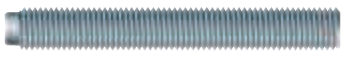


Injection System VMU plus

 **Threaded Stud VMU-A**
for concrete and brickwork

 **Threaded Stud VM-A**
1 meter length, to be cut to the required length
for concrete and brickwork

 **Internally Threaded Sleeve VMU-IG**
for concrete and brickwork

 **Perfo Sleeve VM-SH**
for perforated brick

 **Cartridge VMU plus 150**
Coaxial cartridge suitable for silicone guns
Content: 150ml

 **Cartridge VMU plus 280**
Coaxial cartridge suitable for silicone guns
Content: 280ml, including 2 mixers, attached to the cartridge

 **Cartridge VMU plus 300**
Foil tube cartridge suitable for silicone guns
Content: 300 ml

 **Cartridge VMU plus 345**
Side-by-side cartridge
Content: 345ml

 **Cartridge VMU plus 410**
Coaxial cartridge
Content: 410ml



Range of loading: 0,3 kN – 202,0 kN

Concrete quality: C20/25 - C50/60

Brickwork: Solid and perforated brick

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

Description

The injection system VMU plus is a universal injection system for almost all applications and materials. Besides the use in non-cracked concrete and masonry, VMU plus is also approved for fixings in cracked concrete and for post installed rebar connections¹⁾. The new European Technical Assessment ETA-13/0909 includes 6 sizes of perforated sleeves up to 200 mm length and is approved in 15 different types of bricks. To complete the fastening, various anchor rods or internal sleeves can be used from the existing MKT-range (VMU-A, VMU-IG, VM-A and V-A), as well as standard threaded rods or reinforcing bars. In perforated brick, a perfo sleeve is required.

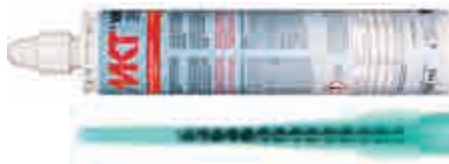
Advantages

- Only one adhesive for almost all applications, more flexibility, less inventory, greater application safety
- Approved for cracked and non-cracked concrete
- Approved for post-installed rebar connections (Ø8-Ø32)¹⁾
- Approved application in wet or water-filled drill holes (M8-M16)
- Approved for autoclaved aerated concrete, solid and perforated brickwork
- Approved with standard threaded studs (test certificate required)
- Base material temperature during installation -10°C (concrete) to +40°C
- Ambient temperature when completely cured -40°C to +120°C (concrete)
- Variable anchorage depth for less drilling efforts
- Fire test report
- Opened cartridges can be re-used with a new mixer nozzle
- Styrene-free vinylester resin
- Approved for use under seismic action according to the performance category C1

¹⁾only with Coaxial- and Side-by-side VMU plus cartridge

**Cartridge****VMU plus 825**

Side-by-side cartridge
Content: 825 ml
With big mixer VM-XL
and reducer / extension
tube for drill holes down
to 12mm diameter

**Cartridge****VMU plus 300 Polar**

Foil tube cartridge
suitable for silicone guns
Content: 300 ml

**Cartridge****VMU plus 345 Polar**

Side-by-side cartridge
Content: 345 ml

**Cartridge****VMU plus 420 Polar**

Coaxial cartridge
Content: 420 ml

**Additional advantages VMU plus Polar**

- Fast and reliable curing even at low temperatures and minus degrees
- Approved for cracked and non-cracked concrete as well as masonry even at icy -20 °C
- Approved temperature range from + 10 °C to -20 °C for base material and cartridge. Heating and keeping the cartridge warm before installation is not necessary.
- The same European Technical Assessments (ETA-11/0415 and ETA-13/0909) for VMU plus and VMU plus Polar; therefore the Installation is possible from + 40 °C to -20 °C temperature without recalculation of the application.

**Applications****Fastenings in cracked and non-cracked concrete:**

Base plates, supports, mounting of joint tapes, shelves, brackets, railings, facade substructures, wooden structures, cable trays, etc.

Fastenings with rebars in cracked and non-cracked concrete - with shear forces:

Shear connectors, wall connecting reinforcement, concrete overlay

Post-installed rebar connections¹⁾:

Ceiling and wall connections, structural reinforcement, structural complement building extensions, connection of balconies and canopies, subsequent attaching of „forgotten or misplaced“ reinforcing bars

Fastenings in Brickwork:

Canopies, door and window frames, facade substructures, battens, gates etc.

¹⁾only with Coaxial- and Side-by-side VMU plus cartridge

Injection Cartridge VMU plus



- Two component cartridge, styrene-free
- Approved for non-cracked concrete and brickwork

Description	Ref. No.	Content ml	Cont. of master box pcs	Weight per master box kg	Weight per piece kg
Cartridge VMU plus 150	28255271	150	12	4,20	0,34
Cartridge VMU plus 280 ¹⁾	28252401	280	12	6,70	0,56
Cartridge VMU plus 300	28255126	300	12	6,40	0,53
Cartridge VMU plus 300 Polar	28252901	300	12	6,40	0,53
Cartridge VMU plus 345	28254001	345	12	8,00	0,65
Cartridge VMU plus 345 Polar	28253901	345	12	8,00	0,65
Cartridge VMU plus 410	28256041	410	12	10,1	0,83
Cartridge VMU plus 420 Polar	28257121	420	12	10,1	0,83
Cartridge VMU plus 825	28259001	825	8	13,0	1,63
Static mixer VM-X	28305111	-	12	0,12	0,01
Static mixer VM-XL ²⁾	28305201	-	10	0,28	0,03
Mixer extension VM-XE 10/200 (200mm)	28306011	-	12	-	0,01
Mixer extension VM-XE 10/500 (500mm)	85951101	-	10	0,02	0,02

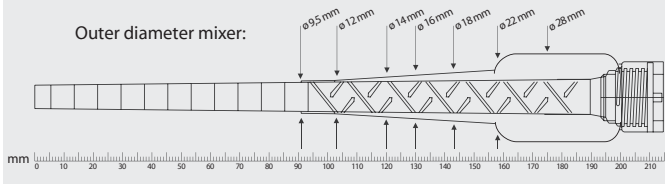
One static mixer VM-X as well as one screw-on cap comes with each cartridge. (VMU plus 825: VM-XL). Usable length of static mixer see below, Extension tubes see page 110.

¹⁾Cartridge VMU plus 280 comes with 2 mixers.

²⁾With larger cross section for larger drill holes or post-installed rebar connections.

Usable length Static mixer VM-X/VM-XP

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.



Storage Box

- In stackable multi-purpose container
- Storage box, the container for various items

Description	Ref. No.	Contents	Quantity pcs.	Weight per Box kg
Storage box VMU plus 280	28999148	Cartridge VMU plus 280 Static mixer VM-X	20 40	12,8
Storage box VMU plus 345	28999640	Cartridge VMU plus 345 Static mixer VM-X	20 40	15,3
Storage box VMU plus 345 Polar	28999670	Cartridge VMU plus 345 Polar Static mixer VM-X	20 40	15,3
Storage box VMU plus 410	28999652	Cartridge VMU plus 410 Static mixer VM-X	20 40	18,0

Dimensions storage box

Description	Height mm	Width mm	Depth mm
Storage box	220	400	300



Curing Time Injection Adhesive VMU plus

Temperature in drill hole	Cartridge temperature ¹⁾	Max. Gel time	Curing time	
			Dry base material	Wet base material
-10°C - -6°C	+15°C - +40°C	90 min	24 h	48 h
-5°C - -1°C		90 min	14 h	28 h
0°C - +4°C		45 min	7 h	14 h
+5°C - +9°C	+5°C - +40°C	25 min	2 h	4 h
+10°C - +19°C	(+25°C) ²⁾	15 min	80 min	160 min
+20°C - +24°C		6 min	45 min	90 min
+25°C - +29°C		6 min (4 min) ²⁾	45 min (25 min) ²⁾	90 min (50 min) ²⁾
+30°C - +34°C		4 min (2,5 min) ²⁾	25 min (15 min) ²⁾	50 min (30 min) ²⁾
+35°C - +39°C	+5°C - +40°C	2 min (2,5 min) ²⁾	20 min (15 min) ²⁾	40 min (30 min) ²⁾
+40°C	(< +20°C) ²⁾	1,5 min (2,5 min) ²⁾	15 min	30 min

¹⁾When installing

²⁾Values in brackets for rebar connections (ETA-11/0514)

Curing Time Injection Adhesive VMU plus Polar

- Cartridge temperature during installing -20°C to +10°C

Temperature (°C) of the base material	Gel time	Curing time	
		dry base material	wet base material
-20°C to -16°C	75 min	24 h	48 h
-15°C to -11°C	55 min	16 h	32 h
-10°C to -6°C	35 min	10 h	20 h
-5°C to -1°C	20 min	5 h	10 h
0°C to +4°C	10 min	2,5 h	5 h
+5°C to +9°C	6 min	80 min	160 min
+10°C	6 min	60 min	120 min

