

Injection System VME



Threaded Stud V-A



Threaded Stud VMU-A



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



Reinforcement Bars BSt 500 S



Cartridge VME 385
Side-by-side cartridge
Content: 385ml
With big mixer VM-XL and reducers / extension tube for drill holes from 12mm diameter



Cartridge VME 585
Side-by-side cartridge
Content: 585ml
With big mixer VM-XL and reducers / extension tube for drill holes from 12mm diameter



Cartridge VME 1400
Side-by-side cartridge
Content: 1400ml
With big mixer VM-XL and reducers / extension tube for drill holes from 12mm diameter

Range of loading: 2,4 - 128 kN

Concrete quality: C20/25 - C50/60

Material: Steel zinc plated, hot dip galvanized, Stainless steel A4/316, Stainless steel HCR, BSt 500 S

Description

The Injection System VME is an approved system for fixings of threaded studs or reinforcement bars in cracked and non-cracked concrete. In the cartridge, the epoxy resin and the hardener are separated. By means of the dispenser gun VM-P the components are pushed through the mixer nozzle, activated and injected into the drill hole. The Injection System VME can be used with the threaded Studs V-A, VMU-A and also the internally threaded sleeves VMU-IG. It can also be used with VM-A studs, sold by meter to be cut to the required length or with standard reinforcement bars.



Applications

Fixing of rack systems, railings, steel structures, noise barriers, stairs and machines.

Subsequent closure of wall and ceiling openings, reinforcement of existing concrete structures, installation of reinforcement for the connection of the following concrete components (if the installation of reinforcement was missed or not possible because of the working process), connection of steel structures.

Advantages:

- approved in cracked and non-cracked concrete
- approved with threaded studs, internally threaded sleeves and reinforcement bars
- approved with standard threaded studs (test certificate required)
- approved to use under seismic action according to the performance category C1 and C2 (M12-M16)
- also approved for post-installed rebar connections according to ETA-07/0299 / Z-21.8-1872
- approved for diamond coring (ETA-13/0773) in non-cracked concrete
- ICC Evaluation Service listing for cracked and non-cracked concrete
- variable anchorage depth for less drilling efforts
- long curing times for an economic working process with serial installations and/or large drill holes
- suitable for dry and wet concrete and in water-filled drill holes
- styrene-free
- fire test report

Injection Cartridge VME



- Very high loads
- No shrinkage

Description	Ref. No.	Content ml	Content of master box pcs	Weight per master box kg	Weight per piece kg
Cartridge VME 385	28255501	385	12	8,5	0,70
Cartridge VME 585	28255601	585	12	12,09	0,98
Cartridge VME 1400	28255701	1400	5	12,34	2,40
Static mixer VM-XL ¹⁾	28305201	-	10	0,28	0,03
Static mixer VM-X ²⁾	28305111	-	12	0,12	0,01

One static mixer VM-XL as well as one screw-on cap comes with each cartridge.
¹⁾ Mixer VM-XL comes with a reducers / extension tube. Suitable for drill holes from 12mm diameter.
²⁾ Static mixer VM-X only required for drill hole diameter of 10mm (special accessories).

Threaded studs for use in **cracked and non-cracked concrete**

Threaded Stud VMU-A

Steel, zinc plated 5.8
Dimensions see page 107



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

Threaded Stud VMU-A A4

Stainless steel A4
Dimensions see page 107



- 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 108



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

Internally Threaded Sleeve VMU-IG A4

Stainless steel A4
Dimensions see page 108



- 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 144



- For use in structures subject to dry internal conditions

Threaded Stud V-A A4

Stainless steel A4
Dimensions see page 144

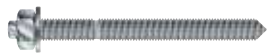


- For use in structures subject to dry internal conditions or external atmospheric exposure

