

## Injection System VMZ **dynamic**



**Conical Stud VMZ-A **dynamic****  
Through Fastening



**Conical Stud VMZ-AV **dynamic****  
Pre-Installation



**Cartridge VMZ 280**  
Coaxial Cartridge  
for silicone guns  
Content: 280ml, incl. 2 Static  
mixer on Cartridge



**Cartridge VMZ 345**  
Side-by-side Cartridge  
Content: 345ml



**Cartridge VMZ 420**  
Coaxial Cartridge  
Content: 420ml

**Range of loading:** 4,9 kN–32,2 kN  
**Range of concrete quality:** C20/25–C50/60  
**Material:** Steel, zinc plated, Stainless steel HCR

### Description

The Injection System VMZ **dynamic** consists of an anchor rod with conical expansion elements and a 2 component injection adhesive. This combination provides extremely high load bearing capacity even at minimum edge distance and spacing. The VMZ system combines the benefits of bonded anchors and expansion anchors in an approved fastening system for both cracked and uncracked concrete. There are threaded studs available for the various applications for through fastening (pre-assembled) and for pre-installation in galvanized steel, A4 stainless steel and HCR high corrosion resistant stainless steel. The drill holes can also be created with the hollow drill bit SB, the use of which reduces contamination and fine dust exposure of the respiratory tract to a minimum.

### Advantages

- Approved in cracked and uncracked concrete under fatigue cyclic loading
- Low anchorage depths and component thicknesses
- Very high loads in axial and oblique tension



- Higher loads, if the number of load cycles is limited
- The design can distinguish between static and non-static loads
- No load reduction for wet or water-filled drill holes
- Approved processing from -15°C substrate temperature
- Two different versions for optimum adaptation to the application conditions:
  - VMZ-A **dynamic**: pre-assembled for quick through fastening
  - VMZ-AV **dynamic**: flexible, suitable for pre-installation and through fastening
- Special nut and washer to account for angular misalignment
- Fire test report for all dimensions
- Fire test report according to ZTV tunnel temperature curve for threaded studs of HCR high corrosion resistant stainless steel
- Standard and fast-curing express adhesive made of styrene-free, 2 component adhesive on vinyl ester basis
- Opened cartridges can be re-used with a new mixer nozzle
- Drill hole creation with hammer drill or hollow drill bit

### Applications

Heavy duty fastenings with alternating loads and unlimited load cycles in cracked and uncracked concrete:  
Cranes, industrial robots, antenna towers, noise barriers, elevators

**Injection Cartridge VMZ**



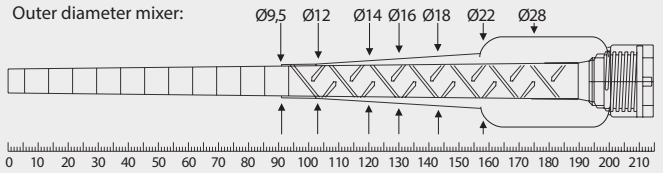
- Two component cartridge, styrene-free
- Various cartridge systems
- Approved for cracked and uncracked concrete

Description	Ref. No.	Content ml	Content of master box pcs.	Weight per master box kg	Weight per piece kg
Cartridge VMZ 280 <sup>1)</sup>	28252601	280	12	6,70	0,56
Cartridge VMZ 345	28255310	345	12	8,28	0,69
Cartridge VMZ 420	28254701	420	12	9,84	0,83
Cartridge VMZ 345 express	28254201	345	12	8,00	0,65
Static mixer VM-X (for all cartridge)	28305111	-	12	0,12	0,01
Mixer extension VM-XE 10/200 (200mm)	28306011	-	12	-	0,01
Installation wedge VMZ-MK	33300103	-	10	-	0,01

One static mixer comes with each cartridge.  
<sup>1)</sup>Cartridge VMZ 280 comes with 2 mixers.

**Usable length Static mixer VM-X**

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.



