

Injection System VME basic



Threaded Stud V-A



Threaded Stud VMU-A



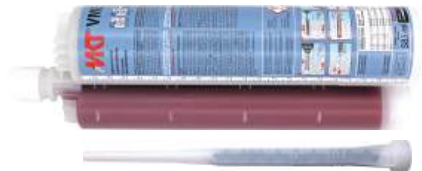
Threaded Stud VM-A
1 meter length, to be cut to the required length



Internally Threaded Sleeve VMU-IG



Cartridge VME basic 440
Side-by-side cartridge
Content: 440 ml



Cartridge VME basic 585
Side-by-side cartridge
Content: 585 ml

- Range of loading:** 1,8 kN–221,6 kN
- Concrete quality:** C20/25–C50/60
- Material:** Steel, zinc plated, hot dip galvanized, stainless steel A4, stainless steel HCR

Description

The VME basic injection system is based on a slow curing epoxy adhesive. It has the European Technical Assessments for fixings in cracked and uncracked concrete as well as for post-installed rebar connections. The cost-effective injection mortar for the medium load range is particularly suitable for large diameters and deep boreholes.

By using the hollow drill bit SB, contamination and dust exposure of the respiratory tract can be reduced to a minimum and subsequent drill hole cleaning is not necessary.

As anchoring elements the threaded studs VMU-A, VM-A and V-A, the internally threaded sleeves VMU-IG also standard threaded studs with strength test certificate 3.1 or reinforcement bars can be used.



Advantages

- European Technical Assessment in cracked and uncracked concrete
- Long processing time, even at high temperatures
- No shrinkage, therefore very high tightness of the fastenings
- Approved for installation in dry and wet concrete and in water-filled drill holes
- Variable anchorage depths allow flexible adaptation to the respective load situation, reduce the drilling effort and adhesive consumption
- Versatile in application
- The wide range of threaded studs VMU-A, VM-A, V-A and internally threaded sleeves VMU-IG as well as the use of standard threaded studs with strength test certificate 3.1 or reinforcement bars allows any requirement to be met
- Drill hole creation with hammer drill, compressed air drill or hollow drill bit
- When using the hollow drill bit SB the subsequent cleaning of the borehole is not necessary
- Opened cartridges can be reused with a new static mixer
- Styrene-free

Applications

- Fastenings in cracked and uncracked concrete:** Steel structures, railings, base plates, supports, brackets, facade structures.
- Fastenings with rebar in cracked and uncracked concrete with shear force:** Shear connectors, wall connecting reinforcement, concrete joints.

Injection Cartridge VME basic



→ Long processing time

→ No shrinkage

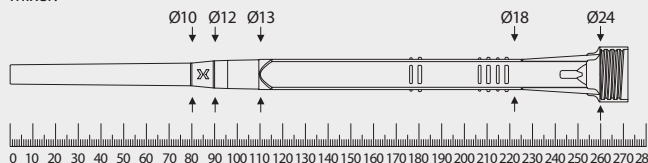
Description	Ref. No.	Content ml	Content of master box pcs.	Weight per master box kg	Weight per piece kg
Cartridge VME basic 440	28258143	440	12	9,79	0,78
Cartridge VME basic 585	28258343	585	12	12,28	1,02
Static mixer VM-XHP	28305301	-	12	0,18	0,01

One static mixer VM-XHP comes with each cartridge

Usable length static mixer VM-XHP

Drill holes must always be filled from the bottom of the hole to ensure no air pockets are trapped in the adhesive. This is only possible when the tip of the mixing nozzle reaches the very bottom of the drill hole before injecting the adhesive. If the mixing nozzle does not reach the bottom of the drill hole, a mixer extension tube must be used.