NEW

Threaded Stud V-A 8.8

Steel, zinc plated 8.8
Dimensions see page 144



- For use in structures subject to dry internal conditions

Threaded Stud V-A HCR

Stainless steel HCR
Dimensions see page 144



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

Threaded Stud V-A fvz

Steel, hot dip galvanized 5.8
Dimensions see page 144



- For use in structures subject to dry internal conditions

Threaded stud VM-A

Stainless steel A4
Dimensions see page 108



- 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

Threaded stud VM-A

Steel 5.8, zinc plated
Dimensions see page 108



- 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

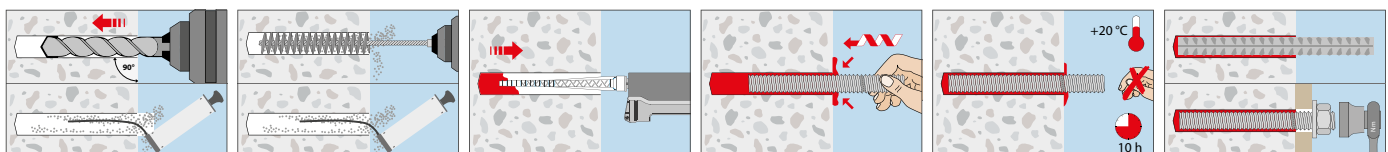
Threaded stud VM-A

Steel 8.8, zinc plated
Dimensions see page 108



- 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

Installation



Injecting equipment

Retaining Washer



- For bubble-free filling of the drill hole
- Only for horizontal or overhead installation for drill hole diameter of 24 mm and bigger.
- Fits to extension tubes VM-XE 10 and VM-XLE 16

Description	Ref. No.	Colour	Suitable for drill hole Ø mm	To use in conjunction with	Package content pcs	Weight per pkg. kg
VM-IA 24	85924101	black	24	VM-XL + VM-XE / VM-XLE	20	0,06
VM-IA 25	85925201	black	25	VM-XL + VM-XE / VM-XLE	20	0,06
VM-IA 28	85928101	black	28	VM-XL + VM-XE / VM-XLE	20	0,08
VM-IA 32	85932201	black	32	VM-XL + VM-XE / VM-XLE	20	0,08
VM-IA 35	85935201	black	35	VM-XL + VM-XE / VM-XLE	20	0,08
VM-IA 40	85938201	black	40	VM-XL + VM-XE / VM-XLE	20	0,08

Extension Tubes

Description	Ref. No.	Length mm	Diameters mm	To use in conjunction with	Pkg. cont. pcs.	Weight per pkg. kg
VM-XE 10/200	28306011	200	10	VM-XL, VM-X	12	0,12
VM-XE 10/500	85951101	500	10	VM-XL, VM-X	10	0,20
VM-XE 10/1000	85952101	1000	10	VM-XL, VM-X	10	0,30

Drill hole Cleaning

Cleaning Brush RB M6



- With connection thread M6
- Extension for large depths of drill hole
- For drilling machines with keyed chuck
- Separate SDS plus adaptor with internal thread M6 for SDS plus drill holder

Description	Ref. No.	Suitable for drill hole Ø mm	Total length of brush mm	Suitable for Threaded stud	Reinforcement Bars	Pkg. cont. pcs.	Weight per piece kg
RB 10 M6	33510101	10	130	M8	-	1	0,05
RB 12 M6	33512101	12	140	M10	Ø8	1	0,05
RB 14 M6	33514101	14	180	M12	Ø10	1	0,05
RB 16 M6	33516101	16	200	-	Ø12	1	0,05
RB 18 M6	33518101	18	200	M16	Ø14	1	0,05
RB 20 M6	33520101	20	220	-	Ø16	1	0,05
RB 24 M6	33524101	24	250	M20	Ø20	1	0,06
RB 28 M6	33528101	28	260	M24	-	1	0,06
RB 32 M6	33532101	32	350	M27	Ø25	1	0,08
RB 35 M6	33535101	35	350	M30	Ø28	1	0,08
RB 40 M6	33537101	40	350	-	Ø32	1	0,08
RBL M6	33968101	Brush extension 150mm with connection thread M6				1	0,09
RBL M6 SDS	33350101	SDS Plus adapter with internal thread M6				1	0,06

Blow-out pump VM-AP



- For assessment-compliant air-cleaning of drill holes in non-cracked concrete with a diameter up to 20 mm and a drill hole depth at most ten times larger than the diameter of the threaded stud (VME)
- For best drill hole cleaning, the hose must reach the bottom of the drill hole

Description	Ref. No.	Hose Ø mm	For drill hole Ø mm	Max. drill hole depth ²⁾ mm	Pkg. cont. pcs	Weight per piece kg
Blow-out pump VM-AP 360	33200101	8	8 ¹⁾ -20	330	1	0,27

¹⁾With extension tube Ø 6 x 100mm

²⁾For through fastening: Maximum drill hole depth through fi ture

Air gun VM-ABP



- For assessment-compliant drill hole cleaning with compressed air for drill holes with a diameter larger than 6 mm
- For best drill hole cleaning, the nozzle of the air gun must reach the bottom of the drill hole

