mm]	Cap [Ø mm]	Match	Sales unit [pcs]
Item						
ASM 10 W	**060320**	white	3	15	F 10 M	100
ADM 10 W	**088688**	white	4	16,5	F 10 M	100

Loads

Metal frame fixing F-M

Recommended loads[1] of a single anchor as part of a multiple fixing of non-structural systems.

Type			F 8 M	F 10 M
Recommended loads in the respective base material F_{rec} [2]				
Concrete	≥ C20/25	[kN]	1.00	1.40
Solid brick	≥ Mz 12	[kN]	0.30	1.30
Solid sand-lime brick	≥ KS 12	[kN]	0.70	1.30
Solid brick of lightweight aggregate concrete	≥ V 2	[kN]	-	0.50
Perforated sand-lime brick	≥ KSL 6	[kN]	0.25	0.60

[1] Required safety factors are considered.
[2] Valid for tensile load, shear load and oblique load under any angle.

Window frame screws FFSZ and FFS

The economical special screw for window installation

Window frames

Applications

- Window frames made of wood, plastic and aluminium
- Door frames
- Squared timbers

Advantages

- Screw installation without plug for economical processing.
- The small drill bit diameter of 6 mm allows for efficient series installation.
- The continuous thread ensures a stress-free fixing of the frame in the substrate.
- The high-low-thread at the screw tip as well as several cutting notches reduce the amount of force required for screwing in the screws. The installation process can be completed without excessive effort.
- With two head types applicable for all common frame materials.
- According to the ift Rosenheim suitable for the fixation of a plastic window in brick masonry.

Certificates

Test Report No.: 14-000559-PR02

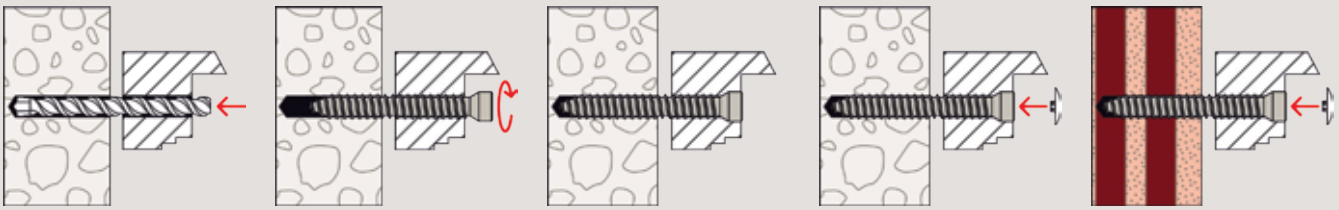
Building materials

- Concrete
- Vertically perforated brick
- Hollow blocks made from lightweight concrete
- Perforated sand-lime brick
- Solid sand-lime brick
- Solid brick made from lightweight concrete
- Solid brick
- Aerated concrete

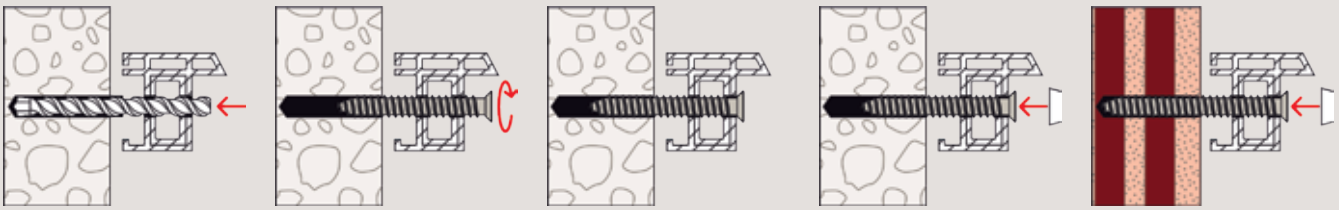
Functioning

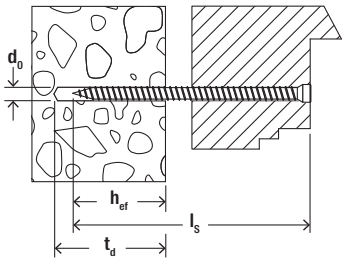
- Note the drill hole and screw-in depths for the different building materials listed in the table.
- Cylinder head screws are recommended for recessed installation in wooden profiles.
- Flat head screws are recommended for installation in plastic and aluminium profiles.

Installation FFSZ



Installation FFS





Anchorage depth h_{ef}
$h_{ef} \geq 30$ mm in concrete
$h_{ef} \geq 40$ mm in solid brick
$h_{ef} \geq 60$ mm in perforated brick / aerated concrete

t_d : drill hole depth $\geq h_{ef} + 10$ mm

Technical data

Window frame screws FFSZ

FFSZ with cylinder head

Item	Item No.	Drill hole diameter d_0 [mm]	Screw length l_s [mm]	Drive	Head [Ø mm]	Sales unit [pcs]
FFSZ 7,5 x 52 T30	532906	6	52	T30	8	100
FFSZ 7,5 x 62 T30	532907	6	62	T30	8	100
FFSZ 7,5 x 72 T30	532908	6	72	T30	8	100
FFSZ 7,5 x 82 T30	532909	6	82	T30	8	100
FFSZ 7,5 x 92 T30	532910	6	92	T30	8	100
FFSZ 7,5 x 102 T30	532911	6	102	T30	8	100
FFSZ 7,5 x 112 T30	532912	6	112	T30	8	100
FFSZ 7,5 x 122 T30	532913	6	122	T30	8	100
FFSZ 7,5 x 132 T30	532914	6	132	T30	8	100
FFSZ 7,5 x 152 T30	532915	6	152	T30	8	100
FFSZ 7,5 x 182 T30	532916	6	182	T30	8	100
FFSZ 7,5 x 202 T30	532917	6	202	T30	8	100
FFSZ 7,5 x 212 T30	532919	6	212	T30	8	100
FFSZ 7,5 x 252 T30	532920	6	252	T30	8	100
FFSZ 7,5 x 302 T30	532921	6	302	T30	8	100

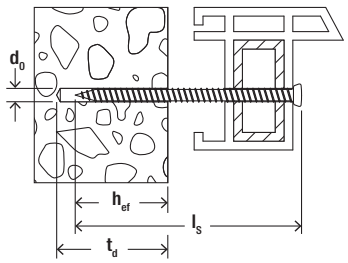
No pre-drilling in aerated concrete.

Accessories

Cover cap FFSZ-A

FFSZ-A

Item	Item No.	Colour	Cap [Ø mm]	Cap height [mm]	Match	Sales unit [pcs]
FFSZ-A W	538708	white	14	2,2	FFSZ - cylinder head	100
FFSZ-A BR	538709	brown	14	2,2	FFSZ - cylinder head	100



Anchorage depth h_{ef}
h_{ef} ≥ 30 mm in concrete
h_{ef} ≥ 40 mm in solid brick
h_{ef} ≥ 60 mm in perforated brick / aerated concrete

t_d: drill hole depth ≥ h_{ef} + 10 mm

Technical data

Window frame screws FFS

FFS with flat head

Item	Item No.	Drill hole diameter d_0 [mm]	Screw length l_s [mm]	Drive	Head [Ø mm]	Sales unit [pcs]
FFS 7,5 x 42 T30	532922	6	42	T30	11,5	100
FFS 7,5 x 52 T30	532923	6	52	T30	11,5	100
FFS 7,5 x 62 T30	532925	6	62	T30	11,5	100
FFS 7,5 x 72 T30	532927	6	72	T30	11,5	100
FFS 7,5 x 82 T30	532928	6	82	T30	11,5	100
FFS 7,5 x 92 T30	532930	6	92	T30	11,5	100
FFS 7,5 x 102 T30	532931	6	102	T30	11,5	100
FFS 7,5 x 112 T30	532932	6	112	T30	11,5	100
FFS 7,5 x 122 T30	532934	6	122	T30	11,5	100
FFS 7,5 x 132 T30	532935	6	132	T30	11,5	100
FFS 7,5 x 152 T30	532941	6	152	T30	11,5	100
FFS 7,5 x 182 T30	532942	6	182	T30	11,5	100
FFS 7,5 x 202 T30	532943	6	202	T30	11,5	100
FFS 7,5 x 212 T30	532944	6	212	T30	11,5	100
FFS 7,5 x 252 T30	532945	6	252	T30	11,5	100
FFS 7,5 x 302 T30	532946	6	302	T30	11,5	100

Accessories

Cover cap FFS-A

FFS-A

Item	Item No.	Colour	Cap [Ø mm]	Cap height [mm]	Match	Sales unit [pcs]
FFS-A W	**061560**	white	15	4,8	FFS - flat head	100
FFS-A BR	**061561**	brown	15	4,8	FFS - flat head	100

Loads

4

Window frame screws FFSZ and FFS

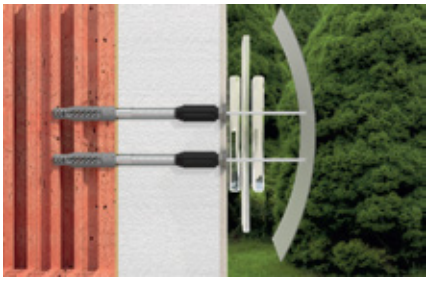
Recommended loads[1] of a single screw.

Type			FFSZ			FFS		
Screw diameter		[mm]	7.5			7.5		
Anchorage depth	$h_{ef} \geq$	[mm]	30	40	60	30	40	60
Recommended loads in concrete ≥ C20/25								
Tension load N_{rec}		[kN]	1.00	–	–	1.00	–	–
Shear load V_{rec}		[kN]	0.70	–	–	0.70	–	–
Minimum edge distance[2]	c_{min}	[mm]	30	–	–	30	–	–
Recommended loads in masonry								
Tension load N_{rec} in solid brick	≥ Mz 12	[kN]	–	0.40[3]	0.80	–	0.40[3]	0.80
Shear load V_{rec} in solid brick	≥ Mz 12	[kN]	–	0.303)	0.70	–	0.30[3]	0.70
Tension load N_{rec} in solid sand-lime brick	≥ KS 12	[kN]	–	1.00	–	–	1.00	–
Shear load V_{rec} in solid sand-lime brick	≥ KS 12	[kN]	–	0.60	–	–	0.60	–
Tension load N_{rec} in vertically perforated brick	≥ Hlz 12	[kN]	–	–	0.25[3]	–	–	0.25[3]
Shear load V_{rec} in vertically perforated brick	≥ Hlz 12	[kN]	–	–	0.40[3]	–	–	0.40[3]
Minimum edge distance[2]	c_{min}	[mm]	–	40	40	–	40	40
Recommended loads in aerated concrete								
Load[4] F_{rec} in aerated concrete	≥ AAC 2	[kN]	–	–	0.10[5]	–	–	0.10[5]
	≥ AAC 4	[kN]	–	–	0.25[5]	–	–	0.25[5]
Minimum edge distance[2]	c_{min}	[mm]	–	–	40	–	–	40

[1] Required safety factors are considered.
As a single screw counts e.g. a screw with a spacing $s \geq 3 \times h_{ef}$ and an edge distance $c \geq 1.5 \times h_{ef}$.
[2] Minimal possible edge distance while reducing the recommended loads.
[3] Rotary drilling.
[4] Valid for tensile load, shear load and oblique load under any angle.
[5] Without pre-drilling.

Stand-off installation TherMax 8/10

The thermally separated stand-off installation in external thermal insulation composite systems (ETICS)



External lighting

Down pipes

Applications

For the thermally separated fixing of:
- Signs
- Lighting
- Letter boxes
- Motion detectors
- Downpipes
- Lightning rods
- Blind guide rails

Advantages

- The stand-off installation allows for the fixture to be adjusted to the exact position required, whereby pressure marks and damage to the ETICS are avoided.
- The plastic cone creates a thermal barrier between the fixture and the inner fixture, and offers an energy-optimised fixing.
- The glass-fibre-reinforced plastic cone cuts its own way through the ETICS with a positive fit, and allows for a simple and fast installation without the need for any special tools.
- Combining TherMax 8 and 10 with the universal plug UX provides a secure anchoring in the substrate.
- Without UX plug direct mounting in wood substrate is possible after pre-drilling.

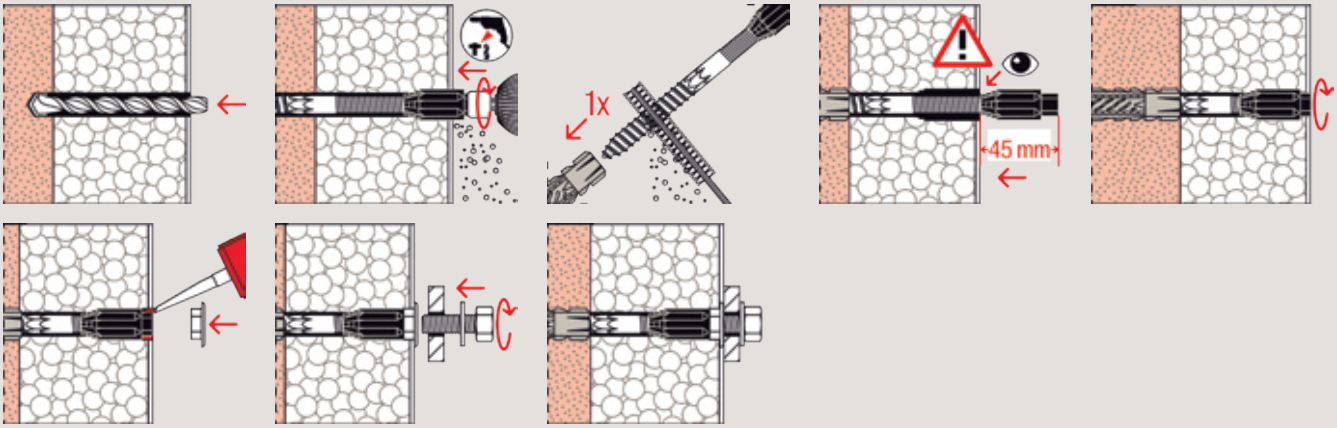
Building materials

- Concrete
- Vertically perforated brick
- Hollow blocks made from lightweight concrete
- Perforated sand-lime brick
- Solid sand-lime brick
- Building brick
- Aerated concrete
- Wood

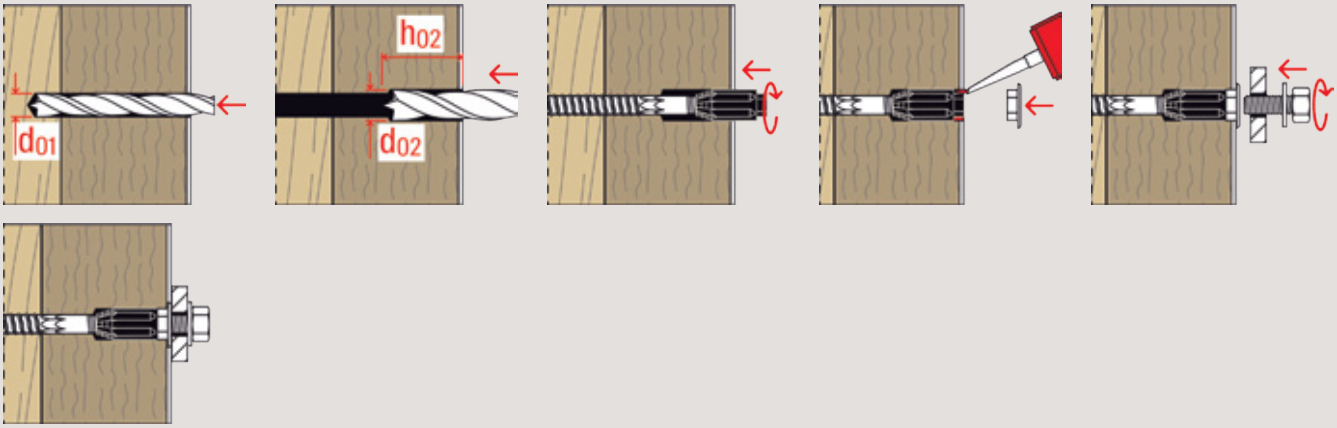
Functioning

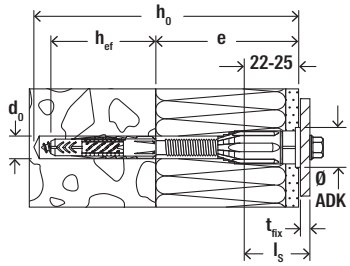
- The TherMax 8 and 10 systems are suitable for pre-positioned installation.
- The self-tapping, glass-fibre-reinforced cone cuts its own way through the plaster into the insulation during installation.
- The anti-cold cone uses a thermal barrier to minimise heat losses.
- Installation without any special tools.
- For use in wood without plug, the wood (footnote below load table) as well as the plaster has to be pre-drilled:
  TherMax 8:
  d_{02} = 14 mm, h_{02} = 50 mm;
  TherMax 10:
  d_{02} = 18 mm, h_{02} = 50 mm
- The extensive range features fitting options with metric screws (M6/8/10), sheet screws (6.3 mm), chipboard screws (6.0 mm) or chipboard screws (4.5 - 5.5 mm) when using an SX 5 expansion plug.

Installation in masonry



Installation in wooden substrate





Technical data

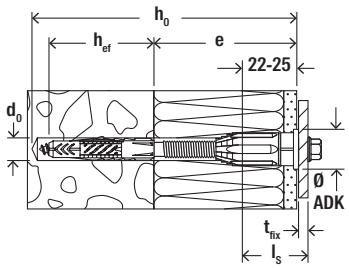
Stand-off installation TherMax 8/10

TherMax 8 and 10

Item	Item No.	Drill hole diameter d_0 [mm]	Drill hole depth h_0 [mm]	Max. thickness of non-bearing layer e [mm]	Anchorage depth h_{ef} [mm]	Cover cap-Ø ADK [mm]	Width across nut SW [mm]	Chipboard / metric / sheet metal screw	Sales unit [pcs]
TherMax 8/60 M6	**045685** 1)2)	10	120	45 - 60	60	18	10	4,5 - 6,0 / M6 / 6,3	20
TherMax 8/80 M6	**045686** 1)2)	10	140	60 - 80	60	18	10	4,5 - 6,0 / M6 / 6,3	20
TherMax 8/100 M6	**045687** 1)2)	10	160	80 - 100	60	18	10	4,5 - 6,0 / M6 / 6,3	20

1) including SX 5

2) Min. screw length l_s = 22mm + thickness of mounting member t_{fix}; for use in wood without universal plug UX, consider drill hole diameter in footnote under load table.



Technical data

Stand-off installation TherMax 8/10

TherMax 8 and 10

Item	Item No.	Drill hole diameter d_0 [mm]	Drill hole depth h_0 [mm]	Max. thickness of non-bearing layer e [mm]	Anchorage depth h_{ef} [mm]	Cover cap-Ø ADK [mm]	Width across nut SW [mm]	Chipboard / metric / sheet metal screw	Sales unit [pcs]
TherMax 8/120 M6	**045688** 1)2)	10	180	100 - 120	60	18	10	4,5 - 6,0 / M6 / 6,3	20
TherMax 8/140 M6	**045689** 1)2)	10	200	120 - 140	60	18	10	4,5 - 6,0 / M6 / 6,3	20
TherMax 8/160 M6	**045690** 1)2)	10	220	140 - 160	60	18	10	4,5 - 6,0 / M6 / 6,3	20
TherMax 8/180 M6	**045691** 1)2)	10	240	160 - 180	60	18	10	4,5 - 6,0 / M6 / 6,3	20
TherMax 10/100 M6	**045692** 1)2)	12	160	80 - 100	70	22	13	4,5 - 6,0 / M6 / 6,3	20
TherMax 10/120 M6	**045693** 1)2)	12	180	100 - 120	70	22	13	4,5 - 6,0 / M6 / 6,3	20
TherMax 10/140 M6	**045694** 1)2)	12	200	120 - 140	70	22	13	4,5 - 6,0 / M6 / 6,3	20
TherMax 10/160 M6	**045695** 1)2)	12	220	140 - 160	70	22	13	4,5 - 6,0 / M6 / 6,3	20
TherMax 10/180 M6	**045696** 1)2)	12	240	160 - 180	70	22	13	4,5 - 6,0 / M6 / 6,3	20
TherMax 10/200 M6	**512605** 1)2)	12	260	180 - 200	70	22	13	4,5 - 6,0 / M6 / 6,3	20
TherMax 10/220 M6	**514250** 1)2)	12	280	200 - 220	70	22	13	4,5 - 6,0 / M6 / 6,3	20
TherMax 10/240 M6	**514251** 1)2)	12	300	220 - 240	70	22	13	4,5 - 6,0 / M6 / 6,3	20
TherMax 10/100 M8	**045697** 2)	12	160	80 - 100	70	22	13	M8	20
TherMax 10/120 M8	**045698** 2)	12	180	100 - 120	70	22	13	M8	20
TherMax 10/140 M8	**045699** 2)	12	200	120 - 140	70	22	13	M8	20
TherMax 10/160 M8	**045700** 2)	12	220	140 - 160	70	22	13	M8	20
TherMax 10/180 M8	**514252** 2)	12	240	160 - 180	70	22	13	M8	20
TherMax 10/200 M8	**514253** 2)	12	260	180 - 200	70	22	13	M8	20
TherMax 10/220 M8	**514254** 2)	12	280	200 - 220	70	22	13	M8	20
TherMax 10/240 M8	**514255** 2)	12	300	220 - 240	70	22	13	M8	20
TherMax 10/100 M10	**045702** 2)	12	160	80 - 100	70	22	13	M10	20
TherMax 10/120 M10	**045703** 2)	12	180	100 - 120	70	22	13	M10	20
TherMax 10/140 M10	**045704** 2)	12	200	120 - 140	70	22	13	M10	20
TherMax 10/160 M10	**045705** 2)	12	220	140 - 160	70	22	13	M10	20
TherMax 10/180 M10	**514256** 2)	12	240	160 - 180	70	22	13	M10	20
TherMax 10/200 M10	**514257** 2)	12	260	180 - 200	70	22	13	M10	20
TherMax 10/220 M10	**514258** 2)	12	280	200 - 220	70	22	13	M10	20
TherMax 10/240 M10	**514259** 2)	12	300	220 - 240	70	22	13	M10	20

1) including SX 5

2) Min. screw length l_s = 22mm + thickness of mounting member t_{fix}; for use in wood without universal plug UX, consider drill hole diameter in footnote under load table.

Loads

Stand-off installation TherMax 8 and 10

Recommended loads[1] of a single anchor in concrete and masonry.

Type			TherMax 8	TherMax 10
Supplied type of plug for the anchorage in the base material			UX 10 x 60	UX 12 x 70
Recommended tensile loads in the respective base material N_{rec}[2]				
Concrete[3] [4]	≥ C20/25	**[kN]**	1.00	1.00
Solid brick[3][4]	≥ Mz 12	**[kN]**	0.50	0.70
Perforated sand-lime brick[3][4]	≥ KSL 12	**[kN]**	0.60	0.80
Vertically perforated brick[4]	≥ Hlz 12	**[kN]**	0.20	0.30
Aerated concrete[3][4]	≥ AAC 4	**[kN]**	0.40	0.60
Recommended shear load V_{rec}, valid für all above mentioned base materials for the stated insulation thickness				
External Thermal Insulation Composite System[5]	≤ 240 mm	**[kN]**	0.15	0.20

[1] Required safety factors are considered.
[2] The drilling method is to be adapted to the building material used. As different joint qualities are possible, the given values only apply for installation in the brick.
[3] The given recommended tensile loads apply for fastenings with metric screws.
When using chipboard screws with diameter 6.0 mm they have to be reduced to 0.35 kN.
[4] The given recommended tensile loads apply for fastenings with metric screws.
When using a SX 5-plug chipboard screws with diameter 4.5 - 5.5 mm they have to be reduced to 0.1 kN.
[5] Values are valid for an ETICS made from PS- respectively PU-rigid foam panels. Thickness of rendering minimum 6 mm.

Loads

Stand-off installation TherMax 8 and 10

Recommended shear loads[1] for a single anchor.

Type			UX 10 + TherMax 8[3]	UX 12 + TherMax 10[3]
Recommended shear loads V_{rec}[1]				
External thermal insulation composite system[2]	≤ 240 mm	**[kN]**	0.15	0.20

[1] Required safety factors are considered.
[2] Values are valid for an ETICS made from PS- respectively PU-rigid foam panels. Thickness of rendering minimum 6 mm.
[3] In wood installation without plug.

Loads

Stand-off installation TherMax 8 and 10

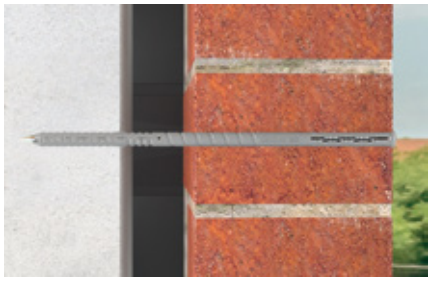
Recommended tensile loads[1] for a single anchor in wood.

Type			TherMax 8	TherMax 10
Recommended tensile loads in the respective base material N_{rec}[2]				
Beech	≥ D35	**[kN]**	1.00[3]	1.00[5]
Spruce	≥ C24	**[kN]**	1.00[4]	1.00[5]

[1] Required safety factors are considered.
[2] Installation without UX-plug. Edge distances and spacings following Eurocode 5.
[3] Pre-drilled wood with diameter 6 mm.
[4] Pre-drilled wood with diameter 5 mm.
[5] Pre-drilled wood with diameter 7 mm.

Remedial wall tie mechanical VBS-M

The quick façade repair for two-leaf cavity walls



Facing masonry

Repairing outer leafs

Applications

- VBS-M is especially suitable for applications where external thermal insulation composite systems (ETICS) have been previously installed.
- Retrorespective repair of facing masonry.

Certificates

Advantages

- The approved fixing in stone and in joints from at least 50 mm facing masonry provides a high degree of flexibility and security.
- Use in joints and with a low anchorage depth of just 50 mm allows for a quick and economical installation.
- The small anchor rim and screw head allow for a surface-flush or deep-set installation.
- The drill hole can be retrospectively sealed so that it is no longer visible in the façade.
- A drip coil prevents condensate running into the load-bearing layer, thus preventing frost and corrosive damage.

Building materials

- Facing masonry with and without an air layer

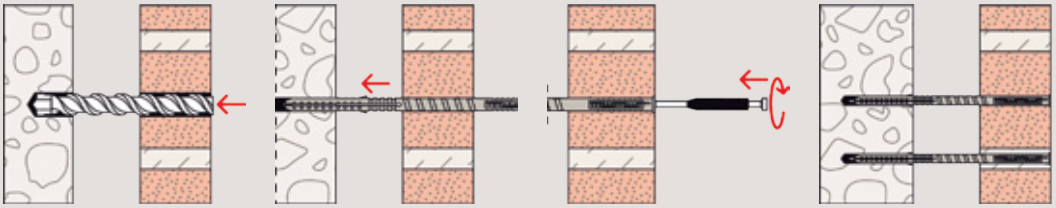
Versions

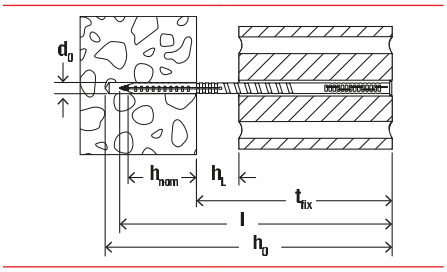
- Zinc-plated steel
- Stainless steel

Functioning

- The remedial wall tie VBS-M is set in the load-bearing layer and into facing masonry using push-through installation.
- In accordance with the approval, no drill hole cleaning is required.
- The two expansion zones in the load-bearing layer and in the facing masonry ensure a secure fixation.
- The plug doesn't fix into the facing masonry until the head grips into the load-bearing layer. This ensures the very best installation safety.

Installation VBS-M





Technical data

Remedial wall tie mechanical VBS-M

VBS-M

	Zinc-plated steel	Stainless steel	Approval	Max. shell distance at 115 mm facing masonry, flush installation	Max. shell distance at 115 mm facing masonry, 20 mm sunk installation	Facing masonry + cavity	Drill diameter	Drill hole depth	Effect. anchoring depth	Anchor length	Sales unit
	Item No.	Item No.		[mm]	[mm]	t_{fix} [mm]	d_0 [mm]	h_0 [mm]	h_{nom} [mm]	l [mm]	[pcs]
Item	**gvz**	**R**	**DIBt**								
VBS-M 8 x 120	**514243**	**514236**	●	20*	–	70	8	140	>50	120	100
VBS-M 8 x 185	**514244**	**514237**	●	20	40	135	8	205	>50	185	100
VBS-M 8 x 205	**514245**	**514238**	●	40	60	155	8	225	>50	205	100
VBS-M 8 x 225	**514246**	**514239**	●	60	80	175	8	245	>50	225	100
VBS-M 8 x 245	**514247**	**514240**	●	80	100	195	8	265	>50	245	100
VBS-M 8 x 265	**514248**	**514241**	●	100	120	215	8	285	>50	265	100
VBS-M 8 x 285	**514249**	**514242**	●	120	140	235	8	305	>50	285	100

* Max. 20 mm mortar layer in the case of 50 mm thick economy facing.

Accessories

Drill bits

SDS Plus IV 8/100/400

Pointer M 8/100/400

SDS Plus II Pointer 8/400/460

	Item No.	Description	Sales unit [pcs]
Item			
SDS PLUS IV 8/100/400	**517689**	fischer Quattric drill bit with SDS-plus shank and short flute for drilling in concrete	1
Pointer M 8/100/400	**517690**	fischer masonry drill bit with SDS-plus shank and short flute, ground sharp, for rotary drilling in perforated brick and in the bed joint	1
SDS Plus-V II 8/400/460	**531785**	fischer hammer drill bit for drilling in concrete and in the facing brick	1

Accessories

ProfiBit

FPB TX

Item	Item No.	Description	Sales unit [pcs]
FPB TX 25 ProfiBit W5	**517693**	fischer ProfiBit long, which can be extended to 50 mm bit, allows for deep setting in stone and in the bed joint	1

5

5
General fixings

Universal plug UX

The nylon plug for all building materials

Mirror fixings

Pictures

Applications

- Pictures
- Lighting
- Skirting
- Light cabinets
- Towel rails
- Mirror cabinets
- Curtain rails
- Wash basin fixings
- TV consoles
- Plumbing and heating fixings

Advantages

- The universal operating principle (knotting or expanding) allows for use in all solid, hollow and board building materials. Thus the UX is the correct choice for unknown base materials.
- The UX's angled connection ridges allow for optimum screw guidance. Serrated anti-rotation locks prevent rotation in the drill hole. This guarantees the greatest possible installation safety.
- Fixing sets with screws, eye screws and hooks provide the right solution for all applications.

Certificates

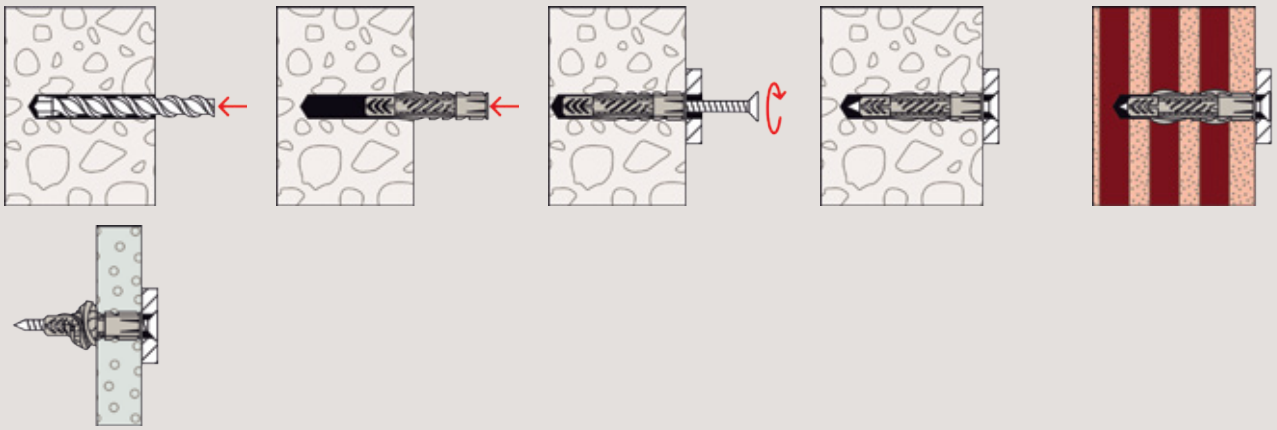
Building materials

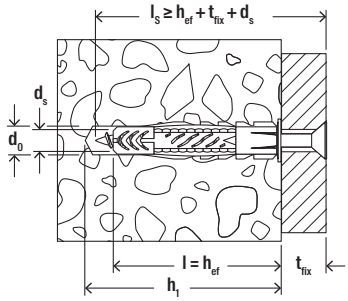
- Concrete
- Gypsum plasterboard and gypsum fibreboards
- Vertically perforated brick
- Hollow blocks made from lightweight concrete
- Cavity floor slabs made from bricks and concrete
- Perforated sand-lime brick
- Solid sand-lime brick
- Natural stone
- Aerated concrete
- Chipboard
- Solid panel made from gypsum
- Solid brick made from lightweight concrete
- Solid brick

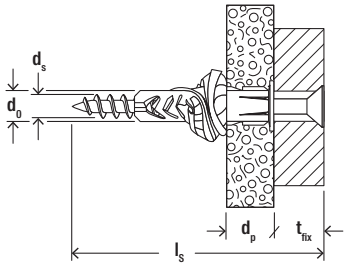
Functioning

- The UX with rim is suitable for pre-positioned installation; the UX without rim is suitable for push-through installation.
- Turning in the screw causes the UX to expand in the solid building material and to knot within the cavity.
- The required screw length is given by the plug length + fixture thickness + 1 x screw diameter.
- Suitable for wood and chipboard screws, as well as stud screws.
- In the case of board building materials, the threadless part of the screw must not be longer than the fixture, and the UX with rim is to be used.
- The edge distance must be at least one plug length.

