

**SUORITUSTASOILMOITUS**DoP Nro: **MKT-2.1-500\_fi**

- ◇ **Tuotetyypin yksilöllinen tunniste:** **Ruiskutusjärjestelmä VM-EA**
- ◇ **Aiottu käyttötarkoitus (aiotut käyttötarkoitukset):** Injektionestojärjestelmä halkeamattoman betonin ankkurointiin, katso liite / Annex B
- ◇ **Valmistaja:** MKT Metall-Kunststoff-Technik GmbH & Co.KG  
Auf dem Immel 2  
67685 Weilerbach
- ◇ **Rakennustuotteen suoritustason pysyvyyden arviointi- ja varmennusjärjestelmä(t):** 1
- ◇ **Eurooppalainen arviointiasiakirja:** **EAD 330499-01-0601**  
Eurooppalainen tekninen arviointi: **ETA-16/0898, 25.04.2020**  
Teknisestä arvioinnista vastaava laitos: TZÚS, Prag  
Ilmoitettu laitos/ilmoitetut laitokset: NB 2873 – Technische Universität Darmstadt

◇ **Ilmoitettu suoritustaso/ilmoitetut suoritustasot:**

Olennaiset ominaisuudet	Suoritustaso
<b>Mekaaninen lujuus ja vakaus (BWR 1)</b>	
Ominaisresistanssit vetolujuudessa (staattiset ja lähes staattiset vaikutukset)	Liite / Annex C1, C2, C4
Ominaisresistanssit poikittaisessa rasituksessa (staattiset ja lähes staattiset vaikutukset)	Liite / Annex C1, C3, C5
Vuorossa	Liite / Annex C6
Kierrätettävyys	Liite / Annex B1
<b>Hygienia, terveys ja ympäristö (BWR 3)</b>	
Vaarallisten aineiden pitoisuus, päästöt ja / tai päästöt	Suorituskykyä ei arvioitu

Edellä yksilöidyn tuotteen suoritustaso on ilmoitettujen suoritustasojen joukon mukainen. Tämä suoritustasoilmoitus on asetuksen (EU) N:o 305/2011 mukaisesti annettu edellä ilmoitetun valmistajan yksinomaisella vastuulla.

Valmistajan puolesta allekirjoittanut:

  
**Stefan Weustenhagen**  
(Toimitusjohtaja)  
Weilerbach, 01.01.2021

p.p.   
**Dipl.-Ing. Detlef Bigalke**  
(Tuotekehityksen johtaja)



Tämän suoritusilmoituksen alkuperäinen teksti on kirjoitettu saksaksi. Jos käännökset poikkeavat toisistaan, saksankielinen versio on pätevä.

## Specifications of intended use

Injection System VM-EA	Anchor rod	Internally threaded anchor rod
Static or quasi-static action	<b>VMU-A, V-A, VM-A</b> , commercial standard threaded rod M8 – M24 zinc plated, A2, A4, HCR	<b>VMU-IG</b> M6 - M16 electroplated or sherardized, A4, HCR
Base materials	reinforced or unreinforced normal weight concrete acc. to EN 206:2013+A1:2016	
	strength classes acc. to EN 206:2013+A1:2016: C20/25 to C50/60	
	uncracked concrete	
Temperature Range I: 24°C / 40°C	Temperature range from -40°C to +40°C with max. long term temperature +24°C and max. short term temperature +40 °C	
Temperature Range II: 50°C / 80°C	Temperature range from -40°C to +80°C with max. long term temperature +50°C and max. short term temperature +80 °C	

### Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (all materials).
- For all other conditions according to EN 1993-1-4:2006+A1:2015 corresponding to corrosion resistance classes:
  - Stainless steel A2 according to Annex A, Table A3: CRC II
  - Stainless steel A4 according to Annex A, Table A3: CRC III
  - High corrosion resistant steel HCR according to Annex A, Table A3: CRC V
 Steel grades of a higher corrosion resistance class may be used

### Design:

- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.)
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work
- Anchorages are designed in accordance with EN 1992-4:2018 or TR 055.

