

Injection System VMU **plus**



**Threaded Stud
V-A**



**Threaded Stud
VMU-A**



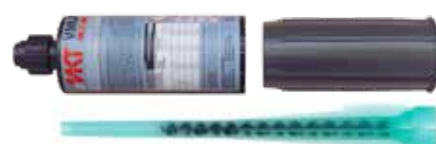
**Threaded Stud
VM-A**
1 meter length, to be cut to
the required length



**Internally Threaded
Sleeve VMU-IG**



Perfo Sleeve VM-SH



**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

Range of loading: 0,17 kN–217,0 kN
Concrete quality: C20/25–C50/60
Brickwork: Solid and perforated brick
Material: Steel, zinc plated, Steel, hot dip galvanized,
Stainless steel A4, Stainless steel HCR



Description

The injection system VMU **plus** is a universal injection system for almost all applications and materials. Besides the use in uncracked concrete and masonry, VMU **plus** is also approved for fixings in cracked concrete and for post installed rebar connections¹⁾. The 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. The choice between VMU **plus** and VMU **plus** Polar injection adhesives allows processing temperatures from -20°C to +40°C for the base material and cartridges.

Advantages

- Approved in cracked and uncracked concrete
- Approved for autoclaved aerated concrete, solid and perforated brickwork
- Approved for post-installed rebar connections (Ø8–Ø32)¹⁾
- Approved for threaded studs V-A, VMU-A, standard threaded studs with strength verification (strength test certificate 3.1), internally threaded sleeves VMU-IG as well as perfo sleeves VM-SH
- Approved for use under seismic action according to the performance category C1
- Only one adhesive for almost all applications, more flexibility, less inventory, greater application safety
- Variable anchorage depths for optimum adaptation to the respective installation situation for maximum economy
- Approved application in wet concrete
- Approved application in wet or water-filled drill holes (Threaded Stud M8–M16, Internally Threaded Sleeve IG M6–IG M10, Rebar Ø8–Ø16)
- Fire test report for all diameters
- ICC Evaluation Service listing, USA (ESR-4004)
- Base material temperature during application for VMU **plus** from -10°C to +40°C, for VMU **plus** Polar from -20°C to +10°C
- Opened cartridges can be re-used with a new mixer nozzle
- Styrene-free vinyl ester resin

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



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



**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: 345ml



**Cartridge
VMU plus 420 Polar**
Coaxial cartridge
Content: 420ml



Additional advantages VMU plus Polar

- Fast and reliable curing even at low temperatures and minus degrees
- Approved for cracked and uncracked 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 uncracked concrete:

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

Fastenings with rebars in cracked and uncracked 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 uncracked 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

One static mixer VM-X (VMU plus 825: VM-XL) comes with each cartridge.

¹⁾Cartridge VMU plus 280 comes with 2 mixers.

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

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	(+5°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

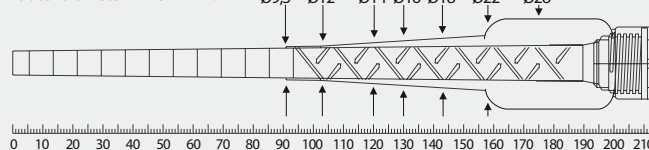
²⁾Values in brackets for rebar connection (ETA-11/0514)



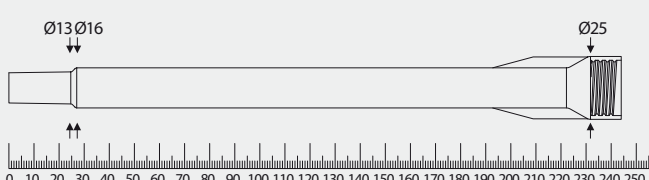
Usable length Static mixer VM-X and VM-XL

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 VM-X:



Outer diameter mixer VM-XL:



Curing Time Injection

Adhesive VMU plus Polar¹⁾

→ 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

¹⁾The injection adhesive VMU plus Polar cannot be used for post-installed rebar connection according to ETA-11/0415.

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	20	12,8
		Static mixer VM-X	40	
Storage box VMU plus 300 Polar	28999661	Cartridge VMU plus 300 Polar	20	12,8
		Static mixer VM-X	40	
Storage box VMU plus 345	28999640	Cartridge VMU plus 345	20	15,3
		Static mixer VM-X	40	
Storage box VMU plus 345 Polar	28999670	Cartridge VMU plus 345 Polar	20	15,3
		Static mixer VM-X	40	
Storage box VMU plus 410	28999652	Cartridge VMU plus 410	20	18,0
		Static mixer VM-X	40	
Storage box VMU plus 420 Polar	28999680	Cartridge VMU plus 420 Polar	20	18,0
		Static mixer VM-X	40	

Dimensions storage box

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

Accessories for Injection System VMU **plus** in concrete

Threaded Stud	Internally threaded stud	Rebar Ø	Drill bit Ø	Blow-out pump / Air gun	Cleaning brush RB	Retaining Washer VM-IA ²⁾	Extension tube ²⁾	Extension tube ¹⁾
mm	mm	mm	mm					
M8			10	VM-AP360 ¹⁾ VM-ABP 200	RB 10 M6		VM-XE 10	
M10	VMU-IG M6	8	12	VM-AP360 ¹⁾ VM-ABP 200	RB 12 M6 RB 12 M8		VM-XE 10	
M12	VMU-IG M8	10	14	VM-AP360 ¹⁾ VM-ABP 200	RB 14 M6 RB 14 M8		VM-XE 10	
		12	16	VM-AP360 ¹⁾ VM-ABP 200	RB 16 M6 RB 16 M8		VM-XE 10	
M16	VMU-IG M10	14	18	VM-AP 360 ¹⁾ VM-ABP 200 / 250 / 500 / 1000	RB 18 M6 RB 18 M8	VM-IA 18	VM-XE 10, VM-XLE 16 ³⁾	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 345 Pneumatic Eco, VM-P 380 Pneumatic Eco, VM-P 380 Pneumatic, VM-P 825 Pneumatic
		16	20	VM-AP 360 ¹⁾ VM-ABP 200 / 250 / 500 / 1000	RB 20 M6 RB 20 M8	VM-IA 20	VM-XE 10, VM-XLE 16 ³⁾	
M20	VMU-IG M12	20	24	VM-ABP 250/ 500 / 1000	RB 24 M6	VM-IA 24	VM-XE 10, VM-XLE 16 ³⁾	
M24	VMU-IG M16		28	VM-ABP 250/ 500 / 1000	RB 28 M6	VM-IA 28	VM-XE 10, VM-XLE 16 ³⁾	
M27		25	32	VM-ABP 250/ 500 / 1000	RB 32 M6 RB 32 M8	VM-IA 32	VM-XE 10, VM-XLE 16 ³⁾	
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 ³⁾	
		32	40	VM-ABP 250/ 500 / 1000	RB 40 M6	VM-IA 40	VM-XE 10, VM-XLE 16 ³⁾	
See page				172	173	175	174	175/176

¹⁾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).

²⁾If the static mixer does not reach the bottom of the borehole (see usable length of static mixer), an extension tube must be used. From a drill-Ø $d_0 \geq 18$ mm, retaining washer and extension tube must be used for overhead installation and for drill hole depths > 250 mm.