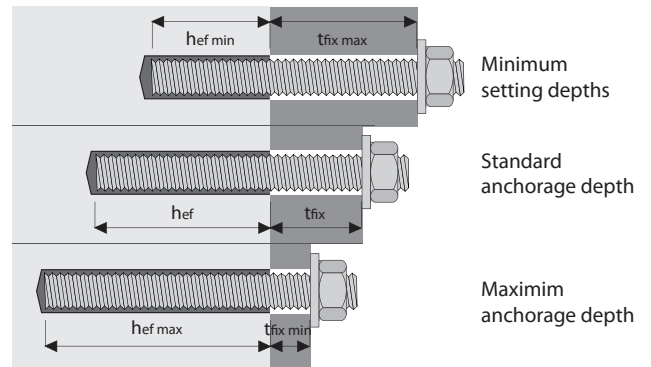


Threaded Studs for the Injection System VMU plus in concrete:
A flexible system means less inventory

The flexible anchoring depths of the Injection System VMU plus make it possible to adjust the setting depths to the required load. This allows at low loads, the use of shorter anchor rods with correspondingly shorter drilling depths, high loads can be supported by correspondingly deeper anchorage depths.

All anchor rod groups from the existing MKT range listed below can be used with the Injection System VMU plus. But these anchor rods can, according to the applied load, be set deeper or shallower. The minimum and maximum possible anchorage depths are specified in the assessment for each diameter and can be found in the extract from Permissible Service Conditions of ETA-11/0415 on the following pages.

Variable anchorage depth:



hef + tfix = Usable length of the threaded rod (without nut and washer)

Threaded Studs for applications in cracked and non-cracked concrete

Threaded Stud VMU-A

Steel, zinc plated 5.8



- ➔ May be used in structures subject to dry internal conditions
- ➔ Steel, zinc plated grade 8.8 on demand or as threaded studs VM-A

Threaded Stud VMU-A A4

Stainless steel A4




- ➔ May be used in structures subject to dry internal conditions or to external atmospheric exposure
- ➔ Stainless steel HCR (1.4529) on demand


Description	Ref. No.	Usable length in concrete mm	Pkg. cont. pcs.	Weight per pkg. kg
VMU-A 8x100	31510101	90	10	0,42
VMU-A 8x110	31515101	100	10	0,46
VMU-A 8x130	31525101	120	10	0,52
VMU-A 8x145	31528101	135	10	0,55
VMU-A 8x160	31530101	150	10	0,60
VMU-A 8x205	31550101	195	10	0,74
VMU-A 10x110	31605101	100	10	0,75
VMU-A 10x130	31625101	120	10	0,85
VMU-A 10x150	31630101	140	10	0,95
VMU-A 10x165	31635101	155	10	1,02
VMU-A 10x190	31645101	180	10	1,15
VMU-A 10x260	31655101	250	10	1,50
VMU-A 12x120	31717101	105	10	1,14
VMU-A 12x130	31718101	115	10	1,21
VMU-A 12x135	31710101	120	10	1,25
VMU-A 12x155	31720101	140	10	1,42
VMU-A 12x175	31730101	160	10	1,54
VMU-A 12x185	31734101	170	10	1,63
VMU-A 12x210	31740101	195	10	1,82
VMU-A 12x225	31748101	210	10	1,89
VMU-A 12x250	31750101	235	10	2,13
VMU-A 12x265	31757101	250	10	2,18
VMU-A 12x300	31760101	285	10	2,50
VMU-A 16x160	31810101	140	10	2,65
VMU-A 16x175	31815101	155	10	2,85
VMU-A 16x205	31820101	185	10	3,25
VMU-A 16x235	31830101	215	10	3,65
VMU-A 16x300	31840101	280	10	4,53
VMU-A 20x240	31910101	220	10	5,85
VMU-A 20x260	31915101	240	10	6,30
VMU-A 20x285	31920101	265	10	6,75
VMU-A 20x300	31925101	280	10	7,15
VMU-A 20x350	31930101	330	10	8,10
VMU-A 20x400	31935101	380	10	9,10
VMU-A 24x290	31960101	265	5	4,95
VMU-A 24x350	31965101	325	5	5,85
VMU-A 24x400	31970101	375	5	6,60
VMU-A 30x370	31990101	340	5	9,90

Description	Ref. No.	Usable length in concrete mm	Pkg. cont. pcs.	Weight per pkg. kg
VMU-A 8x100 A4	31510501	90	10	0,42
VMU-A 8x110 A4	31515501	100	10	0,46
VMU-A 8x130 A4	31525501	120	10	0,52
VMU-A 8x145 A4	31528501	135	10	0,55
VMU-A 8x160 A4	31530501	150	10	0,60
VMU-A 8x205 A4	31550501	195	10	0,74
VMU-A 10x110 A4	31605501	100	10	0,75
VMU-A 10x130 A4	31625501	120	10	0,85
VMU-A 10x150 A4	31630501	140	10	0,95
VMU-A 10x165 A4	31635501	155	10	1,02
VMU-A 10x190 A4	31645501	180	10	1,15
VMU-A 10x260 A4	31655501	250	10	1,50
VMU-A 12x120 A4	31717501	105	10	1,14
VMU-A 12x130 A4	31718501	115	10	1,21
VMU-A 12x135 A4	31710501	120	10	1,25
VMU-A 12x155 A4	31720501	140	10	1,42
VMU-A 12x175 A4	31730501	160	10	1,54
VMU-A 12x185 A4	31734501	170	10	1,63
VMU-A 12x210 A4	31740501	195	10	1,82
VMU-A 12x225 A4	31748501	210	10	1,89
VMU-A 12x250 A4	31750501	235	10	2,13
VMU-A 12x265 A4	31757501	250	10	2,18
VMU-A 12x300 A4	31760501	285	10	2,50
VMU-A 16x160 A4	31810501	140	10	2,65
VMU-A 16x175 A4	31815501	155	10	2,85
VMU-A 16x205 A4	31820501	185	10	3,25
VMU-A 16x235 A4	31830501	215	10	3,65
VMU-A 16x300 A4	31840501	280	10	4,53
VMU-A 20x240 A4	31910501	220	10	5,85
VMU-A 20x260 A4	31915501	240	10	6,30
VMU-A 20x285 A4	31920501	265	10	6,75
VMU-A 20x300 A4	31925501	280	10	7,15
VMU-A 24x290 A4	31960501	265	5	4,95
VMU-A 24x350 A4	31965501	325	5	5,85
VMU-A 24x400 A4	31970501	375	5	6,60
VMU-A 30x370 A4	31990501	340	5	9,90

Threaded Studs and Internally Threaded Sleeves for applications in **cracked and non-cracked concrete**
Threaded Stud VM-A

Steel, zinc plated 5.8


 Threaded studs, of 1 meter length, to be cut to the required length


 Comes with manufacturer's certificate (3.1 EN10204) in every package

Description	Ref. No.	Thread	Length	Package content pcs.	Weight per pkg. kg
			mm		
VM-A 8x1000	31199101	M8	1000	10	3,91
VM-A 10x1000	31299101	M10	1000	10	5,5
VM-A 12x1000	31399101	M12	1000	10	7,76
VM-A 16x1000	31599101	M16	1000	10	13,6
VM-A 20x1000	31699101	M20	1000	5	10,8
VM-A 24x1000	31799101	M24	1000	5	15,35

Threaded Stud VM-A

Stainless steel A4



 Threaded studs, of 1 meter length, to be cut to the required length


 Comes with manufacturer's certificate (3.1 EN10204) in every package

Description	Ref. No.	Thread	Length	Package content pcs.	Weight per pkg. kg
			mm		
VM-A 8x1000 A4	31199501	M8	1000	10	3,77
VM-A 10x1000 A4	31299501	M10	1000	10	5,43
VM-A 12x1000 A4	31399501	M12	1000	10	8,03
VM-A 16x1000 A4	31599501	M16	1000	10	13,95
VM-A 20x1000 A4	31699501	M20	1000	5	11,0
VM-A 24x1000 A4	31799501	M24	1000	5	15,6

Threaded Stud VM-A

Steel, zinc plated 8.8

 Threaded studs, of 1 meter length, to be cut to the required length

 Comes with manufacturer's certificate (3.1 EN10204) in every package

Description	Ref. No.	Thread	Length	Package content pcs.	Weight per pkg. kg
			mm		
VM-A 8x1000 8.8	31199181	M8	1000	10	3,91
VM-A 10x1000 8.8	31299181	M10	1000	10	5,5
VM-A 12x1000 8.8	31399181	M12	1000	10	7,76
VM-A 16x1000 8.8	31599181	M16	1000	10	13,6