**Curing Time Injection Adhesive VMZ when used according ETA-17/0194**

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

Temperature (°C) of the base material	Gel time	Curing time	
		dry base material	wet base material
-15°C to -10°C	45 min	7 d	14 d <sup>1)</sup>
-9°C to -5°C	45 min	10:30 h	21:00 h <sup>1)</sup>
-4°C to -1°C <sup>1)</sup>	45 min	6:00 h	12:00 h <sup>2)</sup>
0°C to +4°C	20 min	3:00 h	6:00 h
+5°C to +9°C	12 min	2:00 h	4:00 h
+10°C to +19°C	6 min	1:20 h	2:40 h
+20°C to +29°C	4 min	45 min	1:30 h
+30°C to +34°C	2 min	25 min	50 min
+35°C to +39°C	1,4 min	20 min	40 min
+40°C	1,4 min	15 min	30 min

<sup>1)</sup>It must be ensured that icing does not occur in the drill hole.

**Curing Time Injection Adhesive VMZ express when used according ETA-17/0194**

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

Temperature (°C) of the base material	Gel time	Curing time	
		dry base material	wet base material
-5°C to -1°C	20 min	4:00 h	8:00 h <sup>1)</sup>
0°C to +4°C	10 min	2:00 h	4:00 h
+5°C to +9°C	6 min	1:00 h	2:00 h
+10°C to +19°C	3 min	40 min	80 min
+20°C to +29°C	1 min	20 min	40 min
+30°C	1 min	10 min	20 min

<sup>1)</sup>It must be ensured that icing does not occur in the drill hole.

**Accessories for injection system VMZ dynamic**

VMZ-A Dynamic-, VMZ-AV Dynamic-Threaded stud	Drill bit Ø mm	Blow-out pump / Air gun	Cleaning brush RB	Extension tube	Dispenser
VMZ-A 100 M12 dyn VMZ-AV 100 M12 dyn	14	VM-AP 360 VM-ABP 200	RB 14 M6 / RB 14 M8	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
VMZ-A 125 M16 dyn VMZ-AV 125 M16 dyn	18	VM-AP 360 VM-ABP 200 / 250 / 500	RB 18 M6 / RB 18 M8	VM-XE 10	
VMZ-A 170 M20 dyn VMZ-AV 170 M20 dyn	24	VM-ABP 250 / 500	RB 24 M6	VM-XE 10	
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## Through-setting installation

### Conical Stud VMZ-A dynamic

Steel zinc plated, Through-setting installation



- Through-setting installation: Pre-assembled set of conical Stud, concave washer, ball nut, lock nut and a plastic sleeve as a thread protector.
- For use in structures subject to dry internal conditions

Description	Ref. No.	Drill hole Ø d <sub>o</sub> mm	Drill hole depth h <sub>o</sub> mm		Fixture thickness t <sub>fix</sub> mm		Drill hole depth through fixture h <sub>d</sub> mm	Concave washer <sup>1)</sup> d <sub>1</sub> x h <sub>1</sub> mm	Anchor length mm	Pkg. cont. pcs.	Weight per pkg. kg	Amount of adhesive per anchor ml	Anchors per cartridge		
			min	max	min	max							280 ml	345 ml	420ml
VMZ-A 100 M12-25/160 dyn	36375101	14	105	118	12	25	130	36 x 6	160	10	2,22	12,2	19	25	31
VMZ-A 100 M12-50/185 dyn	36385101	14	105	143	12	50	155	36 x 6	185	10	2,46	15,2	15	20	25
VMZ-A 125 M16-30/200 dyn	36520101	18	133	147	16	30	163	44 x 7	200	10	4,20	19,3	12	15	19
VMZ-A 125 M16-50/220 dyn	36525101	18	133	167	16	50	183	44 x 7	220	10	4,54	22,5	10	13	16
VMZ-A 170 M20-50/280 dyn	36610101	24	180	210	20	50	230	50 x 8	280	5	4,64	44,6	5	6	8

### Conical Stud VMZ-A dynamic A4

Stainless steel A4, Through-setting installation



- Through-setting installation: Pre-assembled set of conical Stud, concave washer, ball nut, lock nut and a plastic sleeve as a thread protector.
- For use in structures subject to dry internal conditions or external atmospheric exposure (Conical Stud: Stainless Steel HCR; concave washer, ball nut, lock nut: Stainless Steel A4)

