BUILDING TRUST

# Sika AnchorFix®-3030

## VYHLÁSENIE O PARAMETROCH
## č. 66629518

| | | |
|---|---|---|
| 1 | **JEDINEČNÝ IDENTIFIKAČNÝ KÓD TYPU VÝROBKU:** | 66629518 |
| 2 | **ZAMÝŠĽANÉ POUŽITIE/POUŽITIA:** | ETA 17/0694 z 11/07/2018<br>Injektážne kotvy na použitie v betóne s trhlinami aj bez trhlín |
| 3 | **VÝROBCA:** | Sika Services AG<br>Tüffenwies 16-22<br>8048 Zürich, Švajčiarsko |
| 4 | **SPLNOMOCNENÝ ZÁSTUPCA:** | Sika Slovensko, spol. s r.o.<br>Rybničná 38/e<br>831 06 Bratislava, Slovenská republika |
| 5 | **SYSTÉM(-Y) POSUDZOVANIA A OVEROVANIA NEMENNOSTI PARAMETROV:** | Systém 1 |
| 6b | **EURÓPSKY HODNOTIACI DOKUMENT:** | EAD 330499-00-0601 |
| | Európske technické posúdenie: | ETA 17/0694 z 11/07/2018 |
| | Orgán technického posudzovania: | TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA s.p. |
| | Notifikovaný(-é) subjekt(-y): | 1020 |

## 7 DEKLAROVANÉ PARAMETRE

**Reakcia na oheň** – kotvy vyhovujú požiadavkách pre triedu A1
**Odolnosť voči ohňu** – Nehodnotené

**Kotvenie vystavené:**

- Statickému a kvázistatickému zaťaženiu
- Seizmickým účinkom kategórie C1 (max. w = 0,5 mm): závitová tyč s rozmermi M12, M16, M20
- Seizmickým účinkom kategórie C2 (max. w = 0,8 mm): závitová tyč s rozmermi M12, M16, M20

**Podkladné materiály:**

- Betón s trhlinami a bez trhlín
- Vystužený alebo nevystužený betón s normálnou hmotnosťou s triedou pevnosti minimálne C20/25 a maximálne C50/60 podľa normy EN 206: 2013.

**Teplotné rozmedzie:**

- T3: -40°C až +70°C (maximálna krátkodobá teplota +70°C a maximálna dlhodobá teplota +50°C)

**Podmienky použitia (podmienky prostredia):**

- (X1) Konštrukcie vystavené suchým vnútorným podmienkam (pozinkovaná oceľ, nehrdzavejúca oceľ, oceľ s vysokou odolnosťou proti korózii).
- (X2) Konštrukcie vystavené vonkajšiemu atmosferickému zaťaženiu (vrátane priemyselného a morského prostredia) a trvale vlhkým vnútorným podmienkam, ak neexistujú žiadne osobitné agresívne podmienky (nehrdzavejúca oceľ A4, oceľ s vysokou odolnosťou proti korózii).
- (X3) Konštrukcie vystavené vonkajšiemu atmosferickému zaťaženiu a trvale vlhkým vnútorným podmienkam, ak neexistujú žiadne osobitné agresívne podmienky (oceľ s vysokou odolnosťou proti korózii).

Poznámka: Osobitné agresívne podmienky sú napr. trvalé, striedavé ponorenie do morskej vody alebo striekajúcej zóny morskej vody, chlórové prostredie vnútorných bazénov alebo prostredie s extrémnym chemickým znečistením (napr. v odsírovacích závodoch alebo cestných tuneloch, kde sa používajú odmrazovacie materiály).

**Podmienky betónu:**

- I1 – montáž do suchého alebo mokrého (vodou nasýteného) betónu alebo zaplaveného otvoru.
- I2 – montáž do vodou vyplneného betónu (nie morskej vody) a prevádzka v suchom alebo mokrom betóne

**Návrh kotvenia:**

- Kotvy sú navrhnuté v súlade s normou EN 1992-4 alebo technickou správou EOTA TR 055 v zodpovednosti inžiniera s praxou v oblasti kotviacej techniky a prípravy betónu.
- Musia byť pripravené overiteľné výpočty a výkresy s ohľadom na zaťaženie, ktoré má kotva prenášať. Poloha kotvy musí byť vyznačená na konštrukčných výkresoch.
- Kotvy so seizmickým zaťažením (betón s trhlinami) musia byť navrhnuté v súlade s normou EN 1992-4.

**Zabudovanie/ Montáž:**

- Vŕtanie otvorov pomocou vŕtačky s príklepom.
- Montáž kotiev sa musí vykonávať vhodne kvalifikovaným personálom a pod dohľadom osoby zodpovednej za technické záležitosti na stavbe.

**Smer montáže:**

D3 – montáž nadol a horizonálne a nahor (napr. nad hlavou)

- Table B1: Installation parameters of threaded rod

| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Nominal drill hole diameter | $Ød_0$ | [mm] | 10 | 12 | 14 | 18 | 22 | 26 | 30 | 35 |
| Cleaning brush | | | S11HF | S14HF | S14/15HF | S22HF | S24HF | S31HF | S31HF | S38HF |
| Torque moment | max $T_{inst}$ | [Nm] | 10 | 20 | 40 | 80 | 120 | 160 | 180 | 200 |
| Embedment depth for $h_{ef,min}$ | $h_{ef}$ | [mm] | 60 | 60 | 70 | 80 | 90 | 96 | 108 | 120 |
| Embedment depth for $h_{ef,max}$ | $h_{ef}$ | [mm] | 160 | 200 | 240 | 320 | 400 | 480 | 540 | 600 |
| Depth of drill hole | $h_0$ | [mm] | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 |
| Minimum edge distance | $c_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 50 | 60 |
| Minimum spacing | $s_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 50 | 60 |
| Minimum thickness of member | $h_{min}$ | [mm] | $h_{ef}$ + 30 mm ≥ 100 mm | | | $h_{ef}$ + $2d_0$ | | | | |

- Table B2: Installation parameters of rebar

| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
|---|---|---|---|---|---|---|---|---|---|
| Nominal drill hole diameter | $Ød_0$ | [mm] | 12 | 14 | 16 | 20 | 25 | 32 | 40 |
| Cleaning brush | | | S12/13HF | S14/15HF | S18HF | S22HF | S27HF | S35HF | S43HF |
| Torque moment | max $T_{inst}$ | [Nm] | 10 | 20 | 40 | 80 | 120 | 180 | 200 |
| Min. embedment depth | | | | | | | | | |
| Embedment depth for $h_{ef,min}$ | $h_{ef}$ | [mm] | 60 | 60 | 70 | 80 | 90 | 100 | 128 |
| Embedment depth for $h_{ef,max}$ | $h_{ef}$ | [mm] | 160 | 200 | 240 | 320 | 400 | 500 | 640 |
| Depth of drill hole | $h_0$ | [mm] | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 |
| Minimum edge distance | $c_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 70 |
| Minimum spacing | $s_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 70 |
| Minimum thickness of member | $h_{min}$ | [mm] | $h_{ef}$ + 30 mm ≥ 100 mm | | | $h_{ef}$ + $2d_0$ | | | |

- Table B3: Cleaning

| All diameters |
|---|
| - 2 x blowing |
| - 2 x brushing |
| - 2 x blowing |
| - 2 x brushing |
| - 2 x blowing |

- Table B4: Minimum curing time

| Base Material Temperature [°C] | Cartridge Temperature [°C] | T Work [mins] | T Load [hrs] |
|---|---|---|---|
| +5 | Minimum +10 | 300 | 24 |
| +5°C to +10 | | 150 | |
| +10°C to +15 | +10°C to +15 | 40 | 18 |
| +15°C to +20 | +15°C to +20 | 25 | 12 |
| +20°C to +25 | +20°C to +25 | 18 | 8 |
| +25°C to +30 | +25°C to +30 | 12 | 6 |
| +30°C to +35 | +30°C to +35 | 8 | 4 |
| +35°C to +40 | +35°C to +40 | 6 | 2 |
| Ensure cartridge is ≥ 10°C | | | |

- T Work is typical gel time at highest base material temperature in the range.
- T Load is minimum set time required until load can be applied at the lowest temperature in the range.