³⁾Only in connection with static mixer VM-XL

Accessories for Injection System VMU **plus** in brickwork

Threaded Stud (without perfor sleeve)	Internally Threaded Sleeve (without perfor sleeve)	Rebar Ø	Drill bit Ø	Blow-out pump / Air gun	Cleaning brush RB	Extension tube ¹⁾	Extension tube
mm	mm		mm				
M8			10	VM-AP 360 VM-ABP 200	RB 10 M6	VM-XE 10	
M10	VMU-IG M6	VM-SH 12 x 80	12	VM-AP 360 VM-ABP 200	RB 12 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 345 Pneumatic Eco, VM-P 380 Pneumatic Eco, VM-P 380 Pneumatic, VM-P 825 Pneumatic
M12	VMU-IG M8		14	VM-AP 360 VM-ABP 200	RB 14 M6	VM-XE 10	
		VM-SH 16 x 85 VM-SH 16 x 130	16	VM-AP 360 VM-ABP 200	RB 16 M6	VM-XE 10	
M16	VMU-IG M10		18	VM-AP 360 VM-ABP 200 / 250	RB 18 M6	VM-XE 10 VM-XLE 16 ²⁾	
		VM-SH 20 x 85 VM-SH 20 x 130 VM-SH 20 x 200	20	VM-AP 360 VM-ABP 200 / 250	RB 20 M6	VM-XE 10 VM-XLE 16 ²⁾	
See page				172	173	174	175/176

¹⁾If the static mixer does not reach the bottom of the borehole (see usable length of static mixer), the extension tube VM-XE 10 must be used.

²⁾Only in connection with static mixer VM-XL

Threaded studs for Injection System VMU **plus** in concrete and brickwork

Threaded Stud VMU-A

Steel, zinc plated 5.8
Dimensions see page 166



- For use in structures subject to dry internal conditions
- Stahl verzinkt 8.8 auf Anfrage

Threaded Stud VMU-A fvz

Steel, hot dip galvanized 5.8
Dimensions see page 166



- For use in structures subject to dry internal conditions

Threaded Stud VMU-A A4

Stainless steel A4-70
Dimensions see page 166



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

Internally Threaded Sleeve VMU-IG

Steel, zinc plated 5.8
Dimensions see page 168



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

Internally Threaded Sleeve VMU-IG A4

Stainless steel A4-70
Dimensions see page 168



- 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 167



- For use in structures subject to dry internal conditions

Threaded Stud V-A fvz

Steel, hot dip galvanized 5.8
Dimensions see page 167



- For use in structures subject to dry internal conditions

Threaded Stud V-A 8.8

Steel, zinc plated 8.8
Dimensions see page 167



- For use in structures subject to dry internal conditions

Threaded Stud V-A A4

Stainless steel A4-70
Dimensions see page 167



- 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 167



- 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 168



- 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 168



- 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 168



- 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

Perfo Sleeve VM-SH

Polypropylen
Dimensions see page 169



- Approved for hollow base material



Extract from Permissible Service Conditions of European Technical Assessment ETA-11/0415 for use in cracked and uncracked concrete (Option 1)

Approved loads according to EN 1992-4 for single anchors without the influence of spacing and edge distances in dry and wet concrete 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 $\Psi_{\text{sus}} = 1,0$ and the total safety factor (γ_M und γ_p) is included. For further details and temperature ranges see ETA. Load capacities under fire exposure see page 193.

Loads and performance data

Injection System VMU plus, threaded stud steel 5.8

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	11,7-54,9	12,9-79,0	15,3-109,5	18,0-133,3
	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	15,3-81,8	18,0-101,0
Approved loads, tension for $h_{ef,min} - h_{ef,max}$					uncracked concrete							
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	7,2-8,6	9,0-13,8	11,4-20,0	14,0-37,1	16,7-58,1	18,4-83,8	21,9-109,5	25,7-133,3
	50°C/80°C ¹⁾	C20/25	appr. N	[kN]	5,4-8,6	6,7-13,8	9,4-20,0	14,0-37,1	16,7-58,1	18,4-83,8	21,9-109,5	25,7-133,3
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]	5,7-6,3	9,0-9,7	13,8-14,3	21,1-26,9	28,0-42,3	30,8-60,6	36,8-78,9	43,1-96,0
	50°C/80°C ¹⁾	C20/25	appr. V	[kN]	3,6-6,3	6,3-9,7	10,1-14,3	15,3-26,9	21,5-42,3	27,6-60,6	36,8-78,9	43,1-96,0
Approved loads, shear for $h_{ef,min} - h_{ef,max}$					uncracked concrete							
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V	[kN]	6,3	9,7	14,3	26,9	40,0-42,3	44,1-60,6	52,6-78,9	61,6-96,0
	50°C/80°C ¹⁾	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 VMU plus, threaded stud steel 8.8

Approved loads, tension for $h_{\text{ef,min}} - h_{\text{ef,max}}$													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	11,7-54,9	12,9-79,0	15,3-118,1	18,0-145,9					
	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	15,3-81,8	18,0-101,0					
Approved loads, tension for $h_{\text{ef,min}} - h_{\text{ef,max}}$													uncracked concrete				
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	7,2 - 13,8	9,0 - 21,9	11,4 - 31,9	14,0 - 59,5	16,7 - 93,3	18,4 - 134,3	21,9 - 175,2	25,7 - 202,0					
	50°C/80°C ¹⁾	C20/25	appr. N	[kN]	5,4 - 13,8	6,7 - 21,9	9,4 - 31,9	14,0 - 57,4	16,7 - 89,8	18,4 - 122,1	21,9 - 136,3	25,7 - 145,9					
Approved loads, shear for $h_{\text{ef,min}} - h_{\text{ef,max}}$													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	28,0-56,0	30,8-80,6	36,8-105,1	43,1-128,0					
	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	36,8-105,1	43,1-128,0					
Approved loads, shear for $h_{\text{ef,min}} - h_{\text{ef,max}}$													uncracked concrete				
Range of temperature	24°C/40°C ¹⁾	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					
	50°C/80°C ¹⁾	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 VMU plus, threaded stud stainless steel A4-70, HCR-70

Approved loads, tension for $h_{\text{ef,min}} - h_{\text{ef,max}}$												
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	11,7 - 54,9	12,9 - 79,0	15,3 - 57,4	18,0 - 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	15,3 - 57,4	18,0 - 70,2
Approved loads, tension for $h_{\text{ef,min}} - h_{\text{ef,max}}$												
uncracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	7,2 - 9,9	9,0 - 15,7	11,4 - 22,5	14,0 - 42,0	16,7 - 65,3	18,4 - 94,3	21,9 - 57,4	25,7 - 70,2
	50°C/80°C ¹⁾	C20/25	appr. N	[kN]	5,4 - 9,9	6,7 - 15,7	9,4 - 22,5	14,0 - 42,0	16,7 - 65,3	18,4 - 94,3	21,9 - 57,4	25,7 - 70,2
Approved loads, shear for $h_{\text{ef,min}} - h_{\text{ef,max}}$												
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	28,0 - 39,4	30,8 - 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 $h_{\text{ef,min}} - h_{\text{ef,max}}$												
uncracked concrete												
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V	[kN]	6,0	9,2	13,7	25,2	39,4	44,1 - 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	44,1 - 56,8	34,5	42,0

Spacing and edge distance

Min. thickness of concrete slab for $h_{\text{ef,min}} - h_{\text{ef,max}}$	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