Outer diameter mixer:



Curing Time Injection Adhesive VME basic

→ Cartridge temperature when installing +5°C to +40°C

Temperature (°C) of the concrete	maximum working time	minimum curing time	
		dry concrete	wet concrete
+5°C bis +9°C	80 min	60 h	120 h
+10°C bis +14°C	60 min	48 h	96 h
+15°C bis +19°C	40 min	24 h	48 h
+20°C bis +24°C	30 min	12 h	24 h
+25°C bis +34°C	12 min	10 h	20 h
+35°C bis +39°C	8 min	7 h	14 h
+40°C	8 min	4 h	8 h

Accessories for Injection System VME basic

Threaded stud	Internally threaded stud	Rebar Ø	Drill bit Ø	Blow-out pump ¹⁾ / Air gun ¹⁾	Cleaning brush RB ¹⁾	Retaining Washer VM-IA ²⁾	Extension tube ¹⁾	Dispenser
		mm	mm					
M8		8	10	VM-AP 360 ²⁾ VM-ABP 200	RB 10 M6		VM-XE 10	
M10	VMU-IG M6	8 / 10	12	VM-AP 360 ²⁾ VM-ABP 200 DLS with RS, RS25	RB 12 M6 RB 12 M8		VM-XE 10	
M12	VMU-IG M8	10 / 12	14	VM-AP 360 ²⁾ VM-ABP 200 DLS with RS, RS25	RB 14 M6 RB 14 M8		VM-XE 10	
		12	16	VM-AP 360 ²⁾ VM-ABP 200 DLS with RS, RS25	RB 16 M6 RB 16 M8		VM-XE 10	
M16	VMU-IG M10	14	18	VM-AP 360 ²⁾ VM-ABP 200 / 250 / 500 / 1000 DLS with RS, RS25	RB 18 M6 RB 18 M8	VM-IA 18	VM-XE 10 VM-XLE 16	
		16	20	VM-AP 360 ²⁾ VM-ABP 200 / 250 / 500 / 1000 DLS with RS, RS25	RB 20 M6 RB 20 M8	VM-IA 20	VM-XE 10 VM-XLE 16	VM-P 585 Standard, VM-P 585 Profi, VM-P 585 Akku, VM-P 585 Pneumatic
M20	VMU-IG M12	14	18	VM-ABP 250 / 500 / 1000 DLS with RS, RS25	RB 18 M6 RB 18 M8	VM-IA 18	VM-XE 10 VM-XLE 16	
		20	25	VM-ABP 250 / 500 / 1000 DLS with RS, RS25	RB 22 M6 RB 26 M6	VM-IA 22	VM-XE 10 VM-XLE 16	
M24	VMU-IG M16	24	30	VM-ABP 250 / 500 / 1000 DLS with RS, RS25	RB 24 M6 RB 28 M6	VM-IA 24	VM-XE 10 VM-XLE 16	
M27		27	33	VM-ABP 250 / 500 / 1000 DLS with RS, RS25	RB 27 M6 RB 31 M6	VM-IA 27	VM-XE 10 VM-XLE 16	
M30	VMU-IG M20	24 / 25	32	VM-ABP 250 / 500 / 1000 DLS with RS, RS35	RB 32 M6 RB 32 M8	VM-IA 32	VM-XE 10 VM-XLE 16	
		28	35	VM-ABP 250 / 500 / 1000 DLS with RS, RS35	RB 35 M6 RB 35 M8	VM-IA 35	VM-XE 10 VM-XLE 16	
M30	VMU-IG M20	32	40	VM-ABP 250 / 500 / 1000 DLS with RS, RS35	RB 40 M6	VM-IA 40	VM-XE 10 VM-XLE 16	
See page				179	180	182	181	182 / 183

¹⁾When using the MKT hollow drill SB (see page 178) the subsequent cleaning of the borehole is not necessary

²⁾If the static mixer does not reach the bottom of the borehole (see usable length of static mixer), an extension tube must be used. From a drill-Ø ≥ 18 mm, retaining washer and extension tube must be used for overhead installation and for drill hole depths > 250 mm.

Threaded studs for Injection System VME basic

Threaded stud VMU-A

Steel, zinc plated 5.8
Dimensions see page 173



- For use in structures subject to dry internal conditions
- Steel, zinc plated 8.8 on demand

Threaded stud VMU-A fvz

Steel, hot dip galvanized 5.8
Dimensions see page 173



- For use in structures subject to dry internal conditions

Threaded stud VMU-A A4

Stainless steel A4-70
Dimensions see page 173



- For use in structures subject to dry internal conditions or external atmospheric exposure
- Stainless steel HCR on request