**Table C1:** Design method EN 1992-4
Characteristic values of resistance to tension load of threaded rod

| Steel failure – Characteristic resistance | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| Steel grade 4.6 | $N_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 2,00 | | | | | | | |
| Steel grade 5.8 | $N_{Rk,s}$ | [kN] | 18 | 29 | 42 | 79 | 123 | 177 | 230 | 281 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Steel grade 8.8 | $N_{Rk,s}$ | [kN] | 29 | 46 | 67 | 126 | 196 | 282 | 367 | 449 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Steel grade 10.9 | $N_{Rk,s}$ | [kN] | 37 | 58 | 84 | 157 | 245 | 353 | 459 | 561 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | | | | | | |
| Stainless steel grade A2-70, A4-70 | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 172 | 247 | 321 | 393 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,87 | | | | | | | |
| Stainless steel grade A4-80 | $N_{Rk,s}$ | [kN] | 29 | 46 | 67 | 126 | 196 | 282 | 367 | 449 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,60 | | | | | | | |
| Stainless steel grade 1.4529 | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 172 | 247 | 321 | 393 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Stainless steel grade 1.4565 | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 172 | 247 | 321 | 393 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,87 | | | | | | | |
| **Combined pullout and concrete cone failure in concrete C20/25** | | | | | | | | | | |
| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| **Characteristic bond resistance in uncracked concrete** | | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,ucr}$ | [N/mm²] | 17 | 15 | 15 | 12 | 12 | 12 | 11 | 9,5 |
| Dry, wet concrete, flooded hole | | | | | | | | | | |
| Partial safety factor | $\gamma_2$[1]=$\gamma_{inst}$[2] | [-] | 1,0 | | | | | | | |
| Factor for uncracked concrete | C25/30 | $\psi_c$ | [-] | 1,02 | | | | | | |
| | C30/37 | | | 1,04 | | | | | | |
| | C35/45 | | | 1,06 | | | | | | |
| | C40/50 | | | 1,07 | | | | | | |
| | C45/55 | | | 1,08 | | | | | | |
| | C50/60 | | | 1,09 | | | | | | |
| **Characteristic bond resistance in cracked concrete** | | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,cr}$ | [N/mm²] | 10 | 10 | 10 | 9,5 | 9 | 9 | 6 | 6 |
| Dry, wet concrete, flooded hole | | | | | | | | | | |
| Partial safety factor | $\gamma_2$[1]=$\gamma_{inst}$[2] | [-] | 1,0 | | | | | | | |
| Factor for cracked concrete | C25/30 | $\psi_c$ | [-] | 1,02 | | | | | | |
| | C30/37 | | | 1,04 | | | | | | |
| | C35/45 | | | 1,06 | | | | | | |
| | C40/50 | | | 1,07 | | | | | | |
| | C45/55 | | | 1,08 | | | | | | |
| | C50/60 | | | 1,09 | | | | | | |
| **Concrete cone failure** | | | | | | | | | | |
| Factor for concrete cone failure for uncracked concrete | $k_1$[1] | [-] | 10,1 | | | | | | | |
| | $k_{ucr,N}$[2] | | 11 | | | | | | | |
| Factor for concrete cone failure for cracked concrete | $k_1$[1] | | 7,2 | | | | | | | |
| | $k_{cr,N}$[2] | | 7,7 | | | | | | | |
| Edge distance | $c_{cr,N}$ | [mm] | $1,5h_{ef}$ | | | | | | | |
| **Splitting failure** | | | | | | | | | | |
| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| Edge distance | $c_{cr,sp}$ | [mm] | $2 \cdot h_{ef}$ | | | | | | | |
| Spacing | $s_{cr,sp}$ | [mm] | $2 \cdot c_{cr,sp}$ | | | | | | | |
| Partial safety factor | $\gamma_{Msp}$ | [-] | 1,5 | | | | | | | |

[1] Design according EOTA Technical Report TR 055
[2] Design according EN 1992-4:2016

**Table C2:** Design method EN 1992-4
Characteristic values of resistance to tension load of rebar

| Steel failure – Characteristic resistance | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Rebar BSt 500 S | $N_{Rk,s}$ | [kN] | 28 | 43 | 62 | 111 | 173 | 270 | 442 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,4 | | | | | | |

| Pullout failure in concrete C20/25 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Characteristic bond resistance in uncracked concrete | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,ucr}$ | [N/mm²] | 13 | 13 | 13 | 12 | 12 | 12 | 8 |
| Dry and wet concrete | | | | | | | | | |
| Installation safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,0 | | | | | | |
| Flooded hole | | | | | | | | | |
| Installation safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,2 | | | | | | |
| Factor for uncracked concrete | C25/30 | [-] | 1,02 | | | | | | |
| | C30/37 | | 1,04 | | | | | | |
| | C35/45 | | 1,06 | | | | | | |
| | C40/50 | $\psi_c$ | 1,07 | | | | | | |
| | C45/55 | | 1,08 | | | | | | |
| | C50/60 | | 1,09 | | | | | | |
| Characteristic bond resistance in cracked concrete | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,cr}$ | [N/mm²] | 8 | 11 | 10 | 10 | 9 | 8,5 | 6 |
| Dry and wet concrete | | | | | | | | | |
| Installation safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,0 | | | | | | |
| Flooded hole | | | | | | | | | |
| Installation safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,2 | | | | | | |
| Factor for cracked concrete | C25/30 | [-] | 1,02 | | | | | | |
| | C30/37 | | 1,04 | | | | | | |
| | C35/45 | | 1,06 | | | | | | |
| | C40/50 | $\psi_c$ | 1,07 | | | | | | |
| | C45/55 | | 1,08 | | | | | | |
| | C50/60 | | 1,09 | | | | | | |

| Concrete cone failure | | | |
|---|---|---|---|
| Factor for concrete cone failure | $k_1$ [1] | [-] | 10,1 |
| for uncracked concrete | $k_{ucr,N}$ [2] | | 11 |
| Factor for concrete cone failure | $k_1$ [1] | | 7,2 |
| for cracked concrete | $k_{cr,N}$ [2] | | 7,7 |
| Edge distance | $c_{cr,N}$ | [mm] | $1{,}5h_{ef}$ |

| Splitting failure | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Edge distance | $c_{cr,sp}$ | [mm] | $2 \cdot h_{ef}$ | | | | | | |
| Spacing | $s_{cr,sp}$ | [mm] | $2 \cdot c_{cr,sp}$ | | | | | | |
| Partial safety factor Dry and wet concrete | $\gamma_{Msp}$ | [-] | 1,5 | | | | | | |
| Partial safety factor Flooded hole | $\gamma_{Msp}$ | [-] | 1,8 | | | | | | |

[1] Design according EOTA Technical Report TR 055
[2] Design according EN 1992-4:2016

**Table C3:** Design method EN 1992-4
Characteristic values of resistance to shear load of threaded rod

| Steel failure without lever arm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| Steel grade 4.6 | $V^0_{Rk,s}$ | [kN] | 7 | 12 | 17 | 31 | 49 | 71 | 92 | 112 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,67 | | | | | | | |
| Steel grade 5.8 | $V^0_{Rk,s}$ | [kN] | 9 | 15 | 21 | 39 | 61 | 88 | 115 | 140 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade 8.8 | $V^0_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade 10.9 | $V^0_{Rk,s}$ | [kN] | 18 | 29 | 42 | 79 | 123 | 177 | 230 | 281 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,5 | | | | | | | |
| Stainless steel grade A2-70, A4-70 | $V^0_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | 161 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Stainless steel grade A4-80 | $V^0_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | | | | | | |
| Stainless steel grade 1.4529 | $V^0_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | 161 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Stainless steel grade 1.4565 | $V^0_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | 161 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Characteristic resistance of group of fasteners | | | | | | | | | | |
| Ductility factor $k_7$ = 1,0 for steel with rupture elongation $A_5$ > 8% | | | | | | | | | | |

| Steel failure with lever arm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| Steel grade 4.6 | $M^{0}_{Rk,s}$ | [N.m] | 15 | 30 | 52 | 133 | 260 | 449 | 666 | 900 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,67 | | | | | | | |
| Steel grade 5.8 | $M^{0}_{Rk,s}$ | [N.m] | 19 | 37 | 66 | 166 | 325 | 561 | 832 | 1125 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade 8.8 | $M^{0}_{Rk,s}$ | [N.m] | 30 | 60 | 105 | 266 | 519 | 898 | 1332 | 1799 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade 10.9 | $M^{0}_{Rk,s}$ | [N.m] | 37 | 75 | 131 | 333 | 649 | 1123 | 1664 | 2249 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Stainless steel grade A2-70, A4-70 | $M^{0}_{Rk,s}$ | [N.m] | 26 | 52 | 92 | 233 | 454 | 786 | 1165 | 1574 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Stainless steel grade A4-80 | $M^{0}_{Rk,s}$ | [N.m] | 30 | 60 | 105 | 266 | 519 | 898 | 1332 | 1799 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | | | | | | |
| Stainless steel grade 1.4529 | $M^{0}_{Rk,s}$ | [N.m] | 26 | 52 | 92 | 233 | 454 | 786 | 1165 | 1574 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Stainless steel grade 1.4565 | $M^{0}_{Rk,s}$ | [N.m] | 26 | 52 | 92 | 233 | 454 | 786 | 1165 | 1574 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Concrete pryout failure | | | | | | | | | | |
| Factor for resistance to pry-out failure | $k_8$ | [-] | 2 | | | | | | | |

| Concrete edge failure | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| Outside diameter of fastener | $d_{nom}$ | [mm] | 8 | 10 | 12 | 16 | 20 | 24 | 27 | 30 |
| Effective length of fastener | $\ell_f$ | [mm] | min ($h_{ef}$, 8 $d_{nom}$) | | | | | | | |

Table C4: Design method EN 1992-4
Characteristic values of resistance to shear load of rebar

| Steel failure without lever arm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Rebar BSt 500 S | $V^0_{Rk,s}$ | [kN] | 14 | 22 | 31 | 55 | 86 | 135 | 221 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,5 | | | | | | |
| Characteristic resistance of group of fasteners | | | | | | | | | |
| Ductility factor | $k_7$ = 1,0 for steel with rupture elongation $A_5$ > 8% | | | | | | | | |

| Steel failure with lever arm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Rebar BSt 500 S | $M^0_{Rk,s}$ | [N.m] | 33 | 65 | 112 | 265 | 518 | 1013 | 2122 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,5 | | | | | | |
| Concrete pryout failure | | | | | | | | | |
| Factor for resistance to pry-out failure | $k_8$ | [-] | 2 | | | | | | |

| Concrete edge failure | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Outside diameter of fastener | $d_{nom}$ | [mm] | 8 | 10 | 12 | 16 | 20 | 25 | 32 |
| Effective length of fastener | $\ell_f$ | [mm] | min ($h_{ef}$, 8 $d_{nom}$) | | | | | | |