Description	Ref. No.	Drill hole Ø d <sub>o</sub> mm	Drill hole depth h <sub>o</sub> mm		Fixture thickness t <sub>fix</sub> mm		Drill hole depth through fixture h <sub>d</sub> mm	Concave washer <sup>1)</sup> d <sub>1</sub> x h <sub>1</sub> mm	Anchor length mm	Pkg. cont. pcs.	Weight per pkg. kg	Amount of adhesive per anchor ml	Anchors per cartridge		
			min	max	min	max							280 ml	345 ml	420ml
VMZ-A 100 M12-25/153 dyn A4	36375501	14	105	118	12	25	130	30 x 6	153	10	2,22	12,2	19	25	31
VMZ-A 100 M12-50/178 dyn A4	36385501	14	105	143	12	50	155	30 x 6	178	10	2,46	15,2	15	20	25
VMZ-A 125 M16-25/185 dyn A4	36520501	18	133	142	16	25	158	40 x 7	185	10	3,02	18,5	12	16	20
VMZ-A 125 M16-50/210 dyn A4	36525501	18	133	167	16	50	183	40 x 7	210	10	3,44	22,5	10	13	16

### Conical Stud VMZ-A dynamic HCR

Stainless steel HCR, Through-setting installation



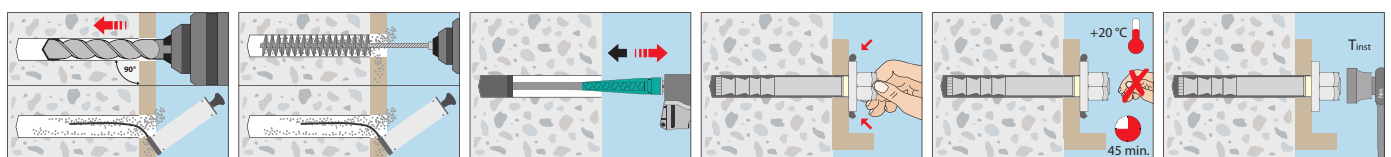
- Through-setting installation: Pre-assembled set of conical Stud, concave washer, ball nut, lock nut and a plastic sleeve as a thread protector.
- Highly corrosion resistant stainless steel 1.4529 for use in structures subject to external atmospheric exposure and in particularly corrosive environments

Description	Ref. No.	Drill hole Ø d <sub>o</sub> mm	Drill hole depth h <sub>o</sub> mm		Fixture thickness t <sub>fix</sub> mm		Drill hole depth through fixture h <sub>d</sub> mm	Concave washer <sup>1)</sup> d <sub>1</sub> x h <sub>1</sub> mm	Anchor length mm	Pkg. cont. pcs.	Weight per pkg. kg	Amount of adhesive per anchor ml	Anchors per cartridge		
			min	max	min	max							280 ml	345 ml	420ml
VMZ-A 100 M12-25/153 dyn HCR	36375651	14	105	118	12	25	130	30 x 6	153	10	2,22	12,2	19	25	31
VMZ-A 100 M12-50/178 dyn HCR	36385651	14	105	143	12	50	155	30 x 6	178	10	2,46	15,2	15	20	25
VMZ-A 125 M16-25/185 dyn HCR	36520651	18	133	142	16	25	158	40 x 7	185	10	3,02	18,5	12	16	20
VMZ-A 125 M16-50/210 dyn HCR	36525651	18	133	167	16	50	183	40 x 7	210	10	3,44	22,5	10	13	16

Other lengths on demand.

<sup>1)</sup>Outer diameter d<sub>1</sub> x thickness h<sub>1</sub>

## Installation



**Pre- and through-setting installation**

**Conical Stud VMZ-AV dynamic**

Steel zinc plated, Pre- and through-setting installation



→ Pre- and through-setting installation: Set conical stud, concave washer with diagonal fill hole, ball nut, lock nut and plastic sleeve as thread protection (through-setting installation) and mixer tip to fill the annular gap in the fixture (pre-setting installation). There are 5 mixer tips per 10-pack and 3 tips per 5-pack in each assembly package