### Concrete condition:

- I1 = installation in dry or wet (water saturated) concrete and use in service in dry or wet concrete
- I2 = installation in water-filled drill holes (not sea water) and use in service in dry or wet concrete

### Installation:

- Hole drilling by hammer or compressed air drill mode
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site

### Installation direction:

- D3 = downward and horizontal and upwards (e.g. overhead) installation

<b>Injection System VM-EA for concrete</b>	<b>Annex B1</b>
<b>Intended use Specifications</b>	

**Table B1: Installation parameters for threaded rod**

Threaded rod			M 8	M 10	M 12	M 16	M 20	M 24
Diameter of threaded rod	$d=d_{nom}$	[mm]	8	10	12	16	20	24
Nominal drill hole diameter	$d_0$	[mm]	10	12	14	18	24	28
Effective anchorage depth	$h_{ef,min}$	[mm]	60	60	70	80	90	96
	$h_{ef,max}$	[mm]	160	200	240	320	400	480
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9	12	14	18	22	26
Installation torque	$T_{inst} \leq$	[Nm]	10	20	40	80	120	160
Minimum thickness of member	$h_{min}$	[mm]	$h_{ef} + 30 \text{ mm}$ $\geq 100 \text{ mm}$			$h_{ef} + 2d_0$		
Minimum spacing	$s_{min}$	[mm]	40	50	60	80	100	120
Minimum edge distance	$c_{min}$	[mm]	40	50	60	80	100	120

**Table B2: Installation parameters for internally threaded anchor rod**

Internally threaded anchor rod			VMU-IG M 6	VMU-IG M 8	VMU-IG M 10	VMU-IG M 12	VMU-IG M 16
Inner diameter of threaded rod	$d_2$	[mm]	6	8	10	12	16
Outer diameter of threaded rod <sup>1)</sup>	$d=d_{nom}$	[mm]	10	12	16	20	24
Nominal drill hole diameter	$d_0$	[mm]	12	14	18	24	28
Effective anchorage depth	$h_{ef,min}$	[mm]	60	70	80	90	96
	$h_{ef,max}$	[mm]	200	240	320	400	480
Diameter of clearance hole in the fixture <sup>1)</sup>	$d_f \leq$	[mm]	7	9	12	14	18
Installation torque	$T_{inst} \leq$	[Nm]	10	10	20	40	60
Minimum screw-in depth	$l_{IG}$	[mm]	8	8	10	12	16
Minimum thickness of member	$h_{min}$	[mm]	$h_{ef} + 30 \text{ mm}$ $\geq 100 \text{ mm}$			$h_{ef} + 2d_0$	
Minimum spacing	$s_{min}$	[mm]	50	60	80	100	120
Minimum edge distance	$c_{min}$	[mm]	50	60	80	100	120

<sup>1)</sup> With metric thread acc. to EN 1993-1-8:2005+AC:2009

**Injection System VM-EA for concrete**

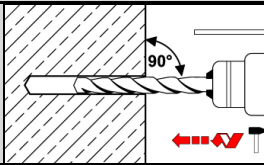
**Intended use**  
Installation parameters

**Annex B2**

# Installation instructions

## Drilling of the hole

1.



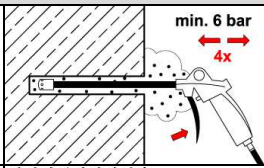
Drill with hammer drill a hole into the base material to the size required by the selected anchor (Table B1 or B2). In case of aborted drill hole, the drill hole shall be filled with mortar.

## Cleaning

**Attention! Standing water in the drill hole must be removed before cleaning!**

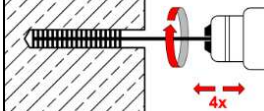
### Cleaning with compressed air (all diameters)

2a.