Threaded Stud V-A

Steel, zinc plated 5.8

Dimensions see page 144



 For use in structures subject to dry internal conditions

 Steel, zinc plated 8.8 on demand

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

Threaded Stud V-A fvz

Steel, hot dip galvanized 5.8

Dimensions see page 144



 For use in structures subject to dry internal conditions


 Steel hot dip galvanized 8.8 on demand

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)

Internally Threaded Sleeve VMU-IG

Steel, zinc plated 5.8/Stainless steel A4


 With internal thread

 For cracked and non-cracked concrete

Description	Ref. No.		Drill hole-Ø x depth mm	Outer-Ø x Length mm	Thread depth min / max mm	Package content pcs.	Weight per pkg. kg
	Steel, zinc plated	Stainless steel A4					
VMU-IG M6x80	31502101	31502501	12 x 80	10 x 80	8 / 20	10	0,38
VMU-IG M6x90	31503101	31503501	12 x 90	10 x 90	8 / 20	10	0,42
VMU-IG M8x80	31562101	31562501	14 x 80	12 x 80	8 / 20	10	0,52
VMU-IG M8x100	31563101	31563501	14 x 100	12 x 100	8 / 20	10	0,66
VMU-IG M10x80	31601101	31601501	18 x 80	16 x 80	10 / 25	10	0,92
VMU-IG M10x100	31602101	31602501	18 x 100	16 x 100	10 / 25	10	1,18

Other dimensions on demand.

Threaded Studs, Internally Threaded Sleeves and Perfo Sleeves for applications in solid and hollow base material

Threaded Stud VMU-A

Steel, zinc plated 5.8/Stainless steel A4



→ Steel hot dip galvanized and stainless steel HCR (1.4529) on demand



Description	Ref. No.		Usable length mm	Solid base material without SH			Solid and hollow base material with VM-SH						Package content Pcs.	Weight per pkg. kg
	Steel, zinc plated	Stainless steel A4		Drill hole-Ø x depth mm	Maximum Fixture thickness fix mm	Drill hole Ø x depth mm								
						VM-SH 12x85	VM-SH 16x90	VM-SH 16x135	VM-SH 20x90	VM-SH 20x135	VM-SH 20x205			
						12x85	16x90	16x135	20x90	20x135	20x205			
Maximum Fixture thickness t_{fix} mm														
VMU-A 8 x 100	31510101	31510501	90	10 x 80	10	10	5	-	-	-	-	10	0,42	
VMU-A 8 x 110	31515101	31515501	100	10 x 80	20	20	15	-	-	-	-	10	0,46	
VMU-A 8 x 130	31525101	31525501	120	10 x 80	40	40	35	-	-	-	-	10	0,52	
VMU-A 8 x 145	31528101	31528501	135	10 x 80	55	55	50	5	-	-	-	10	0,55	
VMU-A 8 x 160	31530101	31530501	150	10 x 80	70	70	65	20	-	-	-	10	0,60	
VMU-A 8 x 205	31550101	31550501	195	10 x 80	115	115	110	65	-	-	-	10	0,74	
VMU-A 10 x 110	31605101	31605501	100	12 x 90	10	-	15	-	-	-	-	10	0,75	
VMU-A 10 x 130	31625101	31625501	120	12 x 90	30	-	35	-	-	-	-	10	0,85	
VMU-A 10 x 150	31630101	31630501	140	12 x 90	50	-	55	10	-	-	-	10	0,95	
VMU-A 10 x 165	31635101	31635501	155	12 x 90	65	-	70	25	-	-	-	10	1,02	
VMU-A 10 x 190	31645101	31645501	180	12 x 90	90	-	95	50	-	-	-	10	1,15	
VMU-A 10 x 260	31655101	31655501	250	12 x 90	160	-	165	120	-	-	-	10	1,50	
VMU-A 12 x 120	31717101	31717501	105	14 x 100	5	-	-	-	20	-	-	10	1,14	
VMU-A 12 x 130	31718101	31718501	115	14 x 100	15	-	-	-	30	-	-	10	1,21	
VMU-A 12 x 135	31710101	31710501	120	14 x 100	20	-	-	-	35	-	-	10	1,25	
VMU-A 12 x 155	31720101	31720501	140	14 x 100	40	-	-	-	55	10	-	10	1,42	
VMU-A 12 x 175	31730101	31730501	160	14 x 100	60	-	-	-	75	30	-	10	1,54	
VMU-A 12 x 185	31734101	31734501	170	14 x 100	70	-	-	-	85	40	-	10	1,63	
VMU-A 12 x 210	31740101	31740501	195	14 x 100	95	-	-	-	110	65	-	10	1,82	
VMU-A 12 x 225	31748101	31748501	210	14 x 100	110	-	-	-	125	80	10	10	1,89	
VMU-A 12 x 250	31750101	31750501	235	14 x 100	135	-	-	-	150	105	35	10	2,13	
VMU-A 12 x 265	31757101	31757501	250	14 x 100	150	-	-	-	165	120	50	10	2,18	
VMU-A 12 x 300	31760101	31760501	285	14 x 100	185	-	-	-	200	155	85	10	2,50	
VMU-A 16 x 160	31810101	31810501	140	18 x 100	40	-	-	-	55	10	-	10	2,65	
VMU-A 16 x 175	31815101	31815501	155	18 x 100	55	-	-	-	70	25	-	10	2,85	
VMU-A 16 x 205	31820101	31820501	185	18 x 100	85	-	-	-	100	55	-	10	3,25	
VMU-A 16 x 235	31830101	31830501	215	18 x 100	115	-	-	-	130	85	15	10	3,65	
VMU-A 16 x 300	31840101	31840501	280	18 x 100	180	-	-	-	195	150	80	10	4,53	

Internally Threaded Sleeve VMU-IG

Steel, zinc plated 5.8/Stainless steel A4



→ With internal thread

→ Approved for solid and hollow base material



Description	Ref. No.		Solid base material without SH Drill hole Ø x depth mm	Solid and hollow base material with SH		Outer-Ø x Length mm	Thread depth min / max mm	Package content pcs.	Weight per pkg. kg
	Steel, zinc plated	Stainless steel A4		VM-SH 16x85 Drill hole Ø x depth mm	VM-SH 20x85 Drill hole-Ø x depth mm				
	VMU-IG M6x80	31502101		31502501	-				
VMU-IG M6x90	31503101	31503501	12 x 90	-	-	10 x 90	8 / 20	10	0,42
VMU-IG M8x80	31562101	31562501	-	-	20 x 90	12 x 80	8 / 20	10	0,52
VMU-IG M8x100	31563101	31563501	14 x 100	-	-	12 x 100	8 / 20	10	0,60
VMU-IG M10x80	31601101	31601501	-	-	20 x 90	16 x 80	10 / 25	10	0,92
VMU-IG M10x100	31602101	31602501	18 x 100	-	-	16 x 100	10 / 25	10	1,18

Perfo Sleeve VM-SH

Polypropylen

→ Approved for hollow base material



Description	Ref. No.	Drill hole Ø x depth mm	For threaded studs	For internally threaded sleeves	Appropriate for cleaning brush	Package content Pcs.	Weight per pkg. kg
VM-SH 12 x 80	28151201	12 x 85	M8	-	RB 12 M6	10	0,02
VM-SH 16 x 85	28152001	16 x 90	M8 / M10	VMU-IG M6 x 80	RB 16 M6	10	0,03
VM-SH 16 x 130	28153001	16 x 135	M8 / M10	-	RB 16 M6	10	0,04
VM-SH 20 x 85	28154001	20 x 90	M12 / M16	VMU-IG M8 x 80/VMU-IG M10 x 80	RB 20 M6	10	0,04
VM-SH 20 x 130	28154301	20 x 135	M12 / M16	-	RB 20 M6	10	0,07
VM-SH 20 x 200	28154601	20 x 205	M12 / M16	-	RB 20 M6	10	0,10

Accessories

Possible combinations static mixer / Extension tube / Retaining Washer:



Extension tubes



- Extension tubes for deeper drill holes
- Two diameters available

Description	Ref. No.	Length mm	Ø 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
VM-XLE 16/250	85959101	250	16	VM-XL	10	0,30
VM-XLE 16/1000	85956101	1000	16	VM-XL	10	1,15

Retaining Washer VM-IA



- For bubble-free filling of the drill hole
- Suitable for extension tubes VM-XE 10 and VM-XLE 16