Internally threaded sleeve VMU-IG

Steel, zinc plated 5.8
Dimensions see page 175



- For use in structures subject to dry internal conditions
- With internal thread

Internally threaded sleeve VMU-IG A4

Stainless steel A4-70
Dimensions see page 175



- For use in structures subject to dry internal conditions or external atmospheric exposure
- With internal thread

Threaded stud V-A

Steel, zinc plated 5.8
Dimensions see page 174



- For use in structures subject to dry internal conditions

Threaded stud V-A fvz

Steel, hot dip galvanized 5.8
Dimensions see page 174



- For use in structures subject to dry internal conditions

Threaded stud V-A 8.8

Steel, zinc plated 8.8
Dimensions see page 174



- For use in structures subject to dry internal conditions

Threaded stud V-A A4

Stainless steel A4-70
Dimensions see page 174



- For use in structures subject to dry internal conditions or external atmospheric exposure

Threaded stud V-A HCR

Stainless steel HCR-70
Dimensions see page 174



- For use in particularly corrosive environments
- High corrosion resistant steel 1.4529 (HCR)

Threaded stud VM-A

Steel 5.8, zinc plated
Dimensions see page 175



- For use in structures subject to dry internal conditions
- Threaded studs, of 1 meter length, to be cut to the required length
- Comes with manufacturer's certificate (3.1 EN 10204) in every package

Threaded stud VM-A 8.8

Steel 8.8, zinc plated
Dimensions see page 175



- For use in structures subject to dry internal conditions
- Threaded studs, of 1 meter length, to be cut to the required length
- Comes with manufacturer's certificate (3.1 EN 10204) in every package

Threaded stud VM-A

Stainless steel A4-70
Dimensions see page 175



- For use in structures subject to dry internal conditions or external atmospheric exposure
- Threaded studs, of 1 meter length, to be cut to the required length
- Comes with manufacturer's certificate (3.1 EN 10204) in every package



Extract from Permissible Service Conditions of European Technical Assessment ETA-21/0787 for use in cracked and uncracked concrete (Option 1)

Approved loads without influence of spacing and edge distance according EN 1992-4 in dry or wet concrete for temperature range I -40°C to +24°C/+40°C¹⁾ and for temperature range II -40°C to +43°C/+70°C¹⁾. The influence of the sustained load has been taken into account by the factor $\Psi_{sus} = 1.0$. A total safety factor (γ_M und γ_P) is included. For further details and temperature ranges, see ETA.

Loads and performance data

Injection System VME basic, threaded stud steel 5.8				M8	M10	M12	M16	M20	M24	M27	M30	
Range of anchorage depths	$h_{ef,min} - h_{ef,max}$	[mm]		60 - 160	60 - 200	70 - 240	80 - 320	90 - 400	96 - 480	108 - 540	120 - 600	
Approved loads, tension for $h_{ef,min} - h_{ef,max}$ cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	3,6 - 8,6	4,5 - 13,8	6,3 - 20,0	8,8 - 37,1	10,5 - 58,1	11,5 - 73,9	13,7 - 93,5	16,1 - 115,4
	43°C/70°C ¹⁾	C20/25	appr. N	[kN]	1,8 - 4,8	2,2 - 7,5	3,1 - 10,8	4,8 - 19,1	6,7 - 29,9	7,4 - 36,9	9,3 - 46,7	11,5 - 57,7
Approved loads, tension for $h_{ef,min} - h_{ef,max}$ uncracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	7,7 - 8,6	8,0 - 13,8	10,1 - 20,0	12,3 - 37,1	14,7 - 58,1	16,2 - 83,8	19,3 - 109,5	22,6 - 133,3
	43°C/70°C ¹⁾	C20/25	appr. N	[kN]	3,6 - 8,6	4,5 - 13,8	6,3 - 20,0	8,9 - 35,6	12,5 - 55,6	14,8 - 73,9	18,7 - 93,5	22,6 - 115,4
Approved loads, shear for $h_{ef,min} - h_{ef,max}$ cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V	[kN]	6,3	9,7	14,3	24,5 - 26,9	29,3 - 42,3	32,2 - 60,6	38,5 - 78,9	45,1 - 96,0
	43°C/70°C ¹⁾	C20/25	appr. V	[kN]	5,0 - 6,3	6,3 - 9,7	8,8 - 14,3	13,4 - 26,9	18,8 - 42,3	20,7 - 60,6	26,2 - 78,9	32,3 - 96,0
Approved loads, shear for $h_{ef,min} - h_{ef,max}$ uncracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V	[kN]	6,3	9,7	14,3	26,9	41,1 - 42,3	45,2 - 60,6	54,0 - 78,9	63,2 - 96,0
	43°C/70°C ¹⁾	C20/25	appr. V	[kN]	6,3	9,7	14,3	24,9 - 26,9	35,0 - 42,3	41,4 - 60,6	52,3 - 78,9	63,2 - 96,0

