

## Injection System VMH



**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**



**Cartridge VMH 280**  
Coaxial cartridge suitable for silicone guns  
Content: 280ml including 2 mixers



**Cartridge VMH 345**  
Side-by-side cartridge  
Content: 345ml

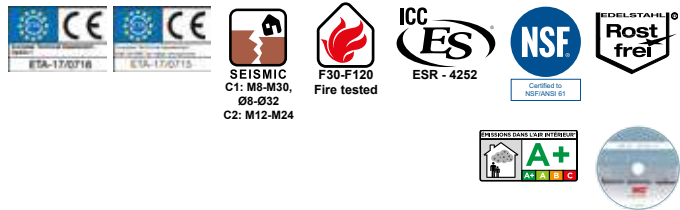


**Cartridge VMH 420**  
Coaxial cartridge  
Content: 420ml

**Range of loading: 3,9 kN – 221,6 kN**

**Concrete quality: C20/25 - C50/60**

**Material: Steel zinc plated, hot dip galvanized, stainless steel A4, stainless steel HCR**



### Description

The Injection System VMH is a universal injection system for heavy duty fastenings, usable in cracked and non-cracked concrete. It is composed of a hybrid injection adhesive as well as a threaded stud V-A, a threaded stud VMU-A, or an internally threaded sleeve VMU-IG. A standard threaded stud with strength test certificate 3.1 or a rebar can also be used. The variable anchorage depths allow for a perfect adjustment to the respective installation situation, even under seismic action.

### Advantages

- Extremely high loads in cracked and non-cracked concrete, strength class C20/25 to C50/60
- Approved with threaded studs V-A, VMU-A, standard threaded studs with strength test certificate and internally threaded sleeves VMU-IG, thus more flexibility in the choice of the fastening
- Variable anchorage depths allow perfect adjustment to the respective installation situation for an economic working process
- Approved for use under seismic action according to the performance categories C1 (threaded studs M8 – M30, reinforcement bars Ø8 – Ø32) and C2 (threaded studs M12 – M24 steel, zinc plated 8.8, A4 and HCR)
- Due to the high short-term temperature resistance up to +160°C, also suitable for fastenings exposed to high temperature
- Approved for installation in wet concrete
- Base material temperature during installation -5°C to +40°C
- Opened cartridges can be re-used with a new mixer nozzle
- Styrene free

### Applications

#### Heavy duty fastenings in cracked and non-cracked concrete:

Steel structures, railings, base plates, supports, brackets, facade structures.

**Fastenings with rebar in cracked and non-cracked concrete with shear force:** Shear connectors, wall connecting reinforcement, concrete overlay.

### Injection Cartridge VMH



- Hybrid injection adhesive, styrene free
- Approved for cracked and non-cracked concrete as well as post-installed rebar

| Description                     | Ref. No. | Content ml | Content of master box | Weight per master box kg | Weight per piece kg |
|---------------------------------|----------|------------|-----------------------|--------------------------|---------------------|
|                                 |          |            |                       |                          |                     |
| Cartridge VMH 280 <sup>1)</sup> | 28251501 | 280        | 12                    | 6,70                     | 0,56                |
| Cartridge VMH 345               | 28253501 | 345        | 12                    | 8,00                     | 0,65                |
| Cartridge VMH 420               | 28257501 | 420        | 12                    | 10,1                     | 0,83                |
| Static mixer VM-XH              | 28304801 | -          | 12                    | 0,16                     | 0,01                |

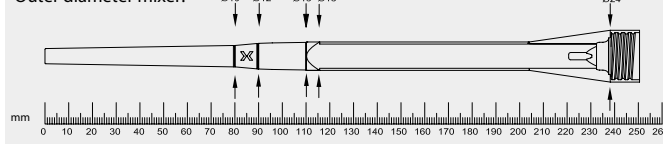
One static mixer comes with each cartridge.

<sup>1)</sup>Cartridge VMH 280 comes with 2 mixers.

