Highbond anchor FHB II

Flexible installation and highest loads in the cracked tensile zone.

OVERVIEW

FHB II-A S (standard)

FHB II-A L (performance optimised)

Resin capsule **FHB II-P Standard**

Resin capsule **FHB II-PF (Quick version)**

Injection mortar **FIS HB 345 S** + static mixer **FIS S**

Injection mortar **FIS HB 150 C**

Approved for:

- Cracked and non-cracked concrete C20/25 to C50/60

Also suitable for:

- Concrete C12/15

For fixing of:

- Steel constructions
- Railings
- Consoles
- Ladders
- Wooden constructions
- Cable trays
- Machines
- S taircases
- Gat es
- F acades
- Window elements
- S tand-off installations

European Technical Approval- Option 1 for cracked concrete

Fire resistance classification R 120

DESCRIPTION

- The bonded anchor suitable for cracked concrete consists of the anchor rod FHB II-A L (long version) or FHB II-A S (short version) and resin capsule FHB II-P, FHB II-PF or Injection mortar FIS HB.
- The FHB II-PF capsules allow quickest curing e.g. 2 min > 20°.
- The capsules FHB II-PF contains quick-setting vinyl ester resin.
- The FIS HB injection mortar is a high-strength 2-component vinyl ester mortar.
- When using the Injection mortar FIS HB 345 S a special application gun is needed (see pages 114/115). By using the application gun the two components are mixed and activated in the static mixer.
- Partially used cartridges can be reused, simply by changing the static mixer.
- The mortar bonds the entire surface of the anchor rod to the wall of the drilled hole and largely seals the hole.
- Anchor rod FHB II-A A4 made of stainless steel of the corrosion resistance class III e.g. A4 for outdoor use and in damp conditions. Highly corrosion-resistant steel of the corrosion resistance class IV e.g. 1.4529 for applications in aggressive atmospheres (e.g. tunnels, swimming baths).

FHB II -ADVANTAGES AT A GLANCE

FHB II-A S short version for standard applications with reduced anchorage depth for thinnest thickness of the concrete member possible.

FHB II-A S

Edge oblique for use with resin capsule.

Thread diameter corresponds to drill diameter for user-friendly push-through installation.

FHB II-A L

The geometry of the cones is specially developed for use in cracked concrete. This ensures uniform load distribution for small axial spacings and edge distances.

The performance optimised version with larger anchoring depth for highest loads.

Using a push-through element enables push-through installation.

Quick curing time!

DESCRIPTION

- Flexible system as both injection cartridge and resin capsule can be used.
- Suitable for use in cracked tensile zone guarantees highest safety.
- Low-expansion force allows cost-efficient fixing with small edge distances and spacings.
- Ergonomic application gun guarantees fast and easy installation.
- Quick installation by hand without a setting tool reduces the work involved.

Advantages/Benefits

Anchor rod FHB II-A L

- Highest loads due to greater anchorage depth.
- Push-through installation by using a push-through element (when using Injection mortar FIS HB).

Anchor rod FHB II-A S

- Reduced anchorage depth for use in thin concrete members, therefore reduced drilling effort.
- Suitable for pre-positioned and push-through installation.

INSTALLATION

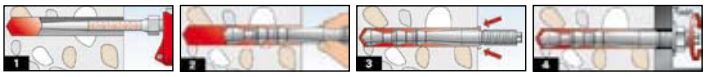
Type of installation

- Pre-positioned and push-through installation with FHB II A-S

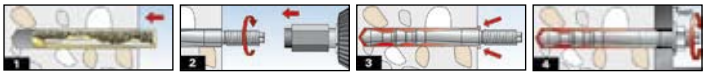
Installation tips

- For sizes ≥ M20, blow out the drilled hole with compressed air (see page 47 for installation accessories).
- For over head installation for sizes ≥ M16 centring wedges are recommended.
- If application is used with FHB II-P and FHB II-PF capsule setting tool, RA-SDS (see page 56) is recommended.

