# Universal polyester mortar anchor, for use in non-cracked concrete and masonry

## MO-PU

Assessed ETA Option 7 (non-cracked concrete).


# PRODUCT INFORMATION

### DESCRIPTION
Chemical anchor, universal polyester.

### OFFICIAL DOCUMENTATION
- ETA 20/0650 option 7, M8 to M24 for non-cracked concrete.
- Declaration features DoP MO-PU.
- Certificate EVCP 1020-CPR-090-050581 for use in concrete.

### VALID FOR

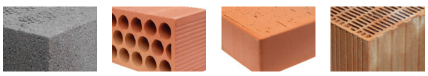
Stud

### DIMENSIONS
Stud M8 - M24

### RANGE OF CACULATION LOADS
From 7,2 to 33,3 kN (non-cracked).

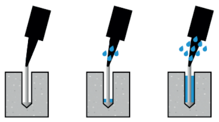
kg.

### BASE MATERIAL
Concrete quality C20/25 to C50/60 non-cracked.


Concrete | Hollow brick | Solid brick | Thermal clay

### ASSESSMENTS
- ETA 20/0650 Option 7: non-cracked concrete.

STRUCTURAL FIXINGS IN UNCRACKED CONCRETE ETA 20/0650 — ÉMISSIONS DANS L'AIR INTÉRIEUR A+ — LEED TESTED

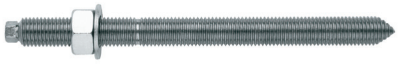
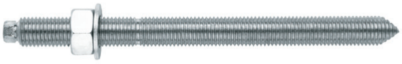
### DRILL HOLE CONDITION

Dry | Wet | Flooded

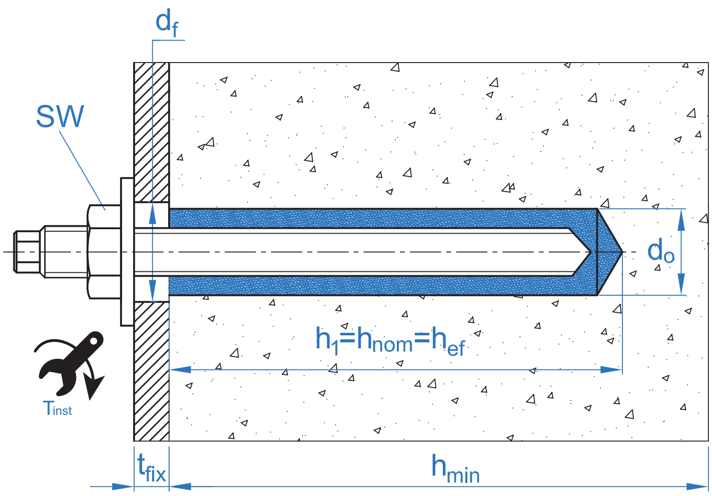
### CHARACTERISTICS AND BENEFITS
- Easy installation.
- Use in non-cracked concrete, hollow and solid plasterboard.
- Used for medium loads.
- Temperature range -40°C to +80°C (maximum long-term temperature +50°C).
- Variety of lengths and diameters: M8-M24-assessed studs, flexible assembly.
- For static or quasi-static loads.
- Version in zinc plated steel, stainless steel A2 and A4.
- Available in INDEXcal. INDEX CAL

### MATERIALS
**Standard stud:**
Carbon steel 5.8, 8.8. (Z ZINC)

**Stainless standard stud:**
Stainless steel A2-70 and A4-70. (A2 INOX AISI 304) (A4 INOX AISI 316)

### APPLICATIONS
- For indoor and outdoor use.
- Fixing of building substructures.
- Rehabilitation of facades. For fixing air-conditioning supports, boilers, awnings, signs, balconies, shelving units, railings, etc.
- Large metric sizes, retaining walls.
- Structural applications.

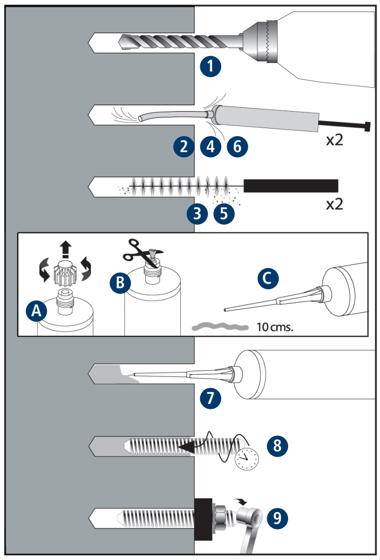
| CONCRETE INSTALLATION PARAMETERS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| METRIC | | | M8 | M10 | M12 | M16 | M20 | M24 |
| $d_0$ | nominal diameter | [mm] | 10 | 12 | 14 | 18 | 22 | 26 |
| $d_f$ | diameter in anchor plate ≤ | [mm] | 9 | 12 | 14 | 18 | 22 | 26 |
| $T_{inst}$ | tightening torque ≤ | [Nm] | 10 | 20 | 40 | 80 | 150 | 200 |
| Circular cleaning brush | | | Ø14 | | Ø20 | | Ø29 | |
| **$h_{ef,min}$ = 8d** | | | | | | | | |
| $h_1$ | depth of the drill hole | [mm] | 64 | 80 | 96 | 128 | 160 | 192 |
| $s_{cr,N}$ | critical distance between anchors | [mm] | 192 | 240 | 288 | 384 | 480 | 576 |
| $c_{cr,N}$ | critical distance from the edge | [mm] | 96 | 120 | 144 | 192 | 240 | 288 |
| $c_{min}$ | minimum distance from the edge | [mm] | 35 | 40 | 50 | 65 | 80 | 96 |
| $s_{min}$ | minimum distance between anchors | [mm] | 35 | 40 | 50 | 65 | 80 | 96 |
| $h_{min}$ | minimum concrete thickness | [mm] | 100 | 110 | 126 | 158 | 204 | 244 |
| **Standard stud** | | | | | | | | |
| $h_1$ | depth of the drill hole | [mm] | 80 | 90 | 110 | 128 | 170 | 210 |
| $s_{cr,N}$ | critical distance between anchors | [mm] | 240 | 270 | 330 | 384 | 510 | 630 |
| $c_{cr,N}$ | critical distance from the edge | [mm] | 120 | 135 | 165 | 192 | 255 | 315 |
| $c_{min}$ | minimum distance from the edge | [mm] | 43 | 45 | 56 | 65 | 85 | 105 |
| $s_{min}$ | minimum distance between anchors | [mm] | 43 | 45 | 56 | 65 | 85 | 105 |
| $h_{min}$ | minimum concrete thickness | [mm] | 110 | 120 | 140 | 158 | 214 | 262 |
| **$h_{ef,max}$ = 12d** | | | | | | | | |
| $h_1$ | depth of the drill hole | [mm] | 96 | 120 | 144 | 192 | 240 | 288 |
| $s_{cr,N}$ | critical distance between anchors | [mm] | 288 | 360 | 432 | 576 | 720 | 864 |
| $c_{cr,N}$ | critical distance from the edge | [mm] | 144 | 180 | 216 | 288 | 360 | 432 |
| $c_{min}$ | minimum distance from the edge | [mm] | 50 | 60 | 70 | 95 | 120 | 145 |
| $s_{min}$ | minimum distance between anchors | [mm] | 50 | 60 | 70 | 95 | 120 | 145 |
| $h_{min}$ | minimum concrete thickness | [mm] | 126 | 150 | 174 | 222 | 284 | 340 |
| Zinc-plated stud code 5.8 / 8.8  | | | EQAC08110<br>EQ8808110 | EQAC10130<br>EQ8810130 | EQAC12160<br>EQ8812160 | EQAC16190<br>EQ8816190 | EQAC20260<br>EQ8820260 | EQAC24300<br>EQ8824300 |
| Stainless steel stud code A2 / A4  | | | EQA208110<br>EQA408110 | EQA210130<br>EQA410130 | EQA212160<br>EQA412160 | EQA216190<br>EQA416190 | EQA220260<br>EQA420260 | EQA224300<br>EQA424300 |