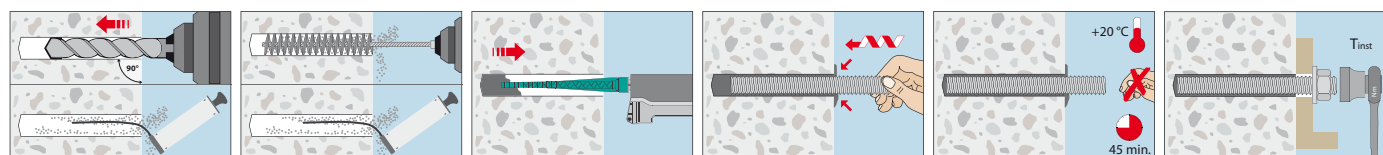
Drill hole diameter	d_o	[mm]	10	12	14	18	24	28	32	35
Clearance hole in the fixture for Pre-setting installation	$d_{r \leq}$	[mm]	9	12	14	18	22	26	30	33
Clearance hole in the fixture for Through-setting installation	$d_{r \leq}$	[mm]	12	14	16	20	25	30	33	38
Range of drill hole depth for $h_{\text{ef,min}} - h_{\text{ef,max}}$	h_o	[mm]	60 - 160	60 - 200	70 - 240	80 - 320	90 - 400	96 - 480	108 - 540	120 - 600
Installation torque	$T_{\text{inst} \leq}$	[Nm]	10	20	40	80	120	160	180	200
Amount of mortar per 100 mm drill ole depth		[ml]	6,53	8,16	9,82	13,61	26,71	32,25	42,03	48,70

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

Installation in concrete and solid base material





Extract from Permissible Service Conditions of European Technical Assessment ETA-11/0415 for use in cracked and uncracked concrete (Option 1)

Approved loads according to EN 1992-4 for single anchors without the influence of spacing and edge distances in dry and wet concrete 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 $\Psi_{\text{sus}} = 1,0$ and the total safety factor (γ_M und γ_F) is included. For further details and temperature ranges see ETA.

Loads and performance data												
Internally Threaded Sleeve				IG M6 x 80	IG M6 x 90	IG M8 x 80	IG M8 x 100	IG M10 x 80	IG M10 x 100	IG M12 x125	IG M16 x 170	IG M20 x 200
Anchorage depth h_{ef}			[mm]	80	90	80	100	80	100	125	170	200
Injection System 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	8,1	8,8	11,0	17,1	28,0	38,7
	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}				uncracked concrete								
Temperature range	24°C/40°C ¹⁾	C20/25	appr. N [kN]	4,8	4,8	8,1	8,1	13,8	13,8	20,0	36,2	55,2
	50°C/80°C ¹⁾	C20/25	appr. N [kN]	4,8	4,8	8,1	8,1	13,8	13,8	20,0	36,2	48,6
Approved loads, shear for h_{ef}				cracked concrete								
Temperature range	24°C/40°C ¹⁾	C20/25	appr. V [kN]	3,4	3,4	5,7	5,7	9,7	9,7	14,3	25,7	42,3
	50°C/80°C ¹⁾	C20/25	appr. V [kN]	3,4	3,4	5,7	5,7	9,7	9,7	14,3	25,7	42,3
Approved loads, shear for h_{ef}				uncracked concrete								
Temperature range	24°C/40°C ¹⁾	C20/25	appr. V [kN]	3,4	3,4	5,7	5,7	9,7	9,7	14,3	25,7	42,3
	50°C/80°C ¹⁾	C20/25	appr. V [kN]	3,4	3,4	5,7	5,7	9,7	9,7	14,3	25,7	42,3
Injection System VMU plus, Internally threaded VMU-IG, Stainless steel A4-70, HCR-70												
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}				uncracked concrete								
Temperature range	24°C/40°C ¹⁾	C20/25	appr. N [kN]	5,3	5,3	9,9	9,9	14,0	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	14,0	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}				uncracked 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	173	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}		h_o	[mm]	80	90	80	100	80	100	125	170	200
Installation		$T_{\text{inst}} \leq$	[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	33.4	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.

Injection System VMU plus, reinforcement bars B500B					ø8	ø10	ø12	ø14	ø16	ø20	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	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	11,7 - 54,9	13,7 - 85,7	16,2 - 127,1	19,8 - 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 - 62,3	16,2 - 88,0	19,8 - 114,9
Approved loads, tension for h _{ef,min} - h _{ef,max}					uncracked concrete								
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. N	[kN]	7,2 - 13,8	9,0 - 21,6	11,4 - 31,2	12,7 - 42,4	14,0 - 55,4	16,7 - 86,6	19,5 - 135,2	23,1 - 169,6	28,3 - 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	14,0 - 55,4	16,7 - 86,6	19,5 - 124,7	23,1 - 136,8	28,3 - 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	28,0 - 40,4	32,8 - 63,1	38,9 - 79,2	47,5 - 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	38,9 - 79,2	47,5 - 103,4
Approved loads, shear for h _{ef,min} - h _{ef,max}					uncracked concrete								
Range of temperature	24°C/40°C ¹⁾	C20/25	appr. V	[kN]	6,5	10,1	14,5	19,8	25,9	40,4	46,9 - 63,1	55,5 - 79,2	67,8 - 103,4
	50°C/80°C ¹⁾	C20/25	appr. V	[kN]	6,5	10,1	14,5	19,8	25,9	40,4	46,9 - 63,1	55,5 - 79,2	67,8 - 103,4
Spacing and edge distance													
Minimum thickness of concrete slab for h _{ef}		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
Amount of adhesive per 100 mm drill hole depth			[ml]		8,46	10,12	11,78	13,44	15,09	18,41	40,03	44,22	57,32

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-13/0909 for use in masonry

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 (short term temperature +40°C) – use category dry/dry. The total safety factor according ETAG 029 (γ_M and γ_F) is included. For further details and temperature ranges see ETA.

Injection system VMU plus, solid base material without perfo sleeve¹⁾

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	$f_b \geq 10$ N/mm ²	appr. N	[kN]	1,00	1,00	1,14	1,14	1,00	1,14
	$f_b \geq 20$ N/mm ²	appr. N	[kN]	1,29	1,57	1,71	1,71	1,57	1,71
	$f_b \geq 28$ N/mm ²	appr. N	[kN]	1,57	1,71	1,94	1,94	1,71	1,94
Approved shear load for compressive strength	$f_b \geq 10$ N/mm ²	appr. V	[kN]	1,00	1,00	1,00	1,57	1,00	1,57
	$f_b \geq 20$ N/mm ²	appr. V	[kN]	1,43	1,43	1,43	2,29	1,43	2,29
	$f_b \geq 28$ N/mm ²	appr. V	[kN]	1,57	1,57	1,57	2,57	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	$f_b \geq 10$ N/mm ²	appr. N	[kN]	1,29	1,29	1,29	1,00	1,29	1,00
	$f_b \geq 20$ N/mm ²	appr. N	[kN]	1,71	1,71	1,71	1,43	1,71	1,43
	$f_b \geq 27$ N/mm ²	appr. N	[kN]	2,00	2,00	2,00	1,71	2,00	1,71
Approved shear load for compressive strength	$f_b \geq 10$ N/mm ²	appr. V	[kN]	0,71	0,86	0,71	0,71	0,86	0,71
	$f_b \geq 20$ N/mm ²	appr. V	[kN]	1,14	1,29	1,14	1,14	1,29	1,14
	$f_b \geq 27$ N/mm ²	appr. V	[kN]	1,29	1,57	1,29	1,29	1,57	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	$f_b \geq 2$ N/mm ²	appr. N	[kN]	0,86	0,86	1,00	0,86	0,86	1,00
Approved shear load for compressive strength	$f_b \geq 2$ N/mm ²	appr. V	[kN]	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
Achsabstand	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
Minimum edge distance	$c_{min,N}$	[mm]	75	75	75	75	75	75	75
	$c_{min,v,II}^{2)}$	[mm]	75	75	75	75	75	75	75
	$c_{min,v,I}^{3)}$	[mm]	120	135	150	150	135	150	150
Approved tension load for compressive strength	$f_b \geq 6$ N/mm ²	appr. N	[kN]	0,89	1,43	1,79	2,32	1,43	1,79
Approved shear load for compressive strength	$f_b \geq 6$ N/mm ²	appr. V	[kN]	2,14	3,57	3,57	3,57	2,86	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
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⁾Installation with perforated sleeve allowed; technical data, see ETA-13/0909

²⁾Minimum edge distance $c_{min,v,II}$ for shear loads parallel to free edge

³⁾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 for use in masonry

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 (short term temperature +40°C) – use category dry/dry. The total safety factor according ETAG 029 (γ_M and γ_F) is included. For further details and temperature ranges see ETA.