Table C5: Displacement of threaded rod under tension and shear load

| Size | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|
| Tension load | | | | | | | | | |
| Uncracked concrete | | | | | | | | | |
| F | [kN] | 11,9 | 14,3 | 19,0 | 23,8 | 35,7 | 35,7 | 45,2 | 45,2 |
| $\delta_{ND}$ | [mm] | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 |
| $\delta_{N\infty}$ | [mm] | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 |
| Cracked concrete | | | | | | | | | |
| F | [kN] | 5,7 | 9,5 | 14,3 | 16,7 | 23,8 | 28,6 | 28,6 | 28,6 |
| $\delta_{ND}$ | [mm] | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,6 | 0,6 | 0,7 |
| $\delta_{N\infty}$ | [mm] | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
| Shear load | | | | | | | | | |
| F | [kN] | 3,5 | 5,5 | 8,0 | 15,0 | 23,3 | 33,6 | 43,7 | 53,4 |
| $\delta_{V0}$ | [mm] | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 |
| $\delta_{V\infty}$ | [mm] | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 |

Table C6: Displacement of rebar under tension and shear load

| Size | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
|---|---|---|---|---|---|---|---|---|
| Tension load | | | | | | | | |
| Uncracked concrete | | | | | | | | |
| F | [kN] | 7,6 | 11,9 | 16,7 | 28,6 | 35,7 | 45,2 | 66,7 |
| $\delta_{ND}$ | [mm] | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 |
| $\delta_{N\infty}$ | [mm] | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 |
| Cracked concrete | | | | | | | | |
| F | [kN] | 5,7 | 9,5 | 11,9 | 19,0 | 23,8 | 28,6 | 35,7 |
| $\delta_{ND}$ | [mm] | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,6 |
| $\delta_{N\infty}$ | [mm] | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
| Shear load | | | | | | | | |
| F | [kN] | 6,6 | 10,3 | 14,8 | 26,3 | 41,1 | 64,3 | 105,3 |
| $\delta_{V0}$ | [mm] | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 |
| $\delta_{V\infty}$ | [mm] | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 |

**Table C7:** Seismic performance category C1

| Size | | | M12 | M16 | M20 |
|---|---|---|---|---|---|
| **Tension load** | | | | | |
| **Steel failure** | | | | | |
| Characteristic resistance grade 4.6 | $N_{Rk,s,eq,C1}$ | [kN] | 34 | 63 | 98 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 2,00 | |
| Characteristic resistance grade 5.8 | $N_{Rk,s,eq,C1}$ | [kN] | 42 | 79 | 123 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade 8.8 | $N_{Rk,s,eq,C1}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade 10.9 | $N_{Rk,s,eq,C1}$ | [kN] | 84 | 157 | 245 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance A2-70, A4-70 | $N_{Rk,s,eq,C1}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| Characteristic resistance A4-80 | $N_{Rk,s,eq,C1}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,60 | |
| Characteristic resistance 1.4529 | $N_{Rk,s,eq,C1}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance 1.4565 | $N_{Rk,s,eq,C1}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| **Characteristic resistance to pull-out** | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,p,eq,C1}$ | [N/mm²] | 5,2 | 6,6 | 6,8 |
| Installation safety factor | $\gamma_2=\gamma_{inst}$ | [-] | | 1,0 | |
| **Shear load** | | | | | |
| **Steel failure without lever arm** | | | | | |
| Characteristic resistance grade 4.6 | $V_{Rk,s,eq,C1}$ | [kN] | 13 | 19 | 29 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,67 | |
| Characteristic resistance grade 5.8 | $V_{Rk,s,eq,C1}$ | [kN] | 17 | 24 | 37 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade 8.8 | $V_{Rk,s,eq,C1}$ | [kN] | 27 | 38 | 59 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade 10.9 | $V_{Rk,s,eq,C1}$ | [kN] | 34 | 47 | 74 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance A2-70, A4-70 | $V_{Rk,s,eq,C1}$ | [kN] | 24 | 33 | 51 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic resistance A4-80 | $V_{Rk,s,eq,C1}$ | [kN] | 27 | 38 | 59 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance 1.4529 | $V_{Rk,s,eq,C1}$ | [kN] | 24 | 33 | 51 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance 1.4565 | $V_{Rk,s,eq,C1}$ | [kN] | 24 | 33 | 51 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic shear load resistance $V_{Rk,s,eq}$ in the Table C7 shall be multiplied by following reduction factor for hot-dip galvanized commercial standard rods | | | | | |
| Reduction factor for hot-dip galvanized rods | $\alpha_{v,hr-dg,ct}$ | [-] | 0,44 | 0,58 | 0,58 |
| Factor for annular gap | $\alpha_{gap}$ | [-] | | 0,5 | |

**The anchor shall be used with minimum rupture elongation after fracture $A_5$ equal to 19%.**

Table C8: Seismic performance category C2

| Size | | | M12 | M16 | M20 |
|---|---|---|---|---|---|
| **Tension load** | | | | | |
| **Steel failure** | | | | | |
| Characteristic resistance grade 4.6 | $N_{Rk,s,eq,C2}$ | [kN] | 34 | 63 | 98 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 2,00 | |
| Characteristic resistance grade 5.8 | $N_{Rk,s,eq,C2}$ | [kN] | 42 | 79 | 123 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade 8.8 | $N_{Rk,s,eq,C2}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade 10.9 | $N_{Rk,s,eq,C2}$ | [kN] | 84 | 157 | 245 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance A2-70, A4-70 | $N_{Rk,s,eq,C2}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| Characteristic resistance A4-80 | $N_{Rk,s,eq,C2}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,60 | |
| Characteristic resistance 1.4529 | $N_{Rk,s,eq,C2}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance 1.4565 | $N_{Rk,s,eq,C2}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| **Characteristic resistance to pull-out** | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,p,eq,C2}$ | [N/mm²] | 3,5 | 4,0 | 4,5 |
| Installation safety factor | $\gamma_2=\gamma_{inst}$ | [-] | | 1,0 | |
| **Shear load** | | | | | |
| **Steel failure without lever arm** | | | | | |
| Characteristic resistance grade 4.6 | $V_{Rk,s,eq,C2}$ | [kN] | 13 | 18 | 28 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,67 | |
| Characteristic resistance grade 5.8 | $V_{Rk,s,eq,C2}$ | [kN] | 16 | 22 | 35 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade 8.8 | $V_{Rk,s,eq,C2}$ | [kN] | 25 | 36 | 56 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade 10.9 | $V_{Rk,s,eq,C2}$ | [kN] | 32 | 45 | 70 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance A2-70, A4-70 | $V_{Rk,s,eq,C2}$ | [kN] | 22 | 31 | 49 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic resistance A4-80 | $V_{Rk,s,eq,C2}$ | [kN] | 25 | 36 | 56 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance 1.4529 | $V_{Rk,s,eq,C2}$ | [kN] | 22 | 31 | 49 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance 1.4565 | $V_{Rk,s,eq,C2}$ | [kN] | 22 | 31 | 49 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic shear load resistance $V_{Rk,s,eq}$ in the Table C8 shall be multiplied by following reduction factor for hot-dip galvanized commercial standard rods | | | | | |
| Reduction factor for hot-dip galvanized rods | $\alpha_{v,h-dg,C2}$ | [-] | 0,46 | 0,61 | 0,61 |
| Factor for annular gap | $\alpha_{gap}$ | [-] | | 0,5 | |

Table C9: Displacement under tensile and shear load - seismic category C2

| Size | | M12 | M16 | M20 |
|---|---|---|---|---|
| $\delta_{N,eq(DLS)}$ | [mm] | 0,20 | 0,40 | 0,77 |
| $\delta_{N,eq(ULS)}$ | [mm] | 0,76 | 0,74 | 1,68 |
| $\delta_{V,eq(DLS)}$ | [mm] | 5,29 | 4,12 | 4,94 |
| $\delta_{V,eq(ULS)}$ | [mm] | 10,20 | 90,5 | 10,99 |

**The anchor shall be used with minimum rupture elongation after fracture As equal to 19%.**

## 8 VHODNÁ TECHNICKÁ DOKUMENTÁCIA A/ALEBO ŠPECIFICKÁ TECHNICKÁDOKUMENTÁCIA

Uvedené parametre výrobku sú v zhode so súborom deklarovaných parametrov. Toto vyhlásenie o parametroch sa v súlade s nariadením (EÚ) č. 305/2011 vydáva na výhradnú zodpovednosť uvedeného výrobcu.