| INSTALLATION ACCESSORIES | | |
|---|---|---|
| CODE | PRODUCT | MATERIAL |
| **MOPISSI** | APPLICATION GUNS | Gun for 300 ml cartridges |
| **MOPISTO** | APPLICATION GUNS | Guns for 410 ml cartridges, professional use |
| **MOPISNEU** | APPLICATION GUNS | Pneumatic gun for 410 ml coaxial cartridges, professional use |
| **EQ-AC**<br>**EQ-8.8**<br>**EQ-A2**<br>**EQ-A4** | STUD | Studs threaded steel, class 5.8 ISO 898-1<br>Studs threaded steel, class 8.8 ISO 898-1<br>Studs stainless steel A2-70<br>Studs stainless steel A4-70 |
| **MORCEPKIT** | CLEANING BRUSHES | Kit with 3 cleaning brushes measuring ø14, ø20 and ø29 mm |
| **MOBOMBA** | CLEANING PUMP | Pump for cleaning leftover dust and fragments in the drill hole |
| **MORCANU** | MIXING TUBE | Plastic. Static labyrinth mixture |

**INSTALLATION PROCEDURE**

CONCRETE




| MINIMUM CURING TIME | | | |
|---|---|---|---|
| TYPE | BASE MATERIAL TEMPERATURE [ºC] | HANDLING TIME [min] | CURING TIME [min] |
| **MO-PU** | min +5 | 18 | 120 |
| | +5 to +10 | 12 | 120 |
| | +10 to +20 | 6 | 80 |
| | +20 to +25 | 4 | 40 |
| | +25 to +30 | 3 | 30 |
| | +30 to +35 | 2 | 20 |
| | +35 to +40 | 1.5 | 15 |
| | 40 | 1.5 | 10 |

## Resistance in concrete C20/25 for an insulated anchor, without effects of distance from the edge or spacing between anchors, with a standard stud EQ-AC, EQ-8.8, EQ-A2 or EQ-A4.

| Characteristic tensile strength $N_{Rk}$ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Metric | | | M8 | M10 | M12 | M16 | M20 | M24 |
| $N_{Rk}$ | Non-cracked concrete | [kN] | 13,0 | 18,3 | 22,8 | 25,7 | 42,7 | 60,0 |
| **Calculated tensile strength $N_{Rd}$** | | | | | | | | |
| Metric | | | M8 | M10 | M12 | M16 | M20 | M24 |
| $N_{Rd}$ | Non-cracked concrete | [kN] | 7,2 | 10,2 | 12,6 | 14,3 | 23,7 | 33,3 |
| **Maximum recommended tensile load $N_{rec}$** | | | | | | | | |
| Metric | | | M8 | M10 | M12 | M16 | M20 | M24 |
| $N_{rec}$ | Non-cracked concrete | [kN] | 5,1 | 7,3 | 9,0 | 10,2 | 16,9 | 23,8 |
| **Characteristic resistance to shear stress $V_{Rk}$** | | | | | | | | |
| Metric | | | M8 | M10 | M12 | M16 | M20 | M24 |
| $V_{Rk}$ | Zinc-plated stud 5.8 | [kN] | *9,0* | *15,0* | *21,0* | *39,0* | *61,0* | *88,0* |
| | Zinc-plated stud 8.8 | [kN] | *15,0* | *23,0* | *34,0* | *63,0* | *98,0* | *141,0* |
| | Stainless steel stud (A2/A4) | [kN] | *13,0* | *20,0* | *30,0* | *55,0* | *86,0* | *124,0* |
| **Calculated resistance to shearing $V_{Rd}$** | | | | | | | | |
| Metric | | | M8 | M10 | M12 | M16 | M20 | M24 |
| $V_{Rd}$ | Zinc-plated stud 5.8 | [kN] | *7,2* | *12,0* | *16,8* | *31,2* | *48,8* | *70,4* |
| | Zinc-plated stud 8.8 | [kN] | *12,0* | *18,4* | *27,2* | *50,4* | *78,4* | *112,8* |
| | Stainless steel stud (A2/A4) | [kN] | *8,3* | *12,8* | *19,2* | *35,3* | *55,1* | *79,5* |
| **Maximum recommended load to shear stress $V_{rec}$** | | | | | | | | |
| Metric | | | M8 | M10 | M12 | M16 | M20 | M24 |
| $V_{rec}$ | Zinc-plated stud 5.8 | [kN] | *5,1* | *8,6* | *12,0* | *22,3* | *34,9* | *50,3* |
| | Zinc-plated stud 8.8 | [kN] | *8,6* | *13,1* | *19,4* | *36,0* | *56,0* | *80,6* |
| | Stainless steel stud (A2/A4) | [kN] | *6,0* | *9,2* | *13,7* | *25,2* | *39,4* | *56,8* |
| **Effective depth of studs EQ-AC / EQ-A2 / EQ-A4** | | | | | | | | |
| Metric | | | M8 | M10 | M12 | M16 | M20 | M24 |
| Effective depth | | [mm] | 80 | 90 | 110 | 128 | 170 | 210 |

The values underlined and in italics indicate steel failure

## Simplified calculation method. European Technical Assessment ETA 20/0650

Simplified version of the calculation method according to Eurocode 2 EN 1992-4. Resistance is calculated according to the data shown in assessment ETA 20/0650.

- Influence of concrete resistance.
- Influence of the distance from the edge of the concrete.
- Influence of the spacing between anchors.
- Influence of rebars.
- Influence of the base material thickness.
- Influence of the load application angle.
- Influence of the effective depth.
- Valid for a group of two anchors.
- Valid for dry or wet drill holes.