Injection System VME basic, threaded stud steel 8.8												
Approved loads, tension for $h_{ef,min} - h_{ef,max}$ cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	3,6 - 9,6	4,5 - 15,0	6,3 - 21,5	8,8 - 38,3	10,5 - 59,8	11,5 - 73,9	13,7 - 93,5	16,1 - 115,4
	43°C/70°C ¹⁾	C20/25	appr. N	[kN]	1,8 - 4,8	2,2 - 7,5	3,1 - 10,8	4,8 - 19,1	6,7 - 29,9	7,4 - 36,9	9,3 - 46,7	11,5 - 57,7
Approved loads, tension for $h_{ef,min} - h_{ef,max}$ uncracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	7,7 - 13,8	8,0 - 21,9	10,1 - 31,9	12,3 - 59,5	14,7 - 93,3	16,2 - 134,3	19,3 - 175,2	22,6 - 213,8
	43°C/70°C ¹⁾	C20/25	appr. N	[kN]	3,6 - 9,6	4,5 - 15,0	6,3 - 21,5	8,9 - 35,6	12,5 - 55,6	14,8 - 73,9	18,7 - 93,5	22,6 - 115,4
Approved loads, shear for $h_{ef,min} - h_{ef,max}$ cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V	[kN]	8,6	12,6 - 13,1	17,6 - 19,4	24,5 - 36,0	29,3 - 56,0	32,2 - 80,6	38,5 - 105,1	45,1 - 128,0
	43°C/70°C ¹⁾	C20/25	appr. V	[kN]	5,0 - 8,6	6,3 - 13,1	8,8 - 19,4	13,4 - 36,0	18,8 - 56,0	20,7 - 80,6	26,2 - 105,1	32,3 - 128,0
Approved loads, shear for $h_{ef,min} - h_{ef,max}$ uncracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V	[kN]	8,6	13,1	19,4	34,4 - 36,0	41,1 - 56,0	45,2 - 80,6	54,0 - 105,1	63,2 - 128,0
	43°C/70°C ¹⁾	C20/25	appr. V	[kN]	8,6	12,6 - 13,1	17,6 - 19,4	24,9 - 36,0	35,0 - 56,0	41,4 - 80,6	52,3 - 105,1	63,2 - 128,0

Injection System VME basic, threaded stud stainless steel A4-70, HCR-70												
Approved loads, tension for $h_{ef,min} - h_{ef,max}$ cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	3,6 - 9,6	4,5 - 15,0	6,3 - 21,5	8,8 - 38,3	10,5 - 59,8	11,5 - 73,9	13,7 - 57,4	16,1 - 70,2
	43°C/70°C ¹⁾	C20/25	appr. N	[kN]	1,8 - 4,8	2,2 - 7,5	3,1 - 10,8	4,8 - 19,1	6,7 - 29,9	7,4 - 36,9	9,3 - 46,7	11,5 - 57,7
Approved loads, tension for $h_{ef,min} - h_{ef,max}$ uncracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	7,7 - 9,9	8,0 - 15,7	10,1 - 22,5	12,3 - 42,0	14,7 - 65,3	16,2 - 94,3	19,3 - 57,4	22,6 - 70,2
	43°C/70°C ¹⁾	C20/25	appr. N	[kN]	3,6 - 9,6	4,5 - 15,0	6,3 - 21,5	8,9 - 35,6	12,5 - 55,6	14,8 - 73,9	18,7 - 57,4	22,6 - 70,2
Approved loads, shear for $h_{ef,min} - h_{ef,max}$ cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V	[kN]	6,0	9,2	13,7	24,5 - 25,2	29,3 - 39,4	32,2 - 56,8	34,5	42,0
	43°C/70°C ¹⁾	C20/25	appr. V	[kN]	5,0 - 6,0	6,3 - 9,2	8,8 - 13,7	13,4 - 25,2	18,8 - 39,4	20,7 - 56,8	26,2 - 34,5	32,3 - 42,0
Approved loads, shear for $h_{ef,min} - h_{ef,max}$ uncracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V	[kN]	6,0	9,2	13,7	25,2	39,4	45,2 - 56,8	34,5	42,0
	43°C/70°C ¹⁾	C20/25	appr. V	[kN]	6,0	9,2	13,7	24,9 - 25,2	35,0 - 39,4	41,4 - 56,8	34,5	42,0