Podpísal(-a) za Sika Slovensko, spol. s r.o:

Meno : Ing. Henrieta Absolonová
Funkcia: Manažér kvality a EMS
V Bratislave, dňa 28.10.2019

Meno : Ing. Marek Mikuš
Funkcia: Konateľ Sika Slovensko, spol. s r.o.
V Bratislave, dňa 28.10.2019

End of information as required by Regulation (EU) No 305/2011

## SÚVISIACE VYHLÁSENIE O PARAMETROCH

| Názov produktu | Harmonizovaná technická špecifikácia | Číslo VoP |
|---|---|---|
| Sika AnchorFix®-3030 pre injektážne kotvy | ETA 17/0693 | 10823672 |

## ÚPLNÉ CE OZNAČENIE

CE

17

Sika Services AG, Zürich, Švajčiarsko

VoP č. 66629518

EAD 330499-00-0601

Notifikovaný subjekt 1020

Injektážne kotvy na použitie v betóne s trhlinami aj bez trhlín

**Reakcia na oheň** – kotvy vyhovujú požiadavkách pre triedu A1
**Odolnosť voči ohňu** – Nehodnotené

**Kotvenie vystavené:**

- Statickému a kvázistatickému zaťaženiu
- Seizmickým účinkom kategórie C1 (max. w = 0,5 mm): závitová tyč s rozmermi M12, M16, M20
- Seizmickým účinkom kategórie C2 (max. w = 0,8 mm): závitová tyč s rozmermi M12, M16, M20

**Podkladné materiály:**

- Betón s trhlinami a bez trhlín
- Vystužený alebo nevystužený betón s normálnou hmotnosťou s triedou pevnosti minimálne C20/25 a maximálne C50/60 podľa normy EN 206: 2013.

**Teplotné rozmedzie:**

- T3: -40°C až +70°C (maximálna krátkodobá teplota +70°C a maximálna dlhodobá teplota +50°C)

**Podmienky použitia (podmienky prostredia):**

- (X1) Konštrukcie vystavené suchým vnútorným podmienkam (pozinkovaná oceľ, nehrdzavejúca oceľ, oceľ s vysokou odolnosťou proti korózii).
- (X2) Konštrukcie vystavené vonkajšiemu atmosferickému zaťaženiu (vrátane priemyselného a morského prostredia) a trvale vlhkým vnútorným podmienkam, ak neexistujú žiadne osobitné agresívne podmienky (nehrdzavejúca oceľ A4, oceľ s vysokou odolnosťou proti korózii).
- (X3) Konštrukcie vystavené vonkajšiemu atmosferickému zaťaženiu a trvale vlhkým vnútorným podmienkam, ak neexistujú žiadne osobitné agresívne podmienky (oceľ s vysokou odolnosťou proti korózii).

Poznámka: Osobitné agresívne podmienky sú napr. trvalé, striedavé ponorenie do morskej vody alebo striekajúcej zóny morskej vody, chlórové prostredie vnútorných bazénov alebo prostredie s extrémnym chemickým znečistením (napr. v odsírovacích závodoch alebo cestných tuneloch, kde sa používajú odmrazovacie materiály).

**Podmienky betónu:**

- I1 – montáž do suchého alebo mokrého (vodou nasýteného) betónu alebo zaplaveného otvoru.
- I2 – montáž do vodou vyplneného betónu (nie morskej vody) a prevádzka v suchom alebo mokrom betóne

**Návrh kotvenia:**

- Kotvy sú navrhnuté v súlade s normou EN 1992-4 alebo technickou správou EOTA TR 055 v zodpovednosti inžiniera s praxou v oblasti kotviacej techniky a prípravy betónu.
- Musia byť pripravené overiteľné výpočty a výkresy s ohľadom na zaťaženie, ktoré má kotva prenášať. Poloha kotvy musí byť vyznačená na konštrukčných výkresoch.
- Kotvy so seizmickým zaťažením (betón s trhlinami) musia byť navrhnuté v súlade s normou EN 1992-4.

**Zabudovanie/ Montáž:**

- Vŕtanie otvorov pomocou vŕtačky s príklepom.
- Montáž kotiev sa musí vykonávať vhodne kvalifikovaným personálom a pod dohľadom osoby zodpovednej za technické záležitosti na stavbe.

**Smer montáže:**

D3 – montáž nadol a horizonálne a nahor (napr. nad hlavou)

- Table B1: Installation parameters of threaded rod

| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Nominal drill hole diameter | $Ød_0$ | [mm] | 10 | 12 | 14 | 18 | 22 | 26 | 30 | 35 |
| Cleaning brush | | | S11HF | S14HF | S14/15HF | S22HF | S24HF | S31HF | S31HF | S38HF |
| Torque moment | max $T_{bd}$ | [Nm] | 10 | 20 | 40 | 80 | 120 | 160 | 180 | 200 |
| Embedment depth for $h_{ef,min}$ | $h_{ef}$ | [mm] | 60 | 60 | 70 | 80 | 90 | 96 | 108 | 120 |
| Embedment depth for $h_{ef,max}$ | $h_{ef}$ | [mm] | 160 | 200 | 240 | 320 | 400 | 480 | 540 | 600 |
| Depth of drill hole | $h_0$ | [mm] | $h_{ef}+5$ | $h_{ef}+5$ | $h_{ef}+5$ | $h_{ef}+5$ | $h_{ef}+5$ | $h_{ef}+5$ | $h_{ef}+5$ | $h_{ef}+5$ |
| Minimum edge distance | $c_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 50 | 60 |
| Minimum spacing | $s_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 50 | 60 |
| Minimum thickness of member | $h_{min}$ | [mm] | $h_{ef}+30$ mm ≥ 100 mm | | | $h_{ef}+2d_0$ | | | | |

- Table B2: Installation parameters of rebar

| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
|---|---|---|---|---|---|---|---|---|---|
| Nominal drill hole diameter | $Ød_0$ | [mm] | 12 | 14 | 16 | 20 | 25 | 32 | 40 |
| Cleaning brush | | | S12/13HF | S14/15HF | S18HF | S22HF | S27HF | S35HF | S43HF |
| Torque moment | max $T_{bd}$ | [Nm] | 10 | 20 | 40 | 80 | 120 | 180 | 200 |
| Min. embedment depth | | | | | | | | | |
| Embedment depth for $h_{ef,min}$ | $h_{ef}$ | [mm] | 60 | 60 | 70 | 80 | 90 | 100 | 128 |
| Embedment depth for $h_{ef,max}$ | $h_{ef}$ | [mm] | 160 | 200 | 240 | 320 | 400 | 500 | 640 |
| Depth of drill hole | $h_0$ | [mm] | $h_{ef}+5$ | $h_{ef}+5$ | $h_{ef}+5$ | $h_{ef}+5$ | $h_{ef}+5$ | $h_{ef}+5$ | $h_{ef}+5$ |
| Minimum edge distance | $c_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 70 |
| Minimum spacing | $s_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 70 |
| Minimum thickness of member | $h_{min}$ | [mm] | $h_{ef}+30$ mm ≥ 100 mm | | | $h_{ef}+2d_0$ | | | |

- Table B3: Cleaning

| All diameters |
|---|
| - 2 x blowing |
| - 2 x brushing |
| - 2 x blowing |
| - 2 x brushing |
| - 2 x blowing |

- Table B4: Minimum curing time

| Base Material Temperature [°C] | Cartridge Temperature [°C] | T Work [mins] | T Load [hrs] |
|---|---|---|---|
| +5 | Minimum +10 | 300 | 24 |
| +5°C to +10 | | 150 | |
| +10°C to +15 | +10°C to +15 | 40 | 18 |
| +15°C to +20 | +15°C to +20 | 25 | 12 |
| +20°C to +25 | +20°C to +25 | 18 | 8 |
| +25°C to +30 | +25°C to +30 | 12 | 6 |
| +30°C to +35 | +30°C to +35 | 8 | 4 |
| +35°C to +40 | +35°C to +40 | 6 | 2 |
| Ensure cartridge is ≥ 10°C | | | |

- T Work is typical gel time at highest base material temperature in the range.
- T Load is minimum set time required until load can be applied at the lowest temperature in the range.

