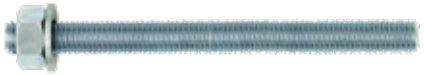
Injection System VMH

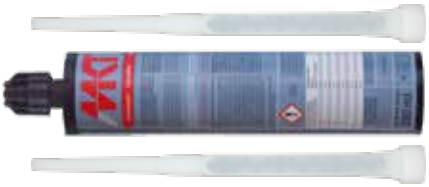
Threaded stud V-A



Threaded stud VMU-A

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

Internally threaded sleeve VMU-IG



Cartridge VMH 280
Coaxial cartridge suitable for silicone guns
Content: 280ml including 2 mixers

Cartridge VMH 345
Side-by-side cartridge
Content: 345ml

Cartridge VMH 420
Coaxial cartridge
Content: 420ml

ETA-17/0716 | ETA-17/0715 | SEISMIC C1: M8-M30, Ø8-Ø32 C2: M12-M24 | 100 YEARS | F30-F120 | Allgemeine Bauartgenehmigung Z-21.8-2126 als Beton-Beton-Verbinder | Allgemeine Bauartgenehmigung Z-74.8-204 in unbeschichteten FD-/FDE-Betonflächen

ESR - 4252 | Certified to NSF/ANSI 61 | EMISSIONS DANS L'AIR INTÉRIEUR A+ | EDELSTAHL Rostfrei

Range of loading: 3,2 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 Injection System VMH is a universal injection system for heavy duty fastenings, usable in cracked and uncracked concrete. It is composed of a hybrid injection adhesive as well as a threaded stud V-A, a threaded stud VMU-A, or an internally threaded sleeve VMU-IG. A standard threaded stud with strength test certificate 3.1 or a rebar can also be used. The variable anchorage depths allow for a perfect adjustment to the respective installation situation, even under seismic action. The drill holes can also be created with MKT hollow drill bit SB, the use of which reduces contamination and fine dust exposure of the respiratory tract to a minimum and makes subsequent drill hole cleaning unnecessary.

Advantages
- Extremely high loads in cracked and uncracked concrete, strength class C20/25 to C50/60
- Working life 100 years for use in concrete (ETA-17/0716)
- Approved for post-installed rebar connection (Ø8–Ø32)
- Approved with threaded studs V-A, VMU-A, standard threaded studs with strength test certificate and internally threaded sleeves VMU-IG, thus more flexibility in the choice of the fastening
- Variable anchorage depths allow perfect adjustment to the respective installation situation for an economic working process
- Approved for use under seismic action according to the performance categories C1 (Threades studs M8 – M30, Reinforcement Bars Ø8 – Ø32) and C2 (Threades studs M12 Steel, zinc plated ≥8.8, M12 A4, M12 HCR: FKL ≥70
- For higher loads under seismic action, the annular gap between anchor rod and fixture can be filled using the VS backfill disc
- Due to the high short-term temperature resistance up to +160°C, also suitable for fastenings exposed to high temperature
- Fire test report for all diameters
- General design approval by ‚Deutsches Institut für Bautechnik' in Berlin, Germany as concrete-to-concrete connector (Z-21.8-2126)
- General design approval by ‚Deutsches Institut für Bautechnik' in Berlin, Germany for use in uncoated liquid-tight concrete members in storage-filling-handling plants (Z-74.8-204)
- ICC Evaluation Service listing, USA (ESR-4252)
- Approved for installation in wet concrete or water-filled drill holes
- Base material temperature during installation -5°C to +40°C
- Opened cartridges can be re-used with a new mixer nozzle
- Styrene free
- When using the hollow drill bit SB, the subsequent cleaning of the borehole can be omitted

Applications
Heavy duty 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 overlay.

Injection Cartridge VMH

- Hybrid injection adhesive, styrene free
- Approved for cracked and uncracked concrete

Description	Ref. No.	Content ml	Content of master box	Weight per master box kg	Weight per piece kg
Cartridge VMH 280[1)]	28251501	280	12	6,70	0,56
Cartridge VMH 345	28253501	345	12	8,00	0,65
Cartridge VMH 420	28257501	420	12	10,1	0,83
Static mixer VM-XHP	28305301	-	12	0,18	0,01

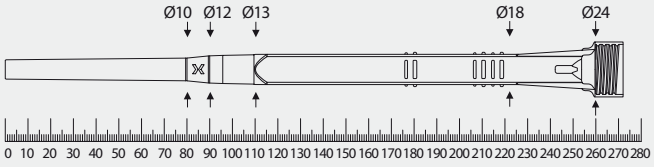
One static mixer comes with each cartridge.