### Usable length Static mixer VM-XH

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:



### Curing Time Injection Adhesive VMH

→ Cartridge temperature when installing + 5°C to + 40°C

| Temperature (°C) of the base material | Gel time | Curing time       |                   |
|---------------------------------------|----------|-------------------|-------------------|
|                                       |          | Dry base material | Wet base material |
| -5°C to -1°C                          | 50 min   | 5 h               | 10 h              |
| 0°C to +4°C                           | 25 min   | 3,5 h             | 7 h               |
| +5°C to +9°C                          | 15 min   | 2 h               | 4 h               |
| +10°C to +14°C                        | 10 min   | 1 h               | 2 h               |
| +15°C to +19°C                        | 6 min    | 40 min            | 80 min            |
| +20°C to +29°C                        | 3 min    | 30 min            | 60 min            |
| +30°C to +40°C                        | 2 min    | 30 min            | 60 min            |

### Mixer extensions

→ Extension tubes for deeper drill holes

VM-XE 10

| Description   | Ref. No. | Diameter mm | Length mm | Package content Pcs. | Weight per pkg. kg |
|---------------|----------|-------------|-----------|----------------------|--------------------|
|               |          |             |           |                      |                    |
| VM-XE 10/200  | 28306011 | 200         | 10        | 12                   | 0,12               |
| VM-XE 10/500  | 85951101 | 500         | 10        | 10                   | 0,20               |
| VM-XE 10/1000 | 85952101 | 1000        | 10        | 10                   | 0,30               |

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

### Threaded Stud VMU-A

Steel, zinc plated 5.8  
Dimensions see page 107



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

### Internally Threaded Sleeve VMU-IG

Steel, zinc plated 5.8  
Dimensions see page 108



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

### Threaded Stud V-A

Steel, zinc plated 5.8  
Dimensions see page 144



- For use in structures subject to dry internal conditions

### Threaded Stud V-A 8.8

Steel, zinc plated 8.8  
Dimensions see page 144



- For use in structures subject to dry internal conditions

### Threaded stud VM-A

Steel 5.8, zinc plated  
Dimensions see page 108



- For use in structures subject to dry internal conditions
- Threaded studs, of 1 meter length, to be cut to the required length
- Comes with manufacturer's certificate (3.1 EN 10204) in every package

### Threaded stud VM-A

Steel 8.8, zinc plated  
Dimensions see page 108



- For use in structures subject to dry internal conditions
- Threaded studs, of 1 meter length, to be cut to the required length
- Comes with manufacturer's certificate (3.1 EN 10204) in every package

### Threaded Stud VMU-A A4

Stainless steel A4  
Dimensions see page 107



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

### Internally Threaded Sleeve VMU-IG A4

Stainless steel A4  
Dimensions see page 108



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

### Threaded Stud V-A fzv

Steel, hot dip galvanized 5.8  
Dimensions see page 144



- For use in structures subject to dry internal conditions
- Steel hot dip galvanized 8.8 on demand

### Threaded Stud V-A A4

Stainless steel A4  
Dimensions see page 144



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

### Threaded Stud V-A HCR

Stainless steel HCR  
Dimensions see page 144



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

### Threaded stud VM-A

Stainless steel A4  
Dimensions see page 108



- For use in structures subject to dry internal conditions or external atmospheric exposure
- Threaded studs, of 1 meter length, to be cut to the required length
- Comes with manufacturer's certificate (3.1 EN 10204) in every package