The calculation method is based on the following simplification:
**No different loads act on individual anchors, without eccentricity.**

INDEXcal
For a more precise calculation and taking into account more constructive arrangements we recommend the use of our INDEXcal calculation program. It can be downloaded free from our website **www.indexfix.com**

# TENSILE LOADS

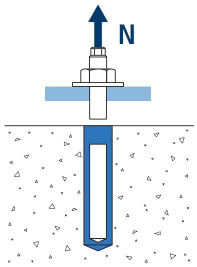
**MO-PU**

- Calculated steel resistance: $N_{Rd,s}$
- Calculated extraction resistance: $N_{Rd,p} = N^o_{Rd,p} \cdot \Psi_c \cdot \Psi_{hef,p}$
- Calculated concrete cone resistance: $N_{Rd,c} = N^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{s,N} \cdot \Psi_{c,N} \cdot \Psi_{re,N} \cdot \Psi_{hef,N}$
- Calculated concrete cracking resistance: $N_{Rd,sp} = N^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{s,sp} \cdot \Psi_{c,sp} \cdot \Psi_{re,N} \cdot \Psi_{h,sp} \cdot \Psi_{hef,N}$

## Calculated steel resistance

$N_{Rd,s}$

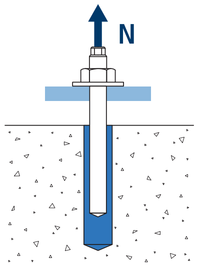
| | Metric | | M8 | M10 | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|---|---|---|
| $N^o_{Rd,s}$ | Steel class 5.8 | [kN] | 12 | 19,3 | 28 | 52,7 | 82 | 118 |
| | Steel class 8.8 | [kN] | 19,3 | 30,7 | 44,7 | 84 | 130,7 | 188 |
| | Steel class 10.9 | [kN] | 27,8 | 43,6 | 63,2 | 118 | 184,2 | 265,4 |
| | Stainless steel Class A2-70, A4-70 | [kN] | 13,9 | 21,9 | 31,6 | 58,8 | 92 | 132,1 |




## Calculated extraction resistance

$N_{Rd,p} = N^o_{Rd,p} \cdot \Psi_c \cdot \Psi_{hef,p}$

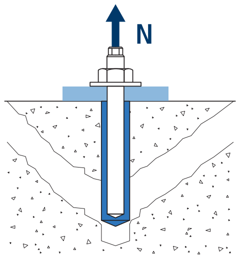
| | Metric | | M8 | M10 | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|---|---|---|
| $N^o_{Rd,p}$ | Non-cracked concrete | [kN] | 7,3 | 10,2 | 12,7 | 14,3 | 23,7 | 30,8 |




## Calculated concrete cone resistance

$N_{Rd,c} = N^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{s,N} \cdot \Psi_{c,N} \cdot \Psi_{re,N} \cdot \Psi_{hef,N}$

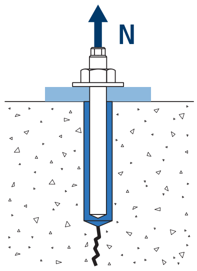
| | Metric | | M8 | M10 | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|---|---|---|
| $N^o_{Rd,c}$ | Non-cracked concrete | [kN] | 19,6 | 23,3 | 31,5 | 39,6 | 60,6 | 83,2 |




## Calculated concrete cracking resistance

$N_{Rd,sp} = N^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{s,sp} \cdot \Psi_{c,sp} \cdot \Psi_{re,N} \cdot \Psi_{h,sp} \cdot \Psi_{hef,N}$

| | Metric | | M8 | M10 | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|---|---|---|
| $N^o_{Rd,sp}$ | Non-cracked concrete | [kN] | 19,6 | 23,3 | 31,5 | 39,6 | 60,6 | 83,2 |



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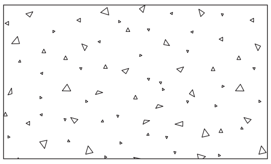
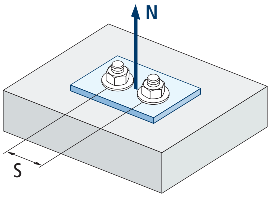
## Influence coefficients



| Influence of concrete resistance for extraction $\Psi_c$ | | | | | |
|---|---|---|---|---|---|
| | Concrete type | C20/25 | C30/37 | C40/50 | C50/60 |
| $\Psi_c$ | Non-cracked concrete | 1.00 | 1.04 | 1.07 | 1.09 |

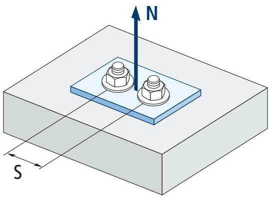
$$\Psi_b = \sqrt{\frac{f_{ck,cube}}{25}} \geq 1$$

| Influence of concrete resistance for concrete cone and concrete cracking $\Psi_b$ | | | | | |
|---|---|---|---|---|---|
| | Concrete type | C20/25 | C30/37 | C40/50 | C50/60 |
| $\Psi_b$ | | 1.00 | 1.22 | 1.41 | 1.55 |



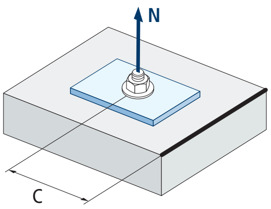

| Influence of spacing between anchors (concrete cone) $\Psi_{s,N}$ | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $s/s_{cr,N}$ | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| $\Psi_{s,N}$ | 0.55 | 0.60 | 0.65 | 0.70 | 0.75 | 0.80 | 0.85 | 0.90 | 0.95 | 1.00 |

$$\Psi_{s,N} = 0.5\left(1 + \frac{s}{s_{cr,N}}\right) \leq 1$$



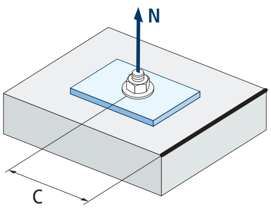

| Influence of spacing between anchors (cracking) $\Psi_{s,N}$ | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $s/s_{cr,sp}$ | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| $\Psi_{s,sp}$ | 0.55 | 0.60 | 0.65 | 0.70 | 0.75 | 0.80 | 0.85 | 0.90 | 0.95 | 1.00 |

$$\Psi_{s,sp} = 0.5\left(1 + \frac{s}{s_{cr,sp}}\right) \leq 1$$



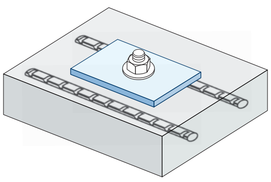

| Influence of the distance from the edge of the concrete (concrete cone) $\Psi_{c,N}$ | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $c/C_{cr,N}$ | 0.1 | 0.2 | 0.3 | 0.5 | 0.6 | 0.8 | 0.9 | 1.1 | 1.2 | 1.4 | 1.5 | 1.6 |
| $\Psi_{c,N}$ | 0.40 | 0.46 | 0.51 | 0.45 | 0.49 | 0.55 | 0.61 | 0.67 | 0.75 | 0.83 | 0.91 | 1.00 |

$$\Psi_{c,N} = 0.35 + \frac{0.5 \cdot c}{C_{cr,N}} + \frac{0.15 \cdot c^2}{C_{cr,N}^{2}} \leq 1$$