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	85
Spacing parallel to horizontal joint	$Scr_{ }$	[mm]		500	500	500	500	500	500	500
Spacing perpendicular to horizontal joint	$Scr_{\perp}$	[mm]		299	299	299	299	299	299	299
Minimum spacing	S_{min}	[mm]		100	100	100	100	100	100	100
Edge distance	C_{cr}	[mm]		100	100	100	120	120	100	120
Minimum edge distance	$C_{min}^{1)}$	[mm]		100	100	100	120	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	0,26
	$f_b \geq 6$ N/mm ²	appr. N	[kN]	0,26	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	0,34
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
	$f_b \geq 6$ N/mm ²	appr. V	[kN]	0,71	0,71	0,71	0,86	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

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: ≥ FKL 5.8, A4, HCR: ≥ 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	$S_{cr, }$	[mm]	497	497	497	497	497	497	497	497	
Spacing perpendicular to horizontal joint	$S_{cr,\perp}$	[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	$C_{min}^{1)}$	[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	0,71
	$f_b \geq 8$ N/mm ²	appr. N	[kN]	0,86	0,86	1,29	0,86	1,29	1,29	0,86	0,86
	$f_b \geq 12$ N/mm ²	appr. N	[kN]	1,00	1,00	1,43	1,00	1,43	1,43	1,00	1,00
	$f_b \geq 14$ N/mm ²	appr. N	[kN]	1,14	1,14	1,57	1,14	1,57	1,57	1,14	1,14
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: ≥ FKL 5.8, A4, HCR: ≥ 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		$s_{cr, }$	[mm]	250	250	250	250	250	250	250	250
Spacing perpendicular to horizontal joint		$s_{cr,\perp}$	[mm]	120	120	120	120	120	120	120	120
Min. spacing parallel to horizontal joint		$s_{min, }$	[mm]	100	100	100	100	100	100	100	100
Min. Perpendicular to horizontal joint		$s_{min,\perp}$	[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		$c_{min}^{1)}$	[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: ≥ FKL 5.8, A4, HCR: ≥ 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	$s_{cr, }$	[mm]	240	240	240	240	240	240	240	240
Spacing perpendicular to horizontal joint	$s_{cr,\perp}$	[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	$c_{min}^{1)}$	[mm]	60	60	60	60	60	60	60	60
Approved tension load for compressive strength	$f_b \geq 8 \text{ N/mm}^2$	appr. N	0,43	0,43	0,43	1,29	1,29	1,29	0,43	1,29
	$f_b \geq 12 \text{ N/mm}^2$	appr. N	0,57	0,57	0,71	1,71	1,71	1,71	0,57	1,71
	$f_b \geq 14 \text{ N/mm}^2$	appr. N	0,71	0,71	0,71	1,86	1,86	1,86	0,71	1,86
Approved shear load for compressive strength	$f_b \geq 8 \text{ N/mm}^2$	appr. V	0,71	1,14	1,14	1,14	1,14	1,14	1,14	1,14
	$f_b \geq 12 \text{ N/mm}^2$	appr. V	0,86	1,29	1,29	1,29	1,29	1,29	1,29	1,29
	$f_b \geq 14 \text{ N/mm}^2$	appr. V	1,00	1,71	1,71	1,71	1,71	1,71	1,71	1,71

¹⁾For $V_{Rk,c}$: C_{min} see ETAG 029, Annex C



Extract from Permissible Service Conditions of European Technical Assessment ETA-13/0909 for use in masonry

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 (short term temperature +40°C) – use category dry/dry. The total safety factor according ETAG 029 (γ_M and γ_F) is included. For further details and temperature ranges see ETA.

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)

Threaded Stud: Steel: ≥ FKL 5.8, A4, HCR: ≥ 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	85	
Spacing parallel to horizontal joint	$s_{cr, }$	[mm]	498	498	498	498	498	498	498	
Spacing perpendicular to horizontal joint	$s_{cr,\perp}$	[mm]	238	238	238	238	238	238	238	
Minimum spacing	s_{min}	[mm]	120	120	120	120	120	120	120	
Edge distance	c_{cr}	[mm]	100	100	100	120	120	100	120	
Minimum edge distance	$c_{min}^{1)}$	[mm]	100	100	100	120	120	100	120	
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)

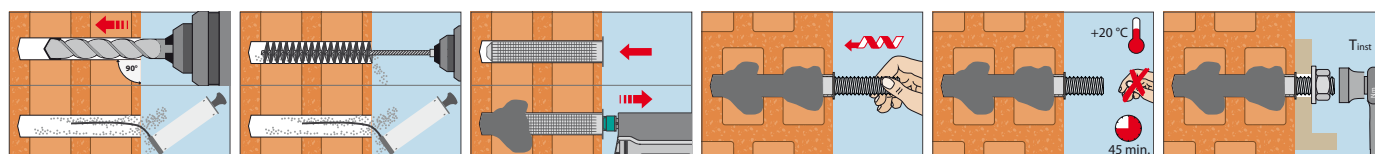
Threaded Stud: Steel: $\geq$ FKL 5.8, A4, HCR: $\geq$ FKL 70			M8	M8 / M10		M12 / M16		IG-M6	IG-M8 / IG-M10
Perfo Sleeve VM-SH			12x80	16x85	16x130	20x85	20x130	16x85	20x85
Anchorage depth	h_{ef}	[mm]	80	85	130	85	130	85	85
Spacing parallel to horizontal joint	$s_{cr, }$	[mm]	494	494	494	494	494	494	494
Spacing perpendicular to horizontal joint	$s_{cr,\perp}$	[mm]	190	190	190	190	190	190	190
Minimum spacing	s_{min}	[mm]	100	100	100	100	100	100	100
Edge distance	c_{cr}	[mm]	100	100	100	120	120	100	120
Minimum edge distance	$c_{min}^{1)}$	[mm]	100	100	100	120	120	100	120
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 perforated bricks with Perfo Sleeve

Installation parameter in perforated blocks with end sleeve			M8	M8 / M10		M12 / M16			IG-M6	IG-M8 / IG-M10	
Threaded Stud: Steel: ≥ FKL 5.8, A4, HCR: ≥ 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	145	115	175	240	115	115	
Clearance hole in the fixture	d _f ≤	[mm]	9	9 / 12	9 / 12	14 / 18	14 / 18	14 / 18	7	9 / 12	
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⁾For $V_{Rk,c}$: c_{min} see ETAG 029, Annex C

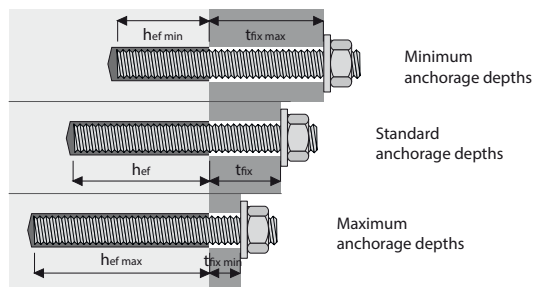
Installation in perforated brickwork



Threaded Studs, Perfo Sleeves and Tension Anchors for MKT Injection Systems

Threaded Studs for the Injection Systems VMH, VMU plus, VME plus, VME basic and VM-EA in concrete and brickwork:
A flexible system means less inventory

The flexible anchoring depths of the Injection Systems VMH, VMU plus, VME plus, VME basic and VM-EA in concrete 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.