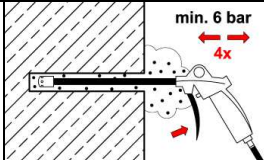
Starting from the bottom or back of the drill hole, blow out the hole with compressed air (min. 6 bar) a minimum of **four** times. If the drill hole ground is not reached, an extension must be used.

2b.



Attach the brush to a drilling machine or a battery screwdriver. Brush the hole with an appropriate sized wire brush  $> d_{b,min}$  (Table B3) a minimum of **four** times. If the drill hole ground is not reached, a brush extension shall be used.

2c.



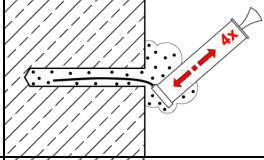
Finally blow the hole clean again with compressed air (min. 6 bar) a minimum of **four** times. If the drill hole ground is not reached an extension shall be used.

2.

### Manual cleaning

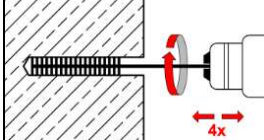
Drill hole diameter  $d_0 \leq 20\text{mm}$  or drill hole depth  $h_0 \leq 240\text{mm}$

2a.



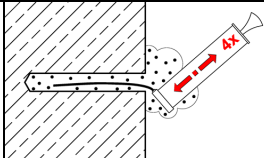
Starting from the bottom or back of the drill hole, blow the hole clean with the blow-out pump minimum of **four** times. If the drill hole ground is not reached an extension shall be used.

2b.



Attach the brush to a drilling machine or a battery screwdriver. Brush the hole with an appropriate sized wire brush  $> d_{b,min}$  (Table B3) a minimum of **four** times. If the drill hole ground is not reached, a brush extension shall be used.

2c.



Finally blow the hole clean again with the blow-out pump a minimum of **four** times. If the drill hole ground is not reached an extension shall be used.

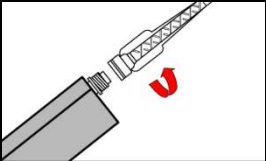
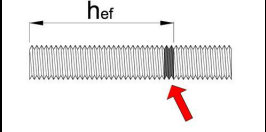
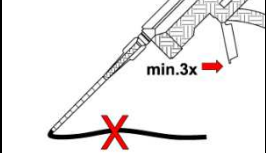
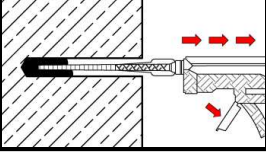
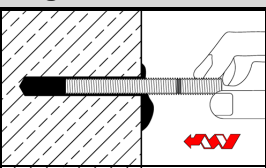
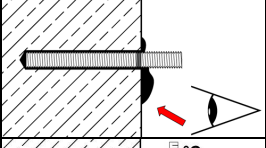
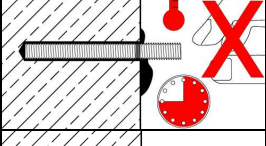
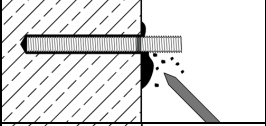
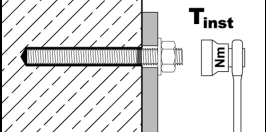
**After cleaning, the drill hole has to be protected against re-contamination in an appropriate way, until dispensing the mortar in the drill hole. If necessary, the cleaning repeated has to be directly before dispensing the mortar. In-flowing water must not contaminate the drill hole again.**