## Drill Hole Cleaning

### Cleaning Brush RB M6



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

| Description | Ref. No. | Suitable for drill hole Ø mm                     | Total length of brush mm | Suitable for  |                                   |       | Package content pcs. | Weight per pkg. kg |      |
|-------------|----------|--------------------------------------------------|--------------------------|---------------|-----------------------------------|-------|----------------------|--------------------|------|
|             |          |                                                  |                          | Threaded stud | Internally threaded sleeve VMU-IG | Rebar |                      |                    |      |
| RB 10 M6    | 33510101 | 10                                               | 130                      | M8            |                                   |       | 1                    | 0,05               |      |
| RB 12 M6    | 33512101 | 12                                               | 140                      | M10           | IG M6                             | Ø 8   | 1                    | 0,05               |      |
| RB 14 M6    | 33514101 | 14                                               | 180                      | M12           | IG M8                             | Ø 10  | 1                    | 0,05               |      |
| RB 16 M6    | 33516101 | 16                                               | 200                      | -             | -                                 | Ø12   | 1                    | 0,05               |      |
| RB 18 M6    | 33518101 | 18                                               | 200                      | M16           | IG M10                            | -     | 1                    | 0,05               |      |
| RB 20 M6    | 33520101 | 20                                               | 220                      | -             | -                                 | Ø 16  | 1                    | 0,05               |      |
| RB 22 M6    | 33522101 | 22                                               | 220                      | M20           | IG M12                            | -     | 1                    | 0,06               |      |
| RB 26 M6    | 33526101 | 25/26                                            | 250                      | -             | -                                 | Ø 20  | 1                    | 0,06               |      |
| RB 28 M6    | 33528101 | 28                                               | 260                      | M24           | IG M16                            | -     | 1                    | 0,06               |      |
| RB 30 M6    | 33530101 | 30                                               | 350                      | M27           | -                                 | -     | 1                    | 0,08               |      |
| RB 32 M6    | 33532101 | 32                                               | 350                      | -             | -                                 | Ø 25  | 1                    | 0,08               |      |
| RB 35 M6    | 33535101 | 35                                               | 350                      | M30           | IG M20                            | Ø 28  | 1                    | 0,08               |      |
| RB 40 M6    | 33537101 | 40                                               | 350                      | -             | -                                 | Ø 32  | 1                    | 0,08               |      |
| RBL M6      | 33968101 | Brush extension 150 mm with connection thread M6 |                          |               |                                   |       |                      | 1                  | 0,09 |
| RBL M6 SDS  | 33350101 | SDS Plus adapter for cleaning brushes (M6)       |                          |               |                                   |       |                      | 1                  | 0,06 |

### Retaining Washer VM-IA



- For bubble-free filling of the drill hole
- Fits to extension tubes VM-XLE 10 and VM-XLE 16

| Description | Ref. No. | Suitable for drill hole Ø mm | Colour | Suitable for  |                                   |       | Package content Pcs. | Weight per pkg. kg |
|-------------|----------|------------------------------|--------|---------------|-----------------------------------|-------|----------------------|--------------------|
|             |          |                              |        | Threaded stud | Internally threaded sleeve VMU-IG | Rebar |                      |                    |
| VM-IA 18    | 85918201 | 18                           | black  | M16           | IG M10                            | Ø 14  | 20                   | 0,02               |
| VM-IA 20    | 85920201 | 20                           | black  | -             | -                                 | Ø 16  | 20                   | 0,06               |
| VM-IA 22    | 85922201 | 22                           | black  | M20           | IG M12                            | -     | 20                   | 0,06               |
| VM-IA 25    | 85925201 | 25                           | black  | -             | -                                 | Ø 20  | 20                   | 0,06               |
| VM-IA 28    | 85928101 | 28                           | black  | M24           | IG M16                            | -     | 20                   | 0,08               |
| VM-IA 32    | 85932201 | 32                           | black  | -             | -                                 | Ø 25  | 20                   | 0,08               |
| VM-IA 35    | 85935201 | 35                           | black  | M30           | IG M20                            | Ø 28  | 20                   | 0,08               |
| VM-IA 40    | 85938201 | 40                           | black  | -             | -                                 | Ø 32  | 20                   | 0,08               |

### Blow-out pump VM-AP



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

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

<sup>1)</sup>With extension tube Ø 6 x 100mm

<sup>2)</sup>For through fastening: Maximum drill hole depth through fi ture

### Air gun VM-ABP



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

| Description | Ref. No. | Nozzle-Ø mm | For drill hole Ø mm | Max. drill hole depth <sup>1)</sup> 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                |

<sup>1)</sup>For through fastening: Maximum drill hole depth through fi ture

### Air gun VM-ABP



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

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

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

### Dispenser VM-P Profi



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

→ Automatic pressure release for minimum adhesive overrun

| Description    | Ref. No. | Suitable for cartridge                                           | Pkg. cont. pcs | Weight per piece kg |
|----------------|----------|------------------------------------------------------------------|----------------|---------------------|
| VM-P 345 Profi | 28350511 | 150ml, 280ml, 300ml, 345ml also suitable for silicone cartridges | 1              | 1,00                |
| VM-P 380 Profi | 28351001 | 380ml, 410ml, 420ml                                              | 1              | 1,10                |