Installation UX







Technical data

Universal plug UX

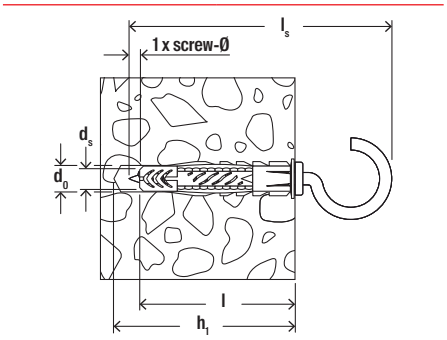
UX - without rim

UX - with rim

UX R S - with rim and screw

Item	Without rim Item No.	With rim Item No.	With rim and screw Item No.	Drill hole diameter d_0 [mm]	Min. drill hole depth h_1 [mm]	Min. panel thickness d_p [mm]	Anchor length l [mm]	Wood and chipboard screws d_s / d_s x l_s [mm]	Max. fixture thickness t_{fix} [mm]	Sales unit [pcs]
UX 5 x 30	094721	094722	–	5	40	9,5	30	3 - 4	–	100
UX 6 x 35	062754	062756	–	6	45	9,5	35	4 - 5	–	100
UX 6 x 35	–	–	094758	6	50	9,5	35	4,5 x 45	20	25
UX 6 x 50	072094	072095	–	6	60	9,5	50	4 - 5	–	100
UX 6 x 50	–	–	094759	6	65	9,5	50	4,5 x 60	5	25
UX 8 x 40	–	505483	–	8	50	9,5	40	4,5 - 6	–	100
UX 8 x 50	077869	077870	–	8	60	9,5	50	4,5 - 6	–	100
UX 8 x 50	–	–	094760	8	70	9,5	50	5 x 65	10	25
UX 10 x 60	077871	077872	–	10	75	12,5	60	6 - 8	–	50
UX 10 x 60	094761 [1)]	–	–	10	90	12,5	60	6 x 85	20	10
UX 12 x 70	062758	–	–	12	85	–	70	8 - 10	–	25
UX 14 x 75	062757	–	–	14	95	–	75	10 - 12	–	20

1) with screw



Technical data

Universal plug UX with hook


UX RH - with rim and round hook


UX RH N - with rim and round hook (white coated)


UX WH - with rim and angle hook


UX WH N - with rim and angle hook (white coated)


UX OH N - with rim and eyebolt (white coated)

	With rim and round hook	With round hook (white coated)	With rim and angle hook	With angle hook (white coated)	With eye-bolt (white coated)	Drill hole diameter	Min. drill hole depth	Min. panel thickness	Anchor length	Screw dimension	Sales unit
	Item No.	Item No.	Item No.	Item No.	Item No.	d_0 [mm]	h_1 [mm]	d_p [mm]	l [mm]	d_s x l_s [Ø mm]	[pcs]
Item	**RH**	**RH N**	**WH**	**WH N**	**OH N**						
UX 6 x 35	**094407**	–	–	–	–	6	45	9,5	35	4,5 x 67	25
UX 6 x 35	–	–	**094408**	–	–	6	45	9,5	35	4,5 x 51	25
UX 8 x 50	**094409**	**094412**	–	–	**094414**	8	60	9,5	50	5,5 x 87	25
UX 8 x 50	–	–	**094410**	**094413**	–	8	60	9,5	50	5,5 x 70	25

Technical data

Universal plug UX in bucket

UX in bucket

	Item No.	Drill hole diameter d_0 [mm]	Min. drill hole depth h_1 [mm]	Anchor length l [mm]	Min. panel thickness d_p [mm]	Wood and chipboard screws d_s / d_s x l_s [mm]	Sales unit [pcs]
Item							
UX 6 x 35 R in bucket	**508027**	6	45	40	9,5	4 - 5	2500
UX 8 x 50 R in bucket	**508028**	8	60	50	9,5	4,5 - 6	1000
UX 10 x 60 R in bucket	**508029**	10	75	60	12,5	6 - 8	600

Technical data

Assortment boxes

Assortment box UX / SX

Box UX / SX-S

Item	Item No.	Contents	Sales unit [pcs]
Box UX 6/8/10	**093182**	100 plugs UX 6 x 35, 70 plugs UX 8 x 50, 20 plugs UX 10 x 60	1
Assortment box UX / SX	**040991**	60 plugs SX 6 x 30, 50 plugs SX 8 x 40, 20 plugs SX 10 x 50, 60 plugs UX 5 x 30 R, 40 plugs UX 6 x 50 R, 50 plugs UX 8 x 50 R, 10 plugs UX 10 x 60 R	1
Box UX / SX-S	**093181**	50 plugs UX 6 x 35, 50 screws 4,5 x 45, 50 plugs SX 6 x 30, 50 screws 4,5 x 40, 25 plugs UX 8 x 50, 25 screws 5 x 65, 25 plugs SX 8 x 40, 25 screws 5 x 55	1
Meister-Box UX + screws + hooks	**513894**	German version: 50 Universal plugs UX 6 x 35 R, 25 Universal plugs UX 8 x 50 R, 20 Chipboard screws 4,5 x 45, 15 Chipboard screws 5 x 65, 4 Angle hooks 5,5, x 70, 4 Round hooks 5,5 x 70	1
Meister-Box UX / UX-R	**513893**	German version: 25 Universal plugs UX 6 x 35, 25 Universal plugs UX 6 x 35 R, 25 Universal plugs UX 8 x 50, 25 Universal plugs UX 8 x 50 R, 10 Universal plugs UX 10 x 60	1
Profi-Box UX / UX-R	**518527**	International version: 25 Universal plugs UX 6 x 35, 25 Universal plugs UX 6 x 35 R, 25 Universal plugs UX 8 x 50, 25 Universal plugs UX 8 x 50 R, 10 Universal plugs UX 10 x 60	1
Profi-Box UX + screws + hooks	**518526**	International version: 50 Universal plugs UX 6 x 35 R, 25 Universal plugs UX 8 x 50 R, 20 Chipboard screws 4,5 x 45, 15 Chipboard screws 5 x 65, 4 Angle hooks 5,5, x 70, 4 Round hooks 5,5 x 70	1

Loads

Universal plug UX

Highest recommended loads[1] for a single anchor.
The given loads are valid for wood screws with the specified diameter.

Type			UX 5 x 30	UX 6 x 35	UX 6 x 50	UX 8 x 40 UX 8 x 50	UX 10 x 60	UX 12 x 70	UX 14 x 75
Wood screw diameter		**[mm]**	**4**	**5**	**5**	**6**	**8**	**10**	**12**
Recommended loads in the respective base material F_{rec} [2]									
Concrete	≥ C20/25	**[kN]**	0.30	0.40	0.60	0.60	1.00	1.50	1.80
Solid brick	≥ Mz 12	**[kN]**	0.20	0.20	0.30	0.30	0.50	0.70	0.80
Perforated sand-lime brick	≥ KSL 12	**[kN]**	0.30	0.40	0.40	0.50	0.60	0.80	0.80
Vertically perforated brick	≥ Hlz 12	**[kN]**	0.20	0.20	0.20	0.20	0.20	0.30	0.40
Aerated concrete	≥ AAC 4 (G4)	**[kN]**	0.15	0.20	0.20	0.30	0.40	0.60	0.70
Gypsum plasterboard	12.5 mm	**[kN]**	0.10	0.10	0.10	0.10	0.10	-	-
Gypsum plasterboard	25 mm	**[kN]**	0.10	0.15	0.15	0.15	0.15	-	-
Gypsum fibreboard	(Fermacell)	**[kN]**	0.20	0.20	0.20	0.20	0.25	-	-
Gypsum block	$\rho \geq 0.9$ kg/dm^3	**[kN]**	-	-	-	0.15	0.35	0.45	0.50

[1] Required safety factors are considered.
[2] Valid for tensile load, shear load and oblique load under any angle.

Loads

Universal plug UX with hook screws respective eye screws

Highest recommended loads[1] for a single anchor.
The given loads are valid for the included hook screws respective eye screws.

Type			UX 6 x 35 RH	UX 6 x 35 WH	UX 8 x 50 RH	UX 8 x 50 WH	UX 8 x 50 OE
Recommended loads in the respective base material F_{rec} [2]							
Concrete	≥ C20/25	**[kN]**	0.25	0.30	0.40	0.45	0.40
Vertically perforated brick	≥ Hlz 12	**[kN]**	0.20	0.20	0.20	0.20	0.20
Gypsum plasterboard	12.5 mm	**[kN]**	0.05	0.05	0.05	0.05	0.05

[1] Required safety factors are considered.

Expansion plug SX Plus

The specialist for solid building materials.

Wall consoles

Shelves

Applications

- Lamps
- Wardrobes
- Motion detectors
- Skirting boards
- Light wall shelves
- Mirror cabinets
- Mailboxes
- TV consoles
- Trellis
- Folding shutters
- Fire detector

Advantages

- The 4-way expansion ensures optimum force transmission into the building material and guarantees high holding values in solid and perforated building materials.
- The special fixing wings ensure pre-fixation of the screw, leaving both of the user's hands free during the setting process.
- The expansion-free plug neck prevents the creation of expansion forces on the material surface whilst screwing in the screw. This helps to prevent damage to tiles and plaster.
- The special shape of the plug makes it easy to insert into the drill hole with just a few hammer blows.
- The pronounced edge of the plug prevents it from slipping deeper into the drill hole and enables secure installation.
- Due to the noticeable tightening torque, the user automatically recognizes when the screw is properly installed and thus prevents overtightening of the screw.

Certificates

★★★★★
Nylon
Quality

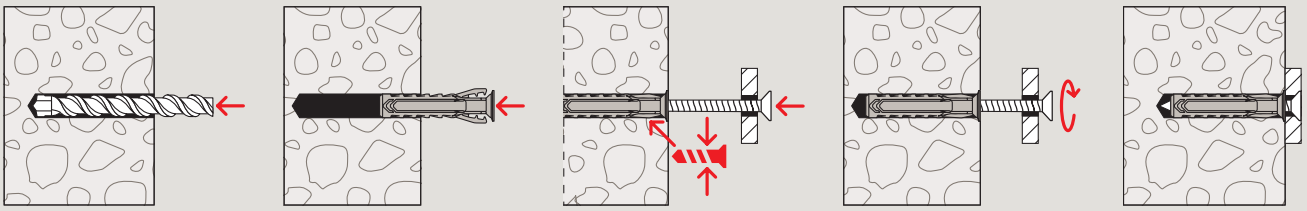
Building materials

- Concrete
- Solid brick
- Solid sand-lime brick
- Aerated concrete
- Vertically perforated brick
- Perforated sand-lime brick
- Solid stone of leightweight concrete
- Hollow block of leightweight concrete
- Natural stone
- Hollow brick & concrete ceilings
- Solid gypsum boards

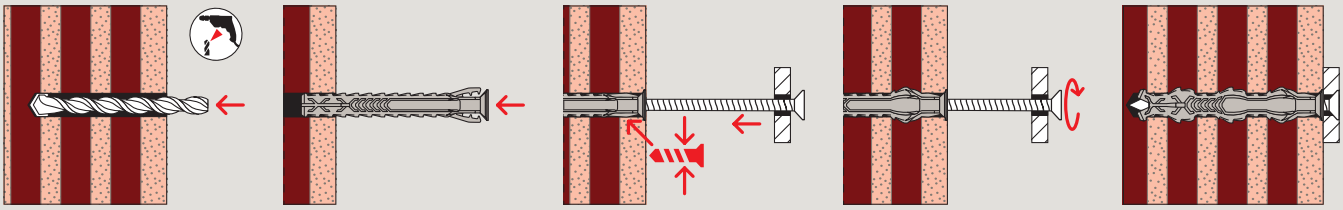
Functioning

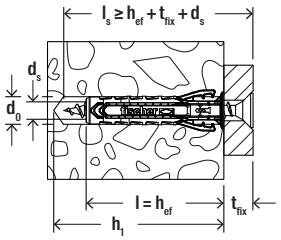
- The SX Plus is suitable for pre-positioned and push-through installation.
- When the plug is inserted, the fixing wings fold inwards. This locks the screw in place when it is inserted into the plug and prevents it from falling out, which is particularly helpful in overhead applications.
- When the screw is tightened, the SX Plus expands in four directions and thus anchors itself securely in the building material.
- The anti-rotation lock prevents the plug from twisting and allows for easy installation.
- Suitable for wood and chipboard screws, as well as stud screws.
- The required screw length is given by the plug length + fixture thickness + the screw diameter.

SX Plus in concrete



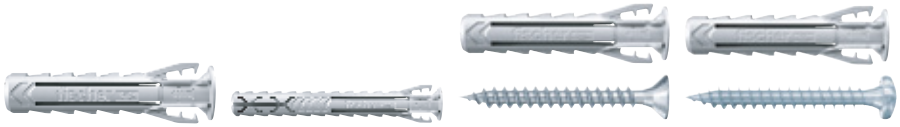
SX Plus long in vertically perforated brick





Technical data

Expansion plug SX Plus



SX Plus | SX Plus | SX Plus S | SX Plus PH

	without screw	with screw	Drill diameter	Min. drill hole depth	Anchor length	Wood and chipboard screws	Max. fixture thickness	Sales unit
			d_0	h_1	l	d_s	t_{fix}	
	Item no.	Item no.	[mm]	[mm]	[mm]	[mm]	[mm]	[pcs]
Item								
SX Plus 4 x 20	**568004**	–	4	25	20	2.0 - 3.0	–	200
SX Plus 5 x 25	**568005**	–	5	35	25	3.0 - 4.0	–	100
SX Plus 6 x 30	**568006**	–	6	40	30	4.0 - 5.0	–	100
SX Plus 6 x 30 S	–	**568206**	6	40	30	4.5 x 40	5	50
SX Plus 6 x 30 S PH TX	–	**567935**	6	40	30	4.5 x 40	5	100
SX Plus 6 x 50	**568106**	–	6	60	50	4.0 - 5.0	–	100
SX Plus 8 x 40 S	–	**568208**	8	50	40	5.0 x 55	15	50
SX Plus 8 x 65	**568108**	–	8	75	65	4.5 - 6.0	–	50
SX Plus 10 x 50	**568010**	–	10	70	50	6.0 - 8.0	–	50
SX Plus 10 x 80	**568110**	–	10	100	80	6.0 - 8.0	–	25
SX Plus 12 x 60	**568012**	–	12	80	60	8.0 - 10.0	–	25
SX Plus 14 x 70	**568014**	–	14	90	70	10.0 - 12.0	–	20

Technical data

Expansion plug SX Plus in bucket

SX Plus in bucket

Item	Item no.	Drill diameter d_0 [mm]	Min. drill hole depth h_1 [mm]	Anchor length l [mm]	Wood and chipboard screws d_s [mm]	Sales unit [pcs]
SX Plus 6 x 30	**567893**	6	40	30	4.0 - 5.0	3200
SX Plus 8 x 40	**567899**	8	50	40	4.5 - 6.0	1200
SX Plus 10 x 50	**567900**	10	60	50	6.0 - 8.0	720
SX Plus 12 x 60	**567901**	12	80	60	8.0 - 10.0	350

Technical data

Assortment boxes

Meisterbox SX Plus

FixTainer SX Plus

RedBox UX / SX Plus

fischer Box UX / SX-S Plus

Item	Item no.	Contents	Sales unit [pcs]
MeisterBox SX Plus DE	**041648**	60 x Expansion plug SX Plus 6 x 30, 60 x Expansion plug SX Plus 8 x 40, 12 x Expansion plug SX Plus 10 x 50	1
MeisterBox SX Plus + screws DE	**513777**	50 x Expansion plug SX 6 x 30, 30 x Expansion plug SX 8 x 40, 50 x Countersunk screw 4,5 x 40, 30 x Countersunk screw 5 x 55	1
ProfiBox SX Plus 6,8,10	**567896**	60 x SX Plus 6x30 30 x SX Plus 8x40 12 x SX Plus 10x50	1
ProfiBox SX Plus 6,8 + screws	**567897**	50 x Expansion plug SX Plus 6 x 30, 30 x Expansion plug SX Plus 8 x 40, 50 x Chipboard screws 4,5 x 40, 30 x Chipboard screws 5 x 55	1
FixTainer SX Plus, UX, GK 6 + screws	**567905**	50 x Expansion plug SX Plus 6 x 30, 50 x Expansion plug UX 6 x 35, 25 x Plasterboard fixing GK, 15 x Plasterboard fixing metal GKM, 50 x Chipboard screw 4,5 x 40, 50 x Chipbaord screw 4,5 x 45	1
FixTainer SX Plus 6,8,10	**567904**	120 x Expansion plug SX Plus 6 x 30, 60 x Expansion plug SX Plus 8 x 40, 30 x Expansion plug SX Plus 10 x 50	1
FixTainer SX Plus 5,6,8 + hooks + screws	**567903**	50 x Expansion plug SX Plus 5 x 25, 25 x Plug Screw 3,5 x 5, 50 x Expansion plug SX Plus 6 x 30, 25 x Plug screw 4,5 x 40, 20 x Expansion plug SX Plus 8 x 40, 10 x Plug Screw 5 x 55, 8 x Hook Fast&Fix Black, 8 x Hook Fast&Fix White, 8 x GKM, 8 x Panhead screw 4,5 x 35	1

Technical data

Assortment boxes

Meisterbox SX Plus

FixTainer SX Plus

RedBox UX / SX Plus

fischer Box UX / SX-S Plus

Item	Item no.	Contents	Sales unit [pcs]
RedBox SX Plus/UX	**569147**	60 x Expansion plug SX Plus 6 x 30, 50 x Expansion plug SX Plus 8 x 40, 20 x Expansion plug SX Plus 10 x 50, 60 x Universal plug UX 6 x 35 R, 40 x Universal plug UX 6 x 50 R, 50 x Universal plug UX 8 x 50 R, 10 x Universal plug UX 10 x 60 R	1
fischer Box SX Plus 5,6,8	**567891**	100 x Expansion plug SX Plus 5 x 25, 100 x Expansion plug SX Plus 6 x 30, 100 x Expansio plug SX Plus 8 x 40	1
fischer Box SX Plus, UX 6,8 S	**567919**	50 x Universal plug UX 6 x 35, 50 x Chipboard screw 4,5 x 45, 50 x Expansion plug SX Plus 6 x 30, 50 x Chipboard screw 4,5 x 40, 25 x Universal plug UX 8 x 50, 25 x Chipboard screw 5 x 65, 25 x Expansion plug SX Plus 8 x 40, 25 x Chipboard screw 5 x 55	1

Loads

Expansion plug SX Plus

Recommended loads[1] for a single anchor.
The given loads are valid for wood screws with the specified diameter.

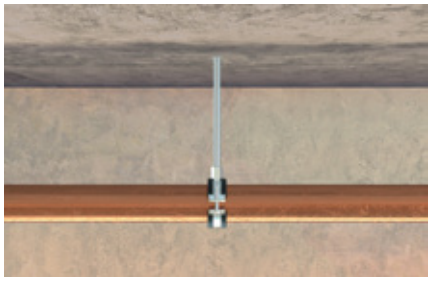
Type			SX Plus 4x20	SX Plus 5x25	SX Plus 6x30	SX Plus 6x50	SX Plus 8x40	SX Plus 8x65	SX Plus 10x50	SX Plus 10x80	SX Plus 12x60	SX Plus 14x70
Wood screw diameter		[mm]	3	4	5	5	6	6	8	8	10	12
Min. edge distance in concrete	c_{min}	[mm]	20	25	35	35	40	50	50	65	65	100
Recommended loads in the respective base material F_{rec} [2]												
Concrete	≥ C20/25	[kN]	0.20	0.35	0.65	1.30	0.75	1.50	1.40	2.90	2.40	3.50
Solid brick	≥ Mz 12	[kN]	0.15	0.27	0.35	0.50	0.60	0.80	1.00	1.40	1.25	1.30
Solid sand-lime brick	≥ KS 12	[kN]	0.20	0.35	0.65	1.30	0.75	1.50	1.40	2.90	2.40	3.50
Aerated concrete	≥ PB2, AAC 2	[kN]	0.03	0.03	0.07	0.12	0.10	0.15	0.18	0.28	0.22	0.35
Aerated concrete	≥ PB4, AAC 4	[kN]	0.10	0.15	0.20	0.35	0.30	0.40	0.50	0.90	0.80	1.00
Perforated sand-lime brick	≥ KSL 12	[kN]	0.18	0.25	0.30	0.35	0.40	0.80	0.45	1.50	0.70	1.00
Vertically perforated brick	≥ HLz 12, Doppio UNI 19	[kN]	0.13	0.13	0.15	0.17	0.25	0.40	0.25	0.50	0.35	0.40
Vertically perforated brick	Forato Type F8	[kN]	0.08[3]	0.08[3]	0.10[3]	-	0.10[3]	-	0.12[3]	-	-	-
Light-weight concrete hollow block	Sepa Parpaing	[kN]	0.15	0.20	0.25	0.30[3]	0.25	0.30[3]	0.35	0.40[3]	0.50[3]	0.50[3]

[1] Required safety factors are considered.
[2] Valid for tension, shear and combined tension and shear load.
[3] Load determination on plastered wall.

Threaded rod plug RodForce FGD

The economical hammerset plug - easy and quick fixing of threaded rods

Suspended ceilings



Single pipe suspension

Applications

- Suspension for individual pipes
- Plumbing and heating fixings
- Cable and pipe clips
- Suspended ceilings
- Ceiling lights
- Consoles
- Mounting rails

Advantages

- The innovative plug geometry allows quick and easy installation of the threaded rod with a few hammer blows.
- The short plug length prevents reinforcement hits and guarantees a secure utilization in reinforced concrete.
- The teeth inside the plug allow standard, metric threads to be held: This saves a large assortment of stud screws.
- Installation without special tools: The only thing needed to set the plug is a hammer. Visible edge of the plug serves as visual setting check and guarantees correct setting.
- The visible edge of the plug serves as visual setting check and guarantees correct setting.
- Easy to check and adjust: To check the setting depth, the closed plug tip is used as a stop point. This predetermined break point also allows the threaded rod to be hammered-in deeper.

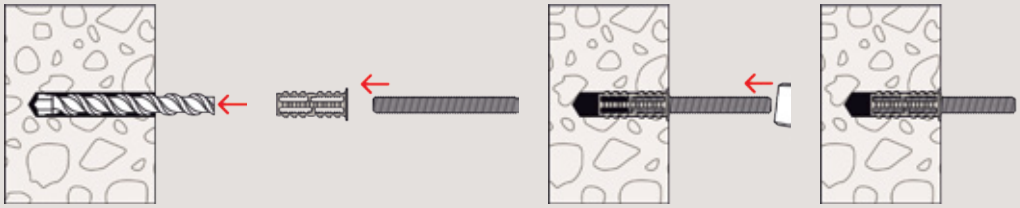
Building materials

- Concrete
- Solid sand-lime brick
- Solid brick

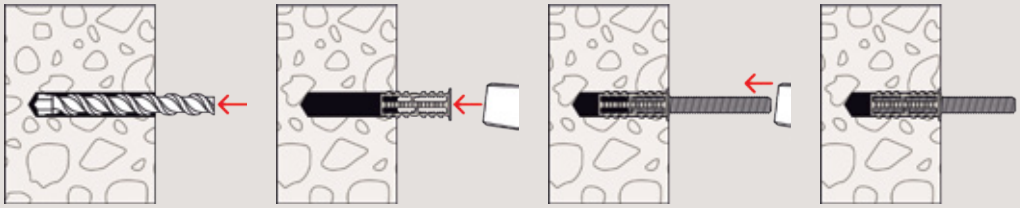
Functioning

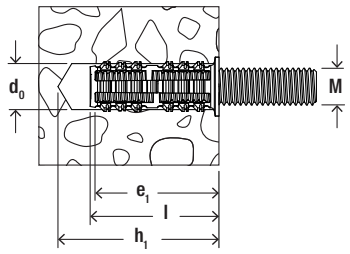
- When hammering-in the threaded rod, the plug expands in four directions as a result of the conical inner geometry.
- The plug is set using pre-positioned installation and this is possible in two different ways: Pre-installation of the threaded rods in the plug with both being hammered into the wall together or pre-inserting of the RodForce into the drill hole followed by hammering-in of the threaded rod.
- The teeth inside the plug mechanically interlock the metric thread securely with the threaded rod.
- The unique elements on the outside of the plug brace against the wall of the drill hole.

Installation within the system



Installation with individual components





Technical data

Threaded rod plug RodForce FGD

RodForce FGD

Item	Item No.	Drill diameter d_0 [mm]	Min. drill hole depth h_1 [mm]	Anchor length l [mm]	Min. drop-in penetration e_1 [mm]	Threaded rod Ø x length [mm]	Sales unit [pcs]
RodForce FGD 10 M6	**542106**	10	40	35	33	–	50
RodForce FGD 10 M6 TR 50	**542107**	10	40	35	33	M 6 x 50	25
RodForce FGD 10 M6 TR 60	**542108**	10	40	35	33	M 6 x 60	25
RodForce FGD 10 M6 TR 80	**542109**	10	40	35	33	M 6 x 80	25
RodForce FGD 12 M8	**542111**	12	40	35	33	–	50
RodForce FGD 12 M8 TR 50	**542112**	12	40	35	33	M 8 x 50	25
RodForce FGD 12 M8 TR 60	**542113**	12	40	35	33	M 8 x 60	25
RodForce FGD 12 M8 TR 80	**542114**	12	40	35	33	M 8 x 80	25

Loads

Threaded rod plug RODFORCE FGD

Highest recommended loads[1] for a single anchor.
The given loads are valid for machine screws or threaded rods with the specifi ed thread size.

Type			RodForce FGD M 6	RodForce FGD M 8
Thread size			**M 6**	**M 8**
Recommended loads in the respective base material F_{rec}[2]				
Concrete	≥ C20/25	**[kN]**	0.31	0.36
Solid brick	≥ Mz 12	**[kN]**	0.31	0.36
Solid sand-lime brick	≥ KS 12	**[kN]**	0.19	0.33

[1] Required safety factors are considered.
[2] Valid for tensile load, shear load and oblique load under any angle.

Metal expansion anchor FMD

The metal anchor for wood and chipboard screws

Pipes

Gas meters

Applications

- Gas pipes
- Water pipes
- Cable and pipe clips

Advantages

- The metal expansion anchor FMD is especially suited to applications in installation technology.
- The external teeth expand in the building material, thus ensuring a high load-bearing capacity.
- The ribbed internal geometry of the FMD is suitable for wood and chipboard screws, and makes it possible to guide the screw securely. This offers increased installation safety, and enables a broad range of applications.

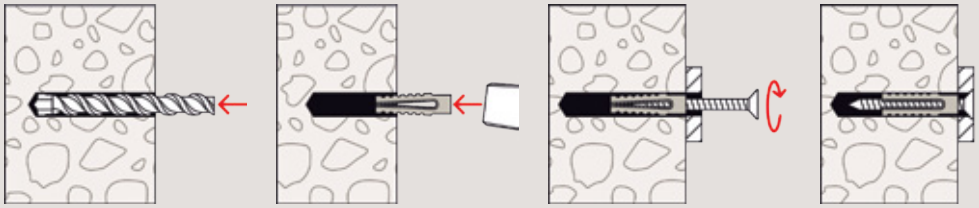
Building materials

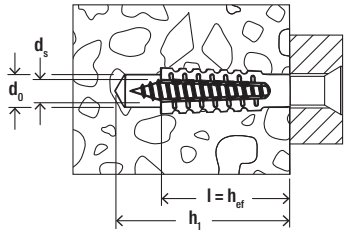
- Concrete
- Vertically perforated brick
- Hollow blocks made from lightweight concrete
- Cavity floor slabs made from bricks and concrete
- Perforated sand-lime brick
- Solid sand-lime brick
- Natural stone with dense structure
- Aerated concrete
- Solid brick made from lightweight concrete
- Solid panel made from gypsum

Functioning

- The FMD is suitable for pre-positioned installation.
- Inserting the screw causes the FMD to expand, and the metal teeth fix the anchor securely in the building material.
- The required (stud) screw length is given by: Anchor length + plaster and/or insulation layer thickness + fixture thickness or installation spacing + 1 x screw diameter.
- Suitable for wood and chipboard screws.
- The drill diameter is relative to the compressive strength of the building material. The higher the compressive strength, the greater the drill diameter. The 6x32 and 8x38 sizes can be hammered directly into low-strength aerated concrete without the need for pre-drilling.

Installation FMD





Technical data

Metal expansion anchor FMD

FMD

Item	Item No.	Drill hole diameter d_0 [mm]	Min. drill hole depth h_1 [mm]	Anchor length l [mm]	Screw diameter d_s [mm]	Sales unit [pcs]
FMD 6 x 32	**061224** [1]	6 - 7	38	32	5 - 6	100
FMD 8 x 38	**061225** [1]	10 - 12	46	38	6 - 8	100
FMD 8 x 60	**061226** [1]	10 - 12	68	60	6 - 8	50
FMD 10 x 60	**061209** [1]	12 - 14	68	60	8 - 10	50

1) The drill diameter is relative to the substrate compressive strength. Generally, the higher the compressive strength, the greater the drill diameter.

Recommended drill hole diameter [mm]

Type		FMD 6 x 32	FMD 8 x 38	FMD 8 x 60	FMD 10 x 60
Concrete	C 20/25	7	10	12	14
Aerated concrete	ACC 4	6	10	10	12
Vertically perforated brick	Hlz 12	7	10	10	12

Loads

Metal expansion fixing FMD

Highest recommended loads[1] for a single anchor.
The given loads are valid for wood screws with maximum diameter.

Type			FMD 8 x 38	FMD 8 x 60	FMD 10 x 60
Wood screw diameter		**[mm]**	**8**	**8**	**10**
Recommended loads in the respective base material F_{rec} [2]					
Aerated concrete	≥ AAC 2 (G2)	**[kN]**	0.20	0.30	0.40
Aerated concrete	≥ AAC 4 (G4)	**[kN]**	0.30	0.40	0.60

[1] Required safety factors are considered.
[2] Valid for tensile load, shear load and oblique load under any angle.

Anchor M

The powerful nylon expansion anchor with brass cone for metric threads

Plant construction

Protective grilles

Applications

- Machines
- Curbs
- Control boxes

Certificates

Advantages

- The anchor's large external diameter helps to achieve a large applied load in the building material. This allows for maximum load-bearing capacity.
- The anchor's high expansion makes it insensitive to building material tolerances. This guarantees a simple and secure installation.
- The internal thread allows for the use of standard metric screws or threaded rods, and for surface flush removal and reuse of the fixing point. This provides great flexibility.

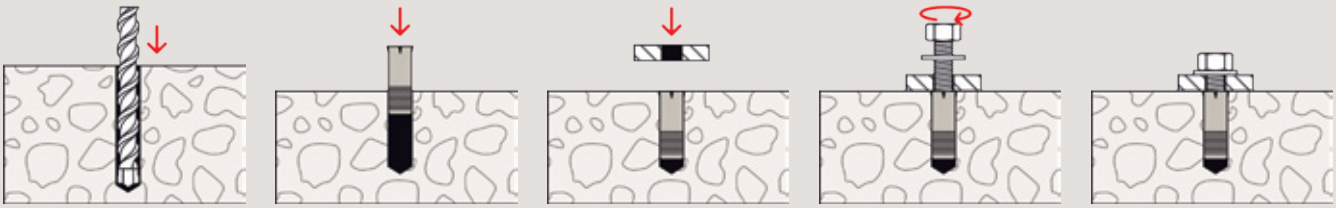
Building materials

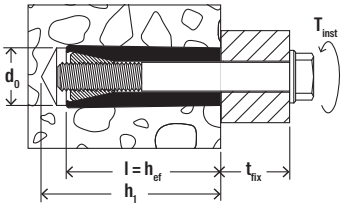
- Concrete
- Natural stone with dense structure
- Solid brick
- Solid sand-lime brick
- Solid brick made from lightweight concrete
- Aerated concrete
- Solid panel made from gypsum
- Hollow blocks made from lightweight concrete

Functioning

- The M anchor is suitable for pre-positioned installation.
- Turning in the screw causes the internal brass cone to expand the M anchor, thus reliably anchoring it in the building material.
- The required screw length is given by anchor length + fixture thickness.
- Suitable for metric screws and threaded bolts.

Installation M





5

Technical data

Anchor M

M for metric screws

Item	Item No.	Drill hole diameter d_0 [mm]	Min. drill hole depth h_1 [mm]	Anchor length l [mm]	Thread M	Max. installation torque T_{inst} [Nm]	Sales unit [pcs]
M 5	**050505** [1]	10	45	35	M 5	4	50
M 6	**050506** [1]	12	50	40	M 6	7	50
M 8	**050508** [1]	16	65	50	M 8	16	20
M 10	**050510** [1]	20	80	60	M 10	32	10
M 12	**050512** [1]	24	90	65	M 12	54	5

1) The given torque values apply to screws of strength class ≥ 5.8.

Loads

Thread size

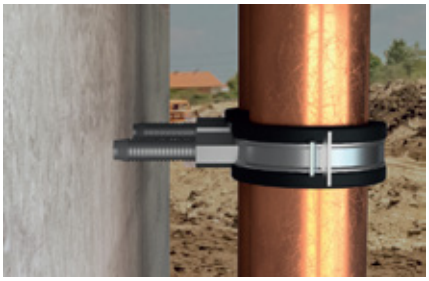
Highest recommended loads[1] for a single anchor.
The given loads are valid for metric screws with the specified thread size.

Type			M 5	M 6	M 8	M 10	M 12
Thread size			**M 5**	**M 6**	**M 8**	**M 10**	**M 12**
Recommended loads in the respective base material F_{rec} [2]							
Concrete	≥ C20/25	**[kN]**	1.10	1.80	2.60	4.40	5.00

[1] Required safety factors are considered.
[2] Valid for tensile load, shear load and oblique load under any angle.

Aircrete anchor GB

The special plug for different fixings in aerated concrete



Pipes

Trellis

Applications

- Light cable trays
- Pipelines
- Guard rails
- Façade and roof constructions made of wood and metal
- Light canopy brackets
- Letter boxes
- Trellis

Advantages

- The general building approval guarantees approved safety for use in safety-relevant applications.
- The spiral-shaped outer ribs cut a positive fit in the soft building material, thus ensuring the best pressure distribution and load-bearing capacity.
- Can be applied with a hammer - there is no need for special tools, thus saving time and money for the installation.
- The GB can also be used safely outside (e.g. in façade installation) when combined with the approved fischer safety screw in A4.

Certificates

Building materials

Approved for (GB 10) resp. suitable for (GB 8 and GB 14):

- Aerated concrete ≥ AAC 2

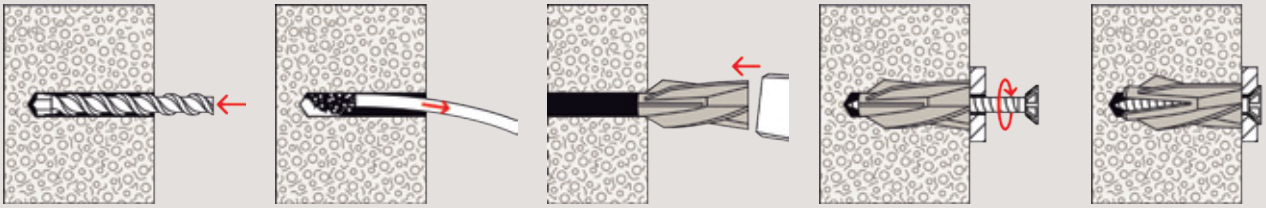
Also suitable for:

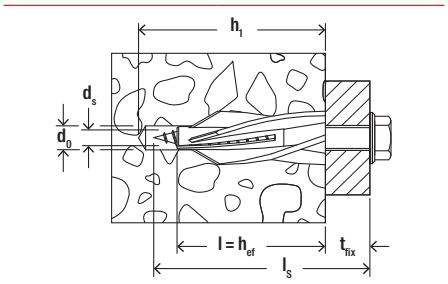
- Aerated concrete and ceiling panels of compressive strength ≥ 3.3

Functioning

- The GB is suitable for pre-positioned installation.
- The spiral-shaped outer ribs ensure a positive fit connection between the building material and anchor.
- The required screw length is given by: Anchor length + fixture thickness + 1 x screw diameter.
- The GB 10 must be used with fischer safety screws to fulfil the approval and to achieve the maximum load-bearing capacity.
- Use rotary drilling to create the drill hole
- Can be used in unplastered aerated concrete

Installation GB





Technical data

Aircrete anchor GB

GB

Item	Item No.	Approval	Drill hole diameter d_0 [mm]	Min. drill hole depth h_1 [mm]	Plug length = min. anchorage depth $l = h_{ef}$ [mm]	fischer safety screw $d_s \times l_s$ [mm]	Sales unit [pcs]
Item		**DIBt**					
GB 8	**050491**	–	8	60	50	5	25
GB 10	**050492**	●	10	65	55	7	20
GB 14	**050493**	–	14	90	75	10	10

fischer Safety srew for GB

Type	Usable length		Screw dimension*	Zinc plated and passivated steel		Stainless steel, corrosion resistance class III, e. g. A4	
	min. t_{fix} [mm]	max. t_{fix} [mm]	Ø x l_s	Countersunk head, TX star recess drive Art.-No.	Hexagonal head Art.-No.	Countersunk head, TX star recess drive Art.-Nr.	Hexagonal head Art.-Nr.
GB 8	5	30	5 x 85	089230[1)]		089240[1)]	
GB 10	0	5	7 x 67		80404		
	5	25	7 x 87	89170	80405	89244	80261
	25	45	7 x 107	89172			
	40	58	7 x 120	89174	80407		
	60	78	7 x 140	89176	80408		
	85	105	7 x 167	89178			
GB 14	0	10	10 x 95		80412		
	0	20	10 x 105	89186	80413		80271
	35	55	10 x 140	89188	80415		
	60	80	10 x 165		80416		

1) Cross drive recess Z.
2) Further sizes on request.

Loads

Aircrete anchor GB

Permissible or recommended loads[1) 2)] for a single anchor in aerated concrete.