Description	Ref. No.	Suitable for drill hole Ø mm	Color	Suitable for		Pkg. cont. pcs.	Weight per pkg. kg
				Threaded stud	Rebar		
VM-IA 14	85914201	14	black	M12	Ø10	20	0,02
VM-IA 16	85916201	16	black	-	Ø12	20	0,02
VM-IA 18	85918201	18	black	M16	Ø14	20	0,02
VM-IA 20	85920201	20	black	-	Ø16	20	0,06
VM-IA 24	85924101	24	black	M20	Ø20	20	0,06
VM-IA 25	85925201	25	black	-	Ø20	20	0,06
VM-IA 28	85928101	28	black	M24	Ø22	20	0,08
VM-IA 32	85932201	32	black	M27	Ø24, 25	20	0,08
VM-IA 35	85935201	35	black	M30	Ø28	20	0,08
VM-IA 40	85938201	40	black		Ø32	20	0,08

Cleaning brush RB M6



- With connection thread M6
- Extensions for large depths
- For drilling machines with keyed chuck or with SDS plus adaptor for SDS plus drill holder
- Direct clamping into the drilling machine with toothed drill chuck is possible

Description	Ref. No.	Suitable for drill hole Ø mm	Total length of brush mm	Suitable for		Pkg. cont. pcs.	Weight per piece kg
				Threaded stud	Internally threaded sleeve		
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 26 M6	33526101	25,26	290	-	Ø20	1	0,06
RB 28 M6	33528101	28	260	M24	Ø22	1	0,06
RB 32 M6	33532101	32	350	M27	Ø24,25	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 150 mm with connection thread M6			1	0,09
RBL M6 SDS	33350101		SDS Plus adaptor with internal thread (M6)			1	0,06

Blow-out pump VM-AP



- For approval-compliant air-cleaning of drill holes in masonry as well as non-cracked concrete with a diameter up to 20 mm and a maximum drill hole depth ten times larger than the diameter of the threaded stud (VMU plus)
- 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 ¹⁾ 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 fixture

Air gun VM-ABP



→ For approval-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

NEW

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 fixture

Air gun VM-ABP



→ Drill hole cleaning with compressed air for holes up to one meter

→ For best drill hole cleaning the nozzle of the air-gun must reach to the bottom of the drill hole

Description	Ref. No.	Nozzle Ø mm	Max. Drill hole depth mm	For drill hole Ø mm	Pkg. cont. pcs	Weight per piece kg
VM-ABP 1000	85806101	14	1000	16-40	1	0,32

Dispenser VM-P 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 345 Profi	28350511	150ml, 280ml, 300ml, 345ml also suitable for silicone cartridges	1	1,00
VM-P 380 Profi	28351001	380ml, 410ml, 420ml	1	1,10

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 345 Standard	28350505	150ml, 280ml, 300ml, 345ml also suitable for silicone cartridges	1	1,00
VM-P 380 Standard	28353005	380ml, 410ml, 420ml	1	1,15

Dispenser VM-P Pneumatic



→ 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	Pkg. cont. pcs	Weight per piece kg
VM-P 345 Pneumatic	28350601	280ml, 300ml, 345ml	8 bar, 40l/min	1	2,41
VM-P 380 Pneumatic	28352002	380ml, 410ml, 420ml	8 bar, 40l/min	1	2,00
VM-P 825 Pneumatic	28352110	825ml	8 bar, 40l/min	1	5,00

Dispenser VM-P Akku



¹⁾ with Akku 18V/2,0 Ah

→ 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 345 Akku	28350801	345ml	5,0	3,53	395 x 180 x 285	1	7,72
VM-P 380 Akku	28352601	380ml, 410ml, 420ml	3,95	3,62	375 x 180 x 285	1	7,80
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

System case and accessories for post-installed rebar connections to use with injection system VMU plus (fast curing time) or the injection system VME (long curing times, optimized for very large and deep drill holes)

Description and content:

Compact system case including equipment for every rebar diameter as well as all the tools necessary for the installation of post-installed rebar connections using the Injection System VME or VMU plus. All parts also sold separately.



Drilling:

- Drilling aid device
- Flat- / Ring wrench

Accessories for drill hole cleaning:

- 1 of each air hose RS 25 and RS 35
- 1 of each blow-out nozzle RD 12/14, 16/18, 20/25, 30/35
- 1 of each cleaning brush RB 12 M8 – RB 35 M8
- Connection set RS with air valve and connector
- 5 Brush extensions RBL M8, L = 500 mm
- 1 SDS-plus adapter RBL M8-SDS

Accessories for injection:

- 5 Static mixer VM-XL
- 5 of each retaining washer VM-IA Ø12 mm - Ø35 mm
- 5 of each extension tube VM-XE 10/500 and VM-XLE 16/500
- Frame saw

Other:

- Approval
- Installation sheet and Installation report (available for download at www.mkt.de)
- Filling quantity tables
- Adhesive tape
- Measuring tape
- Thermometer
- Ear protection, Breathing protection, Protective goggles and protective gloves

Description	Ref. No.	Suitable for drill hole-Ø mm	Pkg. content pcs.	Weight per piece kg
VME System case	85999101	12 - 35	1	11,8

System Components

- Filling of drill hole
- For drill hole diameter 12 - 35 mm

Description	Ref. No.	Length mm	Rebar-Ø mm	Suitable for drill hole Ø mm	Colour	Package content pcs.	Weight per pkg. kg
Extension pipe							
VM-XE 10/1000	85952101	1000	8 - 12	12 - 16	white	10	0,30
VM-XE 10/2000	85954101	2000	8 - 12	12 - 16	white	10	0,65
VM-XLE 16/1000	85956101	1000	14 - 28	18 - 35	grey	10	1,15
VM-XLE 16/2000	85958101	2000	14 - 28	18 - 35	grey	10	3,50
Retaining washer (only for post-installed rebar connections. Fits to the system case)							
VM-IA 12	85912101	-	8	12	white	20	0,04
VM-IA 14	85914101	-	10	14	yellow	20	0,01
VM-IA 16	85916101	-	12	16	blue	20	0,02
VM-IA 18	85918101	-	14	18	black	20	0,01
VM-IA 20	85920101	-	16	20	grey	20	0,02
VM-IA 25	85925101	-	20	25	green	20	0,05
VM-IA 32	85932101	-	25	32	brown	20	0,10
VM-IA 35	85935101	-	28	35	red	20	0,12

Extension pipe VM-XE and VM-XLE can be cut to corresponding drill hole depth.
Extension pipe > 2000 mm on demand.

Reinforced brushes RB M8

- Reinforced brushes with connecting thread M8 for deeper drill holes

Description	Ref. No.	Rebar-Ø mm	Suitable for drill hole Ø mm	Pkg. content pcs.	Weight per piece kg
RB 12 M8	85812101	8	12	1	0,05
RB 14 M8	85814101	10	14	1	0,05
RB 16 M8	85816101	12	16	1	0,05
RB 18 M8	85818101	14	18	1	0,05
RB 20 M8	85820101	16	20	1	0,05
RB 25 M8	85825101	20	25	1	0,06
RB 32 M8	85832101	25	32	1	0,08
RB 35 M8	85835101	28	35	1	0,08
Brush extension RBL M8, L= 500 mm	85871101	8 - 28	12 - 35	1	0,32
SDS-Plus adapter RBL M8 SDS	85881101	-	12 - 35	1	0,07

Please select Brush extension RBL and SDS-Plus adapter according to depth of drill hole.
For drill hole depth > 500 mm, the proper number of Brush extensions must be connected.

Blow-out nozzle



- Every nozzle covers two drill hole diameters
- Fits on the air hose RS

Description	Ref. No.	Rebar-Ø mm	Suitable for drill hole-Ø mm	Pkg. content pcs.	Weight per piece kg
Blow-out nozzle RD 12/14	85852101	8 - 10	12 - 14	1	0,01
Blow-out nozzle RD 16/18	85854101	12 - 14	16 - 18	1	0,02
Blow-out nozzle RD 20/25	85856101	16 - 20	20 - 25	1	0,03
Blow-out nozzle RD 30/35	85858101	24 - 28	30 - 35	1	0,05

Air hose



- pre-assembled set with connectors
- To use with air valve and blow-out nozzle

Description	Ref. No.	Rebar-Ø mm	Suitable for drill hole-Ø mm	Pkg. content pcs.	Weight per piece kg
Air hose RS 25 (2 m)	85802101	8 - 20	12 - 25	1	0,10
Air hose RS 35 (3 m)	85804101	24 - 28	30 - 35	1	0,40

Air Valve



- For drill hole cleaning with compressed air

Description	Ref. No.	Rebar-Ø mm	Suitable for drill hole-Ø mm	Pkg. content pcs.	Weight per piece kg
Connection Set RS with valve and connector	85890101	8 - 28	12 - 35	1	0,40



Extract from Permissible Service Conditions of European Technical Assessment ETA-11/0415

Approved loads without influence of spacing and edge distance in dry or wet concrete for temperature range I -40°C to +24°C/+40°C¹⁾ and for temperature range II -40°C to +50°C/+80°C¹⁾ (For temperature range III -40°C to +72°C/+120°C¹⁾ see ETA-11/0415).