[1)]Cartridge VMH 280 comes with 2 mixers.

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 VMH

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

Temperature (°C) of the base material	Gel time	Curing time	
		Dry base material	Wet base material
-5°C to - 1°C	50 min	5 h	10 h
0°C to + 4°C	25 min	3,5 h	7 h
+ 5°C to + 9°C	15 min	2 h	4 h
+ 10°C to + 14°C	10 min	1 h	2 h
+ 15°C to + 19°C	6 min	40 min	80 min
+ 20°C to + 29°C	3 min	30 min	60 min
+ 30°C to + 40°C	2 min	30 min	60 min

Storage Box

- Storage Box, the container for various items
- In stackable multi-purpose container
- H x W x D: 220 x 400 x 300 mm

Description	Ref. No.	Contents	Quantity pcs.	Weight per Box kg
Storage box VMH 345	28999646	Cartridge VMH 345	20	15,3
		Static mixer VM-XHP	40	
Storage box VMH 420	28999649	Cartridge VMH 420	12	12,0
		Static mixer VM-XHP	24	

Accessories for Injection System VMH

Threaded stud	Internally threaded stud	Rebar Ø mm	Drill bit Ø mm	Blow-out pump[1)] / Air gun[1)]	Cleaning brush RB[1)]	Retaining Washer VM-IA[3)]	Retaining Washer VM-IA[3)]	Dispenser
M8		8	10	VM-AP 360[2)] VM-ABP 200	RB 10 M6		VM-XE 10	VM-P 345 Standard, VM-P 345 Profi, VM-P 380 Standard, VM-P 380 Profi, VM-P 345 Akku, VM-P 380 Akku, VM-P 825 Akku, VM-P 345 Pneumatic Eco; VM-P 380 Pneumatic Eco, VM-P 380 Pneumatic, VM-P 825 Pneumatic
M10	VMU-IG M6	8 / 10	12	VM-AP 360[2)] VM-ABP 200	RB 12 M6 RB 12 M8		VM-XE 10	
M12	VMU-IG M8	10 / 12	14	VM-AP 360[2)] VM-ABP 200	RB 14 M6 RB 14 M8		VM-XE 10	
		12	16	VM-AP 360[2)] VM-ABP 200	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	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	RB 20 M6 RB 20 M8	VM-IA 20	VM-XE 10, VM-XLE 16	
M20	VMU-IG M12		22	VM-ABP 250 / 500 / 1000	RB 22 M6	VM-IA 22	VM-XE 10, VM-XLE 16	
		20	25	VM-ABP 250 / 500 / 1000	RB 25 M8 RB 26 M6	VM-IA 25	VM-XE 10, VM-XLE 16	
M24	VMU-IG M16		28	VM-ABP 250 / 500 / 1000	RB 28 M6	VM-IA 28	VM-XE 10, VM-XLE 16	
M27			30	VM-ABP 250 / 500 / 1000	RB 30 M6	VM-IA 30	VM-XE 10, VM-XLE 16	
		24 / 25	32	VM-ABP 250 / 500 / 1000	RB 32 M6 RB 32 M8	VM-IA 32	VM-XE 10, VM-XLE 16	
M30	VMU-IG M20	28	35	VM-ABP 250 / 500 / 1000	RB 35 M6 RB 35 M8	VM-IA 35	VM-XE 10, VM-XLE 16	
		32	40	VM-ABP 250 / 500 / 1000	RB 40 M6	VM-IA 40	VM-XE 10, VM-XLE 16	
See page				**178**	**179**	**181**	**180**	**181 / 182**

[1)]When using the hollow drill bit SB (see page 177), the subsequent cleaning of the borehole can be omitted. (Load reduction see ETA)

[2)]Approved in uncracked concrete up to a maximum drilling depth of 10 times the outer diameter of the anchor rod/anchor sleeve (for cracked concrete and load reduction, see ETA).