$hef + t_{fix} =$ Usable length of the threaded rod (without nut and washer)

Threaded Stud VMU-A

Steel, zinc plated 5.8



→ For use 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 fvz

Steel, hot dip galvanized 5.8



→ For use in structures subject to dry internal conditions

Threaded Stud VMU-A A4

Stainless steel A4-70



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

→ Stainless steel HCR on request

Description		Ref. No.		Use in									Package content	Weight per package		
				Concrete ¹⁾	Solid base material without Perfo Sleeve	Solid and hollow base material with VM-SH ²⁾										
						Usable length	Drill hole Ø x depth	Maximum fixture thickness t _{fix}	12x85	16x90	16x135	20x90			20x135	20x205
		Steel, zinc plated 5.8	Steel, hot dip galvanized 5.8	Stainless steel A4-70	mm	mm	mm	mm						pcs.	kg	
VMU-A 8x100	31510101	-		31510501	90	10x80	10	10	5	-	-	-	-	10	0,42	
VMU-A 8x110	31515101	31515201		31515501	100	10x80	20	20	15	-	-	-	-	10	0,46	
VMU-A 8x130	31525101	-		31525501	120	10x80	40	40	35	-	-	-	-	10	0,52	
VMU-A 8x145	31528101	-		31528501	135	10x80	55	55	50	5	-	-	-	10	0,55	
VMU-A 8x160	31530101	-		31530501	150	10x80	70	70	65	20	-	-	-	10	0,60	
VMU-A 8x205	31550101	-		31550501	195	10x80	115	115	110	65	-	-	-	10	0,74	
VMU-A 10x110	31605101	-		31605501	100	12x90	10	-	15	-	-	-	-	10	0,75	
VMU-A 10x130	31625101	31625201		31625501	120	12x90	30	-	35	-	-	-	-	10	0,85	
VMU-A 10x150	31630101	31630201		31630501	140	12x90	50	-	55	10	-	-	-	10	0,95	
VMU-A 10x165	31635101	-		31635501	155	12x90	65	-	70	25	-	-	-	10	1,02	
VMU-A 10x190	31645101	31645201		31645501	180	12x90	90	-	95	50	-	-	-	10	1,15	
VMU-A 10x260	31655101	-		31655501	250	12x90	160	-	165	120	-	-	-	10	1,50	
VMU-A 12x120	31717101	-		31717501	105	14x100	5	-	-	-	20	-	-	10	1,14	
VMU-A 12x130	31718101	-		31718501	115	14x100	15	-	-	-	30	-	-	10	1,21	
VMU-A 12x135	31710101	-		31710501	120	14x100	20	-	-	-	35	-	-	10	1,25	
VMU-A 12x155	31720101	31720201		31720501	140	14x100	40	-	-	-	55	10	-	10	1,42	
VMU-A 12x175	31730101	31730201		31730501	160	14x100	60	-	-	-	75	30	-	10	1,54	
VMU-A 12x185	31734101	-		31734501	170	14x100	70	-	-	-	85	40	-	10	1,63	
VMU-A 12x210	31740101	31740201		31740501	195	14x100	95	-	-	-	110	65	-	10	1,82	
VMU-A 12x225	31748101	-		31748501	210	14x100	110	-	-	-	125	80	10	10	1,89	
VMU-A 12x250	31750101	-		31750501	235	14x100	135	-	-	-	150	105	35	10	2,13	
VMU-A 12x265	31757101	-		31757501	250	14x100	150	-	-	-	165	120	50	10	2,18	
VMU-A 12x300	31760101	-		31760501	285	14x100	185	-	-	-	200	155	85	10	2,50	
VMU-A 16x160	31810101	-		31810501	140	18x100	40	-	-	-	55	10	-	10	2,65	
VMU-A 16x175	31815101	31815201		31815501	155	18x100	55	-	-	-	70	25	-	10	2,85	
VMU-A 16x205	31820101	31820201		31820501	185	18x100	85	-	-	-	100	55	-	10	3,25	
VMU-A 16x235	31830101	-		31830501	215	18x100	115	-	-	-	130	85	15	10	3,65	
VMU-A 16x300	31840101	-		31840501	280	18x100	180	-	-	-	195	150	80	10	4,53	
VMU-A 20x240	31910101	-		31910501	220	-	-	-	-	-	-	-	-	10	5,85	
VMU-A 20x260	31915101	-	-	-	240	-	-	-	-	-	-	-	-	10	6,30	
VMU-A 20x285	31920101	-		31920501	265	-	-	-	-	-	-	-	-	10	6,75	
VMU-A 20x300	31925101	-		31925501	280	-	-	-	-	-	-	-	-	10	7,15	
VMU-A 20x350	31930101	-	-	-	330	-	-	-	-	-	-	-	-	10	8,10	
VMU-A 20x400	31935101	-	-	-	380	-	-	-	-	-	-	-	-	10	9,10	
VMU-A 24x290	31960101	-		31960501	265	-	-	-	-	-	-	-	-	5	4,95	
VMU-A 24x350	31965101	-		31965501	325	-	-	-	-	-	-	-	-	5	5,85	
VMU-A 24x400	31970101	-		31970501	375	-	-	-	-	-	-	-	-	5	6,60	
VMU-A 30x370	31990101	-		31990501	340	-	-	-	-	-	-	-	-	5	9,90	

¹⁾Drill hole Ø and drill depth depend on selected injection system and anchorage depth

²⁾Drill hole Ø and drill depth see Perfo Sleeves on page 169

Threaded Stud V-A



- For use in structures subject to dry internal conditions
- Steel, zinc plated 5.8

Threaded Stud V-A A4



- For use in structures subject to dry internal conditions or external atmospheric exposure
- Stainless steel A4-70

Threaded Stud V-A 8.8



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

Threaded Stud V-A HCR



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

Threaded Stud V-A fvz



- For use in structures subject to dry internal conditions
- Steel 5.8, hot dip galvanized $\geq 50 \mu\text{m}$ (average plating thickness according to EN ISO 10684)