Description	Ref. No.	Nozzle-Ø mm	For drill hole Ø mm	Max. drill hole depth ¹⁾ mm	Pkg. cont. pcs.	Weight per piece kg
VM-ABP 200	33090101	5	6-20	240	1	0,55
VM-ABP 250	33100101	16	18-40	240	1	1,00
VM-ABP 500	33106101	16	18-40	480	1	1,30

¹⁾For through fastening: Maximum drill hole depth through fi ture

Dispenser VM-P Standard



→ For occasional use, metal version

→ Piston rod with adjusting screw

Description	Ref. No.	Suitable for cartridge	Pkg. cont. pcs.	Weight per piece kg
VM-P 385 Standard	28353010	385ml	1	1,33

Dispenser VM-P 385 Profi



→ Professional dispenser with an ideal center of gravity for more comfortable working

→ Automatic pressure release for minimum adhesive overrun

Description	Ref. No.	Suitable for cartridge	Pkg. cont. pcs.	Weight per piece kg
VM-P 385 Profi	28353015	385ml	1	1,20

Dispenser VM-P 585 Profi



→ Professional dispenser with an ideal center of gravity for more comfortable working

→ Combi-tool for many different types of cartridges

→ Automatic pressure release for minimum adhesive overrun

Description	Ref. No.	Suitable for cartridge	Pkg. cont. pcs.	Weight per piece kg
VM-P 585 Profi	28353201	280ml, 300ml, 330ml, 380ml, 385ml, 410ml, 420ml, 585ml	1	1,67

Dispenser VM-P Pneumatic



VM-P 1400 Pneumatik

→ Professional air tool with an optimum center of gravity and quick cartridge exchange

→ Automatic pressure release system reduces adhesive overrun to a minimum

→ Single-hand pressure regulation to adjust the piston speed

→ With compressed air connection nipple

Description	Ref. No.	Suitable for cartridge	max. working pressure 8bar, 40l/min	Pkg. cont. pcs.	Weight per piece kg
VM-P 585 Pneumatic	28352101	385ml, 585ml	1	3,60	
VM-P 1400 Pneumatic	28352201	1400ml	1	6,40	

Dispenser VM-P Akku



→ Professional, solid battery cartridge dispenser in a plastic case

→ Repeat function, for retrieving the last fill quantity

→ Stepless variable pressing speed

→ Overrun-quantity-stop by automatic return after release of the dispensing switch

Description	Ref. No.	Suitable for cartridge	Press-out force kN	Weight ¹⁾ kg	Dimensions ¹⁾ L x B x H mm	Pkg. cont. pcs.	Weight per piece kg
VM-P 585 Akku	28353301	385ml, 585ml	5,0	3,86	440 x 180 x 285	1	8,05
Accessories (for all models)							
Replacement battery	28352411			18 V/2,0 Ah		1	1,00
Shoulder strap	28359991			adjustable		1	0,02



Extract from Permissible Service Conditions of ETA-09/0350.

Approved loads for single anchor without influence of spacing and edge distance in dry or wet concrete for temperature range I to -40°C to +24°C/+40°C¹⁾ and for temperature range III -40°C to +43°C/+72°C (For temperature range II -40°C to +43°C/60°C and loads for threaded studs 4.6/4.8/5.6/ see ETA-09/350). Total safety factor as per ETAG 001 included (γ_M and γ_P). Load capacities under fire exposure see page 168.