with FIS HB Injection mortar



with FHB II Resin capsule

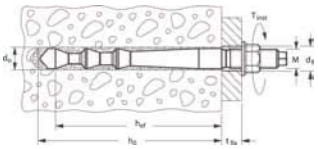


- Drill hole cleaning according to ETA approval

TECHNICAL DATA

Highbond anchor **FHB II-A S** (standard), zinc-plated steel

Highbond anchor **FHB II-A L** (performance optimised), zinc-plated steel



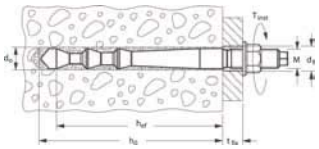
Type	Art.-No.	approval	drill-Ø	drill hole depth	anchorage depth	usable length	thread	width across nut	required quantity FIS HB	element for through fixing	suitable elements	qty. per box
		■ ETA	d_0	h_0	h_{ef}	d_a	M	SW		Art.-No.		
			[mm]	[mm]	[mm]	[mm]			[scale units]		pcs.	pcs.
FHB II-A S M10 x 60/10	**097072**	■	10	75	60	10	M 10	17	3	-	-	10
FHB II-A S M10 x 60/20	**097073**	■	10	75	60	20	M 10	17	3	-	-	10
FHB II-A S M10 x 60/60	**097074**	■	10	75	60	60	M 10	17	3	-	-	10
FHB II-A S M10 x 60/100	**097206**	■	10	75	60	100	M 10	17	3	-	-	10
FHB II-A S M12 x 75/10	**097257**	■	12	90	75	10	M 12	19	4	-	-	10
FHB II-A S M12 x 75/25	**097268**	■	12	90	75	25	M 12	19	4	-	-	10
FHB II-A S M12 x 75/60	**097274**	■	12	90	75	60	M 12	19	4	-	-	10
FHB II-A S M12 x 75/100	**097275**	■	12	90	75	100	M 12	19	4	-	-	10
FHB II-A S M12 x 75/165	**097280**	■	12	90	75	165	M 12	19	4	-	-	10
FHB II-A S M16 x 95/30	**097281**	■	16	110	95	30	M 16	24	8	-	-	10
FHB II-A S M16 x 95/60	**097286**	■	16	110	95	60	M 16	24	8	-	-	10
FHB II-A S M16 x 95/100	**097295**	■	16	110	95	100	M 16	24	8	-	-	10
FHB II-A S M16 x 95/165	**097296**	■	16	110	95	165	M 16	24	8	-	-	10
FHB II-A S M24 x 170/50	**097297**	■	25	190	170	50	M 24	36	26	-	-	4
FHB II-A L M8 x 60/10	**097032**	■	10	75	60	10	M 8	13	3	78230	2	10
FHB II-A L M8 x 60/30	**097033**	■	10	75	60	30	M 8	13	3	78230	5	10
FHB II-A L M8 x 60/50	**097034**	■	10	75	60	50	M 8	13	3	78230	9	10
FHB II-A L M10 x 95/10	**096907**	■	12	110	95	10	M 8	17	5	78232	1	10
FHB II-A L M10 x 95/20	**096940**	■	12	110	95	20	M 8	17	5	78232	2	10
FHB II-A L M10 x 95/60	**096941**	■	12	110	95	60	M 8	17	5	78232	4	10
FHB II-A L M10 x 95/100	**096942**	■	12	110	95	100	M 8	17	5	78232	7	10
FHB II-A L M12 x 120/10	**096943**	■	14	135	120	10	M 8	19	7	78233	2	10
FHB II-A L M12 x 120/25	**096944**	■	14	135	120	25	M 8	19	7	78234	2	10
FHB II-A L M12 x 120/60	**097014**	■	14	135	120	60	M 8	19	7	78234	3	10
FHB II-A L M12 x 120/100	**097031**	■	14	135	120	100	M 8	19	7	78234	5	10
FHB II-A L M16 x 160/30	**097035**	■	18	175	160	30	M 16	24	13	78236	2	10
FHB II-A L M16 x 160/60	**097038**	■	18	175	160	60	M 16	24	13	78236	3	10
FHB II-A L M16 x 160/100	**097070**	■	18	175	160	100	M 16	24	13	78236	5	10
FHB II-A L M20 x 210/50	**097071**	■	25	235	210	50	M 20	30	33	-	-	4

Highbond anchor FHB II

TECHNICAL DATA

Highbond anchor **FHB II-A S A4** (standard), stainless steel of the corrosion resistance class III e.g. A4

Highbond anchor **FHB II-A L A4** (performance optimised), stainless steel of the corrosion resistance class III e.g. A4