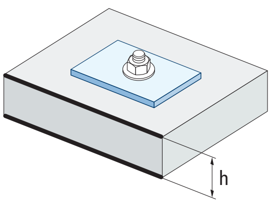

| Influence of the distance from the edge of the concrete (cracking) $\Psi_{c,sp}$ | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $c/C_{cr,sp}$ | 0.1 | 0.2 | 0.3 | 0.5 | 0.6 | 0.8 | 0.9 | 1.1 | 1.2 | 1.4 | 1.5 | 1.6 |
| $\Psi_{c,sp}$ | 0.40 | 0.46 | 0.51 | 0.45 | 0.49 | 0.55 | 0.61 | 0.67 | 0.75 | 0.83 | 0.91 | 1.00 |

$$\Psi_{c,sp} = 0.35 + \frac{0.5 \cdot c}{C_{cr,sp}} + \frac{0.15 \cdot c^2}{C_{cr,sp}^{2}} \leq 1$$



| Influence of the rebars $\Psi_{re,N}$ | | | | | |
|---|---|---|---|---|---|
| $h_{ef}$ (mm) | 64 | 70 | 80 | 90 | 100 |
| $\Psi_{re,N}$ | 0.82 | 0.85 | 0.90 | 0.95 | 1.00 |

$$\Psi_{re,N} = 0.5 + \frac{h_{ef}}{200} \leq 1$$




| Influence of the base material thickness $\Psi_{h,sp}$ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $\Psi_{h,sp}$ | $h/h_{ef}$ | 2.00 | 2.20 | 2.40 | 2.60 | 2.80 | 3.00 | 3.20 | 3.40 | 3.60 | 3.68 |
| | fh | 1.00 | 1.07 | 1.13 | 1.19 | 1.25 | 1.31 | 1.37 | 1.42 | 1.48 | 1.50 |

$$\Psi_{h,sp} = \left(\frac{h}{2 \cdot h_{ef}}\right)^{2/3} \leq 1.5$$

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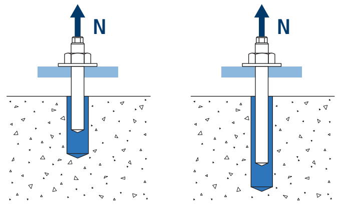
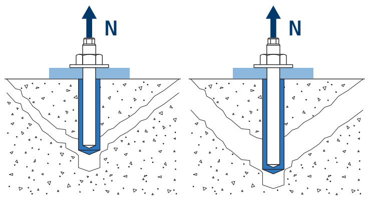
| Influence of the effective depth for the extraction combination $\Psi_{hef,p}$ | | | | | | |
|---|---|---|---|---|---|---|
| Metric $h_{ef}$ | M8 | M10 | M12 | M16 | M20 | M24 |
| 64 | 0,80 | | | | | |
| 80 | 1,00 | 0,89 | | | | |
| 90 | 1,13 | 1,00 | 0,82 | | **Value not permitted** | |
| 96 | 1,20 | 1,07 | 0,87 | | | |
| 110 | | 1,22 | 1,00 | | | |
| 120 | | 1,33 | 1,09 | | | |
| 128 | | | 1,16 | 1,00 | | |
| 144 | | | 1,31 | 1,13 | | |
| 160 | | | | 1,25 | 0,94 | |
| 170 | | | | 1,33 | 1,00 | |
| 192 | | **Value not permitted** | | 1,50 | 1,13 | 0,91 |
| 210 | | | | | 1,24 | 1,00 |
| 240 | | | | | 1,41 | 1,14 |
| 288 | | | | | | 1,37 |




$$\Psi_{hef,p} = \frac{h_{ef}}{h_{stand}}$$

| Influence of the effective depth for the concrete cone $\Psi_{hef,N}$ | | | | | | |
|---|---|---|---|---|---|---|
| Metric $h_{ef}$ | M8 | M10 | M12 | M16 | M20 | M24 |
| 64 | 0,72 | | | | | |
| 80 | 1,00 | 0,84 | | | | |
| 90 | 1,19 | 1,00 | | | **Value not permitted** | |
| 96 | 1,31 | 1,10 | 0,82 | | | |
| 110 | 1,61 | 1,35 | 1,00 | | | |
| 120 | 1,84 | 1,54 | 1,14 | 0,91 | | |
| 128 | 2,02 | 1,70 | 1,26 | 1,00 | 0,65 | |
| 144 | | 2,02 | 1,50 | 1,19 | 0,78 | |
| 160 | | 2,37 | 1,75 | 1,40 | 0,91 | 0,67 |
| 170 | | 2,60 | 1,92 | 1,53 | 1,00 | 0,73 |
| 192 | | | 2,31 | 1,84 | 1,20 | 0,87 |
| 210 | | | 2,64 | 2,10 | 1,37 | 1,00 |
| 240 | **Value not permitted** | | 3,22 | 2,57 | 1,68 | 1,22 |
| 288 | | | | 3,38 | 2,21 | 1,61 |

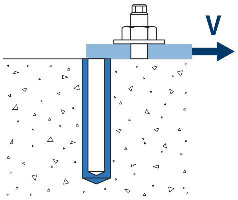



$$\Psi_{hef,N} = \left(\frac{h_{ef}}{h_{stand}}\right)^{1.5}$$

# MO-PU

## SHEARING LOADS

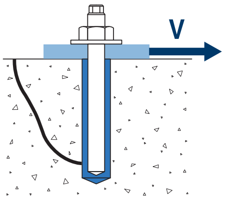
- Calculated steel resistance without lever arm: $V_{Rd,s}$
- Calculated spalling resistance: $V_{Rd,cp} = k \cdot N^{o}_{Rd,c}$
- Calculated concrete edge resistance: $V_{Rd,c} = V^{o}_{Rd,c} \cdot \Psi_b \cdot \Psi_{se,V} \cdot \Psi_{c,V} \cdot \Psi_{re,V} \cdot \Psi_{\alpha,V} \cdot \Psi_{h,V}$




**Calculated steel resistance to shearing**

$V_{Rd,s}$

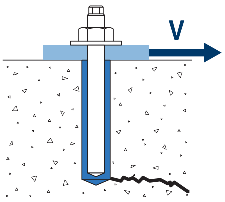
| | Metric | | M8 | M10 | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|---|---|---|
| $V^{o}_{Rd,s}$ | Steel class 5.8 | [kN] | 7,2 | 12 | 16,8 | 31,2 | 48,8 | 70,4 |
| | Steel class 8.8 | [kN] | 12 | 18,4 | 27,2 | 50,4 | 78,4 | 112,8 |
| | Steel class 10.9 | [kN] | 12 | 19,3 | 28 | 52,7 | 82 | 118 |
| | Stainless steel Class A2-70, A4-70 | [kN] | 8,3 | 12,8 | 19,2 | 35,3 | 55,1 | 79,5 |




**Calculated spalling resistance**

$V_{Rd,cp} = k \cdot N^{o}_{Rd,c}$

| Metric | M8 | M10 | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|---|
| k | 2 | | | | | |

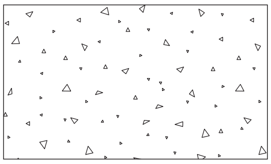



**Calculated concrete edge resistance**

$V_{Rd,c} = V^{o}_{Rd,c} \cdot \Psi_b \cdot \Psi_{se,V} \cdot \Psi_{c,V} \cdot \Psi_{re,V} \cdot \Psi_{\alpha,V} \cdot \Psi_{h,V}$

| | Metric | | M8 | M10 | M12 | M16 | M20 | M24 |
|---|---|---|---|---|---|---|---|---|
| $V^{o}_{Rd,c}$ | Non-cracked concrete | [kN] | 5,7 | 8,6 | 11,8 | 19,0 | 28,3 | 36,4 |

## Influence coefficients



$$\Psi_b = \sqrt{\frac{f_{ck,cube}}{25}} \geq 1$$

**Influence of concrete resistance for concrete cone and concrete cracking $\Psi_b$**

| Concrete type | C20/25 | C30/37 | C40/50 | C50/60 |
|---|---|---|---|---|
| $\Psi_b$ | 1,00 | 1,22 | 1,41 | 1,55 |