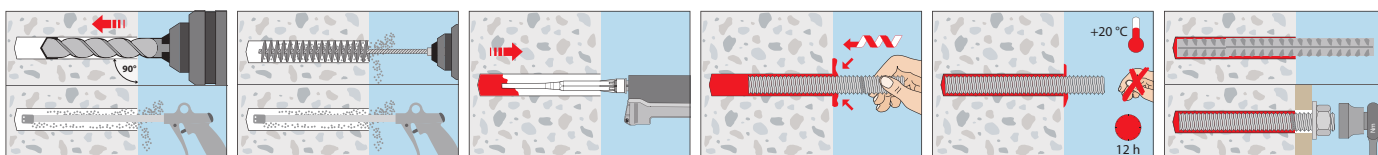
Spacing and edge distance												
Min. thickness of concrete for $h_{ef,min} - h_{ef,max}$	h_{min}	[mm]		100 - 190	100 - 230	100 - 270	116 - 356	134 - 444	152 - 536	168 - 600	190 - 670	
Minimum spacing	s_{min}	[mm]		40	50	60	75	95	115	125	140	
Minimum edge distance	c_{min}	[mm]		35	40	45	50	60	65	75	80	

Installation parameters												
Drill hole diameter	d_o	[mm]		10	12	14	18	22	28	30	35	
Clearance hole in the fixture for Pre-setting installation	df_{\leq}	[mm]		9	12	14	18	22	26	30	33	
Clearance hole in the fixture for Through-setting installation	df_{\leq}	[mm]		12	14	16	20	24	30	33	40	
Range of drill hole depth for $h_{ef,min} - h_{ef,max}$	h_o	[mm]		60 - 160	60 - 200	70 - 240	80 - 320	90 - 400	96 - 480	108 - 540	120 - 600	
Installation torque	$T_{inst,\leq}$	[Nm]		10	20	40	60	100	170	250	300	
Amount of adhesive per 100 mm drill hole depth		[ml]		6,53	8,16	9,82	13,61	17,89	32,25	30,69	48,67	

¹⁾max. long term temperature / max. short term temperature

Higher concrete strength may lead to higher approved loads. Using a hollow drill bit without subsequent cleaning can lead to lower loads in uncracked concrete. Technical data see European Technical Assessment ETA-21/0787.

Installation





Extract from Permissible Service Conditions of European Technical Assessment ETA-21/0787 for use in cracked and uncracked concrete (Option 1)

Approved loads according to EN 1992-4 for single anchors without the influence of spacing and edge distances in dry and wet concrete with compressed air cleaning for temperature range I -40°C to +24°C (short term temperature +40°C) and for temperature range II -40°C to +43°C (short term temperature +70°C). The influence of the sustained load has been taken into account by the factor $\Psi_{sus} = 1,0$ and the total safety factor (γ_M und γ_p) is included. For further details and temperature ranges see ETA.