→ For use in structures subject to dry internal conditions

Description	Ref. No.	Drill hole Ø do mm	Fixture thickness tfix mm		Drill hole depth <sup>1)</sup> ho mm	Concave washer <sup>2)</sup> d1 x h1 mm	Anchor length mm	Pkg. cont. pcs.	Weight per pkg. kg	Amount of adhesive per anchor ml	Anchors per cartridge		
			min	max							280 ml	345 ml	420ml
VMZ-AV 100 M12-25/160 dyn	36390101	14	12	25	130-tfix	35 x 6	160	10	2,22	12,2	19	25	31
VMZ-AV 100 M12-50/185 dyn	36395101	14	12	50	155-tfix	35 x 6	185	10	2,46	15,2	15	20	25
VMZ-AV 125 M16-30/200 dyn	36570101	18	16	30	163-tfix	40 x 7	200	10	4,20	19,3	12	15	19
VMZ-AV 125 M16-50/220 dyn	36575101	18	16	50	183-tfix	40 x 7	220	10	4,54	22,5	10	13	16
VMZ-AV 170 M20-50/280 dyn	36670101	24	20	50	230-tfix	50 x 8	280	5	4,64	44,6	5	6	8

**Conical Stud VMZ-AV dynamic A4**

Stainless steel A4, Pre- and through-setting installation



→ Pre- and through-setting installation: Set conical stud, concave washer with diagonal fill hole, ball nut, lock nut and plastic sleeve as thread protection (through-setting installation) and mixer tip to fill the annular gap in the fixture (pre-setting installation). There are 5 mixer tips per 10-pack and 3 tips per 5-pack in each assembly package

→ For use in structures subject to dry internal conditions or external atmospheric exposure (Conical Stud: Stainless Steel HCR; Nut, lock nut, washer: Stainless Steel A4)

Description	Ref. No.	Drill hole Ø do mm	Fixture thickness tfix mm		Drill hole depth <sup>1)</sup> ho mm	Concave washer <sup>2)</sup> d1 x h1 mm	Anchor length mm	Pkg. cont. pcs.	Weight per pkg. kg	Amount of adhesive per anchor ml	Anchors per cartridge		
			min	max							280 ml	345 ml	420ml
VMZ-AV 100 M12-25/153 dyn A4	36390501	14	12	25	130-tfix	35 x 6	153	10	2,22	12,2	19	25	31
VMZ-AV 100 M12-50/178 dyn A4	36395501	14	12	50	155-tfix	35 x 6	178	10	2,46	15,2	15	20	25
VMZ-AV 125 M16-25/185 dyn A4	36570501	18	16	25	158-tfix	40 x 7	185	10	3,02	18,5	12	16	20
VMZ-AV 125 M16-50/210 dyn A4	36575501	18	16	50	183-tfix	40 x 7	210	10	3,44	22,5	10	13	16

**Conical Stud VMZ-AV dynamic HCR**

Stainless steel HCR, Pre- and through-setting installation



→ Pre- and through-setting installation: Set conical stud, concave washer with diagonal fill hole, ball nut, lock nut and plastic sleeve as thread protection (through-setting installation) and mixer tip to fill the annular gap in the fixture (pre-setting installation). There are 5 mixer tips per 10-pack and 3 tips per 5-pack in each assembly package

→ Highly corrosion resistant stainless steel 1.4529 for use in structures subject to external atmospheric exposure and in particularly corrosive environments

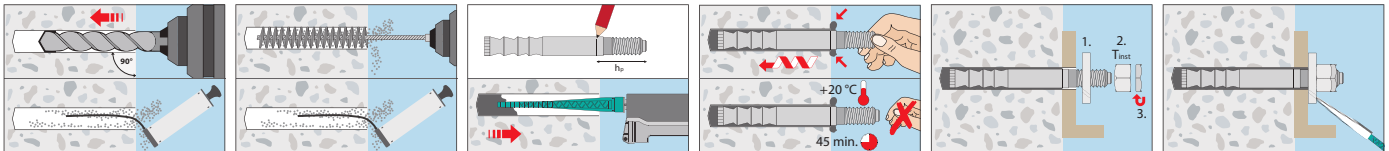
Description	Ref. No.	Drill hole Ø do mm	Fixture thickness tfix mm		Drill hole depth <sup>1)</sup> ho mm	Concave washer <sup>2)</sup> d1 x h1 mm	Anchor length mm	Pkg. cont. pcs.	Weight per pkg. kg	Amount of adhesive per anchor ml	Anchors per cartridge		
			min	max							280 ml	345 ml	420ml
VMZ-AV 100 M12-25/153 dyn HCR	36390651	14	12	25	130-tfix	35 x 6	153	10	2,22	12,2	19	25	31
VMZ-AV 100 M12-50/178 dyn HCR	36395651	14	12	50	155-tfix	35 x 6	178	10	2,46	15,2	15	20	25
VMZ-AV 125 M16-25/185 dyn HCR	36570651	18	16	25	158-tfix	40 x 7	185	10	3,02	18,5	12	16	20
VMZ-AV 125 M16-50/210 dyn HCR	36575651	18	16	50	183-tfix	40 x 7	210	10	3,44	22,5	10	13	16