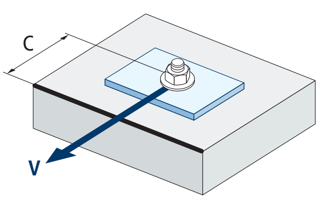
**Influence of the distance from the edge and spacing between anchors $\Psi_{se,V}$**

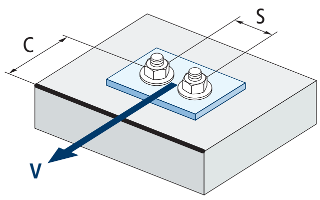
For one anchor

| $c/h_{ef}$ | 0,50 | 0,75 | 1,00 | 1,25 | 1,50 | 1,75 | 2,00 | 2,25 | 2,50 | 2,75 | 3,00 | 3,25 | 3,50 | 3,75 | 4,00 | 4,50 | 5,00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Insulated | 0,35 | 0,65 | 1,00 | 1,40 | 1,84 | 2,32 | 2,83 | 3,38 | 3,95 | 4,56 | 5,20 | 5,86 | 6,55 | 7,26 | 8,00 | 9,55 | 11,18 |

For two anchors

| s/c | $c/h_{ef}$ | 0,50 | 0,75 | 1,00 | 1,25 | 1,50 | 1,75 | 2,00 | 2,25 | 2,50 | 2,75 | 3,00 | 3,25 | 3,50 | 3,75 | 4,00 | 4,50 | 5,00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1,0 | 0,24 | 0,43 | 0,67 | 0,93 | 1,22 | 1,54 | 1,89 | 2,25 | 2,64 | 3,04 | 3,46 | 3,91 | 4,37 | 4,84 | 5,33 | 6,36 | 7,45 |
| | 1,5 | 0,27 | 0,49 | 0,75 | 1,05 | 1,38 | 1,74 | 2,12 | 2,53 | 2,96 | 3,42 | 3,90 | 4,39 | 4,91 | 5,45 | 6,00 | 7,16 | 8,39 |
| | 2,0 | 0,29 | 0,54 | 0,83 | 1,16 | 1,53 | 1,93 | 2,36 | 2,81 | 3,29 | 3,80 | 4,33 | 4,88 | 5,46 | 6,05 | 6,67 | 7,95 | 9,32 |
| | 2,5 | 0,32 | 0,60 | 0,92 | 1,28 | 1,68 | 2,12 | 2,59 | 3,09 | 3,62 | 4,18 | 4,76 | 5,37 | 6,00 | 6,66 | 7,33 | 8,75 | 10,25 |
| | ≥ 3,0 | 0,35 | 0,65 | 1,00 | 1,40 | 1,84 | 2,32 | 2,83 | 3,38 | 3,95 | 4,56 | 5,20 | 5,86 | 6,55 | 7,26 | 8,00 | 9,55 | 11,18 |



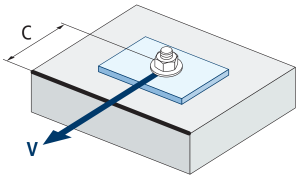

$$\Psi_{se,V} = \left(\frac{c}{h_{ef}}\right)^{1.5}$$

$$\Psi_{se,V} = \left(\frac{c}{h_{ef}}\right)^{1.5} \cdot \left(1 + \frac{s}{3 \cdot c}\right) \cdot 0.5 \leq \left(\frac{c}{h_{ef}}\right)^{1.5}$$

# MO-PU

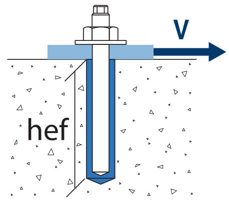
| Influence of the distance from the edge of the concrete $\Psi_{c,V}$ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| c/d | 4 | 5 | 7 | 10 | 15 | 20 | 25 | 30 |
| $\Psi_{c,V}$ | 0,76 | 0,72 | 0,68 | 0,63 | 0,58 | 0,55 | 0,53 | 0,51 |

$$\Psi_{c,V} = \left(\frac{d}{c}\right)^{0.20}$$

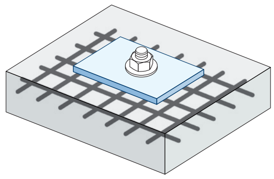



| Influence of the effective depth $\Psi_{hef,V}$ | | | | | |
|---|---|---|---|---|---|
| $h_{ef}/d$ | 8 | 9 | 10 | 11 | 12 |
| $\Psi_{hef,V}$ | 1,65 | 2,04 | 2,47 | 2,93 | 3,42 |

$$\Psi_{hef,V} = 0.04 \cdot \left(\frac{h_{ef}}{d}\right)^{1.79}$$

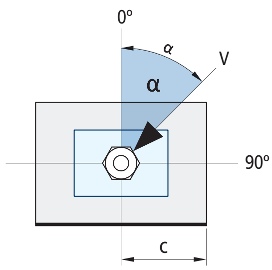



| Influence of the rebars $\Psi_{re,v}$ | | | | |
|---|---|---|---|---|
| | | Without perimeter rebar | Perimeter rebar ≥Ø12mm | Perimeter rebar with abutments at≤100mm |
| $\Psi_{re,v}$ | Non-cracked concrete | 1 | 1 | 1 |



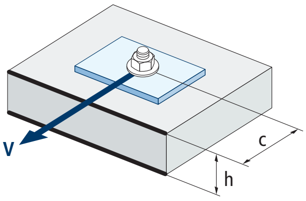
| Influence of the load application angle $\Psi_{\alpha,v}$ | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Angle, α(°) | 0° | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° |
| $\Psi_{\alpha,v}$ | 1,00 | 1,01 | 1,05 | 1,13 | 1,24 | 1,40 | 1,64 | 1,97 | 2,32 | 2,50 |

$$\Psi_{\alpha,v} = \sqrt{\frac{1}{(\cos\alpha_v)^2 + \left(\frac{\sin\alpha_v}{2.5}\right)^2}} \geq 1$$




| Influence of the base material thickness $\Psi_{h,v}$ | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| h/c | 0,67 | 0,75 | 0,85 | 0,95 | 1,10 | 1,30 | 1,65 | 2,25 | 3,30 | 6,65 |
| $\Psi_{h,v}$ | 1,00 | 1,06 | 1,13 | 1,19 | 1,28 | 1,40 | 1,57 | 1,84 | 2,22 | 3,16 |

$$\Psi_{h,v} = \left(\frac{h}{1.5 \cdot c}\right)^{0.5} \geq 1.0$$



# MO-PU

## FIXING IN BRICKS

| INSTALLATION PARAMETERS IN BRICKS. PLASTIC SLEEVE | | | | |
|---|---|---|---|---|
| DIMENSION | | M8 | M10 | M12 |
| Plastic sleeve | ls | | 85 | |
| | $d_o$ | 15 | 15 | 20 |
| Mortar volume per sleeve | [ml] | 15 | 15 | 27 |
| $h_1$ drill hole depth ≥ | [mm] | 90 | 90 | 90 |
| $h_{nom}$ sleeve installation depth | [mm] | 85 | 85 | 85 |
| $h_{ef}$ stud depth ≥ | [mm] | 80 | 80 | 80 |
| $t_{fix}$ thickness material to be fixed ≤ | [mm] | 22 | 25 | 18 |
| $h_{min}$ base material thickness ≥ | [mm] | 110 | 110 | 110 |
| $d_f$ diameter in metal sheet ≤ | [mm] | 9 | 12 | 14 |
| $T_{ins}$ tightening torque ≤ | [Nm] | 2 | 2 | 2 |
| Circular brush | | | ø20 | |
| Stud code |  | MOES08110 | MOES10115 | MOES12110 |
| Sleeve code |  | MOTN15085 | MOTN15085 | MOTN20085 |