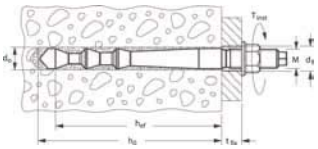


Type	Art.-No.	approval	drill-Ø	drill hole depth	anchorage depth	usable length	thread	width across nut	required quantity FIS HB	element for through fixing	suitable elements	qty. per box
		■ ETA	d_0	h_0	h_{ef}	d_a	M	SW		Art.-No.		
			[mm]	[mm]	[mm]	[mm]			[scale units]		pcs.	pcs.
FHB II-A S M10 x 60/10 A4	**097630**	■	10	75	60	10	M 10	17	3	-	-	10
FHB II-A S M10 x 60/20 A4	**097631**	■	10	75	60	20	M 10	17	3	-	-	10
FHB II-A S M10 x 60/40 A4	**097632**	■	10	75	60	40	M 10	17	3	-	-	10
FHB II-A S M10 x 60/60 A4	**097633**	■	10	75	60	60	M 10	17	3	-	-	10
FHB II-A S M10 x 60/100 A4	**097634**	■	10	75	60	100	M 10	17	3	-	-	10
FHB II-A S M12 x 75/25 A4	**097636**	■	12	90	75	25	M 12	19	4	-	-	10
FHB II-A S M12 x 75/40 A4	**097637**	■	12	90	75	40	M 12	19	4	-	-	10
FHB II-A S M12 x 75/60 A4	**097638**	■	12	90	75	60	M 12	19	4	-	-	10
FHB II-A S M12 x 75/10 A4	**097635**	■	12	90	75	10	M 12	19	4	-	-	10
FHB II-A S M12 x 75/100 A4	**097639**	■	12	90	75	100	M 12	19	4	-	-	10
FHB II-A S M12 x 75/165 A4	**097640**	■	12	90	75	165	M 12	19	4	-	-	10
FHB II-A S M16 x 95/30 A4	**097641**	■	16	110	95	30	M 16	24	8	-	-	10
FHB II-A S M16 x 95/60 A4	**097642**	■	16	110	95	60	M 16	24	8	-	-	10
FHB II-A S M16 x 95/100 A4	**097643**	■	16	110	95	100	M 16	24	8	-	-	10
FHB II-A S M16 x 95/165 A4	**097644**	■	16	110	95	165	M 16	24	8	-	-	10
FHB II-A S M24 x 170/50 A4	**097645**	■	25	190	170	50	M 24	36	25	-	-	4
FHB II-A L M8 x 60/10 A4	**097298**	■	10	75	60	10	M 8	13	3	78230	2	10
FHB II-A L M8 x 60/30 A4	**097299**	■	10	75	60	30	M 8	13	3	78230	5	10
FHB II-A L M8 x 60/50 A4	**097440**	■	10	75	60	50	M 8	13	3	78230	9	10
FHB II-A L M10 x 95/10 A4	**097616**	■	12	110	95	10	M 10	17	5	78232	1	10
FHB II-A L M10 x 95/20 A4	**097617**	■	12	110	95	20	M 10	17	5	78232	2	10
FHB II-A L M10 x 95/40 A4	**097618**	■	12	110	95	40	M 10	17	5	78232	3	10
FHB II-A L M10 x 95/60 A4	**097619**	■	12	110	95	60	M 10	17	5	78232	4	10
FHB II-A L M10 x 95/100 A4	**097620**	■	12	110	95	100	M 10	17	5	78232	7	10
FHB II-A L M12 x 120/10 A4	**097621**	■	14	135	120	10	M 12	19	7	78233	2	10
FHB II-A L M12 x 120/25 A4	**097622**	■	14	135	120	25	M 12	19	7	78234	2	10
FHB II-A L M12 x 120/40 A4	**097623**	■	14	135	120	40	M 12	19	7	78234	2	10
FHB II-A L M12 x 120/60 A4	**097624**	■	14	135	120	60	M 12	19	7	78234	3	10
FHB II-A L M12 x 120/100 A4	**097625**	■	14	135	120	100	M 12	19	7	78234	5	10
FHB II-A L M16 x 160/30 A4	**097626**	■	18	175	160	30	M 16	24	13	78236	2	10
FHB II-A L M16 x 160/60 A4	**097627**	■	18	175	160	60	M 16	24	13	78236	3	10
FHB II-A L M16 x 160/100 A4	**097628**	■	18	175	160	100	M 16	24	13	78236	5	10
FHB II-A L M20 x 210/50 A4	**097629**	■	25	235	210	50	M 20	30	33	-	-	4