Loads and performance data

Injection System VME, threaded stud steel grade 5.8				M8	M10	M12	M16	M20	M24	M27	M30	
Range of anchorage depths	$h_{ef,min} - h_{ef,max}$	[mm]		60 - 96	60 - 120	70 - 144	80 - 192	90 - 240	96 - 288	108 - 324	120 - 360	
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]	4,2-6,7	5,2-10,5	7,9-16,2	10,2-24,9	10,5-30,8	11,5-40,6	13,7-51,4	16,1-63,5
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	2,4-3,8	3,0-6,0	4,2-8,6	5,6-13,4	5,8-15,4	7,4-22,2	9,3-28,0	11,5-34,6
non-cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	8,6	9,3-13,8	11,7-20,0	14,3-37,1	14,7-58,1	16,2-83,8	19,3-100,2	22,6-117,3
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	5,1-8,1	6,4-12,7	8,4-17,2	12,0-28,7	13,5-35,9	16,2-51,7	19,3-60,8	22,6-75,0
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]	5,1	8,6	12,0	22,3	29,3-34,9	32,3-50,3	38,5-65,7	45,1-80,0
	43°C/72°C ¹⁾	C20/25	appr. V	[kN]	5,1	7,2-8,6	10,1-12,0	13,4-22,3	16,2-34,9	20,7-50,3	26,2-65,7	32,3-80,0
non-cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V	[kN]	5,1	8,6	12,0	22,3	34,9	45,2-50,3	54,0-65,7	63,2-80,0
	43°C/72°C ¹⁾	C20/25	appr. V	[kN]	5,1	8,6	12,0	22,3	34,9	45,2-50,3	54,0-65,7	63,2-80,0
Injection System VME, threaded stud steel grade 8.8				M8	M10	M12	M16	M20	M24	M27	M30	
Range of anchorage depths	$h_{ef,min} - h_{ef,max}$	[mm]		60 - 96	60 - 120	70 - 144	80 - 192	90 - 240	96 - 288	108 - 324	120 - 360	
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]	4,2-6,7	5,2-10,5	7,9-16,2	10,2-24,9	10,5-30,8	11,5-40,6	13,7-51,4	16,1-63,5
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	2,4-3,8	3,0-6,0	4,2-8,6	5,6-13,4	5,8-15,4	7,4-22,2	9,3-28,0	11,5-34,6
non-cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	9,0-13,8	9,3-21,9	11,7-31,9	14,3-53,3	14,7-63,9	16,2-84,0	19,3-100,2	22,6-117,3
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	5,1-8,1	6,4-12,7	8,4-17,2	12-28,7	13,5-35,9	16,2-51,7	19,3-60,8	22,6-75,0
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	18,8-19,4	24,5-36,0	29,3-56,0	32,3-80,6	38,5-105,1	45,1-128,0
	43°C/72°C ¹⁾	C20/25	appr. V	[kN]	5,7-8,6	7,2-13,1	10,1-19,4	13,4-32,2	16,2-43,1	20,7-62,0	26,2-78,5	32,3-96,9
non-cracked 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/72°C ¹⁾	C20/25	appr. V	[kN]	8,6	13,1	19,4	28,7-36,0	37,7-56,0	45,2-80,6	54,0-105,1	63,2-128,0
Injection System VME, threaded stud stainless steel A4-70²⁾, HCR-70²⁾				M8	M10	M12	M16	M20	M24	M27	M30	
Range of anchorage depths	$h_{ef,min} - h_{ef,max}$	[mm]		60 - 96	60 - 120	70 - 144	80 - 192	90 - 240	96 - 288	108 - 324	120 - 360	
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]	4,2-6,7	5,2-10,5	7,9-16,2	10,2-24,9	10,5-30,8	11,5-40,6	13,7-51,4	16,1-63,5
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	2,4-3,8	3,0-6,0	4,2-8,6	5,6-13,4	5,8-15,4	7,4-22,2	9,3-28,0	11,5-34,6
non-cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	9,0-9,9	9,3-15,7	11,7-22,5	14,3-42,0	14,7-63,9	16,2-84,0	19,3-57,4	22,6-70,2
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	5,1-8,1	6,4-12,7	8,4-17,2	12,0-28,7	13,5-35,9	16,2-51,7	19,3-57,4	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/72°C ¹⁾	C20/25	appr. V	[kN]	5,7-6,0	7,2-9,2	10,1-13,7	13,4-25,2	16,2-39,4	20,7-56,8	26,2-34,5	32,3-42,0
non-cracked 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/72°C ¹⁾	C20/25	appr. V	[kN]	6,0	9,2	13,7	25,2	37,7-39,4	45,2-56,8	34,5	42,0

Spacing and edge distance

Min. thickness of concrete slab for $h_{ef,min} - h_{ef,max}$	h_{min}	[mm]	100-126	100-150	100-174	116-228	138-288	152-344	172-388	190-430
Minimum spacing	s_{min}	[mm]	40	50	60	80	100	120	135	150
Minimum edge distance	c_{min}	[mm]	40	50	60	80	100	120	135	150