Type			GB 10[2)]	GB 8[3)]	GB 10[3)]	GB 14[3)]
Screw diameter		**[mm]**	**7**	**5**	**6**	**10**
Minimum spacing[4)]	s_{min}	**[mm]**	100	150 (100)[6)]	150 (100)[6)]	300 (200)[6)]
Minimum edge distance[5)]	c_{min}	**[mm]**	100	100 (75)[6)]	100 (75)[6)]	200 (150)[6)]
Minimum member thickness	h_{min}	**[mm]**	120	75	120	200
Nominal embedment depth	h_{nom}	**[mm]**	55	50	55	75
Load in the respective base material			**Permissible loads F_{perm}**[7)]	**Recommended loads F_{rec}**[8)]		
AAC 2	$\rho \geq 0.35$ [kg/dm^3]	**[kN]**	0.21	0.18	0.20	0.40
AAC 4	$\rho \geq 0.50$ [kg/dm^3]	**[kN]**	0.54 (0,71)[9)]	0.40	0.50	0.90

[1)] Required safety factors are considered. Valid for tension load, shear load and oblique load under any angle.
[2)] In case of the design of the GB 10 for tension, shear and bending the complete approval Z-21.2-123 has to be considered.
[3)] Not part of the approval.
[4)] Minimum possible axial spacing while reducing the permissible load.
[5)] Minimum possible edge distance.
[6)] Values in brackets apply to AAC 2.
[7)] Value only applies in connection with GB 10 and fischer safety screw according to approval Z-21.2-123.
[8)] Values are valid in combination with wood screws acc. DIN 571.
[9)] The values in brackets are decisive for member thickness ≥ 150 mm.

Turbo aircrete anchor FTP K

The versatile nylon anchor for aerated concrete

External lighting

Radiators

Applications

- Pictures
- Lighting
- Shelves
- Mirror cabinets
- Letter boxes
- Signs
- Motion detectors
- Cable and pipe clips
- Stand-off installations

Advantages

- The FTP K is suitable for both wood screws and metric screws, and thus offers flexibility in screw choice.
- The spiral-shaped outer thread taps itself into the soft aerated concrete with a positive fit, thus ensuring a secure hold.
- Setting with the FTP EK setting tool requires only a small amount of force. For a convenient installation.
- The special geometry allows for an almost expansion-force-free anchoring. This allows for small edge and spacing distances, and avoids splitting in the case of plastered surfaces.

Certificates

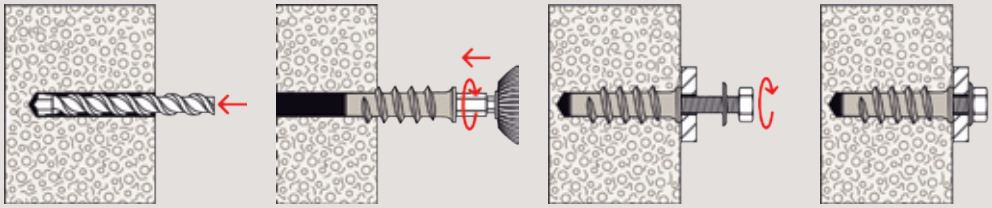
Building materials

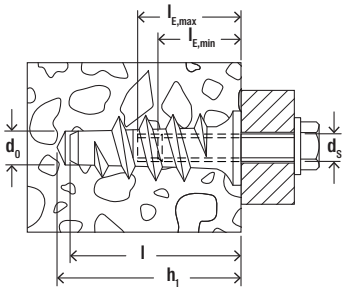
- Aerated concrete
- Solid panel made from gypsum

Functioning

- The FTP K is suitable for pre-positioned installation.
- Set the FTP K with setting tool FTP EK. The aircrete anchor taps itself into the aerated concrete with a positive fit during the installation process.
- Suitable for wood and metric screws with diameter 4 to 10 mm.

Installation FTP





Technical data

Turbo aircrete anchor FTP K

FTP K (nylon)

Item	Item No.	Drill hole diameter d_0 [mm]	Min. drill hole depth h_1 [mm]	Anchor length l [mm]	Woodscrew diameter d_s [mm]	Metric screw M	Min. bolt penetration $l_{E,min}$ [mm]	Max. bolt penetration $l_{E,max}$ [mm]	Sales unit [pcs]
FTP K 4	**078411** 1)	8 - (10)	60	50	4 - 4,5	M 4	35	60	25
FTP K 6	**078412** 1)	8 - (10)	60	50	5 - 6	M 5 - 6	40	60	25
FTP K 8	**078413** 1)	10 - (12)	70	60	7 - 8	M 8	45	70	25
FTP K 10	**078414** 1)	12 - (14)	80	70	9 - 10	M 8 - 10	50	80	10

1) Values in brackets for drill hole diameter apply for aerated concrete, compressive strength of 5,0 N/mm² or higher.

Accessories

Setting tool FTP EK

FTP EK 4/6

FTP EK 8

FTP EK 10

Item	Item No.	Match	Sales unit [pcs]
FTP EK 4/6	**090990**	FTP K4 / FTP K6	1
FTP EK 8	**090991**	FTP K8	1
FTP EK 10	**090992**	FTP K10	1

Loads

Turbo aircrete anchor FTP K

Highest recommended loads[1] for a single anchor in aerated concrete and gypsum blocks.
The given loads are valid for screws with the specified diameter.

Type			FTP K 4	FTP K 6	FTP K 8	FTP K 10
Screw diameter		**[mm]**	**4**	**5 - 6**	**8**	**8 - 10**
Min. edge distance	c_{min}	**[mm]**	**100**	**100**	**150**	**200**
Recommended loads in the respective base material F_{rec} [2]						
Aerated concrete	ACC 2 (≥ 2,5 N/mm²)	**[kN]**	0.15	0.20	0.30	0.40
Aerated concrete	ACC 4 (≥ 5,0 N/mm²)	**[kN]**	0.25	0.30	0.40	0.50
Gypsum block		**[kN]**	-	-	0.29	0.54

[1] Required safety factors are considered.
[2] Valid for tensile load, shear load and oblique load under any angle.

5

Turbo aircrete anchor FTP M

The metal anchor for metric screws for aerated concrete

Shelves

Wall consoles

Applications

- Pictures
- Lighting
- Shelves
- Mirror cabinets
- Curtain rails
- Cable and pipe clips
- Stand-off installations
- Radiators
- TV consoles

Advantages

- The Allen key chuck makes it possible to set the FTP M without the need for a special setting tool. This allows for a simple installation.
- The FTP M achieves a very high load-bearing capacity in aerated concrete for increased safety.
- The spiral-shaped outer thread taps itself into the aerated concrete with a positive fit. This means that it can be set without the need for much force.
- The special geometry allows for an almost expansion-force-free anchoring. This allows for small edge and spacing distances, and avoids splitting in the case of plastered surfaces.

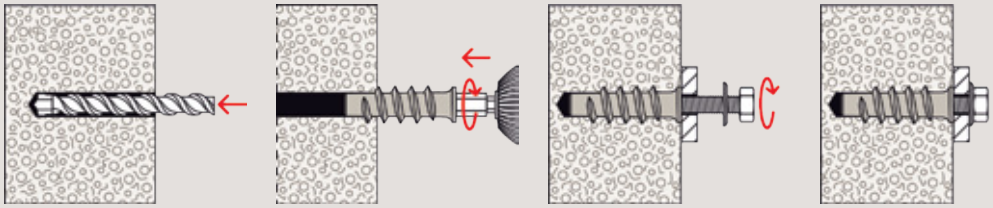
Building materials

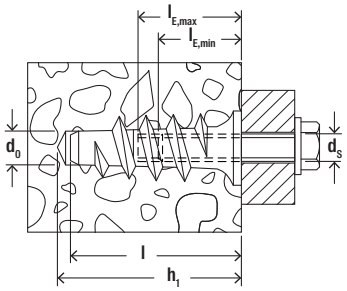
- Aerated concrete
- Solid panel made from gypsum

Functionality

- The FTP M is suitable for pre-positioned installation.
- The aircrete anchor taps itself into the aircrete with a positive fit during the installation process.
- Suitable for metric screws with diameter 6 to 10 mm.
- For installation with a hexagon socket: Size of the hexagon socket corresponds to screw diameter, e.g. FTP M6 is installed with hexagon socket size 6.
- For installation with cordless screwdriver: use a low torque and use the correct 6-kt bit FTP EM.

Installation FTP





Technical data

Turbo aircrete anchor FTP M

FTP M (metal)

Item	Item No.	Drill hole diameter d_0 [mm]	Min. drill hole depth h_1 [mm]	Anchor length l [mm]	Metric screw M	Min. bolt penetration $l_{E,min}$ [mm]	Max. bolt penetration $l_{E,max}$ [mm]	Sales unit [pcs]
FTP M 6	**078415** [1]	8 - (10)	60	50	M 6	15	20	25
FTP M 8	**078416** [1]	10 - (12)	70	60	M 8	20	25	25
FTP M 10	**078417** [1]	12 - (14)	80	70	M 10	25	30	25

1) Values in brackets for drill hole diameter apply for aerated concrete, compressive strength of 5,0 N/mm² or higher.

Accessories

Setting tool FTP EM

FTP EM for FTP M (metal)

Item	Item No.	Match	Sales unit [pcs]
FTP EM 6	**078577**	FTP M6	1
FTP EM 8	**078578**	FTP M8	1
FTP EM 10	**078579**	FTP M10	1

Loads

Turbo aircrete anchor FTP M

Highest recommended loads[1] for a single anchor in aerated concrete and gypsum blocks.
The given loads are valid for metric screws with the specified thread size.

Type			FTP M 6	FTP M 8	FTP M 10
Thread size		**[mm]**	**M 6**	**M 8**	**M 10**
Min. edge distance	c_{min}	**[mm]**	**100**	**150**	**200**
Recommended loads in the respective base material F_{rec} [2]					
Aerated concrete	ACC 2 (≥ 2,5 N/mm²)	**[kN]**	0.30	0.45	0.60
Aerated concrete	ACC 4 (≥ 5,0 N/mm²)	**[kN]**	0.50	0.65	0.70
Aerated concrete	ACC 6 (≥ 7,5 N/mm²)	**[kN]**	0.70	0.80	0.90
Gypsum block		**[kN]**	-	0.45	0.65

[1] Required safety factors are considered.
[2] Valid for tensile load, shear load and oblique load under any angle.

6
Adhesives

Multi MS

The universal sealant and adhesive.

Window sills

Sanitary joints at washbasins

Applications

- Connection and floor joints (interior & exterior)
- Movement and connection joints in kitchen, sanitary and installation areas
- Joints of RLT systems according to DIN EN ISO 846
- Stress-compensating bonding of different materials
- Standard mirrors
- Bonding and jointing of moldings and tiles

Advantages

- The high elasticity of 25% enables tension-compensating adhesive joints as well as elastic joint seals and thus compensates for unevenness in the substrate.
- The CE marking according to DIN EN 15651 confirms the application for façade, sanitary and floor joints in interior and exterior areas for universal use.
- The virtually odourless adhesive prevents odour formation in occupied areas for a pleasant indoor climate.
- The external test reports, such as EC 1 PLUS, M1 and ISEGA, as well as the classification according to French VOC class A+, confirm the health benefits of the product. VOC class A+ confirms the health-protective application.
- The special formulation allows simultaneous fixing and sealing of mirrors, thus time-saving.

Building materials

- Concrete
- Steel, metals
- Wood and wood-based materials
- Hard PVC
- Masonry, clinker
- Glass, glazed surfaces
- Enamel, tiles, ceramics
- Brick
- Mirror
- Plasterboard and gypsum fibreboard

Certificates

- EN 15651 - Part 1: F EXT-INT-CC (25HM)
- EN 15651 - Part 3: S (XS3)
- EN 15651 - Part 4: PW-EXT-INT-CC (25HM)
- EMICODE® EC 1 Plus - very low emission
- French VOC-emission class A+
- ISEGA
- M1 (Emission class for building materials)

Functioning

- Chemical basis: 1K Hybrid MS Polymer
- Working temperature: +5 °C to +40 °C
- Curing time approx. 3 mm/24h
- High elasticity of 25%
- Shore A 52
- Temperature resistance: -40 °C to +90 °C
- Solvent-, isocyanate- and silicone-free
- Waterproof and seawater resistant

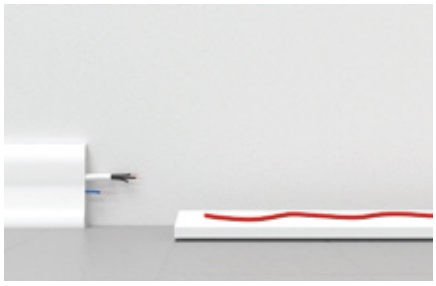
Multi MS (Print)

Item	Item no.	Languages on the cartridge	Contents [ml]	Packaging	Colour	Content per box [St.]	Sales unit [pcs]
Multi MS black 290 ml	**503319**	DE, EN	290	Cartridge	black	12	1
Multi MS grey 290 ml	**503318**	DE, EN	290	Cartridge	grey	12	1
Multi MS white 290 ml	**059389**	DE, EN	290	Cartridge	white	12	1
Multi MS white 290 ml (CZ/SK)	**558977**	CZ, SK	290	Cartridge	white	12	1
Multi MS white 80 ml Tube (DE/EN)	**563232**	DE, EN	80	Tube	white	12	1

High Tack AC

The water-based assembly adhesive with high initial adhesion.

Insulation panels on the ceiling



Fixing skirting boards

Applications

- Skirting
- Timber sub-structures
- Décorative, acoustic and insulation panels
- Cable ducts
- Window sills
- Tiles
- Door signs

Advantages

- The very high initial adhesion as well as final strength ensures the secure fixing of add-on parts without additional aids.
- Mounting without drilling or nailing allows attachments to be securely fastened even in hard-to-reach places.
- The high-quality raw materials also allow use on sensitive substrates such as natural stone.
- The components can still be readjusted within a few minutes for flexible assembly.
- The water-based acrylic adhesive is odorless and therefore particularly suitable for indoor processing.
- The special formulation ensures good compatibility with foamed polystyrene, such as Styropor®.

Building materials

- Concrete
- Plaster
- Wood
- Clinker
- Masonry
- Metal
- Natural stone
- Brick

Certificates

- EMICODE® EC 1 Plus - very low emission
- French VOC-emission class A+

Functioning

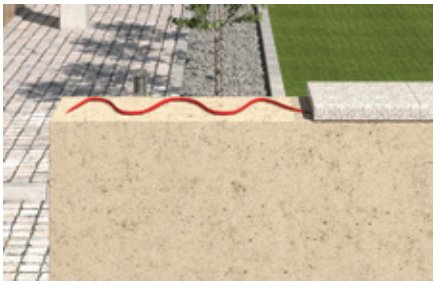
- Chemical base: 1K acrylic dispersion (water-based)
- For interior use
- Processing temperature: +10 °C to +30 °C
- Very high initial adhesive strength of up to 345 kg/m²
- High final strength
- Temperature resistance: -20 °C to +60 °C
- Min. one substrate must be non-absorbent
- Solvent-, silicone- and MDI-free

Technical Data

Item	Item no.	Languages on the cartridge	Contents [ml]	Packaging	Colour	Content per box [St.]	Sales unit [pcs]
High Tack AC white 310 ml	**053128**	DE, EN	310	Cartridge	creamwhite	12	1

Express PU

The adhesive with fast strength build-up and highest final adhesion.



Wall head cover

Bonding in staircase construction

Applications

- Gluing timber sub-structures
- Stair construction and stair renovations
- Laminate cladding
- Skirting boards
- Décorative, acoustic and insulation panels
- Professional modelling
- Door signs
- Cable ducts
- General repair and mounting applications

Advantages

- The extremely high final strength of up to 100 kg/cm² ensures the secure fastening of heavy attachments.
- The fast curing allows the adhesive joint to be loaded after only approx. 10 minutes.
- The Express PU is heat resistant up to 110°C and therefore suitable for applications with extreme temperature exposure.
- The water resistance according to DIN EN 204 D4 allows indoor and outdoor applications.
- The high-quality raw materials allow the use on sensitive substrates, such as natural stone, without discoloration.
- The special formulation ensures good compatibility with foamed polystyrene, such as Styropor®.

Building materials

- Concrete
- Gypsum
- Wood-based material
- Hard PVC
- Ceramics
- Masonry
- Metals
- Natural stone
- Polystrene foam
- Plaster

Certificates

- EMICODE® EC 1 Plus - very low emission
- French VOC emission class A+
- M1 (emission class for building materials)

Functioning

- Chemical base: 1K PUR adhesive
- Processing temperature: 0 °C to +35 °C
- Processing time: approx. 3 minutes
- Functionally stable after approx. 10 minutes (with zero joint)
- Temperature resistance: -40 °C to +110 °C
- Does not drip for overhead applications
- Easily foaming and gap bridging
- Press parts until functional strength is achieved
- Very high final strength
- Solvent and silicone free

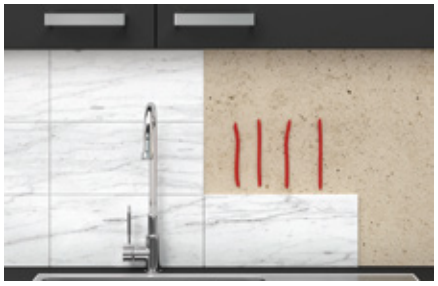
Technical Data

	Item no.	Languages on the cartridge	Contents [ml]	Packaging	Colour	Content per box [St.]	Sales unit [pcs]
Item							
Express PU beige 310 ml + gloves	**059014**	DE, EN	310	Cartridge	beige	12	1

High Tack MS

The elastic adhesive with extremely high initial tack.

Insulation panels on the ceiling



Bonding of natural tiles

Applications

- Fixing of tiles and slabs, including natural stone
- Bonding of skirting boards, panels, cladding
- Fixing of mirrors
- Substructures made of wood and metal
- Insulation panels
- Outdoor fixings

Advantages

- The extremely high initial tack allows attachment of add-on parts without additional pre-fixing.
- The elasticity of the adhesive compensates for component movements, vibrations and unevenness in the substrate.
- The high-quality raw materials allow use on sensitive substrates such as natural stone or mirror coatings.
- The position of bonded attachments can be corrected within the first 10 minutes.
- The High Tack MS can also be applied to damp substrates outdoors and allows for weather-independent application.
- On smooth and non-absorbent surfaces, the adhesive can be removed without leaving any residue.

Building materials

- Natural stone
- Metals
- Glass
- Enamel, tiles, ceramics
- Mirrors
- Hard PVC
- Wood and wood-based material
- Masonry, clinker
- Concrete
- Brick

Certificates

- EMICODE EC 1 Plus - very low emission
- French VOC emission class A+

Functioning

- Chemical base: 1K Hybrid MS-Polymer
- Working temperature: +5 °C to +40 °C
- Extremely high initial adhesive strength of approx. 520 kg/m²
- Curing time 2 to 3 mm/24h
- Stress-equalizing
- Temperature resistance: -40 °C to +90 °C
- Solvent-, isocyanate- and silicone-free
- Waterproof and seawater resistant

Technical Data

Item	Item no.	Languages on the cartridge	Contents [ml]	Packaging	Colour	Content per box [St.]	Sales unit [pcs]
High Tack MS white 290 ml	**541712**	DE, EN	290	Cartridge	white	12	1
High Tack MS white 290 ml (CZ/SK)	**558980**	CZ, SK	290	Cartridge	white	12	1
Ultra MS Express white 290 ml (ES/EN)	**559068**	ES, EN	290	Cartridge	white	12	1
V-Nozzle Express Cement	**524315**	–	–	Polybag	–	5	1

11
Power tools

Cordless impact wrenches FSS 18V

The specialists for concrete screws.

Column feet

Balcony railings

Applications

- Anchoring of railings
- Column bases
- Pipeline routes
- Canopies
- Shelving systems
- Steel-steel connections
- Tyre changes

Advantages

- The tangential impact wrenches FSS 18V are compatible with all Cordless Alliance System (CAS) chargers and rechargeable batteries worldwide.
- The FSS 18V guarantee low-vibration despite an extremely high torque.
- The additionally accessories supplied as sockets and checking gauges, enable ease of installation and checking for reusability of the concrete screws FBS II gvz.
- The tools are delivered in the compatible L-Boxx, which can be connected by a click system.
- Powerful rechargeable battery (4.0 Ah) with lithium-ion power and integrated capacity indicator to check the state of charge.

Additional advantages FSS 18V 400 BL:

- The 12 levels of regulation allow the torque of the FSS 18V 400 BL to be individually adapted to the application.
- The brushless motor has an overheat protection that increases safety while reducing downtime and wear.

Certificates

Versions

- FSS 18V 400 BL: Torque 400 Nm
- FSS 18V 600: Torque 600 Nm

Functioning

- The fischer cordless impact wrenches FSS 18V are perfectly suited for the installation of fischer UltraCut concrete screws FBS II of all diameters.
- Depending on the head shape of the concrete screw, either an appropriate socket or a special torx bit is recommended for the installation.
- The concrete screw is first screwed in and then tightened by the percussion mechanism.
- If the screw head is in contact with the attachment, correct assembly of the concrete screw is guaranteed (optical setting check).

Technical data

Cordless impact wrenches FSS

FSS 18V 400 BL

FSS 18V 600

	Item No.	Belt hook	Sockets [SW]		Test sleeves FUP for concrete screw diameter		Battery pack 4.0 Ah		Charger		Packaging L-Boxx, stackable
		FSS BH	10 / 13 / 15	15 / 17 / 21	8 / 10	12 / 14	1x	2x	Type EU	Type UK	
Item											
FSS 18V 400 BL - Set 4	552928	●	●		●			●		●	●
FSS 18V 600 - Set 4	552929	●		●		●		●		●	●

Technical data

Cordless impact wrenches FSS

FSS 18V 400 BL

FSS 18V 600

	Battery voltage [V]	Max. idle speed [/min]	Max. number of strokes [/min]	Max. torque [Nm]	Torque levels	Tool mounting	Vibration impact screws (m/s^2)	Sound power level [dB (A)]	Sound pressure level (LwA) [dB (A)]	Weight with battery [kg]
Item								[3]		
FSS 18V 400 BL	18	0-2150	4250	400	12	outer square 1/2“ (12,7 mm)	12	111	100 [3]	1,9
FSS 18V 600	18	0-1600	2200	600	1	outer square 1/2“ (12,7 mm)	5,9 [1] [2]	107	96	3,1

1) Measurement uncertainty K --> 1,5 m/s^2

2) Measurement uncertainty K --> 5,9 m/s^2

3) Measurement uncertainty K --> 3,0 dB(A)

Accessories

FSS-B and FSS-BC

FSS-B 4.0Ah Battery

FSS-BC Battery charger, air-cooled

	Item No.	CAS-compatible	Type of battery	Battery capacity [Ah]	Mains voltage [V]	Mains frequency [Hz]	Max. charge amperage [A]	Weight of battery [g]	Suitable for battery voltage [V]	Storage & processing [°C]	Air humidity [%]	Vibration & Shock impact [G]
Item												
FSS-BC 12-36V UK	**552932** 1)	●	-	-	230-240	50-60	3	-	12-36	-	-	-

1) Battery may only be charged with fischer or CAS chargers.

Accessories

Accessories

FUP

Nut SW

Nut 1/2" - 1/4"

MaxxBit FMB TX

FPB ProfiBit TX 50 5/16"

	Item No.	Internal diameter [mm]	Drive	Match	Sales unit [pcs]
Item					
FUP 8	**537200**	9,9	–	FBS II 8	1
FUP 10	**537201**	12,0	–	FBS II 10	1
FUP 12	**537202**	13,0	–	FBS II 12	1
FUP 14	**537203**	15,0	–	FBS II 14	1
Nut SW 10	**538577**	–	1/2" / SW10	FBS II 6	1
Nut SW 13	**538578**	–	1/2" / SW13	FBS II 8	1
Nut SW 15	**538579**	–	1/2" / SW15	FBS II 10	1
Nut SW 17	**538580**	–	1/2" / SW17	FBS II 12	1
Nut SW 21	**538581**	–	1/2" / SW21	FBS II 14	1
Nut 1/2" - 1/4"	**553928**	–	1/2" / 1/4''	FBS II 6 / FBS II 8 / FBS II 8 SK	1
Nut 1/2" - TX 50	**553929**	–	1/2" / TX50	FBS II 10 / FBS II 10 SK	1
FMB TX30 MaxxBit W 5	**533158**	–	TX30	FBS II 6	1
FMB TX40 MaxxBit W 5	**533159**	–	TX40	FBS II 6 / FBS II 8 / FBS II 8 SK	1
FPB TX 50 5/16" ProfiBit	**557844**	–	TX50	FBS II 10 SK	1

Vacuum cleaner FVC 35 M

Universal wet and dry vac for virtually dust free applications.

Hollow drilling

Wet vacuuming

Applications

Suitable for:
- Dry suction
- Wet suction

As suction system for:
- Hollow drill bits
- Sawing machines
- Grinding machines
- Milling machines

Advantages

- Automatic filter cleaning during suction operation without any interruption enables non-stop suction.
- Vacuum cleaner filter with dust retention capacity of 99,9 % according to dust class M, perfectly suited for use with the fischer hollow drill bit FHD.
- High performance motor for constantly high suction power.
- Matching cleaning set FVC AP enables dry and wet suction work.
- Sealable filter bags guarantee a dust-free disposal.

Certificates

Versions

- FVC 35 M
- FVC 35 M UK

Functioning

- The power cable of the electrical device is plugged into the socket of the vacuum cleaner. This means that the vacuum cleaner only runs during the use of the device. The left switch can be used to adjust the suction power according to the device used.
- When the filter bag is full, the lamp to the right of the switches lights up. To change the bag, remove the top container, close the filter bag and replace it without generating any dust.

Technical data

Vacuum cleaner FVC 35 M

FVC 35 M

	Item No.	Voltage [V]	Max. power from suction cup to socket [Watt]	Max. power [Watt]	Max. volume flow [l/s]	Negative pressure [mbar]	Noise pressure [dB (A)]	Contents	Weight [kg]	Dimensions [cm]
Item										
FVC 35 M UK	**558177**	110-120	400 (110 - 120V~)	1400	74*	234*	69	1x Vaccum cleaner FVC 35 M UK, 1x Suction hose FVC SH, 2x Folded filter cartridges FVC FC, 1x Bag FVC PB	15,5	53 x 40 x 56 (Power cable length: 800)

* Measured at motor head

Accessories

Vacuum cleaner FVC 35M

Cleaning set FVC AP

	Item No.	Adapted for	Material	Contents	Sales unit [pcs]
Item					
FVC AP	**552058**	FVC 35 M	Plastic	1 x Hand tube with supplementary air slide, 30 cm long, Ø 35 mm 2 x Suction tube, 50 cm long, Ø 35 mm 1 x Floor nozzle, 30 cm broad, Ø 35 mm 1 x Crevice nozzle, 22 cm long, Ø 35 mm	1

Accessories

Accessories

Filter bag FVC FB

Bag FVC PB

Folded filter cartridges FVC FC

Suction hose FVC SH

Push handle FVC PH

Item	Item No.	Adapted for	Material	Dimensions accessories	Contents	Sales unit [pcs]
FVC FB	**552059**	FVC 35 M	Fleece	For 35 litre plastic container	5 x FVC FB fleece filter bag	1
FVC PB	**552060**	FVC 35 M	Polyethylene	For 35 litre plastic container	5 x polyethylene emptying bag FVC PB	1
FVC FC	**552061**	FVC 35 M	Polyester	Filter surface 8600 cm2	2 x FVC FC filter cartridges	1
FVC SH	**552062**	FVC 35 M	Polyethylene	Ø 35 mm, length 5 m	1 x suction hose Ø 35 mm, length 5 m	1
FVC PH	**552063**	FVC 35 M	Stainless steel	–	1 x Push handle FVC PH	1

Accessories

Hollow drill bit FHD

Hollow drill bit FHD

Detail:
Top of drill FHD
Ø 12 - 14 mm

Detail:
Top of drill FHD
Ø 16 - 18 mm
Top of drill FHD Max
Ø 16 - 35 mm

Item	Item No.	Drill hole diameter d_0 [mm]	Working length [mm]	Total length l [mm]	Contents	Sales unit [pcs]
FHD 12/200/330	**546597**	12	200	330	1	1
FHD 14/250/380	**546598**	14	250	380	1	1
FHD 16/250/380	**546599**	16	250	380	1	1
FHD 18/320/450	**546600**	18	320	450	1	1
FHD Max 16/400/620	**546601**	16	400	620	1	1
FHD Max 18/400/620	**546602**	18	400	620	1	1
FHD Max 20/400/620	**546603**	20	400	620	1	1
FHD Max 24/400/620	**546604**	24	400	620	1	1
FHD Max 28/600/820	**546605**	28	600	820	1	1
FHD Max 30/600/820	**546606**	30	600	820	1	1
FHD Max 35/650/870	**546607**	35	650	870	1	1

Gas actuated fastening tool FGC 100

Quick and easy fastening in concrete and steel.

Drywall tracks

Electrical installations

Applications

- Drywall tracks
- Electrical installations
- Composite decks
- Insulation systems
- Light duty building construction applications

Advantages

- The 100 joules power ensures correct penetration into the working surface, even for steel to steel applications.
- Easy nail depth adjustment switch to choose how to set the nails.
- Long lifetime with service intervals after every 20,000 fixings under standard conditions.
- Quick release system for a fast disassembling of the magazine and clearing of jammed nails.
- Rechargeable battery with Li-Ion power: 8,000 fixings with one charge.
- Battery-LED status.
- A 10 minutes charge allows to fix at least another 300 nails.
- The FGC 100 is delivered in the practical XL-BOXX, which is fully compatible with the L-BOXX.

Certificates

CE

Building materials

- Concrete
- Sand-lime brick
- Solid brick
- Steel

Functioning

- The fischer gas actuated fastening tool FGC 100 is suitable for a fast and reliable installation of e. g. drywall tracks and electrical connections in all directions - on floors, walls and ceilings.
- For optimum installation, the tool must be positioned perpendicularly to the working surface.
- The attached stand gives support but can also be removed to drive nails in narrow areas.
- The tool will operate within the temperature range of -7°C to +50°C.
- The dimensions of the tool are: L 336 mm x W 121 mm x H 404 mm.

Technical data

Gas actuated fastening tool FGC 100

Gas actuated fastening tool FGC 100

Battery charger BC 7.2 V

Li-Ion battery B 7.2 V 2.5 Ah

XL-BOXX

	Item No.	Contents	Technical details	Sales unit [pcs]
Item				
Set FGC 100 (UK)	**553585** [1]	1x fischer gas actuated fastening tool FGC 100, 1x Magazine FGC 100 – M26, 1x Battery charger BC 7.2 V incl. charging plug for UK, 2x Li-Ion battery B 7.2 V 2.5 Ah, 1x Push bar, 2x Hex wrench, 1x XL-BOXX	100 joules setting energy, 4.1 kg with battery, Capacity of 26 nails, curved, Input 100 – 240 V, Output 8.4 V – 2 A, > 8,000 fixings per charge, For the clearance of jammed nails, - Is fully compatible with the L-BOXX	1

1) Possibly further variants.

7

Accessories

Accessories for the fastening tool


Magazine standard
FGC 100-M26


Magazine extended
FGC 100-M50


Battery charger
BC 7.2 V


Li-Ion battery
B 7.2 V 2.5 Ah

Item	Item No.	Technical details	Sales unit [pcs]
Magazine standard FGC 100-M26	**553412**	Capacity of 26 nails, curved	1
Magazine extended FGC 100-M50	**553717**	Capacity of 50 nails, curved	1
Battery charger BC 7.2V (UK)	**553588** [1)]	Input 100-240 V, Output 8.4 V – 2 A	1
Li-Ion battery B 7.2V 2.5Ah	**553415**	> 8,000 fixings per charge	1

1) Country specific charging plug. Possibly further variants.

7

Accessories

Accessories for fixings


Standard nail DFN


High performance nail DFNH

Item	Item No.	Length [mm]	Technical details	Contents
Standard nail DFN 17	**553417**	17	Gvz with 5 µm coating thickness, for soft concrete < C30/37, shaft diameter 2.6 mm, nail length 17 mm	1,008 nails + 1 fuel cell
Standard nail DFN 20	**553418**	20	Gvz with 5 µm coating thickness, for soft concrete < C30/37, shaft diameter 2.6 mm, nail length 20 mm	1,008 nails + 1 fuel cell
Standard nail DFN 22	**553419**	22	Gvz with 5 µm coating thickness, for soft concrete < C30/37, shaft diameter 2.6 mm, nail length 22 mm	1,008 nails + 1 fuel cell
Standard nail DFN 25	**553420**	25	Gvz with 5 µm coating thickness, for soft concrete < C30/37, shaft diameter 2.6 mm, nail length 25 mm	1,008 nails + 1 fuel cell
Standard nail DFN 30	**553421**	30	Gvz with 5 µm coating thickness, for soft concrete < C30/37, shaft diameter 2.6 mm, nail length 30 mm	1,008 nails + 1 fuel cell
Standard nail DFN 32	**553422**	32	Gvz with 5 µm coating thickness, for soft concrete < C30/37, shaft diameter 2.6 mm, nail length 32 mm	1,008 nails + 1 fuel cell
Standard nail DFN 35	**553423**	35	Gvz with 5 µm coating thickness, for soft concrete < C30/37, shaft diameter 2.6 mm, nail length 35 mm	1,008 nails + 1 fuel cell
Standard nail DFN 40	**553424**	40	Gvz with 5 µm coating thickness, for soft concrete < C30/37, shaft diameter 2.6 mm, nail length 40 mm	1,008 nails + 1 fuel cell
High performance nail DFNH 15	**553425**	15	Gvz with 5 µm coating thickness, for hard concrete ≥ C30/37 and steel, shaft diameter 3.0 mm, nail length 15 mm	1,008 nails + 1 fuel cell
High performance nail DFNH 17	**553426**	17	Gvz with 5 µm coating thickness, for hard concrete ≥ C30/37 and steel, shaft diameter 3.0 mm, nail length 17 mm	1,008 nails + 1 fuel cell
High performance nail DFNH 22	**553427**	22	Gvz with 5 µm coating thickness, for hard concrete ≥ C30/37 and steel, shaft diameter 3.0 mm, nail length 22 mm	1,008 nails + 1 fuel cell
High performance nail DFNH 27	**553428**	27	Gvz with 5 µm coating thickness, for hard concrete ≥ C30/37 and steel, shaft diameter 3.0 mm, nail length 27 mm	1,008 nails + 1 fuel cell
High performance nail DFNH 32	**553429**	32	Gvz with 5 µm coating thickness, for hard concrete ≥ C30/37 and steel, shaft diameter 3.0 mm, nail length 32 mm	1,008 nails + 1 fuel cell

Accessories

Accessories for fixings

Fuel cell
FC 165

EWI plug
TFD

EWI nose
FGC 100 - N EWI

Magnetic nose piece supplement FGC 100 – N magnetic

Item	Item No.	Length [mm]	Technical details	Contents
Fuel cell FC 165	**553416**	165	For more than 1,100 fixings	–
EWI plug TFD 30	**554928**	30	To fix insulation material with a thickness of 50 mm, on soft concrete < C30/37 with DFN 40	504
EWI plug TFD 50	**554929**	50	Gvz with 5 µm coating thickness, for hard concrete ≥ C30/37 and steel, shaft diameter 3.0 mm, nail length 32 mm	504
EWI nose FGC 100-N EWI	**554869**	–	For the use of fischer EWI plugs TFD 30 and TFD 50	1
Magnetic nose piece supplement FGC 100-N magnetic	**553715**	–	For the use with metal washers	2
Metal washer FGC 100	**554935**	–	It prevents fixture pull-over and is used with the magnetic nose piece supplement to fix wire mesh or membranes.	1,008
Cleaning kit FGC 100	**553718**	–	150 ml Cleaner, 100 ml Lubricating Oil and tool rubber sealing rings	1

Loads

Standard nails DFN and high-performance nails DFNH

Recommended loads[1] of a single nail in the respective building material as multiple use with at least 6 nails per attachment part.