TECHNICAL DATA

Highbond anchor **FHB II-A S C** (standard), highly corrosion-resistant steel of the corrosion resistance class IV e.g. 1.4529

Highbond anchor **FHB II-A L C** (performance optimised), highly corrosion-resistant steel of the corrosion resistance class IV e.g. 1.4529



Type		Art.-No.	approval	drill-Ø	drill hole depth	anchorage depth	usable length	thread	width across nut	required quantity FIS HB	qty. per box
			■ ETA	d_0	h_0	h_{ef}	d_a	M	SW		
				[mm]	[mm]	[mm]	[mm]			[scale units]	pcs.
FHB II-A S M10 x 60/10 C	1)	**097704**	■	10	75	60	10	M 10	17	3	10
FHB II-A S M10 x 60/20 C	1)	**097705**	■	10	75	60	20	M 10	17	3	10
FHB II-A S M12 x 75/40 C	1)	**097707**	■	12	90	75	40	M 12	19	4	10
FHB II-A S M12 x 75/25 C	1)	**097706**	■	12	90	75	25	M 12	19	4	10
FHB II-A S M16 x 95/30 C	1)	**097708**	■	16	110	95	30	M 16	24	8	10
FHB II-A S M16 x 95/60 C	1)	**097709**	■	16	110	95	60	M 16	24	8	10
FHB II-A S M24 x 170/50 C	1)	**097711**	■	25	190	170	50	M 24	36	26	4
FHB II-A L M8 x 60/10 C	1)	**097696**	■	10	75	60	10	M 8	13	3	10
FHB II-A L M8 x 60/30 C	1)	**097697**	■	10	75	60	30	M 8	13	3	10
FHB II-A L M10 x 95/10 C	1)	**097698**	■	12	110	95	10	M 8	17	5	10
FHB II-A L M10 x 95/20 C	1)	**097699**	■	12	110	95	20	M 8	17	5	10
FHB II-A L M12 x 120/25 C	1)	**097700**	■	14	135	120	25	M 8	19	7	10
FHB II-A L M12 x 120/40 C	1)	**097701**	■	14	135	120	40	M 12	19	7	10
FHB II-A L M16 x 160/30 C	1)	**097702**	■	18	175	160	30	M 16	24	13	10
FHB II-A L M20 x 210/50 C	1)	**097703**	■	25	235	210	50	M 20	30	33	4

1) Prices and delivery time on request.

Resin capsule **FHB II-P** standard

Resin capsule **FHB II-PF (quick version)**

Type	Art.-No.	approval	drill	drill hole depth	anchorage depth	fits	Qty. per box
		■ ETA	d_0	h_0	h_{ef}		
			[mm]	[mm]	[mm]		pcs.
Resin capsule **FHB II-P** standard							
FHB II-P 8 x 60	**096824**	■	10	75	60	FHB II-A L M 8 x 60	10
FHB II-P 10 x 60	**096847**	■	10	75	60	FHB II-S M 10 x 60	10
FHB II-P 10 x 95	**096843**	■	12	110	95	FHB II-A L M 10 x 95	10
FHB II-P 12 x 75	**096848**	■	12	90	75	FHB II-S M 12 x 75	10
FHB II-P 12 x 120	**096844**	■	14	135	120	FHB II-A L M 12 x 120	10
FHB II-P 16 x 95	**096849**	■	16	110	95	FHB II-S M 16 x 95	10
FHB II-P 16 x 160	**096845**	■	18	175	160	FHB II-A L M 16 x 160	10
FHB II-P 20 x 210	**096846**	■	25	235	210	FHB II-A L M 20 x 210	4
FHB II-P 24 x 170	**096851**	■	25	190	170	FHB II-S M 24 x 170	4
Resin capsule **FHB II-PF** quick version							
FHB II-PF 8 x 60	**500542**	■	10	75	60	FHB II-A L M 8 x 60	10
FHB II-PF 10 x 60	**500547**	■	10	75	60	FHB II-S M 10 x 60	10
FHB II-PF 10 x 95	**500543**	■	12	110	95	FHB II-A L M 10 x 95	10
FHB II-PF 12 x 75	**500548**	■	12	90	75	FHB II-S M 12 x 75	10
FHB II-PF 12 x 120	**500544**	■	14	135	120	FHB II-A L M 12 x 120	10
FHB II-PF 16 x 95	**500549**	■	16	110	95	FHB II-S M 16 x 95	10
FHB II-PF 16 x 160	**500545**	■	18	175	160	FHB II-A L M 16 x 160	10
FHB II-PF 20 x 210	**500546**	■	25	235	210	FHB II-A L M 20 x 210	4
FHB II-PF 24 x 170	**500550**	■	25	190	170	FHB II-S M 24 x 170	4