### Dispenser VM-P Standard



→ For occasional use, metal version

→ Piston rod with adjusting screw

| Description       | Ref. No. | Suitable for cartridge                                           | Pkg. cont. pcs | Weight per piece kg |
|-------------------|----------|------------------------------------------------------------------|----------------|---------------------|
| VM-P 345 Standard | 28350505 | 150ml, 280ml, 300ml, 345ml also suitable for silicone cartridges | 1              | 1,00                |
| VM-P 380 Standard | 28353005 | 380ml, 410ml, 420ml                                              | 1              | 1,15                |

### Dispenser VM-P Pneumatic



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

→ Automatic pressure release system reduces adhesive overrun to a minimum

→ Single-hand pressure regulation to adjust the piston speed

→ With compressed air connection nipple

| Description        | Ref. No. | Suitable for cartridge | max. working pressure | Pkg. cont. pcs | Weight per piece kg |
|--------------------|----------|------------------------|-----------------------|----------------|---------------------|
| VM-P 345 Pneumatic | 28350601 | 280ml, 300ml, 345ml    | 8 bar, 40l/min        | 1              | 2,41                |
| VM-P 380 Pneumatic | 28352002 | 380ml, 410ml, 420ml    | 8 bar, 40l/min        | 1              | 2,00                |

### Auspresspistolen VM-P Akku



<sup>1)</sup> with Akku 18V/2,0 Ah

→ Professional, solid battery cartridge dispenser in a plastic case

→ Repeat function, for retrieving the last fill quantity

→ Stepless variable pressing speed

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

| Description                  | Ref. No. | Suitable for cartridge | Press-out force kN | Weight <sup>1)</sup> kg | Dimensions <sup>1)</sup> L x B x H mm | Pkg. cont. pcs | Weight per piece kg |
|------------------------------|----------|------------------------|--------------------|-------------------------|---------------------------------------|----------------|---------------------|
| VM-P 345 Akku                | 28350801 | 345ml                  | 5,0                | 3,53                    | 395 x 180 x 285                       | 1              | 7,72                |
| VM-P 380 Akku                | 28352601 | 380ml, 410ml, 420ml    | 3,95               | 3,62                    | 375 x 180 x 285                       | 1              | 7,80                |
| Accessories (for all models) |          |                        |                    |                         |                                       |                |                     |
| Replacement battery          | 28352411 |                        |                    | 18 V/2,0 Ah             |                                       | 1              | 1,00                |
| Shoulder strap               | 28359991 |                        |                    | adjustable              |                                       | 1              | 0,02                |



**Extract from Permissible Service Conditions of European Technical Assessment ETA-17/0716**

Approved loads without influence of spacing and edge distance in dry or wet concrete for temperature range I -40°C to +50°C/+80°C<sup>1)</sup> (Approved loads for temperature range II -40°C to +72°C/+120°C<sup>1)</sup> and III -40°C to +100°C/+160°C<sup>1)</sup> please see ETA-17/0716). Total safety factor as per ETAG included ( $\gamma_M$  and  $\gamma_F$ ). Load capacities under fire exposure see page 168.