Building material	Setting depth h_{ef} [mm]	Recommended tension load [1] F_{rec} [kN]	
		DFN	DFNH
Concrete C20/25[2]	≥ 14	0.10	-
	≥ 16	0.18	-
	≥ 18	0.20	0.22
	≥ 20	0.20	0.50
Concrete C50/60[2]	≥ 14	-	0.12
	≥ 17	-	0.18
	≥ 18	-	0.22
Solid sand-lime brick KS DIN EN 771-2 / KS 16 998 x 200 x 623 mm	≥ 20	0.50	-
	≥ 25	0.68	-
	≥ 27	0.80	-
	≥ 29	0.95	-
Solid brick Mz DIN EN 771-1 / Mz 20, DF	≥ 14	0.10	-
	≥ 16	0.16	-
	≥ 18	0.19	-
	≥ 20	0.19	-
Steel S235JR acc. to EN 10025-2	≥ 8	-	0.96
Member thickness and edge distance for concrete			
Minimum member thickness	h_{min} [mm]	60	60
Minimum edge distance	c_{min} [mm]	70	70
Member thickness and edge distance for steel			
Minimum member thickness	h_{min} [mm]	-	4
Minimum edge distance	c_{min} [mm]	-	14
Maximum fixture thickness			
Wood	t_{fix} [mm]	25	25
Metal sheet	t_{fix} [mm]	2.5	2.5

[1] Required safety factors are considered. Not for safety relevant single point fixings. All visible setting errors must be corrected. Use only in dry areas. To confirm the technical data, setting and load tests are recommended.

[2] The load values in concrete are valid for tension and shear load.

8

8 Basic knowledge of fastening technology

Building Material – Concrete

The substrate's quality is crucial when selecting the correct fixing: A differentiation is made between concrete, masonry and panel building materials. Concrete is made from a mixture of cement, aggregates and water.

Concrete's main properties are:

- High level of compressive strength,but only low tensile strength(≈ 10 % of the compressive strength).
- Inserting individual rebars andor mats will increase tensile strength(steel + concrete = reinforced concrete).
- Structure easily reproducible as it isregulated by standards, therefore it isan ideal anchor base.

Concrete is mainly split into two categories:

Standard concrete and lightweight concrete. While standard concrete contains gravel; lightweight concrete contains additives such as pumice, expanded clay or polystyrene® usually with a lower compressive strength or bulk density. This leads to unfavourable conditions for anchor fixings.

The load bearing capacity of heavy duty fi xings depends on the concrete's compressive and tensile strength. This is indicated by the numbers in the abbreviations: e. g. the most commonly used concrete compressive strength is C20/25 with a cube compressive strength of 25 N/mm².

EXPERT TIP

- **Standard concrete qualities:**
  C12/15 to C50/60, even higher grades are also available for special applications. The majority of anchors approved for concrete may only be used from concrete quality from C20/25 up to a max. of C50/60. In the past, designations from DIN 1045 were used in Germany: B25 (≃ C20/25) to B55 (≃ C45/55).
- **C20/25 means:**
  C = concrete
  20 = compressive strength f_{ck} or $f_{ck, cyl}$ of a concrete test cylinder (Ø 150 mm, height 300 mm) in N/mm²
  25 = compressive strength f_{ck}, cube of a concrete test cube (edge length 150 mm) in N/mm²
- **Normal concrete** without accelerating additives reaches its nominal strength after 28 days. Only then can the fixing be installed in compliance with the approval /assessment.
- **Fresh concrete:** still workable up to approx. one hour after pouring.
- **Green concrete:**.elbakrow regnol on ,sruoh ruof retfa nedrah ot strats
- **New concrete:** is hardened after 28 days, however minimum compressive strength not yet reached.
- **Hard concrete:** more than 28 days old, nominal strength reached.

Compressive strength classes in different countries

Country	Specimen	Dimensions [1] [cm]	Concrete strength class	Unit	Standard
China	Cube	15x15x15	C15,C20, C25, C30, C35, C40, C45 C50, C55,C60	N/mm²	GB50010-2010
Denmark	Cube	15x15x15	C12/15, C16/20, C20/25, C25/30, C30/37, C40/50, C45/55, C50/60	N/mm²	DS/EN 206
Germany	Cube	15x15x15	C12/15, C16/20, C20/25, C25/30, C30/37, C40/50, C45/55, C50/60	N/mm²	EN 206
France	Cylinder	16x32	B20,B25,B30, B35, B40, B45, B50	N/mm²	BAEL 91
Great Britain	Cube	15x15x15	C20, C25, C30, C37, C40, C45, C55, C60	N/mm²	BS EN 12390-3:2009
Italy	Cube	15x15c15	C 8/10, C12/15, C16/20, C20/25, C25/30, C28/35, C30/37, C32/40, C35/45, C40/50, C45/55, C50/60	N/mm²	UNI EN 206
Japan	Cylinder	10x20	≥ 15	N/mm²	JIS A 1108
Korea	Cylinder	10x20, 15x30	18, 21, 24, 27, 30	N/mm²	KS F 2405
The Netherlands	Cylinder	15x30	C 8/10, C12/15, C16/20, C20/25, C25/30, C30/37, C35/45, C40/50, C45/55, C50/60	N/mm²	NEN-EN 206-1
Austria	Cube	15x15x15	C 8/10, C12/15, C16/20, C20/25, C25/30, C30/37, C35/45, C40/50, C45/55, C50/60	N/mm²	ÖNORM B 4710-1
Sweden	Cube	15x15x15	C12/15, C16/20, C20/25, C25/30, C30/37, C40/50, C45/55, C50/60	N/mm²	SS-EN206
Switzerland	Cube	15x15x15	C12/15, C16/20, C20/25, C25/30, C30/37, C40/50, C45/55, C50/60	N/mm²	SIA 262
Spain	Cylinder	15x30	Unreinforced concrete: HM-20, HM-25, HM-30, HM-35, HM-40, HM-45, HM-50 Reinforced concrete: HA-25, HA-30, HA-35, HA-40, HA-45, HA-50 Pre-stressed concrete: HP-25, HP-30, HP-35, HP-40, HP-45, HP-50	N/mm²	EHE-08
USA	Cylinder	15x30	2000, 2500, 3000, 3500, 4000, 5000, 6000, 7000, 8000	Psi	ACI 318

(1) Conversion: $f_{Cylinder} = 0.85 \times f_{Cube,\ 20x20x20}$; $f_{Cube,\ 15x15x15} = 1.05 \times f_{Cube,\ 20x20x20}$

EXPERT TIP

- **Anchors** used in **new concrete** must be **suitable** for this purpose, or may only bear loads after reaching the minimum compressive strength.
- **Concrete** always shows **cracks** (shrinkage during hardening, loading).
- **In cracked concrete,** anchors which are tested in cracked concrete must be used. These **anchors** must be able to **expand** when concrete starts to crack e. g, expansion anchors (e. g. FAZ II), form locking anchors or undercut anchors (e. g. FZA), or bonded anchors (e. g. FIS SB).
- **Cutting** through **reinforcement steel** while making **drill holes** is **not permitted.** In special cases, non load-bearing steels can be cut after consultation with the responsible engineer.
- The load bearing capacity of the concrete along the entire drill hole must be guaranteed (no honeycombing in the concrete, no voids and pockets).
- **Pre-stressed concrete:** A certain drilling distance must be maintained from the tensioning strands as stated in the approval/assessment (e. g. FHY, FBS II 6 or EA II).

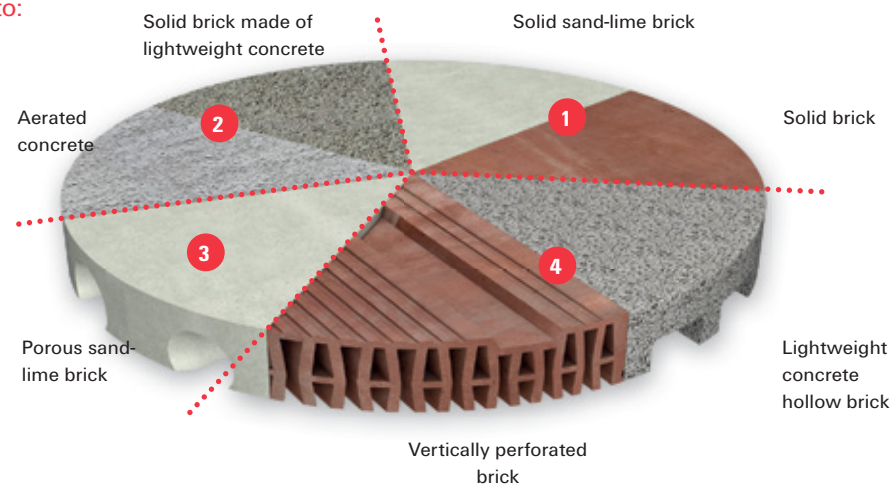
NOTE

Building Material – Masonry

Compared to concrete, there is a larger variety of masonry building materials.

Masonry can be classified according to:

- Brick type used (e. g. natural stone, lime stone or aerated concrete).
- Wall type (e. g. single or double layer).
- Brick strength class and gross density.



Generally, masonry is classifi ed into four groups:

1 Solid bricks with a dense structure are a highly compres-sion resistant building material, without cavities or low hole surface percentage (up to a max. 15 % e. g. as grip holes). This type is very well suited for anchor fi xings.

3 Perforated bricks with a compact structure (perforated and hollow bricks) are mostly manufactured from the same compressive strength materials as solid blocks but with cavities. If higher loads are introduced into these building materials, special fi xings should be used (e. g. bonded anchors, FIS V), which bridge or fi ll the cavities.

2 Solid bricks with porous structure usually have a very large number of pores and low compressive strength. Therefore, special fixings should be used, e. g. fixings with a longer expansion zone or bonded anchors.

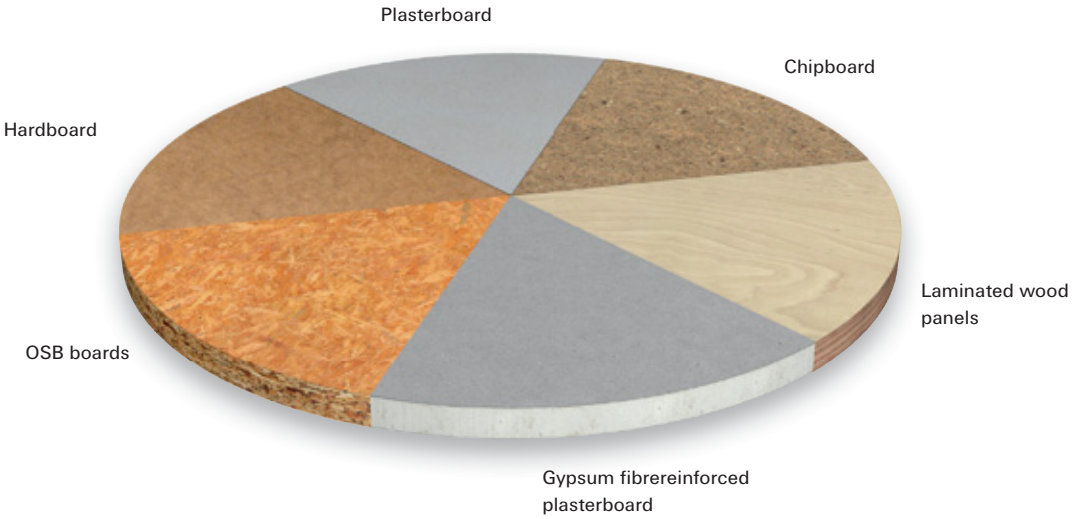
4 Perforated bricks with porous structure have many cavities and pores and thus generally a low compressive strength. In this case, special care is required when selecting the fi xing. Suitable fi xings include those with a long expansion zone or form locking injection anchors.

EXPERT TIP

- Before **fixing in masonry,** determine which brick type (designation, size, compressive strength) and mortar type (mortar category) has been used.
- For **safety anchoring** in unknown or old masonry, pull out tests must be carried out on-site to determine the anchor load bearing capacity.
- For **fixings close to the edge,** it is important to know if the wall is a load bearing wall as this prevents the risk of brick pull out.
- Even **solid brick** can have holes (e. g. MZ, KS). The holes are mostly larger grip-holes in the centre of the brick (up to max. 15 % cavity proportion per brick).
- Always drill without hammer function in **perforated and hollow bricks.** Here, special, sharply ground drills with hard metal tips are suitable.
- **Plaster or other non load-bearing layers** may not be added to the load-bearing base and are not to be used in calculating the anchorage depth.
- **Avoid anchoring into masonry joints** as much as possible due to joint inhomogeneity. If anchoring into a joint cannot be avoided (e. g. plaster on masonry) loads should be reduced.
- For **systems approved by building authorities, anchoring in joints** (vertical or horizontal joints) is regulated in the approval notices.
- For **anchoring high loads** in performated bricks, the anchorage depth should be increased.
- **Expansion fixings** (e. g. FAZ II or FBN II) are not suitable for use in masonry due to its high expansion forces which may lead to cracks in the brick. Frame fixings are suitable due to its longer expansion part.
- **Bonded anchors** achieve the highest possible loads in masonry.

Building Material – Drywall Panels

Panel building materials are thin-walled materials that often have limited strength – e. g. plasterboard like “Rigips”, “Knauf”, “LaGyp”, “Norgips”; Gypsum fi breboard like “Fermacell”, “Rigicell” or chip board, hard fi bre boards, plywood and others.



The main characteristics of panel building materials are:

- Often thin-walled materials, mainly with limited strength.
- Easy-to-process materials for non load-bearing walls and also used as cladding material (e. g. walls, roofs or ceilings).
- A wide range of different building materials.

Special fixing elements must be used:

Cavity fixings are fixings made of plastic or metal, whichanchor by form locking into the material, e. g. by knotting or a snap on mechanism (e. g. toggles).

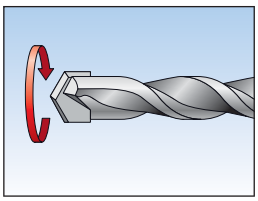
EXPERT TIP

- Only approved anchors should be used for **lightweight materials, prestressed hollow core slabs and panel materials.**
- Contact your **fischer consultant** on site before anchoring **heavy or safety-relevant loads** in the above-mentioned substrates.

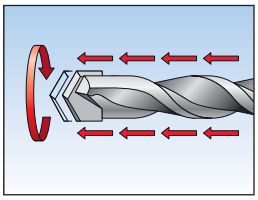
NOTE

Drilling

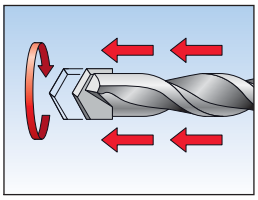
The building material determines the drilling method. Five methods are possible:



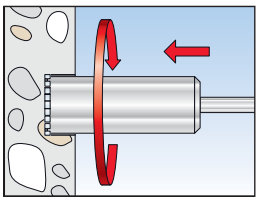
Rotary drilling
Rotary drilling without impact, uses a sharply ground carbide drill bit. When this method is used, the drill hole does not become too large and the perforated brick's webs do not break.



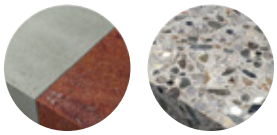
Impact drilling (mechanical)
Impact drill with rotation and a high number of light strokes, is suitable for dense structured building materials.

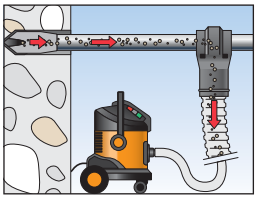


Hammer drilling (pneumatic)
Hammer drill uses rotation and a low number of light strokes with high impact energy, also suitable for dense structured solid building materials.



Diamond or core drilling process
Mainly used for larger drill hole diameters or for heavily reinforced components and/or if noise or vibration must be reduced.





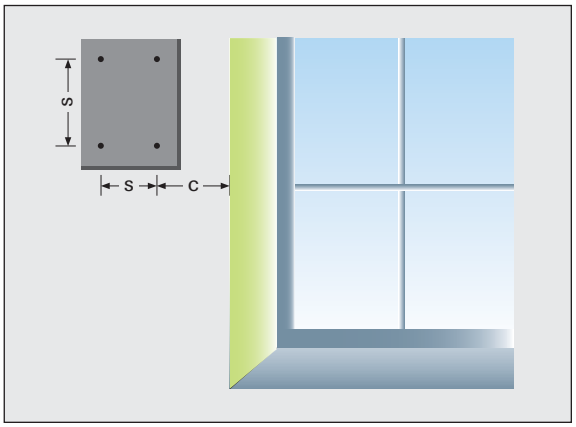
Hollow drilling
Special drill with a hollow core, which is connected to a vacuum cleaner. Cleans the drilled hole during the drilling operation. No further brushing or blowing is required. Can be used in concrete and masonry with dense structure.

EXPERT TIP

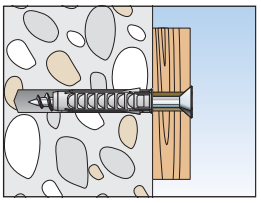
- The drilling method for approved anchors is specifi ed in the **approval / assessment.**
- Drill bits with **excessively worn cutting** edges should **not be used** (see approval /assessment).
- For certain fixings, **special drills** are required (e. g. a stop drill) as per approval /assessment.
- **Drill holes** must be **carefully cleaned** (blown out and brushed). See the respective approval /assessment or manufacturer's specifi cations.
- The **drill hole depth** is always exacly specified and relates to a given anchoring base thickness. For general applications without an approval /assessment the following applies: the drill hole depth + 30 mm should not exceed the anchoring base thickness.
- In case of **incorrect drilled** holes (hitting reinforcements or wrong location), the location for the new drill hole is regulated in the applicable fixing approval /assessment). Usually, the distance for the new drill hole must be twice the depth of the incorrect drill hole. The wrong drill hole must be fi lled with injection mortar (e. g. FIS V).
- **Diamond core drilling** is only permitted if stated in the approval/assessment or according to manufacturer's guidelines (e. g. RSB, FIS EM Plus, FAZ II, FBS II...).
- **The load bearing capacity is reduced** by water filled holes or wet substrates especially for chemical or plastic fixings.
- **Cutting** through a reinforcement is not permitted.
- **The drill hole** must be drilled perpendicular to the anchor base (an inclinement of up to 5° is permitted). Exceptional cases are regulated in the anchor approval /assessment and or according to manufacturer's guidelines.

Installation

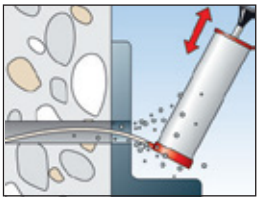
In general, the following aspects must be taken into consideration during installation:



The edge distance and centre distance, as well as the component thickness and width, must be carefully observed to ensure that the fixing can take the required load. Otherwise, it may lead to spalling of the construction material or cracks. For fixings without approval, e. g. nylon fixings, a minimum edge distance of c = 1 x h_{ef} (h_{ef} = anchorage depth) and a minimum spacing of s = 1 x h_{ef} must be adhered to for concrete. When using non approved metal anchors, a minimum edge distance of c = 1.5 x h_{ef} and a minimum spacing of s = 3 x h_{ef} must be adhered to. When using hammerset anchors, spacing and edge distance can increase due to higher expansion forces.



The drill hole depth must be larger than the anchorage depth (exception chemical anchor systems), to ensure that the screw has enough room at the end of the fixing element to penetrate at least one time the screw's diameter.



Drill hole cleaning after drilling, e. g. by blowing out, brushing or suction, is generally necessary. The load bearing capacity will be reduced, if the hole is not cleaned. (Exceptions: approved anchor systems where no hole cleaning is required, e. g. FHB II + PF - High speed capsule).

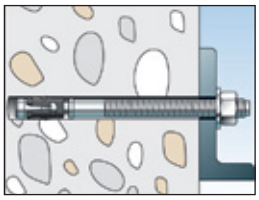
EXPERT TIP

- **Strictly adhere to specifications** for component geometry, edge and spacing distances. If this is not taken into account, the component will be damaged or the anchor capacity will be reduced.
- **Drill hole cleaning is essential.** The specifications in the approvals and the manufacturer's specifications must be observed.

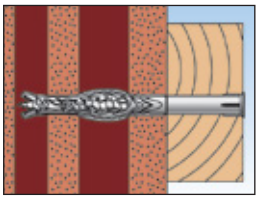
NOTE

Installation types

There are three diff erent types of installation.



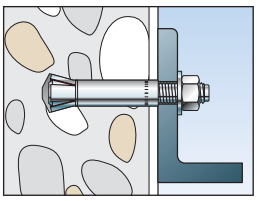
Anchor bolt FAZ II



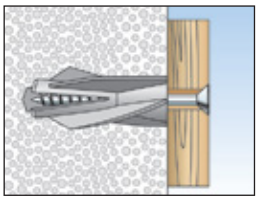
Frame fixing SXRL

Push-through installation
In particular for simplifying installation for series installations or for attachments with two or more fixing points:

- If the attachment's hole diameter is larger than the drill bit diameter, then the attachment can be used as a template. Please note: The drill bit tip is generally larger than the nominal diameter of the drill.
- In addition to facilitating a simple installation, an exact fit is also achieved.
- The fixing is inserted into the drill hole through the attachment and then tightened (e. g. FAZ II, FBN II, FH II).



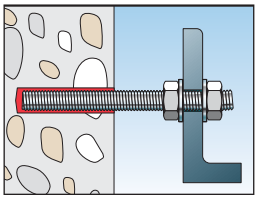
Zykon anchor FZA



Aircrete anchor GB

Pre-positioned installation
The anchor is installed before fastening the attachment. If drilling is not done precisely, then the holes in the attachment will not match up. This could mean that the anchors cannot be installed or could cause damage to the anchors. The installation sequence:

- Transfer the hole pattern of the fixture to the anchor base.
- Drill and clean the holes, install the attachment and then fix the attachment (e. g plastic fixings: S, SX, UX; metal fixings: FZA, EA II).



Threaded rod FIS A

Stand-off installation
This allows attachments to be compression and tension resistant at a certain distance from the anchor base. For this purpose, external threaded metal anchors (e. g. FAZ II, FBN II) or internal threaded anchors (e. g. EA II) with screws or threaded rods are clamped against the anchor base surface while using a bearing washer and nut. When using chemical systems with threaded rods (e. g. FIS SB, FIS V, FIS EM Plus, and FIS A), the installation can be done without using a bearing washer and nut.

EXPERT TIP

- **Clearance holes in the attachment** are specified for the respective anchor size in the approvals/assessments and manufacturer's guidelines.
- **For stand -** off installations with shear loads on the anchor, additional bending moment occurs and this must be considered.
- **The attachment must lie** fully flush on the surface base or it must have either a compression resistant levelling layer of max. 3 mm or half the anchor's diameter, otherwise the anchor must be checked for bending.
- **The attachment shall be in contact with the anchor** over its entire thickness, otherwise the anchor must be checked for bending.
- **Usable length is the maximum fixing height** t_{fix} which takes into account the attachment's thickness plus additional non-bearing layers (e. g. plaster, air, insulation etc.).
- Post-installed anchors must be tightened with a specific torque. A calibrated torque wrench must be used to ensure the correct pre-stressing force and the correct installation of the anchor. For **chemical anchors, the prescribed hardening time must be adhered to** before tightening torque or service load can be applied.
- Anchors must be mounted as a standard unit as delivered. The exchange or removal of parts is not permitted.

Loads

When selecting an anchor, it is necessary to know the load on the total construction and the resulting action forces.

Action forces can differ based on:

Dimension ▪ Direction ▪ Type of load ▪ Point of application

There are various types of loads:

Approvals generally give characteristic resistance. In the manufacturer's guidelines, **"permissible loads"** are specified for products with approvals. For anchors without an approval, **"recommended loads"** are given by the manufacturer.

- **Determine the size,** direction and point of application of the load. These parameters determine which anchor should be used.
- **Characteristic resistance** (N_{RK} or V_{RK}) describes the 5 % fractile of resistance. (Value with a 95 % probability of being exceeded, with a confidence level of 90 %).
- **Permissible loads** are working loads that already include an appropriate safety factor. These only apply if the approval conditions are complied with (N_{zul} or V_{zul}).
- **Recommended loads or maximum working loads** include an adequate safety factor. These only apply if the manufacturer's specifications are complied with (F_{rec} – valid for all load directions, N_{rec} - for compressive or tensile load or V_{rec} for shear load).
- **The calculation** is carried out by dividing the respective failure load or characteristic loads by a safety factor.
  Recommended safety factors compared to the average failure load:

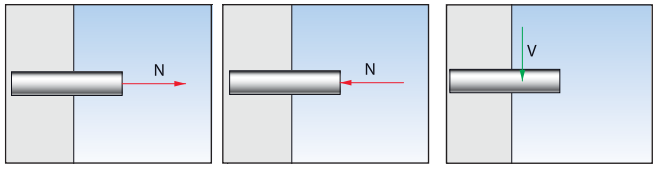
Steel and bonded anchors	$\gamma \geq 4$
Plastic anchors	$\gamma \geq 7$
Hammerfix anchors N	$\gamma \geq 4$

- **Recommended safety factors compared to the characteristic failure loads:**

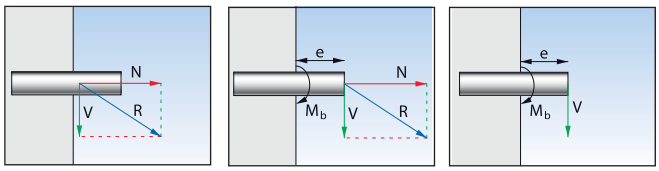
Steel and bonded anchors	$\gamma \geq 3$
Plastic anchors	$\gamma \geq 5$

  For deviations to the regulation, see load tables. For certain products, the safety factors may deviate. In general, the global safety factor is calculated using the scatter of the faillure load, the failure probability and the reliability index of a product.
- **The specified loads** apply to individual anchors that are installed away from the edge, i. e. there is no influence from edges or other anchors.
- **The characteristic spacing and edge distances,** marked with $c_{cr,N}$ and $c_{cr,V}$, give the distances at which an anchor achieves its max. characteristic load.

Load directions

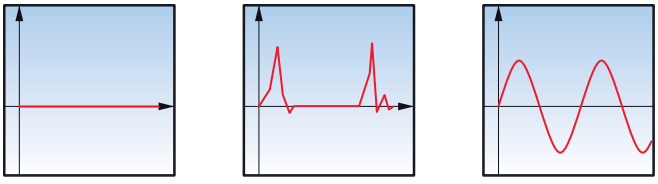


Tensile load | Compression load | Shear load

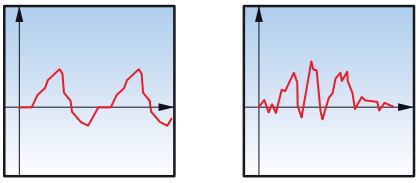


Oblique load (tension and shear load) | Oblique load at distance e (Bend + tension + shear load) | Shear load and bending moment

Types of loads



statically dormant | dynamically rising | dynamically changing

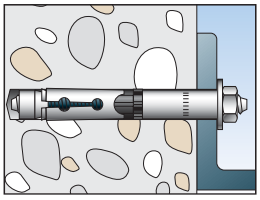


shock | seismic activity

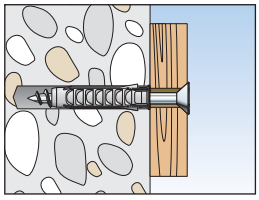
- **The specified minimum spacing and edge distance,** marked with s_{min} and c_{min}, indicates the distance at which no failure of the building material will occur when installing the anchor (cracks). These distances are mandatory and must be complied with. The characteristic spacing and edge distances may be shorter but not less than the minimum values but at the same time the load bearing capacity must be reduced. When combined loads occur, loads are determined separately for tensile and shear load and the overall utilization is determined by means of an interaction equation. As a rule, the sum of the ratio values from tensile and shear loads is less than 1.2.

Working Principles

There are different load transfer mechanisms which induce forces acting on the anchor in a building material.

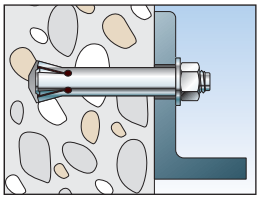


Sleeve anchor (e. g. FH II)

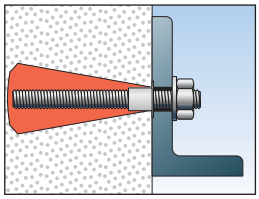


Plastic anchor (e. g. SX)

For frictional locking, the expanding part of the anchor is pressed against the drill hole wall.

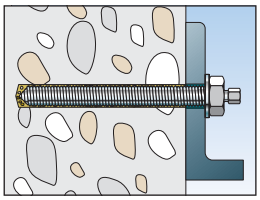


Undercut anchor (e. g. FZA)

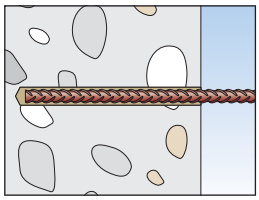


Injection anchor (e. g. FISV with cone drill PBB)

For form locking, the anchor geometry adapts to the subtrate's form or drill hole shape (e. g. conical drill hole).



Resin anchor
(e. g. Superbond RSB)



Subsequent reinforcement connector with concrete reinforcing bars

For adhesive bonding, the load will be transferred by a combination of adhesion and micro-keying (e. g. using resin / injection mortar).

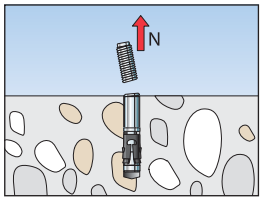
EXPERT TIP

For many fixings, a combination of working principles occurs (e. g. in soft base material a combination of friction and form locking takes place).

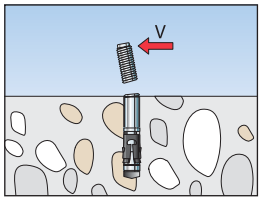
NOTE

Failure modes

If there is excessive stress, incorrect installation or a substrate with inadequate load bearing capacity, the following types of failure can occur.



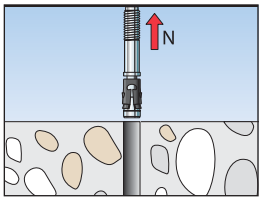
Steel failure tension



Steel failure shear

Steel failure:

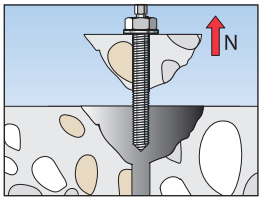
- Insufficient steel stength for the applied load



Pull out

Pull out failure:

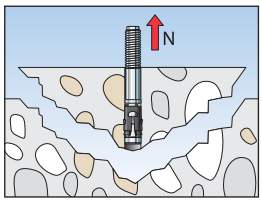
- Friction failure and or adhesion failure due to high load or incorrect installation



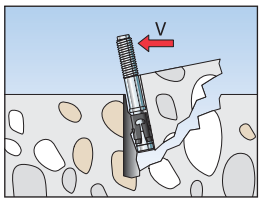
Combined failure

Combined failure:

- Pull out
- Concrete failure near the surface



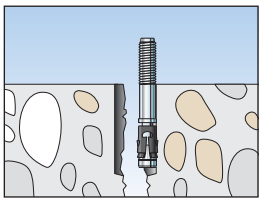
Concrete cone failure



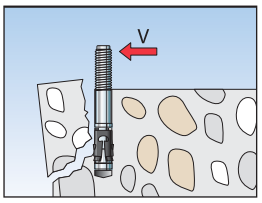
Pry-out failure

Anchor base failure:

- Tensile load “N” or shear load “V” too high
- Inadequate strength of anchor base
- Insufficient embedment depth



Concrete splitting failure



Concrete edge failure

Anchor base splitting:

- Insufficient component dimensions
- Deviation from the spacing and edge distances
- Excessive expansion pressure

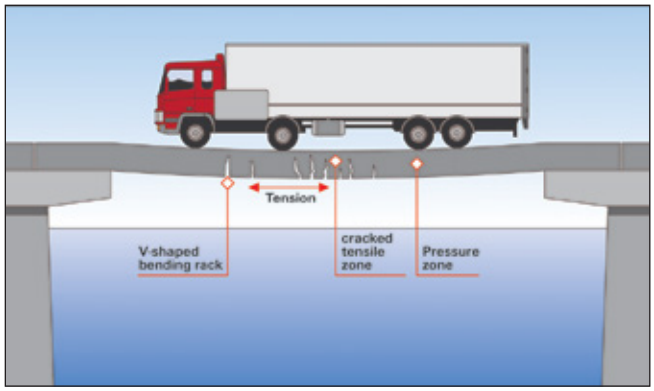
EXPERT TIP

- In most anchor approvals/assessments, the anchoring of **predominately static loads** is regulated. However, there are also approvals which regulate non-static loads (fatigue loads, e. g. FHB dyn).
- Seismic loads for post-installed anchors are regulated in Europe according to ETAG 001 Appendix E. The assessment is to be carried out in accordance with EOTA TR045 until the Eurocode 1992-4 is introduced. The seismic performance of an anchor system is categorised by performance categories C1 and C2. The classification of the seismic performance categories C1 and C2 for seismicity level and the evaluation category is the responsibility of the respective Member State (in Germany, an approval in accordance with ETAG 001 is sufficient. Classification in accordance with C1 and C2 is not necessary). The performance category and the characteristic values are found in the respective ETA (e. g. FAZ II, FH II, FIS SB, FIS EM Plus...).
- **The main causes for anchor failure are overloading, incorrect installation or an insufficient load bearing anchoring base.**

NOTE

Cracks in concrete components

Cracks can occur anywhere in concrete at any time: Factors involved in this are loads such as dead loads, traffi c or windloads, concrete shrinkage and creeping or external infl uences such as seismic activity or ground motion result in stresses and deformations thus leading to cracks.



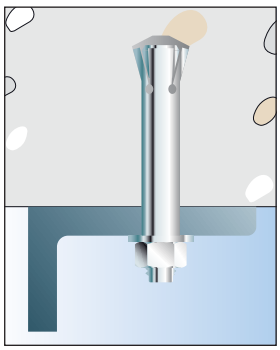
Example:
If a bridge designed as a single-span element is loaded, the bridge will buckle. Due to this buckling, cracks could occur in the element's tensile area.

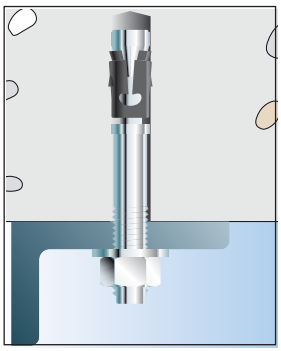
Concrete is not able to support tensile loads, therefore, reinforce-ments are placed in the element to take the tensile load area numerous cracks are formed that are barely visible to the naked eye. This is called the cracked tensile zone.

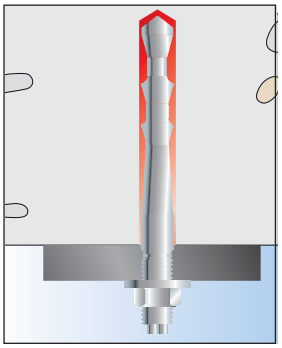
Suitable anchor systems for cracked concrete

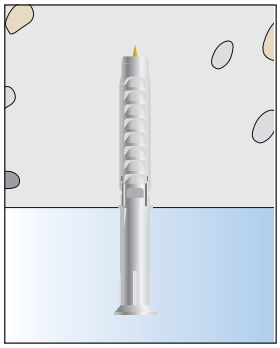
When fixing in concrete, **cracks** are always **expected in the anchoring area which will have an impact on the load bearing capacity** of the anchor system. However, it is very complicated, if not impossible, to prove whether the concrete is cracked or not cracked.

For safety reasons, designers and craftsmen should **always use anchor bolts which are suitable for cracked concrete.** Fixings with an approval/assessment according to ETAG 001 for cracked concrete have proven their suitability in cracks, therefore they can be used without any restrictions in tensile and compres-sion zones of a concrete member.


Undercut anchor FZA


Bolt anchor FAZ II


Threaded rod FHB II


Frame fixing SXS

Due to safety reasons, always use crack-suitable anchor systems such as FAZ II, FH II, FHB II, FIS SB, FIS EM plus or FIS V.

Fire protection – Fundamentals

General requirements of building structures for fire protection.

Structural installations

Structural installations are to be ordered, erected, changed and brought into commission in such a way that:

- the emergence of a fire is prevented from breaking out.
- the spread of fire and smoke (spread of fire) is prevented
- in the event of a fire, the rescue of people and animals is possible.
- eff ective fi re-fi ghting operations are possible.