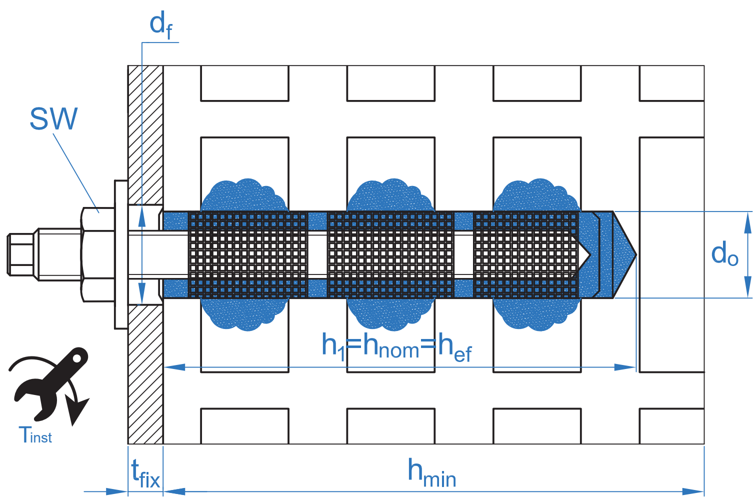
| BASE MATERIAL | | PLASTIC SLEEVE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | M8 | | | M10 | | | M12 | | |
| Minimum distances and from the edge | | $c_{cr} = c_{min}$ | $s_{cr\,II} = s_{min\,II}$ | $s_{min\perp} = c_{min\perp}$ | $c_{cr} = c_{min}$ | $s_{cr\,II} = s_{min\,II}$ | $s_{min\perp} = c_{min\perp}$ | $c_{cr} = c_{min}$ | $s_{cr\,II} = s_{min\,II}$ | $s_{min\perp} = c_{min\perp}$ |
| Brick number 1 | [mm] | 100 | 235 | 115 | 100 | 235 | 115 | 120 | 235 | 115 |
| Brick number 2 | [mm] | 100 | 240 | 113 | 100 | 240 | 113 | 120 | 240 | 113 |
| Brick number 3 | [mm] | 100 | 237 | 237 | 100 | 237 | 237 | 120 | 250 | 237 |
| Brick number 4 | [mm] | 128 | 255 | 255 | 128 | 255 | 255 | 128 | 255 | 255 |
| Brick number 5 | [mm] | 128 | 255 | 255 | 128 | 255 | 255 | 128 | 255 | 255 |
| Brick number 6 | [mm] | 100 | 250 | 240 | 100 | 250 | 240 | 120 | 250 | 240 |
| Brick number 7 | [mm] | 100 | 250 | 248 | 100 | 250 | 248 | - | - | - |
| Brick number 8 | [mm] | 100 | 250 | 248 | 100 | 250 | 248 | 120 | 250 | 248 |
| Brick number 9 | [mm] | 100 | 370 | 238 | 100 | 370 | 238 | 120 | 370 | 238 |

# MO-PU

## INSTALLATION PARAMETERS IN BRICKS. METAL SLEEVE

| DIMENSION | | | M8 | M10 | M12 |
|---|---|---|---|---|---|
| Plastic sleeve | | ls | | 85 | |
| | | $d_o$ | 15 | 20 | 20 |
| Mortar volume per sleeve | | [ml] | 15 | 15 | 20 |
| $h_1$ | drill hole depth ≥ | [mm] | 90 | 90 | 90 |
| $h_{nom}$ | inst. depth plastic sleeve | [mm] | 85 | 85 | 85 |
| $h_{ef}$ | stud depth ≥ | [mm] | 80 | 80 | 80 |
| $t_{fix}$ | thickness material to be fixed ≤ | [mm] | 22 | 25 | 18 |
| $h_{min}$ | base material thickness ≥ | [mm] | 110 | 110 | 110 |
| $d_f$ | diameter in metal sheet ≤ | [mm] | 9 | 12 | 14 |
| $T_{ins}$ | tightening torque ≤ | [Nm] | 2 | 2 | 2 |
| Circular brush | | | | ø20 | |
| Stud code |  | | MOES08110 | MOES10115 | MOES12110 |
| Sleeve code |  | | MOTN15085 | MOTN15085 | MOTN20085 |
| Threaded sleeve code |  | | MOTRO08 | MOTRO10 | MOTRO12 |

| BASE MATERIAL | | PLASTIC SLEEVE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | M8 | | | M10 | | | M12 | | |
| Minimum distances and from the edge | | $c_{cr} = c_{min}$ | $s_{cr\,II} = s_{min\,II}$ | $s_{min\,\perp} = c_{min\,\perp}$ | $c_{cr} = c_{min}$ | $s_{cr\,II} = s_{min\,II}$ | $s_{min\,\perp} = c_{min\,\perp}$ | $c_{cr} = c_{min}$ | $s_{cr\,II} = s_{min\,II}$ | $s_{min\,\perp} = c_{min\,\perp}$ |
| Brick number 1 | [mm] | 100 | 235 | 115 | 120 | 235 | 115 | 120 | 235 | 115 |
| Brick number 2 | [mm] | 100 | 240 | 113 | 120 | 240 | 113 | 120 | 240 | 113 |
| Brick number 3 | [mm] | - | - | - | 120 | 250 | 237 | 120 | 250 | 237 |
| Brick number 4 | [mm] | 128 | 255 | 255 | 128 | 255 | 255 | 128 | 255 | 255 |
| Brick number 5 | [mm] | 128 | 255 | 255 | 128 | 255 | 255 | 128 | 255 | 255 |
| Brick number 6 | [mm] | 100 | 250 | 240 | 120 | 250 | 240 | 120 | 250 | 240 |
| Brick number 7 | [mm] | 100 | 250 | 248 | 120 | 250 | 248 | 120 | 250 | 248 |
| Brick number 8 | [mm] | - | - | - | 120 | 250 | 248 | 120 | 250 | 248 |
| Brick number 9 | [mm] | 100 | 370 | 238 | 120 | 370 | 238 | 120 | 370 | 238 |