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 VMU plus, 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]	2,9-7,7	3,7-12,5	5,8-19,7	8,8-35,1	12,2-54,9	13,4-79,0	16,0-109,5	18,8-133,3
	50°C/80°C ¹⁾	C20/25	appr. N	[kN]	1,8-4,8	2,6-8,7	4,2-14,4	6,4-25,5	9,0-39,9	11,5-57,4	16,0-81,8	18,8-101,0
Approved loads, tension for $h_{ef,min} - h_{ef,max}$												
non-cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	7,2-8,6	9,0-13,8	11,7-20,0	14,3-37,1	17,1-58,1	18,8-83,8	22,5-109,5	26,3-133,3
	50°C/80°C ¹⁾	C20/25	appr. N	[kN]	5,4-8,6	6,7-13,8	9,4-20,0	14,3-37,1	17,1-58,1	18,8-83,8	22,5-109,5	26,3-133,3
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	21,1-22,3	29,3-34,9	32,2-50,3	38,5-65,7	45,1-80,0
	50°C/80°C ¹⁾	C20/25	appr. V	[kN]	3,6-5,1	6,3-8,6	10,1-12,0	15,3-22,3	21,5-34,9	27,6-50,3	38,5-65,7	45,1-80,0
Approved loads, shear for $h_{ef,min} - h_{ef,max}$												
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
	50°C/80°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 VMU plus, threaded stud steel 8.8				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]	2,9-7,7	3,7-12,5	5,8-19,7	8,8-35,1	12,2-54,9	13,4-79,0	16,0-118,1	18,8-145,9
	50°C/80°C ¹⁾	C20/25	appr. N	[kN]	1,8-4,8	2,6-8,7	4,2-14,4	6,4-25,5	9,0-39,9	11,5-57,4	16,0-81,8	18,8-101,0
Approved loads, tension for $h_{ef,min} - h_{ef,max}$												
non-cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	7,2-13,8	9,0-21,9	11,7-31,9	14,3-59,5	17,1-93,3	18,8-134,3	22,5-175,2	26,3-202,0
	50°C/80°C ¹⁾	C20/25	appr. N	[kN]	5,4-13,8	6,7-21,9	9,4-31,9	14,3-57,4	17,1-89,8	18,8-122,1	22,5-136,3	26,3-145,9
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]	5,7-8,6	9,0-13,1	13,8-19,4	21,1-36,0	29,3-56,0	32,2-80,6	38,5-105,1	45,1-128,0
	50°C/80°C ¹⁾	C20/25	appr. V	[kN]	3,6-8,6	6,3-13,1	10,1-19,4	15,3-36,0	21,5-56,0	27,6-80,6	38,5-105,1	45,1-128,0
Approved loads, shear for $h_{ef,min} - h_{ef,max}$												
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
	50°C/80°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

Injection System VMU plus, threaded stud stainless steel A4, HCR				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]	2,9-7,7	3,7-12,5	5,8-19,7	8,8-35,1	12,2-54,9	13,4-79,0	16,0-57,4	18,8-70,2
	50°C/80°C ¹⁾	C20/25	appr. N	[kN]	1,8-4,8	2,6-8,7	4,2-14,4	6,4-25,5	9,0-39,9	11,5-57,4	16,0-57,4	18,8-70,2
Approved loads, tension for $h_{ef,min} - h_{ef,max}$												
non-cracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	7,2-9,9	9,0-15,7	11,7-22,5	14,3-42,0	17,1-65,3	18,8-94,3	22,5-57,4	26,3-70,2
	50°C/80°C ¹⁾	C20/25	appr. N	[kN]	5,4-9,9	6,7-15,7	9,4-22,5	14,3-42,0	17,1-65,3	18,8-94,3	22,5-57,4	26,3-70,2
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]	5,7-6,0	9,0-9,2	13,7	21,1-25,2	29,3-39,4	32,2-56,8	34,5	42,0
	50°C/80°C ¹⁾	C20/25	appr. V	[kN]	3,6-6,0	6,3-9,2	10,1-13,7	15,3-25,2	21,5-39,4	27,6-56,8	34,5	42,0
Approved loads, shear for $h_{ef,min} - h_{ef,max}$												
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
	50°C/80°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

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	138-448	152-536	172-604	190-670
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 - 160	60 - 200	70 - 240	80 - 320	90 - 400	96 - 480	108 - 540	120 - 600
Installation torque	$\leq T_{inst}$	[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. Technical data for water-filled drill holes see approval.

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



Extract from Permissible Service Conditions of European Technical Assessment ETA-11/0415

Approved loads without influence of spacing and edge distance in dry or wet concrete for temperature range I -40°C to +24°C/+40°C¹⁾ and for temperature range II -40°C to +50°C/+80°C¹⁾ (For temperature range III -40°C to +72°C/+120°C¹⁾ see ETA-11/0415).

Total safety factor as per ETAG 001 included (γ_M and γ_F).

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 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 VMU plus, Internally threaded steel VMU-IG, Steel 5.8

Approved loads, tension for h_{ef}				cracked concrete								
Temperature range	24°C/40°C ¹⁾	C20/25	appr. N [kN]	4,8	4,8	6,6	8,2	8,8	11,0	17,1	28,0	40,4
	50°C/80°C ¹⁾	C20/25	appr. N [kN]	3,5	3,9	4,8	6,0	6,4	8,0	12,5	20,3	33,7
Approved loads, tension for h_{ef}				non-cracked concrete								
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	56,7
	50°C/80°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
Approved loads, shear for h_{ef}				cracked concrete								
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
	50°C/80°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
Approved loads, shear for h_{ef}				non-cracked concrete								
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
	50°C/80°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

Injection System VMU plus, Internally threaded VMU-IG, Stainless steel A4, HCR

Approved loads, tension for h_{ef}				cracked concrete								
Temperature range	24°C/40°C ¹⁾	C20/25	appr. N [kN]	5,0	5,3	6,6	8,2	8,8	11,0	17,1	28,0	31,0
	50°C/80°C ¹⁾	C20/25	appr. N [kN]	3,5	3,9	4,8	6,0	6,4	8,0	12,5	20,3	31,0
Approved loads, tension for h_{ef}				non-cracked concrete								
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	42,0	31,0
	50°C/80°C ¹⁾	C20/25	appr. N [kN]	5,3	5,3	9,9	9,9	14,3	15,7	22,5	42,0	31,0
Approved loads, shear for h_{ef}				cracked concrete								
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
	50°C/80°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}				non-cracked concrete								
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
	50°C/80°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
Minimum spacing	s_{min}	[mm]	50	50	60	60	80	80	100	120	150
Minimum edge distance	c_{min}	[mm]	50	50	60	60	80	80	100	120	150

Installation parameters

Drill hole diameter	d_o	[mm]	12	12	14	14	18	18	24	28	35
Clearance hole in the fixture	$d_{r\leq}$	[mm]	7	7	9	9	12	12	14	18	22
Range of drill hole depth for h_{ef}	d_o	[mm]	80	90	80	100	80	100	125	170	200
Installation	$T_{inst\leq}$	[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. Technical data for water-filled drill holes see approval.

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



Extract from Permissible Service Conditions of European Technical Assessment ETA-11/0415

Approved loads without influence of spacing and edge distance in dry or wet concrete for temperature range I -40°C to +24°C/+40°C¹⁾ and for temperature range II -40°C to +50°C/+80°C¹⁾ (For temperature range III -40°C to +72°C/+120°C¹⁾ see ETA-11/0415). Total safety factor as per ETAG 001 included (γ_M and γ_P).

Injection System VMU plus, reinforcement bars B500B				$\phi 8$	$\phi 10$	$\phi 12$	$\phi 14$	$\phi 16$	$\phi 20$	$\phi 25$	$\phi 28$	$\phi 32$	
Range of anchorage depths	$h_{ef,min} - h_{ef,max}$	[mm]		60-160	60-200	70-240	75-280	80-320	90-400	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]	2,9-7,7	3,7-12,5	5,8-19,7	7,2-26,9	8,8-35,1	12,2-54,9	14,3-85,7	16,9-127,1	20,7-166,0
	50°C/80°C ¹⁾	C20/25	appr. N	[kN]	1,8-4,8	2,6-8,7	4,2-14,4	5,2-19,5	6,4-25,5	9,0-39,9	12,5-63,3	16,9-88,0	20,7-114,9
Approved loads, tension for $h_{ef,min} - h_{ef,max}$					non-cracked concrete								
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	7,2-13,8	9,0-21,6	11,7-31,2	13,0-42,4	14,3-55,4	17,1-86,6	20,0-135,2	23,8-169,6	29,0-217,0
	50°C/80°C ¹⁾	C20/25	appr. N	[kN]	5,4-13,8	6,7-21,6	9,4-31,2	11,8-42,4	14,3-55,4	17,1-86,6	20,0-124,7	23,8-136,8	29,0-153,2
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]	5,7-6,5	9,0-10,1	13,8-14,5	17,3-19,8	21,1-25,9	29,3-40,4	34,3-63,1	40,6-79,2	49,7-103,4
	50°C/80°C ¹⁾	C20/25	appr. V	[kN]	3,6-6,5	6,3-10,1	10,1-14,5	12,6-19,8	15,3-25,9	21,5-40,4	29,9-63,1	40,6-79,2	49,7-103,4
Approved loads, shear for $h_{ef,min} - h_{ef,max}$					non-cracked 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	48,1-63,1	57,0-79,2	69,6-103,4
	50°C/80°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