German regulation

In Germany, the procedure for construction and operational fi re protection are specified by the fi re protection standard DIN 4102, the Model Building Ordinance (MBO), Regional Construction Ordinances (LBO) and various trade-specifi c regulations from professional associations.

The following applies as per Section 1 and 2 of DIN 4102:

Building materials such as **concrete, wood, stone, metal** etc., are classified according to their behaviour **into fl ammable or non-flammable building material classes.**

However, **components composed** of different **flammable and non- flammable materials** are not classified into fire classes in building construction but they are evaluated as a complete system according to their fi re resistance duration. The fire resistance duration R is indicated in minutes and classified according to two categories:

- **Components with a fire resistance duration** of R30 and R60 are fire inhibiting.
- **Fire-resistant,** are all components with a fire resistance duration of R90, R120 and R180.

Tested systems such as cable, ventilation or duct systems are not only tested for fire resistance, but also for functional capability in the event of fire (e.g. supply lines to sprinkler systems). The fire resistance duration of these systems is e.g. E30 to E120 for electrical cable systems or L30 to L120 for specifi ed ventilation ducts. The anchors that are used to fasten these systems must have at least the same fire resistance duration.

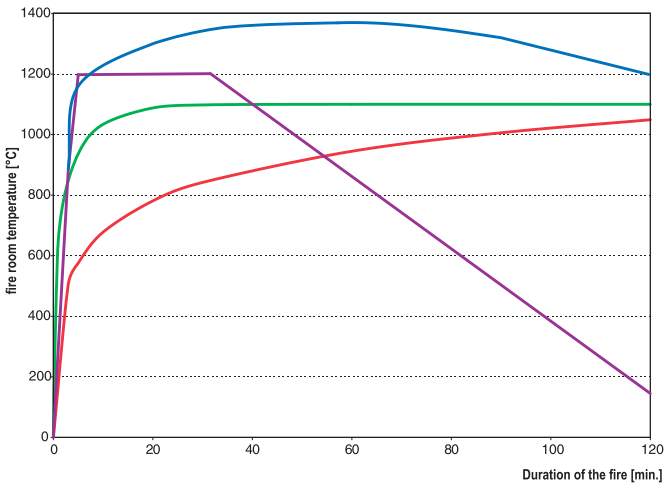
European standardisation

In accordance with the European Norm DIN EN 13501-1, the classifi cation of fi re behaviour of building materials / products is similar to that of DIN 4102. The classifications are, however, much more precise.

In addition to, the main classification criteria concerning flammability, flame spread and heat released, e.g. smoke development and dropping behaviour is tested.

Fire resistance of components has been tested in Germany in accordance with the European Norm DIN EN 1363 or DIN EN 1365 since 2000. The fire resistance duration is then labelled with the letter R for “Resistance”.

The standard temperature-time curve (ETK) of DIN 4102 and ISO 834 is based on a simulation of real fire conditions and forms the evaluation basis that is used worldwide to determine the fire resistance duration. In addition, there are other temperature curves for special fire exposures, e.g. the hydrocarbon curve for destructive fi res caused by flammable liquids or the RAB/ZTV tunnel curve (Germany) or the Rijkswaterstaat tunnel curve (the Netherlands), which describe tunnel fires.



Temperature curves: — (ETC), — Hydrocarbon curve, — RABT/ZTV tunnel curve — Rijkswaterstaat tunnel curve

Fire protection in fastening technology

The fastening technology has a vital importance in fire protection. To ensure the functional capability and stability of railings, pipe systems, fire safety doors or ceiling elements.

Assessing fixings for fire is carried out in accordance with the technical regulation EOTA TR020 or in accordance with fire protection reports.

The labelling and classifi cation of anchors and fixings is classified in:
1 Fire behaviour (e. g. non-flammable)
2 Fire resistance duration (e. g. R90)

For this purpose, the legal regulations set down in the fi nal draft of the Delegated Act "Fire Behaviour" must be observed.

EOTA TR020 only states anchor performance ratings that have an **ETA for cracked concrete!** Meanwhile, a new evaluation document issued by the German Institute for Construction Engineering (DIBt) is used to determine the characteristic load values and the corresponding fi re resistance duration.

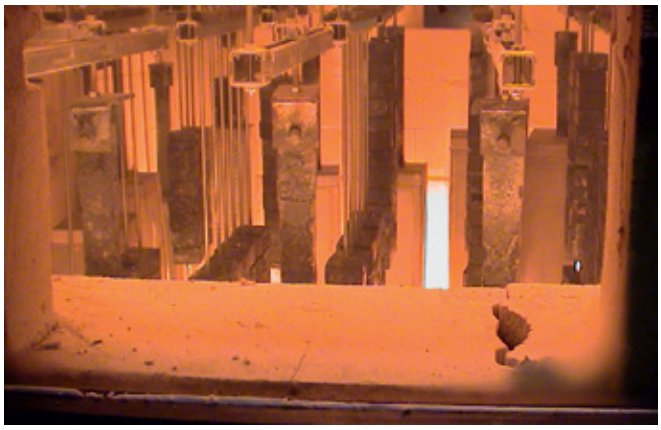
A partial safety factor of $\gamma_M = 1.0$ on the load side is used in the event of fire.

The fire values only refer to anchor bolts that are directly exposed to flames.

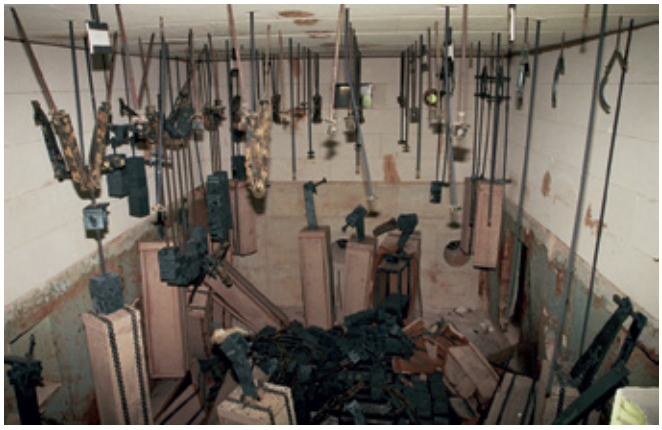
Alternatively, anchors can be protected from direct exposure to fire by using fire protection panels or fire protecting coatings.

For fixing cladding systems, it is assumed that the load bearing capacity of specified plastic screw anchors in concrete with an external diameter of 10 mm and a metal screw diameter of 7 mm and an anchoring depth of $h_{ef} = 50$ mm with a polyam-ide PA6 plastic sleeve has a suffi cient fi re resistance of at least 90 minutes (R90), if the permissible load (no permanent centric tensile load) is ≤ 0.8 kN.

Before the fire test



During the fire test



After the fire test

Corrosion – Fundamentals

Corrosion is a chemical reaction which degrades metal.

The less noble the metal ("electrochemical potential"), the more severe the material damage is, resulting in metal loss or corrosion flakes. For this reason, different appearance patterns have been determined. **The most common types of corrosion in fixings and anchors are:**

Surface corrosion: In this case, the metal corrodes relatively uniformly over the entire surface or over a part of the surface. An example of this is the invisible rusting of a screw in the transition area from anchor plate to hole due to condensation. The result: A connection that appears completely intact from the outside, but suddenly fails.

Contact corrosion: If metals with a different nobility are in contact with each other in a conductive medium, the less noble metal always corrodes (the anode). Whereas stainless is not aff ected. A decisive factor is the surface ratios of the two types of metal: The greater the surface area of the most noble metal in comparison with the less noble, the greater the corrosion. For example, if larger stainless steel sheets are screwed with galvanised screws, the screws will be agressively attacked within a very short time. Whereas using stainless screws in galvinised sheets poses no problems.

Stress corrosion cracking: Permanent internal or external tensile stresses lead to metal strain or corrosion. In this process, a crack develops due to mechanical stresses, which grows under increasing loads and thus creates a path for progressive corrosion. For example, this occurs with stainless steel of corrosion resistance Class III e.g. A4, in an atmosphere containing chlorine (swimming pools). Generally, stress corrosion cracking is not visible with fixings and usually leads to sudden failure of the anchoring.

In 1985, the suspended concrete ceiling of an indoor swimming pool collapsed in Uster, Switzerland. The stainless steel ceiling attachments exhibited no external defects, but were completely destroyed internally in some cases due to stress corrosion cracking.

Example of trans-crystalline stress corro-sion cracking on stainless steel 1.4401 with high chloride concentra-tion

Corrosion protection

There are different ways to protect fastenings from corrosion. The most important are:

Galvinised zinc coating (or also electrolytic zinc coating) followed by passivation is the most common corrosion protection used in metal finishing. A zinc coating thickness of 3 – 10 µm off ers excellent corrosion protection for damp rooms and outdoor use.

Hot-dip galvanising is the application of a metal zinc coating by dipping it in molten zinc (at approx. 450 °C). Zinc layer thickness's of 45 – 80 µm offer an excellent corrosion protec-tion for moist rooms and outdoor use.

Stainless steel fi xings of corrosion resistance class III e. g. A4, material no. 1.4401, 1.4404 and 1.4571 as well as two phased duplex steel (austenitic and ferritic structure / magnetic) are suitable for anchoring in damp rooms, in open air, in industrial atmospheres or near the sea (but not directly in sea water).

Stainless steel anchors made from high corrosion-re-sist-ant steel of the corrosion resistance class V e.g. material no. 1.4529 are used in especially aggressive environ-ments e.g. in atmospheres containing chlorine (swimming pools), in road tunnels or with direct sea water contact. Due to their high molybdenum content they are risistant is such aggressive enviroments. That means that steel type 1.4529 – containing chrome, molybdenum and nicklel – has an alloy content of 58 %. The rest consists of iron and carbon. Due to this very high alloy content, the production for this steel type is very expensive, but on the other hand the conection is safe and maintenance – free in terms of corrosion.

Dynamics

For predominantly non-static loads.

The general building approvals issued by the **German Institute of Construction Engineering (DiBt) and the European Technical Approvals / Assessments (ETA)** are mainly valid for predominately static loads. However, there are certain applications e. g. swinging cranes, crane rails, jib cranes, elevator guide rails, machines, industrial robots and blast fans in tunnels including antenna and masts which are subjeted to dynamic eff ects

In general, the anchoring of components with more than > 1000 load cycles must be carried out using fastening elements that have been checked and approved for this purpose. Until recently, the design for post-installed anchors for such dynamically loaded applications was nearly impossible. Time consuming and costly expert reports and or approvals for individual applications were required.

The bonded anchors: fi scher Highbond anchor FHB dyn and fi scher UMV multicone dyn and FDA **have a German DiBt approval for dynamic loads.** In the approval, only fatigue loads are considered as dynamic loads and not loads from shock or seismic activity.

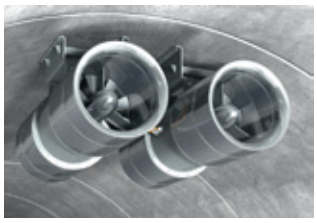
The approvals apply to the anchoring of dynamic loads with unlimited numbers of load cycles, for tension and for shear loads.

In addition, the FHB dyn is manufactured in anchor size M12 and M16 from highly corrosion-resistant steel (e. g. corrosion resistant Class V - 1.4529).

Dynamic load tests have shown - compared to normal stainless steel grades of corrosion resistant class III (e. g. 1.4401 also known as 316) – that this material is not only highly suitable for indoor and outdoor humid environments, as well as other agres-sive conditions, it is also highly suitable for dynamic loadings.

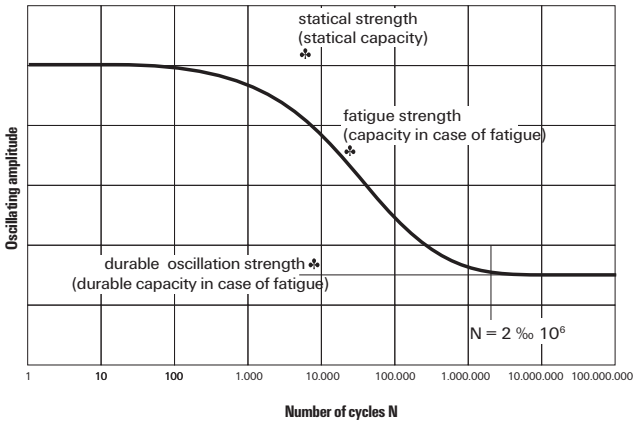
Elevator guide rails

Industrial robots

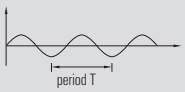
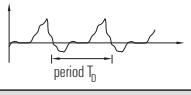
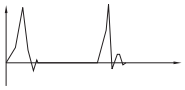


Blast fans

Antenna and masts



Wöhler curve

Action	Run of the oscillation		Possible cause
harmonic		sinusoidal	Unbalances, tumbling machines
periodic		optional, periodical	Regularly abutting parts (e.g. punching machines) , rail- and road traffic
transient		optional, nonperiodical	Earthquakes
impulsive		optional, with very short time of influence	Impact, explosion

Legal basis

The European Union (EU) determines the legal foundation for the assessment, CE labelling and bringing building products into the European Economic Area (EEA).

The aim is to reduce trade barriers by harmonising the requirements of building products.

REGULATION (EU) No 305/2011 (Construction Products Regulations) OF THE EUROPEAN PARLIAMENT AND COUNCIL fully came into force on 1st July 2013. The Construction Products Regulation is law in all EU countries. However, the Construction Product Directive 89/106 / EEC is not law in all EU countries.

Construction products are products, or parts which are permanently incorporated into buildings. Their performance infl uences the structure's basic requirements (e. g. mechanical strength). Therefore, construction products and materials for safetly relevant applications are affected.

Important building requirements include:

1 Mechanical strength and stability
2 Fire protection
3 Hygiene, health and environmental protection
4 Safety and accessibility during use
5 Sound protection
6 Energy saving and heat protection
7 Sustainable use of natural resources

When a construction product is covered by a harmonised standard (hEN), or a European Technical Assessment or Approval (ETA) has been issued for this product, the manufacturer is obligated to draw up a Declaration of Performance (DoP) for this product and affi x the CE marking on the product. The application for an ETA for a construction product by the manufacturer is voluntary. National approvals may only be issued if a construction product is not marked with a CE label.

Existing European Technical Approvals (ETA) are valid until the end of the validity date and will be amended with the Declaration of Performance (DoP) by the manufacturer from the due date. The reference number of the DoP is part of the CE marking and must be determined by the manufacturer. The Declarations of Performance (DoP) are available on the fi scher website under "Approvals/Assessments": http://www.fi scher.de/sdb.

The CE mark is the only means to certify whether the manufacturer has conformed to the applicable harmonised requirements of construction products. The CE label allows the construction product to be freely traded without trade barriers in the European Economic Area.

Each Member State determines the essential characteristics for use of the construction product and its performance in its territory. The unrestricted use of a construction product in a Member State depends on whether performance values exist in the DoP for the essential characteristics determined by the Member State. If one characteristic is declared with "NPD" (No Performance Determined), this can lead to a ban on use in a Member State. Therefore, each member State must establish Product Contact Points, which will provide information on these regulations. In Germany, this is the Federal Institute for Material Research and Testing (BAM: see www.pcp.bam.de).

Assessment procedure

Fasteners which are not covered by a harmonised standard (hEN) can apply for an ETA (European Technical Assessment) on the basis of a European Assessment Document (EAD).

Existing assessment documents, such as ETAGs (European Technical Approval Guidelines) for metal and plastic fixings are still valid and transferred into EADs in accordance with the EU Const-ruction Products Regulation (CRP). The ETAGs and the new EADs can be downloaded from the EOTA website: http://www.eota.eu

The assessment document for mechanical fasteners (ETAG 001- 1, -2, -3, -4 or in the future, EAD 33-0232) and the assessment document for bonded anchors (ETAG 001-5 or in the future, EAD 33-0499) divides possible approvals of metal fixings into 12 options.

Options 1-6 are for use in cracked and non-cracked concrete, options 7-12 are only for use in non-cracked concrete. Anchors of Option 1 off er the largest range of fl exibility for assessment, since performance values for concrete of the strength classes C20/25 to C50/60, as well as the minimum spacing and edge distances are available (see table below).

Section 6 of the ETAG 001 (in the future, EAD 33-0747) regula-tes the assessment of metal fixings in cracked and non-cracked concrete for multiple use for non-structural systems. Non-load bearing systems include components which do not contribute to the stability of the construction, they only transmit their dead or wind load. These are, for instance, simple suspend-ed ceilings and false ceilings, pipelines and façade claddings.

When using fixings for multiple use, it is assumed that if excessive slippage or failure of a fixing point occurs, that the load will be transferred to neighbouring fi xing point. A fixing point can be defi ned as a single anchor or a group of anchors.

This is known as a redundant system, where stability is not affected by an individual anchor failure.

Possible assessment options according to EAD

Options	Cracked concrete	Non-cracked concrete	One value for all concrete strengths	Different values for C20/25 to C50/60	One value for load direction	Separate values for tensile and shear capacity	^{c}cr / ^{s}cr	$^{c}min < ^{c}cr$ / $^{s}min < ^{s}cr$	Design method as per EN 1992-4
1	✓	✗	✗	✓	✗	✓	✓	✓	A
2			✓	✗					
3			✗	✓	✓	✗			B
4			✓	✗					
5			✗	✓			✓	✗	C
6			✓	✗					
7	✗	✓	✗	✓	✗	✓	✓	✓	A
8			✓	✗					
9			✗	✓	✓	✗			B
10			✓	✗					
11			✗	✓			✓	✗	C
12			✓	✗					

Design of fastenings

Two different anchor designs are differentiated.

Method with global safety factors

Permissible loads are determined from the average failure load or from the 5 % fractile load and compared with the action load.

The safety factor depends on the anchoring system, the type of installation and external infl uences such as temperature and or humidity. Global safety factors are generally = 3 for steel and bonded anchors and = 5 for plastic anchors.

Methods with partial safety factors

According to this method, it is shown that the value of the design actions S_d does not exceed the value of the design resistance R_d ($S_d \leq R_d$).

The action on fi xings are determined according to the same rules and used the same partial safety factors employed in reinforcred concrete design (see Eurocode 1990; national appendix must be observed).

The design resistance is determined by using the characteristic resistance and the partial safety factor of the material ($_M$), which takes into account the scatter of the material. The values can be taken directly form the ETA. Safety is national law. The design method as well as the related partial safety factors are determined by the Member State.

Only the product specific coefficient for installation is specified in the ETA, which is used to calculate the partial factor $_M$. The design standard EN 1992-4, which is expected to be ratified in 2018, contains the national determined partial safety factors (observe the respective national appendex).

The design method as set down according to ETAG 001, Annex C - design method for metal anchors and the design method according to TR029 - bonded anchor design in concrete, as well as CEN/TS 1992-4, Section 4 (mechanical anchors) and Section 5 (chemical anchors) are the current methods for anchor design based on a European Technical Approval or Assessment (ETA). Moreover, the ETAG 001 Annex C distinguishes between three different design methods (A, B and C), method A being the most important and the most economical method since anchors are considered separately for all load directions and failure modes. Methods B and C play a minor role and are hardly used.

Other important design provisions are:

EOTA TR020 Anchor design in concrete under fi re exposure, or CEN/TS 1992-4, Part 1, Appendix D

EOTA TR045
Anchor design in concrete for seismic actions
The applicable assessment design methods are generally indicated in the respective ETA. It is important that design methods are not commingled.

The design for metal anchor (under static and seismic loads as well as under fire exposure) is summarised in EN1992-4, i.e. in Section 4 of the Eurocode 2, but then must be ratified by each Member State and, if applicable, adapted for national annexes. As soon as EN1992-4 is published, all other design methods (ETAG 001 Annex C, TR045, TR020, TR029 and CEN/TS 1992-4) are no longer valid.

fischer has developed a simple yet powerful design software for daily use: the fischer - C-FIX. The software enables designers and users to carry out anchor designs according to different design methods. Complex anchor arrangements can be calculated quickly and easily. The feature "multple design" makes it possible to select the best technical and cost saving solution.

Approvals, markings and their importance

The most important symbols are presented below.

European Technical Approval / Assessment
Issued by a European approval authority (e. g. DIBt) on the basis ofthe guidelines for European technical approvals (ETAG). ETA (Eng-lish): European Technical Approval/Assessment. CE: The CE marks the conformity of the product to all applicable legal provisions in which their installation is intended. This means that the CE mark only certifies that the requirements determined in the relevant har-monisation legal provisions of the union have been complied with.Products with the CE mark can be freely traded in the European Economic Market.

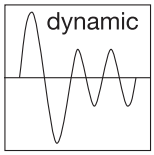
ICC International Code Council
ICC Evaluation Service Inc. (ICC ES) issues reports, e. g. for subsequent anchoring on the basis of the International Building Code® and the related standards in the United States of America

FM Certificate
Recognised for use in local water- based fire extinguisher systems (Factory Mutual Research Corporation for Property Conservation, American insurance company).

General building authority approval
German approval, issued by the DIBt, Berlin with the accompanying certificate of conformity for construction products with the general building authority approval. Confirmed by a material testing institute.

Fire-tested fixing
The anchor was subjected to a fire test. It is an "investigation report to test the anchor under fire exposure (fire behaviour) (with R-Class). Fire tests are not required when using the simplified verification method according to TR020 - then the values can be transferred directly to the ETA.

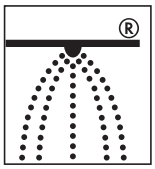
This product is made from **high corrosion resistant steel** of corrosion resistance class V, e. g. 1.4529.



Dynamically loadable anchors
The anchor is suitable and approved for anchoring of "not predominantly static" (i.e. dynamic) loads.static" (i.e. dynamic) loads.static" (i.e. dynamic) loads.

General construction-related test certificate

The fixing is suitable for anchoring under **seismic influence.** Please note: The ICC-ESRs also allow seismic stress (see Category C1 and C2 in accordance with the ETAG 001 Annex E).



Mark for labels that confirm compliance with the VDS-CEA guidelines for **sprinkler systems, planning and installation.** Fixings labelled as such may be used for fixing pipes for extinguishing systems.

Tested for **flammability** in accordance with VDE.

Fixings for tensile zones
The fixing is suitable and approved for anchoring in cracked concrete (tensile zone) and in uncracked concrete (compression zone).

Fixing made of high-quality, ageing-resistant **nylon** (polyamide).

Component test with window frame screws in accordance with ift guideline M0-01/1; Testing structural connections on windows.

The term "approvals" used in the catalogue consists of documents that are available and can be used as evidence of the usability of building products for which the documents were issued. These are (fire) reports, general construction-related approvals issued by the German Institute for Construction Technology Berlin (e.g. Z-21...) or European Technical Approvals or Assessments (ETA). In general, the usability of construction products in an EU Member State is given, if the performance of the significant characteristics required in each Member State has been clarified/ confirmed by the manu-facturer. Information on the significant necessary characteristics in a country can be found at the national Product Information Contact (Link: http://ec.europa.eu/Docs- Room/documents/4170/attach-ments/1/translations/en/renditions/native).

Fire prevention

Fire prevention is a critical consideration for those who are responsible for creating the design, specification and construction of new buildings, with consideration in the ongoing maintenance of occupied premises.

As the causes of fire vary and are often unpredictable, construction measures are being designed to influence the formation and spread of fire, smoke and toxic gases, by minimising the available factors needed to create a fire or to limit the spread of fire once it has started. Effective fire fighting within a building is generally achieved through a combination of active and passive FireStop systems and, when used in conjunction with each other, provide a balanced fire protection strategy.

Active FireStop systems

Active fire prevention systems are designed to react to the outbreak of a fire, which is then suppressed with the help of sprinkler systems, halogen installations, fire extinguishers or other proactive mechanical systems. The effects of the fire may also be lessened by the removal of smoke from the equation. By including alarms and emergency lighting, active systems also serve to provide escape paths for people inside the building.

Passive fire prevention systems

Passive fire prevention is an integral component, which is designed and built in to the fabric of the structure. It is also an essential element of the fire safety of a building. The risk of fire can be minimised by dividing the building into a series of compartment/cells bounded by fire rated walls and floors. To maintain the firestopping integrity of a compartment/cells, any gaps, openings, void or channels within the fire rated walls or floors must be sealed with an approved or certfied system to prevent the passage of fire, smoke and toxic gases.

Building codes and national regulations

Most model building codes have very clear requirements on passive fire protection. “Fire investigation reports have consistently shown that unprotected or improperly protected penetrations and joints cause millions in property damage and contribute to the loss of life and injuries due to the uncontrolled migration of fire, smoke and toxic gases.” In order to promote life safety and property protection, the national building codes include fire testing and performance requirements for penetration firestop and fire resistive joint systems. The following regulations are published as statutory instruments by Parliament with respect to life safety purposes:

ENGLAND AND WALES: 1991

Section 11.2 of Approved Document B3 states: “If a fire separating element is to be effective, then every joint, or imperfection of fit, or opening to allow services to pass through the element, should be adequately protected by sealing or fire stopping so that the fire resistance of the element is not impaired”

Section 11.12 adds, under the heading of ‘Fire stopping’, a requirement that: “Joints between fire separating elements should be fire stopped; and all openings for pipes, ducts, conduits or cables to pass through any part of a fire separa-ting element should be:

Kept as few in number as possible and kept as small as practical fire-stopped (which in the case of a pipe or duct, should allow for thermal movement)”

BS 7671: 2008: UNITED KINGDOM

The 17th edition of the IEE Wiring Regulations (BS 7671:2008) is the national standard in the United King-dom for all commercial, domestic and industrial wiring installations.

Section: 527-02-01 states “Where a wiring system passes through elements of building construction such as floors, walls, roofs, ceilings, partitions or cavity barriers the openings remaining after passage of the wiring systems shall be sealed according to the degree of fire resistance required of the element concerned.”

Section: 527-02-02 states “where a wiring system such as conduit, cable ducting, cable trunking, busbar or busbar trunking penetrates an element of building construction ha-ving specified fire resistance it shall be internally sealed so as to maintain the degree of fire resistance of the respec-tive element as well as being externally sealed to maintain the required fire resistance.”

GERMANY: FEDERAL STATE BUILDING ORDER

In Germany, the Federal State Building Order is regulated at the level of the federal states. Therefore, there are 16 regional state building codes with their own regulations and guidelines. The 2002 Directive Building Code and the 2005 Directive Guidelines for conduit and ventilation systems form the basis for further consideration. The list of the Technical Building Regulations – M-ETB, includes other codes, such as the MLAR and the German Ventilation Systems Directive – MLüAR. Once guidelines are adopted into the list at regional state level List of Technical Building Regulations–LTB, the guidelines become legally binding.

NFPA 101 LIFE SAFETY CODE: UNITED STATES

Life Safety Code addresses those construction, protection, and occupancy features necessary to minimise danger to life from the effects of fire, including smoke, heat, and toxic gases created during a fire. The Code establishes minimum criteria for the designs of egress facilities, so as to allow prompt escape of occupants from buildings or, where desirable, into safe areas within buildings. The Code also addresses protective features and systems, building services, operating features, maintenance activities, and other provisions in recognition of the fact that achieving an acceptable degree of life safety depends on additional safeguards to provide adequate egress time or protection for people exposed to fire. Relevant firestop requirements can be found in below mentioned references:
8.2.2 Compartmentation Continuity
8.2.3.2.4 Penetrations and Openings In Fire barriers
8.2.4.4 Penetrations and Openings In Smoke Partitions
8.3.2 Continuity of Smoke Barriers

NFPA 5000 BUILDING CONSTRUCTION AND SAFETY CODE

NFPA 5000 – Building Construction and Safety Code is a model building code developed by the National Fire Protection Association. For the most part, the requirements for fire stops are the same in NFPA 5000 as they are in the IBC. It also addresses joints between assemblies in a similar manner to the IBC. NFPA 5000 states openings must be protected by „a system or material capable of restricting the transfer of smoke". It addresses protection for through-penetrations and membrane penetrations in Section 8.8 using the same test methods as the IBC. The requirements for F and T ratings are also the same. Joint systems, including perimeter joints at curtain walls, are addressed in the same manner as the IBC.

IBC INTERNATIONAL BUILDING CODE: UNITED STATES

In the Past: The Regional Model codes developed by the Building Officials Code Administrators International (BOCA) were used on the East Coast and throughout the Midwest of the United States, while the codes from the Southern Building Code Congress International (SBCCI) were used in the Southeast and the codes published by the International Conference of Building Officials (ICBO) covered the West Coast and across to most of the Midwest. After three years of extensive research and development, the first edition of the International Building Code was published in 1997. The code was patterned on three legacy codes previously developed by the organizations (BOCA, SBCCI, ICBO) that constitute IBC. By the year 2000, ICC had completed the International Codes series. Relevant firestop requirements can be found in below mentioned references:
702 Definitions
704.9 Separation of Vertical Openings - Sprinkler Exception
708 Fire Partitions 1 Hour Rating
709 Smoke Barriers 1 Hour Rating
710 Horizontal Assemblies
711 Penetrations (General)
711.3.2 Sprinkler Heads Electrical Boxes
711.4.1.2 „F" & „T" Rating Requirements
712 Fire-Resistant Joint Systems
712.4 Curtain Wall to Edge of Slab

OTHER RELEVANT CODES FROM IBC:UNITED STATES

The International Building Code and International Residen-tial Code are just a few of the comprehensive I-Codes the Code Council has created. The publications of the codes allow for easier following from members and allow them to observe and study the model code. Some of these codes have specific practices, such as the International Fire Code and the International Green Construction Code, or the IGCC. Here is the current list of I-Codes developed and published by the Code Council:
International Building Code
International Residential Code
International Fire Code
International Plumbing Code
International Mechanical Code
International Fuel Gas Code
International Energy Conservation Code
IBC Performance Code
International Wildland Urban Interface Code
International Existing Building Code
International Property Maintenance Code
International Private Sewage Disposal Code
International Zoning Code
International Green Construction Code.

OTHER RELEVANT CODE

NFPA is responsible for 300 codes and standards that are designed to minimize the risk and effects of fire by establi-shing criteria for building, processing, design, service, and installation.
Some of the other widely used NFPA codes are:
NFPA 70 NEC – National Electrical Code
NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
NFPA 221 - Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls

Approvals, markings and their importance

British Standard
BS 476-20

BS 476-20:1987
Fire tests on building materials and structures. Method for deter-mination of the fire resistance of elements of construc-tion (general principles).

BS EN13501-1

EN13501-1:2007+A1:2009
Fire classification of construction products and building elements. Reaction to Fire.

BS EN13501-2

EN13501-2:2007+A1:2009
Fire classification of construction products and building elements. Resistance to Fire.

BS EN1366-3: 2004

EN1366-3:2004
Fire resistance tests for service installations - Penetration seals.

BS EN1366-4: 2006

EN1366-4:2006
Fire resistance tests for service installations - Linear joint seals.

DIN

DIN 4102:Part1
Fire behaviour of building materi-al and elements - Part 1: Building materials, concepts.

American Standard
ASTM E 84 (UL 723)

ASTM E 84
Test method for Surface Bur-ning Characteristics of Building materials. The test evaluates the spread of flame along the surface of the material. It is not a resistance test.

American Standard
ASTM E 1966
(UL 2079)

ASTM E 1966
Test method for Fire-Re-sistive Joint Systems. This test is used to evaluate the performance of a joint after a cyclic movement test and fire exposure test. UL 2079 - equivalent.

American Standard
ASTM E 814 (UL 1479)

ASTM E 814
Test method for Fire Tests of Through Penetrations Fire Stops. This test is used to evaluate the performance of a firestop system, following fire ex-posure a hose stream test is conducted. UL 1479 - equivalent.

BS EN ISO 10140

BS EN ISO 10140:2010
The laboratory measurement of airborne sound insulation of buildng elements.

BS EN 1026

BS EN 1026: 2000
Air permeability test method.

BS EN 1027

BS EN 1027: 2000
Water permeability test method.

ETA
CE
ETA-XX/XXXX
ETAG XXX-X
xxx

CE marking is a declaration by the manufacturer (through verified testing) that the product meets all the appropriate provi-sions of the relevant legislations implementing certain European Directives. ETA - The European Technical Assess-ment provides information about the construction product to be declared in relation to its essential characteristics.

CLASSIFIED
C UL US

UL is an abbreviation for Under-writers Laboratories Inc. which is an independant, not for profit product safety testing and certifi-cation organisation.

UL EU

UL-EU Mark is intended for use on products destined for the European marketplace.

FM
APPROVED

FM Approvals is an internatio-nal leader in third-party certifica-tion and approval of commercial and industrial products.

warrington certifire certification
APPROVED PRODUCT
CF xxxx

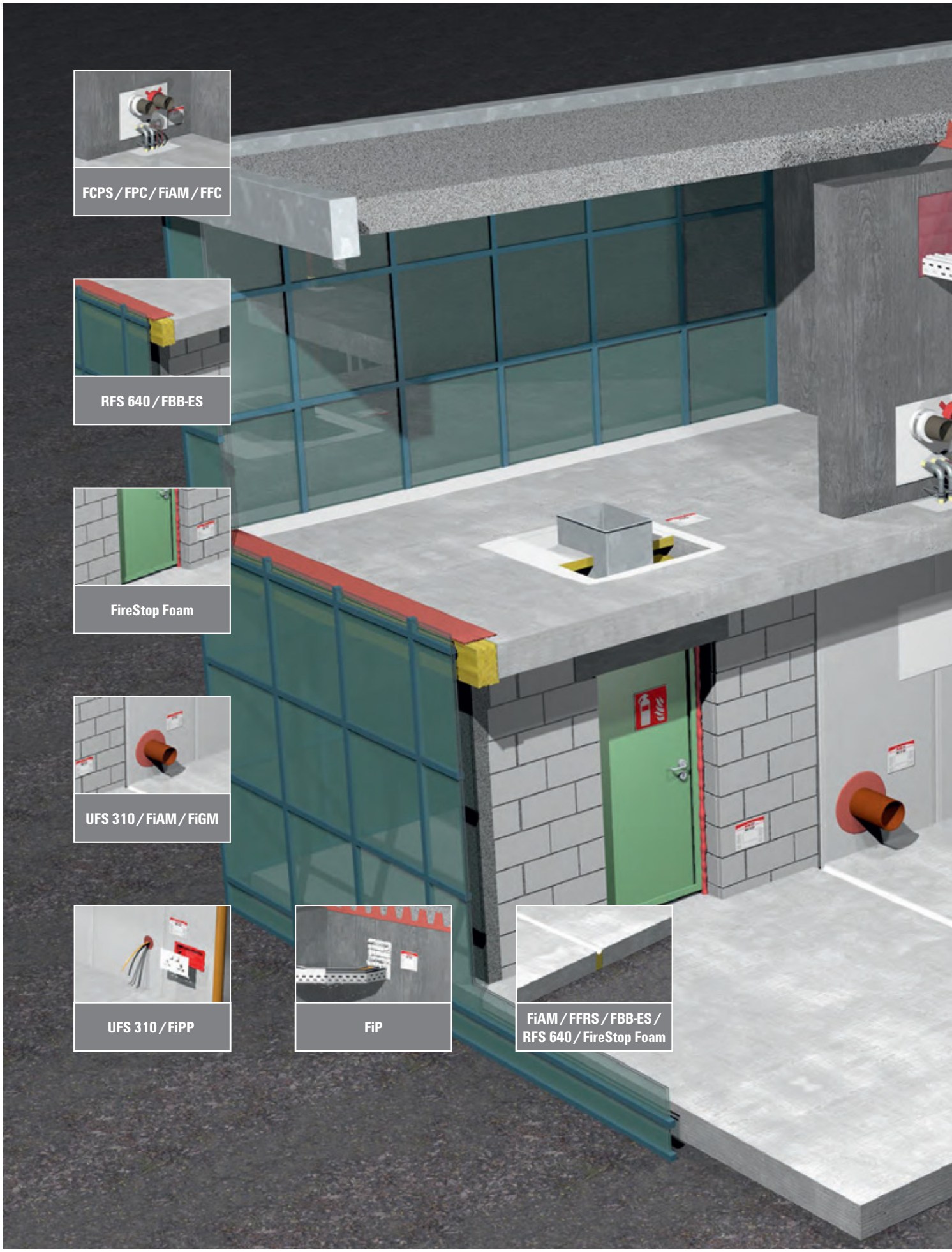
Certifire is an independant Third Party Certification organisation. The scheme under-takes require-ments such as the manufacturing of products under a Third Party Quality Management System, Independent Audit Testing, and a Comprehensive Field of Applica-tions document based on careful chosen test that helps to ensure the products and systems are used within their approval scope.