Loads and performance data

Internally Threaded Sleeve				IG M6 x 80	IG M6 x 90	IG M8 x 80	IG M8 x 100	IG M10 x 80	IG M10 x 100	IG M12 x125	IG M16 x 170	IG M20 x 200
Anchorage depth h_{ef}		[mm]		80	90	80	100	80	100	125	170	200
Injection System VME basic, Internally Threaded Sleeve VMU-IG steel 5.8												
Approved loads, tension for h_{ef}				gerissener Beton								
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N [kN]	4,8	4,8	7,2	8,1	8,4	11,7	16,4	26,0	33,1
	43°C/70°C ¹⁾	C20/25	appr. N [kN]	3,0	3,4	3,6	4,5	4,8	6,0	9,3	13,1	19,2
Approved loads, tension for h_{ef}				ungerissener Beton								
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N [kN]	4,8	4,8	8,1	8,1	12,0	13,8	20,0	36,2	47,3
	43°C/70°C ¹⁾	C20/25	appr. N [kN]	4,8	4,8	7,2	8,1	8,9	11,1	17,4	26,2	38,5
Approved loads, shear for h_{ef}				gerissener Beton								
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V [kN]	3,4	3,4	5,7	5,7	9,7	9,7	14,3	25,7	42,3
	43°C/70°C ¹⁾	C20/25	appr. V [kN]	3,4	3,4	5,7	5,7	9,7	9,7	14,3	25,7	42,3
Approved loads, shear for h_{ef}				ungerissener Beton								
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V [kN]	3,4	3,4	5,7	5,7	9,7	9,7	14,3	25,7	42,3
	43°C/70°C ¹⁾	C20/25	appr. V [kN]	3,4	3,4	5,7	5,7	9,7	9,7	14,3	25,7	42,3
Injection System VME basic, Internally Threaded Sleeve VMU-IG Stainless steel A4-70, HCR-70												
Approved loads, tension for h_{ef}				gerissener Beton								
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N [kN]	5,3	5,3	7,2	9,0	8,4	11,7	16,4	26,0	31,0
	43°C/70°C ¹⁾	C20/25	appr. N [kN]	3,0	3,4	3,6	4,5	4,8	6,0	9,3	13,1	19,2
Approved loads, tension for h_{ef}				ungerissener Beton								
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N [kN]	5,3	5,3	9,9	9,9	12,0	15,7	22,5	37,1	31,0
	43°C/70°C ¹⁾	C20/25	appr. N [kN]	5,3	5,3	7,2	9,0	8,9	11,1	17,4	26,2	31,0
Approved loads, shear for h_{ef}				gerissener Beton								
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V [kN]	3,2	3,2	6,0	6,0	9,2	9,2	13,7	25,2	18,6
	43°C/70°C ¹⁾	C20/25	appr. V [kN]	3,2	3,2	6,0	6,0	9,2	9,2	13,7	25,2	18,6
Approved loads, shear for h_{ef}				ungerissener Beton								
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V [kN]	3,2	3,2	6,0	6,0	9,2	9,2	13,7	25,2	18,6
	43°C/70°C ¹⁾	C20/25	appr. V [kN]	3,2	3,2	6,0	6,0	9,2	9,2	13,7	25,2	18,6
Spacing and edge distance												
Min. thickness of concrete for h_{ef}	h_{min}	[mm]		110	120	110	130	116	136	169	226	270
Minimum spacing	s_{min}	[mm]		50	50	60	60	75	75	95	115	140
Minimum edge distance	c_{min}	[mm]		40	40	45	45	50	50	60	65	80
Installation parameters												
Drill hole diameter	d_o	[mm]		12	12	14	14	18	18	22	28	35
Clearance hole in the fixture	$d_{f \leq}$	[mm]		7	7	9	9	12	12	14	18	22
Drill hole depth for h_{ef}	h_o	[mm]		80	90	80	100	80	100	125	170	200
Installation torque	$T_{inst \leq}$	[Nm]		10	10	10	10	20	20	40	60	100
Amount of adhesive per 100mm drill hole		[ml]		6,6	7,4	7,9	9,9	10,9	13,6	22,4	54,9	97,4

¹⁾Max. long term temperature/max. short term temperature

Higher concrete strength may lead to higher approved loads. Using a hollow drill bit without subsequent cleaning can lead to lower loads in uncracked concrete. Technical data see European Technical Assessment ETA-21/0787.