[3)]If the static mixer does not reach the bottom of the borehole (see usable length of static mixer), a extension tube must be used. From a drill-Ø $d_0 \geq 18$ mm, retaining washer and extension tube must be used for overhead installation and for drill hole depths > 250 mm.

Threaded studs for the injection system VMH

Threaded Stud VMU-A
Steel, zinc plated 5.8
Dimensions see page 172

- 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 172

- For use in structures subject to dry internal conditions

Threaded Stud VMU-A A4
Stainless steel A4
Dimensions see page 172

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

Internally Threaded Sleeve VMU-IG
Steel, zinc plated 5.8
Dimensions see page 174

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

Internally Threaded Sleeve VMU-IG A4
Stainless steel A4
Dimensions see page 174

- 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 173

- For use in structures subject to dry internal conditions

Threaded Stud V-A fvz
Steel, hot dip galvanized 5.8
Dimensions see page 173

- For use in structures subject to dry internal conditions

Threaded Stud V-A 8.8
Steel, zinc plated 8.8
Dimensions see page 173

- For use in structures subject to dry internal conditions

Threaded Stud V-A A4
Stainless steel A4-70
Dimensions see page 173

- 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 173

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

Threaded Stud VM-A
Steel, zinc plated 5.8
Dimensions see page 174

- 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, zinc plated 8.8
Dimensions see page 174

- 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 A4
Stainless steel A4-70
Dimensions see page 174

- 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

ETA-17/0716

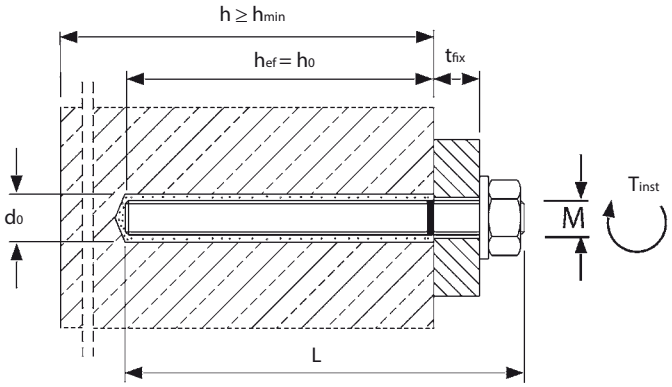
Extract from Permissible Service Conditions of European Technical Assessment ETA-17/0716 for use in cracked and uncracked concrete (Option 1)

Approved loads according to EN 1992-4 for single anchors without the influence of spacing and edge distances for working life of up to 50 years 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 +50°C (short term temperature +80°C). The influence of the sustained load has been taken into account by the factor Ψsus = 1,0 and the total safety factor (γ_M and γ_F) is included. For further details and temperature ranges see ETA. Load capacities under fire exposure see page 199.