**Table C1:** Design method EN 1992-4
Characteristic values of resistance to tension load of threaded rod

| Steel failure – Characteristic resistance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| Steel grade 4.6 | $N_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 2,00 | | | | | | | |
| Steel grade 5.8 | $N_{Rk,s}$ | [kN] | 18 | 29 | 42 | 79 | 123 | 177 | 230 | 281 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Steel grade 8.8 | $N_{Rk,s}$ | [kN] | 29 | 46 | 67 | 126 | 196 | 282 | 367 | 449 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Steel grade 10.9 | $N_{Rk,s}$ | [kN] | 37 | 58 | 84 | 157 | 245 | 353 | 459 | 561 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | | | | | | |
| Stainless steel grade A2-70, A4-70 | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 172 | 247 | 321 | 393 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,87 | | | | | | | |
| Stainless steel grade A4-80 | $N_{Rk,s}$ | [kN] | 29 | 46 | 67 | 126 | 196 | 282 | 367 | 449 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,60 | | | | | | | |
| Stainless steel grade 1.4529 | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 172 | 247 | 321 | 393 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Stainless steel grade 1.4565 | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 172 | 247 | 321 | 393 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,87 | | | | | | | |
| **Combined pullout and concrete cone failure in concrete C20/25** | | | | | | | | | | |
| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| **Characteristic bond resistance in uncracked concrete** | | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,ucr}$ | [N/mm²] | 17 | 15 | 15 | 12 | 12 | 12 | 11 | 9,5 |
| Dry, wet concrete, flooded hole | | | | | | | | | | |
| Partial safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,0 | | | | | | | |
| Factor for uncracked concrete | C25/30 | $\psi_c$ | [-] | 1,02 | | | | | | |
| | C30/37 | | | 1,04 | | | | | | |
| | C35/45 | | | 1,06 | | | | | | |
| | C40/50 | | | 1,07 | | | | | | |
| | C45/55 | | | 1,08 | | | | | | |
| | C50/60 | | | 1,09 | | | | | | |
| **Characteristic bond resistance in cracked concrete** | | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,cr}$ | [N/mm²] | 10 | 10 | 10 | 9,5 | 9 | 9 | 6 | 6 |
| Dry, wet concrete, flooded hole | | | | | | | | | | |
| Partial safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,0 | | | | | | | |
| Factor for cracked concrete | C25/30 | $\psi_c$ | [-] | 1,02 | | | | | | |
| | C30/37 | | | 1,04 | | | | | | |
| | C35/45 | | | 1,06 | | | | | | |
| | C40/50 | | | 1,07 | | | | | | |
| | C45/55 | | | 1,08 | | | | | | |
| | C50/60 | | | 1,09 | | | | | | |
| **Concrete cone failure** | | | | | | | | | | |
| Factor for concrete cone failure for uncracked concrete | $k_1$ [1] | [-] | 10,1 | | | | | | | |
| | $k_{ucr,N}$ [2] | | 11 | | | | | | | |
| Factor for concrete cone failure for cracked concrete | $k_1$ [1] | | 7,2 | | | | | | | |
| | $k_{cr,N}$ [2] | | 7,7 | | | | | | | |
| Edge distance | $c_{cr,N}$ | [mm] | $1,5h_{ef}$ | | | | | | | |
| **Splitting failure** | | | | | | | | | | |
| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| Edge distance | $c_{cr,sp}$ | [mm] | $2 \cdot h_{ef}$ | | | | | | | |
| Spacing | $s_{cr,sp}$ | [mm] | $2 \cdot c_{cr,sp}$ | | | | | | | |
| Partial safety factor | $\gamma_{Msp}$ | [-] | 1,5 | | | | | | | |

[1] Design according EOTA Technical Report TR 055
[2] Design according EN 1992-4:2016

**Table C2:** Design method EN 1992-4
Characteristic values of resistance to tension load of rebar

| Steel failure – Characteristic resistance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Rebar BSt 500 S | $N_{Rk,s}$ | [kN] | 28 | 43 | 62 | 111 | 173 | 270 | 442 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,4 | | | | | | |

| Pullout failure in concrete C20/25 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Characteristic bond resistance in uncracked concrete | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,ucr}$ | [N/mm²] | 13 | 13 | 13 | 12 | 12 | 12 | 8 |
| Dry and wet concrete | | | | | | | | | |
| Installation safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,0 | | | | | | |
| Flooded hole | | | | | | | | | |
| Installation safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,2 | | | | | | |
| Factor for uncracked concrete | C25/30 | [-] | 1,02 | | | | | | |
| | C30/37 | | 1,04 | | | | | | |
| | C35/45 | | 1,06 | | | | | | |
| | C40/50 $\psi_c$ | | 1,07 | | | | | | |
| | C45/55 | | 1,08 | | | | | | |
| | C50/60 | | 1,09 | | | | | | |
| Characteristic bond resistance in cracked concrete | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,cr}$ | [N/mm²] | 8 | 11 | 10 | 10 | 9 | 8,5 | 6 |
| Dry and wet concrete | | | | | | | | | |
| Installation safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,0 | | | | | | |
| Flooded hole | | | | | | | | | |
| Installation safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,2 | | | | | | |
| Factor for cracked concrete | C25/30 | [-] | 1,02 | | | | | | |
| | C30/37 | | 1,04 | | | | | | |
| | C35/45 | | 1,06 | | | | | | |
| | C40/50 $\psi_c$ | | 1,07 | | | | | | |
| | C45/55 | | 1,08 | | | | | | |
| | C50/60 | | 1,09 | | | | | | |

| Concrete cone failure | | | |
|---|---|---|---|
| Factor for concrete cone failure for uncracked concrete | $k_1$ [1] | [-] | 10,1 |
| | $k_{ucr,N}$ [2] | | 11 |
| Factor for concrete cone failure for cracked concrete | $k_1$ [1] | | 7,2 |
| | $k_{cr,N}$ [2] | | 7,7 |
| Edge distance | $c_{cr,N}$ | [mm] | $1{,}5h_{ef}$ |

| Splitting failure | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Edge distance | $c_{cr,sp}$ | [mm] | $2 \cdot h_{ef}$ | | | | | | |
| Spacing | $s_{cr,sp}$ | [mm] | $2 \cdot c_{cr,sp}$ | | | | | | |
| Partial safety factor Dry and wet concrete | $\gamma_{Msp}$ | [-] | 1,5 | | | | | | |
| Partial safety factor Flooded hole | $\gamma_{Msp}$ | [-] | 1,8 | | | | | | |

[1] Design according EOTA Technical Report TR 055
[2] Design according EN 1992-4:2016

Table C3: Design method EN 1992-4
Characteristic values of resistance to shear load of threaded rod

| Steel failure without lever arm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| Steel grade 4.6 | $V^0_{Rk,s}$ | [kN] | 7 | 12 | 17 | 31 | 49 | 71 | 92 | 112 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,67 | | | | | | | |
| Steel grade 5.8 | $V^0_{Rk,s}$ | [kN] | 9 | 15 | 21 | 39 | 61 | 88 | 115 | 140 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade 8.8 | $V^0_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade 10.9 | $V^0_{Rk,s}$ | [kN] | 18 | 29 | 42 | 79 | 123 | 177 | 230 | 281 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,5 | | | | | | | |
| Stainless steel grade A2-70, A4-70 | $V^0_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | 161 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Stainless steel grade A4-80 | $V^0_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | | | | | | |
| Stainless steel grade 1.4529 | $V^0_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | 161 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Stainless steel grade 1.4565 | $V^0_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | 161 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Characteristic resistance of group of fasteners | | | | | | | | | | |
| Ductility factor | $k_7$ = 1,0 for steel with rupture elongation $A_5$ > 8% | | | | | | | | | |

| Steel failure with lever arm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| Steel grade 4.6 | $M^{0}_{Rk,s}$ | [N.m] | 15 | 30 | 52 | 133 | 260 | 449 | 666 | 900 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,67 | | | | | | | |
| Steel grade 5.8 | $M^{0}_{Rk,s}$ | [N.m] | 19 | 37 | 66 | 166 | 325 | 561 | 832 | 1125 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade 8.8 | $M^{0}_{Rk,s}$ | [N.m] | 30 | 60 | 105 | 266 | 519 | 898 | 1332 | 1799 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade 10.9 | $M^{0}_{Rk,s}$ | [N.m] | 37 | 75 | 131 | 333 | 649 | 1123 | 1664 | 2249 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Stainless steel grade A2-70, A4-70 | $M^{0}_{Rk,s}$ | [N.m] | 26 | 52 | 92 | 233 | 454 | 786 | 1165 | 1574 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Stainless steel grade A4-80 | $M^{0}_{Rk,s}$ | [N.m] | 30 | 60 | 105 | 266 | 519 | 898 | 1332 | 1799 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | | | | | | |
| Stainless steel grade 1.4529 | $M^{0}_{Rk,s}$ | [N.m] | 26 | 52 | 92 | 233 | 454 | 786 | 1165 | 1574 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Stainless steel grade 1.4565 | $M^{0}_{Rk,s}$ | [N.m] | 26 | 52 | 92 | 233 | 454 | 786 | 1165 | 1574 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Concrete pryout failure | | | | | | | | | | |
| Factor for resistance to pry-out failure | $k_8$ | [-] | 2 | | | | | | | |

| Concrete edge failure | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| Outside diameter of fastener | $d_{nom}$ | [mm] | 8 | 10 | 12 | 16 | 20 | 24 | 27 | 30 |
| Effective length of fastener | $\ell_f$ | [mm] | min ($h_{ef}$, 8 $d_{nom}$) | | | | | | | |

**Table C4:** Design method EN 1992-4
Characteristic values of resistance to shear load of rebar

| Steel failure without lever arm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Rebar BSt 500 S | $V^0_{Rk,s}$ | [kN] | 14 | 22 | 31 | 55 | 86 | 135 | 221 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,5 | | | | | | |
| Characteristic resistance of group of fasteners | | | | | | | | | |
| Ductility factor | $k_7$ = 1,0 for steel with rupture elongation $A_5$ > 8% | | | | | | | | |

| Steel failure with lever arm | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Rebar BSt 500 S | $M^0_{Rk,s}$ | [N.m] | 33 | 65 | 112 | 265 | 518 | 1013 | 2122 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,5 | | | | | | |
| Concrete pryout failure | | | | | | | | | |
| Factor for resistance to pry-out failure | $k_8$ | [-] | 2 | | | | | | |

| Concrete edge failure | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Outside diameter of fastener | $d_{nom}$ | [mm] | 8 | 10 | 12 | 16 | 20 | 25 | 32 |
| Effective length of fastener | $\ell_f$ | [mm] | min ($h_{ef}$, 8 $d_{nom}$) | | | | | | |