Spacing and edge distance

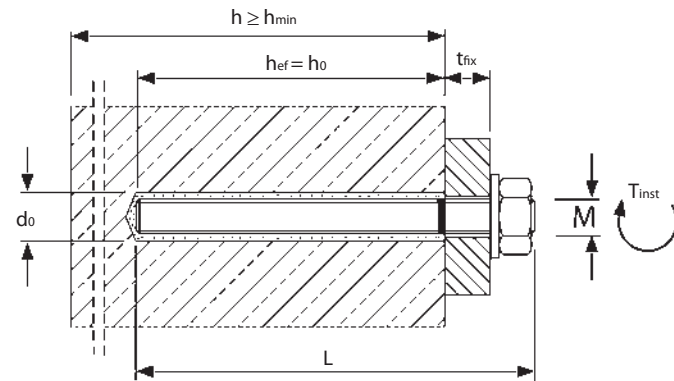
Min. thickness of concrete slab for $h_{ef,min} - h_{ef,max}$	h_{min}	[mm]	100-190	100-230	102-272	111-316	120-360	138-448	164-564	182-630	208-720
Minimum spacing	s_{min}	[mm]	40	50	60	70	80	100	125	140	160
Minimum edge distance	c_{min}	[mm]	40	50	60	70	80	100	125	140	160

Installation parameters

Drill hole diameter	d_o	[mm]	12	14	16	18	20	24	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	100 - 500	112 - 560	128 - 640

¹⁾ Max. long term temperature / max. short term temperature
Higher concrete strength may lead to higher approved loads. Technical data for water-filled drill holes see approval.

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Installation parameters and amount of adhesive for post-installed rebar connections

Rebar connection VMU plus

Rebar-Ø	[mm]	8	10	12	14	16	20	22	24	25
Drill hole-Ø	d_o [mm]	12	14	16	18	20	25/26 ¹⁾	28	32	32
Amount of adhesive/100 mm setting depth	[ml]	7,5	9,0	10,6	12,1	13,6	21,2	28,3	42,2	37,6

¹⁾Compressed air drill

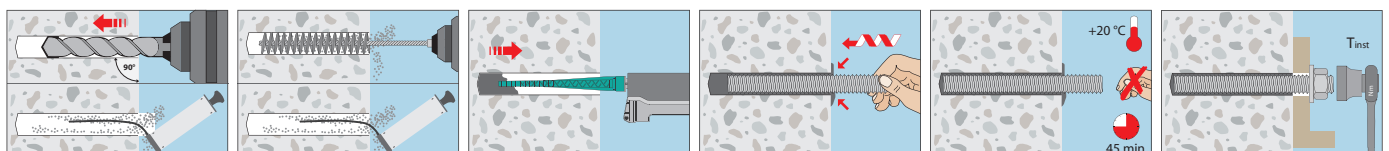


Extract from Permissible Service Conditions of ETA-11/0514 for Post-installed Rebar Connections with Injection System VMU plus

Concrete Strength		C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Design value of bond strength $f_{bd}^{1)}$ [N/mm ²]	Hammer and pneumatic drilling	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3

¹⁾ The values f_{bd} are valid for "good" bond conditions according to EN 1992-1-1:2004.

Installation in concrete and solid base material




Extract from Permissible Service Conditions of European Technical Assessment ETA-13/0909

 Approved loads for single anchor without influence of spacing and edge distance. Butt joint and horizontal joint with adhesive. (Temperature range -40°C to $+24^{\circ}\text{C}/+40^{\circ}\text{C}^{1)}$ – use category dry/dry). Total safety factor as per ETAG included (γ_M and γ_P).

Injection system VMU plus, solid base material without perfo sleeve²⁾
Clay solid brick Mz-DF according EN 771-1, Bulk density ρ : 1,6 kg/dm³, Minimum brick size: 240x115x55 mm (e.g. Unipor)

Threaded Stud: Steel: \geq FKL 5.8, A4, HCR: \geq FKL 70			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Anchorage depth	h_{ef}	[mm]	80	90	100	100	90	100	100
Spacing	s_{cr}	[mm]	240	270	300	300	270	300	300
Minimum spacing	s_{min}	[mm]	120	120	120	120	120	120	120
Edge distance	c_{cr}	[mm]	120	135	150	150	135	150	150
Minimum edge distance	c_{min}	[mm]	60	60	60	60	60	60	60
Approved tension load for compressive strength	$f_b \geq 10 \text{ N/mm}^2$	appr. N [kN]	1,00	1,00	1,14	1,14	1,00	1,14	1,14
	$f_b \geq 20 \text{ N/mm}^2$	appr. N [kN]	1,29	1,57	1,71	1,71	1,57	1,71	1,71
	$f_b \geq 28 \text{ N/mm}^2$	appr. N [kN]	1,57	1,71	1,94	1,94	1,71	1,94	1,94
Approved shear load for compressive strength	$f_b \geq 10 \text{ N/mm}^2$	appr. V [kN]	1,00	1,00	1,00	1,57	1,00	1,00	1,57
	$f_b \geq 20 \text{ N/mm}^2$	appr. V [kN]	1,43	1,43	1,43	2,29	1,43	1,43	2,29
	$f_b \geq 28 \text{ N/mm}^2$	appr. V [kN]	1,57	1,57	1,57	2,57	1,57	1,57	2,57
Drilling method							Hammer drilling		

Calcium silicate solid brick KS-NF according EN 771-2, Bulk density ρ : 2,0 kg/dm³, Minimum brick size: 240x115x71 mm (e.g. Wemding)

Threaded Stud: Steel: \geq FKL 5.8, A4, HCR: \geq FKL 70			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Anchorage depth	h_{ef}	[mm]	80	90	100	100	90	100	100
Spacing	s_{cr}	[mm]	240	270	300	300	270	300	300
Minimum spacing	s_{min}	[mm]	120	120	120	120	120	120	120
Edge distance	c_{cr}	[mm]	120	135	150	150	135	150	150
Minimum edge distance	c_{min}	[mm]	60	60	60	60	60	60	60
Approved tension load for compressive strength	$f_b \geq 10 \text{ N/mm}^2$	appr. N [kN]	1,29	1,29	1,29	1,00	1,29	1,29	1,00
	$f_b \geq 20 \text{ N/mm}^2$	appr. N [kN]	1,71	1,71	1,71	1,43	1,71	1,71	1,43
	$f_b \geq 27 \text{ N/mm}^2$	appr. N [kN]	2,00	2,00	2,00	1,71	2,00	2,00	1,71
Approved shear load for compressive strength	$f_b \geq 10 \text{ N/mm}^2$	appr. V [kN]	0,71	0,86	0,71	0,71	0,86	0,71	0,71
	$f_b \geq 20 \text{ N/mm}^2$	appr. V [kN]	1,14	1,29	1,14	1,14	1,29	1,14	1,14
	$f_b \geq 27 \text{ N/mm}^2$	appr. V [kN]	1,29	1,57	1,29	1,29	1,57	1,29	1,29
Drilling method							Hammer drilling		

Brickwork of solid lightweight concrete LAC according EN 771-3, Bulk density ρ : 0,6 kg/dm³, Minimum brick size: 300x123x248 mm (e.g. Bisotherm)

Threaded Stud: Steel: \geq FKL 5.8, A4, HCR: \geq FKL 70			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Anchorage depth	h_{ef}	[mm]	80	90	100	100	90	100	100
Spacing	s_{cr}	[mm]	240	270	300	300	270	300	300
Minimum spacing	s_{min}	[mm]	120	120	120	120	120	120	120
Edge distance	c_{cr}	[mm]	120	135	150	150	135	150	150
Minimum edge distance	c_{min}	[mm]	60	60	60	60	60	60	60
Approved tension load for compressive strength	$f_b \geq 2 \text{ N/mm}^2$	appr. N [kN]	0,86	0,86	1,00	0,86	0,86	1,00	0,86
	$f_b \geq 2 \text{ N/mm}^2$	appr. V [kN]	0,86	0,86	0,86	0,86	0,86	0,86	0,86
Drilling method							Rotary drilling		

Autoclaved aerated concrete AAC6 according EN 771-4, Bulk density ρ : 0,6 kg/dm³, Minimum brick size: 499x240x249 mm (e.g. Porit)