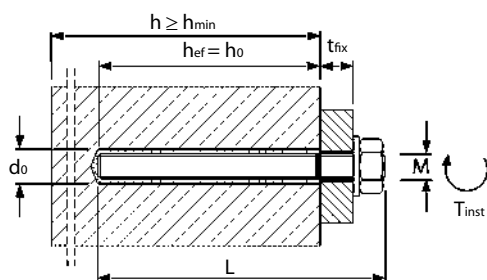
Installation parameters

Drill hole diameter	d_o	[mm]	10	12	14	18	24	28	32	35
Clearance hole in the fixture	d_f	[mm]	9	12	14	18	22	26	30	33
Range of drill hole depth for $h_{ef,min} - h_{ef,max}$	h_o	[mm]	60 - 96	60 - 120	70 - 144	80 - 192	90 - 240	96 - 288	108 - 324	120 - 360
Installation torque	$T_{inst \leq}$	[Nm]	10	20	40	80	120	160	180	200

¹⁾ Max long term temperature / max short term temperature
Higher concrete strength may lead to higher approved loads.

²⁾M27, M30: A4-50, HCR-50

For anchor designing an easy to operate CD-ROM is available on request or can be downloaded at www.mkt.de.



Curing time Injection Adhesive VME

→ Cartridge temperature when installing min. +5°C - +40°C

Temperature (°C) of the base material	maximum working time	minimum curing time	
		dry base material	wet base material
+5°C to +9°C	120 min	50 h	100 h
+10°C to +19°C	90 min	30 h	60 h
+20°C to +29°C	30 min	10 h	20 h
+30°C to +39°C	20 min	6 h	12 h
40°C	12 min	4 h	8 h


Extract from Permissible Service Conditions of ETA-09/0350.

Approved loads for single anchor without influence of spacing and edge distance in dry or wet concrete for temperature range I to -40°C to +24°C/+40°C¹⁾ and for temperature range III -40°C to +43°C/+72°C¹⁾ (For temperature range II -40°C to +43°C/60°C¹⁾ see ETA-09/350). Total safety factor as per ETAG 001 included (γ_M and γ_F).

Loads and performance data
Internally threaded sleeves

				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
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Effective anchorage depth h_{ef}	[mm]			80	90	80	100	80	100	125	170	200
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Injection System VME, Internally threaded sleeve VMU-IG, Steel 5.8

				cracked concrete								
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Approved loads, tension for h_{ef}													
Temperature range	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	4,8	4,8	8,6	8,6	10,2	13,0	16,0	24,0	34,6
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	4,0	4,5	4,8	6,0	5,6	7,0	8,0	13,1	19,2

				non-cracked concrete								
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Approved loads, tension for h_{ef}													
Temperature range	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	4,8	4,8	8,6	8,6	13,8	13,8	20,0	37,6	48,6
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	4,8	4,8	8,6	8,6	12,0	13,8	18,7	30,5	41,7

				cracked concrete								
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Approved loads, tension for h_{ef}													
Temperature range	24°C/40°C ¹⁾	C20/25	appr. V	[kN]	2,9	2,9	5,1	5,1	8,6	8,6	12,0	22,3	34,9
	43°C/72°C ¹⁾	C20/25	appr. V	[kN]	2,9	2,9	5,1	5,1	8,6	8,6	12,0	22,3	34,9

				non-cracked concrete								
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Approved loads, tension for h_{ef}													
Temperature range	24°C/40°C ¹⁾	C20/25	appr. V	[kN]	2,9	2,9	5,1	5,1	8,6	8,6	12,0	22,3	34,9
	43°C/72°C ¹⁾	C20/25	appr. V	[kN]	2,9	2,9	5,1	5,1	8,6	8,6	12,0	22,3	34,9

				cracked concrete								
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Approved loads, tension for h_{ef}													
Temperature range	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	5,3	5,3	9,0	9,9	10,2	13,0	16,0	24,0	31,0
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	4,0	4,5	4,8	6,0	5,6	7,0	8,0	13,1	19,2

				non-cracked concrete								
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Approved loads, tension for h_{ef}													
Temperature range	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	5,3	5,3	9,9	9,9	14,3	15,7	22,5	38,1	31,0
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	5,3	5,3	9,6	9,9	12,0	15,0	18,7	30,5	31,0

				cracked concrete								
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Approved loads, tension for h_{ef}													
Temperature range	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/72°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

				non-cracked concrete								
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Approved loads, tension for h_{ef}													
Temperature range	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/72°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

				cracked concrete								
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Approved loads, tension for h_{ef}													
Temperature range	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	5,3	5,3	9,0	9,9	10,2	13,0	16,0	24,0	31,0
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	4,0	4,5	4,8	6,0	5,6	7,0	8,0	13,1	19,2

				non-cracked concrete								
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Approved loads, tension for h_{ef}													
Temperature range	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	5,3	5,3	9,9	9,9	14,3	15,7	22,5	38,1	31,0
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	5,3	5,3	9,6	9,9	12,0	15,0	18,7	30,5	31,0

				cracked concrete								
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Approved loads, tension for h_{ef}													
Temperature range	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/72°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

				non-cracked concrete								
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Approved loads, tension for h_{ef}													
Temperature range	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/72°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