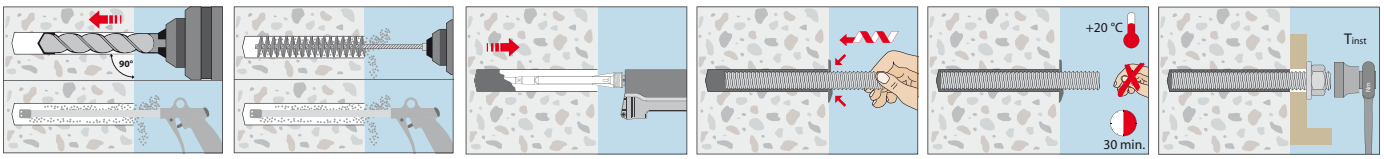
Loads and performance data **Injection system VMH M8-M30**				Temperature range I -40°C to +24°C/+40°C[1)] and temperature range II -40°C to +50°C/+80°C[1)]							
Threaded Studs				**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Range of anchorage depths $h_{ef,min}$ - $h_{ef,max}$			[mm]	60 – 160	60 - 200	70 – 240	80 – 320	90 – 400	96 - 480	108 - 540	120 - 600
Injection System VMH, threaded stud steel 5.8											
Approved loads, tension for $h_{ef,min}$ - $h_{ef,max}$											
Cracked concrete	C20/25	appr. N	[kN]	5,0 - 8,6	6,7 - 13,8	9,6 - 20,0	11,7 - 37,1	14,0 - 58,1	15,4 - 83,8	18,4 - 109,5	21,6 - 133,3
Uncracked concrete	C20/25	appr. N	[kN]	8,6	10,9 - 13,8	13,7 - 20,0	16,8 - 37,1	20,0 - 58,1	22,0 - 83,8	26,3 - 109,5	30,8 - 133,3
Approved loads, shear for $h_{ef,min}$ - $h_{ef,max}$											
Cracked concrete	C20/25	appr. V	[kN]	6,3	9,7	14,3	23,5 - 26,9	28,0 - 42,3	30,8 - 60,6	36,8 - 78,9	43,1 - 96,0
Uncracked concrete	C20/25	appr. V	[kN]	6,3	9,7	14,3	26,9	40,0 - 42,3	44,1 - 60,6	52,6 - 78,9	61,6 - 96,0
Injection System VMH, threaded stud steel 8.8											
Approved loads, tension for $h_{ef,min}$ - $h_{ef,max}$											
Cracked concrete	C20/25	appr. N	[kN]	5,0 - 13,4	6,7 - 21,9	9,6 - 31,9	11,7 - 59,5	14,0 - 93,3	15,4 - 120,6	18,4 - 152,7	21,6 - 188,5
Uncracked concrete	C20/25	appr. N	[kN]	10,9 - 13,8	10,9 - 21,9	13,7 - 31,9	16,8 - 59,5	20,0 - 93,3	22,0 - 134,3	26,3 - 175,2	30,8 - 213,8
Approved loads, shear for $h_{ef,min}$ - $h_{ef,max}$											
Cracked concrete	C20/25	appr. V	[kN]	8,6	13,1	19,2 - 19,4	23,5 - 36,0	28,0 - 56,0	30,8 - 80,6	36,8 - 105,1	43,1 - 128,0
Uncracked concrete	C20/25	appr. V	[kN]	8,6	13,1	19,4	33,5 - 36,0	40,0 - 56,0	44,1 - 80,6	52,6 - 105,1	61,6 - 128,0
Injection System VMH, threaded stud stainless steel A4-70, HCR-70											
Approved loads, tension for $h_{ef,min}$ - $h_{ef,max}$											
Cracked concrete	C20/25	appr. N	[kN]	5,0 - 9,9	6,7 - 15,7	9,6 - 22,5	11,7 - 42,0	14,0 - 65,3	15,4 - 94,3	18,4 - 57,4	21,6 - 70,2
Uncracked concrete	C20/25	appr. N	[kN]	9,9	10,9 - 15,7	13,7 - 22,5	16,8 - 42,0	20,0 - 65,3	22,0 - 94,3	26,3 - 57,4	30,8 - 70,2
Approved loads, shear for $h_{ef,min}$ - $h_{ef,max}$											
Cracked concrete	C20/25	appr. V	[kN]	6,0	9,2	13,7	23,5 - 25,2	28,0 - 39,4	30,8 - 56,8	34,5	42,0
Uncracked concrete	C20/25	appr. V	[kN]	6,0	9,2	13,7	25,2	39,4	44,1 - 56,8	34,5	42,0
Spacing and edge distance											
Min. thickness of concrete slab 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_0	[mm]	10	12	14	18	22	28	30	35
Clearance hole in the fixture for Pre-setting installation		$d_f \leq$	[mm]	9	12	14	18	22	26	30	33
Clearance hole in the fixture for Through-setting installation		$d_f \leq$	[mm]	12	14	16	20	24	30	33	40
Range of drill hole depth for $h_{ef,min}$ - $h_{ef,max}$		h_0	[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 (FKL4.6: 35)	60	100	170	250	300
Amount of adhesive per 100mm 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. Manual cleaning or the use of a suction drill without subsequent cleaning may lead to lower loads. For further information, please refer to the European Technical Assessment ETA-17/0716.
For anchor designing, an easy to operate Software is available on request or can be downloaded at www.mkt.de.