<sup>1)</sup>The optimum drill hole depth must be calculated with the actual fixture thickness (tfix)

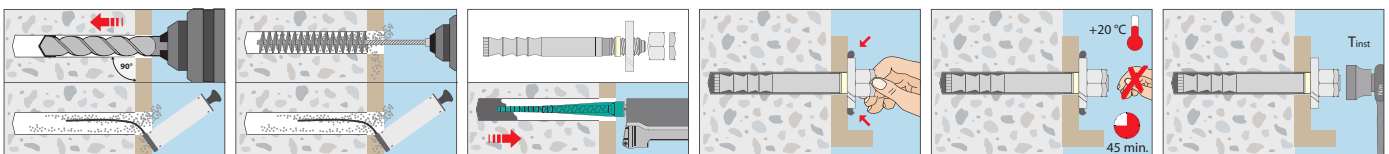
Other lengths on demand.

<sup>2)</sup>Outer diameter d1 x thickness h1

**Through-fastening installation**



**Pre-fastening installation**





**Extract from Permissible Service Conditions of European Technical Assessment ETA-04/0092 for use under fatigue cyclic loading 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 -40°C to +50°C (short term temperature +80°C). The total safety factor ( $\gamma_M$  and  $\gamma_P$ ) is included. For further details and temperature ranges see ETA.

**Loads and performance data**

**Injection System VMZ dynamic**



			100 M 12 steel zinc plated	125 M 16 steel zinc plated	170 M 20 steel zinc plated	100 M 12 A4/HCR	125 M 16 A4/HCR	
Effective anchorage depth	$h_{ef} \geq$	[mm]	100	125	170	100	125	
<b>Single fixing</b>			cracked and uncracked concrete					
Approved loads, tension	C20/25	$\Delta N_{appr.}$	[kN]	14,9	22,2	32,2	15,7	22,2
Approved loads, shear	C20/25	$\Delta V_{appr.}$	[kN]	6,1	11,1	15,6	6,1	11,1
<b>Multiple use (per anchor)</b>			cracked and uncracked concrete					
Approved loads, tension	C20/25	$\Delta N_{appr.}$	[kN]	11,8	19,9	25,5	12,4	21,8
Approved loads, shear	C20/25	$\Delta V_{appr.}$	[kN]	4,9	9,0	12,7	4,9	9,0
<b>Spacing and edge distance</b>								
Characteristic spacing	$s_{cr,N}$	[mm]	300	375	510	300	375	
Characteristic edge distance	$c_{cr,N}$	[mm]	150	187,5	255	150	187,5	
Minimum spacing	$s_{min}$	[mm]	50 (80) <sup>2)</sup>	60	80	50 (80) <sup>2)</sup>	60	
Minimum edge distance	$c_{min}$	[mm]	70 (75) <sup>2)</sup>	80	110	70 (75) <sup>2)</sup>	80	
Minimum thickness of concrete slab	$h_{min}$	[mm]	130	160	220	130	170	
<b>Installation parameters</b>								
Drill hole diameter	$d_o$	[mm]	14	18	24	14	18	
Depth of drill hole <sup>1)</sup>	$h_o$	[mm]	105	130	180	105	133	
Diameter of clearance hole in the fixture	$d_f$	[mm]	15	19	25	15	19	
Installation torque	$T_{inst}$	[Nm]	30	50	80	30	50	
Width across nut	SW	[mm]	19	24	30	19	24	
Minimum thickness of fixture	$t_{fix} \geq$	[mm]	12	16	20	12	16	

<sup>1)</sup> If the maximum fixture thickness  $t_{fix}$  is not completely used, the depth of drill hole and the setting depth of the anchor have to be increased accordingly.

<sup>2)</sup> Values in brackets are for uncracked concrete.

For anchor designing, an easy to operate Software is available on request or can be downloaded at [www.mkt.de](http://www.mkt.de)

Amount of adhesive per anchor see 115/116.