Threaded Stud: Steel: \geq FKL 5.8, A4, HCR: \geq FKL 70			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Anchorage depth	h_{ef}	[mm]	80	90	100	100	90	100	100
Spacing	s_{cr}	[mm]	240	270	300	300	270	300	300
Minimum spacing	s_{min}	[mm]	100	100	100	100	100	100	100
Edge distance	c_{cr}	[mm]	120	135	150	150	135	150	150
	$c_{min,N}$	[mm]	75	75	75	75	75	75	75
	$c_{min,v,II}^{3)}$	[mm]	75	75	75	75	75	75	75
Minimum edge distance	$c_{min,v,I}^{4)}$	[mm]	120	135	150	150	135	150	150
	h_{min}	[mm]	110	120	130	130	120	130	130
Approved tension load for compressive strength	$f_b \geq 6 \text{ N/mm}^2$	appr. N [kN]	0,89	1,43	1,79	2,32	1,43	1,79	2,32
	$f_b \geq 6 \text{ N/mm}^2$	appr. V [kN]	2,14	3,57	3,57	3,57	2,86	3,57	3,57
Drilling method							Rotary drilling		

Installation parameters in solid base material (without Perfo Sleeve)

Threaded Stud: Steel: \geq FKL 5.8, A4, HCR: \geq FKL 70			M8	M10	M12	M16	IG-M6	IG-M8	IG-M10
Drill hole diameter	d_o	[mm]	10	12	14	18	12	14	18
Depth of drill hole	h_o	[mm]	80	90	100	100	90	100	100
Minimum wall thickness	h_{min}	[mm]	110	120	130	130	120	130	130
Clearance hole in the fixture	$d_f \leq$	[mm]	9	12	14	18	7	9	12
Diameter of cleaning brush	$d_b \geq$	[mm]	12	14	16	20	14	16	20
Installation torque	$T_{inst,max}$	[Nm]	2 (14 for clay solid brick Mz-DF)						
Amount of adhesive per drill hole		[ml]	5,2	7,3	9,8	13,6	7,3	9,8	13,6
Drill holes per cartridge VMU plus 280 / 300		[pcs.]	46 / 50	33 / 36	24 / 26	18 / 19	33 / 36	24 / 26	18 / 19
Drill holes per cartridge VMU plus 345 / 410		[pcs.]	59 / 71	42 / 51	31 / 38	22 / 27	42 / 51	31 / 38	22 / 27

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

²⁾Installation with perforated sleeve allowed; technical data, see ETA-13/0909

³⁾Minimum edge distance $c_{min,v,II}$ for shear loads parallel to free edge

⁴⁾Minimum edge distance $c_{min,v,I}$ for shear loads perpendicular to free edge



Extract from Permissible Service Conditions of European Technical Assessment ETA-13/0909

Approved loads for single anchor without influence of spacing and edge distance. Butt joint and horizontal joint with adhesive. (Temperature range -40°C to +24°C/+40°C¹⁾ – use category dry/dry). Total safety factor as per ETAG included (γ_{M} and γ_{P}).

Injection system VMU plus, perforated brick with Perfo Sleeve

Clay hollow brick Porotherm Homebric according EN 771-1, Bulk density ρ : 0,7 kg/dm³, Minimum brick size: 500x200x299mm (e.g. Wienerberger)

Threaded Stud: Steel: \geq FKL 5.8, A4, HCR: \geq FKL 70				M8		M8 / M10		M12 / M16		IG-M6	IG-M8 / IG-M10	
Perfo Sleeve VM-SH				12x80	16x85	16x130	20x85	20x130	16x85	20x85		
Anchorage depth	h_{ef}	[mm]	80	85	130	85	130	85	130	85	85	
Spacing parallel to horizontal joint	$s_{cr,II}$	[mm]	500	500	500	500	500	500	500	500	500	
Spacing perpendicular to horizontal joint	$s_{cr,I}$	[mm]	300	300	300	300	300	300	300	300	300	
Minimum spacing	s_{min}	[mm]	100	100	100	100	100	100	100	100	100	
Edge distance	c_{cr}	[mm]	100	100	100	120	120	100	120	100	120	
Minimum edge distance	$c_{min}^{2)}$	[mm]	100	100	100	120	120	100	120	100	120	
Approved tension load for compressive strength	$f_b \geq 4$ N/mm ²	appr. N	[kN]	0,26	0,26	0,34	0,26	0,34	0,26	0,34	0,26	0,26
	$f_b \geq 6$ N/mm ²	appr. N	[kN]	0,26	0,26	0,34	0,26	0,34	0,26	0,34	0,26	0,26
	$f_b \geq 10$ N/mm ²	appr. N	[kN]	0,34	0,34	0,43	0,34	0,43	0,34	0,43	0,34	0,34
Approved shear load for compressive strength	$f_b \geq 4$ N/mm ²	appr. V	[kN]	0,57	0,57	0,57	0,71	0,71	0,57	0,71	0,57	0,71
	$f_b \geq 6$ N/mm ²	appr. V	[kN]	0,71	0,71	0,71	0,86	0,86	0,71	0,86	0,71	0,86
	$f_b \geq 10$ N/mm ²	appr. V	[kN]	0,86	0,86	1,00	1,14	1,14	0,86	1,14	0,86	1,14

Clay hollow brick HLZ-16-DF according EN 771-1, Bulk density ρ : 0,8 kg/dm³, Minimum brick size: 497x240x238 mm (e.g. Unipor)

Threaded Stud: Steel: \geq FKL 5.8, A4, HCR: \geq FKL 70				M8		M8 / M10		M12 / M16		IG-M6	IG-M8 / IG-M10
Perfo Sleeve VM-SH				12x80	16x85	16x130	20x85	20x130	20x200	16x85	20x85
Anchorage depth	h_{ef}	[mm]	80	85	130	85	130	200	85	85	
Spacing parallel to horizontal joint	$s_{cr,II}$	[mm]	497	497	497	497	497	497	497	497	
Spacing perpendicular to horizontal joint	$s_{cr,I}$	[mm]	238	238	238	238	238	238	238	238	
Minimum spacing	s_{min}	[mm]	100	100	100	100	100	100	100	100	
Edge distance	c_{cr}	[mm]	100	100	100	120	120	120	100	120	
Minimum edge distance	$c_{min}^{2)}$	[mm]	100	100	100	120	120	120	100	120	
Approved tension load for compressive strength	$f_b \geq 6$ N/mm ²	appr. N	[kN]	0,71	0,71	1,00	0,71	1,00	1,00	0,71	1,00
	$f_b \geq 8$ N/mm ²	appr. N	[kN]	0,86	0,86	1,29	0,86	1,29	1,29	0,86	1,29
	$f_b \geq 12$ N/mm ²	appr. N	[kN]	1,00	1,00	1,43	1,00	1,43	1,43	1,00	1,43
	$f_b \geq 14$ N/mm ²	appr. N	[kN]	1,14	1,14	1,57	1,14	1,57	1,57	1,14	1,57
Approved shear load for compressive strength	$f_b \geq 6$ N/mm ²	appr. V	[kN]	0,71	1,29	1,29	1,43	1,71	1,71	1,29	1,43
	$f_b \geq 8$ N/mm ²	appr. V	[kN]	0,86	1,57	1,57	1,71	2,00	2,00	1,57	1,71
	$f_b \geq 12$ N/mm ²	appr. V	[kN]	1,14	1,86	1,86	2,00	2,57	2,57	1,86	2,00
	$f_b \geq 14$ N/mm ²	appr. V	[kN]	1,14	1,86	1,86	2,00	2,57	2,57	1,86	2,00

Clay hollow brick Doppio Uni according EN 771-1, Bulk density ρ : 0,9 kg/dm³, Minimum brick size: 250x120x120 mm (e.g. Wienerberger)