Description			Ref. No.			Use in										Package content	Weight per package
						Concrete ¹⁾	Solid base material without Perfo Sleeve		Solid and hollow base material with VM-SH ²⁾								
Steel, zinc plated 5.8	Steel, zinc plated 8.8	Steel, hot dip galvanized 5.8	Stainless steel A4-70	Stainless steel HCR-70	Usable Length	Drill hole Ø x depth	Maximum fixture thickness t _{fix}	12x85	16x90	16x135	20x90	20x135	20x205	pcs.	kg		
								Maximum fixture thickness t _{fix}									
						mm	mm	mm	mm								
V-A 8-20/110	21101101	21101171	21101201	21101501	21101651	100	10x80	20	20	15	-	-	-	-	10	0,43	
V-A 8-60/150	21105101	21105171	-	21105501	-	140	10x80	60	60	55	-	-	-	-	10	0,53	
V-A 10-15/115	21202101	21202171	-	21202501	-	105	12x90	15	-	20	-	-	-	-	10	0,73	
V-A 10-30/130	21203101	21203171	21203201	21203501	21203651	120	12x90	30	-	35	-	-	-	-	10	0,81	
V-A 10-65/165	21207101	21207171	-	21207501	-	155	12x90	65	-	70	25	-	-	-	10	0,98	
V-A 10-90/190	21210101	21210171	21210201	21210501	-	180	12x90	90	-	95	50	-	-	-	10	1,11	
V-A 10-150/250	21216101	-	-	21216501	-	240	12x90	150	-	155	110	-	-	-	10	1,42	
V-A 10-200/300	21221101	-	-	21221501	-	290	12x90	200	-	205	160	-	-	-	10	1,71	
V-A 12-10/135	21304101	21304171	-	21304501	-	120	12x90	20	-	-	-	35	-	-	10	1,19	
V-A 12-35/160	21306101	21306171	21306201	21306501	21306651	145	14x100	45	-	-	-	60	15	-	10	1,37	
V-A 12-55/180	-	-	-	21309501	-	165	14x100	65	-	-	-	80	35	-	10	1,51	
V-A 12-85/210	21312101	21312171	-	21312501	-	195	14x100	95	-	-	-	110	65	-	10	1,73	
V-A 12-95/220	21313101	-	-	21313501	-	205	14x100	105	-	-	-	120	75	5	10	1,82	
V-A 12-125/250	21316101	21316171	-	21316501	-	235	14x100	135	-	-	-	150	105	35	10	2,02	
V-A 12-175/300	21321101	21321171	-	21321501	-	285	14x100	185	-	-	-	200	155	85	10	2,40	
V-A 16-5/150	-	-	-	21505501	-	130	18x100	30	-	-	-	45	-	-	10	2,38	
V-A 16-20/165	21507101	21507171	21507201	21507501	-	145	18x100	45	-	-	-	60	15	-	10	2,77	
V-A 16-45/190	21510101	21510171	21510201	21505501	21510651	170	18x100	70	-	-	-	85	40	-	10	2,96	
V-A 16-65/210	-	-	21512201	21512501	-	190	18x100	90	-	-	-	105	60	-	10	3,20	
V-A 16-85/230	21514101	21514171	-	21514501	-	210	18x100	110	-	-	-	125	80	10	10	3,65	
V-A 16-105/250	21516101	21516171	-	21516501	-	230	18x100	130	-	-	-	145	100	30	10	3,91	
V-A 16-155/300	21521101	21521171	-	21521501	-	280	18x100	180	-	-	-	195	150	80	10	4,58	
V-A 20-20/220	21613101	21613171	21613201	21613501	-	190	-	-	-	-	-	-	-	-	10	5,56	
V-A 20-60/260	21617101	21617171	21617201	21617501	-	230	-	-	-	-	-	-	-	-	10	6,39	
V-A 20-100/300	21621101	21621171	-	21621501	-	270	-	-	-	-	-	-	-	-	10	7,23	
V-A 24-15/260	21717101	21717171	21717201	21717501	-	225	-	-	-	-	-	-	-	-	5	4,89	
V-A 24-55/300	21721101	21721171	21721201	21721501	-	265	-	-	-	-	-	-	-	-	5	5,54	
V-A 30-70/380 ³⁾	21829101	-	-	21829501	-	350	-	-	-	-	-	-	-	-	5	10,00	

¹⁾Drill hole $\varnothing$ and drill depth depend on selected injection system and anchorage depth.

²⁾Drill hole $\varnothing$ and drill depth see Perfo Sleeves on page 169

³⁾Setting tool V-A 30-70/380 ref. no. 27805160 to be ordered separately.

Other lengths on demand.

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 EN 10204) in every package

Description	Ref. No.	Threaded Studs	Length mm	Package content pcs.	Weight per package kg
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 A4

Stainless steel A4-70



→ 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

Description	Ref. No.	Threaded Studs	Length mm	Package content pcs.	Weight per package kg
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 8.8

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 EN 10204) in every package

Description	Ref. No.	Threaded Studs	Length mm	Package content pcs.	Weight per package kg
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

Internally Threaded Sleeve VMU-IG

Steel, zinc plated 5.8



→ For use in structures subject to dry internal conditions

Internally Threaded Sleeve VMU-IG A4

Stainless steel A4-70



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

Description	Ref. No.		Use in			Outer Ø x Length	Thread depth min / max	Package content	Weight per package
	Steel, zinc plated 5.8	Stainless steel A4	Concrete Drill hole Ø x depth mm	Solid base material without Perfo Sleeve Drill hole Ø x depth mm	Solid and hollow base material with VM-SH ¹⁾				
VMU-IG M6x80	31502101	31502501	12 x 80	-	VM-SH 16x85	10 x 80	8 / 20	10	0,38
VMU-IG M6x90	31503101	31503501	12 x 90	12x90	-	10 x 90	8 / 20	10	0,42
VMU-IG M8x80	31562101	31562501	14 x 80	-	VM-SH 20x85	12 x 80	8 / 20	10	0,52
VMU-IG M8x100	31563101	31563501	14 x 100	14x100	-	12 x 100	8 / 20	10	0,66
VMU-IG M10x80	31601101	31601501	18 x 80	-	VM-SH 20x85	16 x 80	10 / 25	10	0,92
VMU-IG M10x100	31602101	31602501	18 x 100	18x100	-	16 x 100	10 / 25	10	1,18
VMU-IG M12x125	31652101	31652501	22/24 ¹⁾ x 125	-	-	20 x 125	12 / 30	10	2,51
VMU-IG M16x170	31702101	31702501	28 x 170	-	-	24 x 170	16 / 32	5	2,41
VMU-IG M20x200	31802101	31802501	35 x 200	-	-	30 x 200	20 / 40	5	4,18

¹⁾Drill hole Ø depend on selected injection system

²⁾Drill hole Ø and drill depth see Perfo Sleeves on page 169

Internally Threaded Sleeve V-IG



- Steel, zinc plated 5.8
- Flush with concrete surface; with internal thread
- For fastenings not subject to approval

Description	Ref. No.	Suitable for perfo sleeve	Outer-Ø x Length mm	Drill hole Ø x depth mm	Thread mm	Package content pcs.	Weight per package kg
V-IG M 8	24105101	V-P 12	12 x 90	14 x 90	M8 x 25	10	0,50
V-IG M 10	24205101	V-P 14	14 x 90	16 x 90	M10 x 30	10	0,65
V-IG M 12	24305101	V-P 16	16 x 100	18 x 100	M12 x 35	10	1,00
V-IG M 16	24505101	V-P 16 IG	22 x 120	25 x 120	M16 x 40	10	1,65

A setting tool is included with each internally threaded sleeve package.

Internally Threaded Sleeve V-IG A4



- Stainless steel A4
- Flush with concrete surface; with internal thread
- For fastenings not subject to approval

Description	Ref. No.	Suitable for perfo sleeve	Outer-Ø x Length mm	Drill hole Ø x depth mm	Thread mm	Package content pcs.	Weight per package kg
V-IG M 8 A4	24105501	V-P 12	12 x 90	14 x 90	M8 x 25	10	0,50
V-IG M 10 A4	24205501	V-P 14	14 x 90	16 x 90	M10 x 30	10	0,65
V-IG M 12 A4	24305501	V-P 16	16 x 100	18 x 100	M12 x 35	10	1,00
V-IG M 16 A4	24505501	V-P 16 IG	22 x 120	25 x 120	M16 x 40	10	1,65

A setting tool is included with each internally threaded sleeve package.