**Table C5:** Displacement of threaded rod under tension and shear load

| Size | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|
| Tension load | | | | | | | | | |
| Uncracked concrete | | | | | | | | | |
| F | [kN] | 11,9 | 14,3 | 19,0 | 23,8 | 35,7 | 35,7 | 45,2 | 45,2 |
| $\delta_{N0}$ | [mm] | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 |
| $\delta_{N\infty}$ | [mm] | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 |
| Cracked concrete | | | | | | | | | |
| F | [kN] | 5,7 | 9,5 | 14,3 | 16,7 | 23,8 | 28,6 | 28,6 | 28,6 |
| $\delta_{N0}$ | [mm] | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,6 | 0,6 | 0,7 |
| $\delta_{N\infty}$ | [mm] | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
| Shear load | | | | | | | | | |
| F | [kN] | 3,5 | 5,5 | 8,0 | 15,0 | 23,3 | 33,6 | 43,7 | 53,4 |
| $\delta_{V0}$ | [mm] | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 |
| $\delta_{V\infty}$ | [mm] | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 |

**Table C6:** Displacement of rebar under tension and shear load

| Size | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
|---|---|---|---|---|---|---|---|---|
| Tension load | | | | | | | | |
| Uncracked concrete | | | | | | | | |
| F | [kN] | 7,6 | 11,9 | 16,7 | 28,6 | 35,7 | 45,2 | 66,7 |
| $\delta_{N0}$ | [mm] | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 |
| $\delta_{N\infty}$ | [mm] | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 |
| Cracked concrete | | | | | | | | |
| F | [kN] | 5,7 | 9,5 | 11,9 | 19,0 | 23,8 | 28,6 | 35,7 |
| $\delta_{N0}$ | [mm] | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,6 |
| $\delta_{N\infty}$ | [mm] | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
| Shear load | | | | | | | | |
| F | [kN] | 6,6 | 10,3 | 14,8 | 26,3 | 41,1 | 64,3 | 105,3 |
| $\delta_{V0}$ | [mm] | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 |
| $\delta_{V\infty}$ | [mm] | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 |

Table C7: Seismic performance category C1

| Size | | | M12 | M16 | M20 |
|---|---|---|---|---|---|
| **Tension load** | | | | | |
| **Steel failure** | | | | | |
| Characteristic resistance grade 4.6 | $N_{Rk,s,eq,C1}$ | [kN] | 34 | 63 | 98 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 2,00 | |
| Characteristic resistance grade 5.8 | $N_{Rk,s,eq,C1}$ | [kN] | 42 | 79 | 123 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade 8.8 | $N_{Rk,s,eq,C1}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade 10.9 | $N_{Rk,s,eq,C1}$ | [kN] | 84 | 157 | 245 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance A2-70, A4-70 | $N_{Rk,s,eq,C1}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| Characteristic resistance A4-80 | $N_{Rk,s,eq,C1}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,60 | |
| Characteristic resistance 1.4529 | $N_{Rk,s,eq,C1}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance 1.4565 | $N_{Rk,s,eq,C1}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| **Characteristic resistance to pull-out** | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,p,eq,C1}$ | [N/mm²] | 5,2 | 6,6 | 6,8 |
| Installation safety factor | $\gamma_2=\gamma_{inst}$ | [-] | | 1,0 | |

| Shear load | | | | | |
|---|---|---|---|---|---|
| **Steel failure without lever arm** | | | | | |
| Characteristic resistance grade 4.6 | $V_{Rk,s,eq,C1}$ | [kN] | 13 | 19 | 29 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,67 | |
| Characteristic resistance grade 5.8 | $V_{Rk,s,eq,C1}$ | [kN] | 17 | 24 | 37 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade 8.8 | $V_{Rk,s,eq,C1}$ | [kN] | 27 | 38 | 59 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade 10.9 | $V_{Rk,s,eq,C1}$ | [kN] | 34 | 47 | 74 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance A2-70, A4-70 | $V_{Rk,s,eq,C1}$ | [kN] | 24 | 33 | 51 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic resistance A4-80 | $V_{Rk,s,eq,C1}$ | [kN] | 27 | 38 | 59 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance 1.4529 | $V_{Rk,s,eq,C1}$ | [kN] | 24 | 33 | 51 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance 1.4565 | $V_{Rk,s,eq,C1}$ | [kN] | 24 | 33 | 51 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic shear load resistance $V_{Rk,s,eq}$ in the Table C7 shall be multiplied by following reduction factor for hot-dip galvanized commercial standard rods | | | | | |
| Reduction factor for hot-dip galvanized rods | $\alpha_{v,hr-dg,c1}$ | [-] | 0,44 | 0,58 | 0,58 |
| Factor for annular gap | $\alpha_{gap}$ | [-] | | 0,5 | |

**The anchor shall be used with minimum rupture elongation after fracture As equal to 19%.**

Table C8: Seismic performance category C2

| Size | | | M12 | M16 | M20 |
|---|---|---|---|---|---|
| **Tension load** | | | | | |
| **Steel failure** | | | | | |
| Characteristic resistance grade 4.6 | $N_{Rk,s,eq,C2}$ | [kN] | 34 | 63 | 98 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 2,00 | |
| Characteristic resistance grade 5.8 | $N_{Rk,s,eq,C2}$ | [kN] | 42 | 79 | 123 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade 8.8 | $N_{Rk,s,eq,C2}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade 10.9 | $N_{Rk,s,eq,C2}$ | [kN] | 84 | 157 | 245 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance A2-70, A4-70 | $N_{Rk,s,eq,C2}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| Characteristic resistance A4-80 | $N_{Rk,s,eq,C2}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,60 | |
| Characteristic resistance 1.4529 | $N_{Rk,s,eq,C2}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance 1.4565 | $N_{Rk,s,eq,C2}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| **Characteristic resistance to pull-out** | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,p,eq,C2}$ | [N/mm²] | 3,5 | 4,0 | 4,5 |
| Installation safety factor | $\gamma_2=\gamma_{inst}$ | [-] | | 1,0 | |

| Shear load | | | | | |
|---|---|---|---|---|---|
| **Steel failure without lever arm** | | | | | |
| Characteristic resistance grade 4.6 | $V_{Rk,s,eq,C2}$ | [kN] | 13 | 18 | 28 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,67 | |
| Characteristic resistance grade 5.8 | $V_{Rk,s,eq,C2}$ | [kN] | 16 | 22 | 35 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade 8.8 | $V_{Rk,s,eq,C2}$ | [kN] | 25 | 36 | 56 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade 10.9 | $V_{Rk,s,eq,C2}$ | [kN] | 32 | 45 | 70 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance A2-70, A4-70 | $V_{Rk,s,eq,C2}$ | [kN] | 22 | 31 | 49 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic resistance A4-80 | $V_{Rk,s,eq,C2}$ | [kN] | 25 | 36 | 56 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance 1.4529 | $V_{Rk,s,eq,C2}$ | [kN] | 22 | 31 | 49 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance 1.4565 | $V_{Rk,s,eq,C2}$ | [kN] | 22 | 31 | 49 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic shear load resistance $V_{Rk,s,eq}$ in the Table C8 shall be multiplied by following reduction factor for hot-dip galvanized commercial standard rods | | | | | |
| Reduction factor for hot-dip galvanized rods | $\alpha_{v,h\text{-}dg,C2}$ | [-] | 0,46 | 0,61 | 0,61 |
| Factor for annular gap | $\alpha_{gap}$ | [-] | | 0,5 | |

Table C9: Displacement under tensile and shear load - seismic category C2

| Size | | M12 | M16 | M20 |
|---|---|---|---|---|
| $\delta_{N,eq(DLS)}$ | [mm] | 0,20 | 0,40 | 0,77 |
| $\delta_{N,eq(ULS)}$ | [mm] | 0,76 | 0,74 | 1,68 |
| $\delta_{V,eq(DLS)}$ | [mm] | 5,29 | 4,12 | 4,94 |
| $\delta_{V,eq(ULS)}$ | [mm] | 10,20 | 90,5 | 10,99 |

**The anchor shall be used with minimum rupture elongation after fracture As equal to 19%.**

## CE OZNAČENIE MUSÍ BYŤ UMIESTNENÉ NA OBALE

| |
|---|
| CE |
| 17 |
| Sika Services AG, Zürich, Švajčiarsko |
| VoP č. 66629518 |
| EAD 330499-00-0601 |
| Notifikovaný subjekt 1020 |
| Injektážne kotvy na použitie v betóne s trhlinami aj bez trhlín |
| Viac informácií v priložených dokumentoch |

http://dop.sika.com

## INFORMÁCIE O OCHRANE ŽIVOTNÉHO PROSTREDIA, ZDRAVIA A BEZPEČNOSTI PRI PRÁCI (REACH)

Informácie a pokyny týkajúce sa bezpečnej prepravy, manipulácie, skladovania a likvidácie chemických produktov nájdete v aktuálnom vydaní karty bezpečnostných údajov, ktorá obsahuje fyzikálne, ekologické, toxikologické a iné údaje, týkajúce sa bezpečnej manipulácie s produktom.