Installation threaded stud in concrete



ETA-17/0716

Extract from Permissible Service Conditions of European Technical Assessment ETA-17/0716 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 for working life of up to 50 years 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 +50°C (short term temperature +80°C). The influence of the sustained load has been taken into account by the factor Ψsus = 1,0 and the total safety factor (γ_M and γ_F) is included. For further details and temperature ranges see ETA.

Loads and performance data	**Injection system VMH IG M6 - IG M20**			Temperature range I -40°C to +24°C/+40°C[1] and temperature range II -40°C to +50°C/+80°C[1]								
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 x 125**	**IG M16 x 170**	**IG M20 x 200**
Anchorage depth h_{ef}			[mm]	80	90	80	100	80	100	125	170	200
Injection System VMH, internally threaded sleeve VMU-IG steel 5.8												
Approved loads, tension for h_{ef}												
Cracked concrete	C20/25	appr. N	[kN]	4,8	4,8	8,1	8,1	11,7	13,8	20,0	36,2	46,4
Uncracked concrete	C20/25	appr. N	[kN]	4,8	4,8	8,1	8,1	13,8	13,8	20,0	36,2	58,6
Approved loads, shear for h_{ef}												
Cracked concrete	C20/25	appr. V	[kN]	3,4	3,4	5,7	5,7	9,7	9,7	14,3	25,7	42,3
Uncracked concrete	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 VMH, internally threaded sleeve VMU-IG stainless steel A4-70, HCR-70												
Approved loads, tension for h_{ef}												
Cracked concrete	C20/25	appr. N	[kN]	5,3	5,3	9,9	9,9	11,7	15,7	22,5	36,3	31,0
Uncracked concrete	C20/25	appr. N	[kN]	5,3	5,3	9,9	9,9	15,7	15,7	22,5	42,0	31,0
Approved loads, shear for h_{ef}												
Cracked concrete	C20/25	appr. V	[kN]	3,2	3,2	6,0	6,0	9,2	9,2	13,7	25,2	18,6
Uncracked concrete	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 slab		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_0	[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
Range of drill hole depth for h_{ef}		h_0	[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 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. Manual cleaning or the use of a suction drill without subsequent cleaning may lead to lower loads. For further information, please refer to the European Technical Assessment ETA-17/0716.
For anchor designing, an easy to operate Software is available on request or can be downloaded at www.mkt.de.

Loads and performance data				Temperature range I -40°C to +24°C/+40°C[1] and temperature range II -40°C to +50°C/+80°C[1]								
Injection System VMH, 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	C20/25	appr. N	[kN]	3,9 - 10,5	4,9 - 16,5	7,5 - 25,9	10,2 - 38,1	11,7 - 49,8	14,0 - 77,8	15,4 - 112,0	16,4 - 130,9	19,4 - 164,2	23,7 - 214,5
Uncracked concrete	C20/25	appr. N	[kN]	10,1 - 13,8	10,9 - 21,6	13,7 - 31,2	15,2 - 42,4	16,8 - 55,4	20,0 - 86,6	22,0 - 124,5	23,4 - 135,2	27,8 - 169,6	33,9 - 221,6
Approved loads, shear for $h_{ef,min}$ - $h_{ef,max}$													
Cracked concrete	C20/25	appr. V	[kN]	6,5	9,9 - 10,1	14,5	19,8	23,5 - 25,9	28,0 - 40,4	30,8 - 58,1	32,8 - 63,1	38,9 - 79,2	47,5 - 103,4
Uncracked concrete	C20/25	appr. V	[kN]	6,5	10,1	14,5	19,8	25,9	40,0 - 40,4	44,1 - 58,1	46,9 - 63,1	55,5 - 79,2	67,8 - 103,4
Spacing and edge distance													
Min. thickness of concrete slab 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_0	[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_0	[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 100mm 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 Ø8, Ø10, Ø12 both drill hole diameters can be used.

[3]The second value applies to the larger drill diameter

Higher concrete strength may lead to higher approved loads. Manual cleaning or the use of a suction drill without subsequent cleaning may lead to lower loads. For further information, please refer to the European Technical Assessment ETA-17/0716.
For anchor designing, an easy to operate Software is available on request or can be downloaded at www.mkt.de.