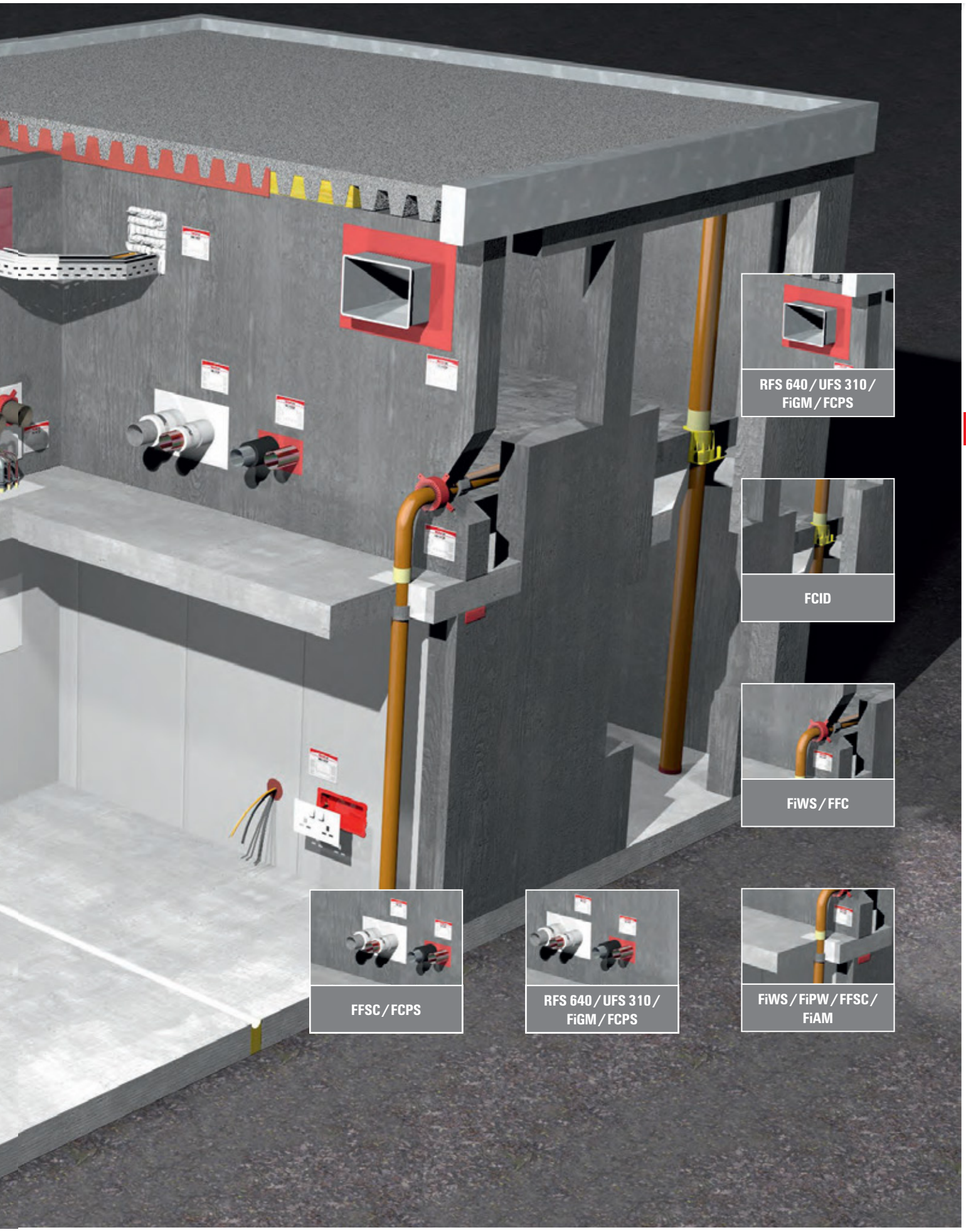
certifire

Advanced product selection guide

The most important symbols are presented below.

Product	Tested to								Approved to				Application								Page
	BS 476: Part 20	BS EN 1366-3	BS EN 1366-4	DIN 4102	AS 1530	ASTM E 814 (UL 1479)	ASTM E 1966 (UL 2079)	ASTM E84 (UL 723)	ETA/CE marking	UL approved	Certifire approved	FM approval	Construction joint	Perimeter joints	Metallic pipes	Insulated pipes	Non-metallic pipes	Cable and cable trays	Air ducts	Insulated air ducts	
Intumescent Acoustic Mastic FiAM	■	■	■				■	■	■	■	■		■		■			■	■		
Fire Rated Silicone Sealant FFRS	■		■						■		■		■								
Rapid Fire Seal RFS 640	■					■	■	■		■		■	■	■	■			■	■		
Fire | Barr ElastoSeal FBB-ES	■		■						■				■	■							
Universal FireStopping Sealant UFS 310	■					■	■	■		■		■	■		■	■	■	■	■	■	
Intumescent Graphite Mastic FiGM	■	■	■						■		■		■		■	■	■	■	■		
Intumescent Pipe Wrap FiPW	■	■							■		■					■	■				
Intumescent Wrap Strip FiWS						■		■		■		■			■	■	■				
Fire Collar FFC	■	■							■							■	■				
Cast in Device FCID	■				■												■				
Intumescent Pillows FiP	■	■							■		■				■			■	■		
Intumescent Putty Pad FiPP	■	■																■			
Coated Panel System FCPS	■	■							■		■				■	■	■	■	■		
FireStop Compound FFSC	■	■			■		■		■	■					■	■	■	■	■		
Fire | Barr Cavity Barriers	■		■										■	■							
FireStop Foam	■		■	■									■								
Thermal Defense Wrap DTW	■	■							■						■	■		■	■	■	


FCPS / FPC / FiAM / FFC
RFS 640 / FBB-ES
FireStop Foam
UFS 310 / FiAM / FiGM
UFS 310 / FiPP
FiP
FiAM / FFRS / FBB-ES / RFS 640 / FireStop Foam


RFS 640 / UFS 310 / FiGM / FCPS
FCID
FiWS / FFC
FFSC / FCPS
RFS 640 / UFS 310 / FiGM / FCPS
FiWS / FiPW / FFSC / FiAM

Engineering judgement request form

Project name: _____
Consultant: _____
Contactor: _____
Contact: _____
Email: _____
Phone: _____
Fax: _____

Requested by: _____
Company: _____
Email: _____
Phone: _____
Fax: _____
Supplier: _____
fischer engineer: _____

Fire rating requirements

Frating (hours):

Trating (hours):

Approval type:

Through penetration

Assembly details: ☐ Wall ☐ Floor

Base material: ☐ Concrete ☐ Blocks ☐ Drywall

Thickness: _____

Other please specify: _____

Opening details: ☐ Circular ☐ Rectangular
Sleeved ☐ Yes ☐ No
Size
Sleeve type ☐ PVC ☐ Steel

Annular Space: Min: _____ Max: _____

Penetration details:

☐ Pipe	☐ Duct	☐ Cables	☐ Cable trays/ladders	☐ Bus Bars
Size _____	Size _____	Size _____	Size _____	Size _____
Type	Type	Type	Type	Type
Insulation	Insulation	Insulation	Insulation	Insulation
Type _____	Type _____	Type _____	Type _____	Type _____
Thick _____	Thick _____	% fill _____	Nos _____	_____

Joint

Joint type: ☐ Head of wall ☐ Wall to wall ☐ Bottom of wall ☐ Perimeter joint ☐ Floor to floor ☐ Floor to wall

Base material: ☐ Concrete ☐ Drywall ☐ Blocks ☐ Steeldeck ☐ Concrete ☐ Drywall ☐ Blocks ☐ Steeldeck

Joint details: ☐ Static ☐ Dynamic
Width _____

Movement required: _____

Curtain wall details: _____

Special conditions / comments / drawings / standards

_____
_____
_____
_____
_____
_____

Reference No.: _____

Calculation of Consumption Guide

CALCULATIONS FOR MASTIC / SEALANT

a = Hole diameter in mm
b = Depth of sealant in mm/wet fi lm thickness for spray material (see recommendations)
c = Pipe or bunched cables diameter in mm
d = Annular space in mm (see recommendations)
l = Length of square opening/joint
w = Width of square opening/joint
h = Cartridge or spray bucket size in ml
n = Number of holes
e = Area of hole in $mm^2 = \pi(a \div 2)^2$
f = area of pipe in $mm^2 = \pi (a \div 2)^2$
g = Amount of mastic needed per hole in ml = ((e-f) x b) ÷ 1,000

Round holes

No. of cartridges needed = n x $(\frac{g}{h})$

Area of hole e = π x $(a \div 2)^2$ mm^2

Area of pipe f = π x $(c \div 2)^2$ mm^2

Mastic volume = g = ((e-f) x b) ÷ 1,000 ml

Example:

a = 90 mm
b = 40 mm
c = 50 mm
h = 310 ml
n = 20

e = 3.14 x 45^2 = 6,361.73 mm^2
f = 3.14 x 25^2 = 1,963.50 mm^2
g = ((6,361.73 - 1,963.50) x 40) ÷ 1,000 = 175.92 ml

No. of cartridges = 20 x $(\frac{175.92}{310})$
= 11.35 cartridges

Square holes

No. of cartridges needed = n x $(\frac{g}{h})$

Area of hole e = l x w mm^2

Area of pipe f = π x $(c \div 2)^2$ mm^2

Mastic volume = g = ((e-f) x b) ÷ 1,000 ml

Example:

l = 90 mm
w = 100 mm
b = 40 mm
c = 50 ml
h = 310 ml
n = 20

e = 90 x 100 = 9,000 mm^2
f = 3.14 x 25^2 = 1,963.50 mm^2
g = ((9,000 - 1,963.50) x 40) ÷ 1,000
= 281.46 ml

No. of cartridges = 20 x $(\frac{281.46}{310})$ = 18.1 cartridges

Linear joints

No. of cartridges/buckets = $(\frac{g}{h})$

Area of joint = e = l x w mm^2

Mastic volume = ((e-f) x b) ÷ 1000 ml
= g

Example for mastic/sealant:

w = 20 mm
l = 30m = 30,000 mm
b = 10 mm
h = 310 ml
e = 20 x 30,000 = 60,000 mm^2
g = (60,000 x 10) ÷ 1,000 = 6,000 ml
No. of cartridges = $(\frac{6,000}{310})$
= 19.4 cartridges

Example of joint Spray:

w = 100 mm, w1 = 125 mm (with overspray)
l = 300 m = 300,000 mm
b = 1.5 mm
h = 19 litres = 19,000 ml
e = 125 x 300,000 = 37,500,000 mm^2
g = (37,500,000 x 1.5) ÷ 1,000 = 56,250 ml
No. of buckets = $(\frac{56,250}{19,000})$ = 2.96 buckets

Calculation of Consumption Guide

CALCULATIONS FOR COMPOUND

l = length of the opening b = width of the opening
d = depth as per required fi re rating C = penetrant area or cross sectional area of services
Y = coverage/yield of 1 bag in litres
Volume of compound required = volume of opening - volume of services
= [(lxbxd) - (Cxd)] m3
= [(lxbxd) - (Cxd)] x 1,000 litres
= V

$$\text{No. of bags} = \frac{V}{Y}$$

Example
l = 1,000 mm = 1 m b = 500 mm = 0.5 m
d = 100 mm = 0.1 m C = 20 % of opening = l x b x 20 % = 1 x 0.5 x 0.2 = 0.1
Y = 24 litres per 22 kg bag
Volume of compound required = [(1 x 0.5 x 0.1) - (0.1 x 0.1)] x 1,000 litres
V = 40 litres

$$\text{Numbers of bags required} = \frac{40}{24}$$

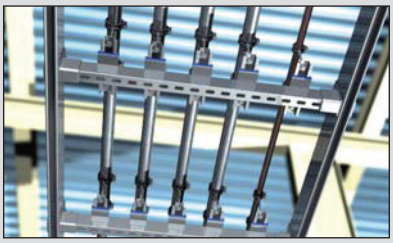
= 1.67 bags

CALCULATIONS FOR PILLOWS FIP

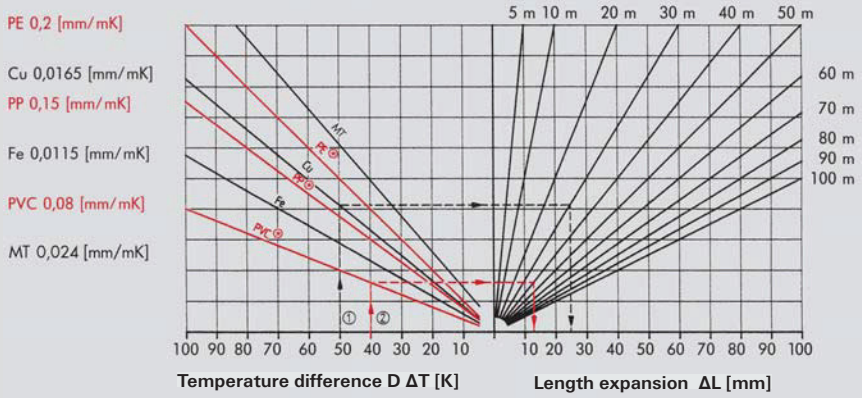
Estimation of large and medium size pillows in walls and floors openings of size up to 1 sq. meter.

Width [mm]	Size / Seal type	Length [mm] 100 Large	100 Medium	300 Large	300 Medium	500 Large	500 Medium	700 Large	700 Medium	900 Large	900 Medium	1,000 Large	1,000 Medium
200	Wall	3	5	7	13	12	22	17	31	21	39	24	47
	Floor	2	3	4	7	6	12	9	17	11	22	12	27
400	Wall	5	9	14	26	24	44	33	61	42	78	47	95
	Floor	3	5	7	15	12	24	17	34	22	43	24	52
600	Wall	7	13	21	39	35	65	49	91	63	117	70	143
	Floor	4	7	11	22	18	36	25	51	33	65	36	79
800	Wall	9	18	28	52	47	87	66	122	84	157	94	192
	Floor	5	10	15	29	24	48	34	67	33	87	48	107
1,000	Wall	10	22	35	65	59	109	82	152	105	196	117	217
	Floor	6	12	18	36	30	60	42	84	54	108	60	120

Elongation



Materials expand with heat. For long components, the change in length is mainly con-sidered. So it is not always a matter of expansion. Shrinkage upon cooling is to also be included in the calculation. This is important when installing pipes. Within piping, the change in length is to be specifi cally steered. Not doing this during installation results not only in pipe defects, but also in serious damage to components. It is therefore essential to determine how great the change in the length of a pipe can be. For this pur-pose, the pipe length and the expansion coeffi cient of the pipe material, as well as the expected temperature diff erence, must be known. This is to be determined such that not only the normal operating temperatures, but also the maximum temperatures that can arise in a case of malfunction, are taken into account. The range is therefore from around 10 °C assembly temperature up to 95°C service temperature for water fi lled systems.



Note:
For plastic pipes (PE, PP, PVC), the length expansionread from the diagram is to be multiplied by a factor of 10.

Example:

① Copper pipe, Cu – Length of pipe span 30 m
Temperature difference △T = 50 K
Length expansion △ L= 24,75 mm

② PVC pipe – Length of pipe span L = 40 m
Temperature difference △ T = 40 K
Length expansion △ L = 128 mm (table value x10)

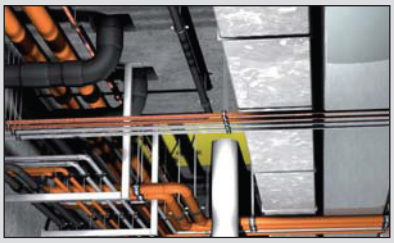
Length expansion calculation formula

$$\triangle L = L \cdot \triangle T \cdot \alpha$$

[mm] [m] [K] [mm/m K]

△ L = Change in length
L = Length of the pipe span/section
△ T = Temperature difference
α = Length expansion coefficient

Soundproofing



As defined in the appropriate standards, the goal of soundproofing is to reduce the transmission to other apartments or usage areas to a given noise range. The upper limits for permissible residual noise levels are defined in the standards.

Soundproofing - VDI 4100

In principle, the VDI 4100 values are, among other things, protection against noise from building systems that are mounted in the neighbouring area. According to VDI 4100, living areas are rooms that are in need of protection; in apartments, these are all rooms with a floor space of > 8m2. This includes kitchens, bathrooms, toilets, hallways and ancillary rooms. VDI 4100 further recommends agreeing with the contracted companies the sound insulation values SSt EB I = 35 dB or SSt EB II = 30 dB for noise emerging from one's own area. Exceptions to this are all sounds that are influenced by the residents, i.e. self-installed air conditioners in the apartment or noises from flushing toilets, etc.

Soundproofing - DIN 4109

The DIN 4109 from 2016-07 still supplemented by A1 (2001-01), in which the permissible sound pressure level in living and sleeping areas for noise from building installations was reduced from 35 to 30 dB(A). The standard is not applicable to the protection against noise from building installations in one's own living area, but only to sounds coming from "external" areas as defined in VDI4100. For increased sound insulation, DIN 4109 Addendum 2 (from 1989) specifies a reduction in the permissible values by 5 dB(A) (to 25 dB(A)) as effective for noises from building installations.

Soundproofing - important influential factors for pipe mounting

Sound propagates in vibrations. These sound waves can propagate in solid, liquid and gaseous media, where the speed of this sound propagation differs greatly in the various media. So the sound in pipe installations is primarily forwarded through the pipeline itself and not through the carried medium. Transmission over the metal pipe is faster than in water, for example. In welded heating systems, for example, the individual sounds of striking a pipe can propagate throughout the entire building. The sound waves are transmitted in a medium in that the molecules constantly jolt one another, thereby transmitting the wave. Steel pipes or metallic mounting elements have an ordered metallic lattice, wherein forwarding is faster and with less loss than in amorphous materials, such as rubber (general elastomers). It can thus be determined that an inversely proportional relationship exists between the speed of sound [symbol; c] and the insulating behaviour of materials. That is, materials with a low sound speed always have better insulating properties than materials with a high sound speed (steel c = 5100 m/s). Rubber (c ~40 m/s) is therefore eminently suitable for sound insulation.
In rubber, the sound waves stop dead, so to speak, wherein the energy is converted into heat.

Therefore, the sound isolation must in principle occur between the pipes and the structure. Here, we recommend the installation of a sound insulating element as close to the sound source as possible; in the simplest case, with an insulating insert in the pipe clamp itself. Sound tested pipe clamps by fischer FRS Plus pipe clamp, FRS pipe clamp and FRS-L Universal pipe clamp.

Corrosion protection

In most cases , pipes and supply lines are installed in dry rooms. Therefore, in addition to corrosion resistant materials, such as plastics or stainless steel and copper, the steel products used for installation systems are galvanised. A zinc coating thickness of 5-8 µm by means of electrolytic process (galvanising) is standard.

For mounting rails, Sendzimir galvanised material is mainly used. Sendzimir galvanising is a method in which the material is drawn through a molten zinc bath, thereby achie-ving a zinc layer thickness of 12-20 µm. This method is used when there is no more welding for the subsequent processing. This is the case for mounting rails because they are cold-formed after galvanising. By cutting and stamping the holes, the surface in this area is not completely covered by a protective layer. Punched mounting rails are therefore only recommended for the dry interior rooms.

For cantilever brackets, non-galvanised channel pieces are used which are welded to the base plate. Following completion, the entire component is galvanised, creating a zinc coating thickness of 5-8 µm.

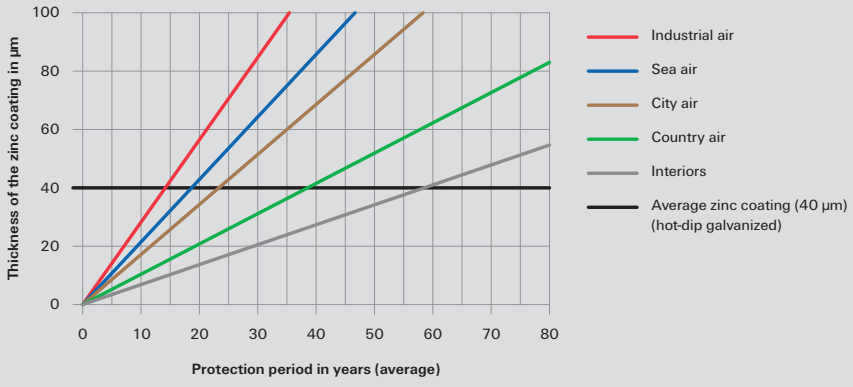
Threaded parts are either galvanised or made of stainless steel. Hot dip galvanising is less suitable for this because the large zinc layer thickness of 40-150 µm severely impairs the thread engagement

.If installation systems are installed outdoors or in wet interior rooms, they must be made of either hot dip galvanised steel or stainless steel.

Hot dip galvanising is very well suited to the protection of steel. The corrosion process is thus 10 times slower than with galvanising. The zinc loss depends on the surrounding atmoshpere and humidity. An annual zinc reduction of 1 - 10 µm can, however, be assumed. The layer thickness is therefore crucial to the durability of the material.

Crucial here are the environmental infl uences under which the systems are installed. An overview of the expected impact on the protective action can be seen in the following diagram and tables.

hot-dip galvanized steel:

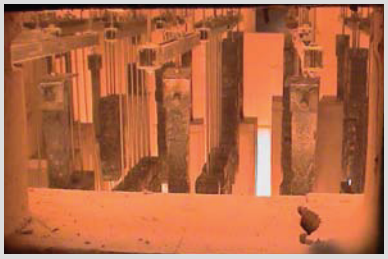


Stainless steel

Steel Grade					Corrosion	
Material No.	Short Name	AISI	UNS	Designation of the Steel Group with	Resistance Class	Exposure and Typical Applications
1.4305	X8CrNiS18-9	303	S 30300	A1	I / light	Indoor climate except damp location.
1.4301	X5CrNi18-10	304	S 30400	A2	II / moderate	Accessible constructions without nameable content of chlorides or sulfur dioxide, except industrial atmosphere.
1.4307	X2CrNi 18-9	304L	S 30403	A2L		
1.4362	X2CrNiN23-4	324	S32304	A4	III / medium	Constructions with moderate chloride and sulfur dioxide exposure and inaccessible constructions.
1.4401	X5CrNiMo17-12-2	316	S 31600			
1.4404	X2CrNiMo17-12-2	316 L	S 31603	A4L		
1.4571	X6CrNiMoTi17-12-2	316 Ti	S 31635	A5		
1.4529	X1NiCrMoCuN25-20-7	-	N 08926	1.4529	IV / strong	High corrosion exposure due to chlorine, chloride and/or sulfur dioxide, high humidity as well as accumulation of hazardous substances.

8

Fire protection



Fire protection in pipe installations according to the latest standards.

- Fire-proof installations for individual pipes and pipe routes from R30 - R120 or F30 to F120.
- Proof of compliance with the criteria of MLAR (German standard pipe system directive) for installation in escape and rescue routes

Fire protection - protection goals

Firstly, fi re protection serves to protect people, and is regulated by the building laws in the respective countries (or regional states). Secondly, fi re protection serves to protect property and this is regulated by the insurance associations, such as VdS and FM. These requirements partially go beyond the building legislation. This is particularly evident in the installation of fi re protection systems, such as sprinklers, etc., as approved or recogni-sed components must be used here. (See the following section for further details on this)

Fire inspection reports for the mounting of pipe clamps and mounting rails

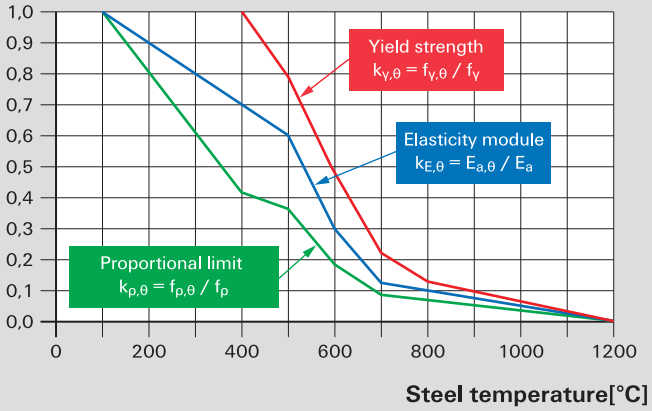
Fire safety inspection reports meet the requirements for fi re protection according to the building regulations of the countries and, especially for Germany, according to the nati-onwide homonymic German pipe systems directive (LAR), based on the standard pipe systems directive of 2005 (MLAR 2005).

Personal protection is defi ned in the MLAR Directive through clear rules for escape routes, such as corridors, stairwells and hallways between stairwells and the exit.

The key message is to ensure the safety of the escape route by ensuring the functioning of the fi re-proof sub-ceiling. To this end, compliance with the minimum distance of min a ≤ 50 mm according to MLAR is required between installations and underlying suspen-ded fi re-proof F30 sub-ceilings (fi re resistance of 30 minutes). Based on the fi re inspec-tions, load information for a fi re resistance of 30 minutes in relation to the maximum

Permissible deformation of mounting rails or pipe clamps, for example, was determined. The necessity for these considerations arises from the properties of the steel, which at 30 minutes is subjected to a temperature of > 800° C according to the standard temperature curve (ISO curve).

Reduction factors k_θ



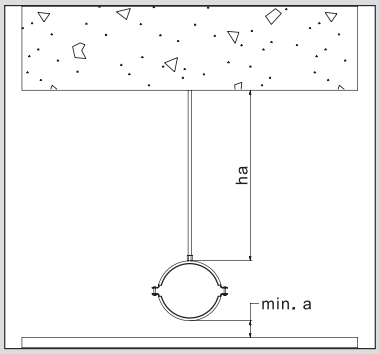
Dependency of the yield strength, proportional limit and elasticity module on the temperatutre (basis: EN1993-1-2:2012-12 Eurocode 3).

Additionally, the same information is documented in the inspection reports for a fire resistance rating of R30, R60, R90 and R120 according to EN1363-1 and DIN4102-2. (see following load tables)

Product overview with proof in inspection reports and supplementary sheets.

Product	Document no.	MLAR	R30 – R120	F30 – F120
FRS	MFPA Leipzig - GS 3.2/14-175-2	•	•	
FUS / FCA	MFPA Leipzig - GS 3.2/14-175-4	•	•	
FRS-L Universal	MFPA Leipzig - GS 3.2/15-141-3	•	•	
FLS / ALK	MFPA Leipzig - GS 3.2/15-141-4	•	•	
SB	MPA-NRW - 210005109-7			•
SBS	MPA-NRW - 210005109-4	•		•
PDH-K	MPA-NRW - 210005109-6	•		•

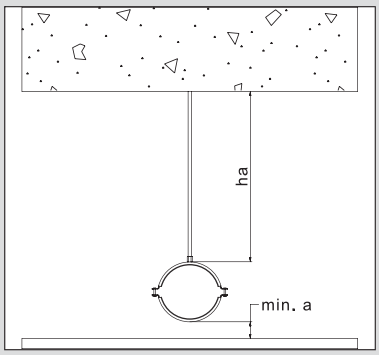
Load tables based on fire protection inspection reports.



Pipe clamp FRS - Load table based on the Adivisory Opinion No. GS 3.2/14-175-2

The following figures are valid for all FRS-L universal pipe clamps, galvanized, hdg and stainless steel.

FRS M8/M10		MLAR-loads		Max. Loads				
Threaded rods ≥ 4.8		Strain	F-resistance	Max. Strain	Fire resistance time [minute]			
Clamping range	h_a	min a	30	min a	30	60	90	120
[mm]	[mm]	[mm]	[kN]	[mm]	[kN]	[kN]	[kN]	[kN]
12 - 67	≤ 250	≤ 50	0.56	51	0.56	0.29	0.20	0.15
	≤ 500	≤ 50	0.56	54				
	≤ 750	≤ 50	0.56	57				
	≤ 1000	≤ 50	5.51	60				
72 - 92	≤ 250	≤ 50	0.65	50	0.79	0.49	0.36	0.29
	≤ 500	≤ 50	0.62	53				
	≤ 750	≤ 50	0.59	56				
	≤ 1000	≤ 50	0.57	59				
108 - 116	≤ 250	≤ 50	0.48	61	0.63	0.39	0.29	0.23
	≤ 500	≤ 50	0.43	64				
	≤ 750	≤ 50	0.39	66				
	≤ 1000	≤ 50	0.35	69				
121 - 168	≤ 250	≤ 50	0.96	61	1.00	0.51	0.34	0.25
	≤ 500	≤ 50	0.89	63				
	≤ 750	≤ 50	0.82	66				
	≤ 1000	≤ 50	0.85	69				



Pipe clamp FRS-L universal load table based on the Adivisory Opinion No. GS 3.2/15-141-3

The following figures are valid for all FRS-L universal pipe clamps, galvanized, hdg and stainless steel.

FRS-L universal M8/M10		MLAR-loads		Max. loads				
Threaded rods ≥ 4.8		Strain	F-resistance	Max. Strain	Fire resistance time [minute]			
Clamping range	h_a	min a	30	min a	30	60	90	120
[mm]	[mm]	[mm]	[kN]	[mm]	[kN]	[kN]	[kN]	[kN]
8 - 37	≤ 250	≤ 50	0.27	54	0.27	0.14	0.09	0.07
	≤ 500	≤ 50	0.26	57				
	≤ 750	≤ 50	0.24	60				
	≤ 1000	≤ 50	0.22	62				
38 - 66	≤ 250	≤ 50	0.17	72	0.29	0.14	0.09	0.06
	≤ 500	≤ 50	0.16	75				
	≤ 750	≤ 50	0.15	78				
	≤ 1000	≤ 50	0.13	80				
67 - 119	≤ 250	≤ 50	0.53	75	0.53	0.35	0.27	0.22
	≤ 500	≤ 50	0.53	78				
	≤ 750	≤ 50	0.53	81				
	≤ 1000	≤ 50	0.53	83				

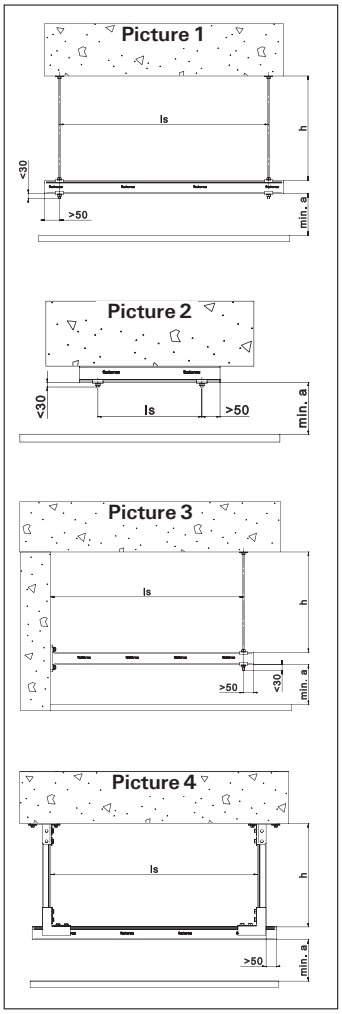
FUS-Channel/FCA-Cantilever arm - Load table based on the Adivisory Opinion No. GS 3.2/14-175-4

The following figures are valid for FUS channels and FCA cantilever arms, galvanized, hdg and stainless steel

FUS / FCA 41/2,5 (picture 1-3)		**MLAR -loads**		**Max. Loads**				
Threaded rods ≥ 4.8		strain	F-resistance	Max. strain	Fire resistance time [minute]			
Load case	l_s	min a [1]	30	min a [2]	30	60	90	120
	[mm]	[mm]	[kN]	[mm]	[kN]	[kN]	[kN]	[kN]
Point load	≤ 400	≤ 50	0,90	278	2,40	1,33	0,92	0,72
	≤ 700	≤ 50	-	320	1,61	1,04	0,80	0,67
Multiple load [3]	≤ 400	≤ 50	0,90	278	2,40	1,33	0,92	0,72
	≤ 700	≤ 50	-	320	1,61	1,04	0,80	0,67
Uniformly distributed load	≤ 400	≤ 50	1,50	258	3,00	2,10	1,41	1,06
	≤ 700	≤ 50	0,60	299	2,44	1,57	1,21	1,00
	≤ 1250	≤ 50	-	468	3,29	1,81	1,27	0,98
FUS / FCA 62/2,5 (picture 1-3)		**MLAR -loads**		**Max. Loads**				
Threaded rods ≥ 4.8		strain	F-resistance	Max. strain	Fire resistance time [minute]			
Load Case	l_s	min a [1]	30	min a [2]	30	60	90	120
	[mm]	[mm]	[kN]	[mm]	[kN]	[kN]	[kN]	[kN]
Point load	≤ 400	≤ 50	1,76	25	1,76	1,06	0,78	0,62
	≤ 1000	≤ 50	-	460	2,27	1,31	0,93	0,72
Multiple load [3]	≤ 400	≤ 50	1,76	25	1,76	1,06	0,78	0,62
	≤ 960 [4]	≤ 50	4,30	550	4,30	2,14	1,39	1,01
	≤ 1000	≤ 50	0,55	661	2,52	1,60	1,21	0,99
Uniformly distributed load	≤ 400	≤ 50	1,76	25	1,76	1,06	0,78	0,62
	≤ 960 [4]	≤ 50	4,30	550	4,30	2,14	1,39	1,01
	≤ 1000	≤ 50	0,55	661	2,52	1,60	1,21	0,99
	≤ 1250	≤ 50	0,50	592	2,41	1,65	1,31	1,11
FUS 62/2,5 (picture 4)		**MLAR -loads**		**Max. Loads**				
Vertical FUS 41/2,5		strain	F-resistance	Max. strain	Fire resistance time [minute]			
Load case	l_s	min a [1]	30	min a [2]	30	60	90	120
	[mm]	[mm]	[kN]	[mm]	[kN]	[kN]	[kN]	[kN]
Point load	≤ 1000	≤ 50	0,57	369	1,33	0,87	0,68	0,57
Multiple load [3]	≤ 1000	≤ 50	0,62	649	1,92	1,34	1,08	0,92
Uniformly distributed load	≤ 1000	≤ 50	0,62	649	1,92	1,34	1,08	0,92

[1] Valid for a suspension height ha ≤ 500 mm
[2] Based on suspension height ha = 250mm, Expansion length of threaded rods in case of fire ~ 10mm/m
[3] Given load values apply for multiple loads as summated point loads symmetrical allocated
[4] This values are valid for FCA 62/2,5 with additional support by threaded rod

Picture 1 - 3 are valid for FUS/FCA and FLS/ALK load tables

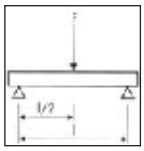


FLS-Channel/ALK-Cantilever arm - Load table based on the Adivisory Opinion No. GS 3.2/14-175-?

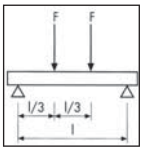
The following figures are valid for FLS channels and ALK cantilever arms, galvanized, hdg and stainless steel

FUS / FCA 41/2,5 (picture 1-3)		**MLAR -loads**		**Max. Loads**				
Threaded rods ≥ 4.8		strain	F-resistance	Max. strain	Fire resistance time [minute]			
Load case	l_s	min a	30	min a	30	60	90	120
	[mm]	[mm]	[kN]	[mm]	[kN]	[kN]	[kN]	[kN]
Point load	≤ 400 [1]	≤ 50	0,24	93	0,24	0,13	0,10	0,09
	≤ 400 [2]	≤ 50	0,09	289	0,47	0,38	0,33	0,30
	≤ 400 [4]	≤ 50	0,32	226	1,33	0,78	0,53	0,40
Multiple load [3]	≤ 400 [1]	≤ 50	0,72	93	0,72	0,38	0,30	0,27
	≤ 400 [2]	≤ 50	0,26	289	1,42	1,13	0,99	0,90
	≤ 400 [4]	≤ 50	0,81	226	1,33	0,78	0,53	0,40
Uniformly distributed load	≤ 400 [1]	≤ 50	0,72	93	0,72	0,38	0,30	0,27
	≤ 400 [2]	≤ 50	0,35	308	1,37	1,19	1,06	0,95
	≤ 400 [4]	≤ 50	0,81	226	1,33	0,78	0,53	0,40

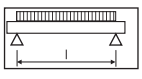
[1] Valid for a suspension height ha = 0 mm, s. picture 2
[2] Valid for a suspension height ha = 500mm, s. picture 1 (Expansion length of threaded rods in case of fire ~ 10mm/m)
[3] Given load values apply for multiple loads as summated point loads symmetrical allocated
[4] This values are valid for ALK 37-450 with additional support by threaded rod, s picture 3 (ha = 500 mm)



Single load
Spot load, e.g. a pipe clamp on the rail.