Internally Threaded Sleeve VM-IG



- Steel, zinc plated
- Installation in hollow base material
- For fastenings not subject to approval

Description	Ref. No.	Suitable for perfo sleeve	Internal thread	Outer Ø mm	Length mm	Package content pcs.	Weight per package kg
VM-IG M 6	28101001	VM-SH 12 / 16	M 6	8	45	10	0,11
VM-IG M 8	28102001	VM-SH 16 / 22	M 8	12	80	10	0,38
VM-IG M 10	28103001	VM-SH 20 / 22	M 10	14	80	10	0,45
VM-IG M 12	28104001	VM-SH 22	M 12	16	80	10	0,52

Perfo Sleeve VM-SH



- Material: Polypropylene
- Installation in hollow base material

Description	Ref. No.	Drill hole Ø x depth mm	suitable for		Amount of mortar per 100 mm drill hole depth ml	Package content pcs.	Weight per package kg
			Threaded Studs	Threaded Sleeve			
VM-SH 12 x 50 ¹⁾	28151001	13 x 55	M8	-	7,5	10	0,01
VM-SH 12 x 80	28151201	12 x 85	M8	-	11,9	10	0,02
VM-SH 16 x 85	28152001	16 x 90	M8 / M10	VMU-IG M6x80	24,9	10	0,03
VM-SH 16 x 130	28153001	16 x 135	M8 / M10	-	38,0	10	0,04
VM-SH 16 x 130/330 ²⁾	28153201	16 x 135 + tfix ²⁾	M8 / M10	-	96,5	10	0,16
VM-SH 20 x 85	28154001	20 x 90	M12 / M16	VMU-IG M8x80 / M10x80	41,1	10	0,04
VM-SH 20 x 130	28154301	20 x 135	M12 / M16	-	62,9	10	0,07
VM-SH 20 x 200	28154601	20 x 205	M12 / M16	-	96,7	10	0,10

¹⁾For fastenings not subject to approval

²⁾VM-SH 16 x 130/330 is only approved in combination with VM-EA. tfix = shortened length perfo sleeves - 130 mm

Perfo Sleeve VM-SH



- Steel, zinc plated
- Metal, to be cut to required length
- Installation in hollow base materials

Description	Ref. No.	Drill hole Ø x depth mm	suitable for		Amount of mortar per 100 mm drill hole depth ml	Package content pcs.	Weight per package kg
			Threaded Studs	Threaded Sleeve			
VM-SH 12 x 1000	28403001	12	M6 / M8	VM-IG M6	15,0	50	2,88
VM-SH 16 x 1000	28404001	16	M10	VM-IG M6 / M8	29,3	50	3,38
VM-SH 22 x 1000	28405001	22	M12 / M16	VM-IG M8 - M12	68,4	25	2,70

Accessories for MKT Injection Systems

Blow-out pump VM-AP



→ For assessment-compliant drill hole cleaning of many anchor systems

→ For best drill hole cleaning, the hose must reach the bottom of the drill hole

Description	Ref. No.	For drill hole Ø mm	Max. drill hole depth ¹⁾ mm	Length mm	Pkg. cont. pcs.	Weight per piece kg
Blow-out pump VM-AP 270	29990002	12 - 20	200	270	1	0,22
Blow-out pump VM-AP 360	33200101	8 ²⁾ - 20	330	360	1	0,27

¹⁾For through fastening: Maximum drill hole depth through fixture

²⁾With extension tube Ø6 x 100mm

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 fixture

Air gun VM-ABP 1000



→ For assessment-compliant drill hole cleaning with compressed air for drill holes with a diameter larger than 16 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 1000	85806101	14	16-40	1000	1	0,32

¹⁾For through fastening: Maximum drill hole depth through fixture

Compressed Air System DLS

→ For blowing out drill holes up to 3 m deep

→ The connection set RS for connection to a compressor, an air hose RS and, for the injection system VME, the corresponding blow-out nozzle RD are required

Air Valve RS



→ Connection set RS with manual slide valve with air valve and connector for connection to a compressor

Air hose RS



→ Air hose RS, pre-assembled with connectors for connection between connection set RS and blow-out nozzle RD

Blow-out nozzle RD



→ Blow-out nozzles RD for optimum cleaning of the drill hole and the drill hole walls

→ Fits on the air hose RS

Description	Ref. No.	For drill hole Ø mm	Max. drill hole depth ¹⁾ mm	Length mm	Pkg. cont. pcs.	Weight per piece kg
Air hose RS	85890101	12 - 35	-	-	1	0,42
Air Valve RS 25	85802101	12 - 28	2000	2000	1	0,11
Air Valve RS 35	85804101	30 - 35	3000	3000	1	0,44
Blow-out nozzle RD 12/14	85852101	12 - 14	-	-	1	0,01
Blow-out nozzle RD 16/18	85854101	16 - 18	-	-	1	0,02
Blow-out nozzle RD 20/25	85856101	20 - 25	-	-	1	0,03
Blow-out nozzle RD 30/35	85858101	30 - 35	-	-	1	0,05

¹⁾For through fastening: Maximum drill hole depth through fixture

Cleaning Brush RB M6



- For machine cleaning of drill holes
- Stainless steel trim for a long service life
- With connection thread M6
- For drilling machines with keyed chuck
- SDS plus adapter for use in a hammer drill
- Use brush extensions according to the drilling depth. Several brush extensions can be screwed together for further extension.

Description	Ref. No.	Suitable for drill hole Ø mm	Length mm	Filling length mm	Pkg. cont. pcs.	Weight per piece kg
RB 10 M6	33510101	10	130	80	1	0,03
RB 12 M6	33512101	12	140	80	1	0,03
RB 14 M6	33514101	14	180	80	1	0,04
RB 16 M6	33516101	16	200	100	1	0,05
RB 18 M6	33518101	18	200	100	1	0,06
RB 20 M6	33520101	20	220	100	1	0,10
RB 22 M6	33522101	22	220	100	1	0,10
RB 24 M6	33524101	24	250	100	1	0,11
RB 26 M6	33526101	25 / 26	290	100	1	0,12
RB 28 M6	33528101	28	260	100	1	0,11
RB 30 M6	33530101	30	350	100	1	0,12
RB 32 M6	33532101	32	350	100	1	0,13
RB 35 M6	33535101	35	350	100	1	0,14
RB 40 M6	33537101	40	350	100	1	0,15
RB 45 M6	on request	45	-	-	1	-
RB 55 M6	on request	55	-	-	1	-
Brush extension RBL M6	33968101	-	150	-	1	0,09
SDS Plus adapter RBL M6 SDS	33350101	-	110	-	1	0,06

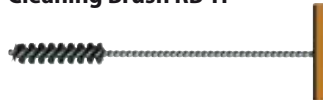
Cleaning Brush RB M8



- Extra sturdy construction for machine cleaning of particularly deep drill holes
- Stainless steel trim for a long service life
- With connection thread M8
- For drilling machines with keyed chuck
- SDS plus adapter for use in a hammer drill
- Use brush extensions according to the drilling depth. Several brush extensions can be screwed together for further extension.