## PRÁVNE OZNÁMENIE



**Pre ďalšie informácie o výrobku kontaktujte:**
Sika Slovensko, spol. s r.o., Rybničná 38/e, 831 06 Bratislava
tel: +421 2 49200403
Fax: +421 2 49200444
e-mail: sika@sk.sika.com

BUILDING TRUST

# Sika AnchorFix®-3030

## DECLARATION OF PERFORMANCE
## No. 66629518

| | | |
|---|---|---|
| **1** | **UNIQUE IDENTIFICATION CODE OF THE PRODUCT-TYPE:** | 66629518 |
| **2** | **INTENDED USE/S** | ETA 17/0694 of 11/07/2018<br>Bonded injection type anchor for use in cracked and uncracked concrete |
| **3** | **MANUFACTURER:** | Sika Services AG<br>Tüffenwies 16-22<br>8064 Zürich |
| **4** | **AUTHORISED REPRESENTATIVE:** | |
| **5** | **SYSTEM/S OF AVCP:** | System 1 |
| **6b** | **EUROPEAN ASSESSMENT DOCUMENT:** | EAD 330499-00-0601 |
| | European Technical Assessment: | ETA 17/0694 of 11/07/2018 |
| | Technical Assessment Body: | TECHNICKY A ZKUSEBNI USTAV STAVEBNI PRAHA s.p. |
| | Notified body/ies: | 1020 |

## 7 DECLARED PERFORMANCE/S

**Reaction to fire -** Anchorages satisfy requirements for Class A1

**Resistance to fire** - No performance determined

**Anchorages subject to:**

- Static and quasi-static load
- Seismic actions category C1 (max w = 0,5 mm): threaded rod size M12, M16, M20
- Seismic actions category C2 (max w = 0,8 mm): threaded rod size M12, M16, M20

**Base materials**

- Cracked and uncracked concrete
- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum and C50/60 at maximum according EN 206:2013.

**Temperature range:**

- T3: -40°C to +70°C (max. short. term temperature +70°C and max. long term temperature +50°C)

**Use conditions (Environmental conditions)**

- (X1) Structures subject to dry internal conditions (zinc coated steel, stainless steel, high corrosion resistance steel).
- (X2) Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel A4, high corrosion resistant steel).
- (X3) Structures subject to external atmospheric exposure and to permanently damp internal condition, if other particular aggressive conditions exist (high corrosion resistant steel).

Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

**Concrete conditions:**

- I1 – installation in dry or wet (water saturated) concrete or flooded hole.
- I2 – installation in water-filled (not sea water) and use in service in dry or wet concrete

**Design:**

- The anchorages are designed in accordance with the EN 1992-4 or EOTA Technical Report TR 055 under the responsibility of an engineer experienced in anchorages and concrete work.
- 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.
- Anchorages under seismic actions (cracked concrete) have to be designed in accordance with EN 1992-4.

**Installation:**

- Hole drilling by hammer 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

- **Table B1**: Installation parameters of threaded rod

| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Nominal drill hole diameter | $Ød_0$ | [mm] | 10 | 12 | 14 | 18 | 22 | 26 | 30 | 35 |
| Cleaning brush | | | S11HF | S14HF | S14/15HF | S22HF | S24HF | S31HF | S31HF | S38HF |
| Torque moment | max $T_{fixt}$ | [Nm] | 10 | 20 | 40 | 80 | 120 | 160 | 180 | 200 |
| Embedment depth for $h_{ef,min}$ | $h_{ef}$ | [mm] | 60 | 60 | 70 | 80 | 90 | 96 | 108 | 120 |
| Embedment depth for $h_{ef,max}$ | $h_{ef}$ | [mm] | 160 | 200 | 240 | 320 | 400 | 480 | 540 | 600 |
| Depth of drill hole | $h_0$ | [mm] | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 |
| Minimum edge distance | $c_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 50 | 60 |
| Minimum spacing | $s_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 50 | 60 |
| Minimum thickness of member | $h_{min}$ | [mm] | $h_{ef}$ + 30 mm ≥ 100 mm | | | $h_{ef}$ + $2d_0$ | | | | |

- **Table B2**: Installation parameters of rebar

| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
|---|---|---|---|---|---|---|---|---|---|
| Nominal drill hole diameter | $Ød_0$ | [mm] | 12 | 14 | 16 | 20 | 25 | 32 | 40 |
| Cleaning brush | | | S12/13HF | S14/15HF | S18HF | S22HF | S27HF | S35HF | S43HF |
| Torque moment | max $T_{fixt}$ | [Nm] | 10 | 20 | 40 | 80 | 120 | 180 | 200 |
| Min. embedment depth | | | | | | | | | |
| Embedment depth for $h_{ef,min}$ | $h_{ef}$ | [mm] | 60 | 60 | 70 | 80 | 90 | 100 | 128 |
| Embedment depth for $h_{ef,max}$ | $h_{ef}$ | [mm] | 160 | 200 | 240 | 320 | 400 | 500 | 640 |
| Depth of drill hole | $h_0$ | [mm] | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 |
| Minimum edge distance | $c_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 70 |
| Minimum spacing | $s_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 70 |
| Minimum thickness of member | $h_{min}$ | [mm] | $h_{ef}$ + 30 mm ≥ 100 mm | | | $h_{ef}$ + $2d_0$ | | | |

- **Table B3**: Cleaning

| All diameters |
|---|
| - 2 x blowing |
| - 2 x brushing |
| - 2 x blowing |
| - 2 x brushing |
| - 2 x blowing |

- **Table B4**: Minimum curing time

| Base Material Temperature [°C] | Cartridge Temperature [°C] | T Work [mins] | T Load [hrs] |
|---|---|---|---|
| +5 | Minimum +10 | 300 | 24 |
| +5°C to +10 | | 150 | |
| +10°C to +15 | +10°C to +15 | 40 | 18 |
| +15°C to +20 | +15°C to +20 | 25 | 12 |
| +20°C to +25 | +20°C to +25 | 18 | 8 |
| +25°C to +30 | +25°C to +30 | 12 | 6 |
| +30°C to +35 | +30°C to +35 | 8 | 4 |
| +35°C to +40 | +35°C to +40 | 6 | 2 |
| **Ensure cartridge is ≥ 10°C** | | | |

- T Work is typical gel time at highest base material temperature in the range.
- T Load is minimum set time required until load can be applied at the lowest temperature in the range.

**Table C1:** Design method EN 1992-4
Characteristic values of resistance to tension load of threaded rod

| **Steel failure – Characteristic resistance** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Size** | | | **M8** | **M10** | **M12** | **M16** | **M20** | **M24** | **M27** | **M30** |
| Steel grade **4.6** | $N_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 2,00 | | | | | | | |
| Steel grade **5.8** | $N_{Rk,s}$ | [kN] | 18 | 29 | 42 | 79 | 123 | 177 | 230 | 281 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Steel grade **8.8** | $N_{Rk,s}$ | [kN] | 29 | 46 | 67 | 126 | 196 | 282 | 367 | 449 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Steel grade **10.9** | $N_{Rk,s}$ | [kN] | 37 | 58 | 84 | 157 | 245 | 353 | 459 | 561 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | | | | | | |
| Stainless steel grade **A2-70, A4-70** | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 172 | 247 | 321 | 393 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,87 | | | | | | | |
| Stainless steel grade **A4-80** | $N_{Rk,s}$ | [kN] | 29 | 46 | 67 | 126 | 196 | 282 | 367 | 449 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,60 | | | | | | | |
| Stainless steel grade **1.4529** | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 172 | 247 | 321 | 393 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Stainless steel grade **1.4565** | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 172 | 247 | 321 | 393 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,87 | | | | | | | |
| **Combined pullout and concrete cone failure in concrete C20/25** | | | | | | | | | |
| **Size** | | | **M8** | **M10** | **M12** | **M16** | **M20** | **M24** | **M27** | **M30** |
| **Characteristic bond resistance in uncracked concrete** | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,ucr}$ | [N/mm²] | 17 | 15 | 15 | 12 | 12 | 12 | 11 | 9,5 |
| **Dry, wet concrete, flooded hole** | | | | | | | | | |
| Partial safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,0 | | | | | | | |
| Factor for uncracked concrete | C25/30 | $\psi_c$ | [-] | 1,02 | | | | | | |
| | C30/37 | | | 1,04 | | | | | | |
| | C35/45 | | | 1,06 | | | | | | |
| | C40/50 | | | 1,07 | | | | | | |
| | C45/55 | | | 1,08 | | | | | | |
| | C50/60 | | | 1,09 | | | | | | |
| **Characteristic bond resistance in cracked concrete** | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,cr}$ | [N/mm²] | 10 | 10 | 10 | 9,5 | 9 | 9 | 6 | 6 |
| **Dry, wet concrete, flooded hole** | | | | | | | | | |
| Partial safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,0 | | | | | | | |
| Factor for cracked concrete | C25/30 | $\psi_c$ | [-] | 1,02 | | | | | | |
| | C30/37 | | | 1,04 | | | | | | |
| | C35/45 | | | 1,06 | | | | | | |
| | C40/50 | | | 1,07 | | | | | | |
| | C45/55 | | | 1,08 | | | | | | |
| | C50/60 | | | 1,09 | | | | | | |
| **Concrete cone failure** | | | | | | | | | |
| Factor for concrete cone failure for uncracked concrete | $k_1$ [1] | [-] | 10,1 | | | | | | | |
| | $k_{ucr,N}$ [2] | | 11 | | | | | | | |
| Factor for concrete cone failure for cracked concrete | $k_1$ [1] | | 7,2 | | | | | | | |
| | $k_{cr,N}$ [2] | | 7,7 | | | | | | | |
| Edge distance | $c_{cr,N}$ | [mm] | $1,5h_{ef}$ | | | | | | | |
| **Splitting failure** | | | | | | | | | |
| Size | | | **M8** | **M10** | **M12** | **M16** | **M20** | **M24** | **M27** | **M30** |
| Edge distance | $c_{cr,sp}$ | [mm] | $2 \bullet h_{ef}$ | | | | | | | |
| Spacing | $s_{cr,sp}$ | [mm] | $2 \bullet c_{cr,sp}$ | | | | | | | |
| Partial safety factor | $\gamma_{Msp}$ | [-] | 1,5 | | | | | | | |