Injection System VM-EA for concrete

Intended use  
Installation instructions

Annex B3

## Installation instructions (continuation)

Injection		
3.		Attach a supplied static-mixing nozzle to the cartridge and load the cartridge into the correct dispensing tool. For foil tube cartridges: cut off the foil tube clip before use. For every working interruption longer than the recommended working time (Table B4) as well as for new cartridges, a new static-mixer shall be used.
4.		Prior to inserting the anchor rod into the filled drill hole, the position of the embedment depth shall be marked on the anchor rod.
5.		Prior to dispensing into the drill hole, squeeze out separately a minimum of three full strokes and discard non-uniformly mixed adhesive components until the mortar shows a consistent grey or blue (VM-EA blue) color. For foil tube cartridges discard a minimum of six full strokes.
6a.		Starting from the bottom or back of the cleaned drill hole fill the hole up to approximately two-thirds with adhesive. Slowly withdraw the static mixing nozzle as the hole fills to avoid air pockets. For embedment larger than 190mm an extension nozzle shall be used. Observe the gel-/ working times given in Table B4.
Inserting the anchor		
7.		Push the threaded rod into the hole while turning slightly to ensure proper distribution of the adhesive until the embedment depth is reached. The anchor shall be free of dirt, grease, oil or other foreign material.
8.		Make sure that the anchor is fully seated up to the full embedment depth and that excess mortar is visible at the top of the hole. If these requirements are not maintained, the application has to be renewed. For overhead installation, the anchor should be fixed (e.g. by wedges).
9.		Allow the adhesive to cure to the specified time prior to applying any load or torque. Do not move or load the anchor until it is fully cured (attend Table B4).
10.		Remove excess mortar.
11.		The fixture can be mounted after curing time. Apply installation torque $T_{inst}$ according to Table B1 or B2.

### Injection System VM-EA for concrete

**Intended use**  
Installation instructions (continuation)

**Annex B4**

**Table B3: Parameter cleaning tools**

Threaded rod	Internally threaded anchor rod	Drill bit - Ø	Brush - Ø	min. Brush - Ø
[-]	[-]	$d_0$ [mm]	$d_b$ [mm]	$d_{b,min}$ [mm]
M8	-	10	12	10,5
M10	VMU-IG M6	12	14	12,5
M12	VMU-IG M8	14	16	14,5
M16	VMU-IG M10	18	20	18,5
M20	VMU-IG M12	24	26	24,5
M24	VMU-IG M16	28	30	28,5

**Recommended compressed air tool (min 6 bar)**  
all applications



**Blow-out pump (volume 750ml)**  
Drill bit diameter ( $d_0$ ): 10 mm to 20 mm  
Drill hole depth ( $h_0$ ): ≤ 240 mm



**Cleaning brush RB**



**Table B4: Working time and curing time**

Concrete temperature	VM-EA low speed		VM-EA, VM-EA blue <sup>1)</sup>		VM-EA express	
	working time	minimum curing time	working time	minimum curing time	working time	minimum curing time
-10 to -6°C	-	-	-	-	60 min	4 h
-5 to -1°C	-	-	90 min	6 h	45 min	2 h
0 to +4°C	-	-	45 min	3 h	25 min	80 min
+5 to +9°C	-	-	25 min	2 h	10 min	45 min
+10 to +14°C	30 min	5 h	20 min	100 min	4 min	25 min
+15 to +19°C	20 min	210 min	15 min	80 min	3 min	20 min
+20 to +29°C	15 min	145 min	6 min	45 min	2 min	15 min
+30 to +34°C	10 min	80 min	4 min	25 min	-	-
+35 to +39°C	6 min	45 min	2 min	20 min	-	-
+40 to +44°C	4 min	25 min	-	-	-	-
+45 °C	2 min	20 min	-	-	-	-
<b>Cartridge temperature</b>	<b>+5°C to +45°C</b>		<b>+5°C to +40°C</b>		<b>0°C to +30°C</b>	

<sup>1)</sup> The VM-EA blue injection mortar has a curing time proof by changing the color from blue to grey after minimum curing time. The curing time proof is only valid for the standard version of the mortar

**Injection System VM-EA for concrete**

**Intended Use**  
Parameter cleaning tools, working time and curing time

**Annex B5**