| Loads and performance data                                                                         |                 |         | Range of temperature I -40°C to +50°C/+80°C <sup>1)</sup> |             |             |             |             |             |              |              |              |
|----------------------------------------------------------------------------------------------------|-----------------|---------|-----------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|
| Threaded studs                                                                                     |                 |         | 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    |              |
| <b>Injection System VMH, threaded stud steel 5.8</b>                                               |                 |         |                                                           |             |             |             |             |             |              |              |              |
| <b>Approved loads, tension for <math>h_{ef,min} - h_{ef,max}</math></b>                            |                 |         |                                                           |             |             |             |             |             |              |              |              |
| Cracked concrete                                                                                   | C20/25          | appr. N | [kN]                                                      | 5,0 - 8,6   | 6,7 - 13,8  | 10,0 - 20,0 | 12,3 - 37,1 | 14,6 - 58,1 | 16,1 - 83,8  | 19,2 - 109,5 | 22,5 - 133,3 |
| Non-cracked concrete                                                                               | C20/25          | appr. N | [kN]                                                      | 8,6         | 11,2 - 13,8 | 14,1 - 20,0 | 17,2 - 37,1 | 20,5 - 58,1 | 22,6 - 83,8  | 27,0 - 109,5 | 31,6 - 133,3 |
| <b>Approved loads, shear for <math>h_{ef,min} - h_{ef,max}</math></b>                              |                 |         |                                                           |             |             |             |             |             |              |              |              |
| Cracked concrete                                                                                   | C20/25          | appr. V | [kN]                                                      | 5,1         | 8,6         | 12,0        | 22,3        | 29,3 - 34,9 | 32,2 - 50,3  | 38,5 - 65,7  | 45,1 - 80,0  |
| Non-cracked concrete                                                                               | C20/25          | appr. V | [kN]                                                      | 5,1         | 8,6         | 12,0        | 22,3        | 34,9        | 45,2 - 50,3  | 54,0 - 65,7  | 63,2 - 80,0  |
| <b>Injection System VMH, threaded stud steel 8.8</b>                                               |                 |         |                                                           |             |             |             |             |             |              |              |              |
| <b>Approved loads, tension for <math>h_{ef,min} - h_{ef,max}</math></b>                            |                 |         |                                                           |             |             |             |             |             |              |              |              |
| Cracked concrete                                                                                   | C20/25          | appr. N | [kN]                                                      | 5,0 - 13,4  | 6,7 - 21,9  | 10,0 - 31,9 | 12,3 - 59,5 | 14,6 - 93,3 | 16,1 - 120,6 | 19,2 - 152,7 | 22,5 - 188,5 |
| Non-cracked concrete                                                                               | C20/25          | appr. N | [kN]                                                      | 11,2 - 13,8 | 11,2 - 21,9 | 14,1 - 31,9 | 12,2 - 59,5 | 20,5 - 93,3 | 22,6 - 134,3 | 27,0 - 175,2 | 31,6 - 213,8 |
| <b>Approved loads, shear for <math>h_{ef,min} - h_{ef,max}</math></b>                              |                 |         |                                                           |             |             |             |             |             |              |              |              |
| Cracked concrete                                                                                   | C20/25          | appr. V | [kN]                                                      | 8,6         | 13,1        | 19,4        | 24,5 - 36,0 | 29,3 - 56,0 | 32,2 - 80,6  | 38,5 - 105,1 | 45,1 - 128,0 |
| Non-cracked concrete                                                                               | C20/25          | appr. V | [kN]                                                      | 8,6         | 13,1        | 19,4        | 34,4 - 36,0 | 41,1 - 56,0 | 45,2 - 80,6  | 54,0 - 105,1 | 63,2 - 128,0 |