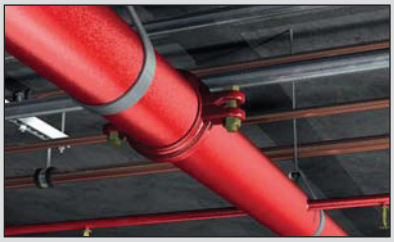


Multiple load
More than one load point on the rail, e.g. several pipe clamps.



Uniform load
Uniform distribution of load on the rails, e.g. bend-proof ventilation duct.

Mounting sprinkler systems



Sprinkler systems are usually created according to diff erent standards. For example, according to the VdS standard (VdS CEA 4001), the American FM standard 1951 (Factory Mutual Insurance Company" (FM Global)), UL 203 (Underwriters Laboratories (UL)), NFPA 13 regulations (National Fire Protection Association (NFPA)) or EN 12845.

The European Directive CEA 4001 was created in 1995 by the insurance industry in coo-peration with the manufacturers' association EUROFEU, and VdS CEA 4001 was created in Germany in 2003 by the "Association of Property Insurers" (VdS).

EN 12845 was developed on the basis of CEA 4001 from 1995 and the VdS CEA 4001 from 2003, creating a standard that was practically the same word for word. National practices, such as those for Germany, are to be included in a revised DIN 14489 as a national annex to EN 12845.

The American rules correspond to the requirements for mounting pipe installations, but they must be checked in detail in each case.

For mounting sprinkler pipes, the diff erent load values, mounting distances and connection sizes for pipe loops and pipe clamps, which are listed in the following table for the most common directives, are applicable.

	FM1951				NFPA13				VdS CEA 4001			
Pipe sizes	Test load	Max. distance	Min rod size		Test load calcula-ted	Max. distance	Min rod size		Loading capacity	Max. distance	Min rod size	
DN	[kN]	[m]	[metric]	[inch]	[kN]	[m]	[metric]	[inch]	[kN]	[m]	[metric]	[inch]
15	no data	no data	no data	no data	1.4	3.60	9.5	3/8	2.0	4.00	M8	no data
20	1.512	3.6	M10	3/8	1.5	3.60	9.5	3/8	2.0	4.00	M8	no data
25	1.824	3.6	M10	3/8	1.7	3.66	9.5	3/8	2.0	4.00	M8	no data
32	1.913	3.6	M10	3/8	1.9	3.66	9.5	3/8	2.0	4.00	M8	no data
40	2.313	4.6	M10	3/8	2.4	4.57	9.5	3/8	2.0	4.00	M8	no data
50	2.825	4.6	M10	3/8	2.9	4.57	9.5	3/8	3.5	4.00	M10	no data
65	4.181	4.6	M10	3/8	3.8	4.57	9.5	3/8	3.5	6.00	M10	no data
80	4.715	4.6	M10	3/8	4.8	4.57	9.5	3/8	3.5	6.00	M10	no data
90	5.583	4.6	M10	3/8	5.7	4.57	9.5	3/8	3.5	6.00	M10	no data
100	6.561	4.6	M10	3/8	6.7	4.57	9.5	3/8	5.0	6.00	M10	no data
125	8.896	4.6	M12	1/2	9.0	4.57	12.7	1/2	5.0	6.00	M12	no data
150	11.632	4.6	M12	1/2	11.8	4.57	12.7	1/2	8.5	6.00	M12	no data
200	16.903	4.6	M12	1/2	18.2	4.57	12.7	1/2	8.5	6.00	M16	no data
250	26.044	4.6	M16	5/8	26.7	4.60	15.9	5/8	no data	6.00	no data	no data

	FM1951				NFPA13				VdS CEA 4001			
Pipe sizes	Test load	Max. distance	Min rod size		Test load calcula-ted	Max. distance	Min rod size		Loading capacity	Max. distance	Min rod size	
DN	[kN]	[m]	[metric]	[inch]	[kN]	[m]	[metric]	[inch]	[kN]	[m]	[metric]	[inch]
300	35.141	4.6	M16	5/8	36.0	4.60	15.9	5/8	no data	6.00	no data	no data
350	no data	no data	no data	no data	42.9	4.60	no data	no data	no data	6.00	no data	no data
400	no data	no data	no data	no data	55.7	4.60	no data	no data	no data	6.00	no data	no data
450	no data	no data	no data	no data	70.1	4.60	no data	no data	no data	6.00	no data	no data
500	no data	no data	no data	no data	84.4	4.60	no data	no data	no data	6.00	no data	no data

Dimensions and weights of pipes, ventilation ducts and ventilation pipes

Schedule 40 pipe table

S.no.	Nom. Pipe Size	Out Diameter	Inner Diameter	Out Diameter	Inner Diameter	Weight of pipe	Weight of water in pipe	Total pipe weight filled with
		in	in	mm	mm	kg/M`	kg/M`	kg/M`
1.	1/8"	0.405	0.269	10.3	6.8	0.4	0.04	0.4
2.	1/4"	0.540	0.364	13.7	9.2	0.6	0.1	0.7
3.	3/8"	0.675	0.493	17.1	12.5	0.8	0.1	1.0
4.	1/2"	0.840	0.622	21.3	15.8	1.3	0.2	1.5
5.	3/4"	1.050	0.824	26.7	20.9	1.7	0.3	2.0
6.	1"	1.315	1.049	33.4	26.6	2.5	0.6	3.1
7.	11/4"	1.660	1.380	42.2	35.1	3.4	1.0	4.3
8.	11/2"	1.900	1.610	48.3	40.9	4.0	1.3	5.4
9.	2"	2.375	2.067	60.3	52.5	5.4	2.2	7.6
10.	21/2"	2.875	2.469	73.0	62.7	8.6	3.1	11.7
11.	3"	3.500	3.068	88.9	77.9	11.3	4.8	16.0
12.	31/2"	4.000	3.548	101.6	90.1	13.6	6.4	19.9
13.	4"	4.500	4.026	114.3	102.3	16.1	8.2	24.3
14.	5"	5.563	5.047	141.3	128.2	21.8	12.9	34.6
15.	6"	6.625	6.065	168.3	154.1	28.2	18.6	46.8
16.	8"	8.625	7.981	219.1	202.7	42.5	32.1	74.6
17.	10"	10.750	10.020	273.1	254.5	60.2	50.7	111.0
18.	12"	12.750	11.938	323.9	303.2	79.7	72.2	151.8
19.	14"	14.000	13.000	355.6	330.2	94.3	87.0	181.3
20.	16"	16.000	15.000	406.4	381.0	123.2	113.8	237.0
21.	18"	18.000	16.874	457.2	428.6	155.9	144.6	300.5
22.	20"	20.000	18.814	508.0	477.9	182.9	179.2	362.0
23.	24"	24.000	22.626	609.6	574.7	254.7	259.2	513.9

Weights of galvanized ventilation ducts in kg/m without insulation

Sheet metal 0.75			Sheet metal 0.88						Sheet metal 1.0						Sheet metal 1.13						Sheet metal 1.25				
200	224	250	280	315	355	400	450	500	560	630	710	800	900	1000	1120	1250	1400	1600	1800	2000	2240	2500	2800	3150	◄B ▼H
6.6	7.0	7.4	9.3	10.0	10.7	11.6	12.6	13.6	16.7	18.3	20.0	22.0	24.2	26.4	32.8	36.0	39.8	44.7	49.7	54.7	70.2	77.6	86.3	96.3	200
	7.4	7.8	9.8	10.4	11.2	12.1	13.0	14.0	17.2	18.8	20.5	22.5	24.7	26.9	33.4	36.6	40.4	45.3	50.3	55.3	70.8	78.3	86.9	97.0	224
		8.3	10.3	10.9	11.7	12.6	13.6	14.5	17.8	19.4	21.1	23.1	25.3	27.5	34.1	37.3	41.0	46.0	51.0	55.9	71.6	79.1	87.7	97.8	250
			10.8	11.5	12.3	13.2	14.1	15.1	18.5	20.0	21.8	23.8	26.0	28.2	34.8	38.0	41.8	46.7	51.7	56.7	72.5	79.9	88.6	98.6	280
				12.2	13.0	13.8	14.8	15.8	19.3	20.8	22.6	24.5	26.7	28.9	35.7	38.9	42.6	47.6	52.6	57.6	73.5	80.9	89.6	99.6	315
					13.7	14.6	15.6	16.6	20.1	21.7	23.4	25.4	27.6	29.8	36.7	39.9	43.6	48.6	53.6	58.5	74.6	82.1	90.7	100.8	355
						15.5	16.5	17.4	21.1	22.7	24.4	26.4	28.6	30.8	37.8	41.0	44.7	49.7	54.7	59.7	75.9	83.4	92.0	102.1	400
							17.4	18.4	22.2	23.8	25.5	27.5	29.7	31.9	39.0	42.3	46.0	51.0	55.9	60.9	77.3	84.8	93.4	103.5	450
								19.4	23.3	24.9	26.6	28.6	30.8	33.0	40.3	43.5	47.2	52.2	57.2	62.2	78.8	86.3	94.9	104.9	500
									24.6	26.2	27.9	29.9	32.1	34.3	41.8	45.0	48.7	53.7	58.7	63.6	80.5	88.0	96.6	106.7	560
										27.6	29.5	31.5	33.7	35.9	43.5	46.7	50.5	55.4	60.4	65.4	82.5	90.0	98.6	108.7	630
											31.2	33.2	35.4	37.6	45.5	48.7	52.5	57.4	62.4	67.4	84.4	92.3	100.9	111.0	710
												35.2	37.4	39.6	47.7	51.0	54.7	59.7	64.6	69.6	87.4	94.9	103.5	113.6	800
													39.6	41.8	50.2	53.4	57.2	62.2	67.1	72.1	90.3	97.8	106.4	116.4	900
														44.0	52.7	55.9	59.7	64.6	69.6	74.6	93.2	100.6	109.3	119.3	1000
															55.7	58.9	62.6	67.6	72.6	77.6	96.6	104.1	112.7	122.8	1120
																62.2	65.9	70.9	75.8	80.8	100.3	107.8	116.4	126.5	1250
																	69.6	74.6	79.6	84.5	104.7	112.1	120.8	130.8	1400
																		79.6	84.5	89.5	110.4	117.9	126.5	136.6	1600
																			89.5	94.5	116.2	123.6	132.3	142.3	1800
																				99.4	121.9	129.4	138.0	148.1	2000
																					128.8	136.3	144.9	155.0	2240
																						143.8	152.4	162.4	2500
																							161.0	171.1	2800
																								181.5	3150

The weights in kg/m are reference values. The weights can deviate, depending on the sheet metal thickness and the type of flange used. The flange weight is included flat-rate. The loads based on a mineral wool weight of 80 kg/m2 and a thickness of 5 cm.

Weights of galvanized ventilation ducts in kg/m with (80 kg/m³ , 5 cm thickness)

Sheet metal 0.75			Sheet metal 0.88						Sheet metal 1.00						Sheet metal 1.13						Sheet metal 1.25				
200	224	250	280	315	355	400	450	500	560	630	710	800	900	1000	1120	1250	1400	1600	1800	2000	2240	2500	2800	3150	◄B ▼H
9.1	9.6	10.2	12.1	13.0	14.0	15.2	16.4	17.7	21.0	22.9	25.1	27.6	30.4	33.2	39.8	43.8	48.3	54.3	60.4	66.4	79.4	87.8	97.6	109.0	200
	10.2	10.8	13.8	13.6	14.6	15.8	17.0	18.3	21.7	23.6	25.8	28.3	31.1	33.8	40.6	44.5	49.0	55.0	61.1	67.1	80.2	88.6	98.4	109.8	224
		11.4	14.5	14.3	15.3	16.4	17.7	19.0	22.4	24.3	26.5	29.0	31.8	34.5	41.3	45.3	49.8	55.8	61.9	67.9	81.0	89.5	99.2	110.6	250
			15.3	15.0	16.0	17.2	18.4	19.7	23.2	25.1	27.3	29.8	32.6	35.4	42.2	46.2	50.7	56.7	62.8	68.8	82.0	90.4	100.2	111.6	280
				15.9	16.9	18.1	19.3	20.6	24.2	26.1	28.3	30.8	33.6	36.3	43.3	47.2	51.8	57.8	63.8	69.9	83.1	91.6	101.3	112.7	315
					17.9	19.1	20.3	21.6	25.3	27.2	29.4	31.9	34.7	37.4	44.5	48.4	53.0	59.0	65.0	71.1	84.4	92.9	102.6	114.0	355
						20.2	21.5	22.7	26.5	28.5	30.7	33.2	35.9	38.7	45.9	49.8	54.3	60.4	66.4	72.4	85.9	94.3	104.1	115.5	400
							22.7	24.0	27.9	29.8	32.0	34.5	37.3	40.1	47.4	51.3	55.8	61.9	67.9	73.9	87.5	96.0	105.7	117.1	450
								25.3	29.3	31.2	33.4	35.9	38.7	41.4	48.9	52.8	57.3	63.4	69.4	75.4	89.1	97.6	107.4	118.7	500
									30.9	32.9	35.1	37.6	40.3	43.1	50.7	54.6	59.1	65.2	71.2	77.3	91.1	99.5	109.3	120.7	560
										34.8	37.0	39.5	42.3	45.0	52.8	56.7	61.3	67.3	73.3	79.4	93.4	101.8	111.6	123.0	630
											39.2	41.7	44.5	47.2	55.2	59.1	63.7	69.7	75.7	81.8	96.0	104.4	114.2	125.6	710
												44.2	47.0	49.7	57.9	61.9	66.4	72.4	78.5	84.5	98.9	107.4	117.1	128.5	800
													49.7	52.5	61.0	64.9	69.4	75.4	81.5	87.5	102.1	110.6	120.4	131.8	900
														55.3	64.0	67.9	72.4	78.5	84.5	90.5	105.4	113.9	123.6	135.0	1000
															67.6	71.5	76.0	82.1	88.1	94.1	109.3	117.8	127.5	138.9	1120
																75.4	80.0	86.0	92.0	98.1	113.5	122.0	131.8	143.1	1250
																	84.5	90.5	96.6	102.6	118.4	126.9	136.6	148.0	1400
																		96.6	102.6	108.6	124.9	133.4	143.1	154.5	1600
																			108.6	114.7	131.4	139.9	149.6	161.0	1800
																				120.7	137.9	146.4	156.2	167.5	2000
																					145.7	154.2	164.0	175.3	2240
																						162.7	172.4	183.8	2500
																							182.2	193.6	2800
																								204.9	3150

8

Important dimensions, variables and units

Material

S 250 GD

	Material No.	Tensile strength Rm N/mm² min.	Yield strength ReH N/mm² min.	Elongation at break A80% min.
S 250 GD	1.0242	≥ 330	≥ 250	≥ 19

DX 51 D

DX 51 D	1.0226	270 - 500	- *	≥ 22

*For fischer profiles defined 240 N/mm²

DC 01

DC 01	1.0330	270 – 410	≤ 280	≥ 28

S 235 JR

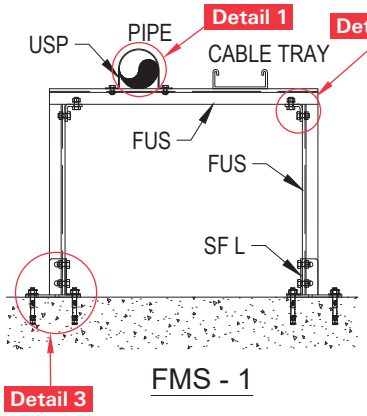
S 235 JR	1.0037	360 - 510	≥ 235	19/17

DD 11

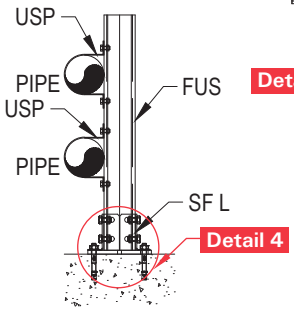
				L0 = 80mm		L0 = 5,65√S0
DD 11	1.0332	440	170 - 360	23	24	28

equivalents of carbon steel qualities			
DIN EN ISO			ASTM
Description	Material-no.		
S 250 GD+Z	1.0242	DIN EN 10346	A 569
DD11	1.0332	DIN EN 10111	A 569
DC01	1.0330	DIN EN 10130	A 366
St 22	1.0320	DIN 1614-1	n/a
DX51D+Z 275 NA-C	1.0226+Z	DIN EN 10327	A 653
S235JR	1.0037	DIN EN 10025	A 283
S 355 MC	1.0976	DIN EN 10149	Gr. 50
4.6; 4.8, 5.8, 8.8	DIN EN ISO 898-1		F 568M

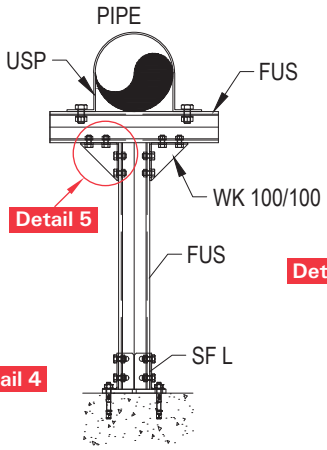
Floor Mounted Supports



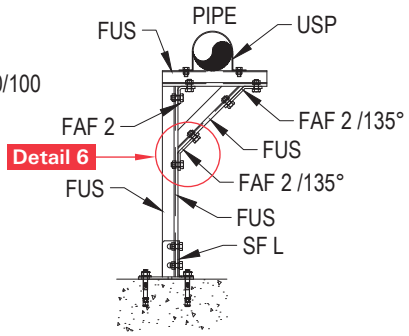
FMS - 1



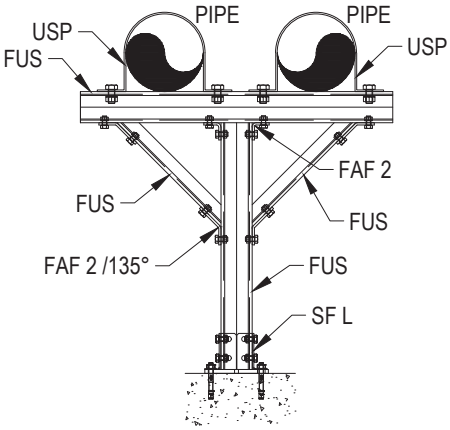
FMS - 2



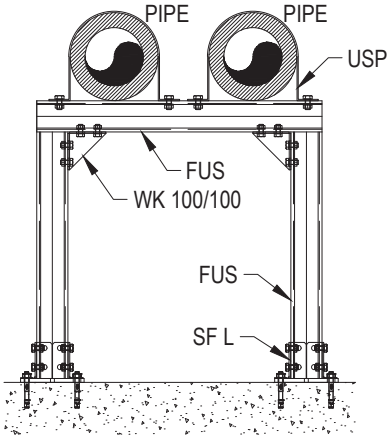
FMS - 3



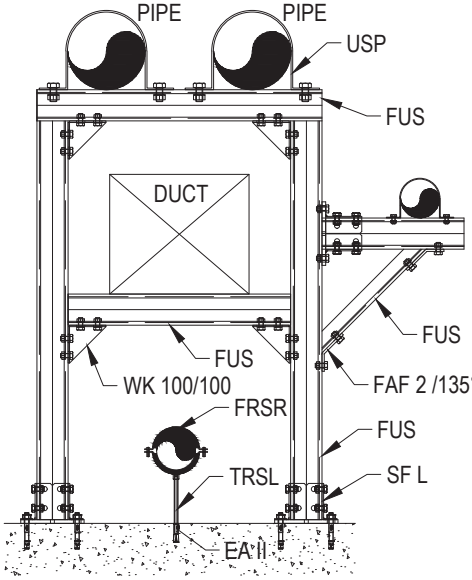
FMS - 4



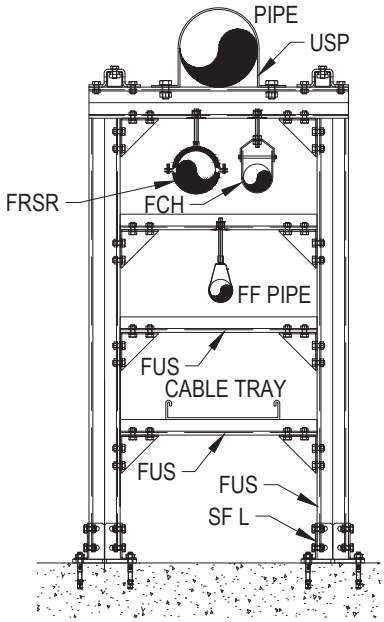
FMS - 5



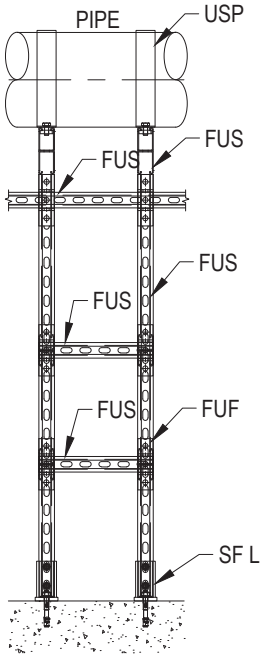
FMS - 6



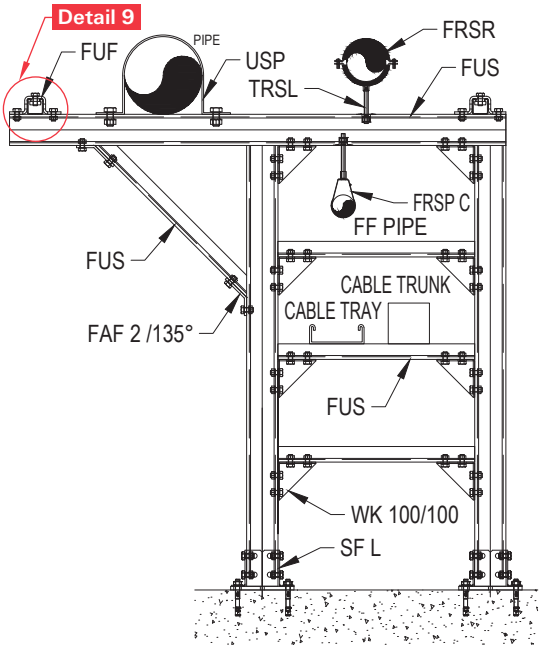
FMS - 7



FMS - 8

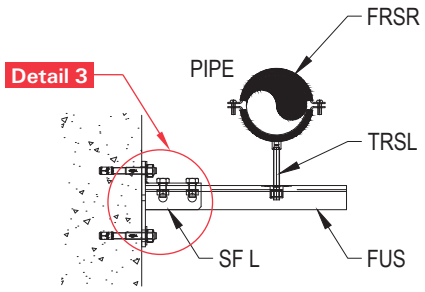


FMS - 9

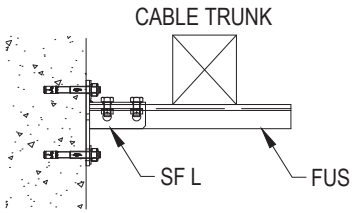


FMS - 10

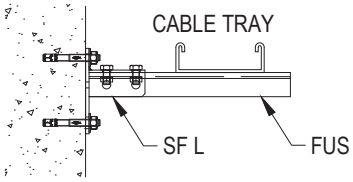
Wall Mounted / Cantilever Supports



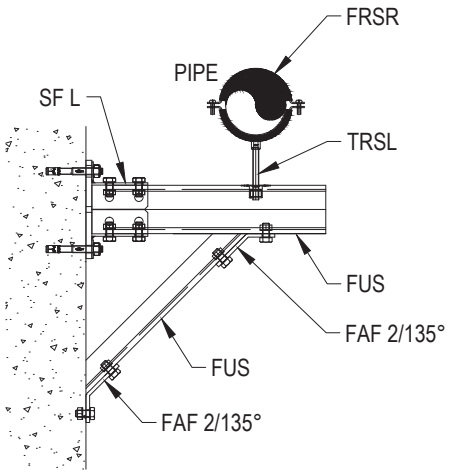
WMS - 1



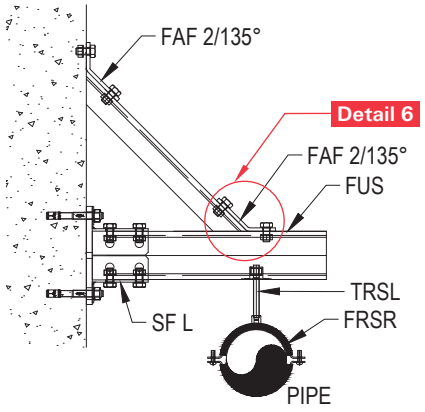
WMS - 2



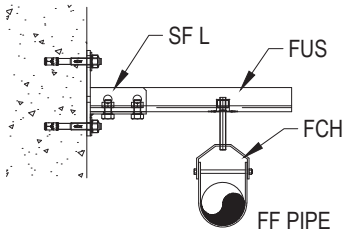
WMS - 3



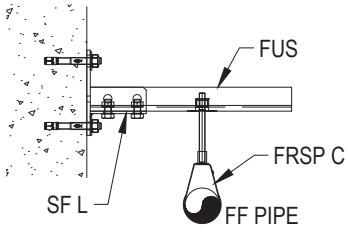
WMS - 4



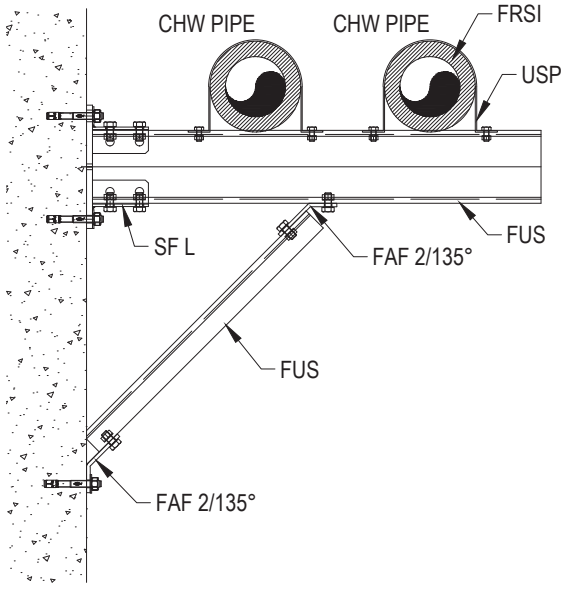
WMS - 5



WMS - 6

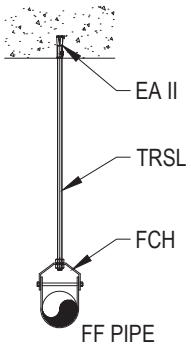


WMS - 7

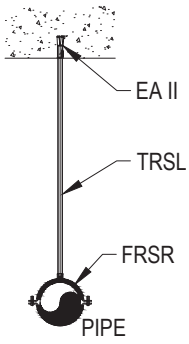


WMS - 8

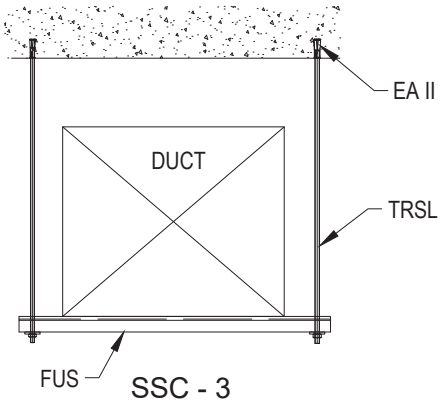
Suspended Supports (Ceiling)



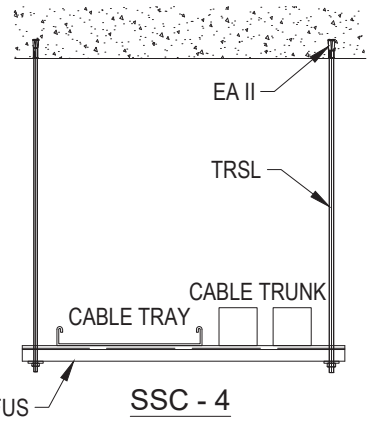
SSC - 1



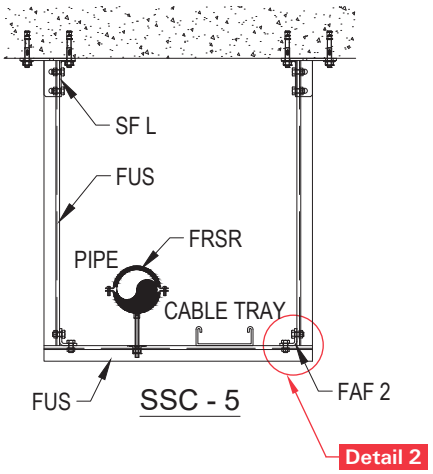
SSC - 2



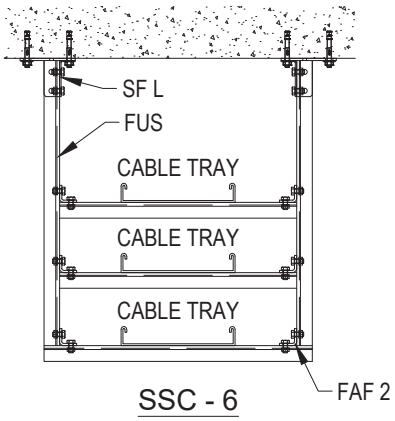
SSC - 3



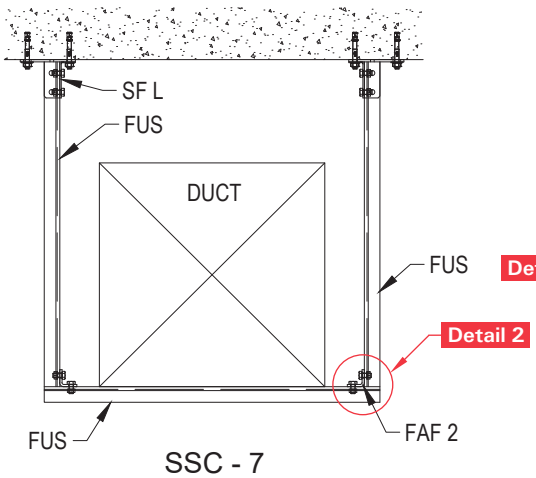
SSC - 4



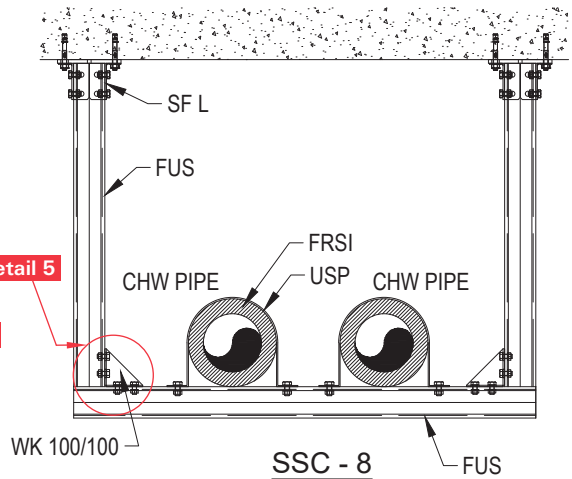
SSC - 5



SSC - 6

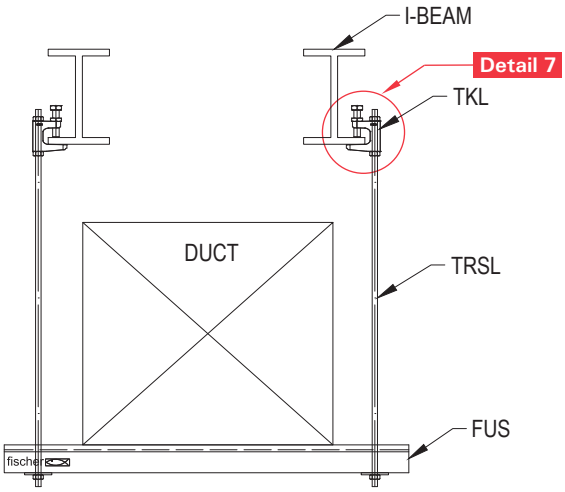


SSC - 7

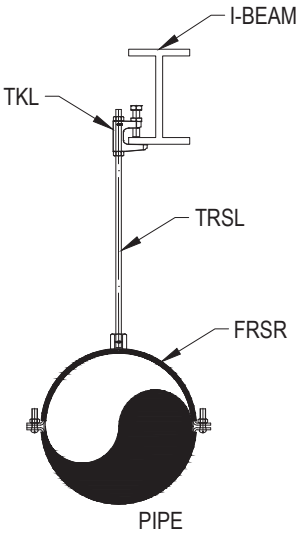


SSC - 8

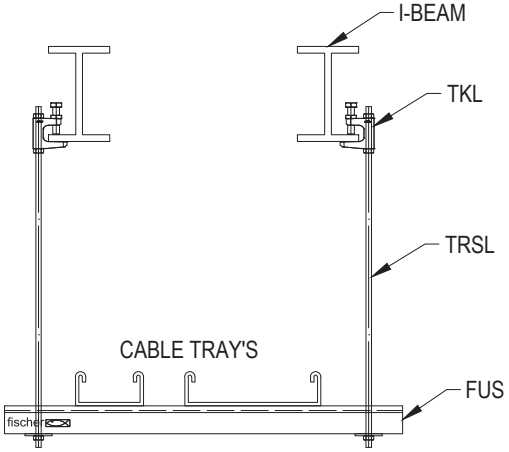
Suspended Supports (Structure)