Minimum thickness of concrete slab for h_{ef}	h_{min}	[mm]		110	120	110	130	116	136	169	226	270
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Minimum spacing	s_{min}	[mm]		50	50	60	60	80	80	100	120	150
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Minimum edge distance	c_{min}	[mm]		50	50	60	60	80	80	100	120	150
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Installation parameters

Diameter of drill hole	d_o	[mm]		12	12	14	14	18	18	24	28	35
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Clearance hole in the fi ture	$d_f \leq$	[mm]		7	7	9	9	12	12	14	18	22
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Range of drill hole depth for h_{ef}	h_o	[mm]		80	90	80	100	80	100	125	170	200
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Installation torque	$T_{inst} \leq$	[Nm]		10	10	10	10	20	20	40	60	100
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Amount of adhesive per drill hole	[ml]			6,6	7,4	7,9	9,9	10,9	13,6	33,4	54,9	97,4
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				Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
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Range of anchorage depths	$h_{ef,min} - h_{ef,max}$	[mm]		60 - 96	60 - 120	70 - 144	75 - 168	80 - 192	90 - 240	100 - 300	112 - 336	128 - 384
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				cracked concrete								
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Approved loads, tension for $h_{ef,min} - h_{ef,max}$													
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	4,2-6,7	5,2-10,5	7,9-16,2	9,2-20,5	10,2-24,9	10,5-30,8	12,2-44,1	14,5-55,3	17,7-72,2
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	2,4-3,8	3,0-6,0	4,2-8,6	4,6-10,3	5,6-13,4	5,8-15,4	8,0-24,0	10,1-30,2	13,1-39,4

				non-cracked concrete								
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Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	8,4-13,4	9,3-20,9	11,7-28,0	13,0-38,1	14,3-46,0	14,7-61,5	17,2-88,2	20,4-105,8	24,9-129,3
	43°C/72°C ¹⁾	C20/25	appr. N	[kN]	4,5-7,2	5,6-11,2	7,9-16,2	9,2-20,5	11,2-26,8	12,5-33,3	16,0-48,1	20,1-60,3	24,9-78,8

				cracked concrete								
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Approved loads, shear for $h_{ef,min} - h_{ef,max}$													
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	34,3-63,1	40,6-79,2	49,7-103,4
	43°C/72°C ¹⁾	C20/25	appr. V	[kN]	5,7-6,5	7,2-10,1	10,1-14,5	11,0-19,8	13,4-25,9	16,2-40,4	22,4-63,1	28,1-79,2	36,8-103,4

				non-cracked concrete								
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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	48,1-63,1	57,0-79,2	69,6-103,4
	43°C/72°C ¹⁾	C20/25	appr. V	[kN]	6,5	10,1	14,5	19,8	25,9	35,0-40,4	44,9-63,1	56,3-79,2	69,6-103,4

Spacing and edge distance

Min. thickness of concrete slab for $h_{ef,min} - h_{ef,max}$	h_{min}	[mm]		100-126	100-150	102-176	111-204	120-232	138-288	164-364	182-406	208-464
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Minimum spacing	s_{min}	[mm]		40	50	60	70	80	100	125	140	160
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Minimum edge distance	c_{min}	[mm]		40	50	60	70	80	100	125	140	160
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Installation parameters

Drill hole diameter	d_o	[mm]		12	14	16	18	20	24	32	35	40
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Range of drill hole depth for $h_{ef,min} - h_{ef,max}$	h_o	[mm]		60 - 96	60 - 120	70 - 144	75 - 168	80 - 192	90 - 240	100 - 300	112 - 336	128 - 384
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¹⁾ Max long term temperature / max short term temperature ²⁾M27, M30: A4-50, HCR-50

Higher concrete strength may lead to higher approved loads.

For anchor designing an easy to operate CD-ROM is available on request or can be downloaded at www.mkt.de.