Highbond anchor FHB II

TECHNICAL DATA

Injection mortar **FIS HB 345 S** + static mixer **FIS S**

Injection mortar **FIS HB 150 C**

Type		Art.-No.	approval ■ ETA	contents [ml]	languages on the lable	contents [scale units]	qty. per box pcs.
FIS HB 345 S	1)	**033211**	■	360	D, GB, F, E, NL, CZ	180	6
FIS HB 345 S	1)	**502290**	■	360	RUS, LT, LV, EST, UA, KZ	180	6
FIS HB 345 S	1)	**502913**	■	360	D, GB, DK, S, FIN, N	180	6
FIS HB 150 C	1)	**077529**	■	145	D, GB, F, E, NL, CZ	70	6
FIS S		**061223**	-	-		-	10

1) Incl. 2 static mixer per cartridge.

FILLING QUANTITIES AND CURING TIME

Filling quantities

Type	**Drill diameter** [mm]	**Drill-hole depth** [mm]	**Mortar volume in scale units shown on the cartidge lables' corresponding scale**	**Anchor per cartridge FIS HB 345 S *)**
FHB II-A S M10 x 60	10	75	3	56
FHB II-A S M12 x 75	12	90	4	42
FHB II-A S M16 x 95	16	110	8	21
FHB II-A S M24 x 170	25	190	26	6
FHB II-A L M8 x 60	10	75	3	56
FHB II-A L M10 x 95	12	110	5	34
FHB II-A L M12 x 120	14	135	7	24
FHB II-A L M16 x 160	18	175	13	13
FHB II-A L M20 x 210	25	235	33	5

*) max. number with one static mixer.

Gelling and Curing time of the Injection mortar

Cartridge temperature (minimum + 5°C)	**Gelling time**	**Temperature at anchoring base**	**Curing time**
		- 5°C - ± 0°C	360 min.
		± 0°C - + 5°C	180 min.
+ 5°C - + 20°C	15 min.	+ 5°C - + 20°C	90 min.
+ 20°C - + 30°C	6 min.	+ 20°C - + 30°C	35 min.
+ 30°C - + 40°C	4 min.	+ 30°C - + 40°C	20 min.
> + 40°C	2 min.	> + 40°C	12 min.

Curing time for installation with resin capsule

Temperature at anchoring base	**Curing time FHB II-P**	**FHB II-PF**
- 5°C - ± 0°C	240 min.	8 min.
± 0°C - + 10°C	45 min.	6 min.
+ 10°C - + 20°C	20 min.	4 min.
≧ + 20°C	10 min.	2 min.

Please note: The curing times apply for dry anchoring bases. In damp anchoring bases they should be doubled. Remove water from drill hole.

TECHNICAL DATA

Cleaning brush for concrete **BS**

Type	Art.-No.	for drill-Ø	brush-Ø	fits	qty. per box
		[mm]	[mm]		pcs.
BS ø 10	**078178**	10	11	FHB II-A L M 80 x 60, FHB II-A S M 10 x 60	1
BS ø 12	**078179**	12	13	FHB II-A L M 10 x 95, FHB II-A S M 12 x 75	1
BS ø 14	**078180**	14	16	FHB II-A L M 12 x 120, FHB-A dyn M12	1
BS ø 16/18	**078181**	16/18	20	FHB II-A L M 16 x 160, FHB II-A S M 16 x 95, FHB-A dyn M20	1
BS ø 24	**078182**	24	26	FHB-A dyn M20	1
BS ø 25	**097806**	25	27	FHB II-A L M 20 x 210, FHB II-A S M 24 x 175	1
BS ø 28	**078183**	28	30	FHB-A dyn M24	1