| <b>Injection System VMH, threaded stud stainless steel A4-70<sup>2)</sup>, HCR-70<sup>2)</sup></b> |                 |         |                                                           |             |             |             |             |             |              |              |              |
| <b>Approved loads, tension for <math>h_{ef,min} - h_{ef,max}</math></b>                            |                 |         |                                                           |             |             |             |             |             |              |              |              |
| Cracked concrete                                                                                   | C20/25          | appr. N | [kN]                                                      | 5,0 - 9,9   | 6,7 - 15,7  | 10,0 - 22,5 | 12,3 - 42,0 | 14,6 - 65,3 | 16,1 - 94,3  | 19,2 - 57,4  | 22,5 - 70,2  |
| Non-cracked concrete                                                                               | C20/25          | appr. N | [kN]                                                      | 9,9         | 11,2 - 15,7 | 14,1 - 22,5 | 17,2 - 42,0 | 20,5 - 65,3 | 22,6 - 94,3  | 27,0 - 57,4  | 31,6 - 70,2  |
| <b>Approved loads, shear for <math>h_{ef,min} - h_{ef,max}</math></b>                              |                 |         |                                                           |             |             |             |             |             |              |              |              |
| Cracked concrete                                                                                   | C20/25          | appr. V | [kN]                                                      | 6,0         | 9,2         | 13,7        | 24,5 - 25,2 | 29,3 - 39,4 | 32,2 - 56,8  | 34,5         | 42,0         |
| Non-cracked concrete                                                                               | C20/25          | appr. V | [kN]                                                      | 6,0         | 9,2         | 13,7        | 25,2        | 39,4        | 45,2 - 56,8  | 34,5         | 42,0         |
| <b>Spacing and edge distance</b>                                                                   |                 |         |                                                           |             |             |             |             |             |              |              |              |
| Min. thickness of concrete slab for $h_{ef,min} - h_{ef,max}$                                      | $h_{min}$       | [mm]    |                                                           | 100 - 190   | 100 - 230   | 100 - 270   | 116 - 356   | 134 - 444   | 152 - 536    | 168 - 600    | 190 - 670    |
| Minimum spacing                                                                                    | $s_{min}$       | [mm]    |                                                           | 40          | 50          | 60          | 75          | 95          | 115          | 125          | 140          |
| Minimum edge distance                                                                              | $c_{min}$       | [mm]    |                                                           | 35          | 40          | 45          | 50          | 60          | 65           | 75           | 80           |
| <b>Installation parameters</b>                                                                     |                 |         |                                                           |             |             |             |             |             |              |              |              |
| Drill hole diameter                                                                                | $d_o$           | [mm]    |                                                           | 10          | 12          | 14          | 18          | 22          | 28           | 30           | 35           |
| Clearance hole in the fixture                                                                      | $d_{r \leq}$    | [mm]    |                                                           | 9           | 12          | 14          | 18          | 22          | 26           | 30           | 33           |
| Range of drill hole depth for $h_{ef,min} - h_{ef,max}$                                            | $h_o$           | [mm]    |                                                           | 60 - 160    | 60 - 200    | 70 - 240    | 80 - 320    | 90 - 400    | 96 - 480     | 108 - 540    | 120 - 600    |
| Installation torque                                                                                | $T_{inst \leq}$ | [Nm]    |                                                           | 10          | 20          | 40          | 60          | 100         | 170          | 250          | 300          |
| Amount of adhesive per 100mm drill hole depth                                                      |                 | [ml]    |                                                           | 6,53        | 8,16        | 9,82        | 13,61       | 17,89       | 32,25        | 30,69        | 48,70        |