Description	Ref. No.	Suitable for drill hole Ø mm	Length mm	Filling length mm	Pkg. cont. pcs.	Weight per piece kg
RB 12 M8	85812101	12	180	140	1	0,05
RB 14 M8	85814101	14	180	140	1	0,05
RB 16 M8	85816101	16	180	140	1	0,05
RB 18 M8	85818101	18	180	140	1	0,05
RB 20 M8	85820101	20	180	140	1	0,05
RB 25 M8	85825101	25	180	140	1	0,06
RB 32 M8	85832101	32	180	140	1	0,08
RB 35 M8	85835101	35	180	140	1	0,08
Brush extension RBL M8	85871101	-	550	-	1	0,32
SDS Plus adapter RBL M8 SDS	85881101	-	110	9	1	0,07

Cleaning Brush RB-H



- For manual drill hole cleaning of non-approved systems in solid and perforated masonry
- Nylon trim
- With wooden handle

Description	Ref. No.	Suitable for drill hole Ø mm	Length mm	Pkg. cont. pcs.	Weight per piece kg
RB-H 12/250	29914501	8-12	250	1	0,04
RB-H 18/250	29918501	10-18	250	1	0,04
RB-H 18/400	33618101	10-18	400	1	0,05
RB-H 28/280	29928501	20-28	280	1	0,05
RB-H 28/400	33628101	20-28	400	1	0,06

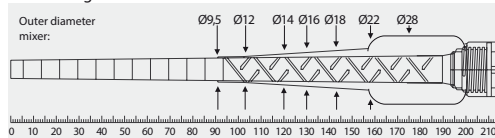
Static mixer

- ➔ To mix the two components of the injection adhesive
- ➔ Before each application, squeeze out an approx. 10cm long strand (initial strand). The initial strand is not suitable for fastening. (See European Technical Assessment and Installation Instructions)
- ➔ Usable length static mixer: 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.

VM-X



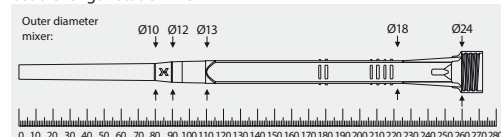
Usable length Static mixer VM-X



VM-XHP



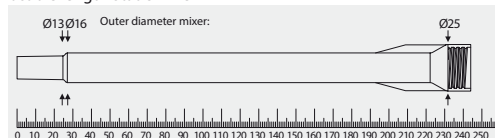
Usable length Static mixer VM-XHP



VM-XL



Usable length Static mixer VM-XL



Description	Ref. No.	Suitable for Injection Systems / Cartridges	Length mm	Package content pcs.	Weight per pkg. kg
VM-X	28305111	VMZ: all Cartridges, VMU plus : 150ml, 280ml, 300ml, 345ml, 410ml VMU plus Polar: all Cartridges VM-EA: all Cartridges	215	12	0,12
VM-XHP	28305301	VME plus : all Cartridges VME basic: all Cartridges VMH: all Cartridges	272	12	0,18
VM-XL ¹⁾	28305201	VMU plus : all Cartridges	245	10	0,28

¹⁾Static mixer VM-XL comes with a reducers / extension tube. Suitable for drill holes from 12mm diameter.

Extension tubes



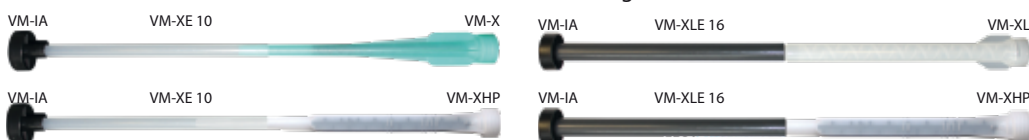
VM-XE 10



VM-XLE 16

- ➔ Extension tubes for deeper drill holes
- ➔ Extension tubes VM-XE and VM-XLE can be cut to the required length

Possible combinations static mixer / Extension tube / Retaining Washer:



Description	Ref. No.	Diameter mm	Length mm	Drill hole-Ø mm	Suitable for static mixer	Package content pcs.	Weight per pkg. kg
VM-XE 10/200	28306011	10	200	12 - 40	VM-X VM-XHP VM-XL	12	0,12
VM-XE 10/500	85951101	10	500	12 - 40		10	0,20
VM-XE 10/1000	85952101	10	1000	12 - 40		10	0,30
VM-XE 10/2000	85954101	10	2000	12 - 40		10	0,65
VM-XLE 16/250	85959101	16	250	18 - 55	VM-XHP VM-XL	10	0,30
VM-XLE 16/1000	85956101	16	1000	18 - 55		10	1,15
VM-XLE 16/2000	85958101	16	2000	18 - 55		10	3,50

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	Pkg. cont. pcs.	Weight per pkg. kg
VM-IA 14	85914201	14	20	0,04
VM-IA 16	85916201	16	20	0,04
VM-IA 18	85918201	18	20	0,04
VM-IA 20	85920201	20	20	0,06
VM-IA 22	85922201	22	20	0,06
VM-IA 24	85924101	24	20	0,06
VM-IA 25	85925201	25 / 26	20	0,06
VM-IA 28	85928101	28	20	0,06
VM-IA 30	on request	30	-	-
VM-IA 32	85932201	32	20	0,08
VM-IA 35	85935201	35	20	0,10
VM-IA 40	85938201	40	20	0,10
VM-IA 45	on request	45	-	-
VM-IA 55	on request	55	-	-

Dispenser VM-P Standard

- ➔ For occasional use, metal version
- ➔ Piston rod with adjusting screw

Description	Ref. No.	Suitable for cartridge	Pkg. cont.	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
VM-P 585 Standard	28352151	385ml, 440ml, 585ml	1	1,60

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.	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 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.	Weight per piece kg
VM-P 585 Profi	28353201	280ml, 300ml, 330ml, 380ml, 385ml, 410ml, 420ml, 440ml, 585ml also suitable for silicone cartridges	1	1,67

Dispenser VM-P Akku



- Professional, solid battery cartridge dispenser
- 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.	Weight pro pcs. 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, 440ml, 585ml	5,0	3,86	440 x 180 x 285	1	8,05
VM-P 825 Akku	28353501	825 ml	5,0	4,14	410 x 180 x 285	1	8,34
Accessories (for all models)							
Replacement battery	28352411		18 V/2,0 Ah			1	1,00
Shoulder strap	28359991		adjustable			1	0,18

¹⁾ with Akku 18V/2,0 Ah

Dispenser VM-P Pneumatic



VM-P 345
Pneumatic Eco



VM-P 380 /
585 Pneumatic



VM-P 1400
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
- VM-P 825 Pneumatic and VM-P 1400 Pneumatic with additional handle

Description	Ref. No.	Suitable for cartridge	Maximum working pressure bar	Maximum Luftverbrauch l/min	Maximum Press-out force kN	Pkg. cont. pcs	Weight per piece kg
VM-P 345 Pneumatic Eco	28351601	280 ml, 300 ml, 345 ml	6,8	40	2,2	1	2,55
VM-P 380 Pneumatic	28352002	380 ml, 410 ml, 420 ml	8	40	4,0	1	2,80
VM-P 380 Pneumatic Eco	28351701	380 ml, 410 ml, 420 ml	6,8	40	2,2	1	2,50
VM-P 585 Pneumatic	28352101	385 ml, 440 ml, 585 ml	8	40	4,0	1	3,20
VM-P 825 Pneumatic	28352110	825 ml	8	40	4,0	1	5,00
VM-P 1400 Pneumatic	28352201	1400 ml	8	40	8,3	1	7,00