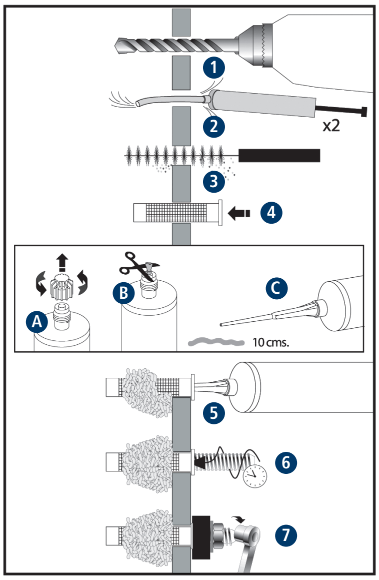


# MO-PU

| INSTALLATION ACCESSORIES | | |
|---|---|---|
| CODE | PRODUCT | MATERIAL |
| **MOPISSI** | APPLICATION GUNS | Gun for 300 ml cartridges |
| **MOPISTO** | APPLICATION GUNS | Guns for 410 ml cartridges, professional use |
| **MOPISNEU** | APPLICATION GUNS | Pneumatic gun for 410 ml coaxial cartridges, professional use |
| **MO-ES** | STUD | Threaded stud |
| **MORCEPKIT** | CLEANING BRUSHES | Kit with 3 cleaning brushes measuring ø14, ø20 and ø29 mm |
| **MOBOMBA** | CLEANING PUMP | Pump for cleaning leftover dust and fragments in the drill hole |
| **MORCANU** | MIXING TUBE | Plastic. Static labyrinth mixture |
| **MO-TN** | NYLON SLEEVE | Plastic white or grey |
| **MO-TR** | THREADED METAL SLEEVE | Threaded metal sleeve M8, M10, M12, zinc-plated |
| **MO-TM** | METAL SLEEVE | Metal sleeve ø12, ø16 and ø22 mm |

**INSTALLATION PROCEDURE**

BRICK




| MINIMUM CURING TIME | | | |
|---|---|---|---|
| TYPE | BASE MATERIAL TEMPERATURE [ºC] | HANDLING TIME [min] | CURING TIME [min] |
| **MO-PU** | min +5 | 12 | 180 |
| | +5 a +10 | 8 | 100 |
| | +10 a +20 | 4 | 70 |
| | +20 a +25 | 3 | 40 |
| | +25 a +30 | 2 | 40 |
| | 30 | 1 | 40 |

# MO-PU

## Characteristic resistances ($F_{Rk}$)

| Base material | Threaded studs Tensile and shear force [kN] | | | Threaded metal sleeve Tensile and shear force [kN] | | |
|---|---|---|---|---|---|---|
| | M8 | M10 | M12 | M8 | M10 | M12 |
| Brick number 1 | 2,50 | 2,0 | 2,0 | 1,5 | 2,50 | 2,50 |
| Brick number 2 | 0,75 | 1,2 | 0,5 | 0,6 | 0,75 | 0,90 |
| Brick number 3 | 0,75 | 1,2 | 0,5 | - | 0,75 | 0,40 |
| Brick number 4 | 1,50 | 1,5 | 3,0 | 2,0 | 3,00 | 4,00 |
| Brick number 5 | 0,75 | 0,9 | 1,5 | 2,0 | 1,50 | 0,90 |
| Brick number 6 | 1,20 | 1,2 | 0,9 | 0,9 | 1,50 | 0,60 |
| Brick number 7 | 0,60 | 0,2 | - | 0,5 | 0,30 | 0,75 |
| Brick number 8 | 0,60 | 1,5 | 1,2 | - | 0,40 | 0,60 |
| Brick number 9 | 2,50 | 1,5 | 2,5 | 0,6 | 1,20 | 0,90 |

## Calculated resistances ($F_{Rd}$)

| Base material | Threaded studs Tensile and shear force [kN] | | | Threaded metal sleeve Tensile and shear force [kN] | | |
|---|---|---|---|---|---|---|
| | M8 | M10 | M12 | M8 | M10 | M12 |
| Brick number 1 | 1,00 | 0,80 | 0,80 | 0,60 | 1,00 | 1,00 |
| Brick number 2 | 0,30 | 0,48 | 0,20 | 0,24 | 0,30 | 0,36 |
| Brick number 3 | 0,30 | 0,48 | 0,20 | - | 0,30 | 0,16 |
| Brick number 4 | 0,60 | 0,60 | 1,20 | 0,80 | 1,20 | 1,60 |
| Brick number 5 | 0,30 | 0,36 | 0,60 | 0,80 | 0,60 | 0,36 |
| Brick number 6 | 0,48 | 0,48 | 0,36 | 0,36 | 0,60 | 0,24 |
| Brick number 7 | 0,24 | 0,08 | - | 0,20 | 0,12 | 0,30 |
| Brick number 8 | 0,24 | 0,60 | 0,48 | - | 0,16 | 0,24 |
| Brick number 9 | 1,00 | 0,60 | 1,00 | 0,24 | 0,48 | 0,36 |

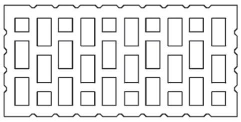
## Recommended maximum loads ($F_{recom}$) (with andF= 1.4)

| Base material | Threaded studs Tensile and shear force [kN] | | | Threaded metal sleeve Tensile and shear force [kN] | | |
|---|---|---|---|---|---|---|
| | M8 | M10 | M12 | M8 | M10 | M12 |
| Brick number 1 | 0,71 | 0,57 | 0,57 | 0,43 | 0,71 | 0,71 |
| Brick number 2 | 0,21 | 0,34 | 0,14 | 0,17 | 0,21 | 0,26 |
| Brick number 3 | 0,21 | 0,34 | 0,14 | - | 0,21 | 0,11 |
| Brick number 4 | 0,43 | 0,43 | 0,86 | 0,57 | 0,86 | 1,14 |
| Brick number 5 | 0,21 | 0,26 | 0,43 | 0,57 | 0,43 | 0,26 |
| Brick number 6 | 0,34 | 0,34 | 0,26 | 0,26 | 0,43 | 0,17 |
| Brick number 7 | 0,17 | 0,06 | - | 0,14 | 0,09 | 0,21 |
| Brick number 8 | 0,17 | 0,43 | 0,34 | - | 0,11 | 0,17 |
| Brick number 9 | 0,71 | 0,43 | 0,71 | 0,17 | 0,34 | 0,26 |

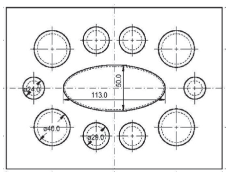
# MO-PU

## BRICK TYPES

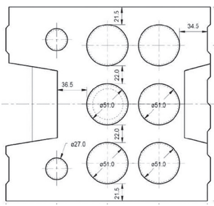
**Brick no. 1**
Hollow clay brick HLz
12-1,0-2DF according to EN 771-1
Length / width / height:
235 mm / 112 mm / 115 mm
fb ≥ 12 N/mm² / ρ ≥ 1.0 kg/dm³



**Brick no. 2**
Calcareous silico hollow brick KSL 12-1, 4-3DF according to EN 771-2
Length / width / height:
240 mm / 175 mm / 113 mm
fb ≥ 12 N/mm² / ρ ≥ 1.4 kg/dm³



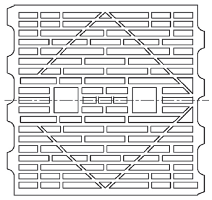
**Brick no. 3**
Silico-calcareous hollow brick KSL 12-1, 4-2DF in accordance with EN 771-2
Length / width / height:
250 mm / 240 mm / 237 mm
fb ≥ 12 N/mm² / ρ ≥ 1.4 kg/dm³