Threaded Stud: Steel: \geq FKL 5.8, A4, HCR: \geq FKL 70				M8		M8 / M10		M12 / M16		IG-M6	IG-M8 / IG-M10
Perfo Sleeve VM-SH				12x80	16x85	16x130	20x85	20x130	20x200	16x85	20x85
Anchorage depth	h_{ef}	[mm]	80	85	130	85	130	200	85	85	
Spacing parallel to horizontal joint	$s_{cr,II}$	[mm]	250	250	250	250	250	250	250	250	
Spacing perpendicular to horizontal joint	$s_{cr,I}$	[mm]	120	120	120	120	120	120	120	120	
Min. spacing parallel to horizontal joint	$s_{min,II}$	[mm]	100	100	100	100	100	100	100	100	
Min. Perpendicular to horizontal joint spacing	$s_{min,I}$	[mm]	120	120	120	120	120	120	120	120	
Edge distance	c_{cr}	[mm]	100	100	100	120	120	120	100	120	
Minimum edge distance	$c_{min}^{2)}$	[mm]	60	60	60	60	60	60	60	60	
Approved tension load for compressive strength	$f_b \geq 10$ N/mm ²	appr. N	[kN]	0,17	0,17	0,17	0,17	0,17	0,17	0,17	0,17
	$f_b \geq 16$ N/mm ²	appr. N	[kN]	0,21	0,21	0,21	0,21	0,21	0,21	0,21	0,21
	$f_b \geq 20$ N/mm ²	appr. N	[kN]	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,26
	$f_b \geq 28$ N/mm ²	appr. N	[kN]	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34
Approved shear load for compressive strength	$f_b \geq 10$ N/mm ²	appr. V	[kN]	0,43	0,43	0,43	0,43	0,43	0,43	0,43	0,43
	$f_b \geq 16$ N/mm ²	appr. V	[kN]	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57
	$f_b \geq 20$ N/mm ²	appr. V	[kN]	0,57	0,57	0,57	0,57	0,57	0,57	0,57	0,57
	$f_b \geq 28$ N/mm ²	appr. V	[kN]	0,71	0,71	0,71	0,71	0,71	0,71	0,71	0,71

Calcium silicate hollow brick KSL-3DF according EN 771-2, Bulk density ρ : 1,4 kg/dm³, Minimum brick size: 240x175x113 mm (e.g. Wemding)

Threaded Stud: Steel: \geq FKL 5.8, A4, HCR: \geq FKL 70				M8		M8 / M10		M12 / M16		IG-M6	IG-M8 / IG-M10
Perfo Sleeve VM-SH				12x80	16x85	16x130	20x85	20x130	20x200	16x85	20x85
Anchorage depth	h_{ef}	[mm]	80	85	130	85	130	200	85	85	
Spacing parallel to horizontal joint	$s_{cr,II}$	[mm]	240	240	240	240	240	240	240	240	
Spacing perpendicular to horizontal joint	$s_{cr,I}$	[mm]	120	120	120	120	120	120	120	120	
Minimum spacing	s_{min}	[mm]	120	120	120	120	120	120	120	120	
Edge distance	c_{cr}	[mm]	100	100	100	120	120	120	100	120	
Minimum edge distance	c_{min}	[mm]	60	60	60	60	60	60	60	60	
Approved tension load for compressive strength	$f_b \geq 8$ N/mm ²	appr. N	[kN]	0,43	0,43	0,43	1,29	1,29	1,29	0,43	1,29
	$f_b \geq 12$ N/mm ²	appr. N	[kN]	0,57	0,57	0,71	1,71	1,71	1,71	0,57	1,71
	$f_b \geq 14$ N/mm ²	appr. N	[kN]	0,71	0,71	0,71	1,86	1,86	1,86	0,71	1,86
Approved shear load for compressive strength	$f_b \geq 8$ N/mm ²	appr. V	[kN]	0,71	1,14	1,14	1,14	1,14	1,14	1,14	1,14
	$f_b \geq 12$ N/mm ²	appr. V	[kN]	0,86	1,29	1,29	1,29	1,29	1,29	1,29	1,29
	$f_b \geq 14$ N/mm ²	appr. V	[kN]	1,00	1,71	1,71	1,71	1,71	1,71	1,71	1,71

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

²⁾For $V_{Rk,c}$: c_{min} see ETAG 029, Annex C


Extract from Permissible Service Conditions of European Technical Assessment ETA-13/0909

 Approved loads for single anchor without influence of spacing and edge distance. Butt joint and horizontal joint with adhesive. (Temperature range -40°C to $+24^{\circ}\text{C}/+40^{\circ}\text{C}^{1)}$ – use category dry/dry). Total safety factor as per ETAG included (γ_M and γ_P).

Injection system VMU plus, perforated brick with Perfo Sleeve
Calcium silicate hollow brick KSL-12DF according EN 771-2, Bulk density ρ : 1,4 kg/dm³, Minimum brick size: 498x175x238 mm (e.g. Wemding)

			M8	M8 / M10		M12 / M16		IG-M6	IG-M8 / IG-M10
Threaded Stud: Steel: \geq FKL 5.8, A4, HCR: \geq FKL 70									
Perfo Sleeve VM-SH			12x80	16x85	16x130	20x85	20x130	16x85	20x85
Anchorage depth	hef	[mm]	80	85	130	85	130	85	85
Spacing parallel to horizontal joint	Scr,II	[mm]	498	498	498	498	498	498	498
Spacing perpendicular to horizontal joint	Scr,I	[mm]	238	238	238	238	238	238	238
Minimum spacing	Smin	[mm]	120	120	120	120	120	120	120
Edge distance	Ccr	[mm]	100	100	100	120	120	100	120
Minimum edge distance	Cmin ²⁾	[mm]	100	100	100	120	120	100	120
Min. thickness of base material (masonry)	hmin	[mm]	115	115	175	115	175	115	115
Approved tension load for compressive strength	$f_b \geq 10 \text{ N/mm}^2$	appr. N [kN]	0,17	0,17	0,71	0,43	0,71	0,17	0,43
	$f_b \geq 12 \text{ N/mm}^2$	appr. N [kN]	0,21	0,21	0,86	0,43	0,86	0,21	0,43
	$f_b \geq 16 \text{ N/mm}^2$	appr. N [kN]	0,26	0,26	1,14	0,57	1,14	0,26	0,57
Approved shear load for compressive strength	$f_b \geq 10 \text{ N/mm}^2$	appr. V [kN]	0,71	1,57	1,57	1,57	1,57	1,57	1,57
	$f_b \geq 12 \text{ N/mm}^2$	appr. V [kN]	0,86	1,86	1,86	1,86	1,86	1,86	1,86
	$f_b \geq 16 \text{ N/mm}^2$	appr. V [kN]	1,00	2,29	2,29	2,29	2,29	2,29	2,29

Hollow lightweight concrete Bloc creux B40 according EN 771-3, Bulk density ρ : 0,8 kg/dm³, Minimum brick size: 494x200x190 mm (e.g. Sepa)

			M8	M8 / M10		M12 / M16		IG-M6	IG-M8 / IG-M10
Threaded Stud: Steel: \geq FKL 5.8, A4, HCR: \geq FKL 70									
Perfo Sleeve VM-SH			12x80	16x85	16x130	20x85	20x130	16x85	20x85
Anchorage depth	hef	[mm]	80	85	130	85	130	85	85
Spacing parallel to horizontal joint	Scr,II	[mm]	494	494	494	494	494	494	494
Spacing perpendicular to horizontal joint	Scr,I	[mm]	190	190	190	190	190	190	190
Minimum spacing	Smin	[mm]	100	100	100	100	100	100	100
Edge distance	Ccr	[mm]	100	100	100	120	120	100	120
Minimum edge distance	Cmin ²⁾	[mm]	100	100	100	120	120	100	120
Min. thickness of base material (masonry)	hmin	[mm]	115	115	175	115	175	115	115
Approved tension load for compressive strength	$f_b \geq 4 \text{ N/mm}^2$	appr. N [kN]	0,34	0,34	0,34	0,34	0,34	0,34	0,34
Approved shear load for compressive strength	$f_b \geq 4 \text{ N/mm}^2$	appr. V [kN]	0,86	0,86	0,86	0,86	0,86	0,86	0,86

Installation parameter in solid brickwork with a Perfo Sleeve

			M8	M8 / M10		M12 / M16		IG-M6	IG-M8 / IG-M10		
Threaded Stud: Steel: \geq FKL 5.8, A4, HCR: \geq FKL 70											
Perfo Sleeve VM-SH			12x80	16x85	16x130	20x85	20x130	20x200	16x85	20x85	
Drill hole diameter	d _o	[mm]	12	16	16	20	20	20	16	20	
Depth of drill hole	h _o	[mm]	85	90	135	90	135	205	90	90	
Minimum wall thickness	h _{min}	[mm]	115	115	175	115	175	240	115	115	
Clearance hole in the fixture	df \leq	[mm]	9	9 / 12	9 / 12	14 / 18	14 / 18	14 / 18	7	9 / 12	
Diameter of cleaning brush	d _b \geq	[mm]	14	18	18	22	22	22	18	22	
Installation torque	T _{inst,max}	[Nm]	2								
Amount of adhesive per drill hole	[ml]		11,2	24,9	38,0	41,1	62,9	96,7	24,9	41,1	
Drill holes per cartridge VMU plus 280 / 300	[pcs.]		21 / 23	9 / 10	6 / 6	5 / 6	3 / 4	2 / 2	9 / 10	5 / 6	
Drill holes per cartridge VMU plus 345 / 410	[pcs.]		27 / 33	12 / 14	8 / 9	7 / 9	4 / 5	3 / 3	12 / 14	7 / 9	
Drilling method			Rotary drilling								

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

²⁾For V_{Rk,c}: C_{min} see ETAG 029, Annex C

Installation