<sup>1)</sup>Max. long term temperature/max. short term temperature

<sup>2)</sup>M27, M30: A4-50, HCR-50

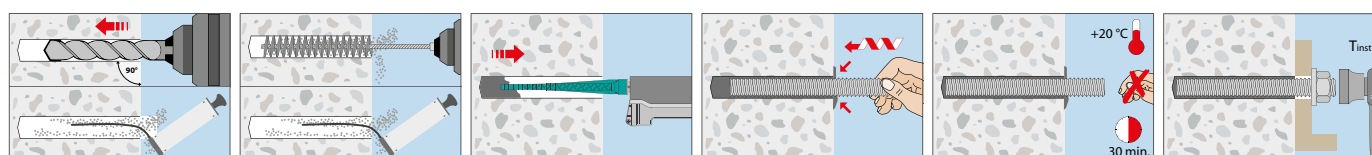
Higher concrete strength may lead to higher approved loads. Technical data see European Technical Assessment. For anchor designing, an easy to operate Software is available on request or can be downloaded at [www.mkt.de](http://www.mkt.de).

| Loads and performance data                                              |           |         | Range of temperature I -40°C bis +50°C/+80°C <sup>1)</sup> |             |             |             |             |             |             |              |              |              |              |
|-------------------------------------------------------------------------|-----------|---------|------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|
| Injection System VMH, rebar B500B                                       |           |         | Ø8                                                         | Ø10         | Ø12         | Ø14         | Ø16         | Ø20         | Ø24         | 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    | 96 - 480    | 100 - 500    | 112 - 560    | 128 - 640    |              |
| <b>Approved loads, tension for <math>h_{ef,min} - h_{ef,max}</math></b> |           |         |                                                            |             |             |             |             |             |             |              |              |              |              |
| Cracked concrete                                                        | C20/25    | appr. N | [kN]                                                       | 3,9 - 10,5  | 4,9 - 16,5  | 7,5 - 25,9  | 10,2 - 38,1 | 12,3 - 49,8 | 14,6 - 77,8 | 16,1 - 112,0 | 17,1 - 130,9 | 20,3 - 164,2 | 24,8 - 214,5 |
| Non-cracked concrete                                                    | C20/25    | appr. N | [kN]                                                       | 10,1 - 13,8 | 11,2 - 21,6 | 14,1 - 31,2 | 15,6 - 42,4 | 17,2 - 55,4 | 20,5 - 86,6 | 22,6 - 124,5 | 24,0 - 135,2 | 28,5 - 169,6 | 34,8 - 221,6 |
| <b>Approved loads, shear for <math>h_{ef,min} - h_{ef,max}</math></b>   |           |         |                                                            |             |             |             |             |             |             |              |              |              |              |
| Cracked concrete                                                        | C20/25    | appr. V | [kN]                                                       | 6,5         | 9,9 - 10,1  | 14,5        | 19,8        | 24,5 - 25,9 | 29,3 - 40,4 | 32,2 - 58,1  | 34,3 - 63,1  | 40,6 - 79,2  | 49,7 - 103,4 |
| Non-cracked concrete                                                    | C20/25    | appr. V | [kN]                                                       | 6,5         | 10,1        | 14,5        | 19,8        | 25,9        | 40,4        | 45,2 - 58,1  | 48,1 - 63,1  | 57,0 - 79,2  | 69,6 - 103,4 |
| <b>Spacing and edge distance</b>                                        |           |         |                                                            |             |             |             |             |             |             |              |              |              |              |
| Min. thickness of concrete slab for $h_{ef,min} - h_{ef,max}$           | $h_{min}$ | [mm]    |                                                            | 100 - 190   | 100 - 230   | 102 - 272   | 111 - 316   | 120 - 360   | 140 - 450   | 160 - 544    | 164 - 564    | 182 - 630    | 208 - 720    |
| Minimum spacing                                                         | $s_{min}$ | [mm]    |                                                            | 40          | 50          | 60          | 70          | 75          | 95          | 120          | 120          | 130          | 150          |
| Minimum edge distance                                                   | $c_{min}$ | [mm]    |                                                            | 35          | 40          | 45          | 50          | 50          | 60          | 70           | 70           | 75           | 85           |
| <b>Installation parameters</b>                                          |           |         |                                                            |             |             |             |             |             |             |              |              |              |              |
| Drill hole diameter                                                     | $d_o$     | [mm]    |                                                            | 12          | 14          | 16          | 18          | 20          | 25          | 32           | 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    | 96 - 480     | 100 - 500    | 112 - 560    | 128 - 640    |
| Amount of adhesive per 100mm drill hole depth                           |           | [ml]    |                                                            | 7,6         | 9,1         | 10,6        | 12,1        | 13,6        | 21,2        | 42,2         | 37,6         | 41,6         | 54,3         |

<sup>1)</sup>Max. long term temperature/max. short term temperature

Higher concrete strength may lead to higher approved loads. Technical data see European Technical Assessment. For anchor designing, an easy to operate Software is available on request or can be downloaded at [www.mkt.de](http://www.mkt.de).

**Installation threaded stud in concrete**







**Extract from Permissible Service Conditions of European Technical Assessment ETA-17/0716**

Approved loads without influence of spacing and edge distance in dry or wet concrete for temperature range I -40°C to + 50°C/+80°C<sup>1)</sup> (Approved loads for temperature range II -40°C to +72°C/+ 120°C<sup>1)</sup> and III -40°C to +100°C/+ 160°C please see ETA-17/0716).

Total safety factor as per ETAG included ( $\gamma_M$  and  $\gamma_F$ ).