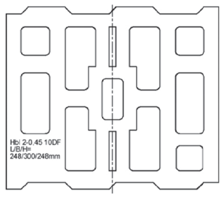
**Brick no. 4**
Fired clay solid brick Mz 12-2, 0-NF according to EN 771-1
Length / width / height:
240 mm / 116 mm / 71 mm
fb ≥ 12 N/mm² / ρ ≥ 2.0 kg/dm³

**Brick no. 5**
Silico-calcareous solid brick KS 12-2, 0-NF according to EN 771-2
Length / width / height:
240 mm / 115 mm / 70 mm
fb ≥ 12 N/mm² / ρ ≥ 2.0 kg/dm³

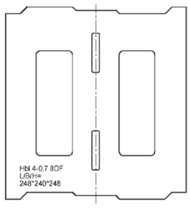
**Brick no. 6**
Fired clay hollow brick HLzW 6-0,7-8DF according to EN 771-1
Length / width / height:
250 mm / 240 mm / 240 mm
fb ≥ 6 N/mm² / ρ ≥ 0.8 kg/dm³



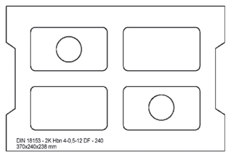
**Brick no. 7**
Lightweight concrete hollow block Hbl 2-0,45-10DF according to EN 771-3
Length / width / height:
250 mm / 300 mm / 248 mm
fb ≥ 2.0 N/mm² / ρ ≥ 0.45 kg/dm³



**Brick no. 8**
Lightweight concrete hollow block Hbl 4-0, 7-8DF according to EN 771-3
Length / width / height:
250 mm / 240 mm / 248 mm
fb ≥ 4.0 N/mm² / ρ ≥ 0.7 kg/dm³



**Brick no. 9**
Concrete block Hbn 4-12DF according to EN 771-3
Length / width / height:
370 mm / 240 mm / 238 mm
fb b ≥ 4 N/mm² / ρ ≥ 1.2 kg/dm³



## RANGE

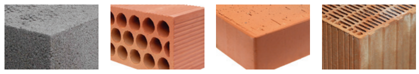
# MO-PU

300ml 410ml


## UNIVERSAL POLYESTER

STRUCTURAL FIXINGS IN UNCRACKED CONCRETE · ETA 20/0650 · ÉMISSIONS DANS L'AIR INTÉRIEUR A+ · LEED TESTED

| CODE | DIMENSION | |
|---|---|---|
| NORMAL | | |
| MOPU300 | 300 ml | 12 |
| MOPU410 | 410 ml | 12 |



Concrete · Hollow brick · Solid brick · Thermal clay

## Accessories for chemical anchor cartridges

### MO-PUIS Application guns


| CODE | MODEL |
|---|---|
| MOPISTO | Manual |
| MOPISPR | Professional 410 ml |
| MOPISSI | Silicone 300 ml |
| MOPISNEU | Pneumatic |

### MO-TN Plastic sleeve



Ny NYLON

| CODE | DIMENSION |
|---|---|
| MOTN12050 | 12 x 50 |
| MOTN12080 | 12 x 80 |
| MOTN15085 | 15 x 85 |
| MOTN15130 | 15 x 130 |
| MOTN20085 | 20 x 85 |

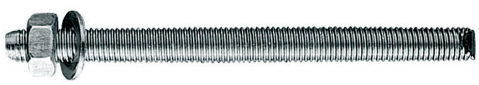
### MO-AC Mixing tubes and miscellaneous

MORCEPKIT
Kit 3 brushes (ø15, ø20, ø30)

MORCANU
MOBOMBA

| CODE | MODEL |
|---|---|
| MOBOMBA | Blower pump |
| MORCANU | Tube 170 - 300 - 410 ml |
| MORCEPKIT | Kit 3 brushes |

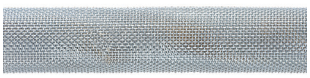
### MO-ES Threaded stud



Z ZINC

| CODE | DIMENSION |
|---|---|
| MOES06070 | M6 x 70 |
| MOES08110 | M8 x 110 |
| MOES10115 | M10 x 115 |
| MOES12110 | M12 x 110 |

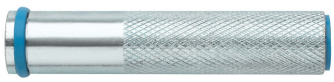
### MO-TM Metal sleeve



Z ZINC

| CODE | DIMENSION |
|---|---|
| MOTM12100 | 12 x 1000 |
| MOTM16100 | 16 x 1000 |
| MOTM22100 | 22 x 1000 |

### MO-TR Threaded sleeve



Z ZINC

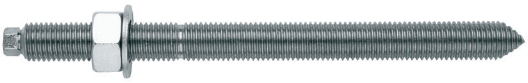
| CODE | DIMENSION |
|---|---|
| MOTRO08 | M8/12 x 80 |
| MOTRO10 | M10/14 x 80 |
| MOTRO12 | M12/16 x 80 |

# MO-PU

## Accessories for chemical anchor cartridges

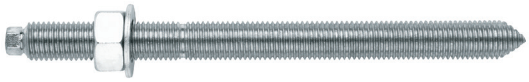
### Stud for chemical anchor with nut and washer


### EQ-AC Zinc-plated 5.8



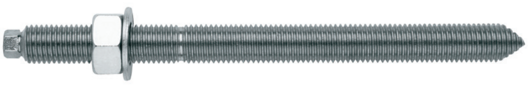
| CODE | DIMENSION |
|---|---|
| **EQAC08110** | M8 x 110 |
| **EQAC10130** | M10 x 130 |
| **EQAC10190** | M10 x 190 |
| **EQAC12160** | M12 x 160 |
| **EQAC12220** | M12 x 220 |
| **EQAC16190** | M16 x 190 |
| **EQAC16250** | M16 x 250 |
| **EQAC20260** | M20 x 260 |
| **EQAC20350** | M20 x 350 |
| **EQAC24300** | M24 x 300 |
| **EQAC24380** | M24 x 380 |
| **EQAC30330** | M30 x 330 |

### EQ-A2 Stainless steel A2



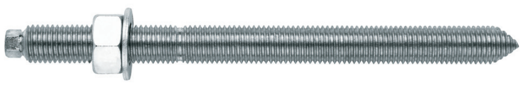
| CODE | DIMENSION |
|---|---|
| **EQA208110** | M8 x 110 |
| **EQA210130** | M10 x 130 |
| **EQA212160** | M12 x 160 |
| **EQA216190** | M16 x 190 |
| **EQA220260** | M20 x 260 |
| **EQA224300** | M24 x 300 |
| **EQA230330** | M30 x 330 |

### EQ-8.8 Zinc-plated 8.8



| CODE | DIMENSION |
|---|---|
| **EQ8808110** | M8 x 11040 |
| **EQ8810130** | M10 x 130 |
| **EQ8812160** | M12 x 160 |
| **EQ8816190** | M16 x 190 |
| **EQ8820260** | M20 x 260 |
| **EQ8824300** | M24 x 300 |

### EQ-A4 Stainless steel A4



| CODE | DIMENSION |
|---|---|
| **EQA408110** | M8 x 110 |
| **EQA410130** | M10 x 130 |
| **EQA412160** | M12 x 160 |
| **EQA416190** | M16 x 190 |
| **EQA420260** | M20 x 260 |
| **EQA424300** | M24 x 300 |
| **EQA430330** | M30 x 330 |