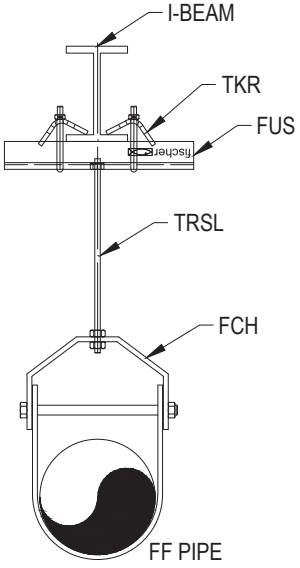
SSS-1



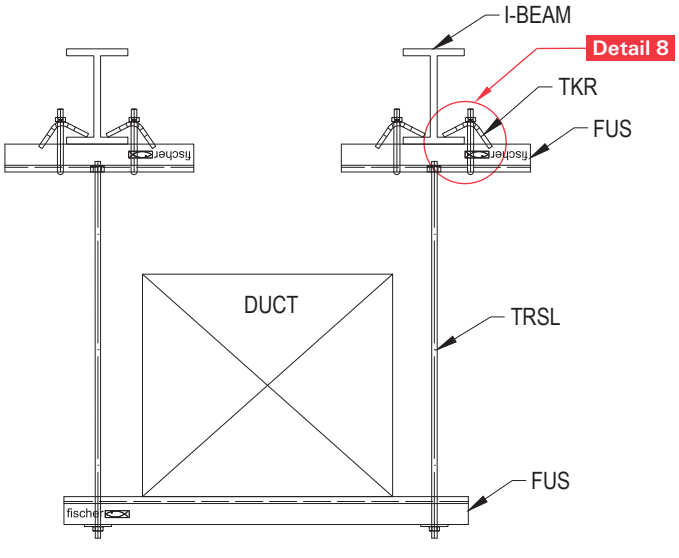
SSS-2



SSS-3

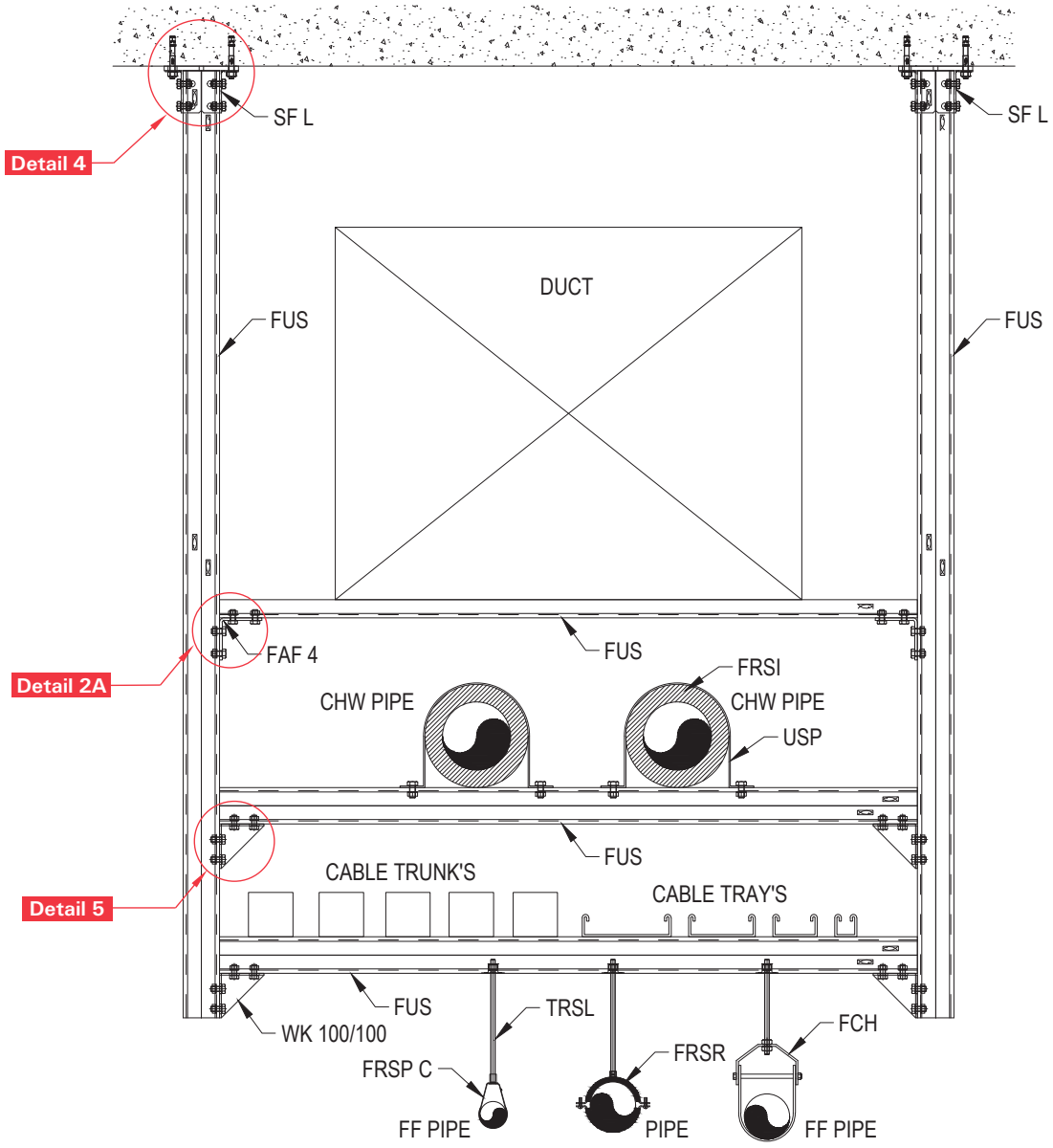


SSS-4

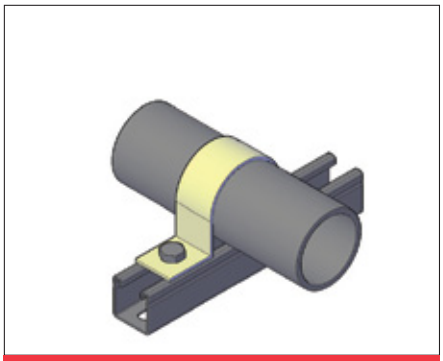


SSS-5

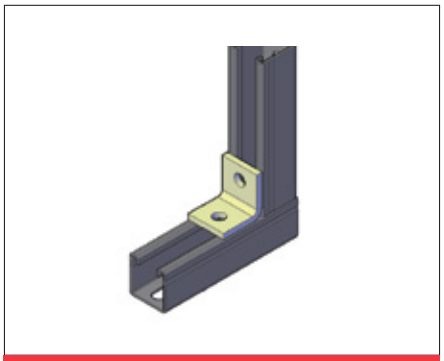
Combined Support for MEP Systems



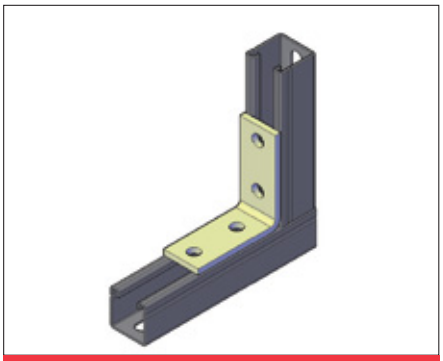
Details



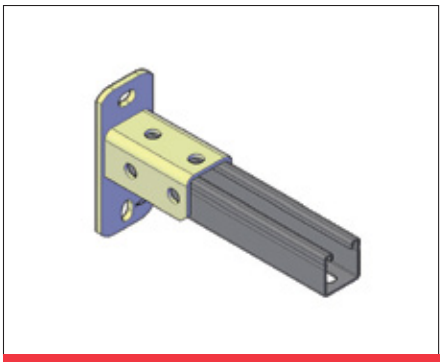
Detail 1 (U-STRAP)



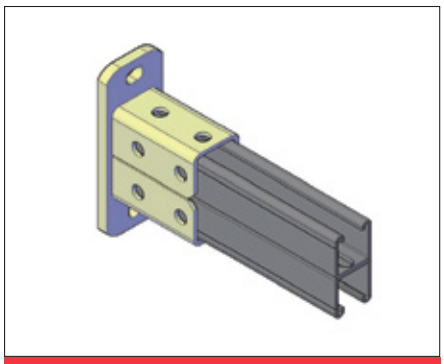
Detail 2 (FAF 2)



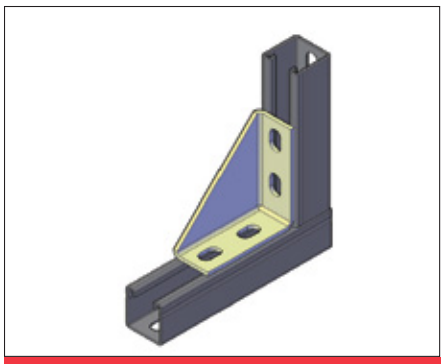
Detail 2A (FAF 4)



Detail 3 (SF L41)

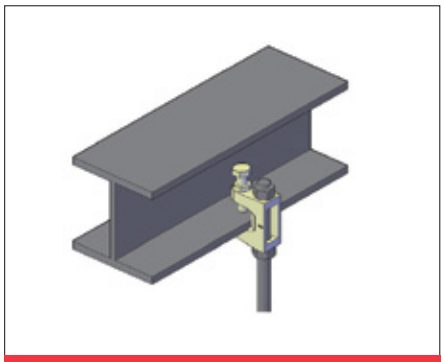


Detail 4 (SF L82)

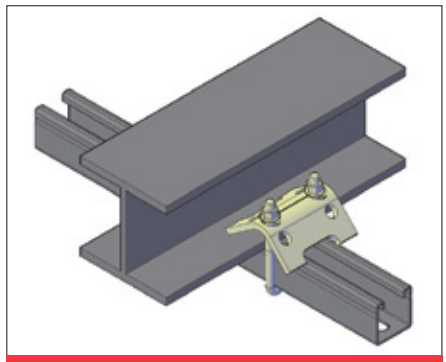


Detail 5 (WK100/100)

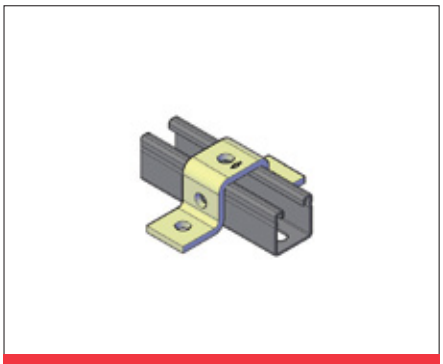
Detail 6 (FAF 2/135°)



Detail 7 (TKL)

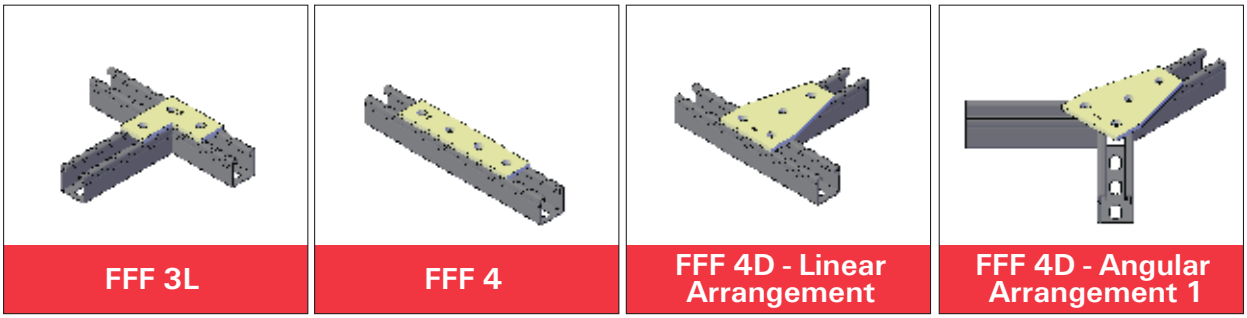


Detail 8 (TKR)

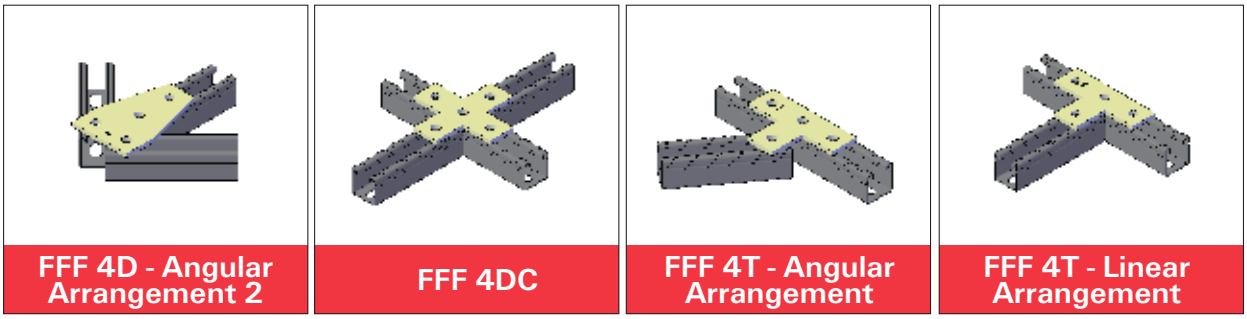


Detail 9 (FUF 41)

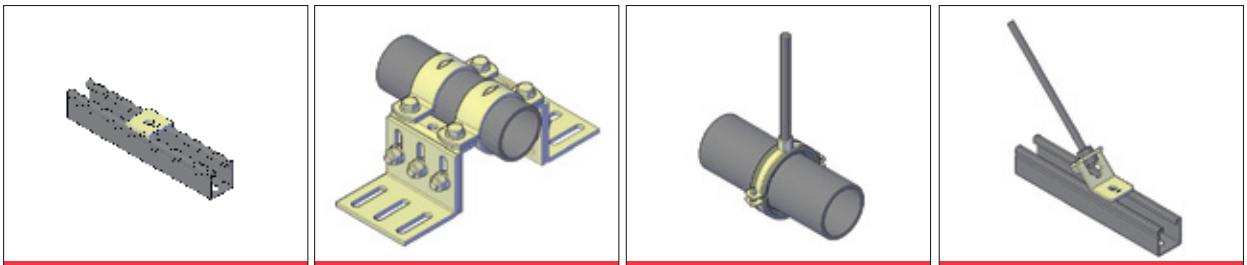
Typical Connection Details



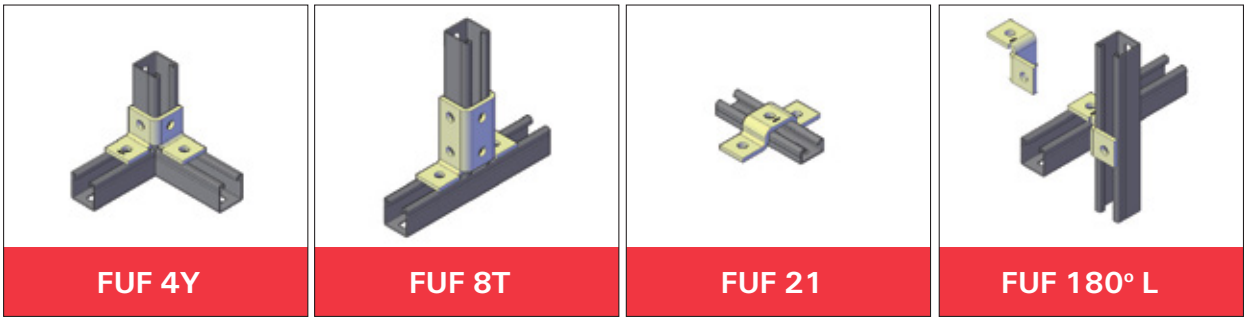
FFF 3L | FFF 4 | FFF 4D - Linear Arrangement | FFF 4D - Angular Arrangement 1



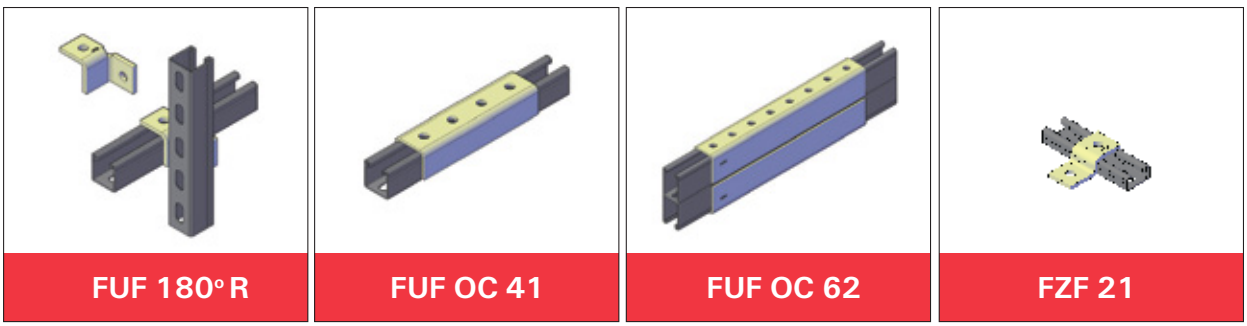
FFF 4D - Angular Arrangement 2 | FFF 4DC | FFF 4T - Angular Arrangement | FFF 4T - Linear Arrangement



FFF1 | FFPK FFFS | FRSR | FSB 45°

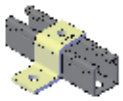


FUF 4Y | FUF 8T | FUF 21 | FUF 180° L

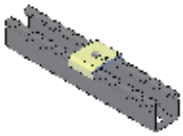


FUF 180° R | FUF OC 41 | FUF OC 62 | FZF 21

Typical Connection Details



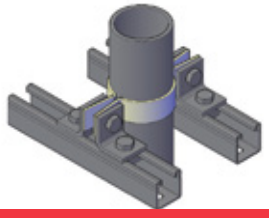
FZF 41



HK 41

PSAE

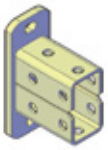
PVB



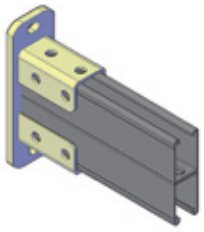
RCWR

SF L41 with FUS 62

SF L41



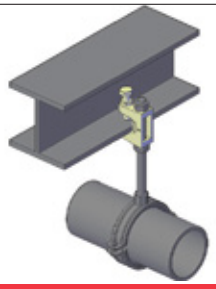
SF L82



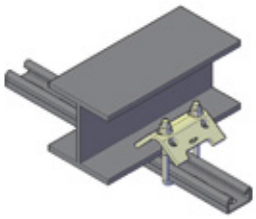
SF L124 with FUS 62D

SF L124

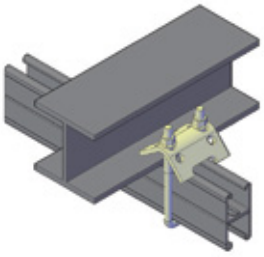
SKSL & FCN Clix Arrangement



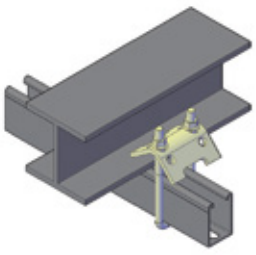
TKL



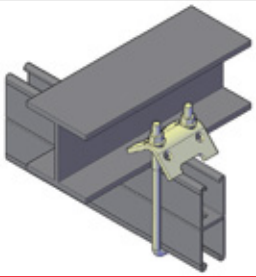
TKR 41 with FUS 21



TKR 82 with FUS 41D

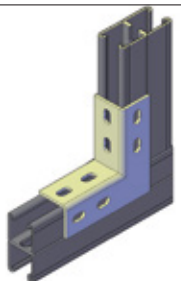


TKR 82 with FUS 62



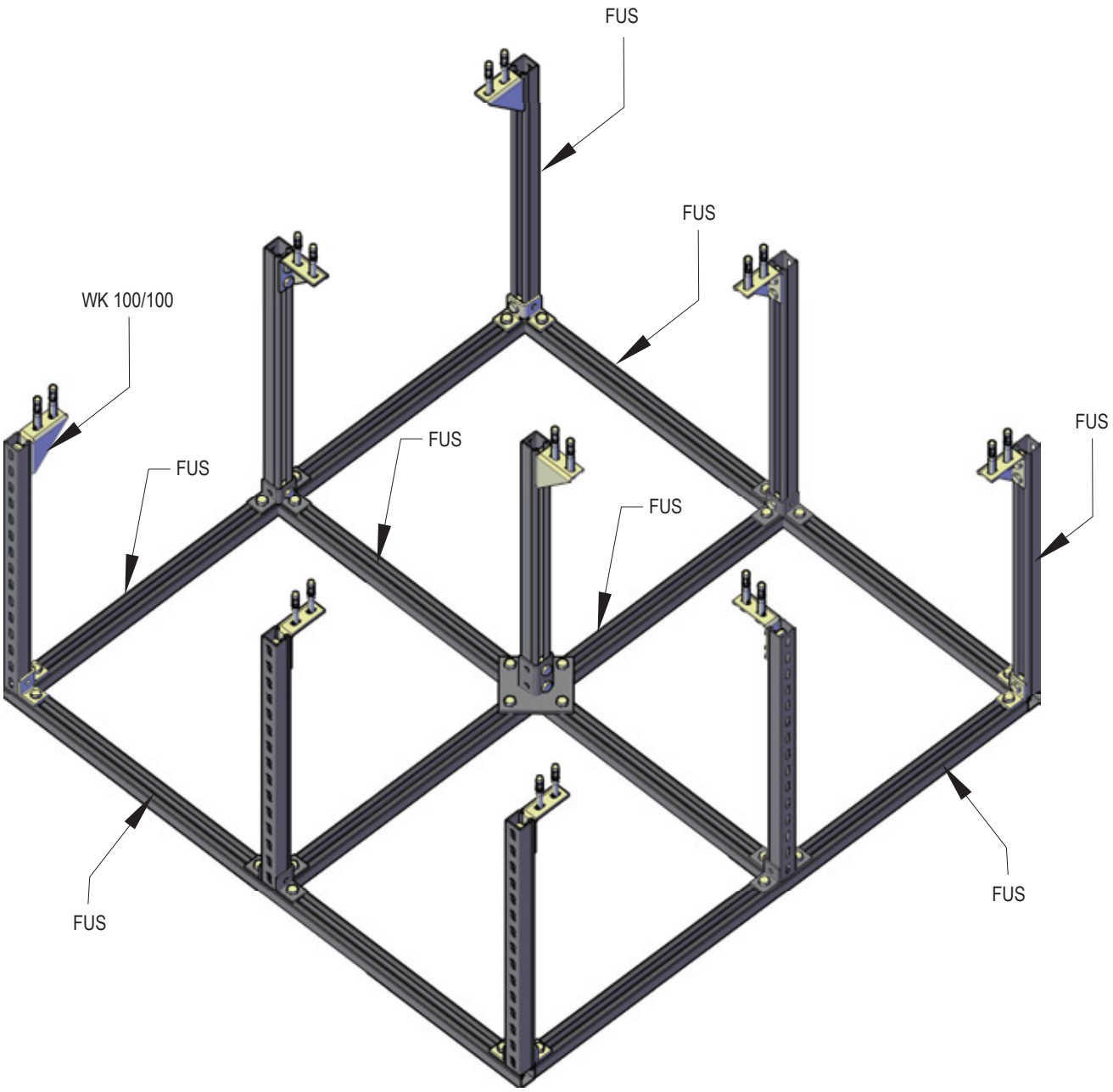
TKR 124 with FUS 62D

U-Bolt ETR

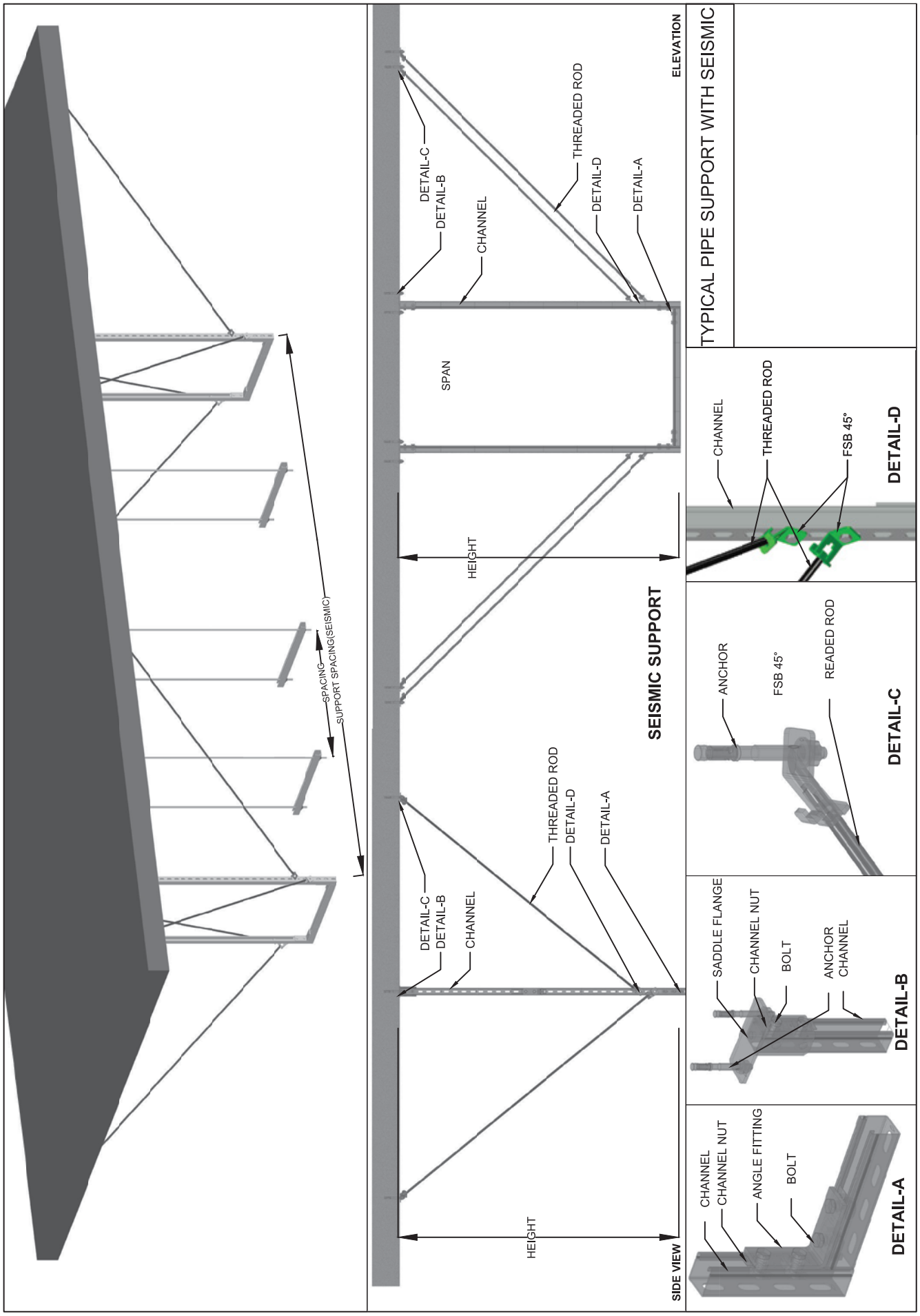


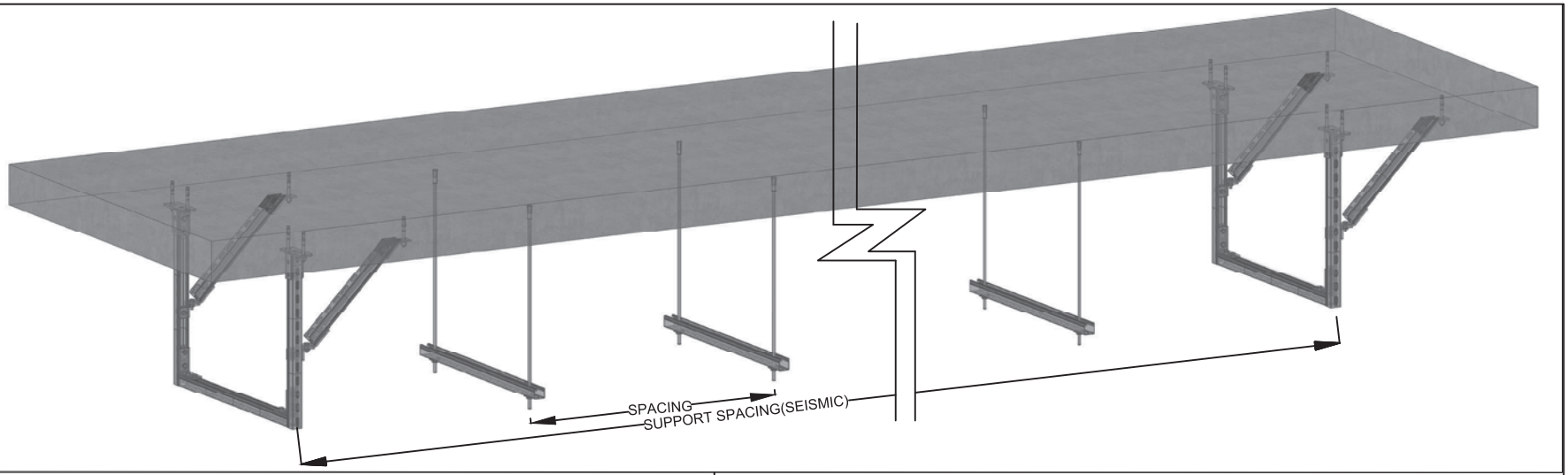
UW S

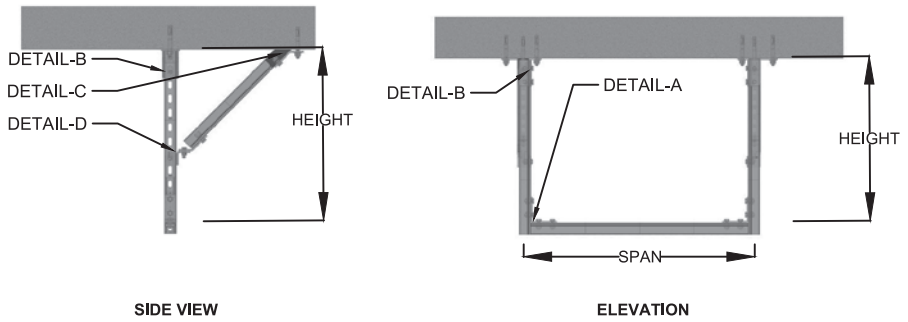
SaMontec Application - 3D Model



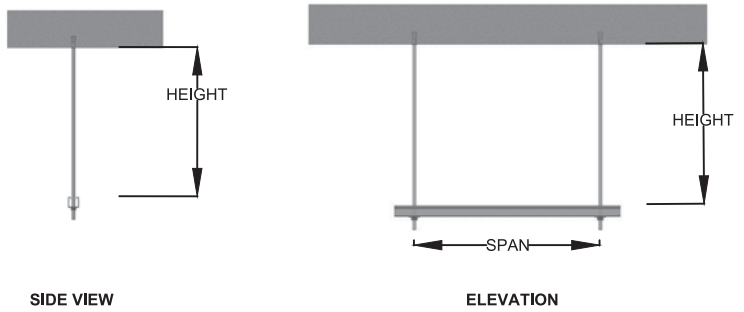
Ceiling Grid System


SPACING
SUPPORT SPACING(SEISMIC)
SEISMIC SUPPORT
ELEVATION
SIDE VIEW
HEIGHT
SPAN
DETAIL-C
DETAIL-B
CHANNEL
THREADED ROD
DETAIL-D
DETAIL-A
TYPICAL PIPE SUPPORT WITH SEISMIC
DETAIL-A
CHANNEL
CHANNEL NUT
ANGLE FITTING
BOLT
DETAIL-B
SADDLE FLANGE
CHANNEL NUT
BOLT
ANCHOR CHANNEL
DETAIL-C
ANCHOR
FSB 45°
READED ROD
DETAIL-D
CHANNEL
THREADED ROD
FSB 45°

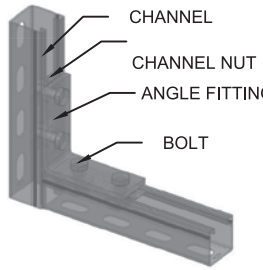




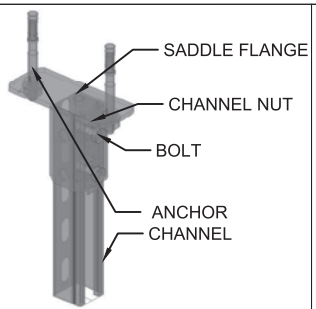
SEISMIC SUPPORT



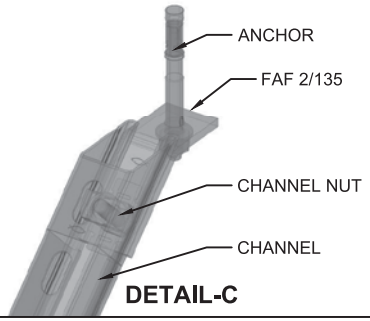
NORMAL SUPPORT



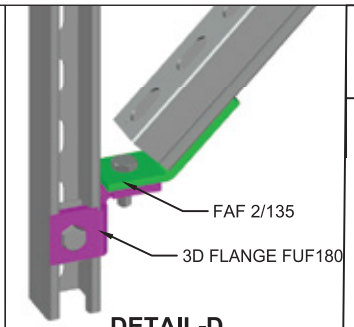
DETAIL-A



DETAIL-B



DETAIL-C



DETAIL-D

TYPICAL SUPPORT WITH SEISMIC

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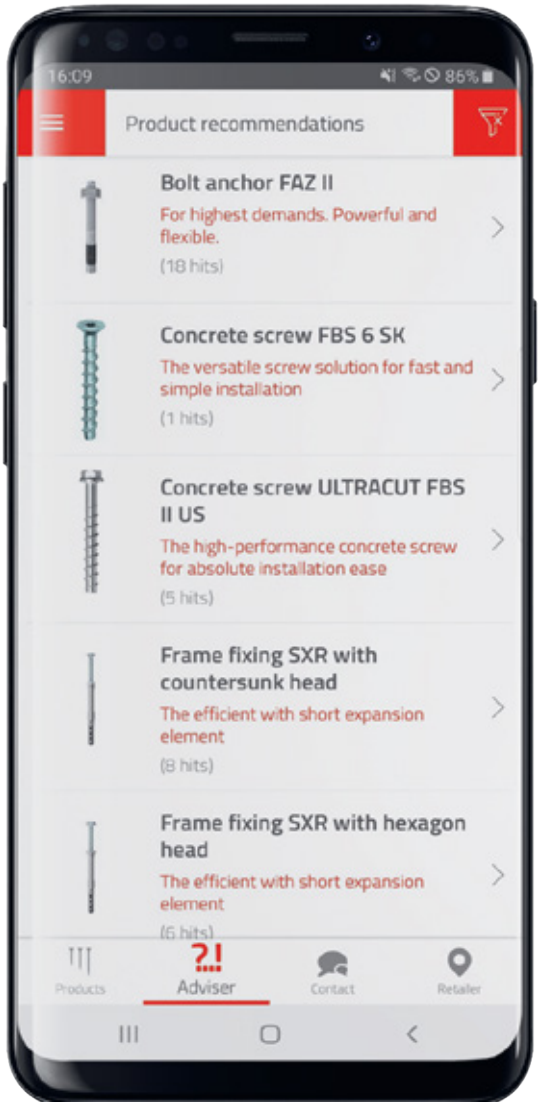

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C-FIX
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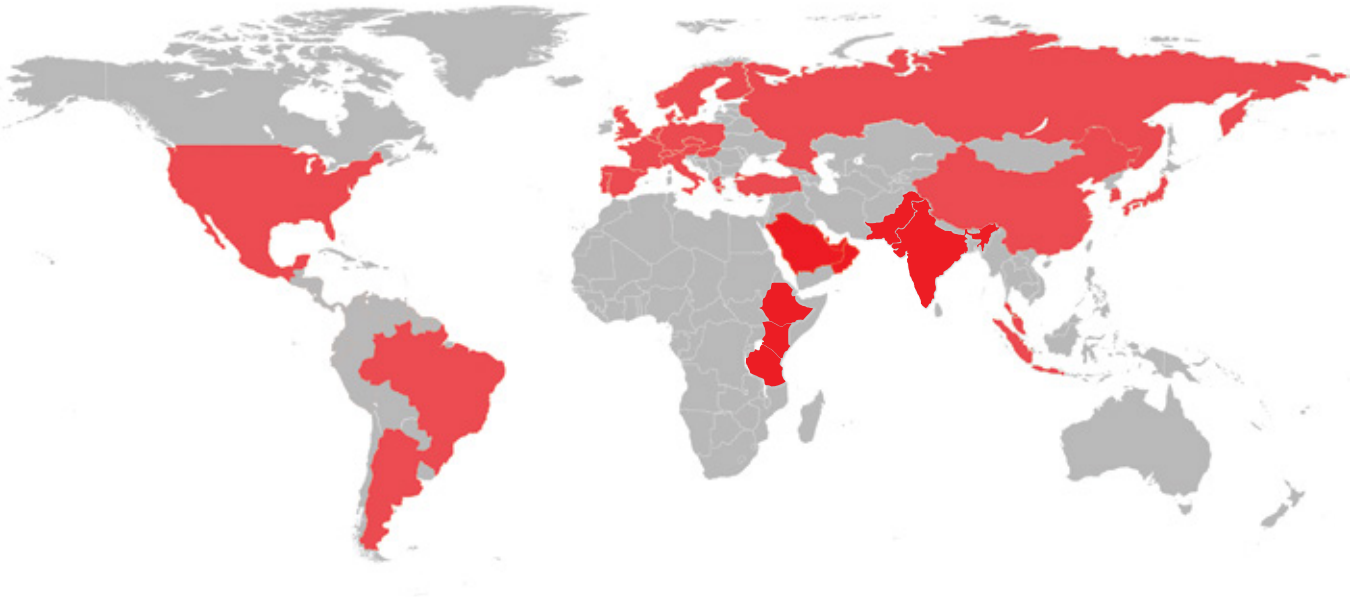

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