| Loads and performance data                                                                                             |                      |              | Range of temperature I -40°C bis + 50°C/+80°C <sup>1)</sup> |            |            |             |             |              |              |              |              |
|------------------------------------------------------------------------------------------------------------------------|----------------------|--------------|-------------------------------------------------------------|------------|------------|-------------|-------------|--------------|--------------|--------------|--------------|
| Internally threaded sleeves                                                                                            |                      |              | IG M6 x 80                                                  | IG M6 x 90 | IG M8 x 80 | IG M8 x 100 | IG M10 x 80 | IG M10 x 100 | IG M12 x 125 | IG M16 x 170 | IG M20 x 200 |
| Anchorage depth $h_{ef}$                                                                                               | [mm]                 |              | 80                                                          | 90         | 80         | 100         | 80          | 100          | 125          | 170          | 200          |
| <b>Injection System VMH, internally threaded sleeve VMU-IG steel 5.8</b>                                               |                      |              |                                                             |            |            |             |             |              |              |              |              |
| <b>Approved loads, tension for <math>h_{ef}</math></b>                                                                 |                      |              |                                                             |            |            |             |             |              |              |              |              |
| Cracked concrete                                                                                                       | C20/25               | appr. N [kN] | 4,8                                                         | 4,8        | 8,6        | 8,6         | 12,3        | 13,8         | 20,0         | 37,6         | 48,5         |
| Non-cracked concrete                                                                                                   | C20/25               | appr. N [kN] | 4,8                                                         | 4,8        | 8,6        | 8,6         | 13,8        | 13,8         | 20,0         | 37,6         | 58,6         |
| <b>Approved loads, shear for <math>h_{ef}</math></b>                                                                   |                      |              |                                                             |            |            |             |             |              |              |              |              |
| Cracked concrete                                                                                                       | C20/25               | appr. V [kN] | 2,9                                                         | 2,9        | 5,1        | 5,1         | 8,6         | 8,6          | 12,0         | 22,3         | 34,9         |
| Non-cracked concrete                                                                                                   | C20/25               | appr. V [kN] | 2,9                                                         | 2,9        | 5,1        | 5,1         | 8,6         | 8,6          | 12,0         | 22,3         | 34,9         |
| <b>Injection System VMH, internally threaded sleeve VMU-IG stainless steel A4-70<sup>2)</sup>, HCR-70<sup>2)</sup></b> |                      |              |                                                             |            |            |             |             |              |              |              |              |
| <b>Approved loads, tension for <math>h_{ef}</math></b>                                                                 |                      |              |                                                             |            |            |             |             |              |              |              |              |
| Cracked concrete                                                                                                       | C20/25               | appr. N [kN] | 5,3                                                         | 5,3        | 9,9        | 9,9         | 12,3        | 15,7         | 22,5         | 38,0         | 31,0         |
| Non-cracked concrete                                                                                                   | C20/25               | appr. N [kN] | 5,3                                                         | 5,3        | 9,9        | 9,9         | 15,7        | 15,7         | 22,5         | 42,0         | 31,0         |
| <b>Approved loads, shear for <math>h_{ef}</math></b>                                                                   |                      |              |                                                             |            |            |             |             |              |              |              |              |
| Cracked concrete                                                                                                       | C20/25               | appr. V [kN] | 3,2                                                         | 3,2        | 6,0        | 6,0         | 9,2         | 9,2          | 13,7         | 25,2         | 18,6         |
| Non-cracked concrete                                                                                                   | C20/25               | appr. V [kN] | 3,2                                                         | 3,2        | 6,0        | 6,0         | 9,2         | 9,2          | 13,7         | 25,2         | 18,6         |
| <b>Spacing and edge distance</b>                                                                                       |                      |              |                                                             |            |            |             |             |              |              |              |              |
| Min. thickness of concrete slab for $h_{ef}$ $h_{min}$                                                                 | [mm]                 |              | 110                                                         | 120        | 110        | 130         | 116         | 136          | 169          | 226          | 270          |
| Minimum spacing                                                                                                        | $s_{min}$ [mm]       |              | 50                                                          | 50         | 60         | 60          | 75          | 75           | 95           | 115          | 140          |
| Minimum edge distance                                                                                                  | $c_{min}$ [mm]       |              | 40                                                          | 40         | 45         | 45          | 50          | 50           | 60           | 65           | 80           |
| <b>Installation parameters</b>                                                                                         |                      |              |                                                             |            |            |             |             |              |              |              |              |
| Drill hole diameter                                                                                                    | $d_o$ [mm]           |              | 12                                                          | 12         | 14         | 14          | 18          | 18           | 22           | 28           | 35           |
| Clearance hole in the fixture                                                                                          | $d_f \leq$ [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 torque                                                                                                    | $T_{inst} \leq$ [Nm] |              | 10                                                          | 10         | 10         | 10          | 20          | 20           | 40           | 60           | 100          |
| Amount of adhesive per drill hole                                                                                      | [ml]                 |              | 6,6                                                         | 7,4        | 7,9        | 9,9         | 10,9        | 13,6         | 22,4         | 54,9         | 97,4         |

<sup>1)</sup>Max. long term temperature/max. short term temperature

<sup>2)</sup>IG M20 x 200: A4-50, HCR-50

Higher concrete strength may lead to higher approved loads. Technical data see European Technical Assessment. For anchor designing, an easy to operate Software is available on request or can be downloaded at [www.mkt.de](http://www.mkt.de).