Compressed-air cleaning gun **ABP**

Centring wedge

Type	Art.-No.	qty. per box
		pcs.
ABP	**059456**	suitable for M 20 - M 24	1
Centring wedge	**093076**	10	

Push-through element, stainless steel A4

Type	Art.-No.	ID	approval	min. - max. usable length	thread	qty. per box
			■ ETA	t_{fix} [mm]	M	pcs.
Push-through element M 8 x 3 A4	**078230**	9	■	3 - 6	M 8	10
Push-through element M 10 x 3 A4	**078231**	6	■	3 - 6	M 10	10
Push-through element M 10 x 8 A4	**078232**	3	■	8 - 16	M 10	10
Push-through element M 12 x 4 A4	**078233**	0	■	4 - 8	M 12	10
Push-through element M 12 x 10 A4	**078234**	7	■	10 - 20	M 12	10
Push-through element M 16 x 5 A4	**078235**	4	■	5 - 10	M 16	10
Push-through element M 16 x 10 A4	**078236**	1	■	10 - 20	M 16	10
Push-through element M 20 x 10 A4	**043906**	7	■	10 - 20	M 20	10

Setting tool RA-SDS see page 56.

Highbond anchor FHB II

LOADS

Mean ultimate loads, design resistant and recommended loads for single anchors of fischer Highbond anchor FHB II with large axial spacing and edge distance

Non-cracked concrete												
Anchor size				**M 8 x 60**	**M 10 x 60**	**M 10 x 95**	**M 12 x 75**	**M 12 x 120**	**M 16 x 95**	**M 16 x 160**	**M 20 x 210**	**M 24 x 170**
Type of anchor				**AL**	**AS**	**AL**	**AS**	**AL**	**AS**	**AL**	**AL**	**AS**
Effective anchorage depth		h_{ef}	[mm]	**60**	**60**	**95**	**75**	**120**	**95**	**160**	**210**	**170**
Drill hole depth		$h_0 \geq$	[mm]	75	75	110	90	135	110	175	235	190
Drill hole diameter		d_0	[mm]	10	10	12	12	14	16	18	25	25
Mean ultimate loads N_u and V_u [kN]												
Tensile	0°	N_u	[kN]	gvz/A4/C	21.9*	21.9*	34.4*	34.4*	49.8*	61.1*	96.6*	137.6*	128.5*
Shear	90°	V_u	[kN]	gvz	15.0*	21.3*	24.9*	29.8*	42.4*	61.6*	72.6*	116.1*	127.1*
			[kN]	A4	21.4*	26.9*	32.9*	39.1*	49.0*	77.9*	89.2*	133.4*	151.6*
			[kN]	C	20.5*	30.2*	33.9*	43.8*	48.8*	85.8*	91.7*	148.4*	175.7*
Design loads N_{Rd} and V_{Rd} [kN]												
Tensile	0°	N_u	[kN]	gvz/A4/C	14.6	14.6	22.9	21.8	33.2	31.1	64.4	91.7	74.5
Shear	90°	V_u	[kN]	gvz	10.6	15.0	16.6	21.8	24.2	40.6	45.0	70.3	91.4
			[kN]	A4	11.7	18.6	18.6	27.0	27.0	50.2	50.2	78.3	99.6
			[kN]	C	11.7	18.6	18.6	27.0	27.0	50.2	50.2	78.3	112.8
Recommended loads N_{rec} and V_{rec} [kN]												
Tensile	0°	N_{rec}	[kN]	gvz/A4/C	10.4	10.4	16.4	15.6	23.7	22.2	46.0	65.5	53.2
Shear	90°	V_{rec}	[kN]	gvz	7.5	10.7	11.9	15.6	17.3	29.0	32.2	50.2	65.3
			[kN]	A4	8.3	13.3	13.3	19.3	19.3	35.8	35.8	55.9	71.1
			[kN]	C	8.3	13.3	13.3	19.3	19.3	35.8	35.8	55.9	80.6
Recommended bending moment M_{rec} [Nm]												
		M_{rec}	[Nm]	gvz/A4/C	17.1	34.3	34.3	60.0	60.0	152.0	152.0	296.6	512.0
Component dimensions, minimum axial spacings and edge distances												
Min. spacing[1)]		s_{min}	[mm]		40	40	40	40	50	50	70	90	80
Min. edge distance[1)]		c_{min}	[mm]		40	40	40	40	50	50	70	90	80
Min. structural component thickness		h_{min}	[mm]		100	100	140	120	170	150	220	280	240
Clearance-hole in fixture to be attached		d_f	[mm]		9	12	12	14	14	18	18	22	26
Required torque		T_{inst}	[Nm]		15	15	20	30	40	50	60	100	100