Injection System VME basic, rebar B500B				Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø24	Ø25	Ø28	Ø32	
Range of anchorage depths $h_{ef,min} - h_{ef,max}$				[mm]	60 - 160	60 - 200	70 - 240	75 - 280	80 - 320	90 - 400	96 - 480	100 - 500	112 - 560	128 - 640
Approved loads, tension for $h_{ef,min} - h_{ef,max}$				cracked concrete										
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N [kN]	4,3 - 11,5	6,3 - 20,9	8,8 - 30,2	10,2 - 38,1	12,3 - 49,8	14,6 - 71,8	16,1 - 103,4	17,1 - 112,2	20,3 - 129,0	24,8 - 168,5	
	43°C/70°C ¹⁾	C20/25	appr. N [kN]	1,8 - 4,8	2,2 - 7,5	3,1 - 10,8	3,9 - 14,7	4,8 - 19,1	6,7 - 29,9	8,6 - 43,1	9,3 - 46,7	11,7 - 58,6	15,3 - 76,6	
Approved loads, tension for $h_{ef,min} - h_{ef,max}$				uncracked concrete										
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N [kN]	10,1 - 13,8	11,2 - 21,6	14,1 - 31,2	15,6 - 42,4	17,2 - 55,4	20,5 - 86,6	22,6 - 124,6	24,0 - 135,2	28,5 - 169,6	34,8 - 221,6	
	43°C/70°C ¹⁾	C20/25	appr. N [kN]	4,3 - 11,5	5,4 - 18,0	7,5 - 25,9	9,4 - 35,2	11,5 - 46,0	14,8 - 65,8	19,0 - 94,8	20,6 - 102,8	23,5 - 117,3	30,6 - 153,2	
Approved loads, shear for $h_{ef,min} - h_{ef,max}$				cracked concrete										
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V [kN]	6,5	10,1	14,5	19,8	24,5 - 25,9	29,3 - 40,4	32,2 - 58,2	34,3 - 63,1	40,6 - 79,2	49,7 - 103,4	
	43°C/70°C ¹⁾	C20/25	appr. V [kN]	3,6 - 6,5	4,5 - 10,1	6,3 - 14,5	7,9 - 19,8	9,6 - 25,9	13,5 - 40,4	17,2 - 58,2	18,7 - 63,1	23,5 - 79,2	30,6 - 103,4	
Approved loads, shear for $h_{ef,min} - h_{ef,max}$				uncracked concrete										
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V [kN]	6,5	10,1	14,5	19,8	25,9	40,4	45,2 - 58,2	48,1 - 63,1	57,0 - 79,2	69,6 - 103,4	
	43°C/70°C ¹⁾	C20/25	appr. V [kN]	6,5	10,1	14,5	18,8 - 19,8	23,0 - 25,9	29,6 - 40,4	37,9 - 58,2	41,1 - 63,1	46,9 - 79,2	61,3 - 103,4	
Spacing and edge distance														
Min. thickness of concrete for $h_{ef,min} - h_{ef,max}$	h_{min}	[mm]		100 - 190	100 - 230	100 - 270 / 102 - 272 ²⁾	111 - 316	120 - 360	140 - 450	160 - 544	164 - 564	182 - 630	208 - 720	
Minimum spacing	s_{min}	[mm]		40	50	60	70	75	95	120	120	130	150	
Minimum edge distance	c_{min}	[mm]		35	40	45	50	50	60	70	70	75	85	
Installation parameters														
Drill hole diameter	d_o	[mm]		10/12 ²⁾	12/14 ²⁾	14/16 ²⁾	18	20	25	32	32	35	40	
Range of drill hole depth for $h_{ef,min} - h_{ef,max}$	h_o	[mm]		60 - 160	60 - 200	70 - 240	75 - 280	80 - 320	90 - 400	96 - 480	100 - 500	112 - 560	128 - 640	
Amount of adhesive per 100 mm drill hole depth		[ml]		4,16/8,46 ³⁾	5,07/10,12 ³⁾	5,97/11,78 ³⁾	13,44	15,09	23,11	44,65	40,03	44,22	57,32	

¹⁾Max. long term temperature/max. short term temperature

²⁾For rebar Ø8, Ø10 and Ø12 both drill hole diameters are possible

³⁾The first value applies to the smaller drill diameter, the second value to the larger drill diameter.

Higher concrete strength may lead to higher approved loads. Using a hollow drill bit without subsequent cleaning can lead to lower loads in uncracked concrete. Technical data see European Technical Assessment ETA-21/0787.