Cracked concrete												
Anchor size				**M 8 x 60**	**M 10 x 60**	**M 10 x 95**	**M 12 x 75**	**M 12 x 120**	**M 16 x 95**	**M 16 x 160**	**M 20 x 210**	**M 24 x 170**
Type of anchor				**AL**	**AS**	**AL**	**AS**	**AL**	**AS**	**AL**	**AL**	**AS**
Effective anchorage depth		h_{ef}	[mm]	**60**	**60**	**95**	**75**	**120**	**95**	**160**	**210**	**170**
Drill hole depth		$h_0 \geq$	[mm]	75	75	110	90	135	110	175	235	190
Drill hole diameter		d_0	[mm]	10	10	12	12	14	16	18	25	25
Mean ultimate loads N_u and V_u [kN]												
Tensile	0°	N_u	[kN]	gvz/A4/C	19.6	21.9*	34.4*	30.7	49.8*	43.8	95.6	137.6*	104.7
Shear	90°	V_u	[kN]	gvz	15.0*	21.3*	24.9*	29.8*	42.4*	61.6*	72.6*	116.1*	127.1*
			[kN]	A4	21.4*	26.9*	32.9*	39.1*	49.0*	77.9*	89.2*	133.4*	151.6*
			[kN]	C	20.5*	30.2*	33.9*	43.8*	48.8*	85.8*	91.7*	148.4*	175.7*
Design loads N_{Rd} and V_{Rd} [kN]												
Tensile	0°	N_u	[kN]	gvz/A4/C	11.2	11.2	22.2	15.6	31.5	22.2	48.6	73.0	53.2
Shear	90°	V_u	[kN]	gvz	10.6	15.0	16.6	21.8	24.2	40.6	45.0	70.3	91.4
			[kN]	A4	11.7	18.6	18.6	27.0	27.0	44.4	50.2	78.3	99.6
			[kN]	C	11.7	18.6	18.6	27.0	27.0	44.4	50.2	78.3	106.4
Recommended loads N_{rec} and V_{rec} [kN]												
Tensile	0°	N_{rec}	[kN]	gvz/A4/C	8.0	8.0	15.9	11.1	22.5	15.9	34.7	52.2	38.0
Shear	90°	V_{rec}	[kN]	gvz	7.5	10.7	11.9	15.6	17.3	29.0	32.2	50.2	65.3
			[kN]	A4	8.3	13.3	13.3	19.3	19.3	31.7	35.8	55.9	71.1
			[kN]	C	8.3	13.3	13.3	19.3	19.3	31.7	35.8	55.9	76.0
Recommended bending moment M_{rec} [Nm]												
		M_{rec}	[Nm]	gvz/A4/C	17.1	34.3	34.3	60.0	60.0	152.0	152.0	296.6	512.0
Component dimensions, minimum axial spacings and edge distances												
Min. spacing[1)]		s_{min}	[mm]		40	40	40	40	50	50	70	90	80
Min. edge distance[1)]		c_{min}	[mm]		40	40	40	40	50	50	70	90	80
Min. structural component thickness		h_{min}	[mm]		100	100	140	120	170	150	220	280	240
Clearance-hole in fixture to be attached		d_f	[mm]		9	12	12	14	14	18	18	22	26
Required torque		T_{inst}	[Nm]		15	15	20	30	40	50	60	100	100

* steel failure

[1)] For min. spacing and min. edge distance the above described loads have to be reduced! (See "Technical Handbook" or design software "CC-Compufix")

All values apply for concrete C 20/25 without edge or spacing influence.

Design loads: material safety factors γ_M is included. Material safety factor γ_M depends on type of anchor.

Recommended loads: material safety factors γ_M and safety factor for load γ_L = 1.4 are included.