[1] Design according EOTA Technical Report TR 055
[2] Design according EN 1992-4:2016

**Table C2:** Design method EN 1992-4
Characteristic values of resistance to tension load of rebar

| **Steel failure – Characteristic resistance** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Size** | | | **Ø8** | **Ø10** | **Ø12** | **Ø16** | **Ø20** | **Ø25** | **Ø32** |
| Rebar BSt 500 S | $N_{Rk,s}$ | [kN] | 28 | 43 | 62 | 111 | 173 | 270 | 442 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,4 | | | | | | |

| **Pullout failure in concrete C20/25** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Size** | | | **Ø8** | **Ø10** | **Ø12** | **Ø16** | **Ø20** | **Ø25** | **Ø32** |
| **Characteristic bond resistance in uncracked concrete** | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,ucr}$ | [N/mm²] | 13 | 13 | 13 | 12 | 12 | 12 | 8 |
| **Dry and wet concrete** | | | | | | | | |
| Installation safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,0 | | | | | | |
| **Flooded hole** | | | | | | | | |
| Installation safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,2 | | | | | | |
| Factor for uncracked concrete | C25/30 | [-] | 1,02 | | | | | | |
| | C30/37 | | 1,04 | | | | | | |
| | C35/45 | | 1,06 | | | | | | |
| | C40/50 | | 1,07 | | | | | | |
| | C45/55 | | 1,08 | | | | | | |
| | C50/60 | | 1,09 | | | | | | |
| **Characteristic bond resistance in cracked concrete** | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,cr}$ | [N/mm²] | 8 | 11 | 10 | 10 | 9 | 8,5 | 6 |
| **Dry and wet concrete** | | | | | | | | |
| Installation safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,0 | | | | | | |
| **Flooded hole** | | | | | | | | |
| Installation safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,2 | | | | | | |
| Factor for cracked concrete | C25/30 | [-] | 1,02 | | | | | | |
| | C30/37 | | 1,04 | | | | | | |
| | C35/45 | | 1,06 | | | | | | |
| | C40/50 | | 1,07 | | | | | | |
| | C45/55 | | 1,08 | | | | | | |
| | C50/60 | | 1,09 | | | | | | |

| **Concrete cone failure** | | | |
|---|---|---|---|
| Factor for concrete cone failure for uncracked concrete | $k_1$ [1] | [-] | 10,1 |
| | $k_{ucr,N}$ [2] | | 11 |
| Factor for concrete cone failure for cracked concrete | $k_1$ [1] | | 7,2 |
| | $k_{cr,N}$ [2] | | 7,7 |
| Edge distance | $c_{cr,N}$ | [mm] | $1{,}5h_{ef}$ |

| **Splitting failure** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | **Ø8** | **Ø10** | **Ø12** | **Ø16** | **Ø20** | **Ø25** | **Ø32** |
| Edge distance | $c_{cr,sp}$ | [mm] | $2 \bullet h_{ef}$ | | | | | | |
| Spacing | $s_{cr,sp}$ | [mm] | $2 \bullet c_{cr,sp}$ | | | | | | |
| Partial safety factor Dry and wet concrete | $\gamma_{Msp}$ | [-] | 1,5 | | | | | | |
| Partial safety factor Flooded hole | $\gamma_{Msp}$ | [-] | 1,8 | | | | | | |

[1] Design according EOTA Technical Report TR 055
[2] Design according EN 1992-4:2016

**Table C3:** Design method EN 1992-4
Characteristic values of resistance to shear load of threaded rod

| **Steel failure without lever arm** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Size** | | | **M8** | **M10** | **M12** | **M16** | **M20** | **M24** | **M27** | **M30** |
| Steel grade **4.6** | $V_{Rk,s}$ | [kN] | 7 | 12 | 17 | 31 | 49 | 71 | 92 | 112 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,67 | | | | | | | |
| Steel grade **5.8** | $V_{Rk,s}$ | [kN] | 9 | 15 | 21 | 39 | 61 | 88 | 115 | 140 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade **8.8** | $V_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade **10.9** | $V_{Rk,s}$ | [kN] | 18 | 29 | 42 | 79 | 123 | 177 | 230 | 281 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,5 | | | | | | | |
| Stainless steel grade **A2-70, A4-70** | $V_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | 161 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Stainless steel grade **A4-80** | $V_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | | | | | | |
| Stainless steel grade **1.4529** | $V_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | 161 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Stainless steel grade **1.4565** | $V_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | 161 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Characteristic resistance of group of fasteners | | | | | | | | | | |
| Ductility factor | $k_7$ = 1,0 for steel with rupture elongation $A_5$ > 8% | | | | | | | | | |

| **Steel failure with lever arm** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Size** | | | **M8** | **M10** | **M12** | **M16** | **M20** | **M24** | **M27** | **M30** |
| Steel grade **4.6** | $M^0_{Rk,s}$ | [N.m] | 15 | 30 | 52 | 133 | 260 | 449 | 666 | 900 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,67 | | | | | | | |
| Steel grade **5.8** | $M^0_{Rk,s}$ | [N.m] | 19 | 37 | 66 | 166 | 325 | 561 | 832 | 1125 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade **8.8** | $M^0_{Rk,s}$ | [N.m] | 30 | 60 | 105 | 266 | 519 | 898 | 1332 | 1799 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade **10.9** | $M^0_{Rk,s}$ | [N.m] | 37 | 75 | 131 | 333 | 649 | 1123 | 1664 | 2249 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Stainless steel grade **A2-70, A4-70** | $M^0_{Rk,s}$ | [N.m] | 26 | 52 | 92 | 233 | 454 | 786 | 1165 | 1574 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Stainless steel grade **A4-80** | $M^0_{Rk,s}$ | [N.m] | 30 | 60 | 105 | 266 | 519 | 898 | 1332 | 1799 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | | | | | | |
| Stainless steel grade **1.4529** | $M^0_{Rk,s}$ | [N.m] | 26 | 52 | 92 | 233 | 454 | 786 | 1165 | 1574 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Stainless steel grade **1.4565** | $M^0_{Rk,s}$ | [N.m] | 26 | 52 | 92 | 233 | 454 | 786 | 1165 | 1574 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| **Concrete pryout failure** | | | | | | | | | | |
| Factor for resistance to pry-out failure | $k_8$ | [-] | 2 | | | | | | | |

| **Concrete edge failure** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Size** | | | **M8** | **M10** | **M12** | **M16** | **M20** | **M24** | **M27** | **M30** |
| Outside diameter of fastener | $d_{nom}$ | [mm] | 8 | 10 | 12 | 16 | 20 | 24 | 27 | 30 |
| Effective length of fastener | $\ell_f$ | [mm] | min ($h_{ef}$, 8 $d_{nom}$) | | | | | | | |

**Table C4:** Design method EN 1992-4
Characteristic values of resistance to shear load of rebar

| **Steel failure without lever arm** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Size** | | | **Ø8** | **Ø10** | **Ø12** | **Ø16** | **Ø20** | **Ø25** | **Ø32** |
| Rebar BSt 500 S | $V_{Rk,s}$ | [kN] | 14 | 22 | 31 | 55 | 86 | 135 | 221 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,5 | | | | | | |
| Characteristic resistance of group of fasteners | | | | | | | | | |
| Ductility factor | $k_7$ = 1,0 for steel with rupture elongation $A_5$ > 8% | | | | | | | | |

| **Steel failure with lever arm** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Size** | | | **Ø8** | **Ø10** | **Ø12** | **Ø16** | **Ø20** | **Ø25** | **Ø32** |
| Rebar BSt 500 S | $M^0_{Rk,s}$ | [N.m] | 33 | 65 | 112 | 265 | 518 | 1013 | 2122 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,5 | | | | | | |
| **Concrete pryout failure** | | | | | | | | | |
| Factor for resistance to pry-out failure | $k_8$ | [-] | 2 | | | | | | |

| **Concrete edge failure** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Size** | | | **Ø8** | **Ø10** | **Ø12** | **Ø16** | **Ø20** | **Ø25** | **Ø32** |
| Outside diameter of fastener | $d_{nom}$ | [mm] | 8 | 10 | 12 | 16 | 20 | 25 | 32 |
| Effective length of fastener | $\ell_f$ | [mm] | min ($h_{ef}$, 8 $d_{nom}$) | | | | | | |

**Table C5:** Displacement of threaded rod under tension and shear load

| Size | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|
| Tension load | | | | | | | | | |
| Uncracked concrete | | | | | | | | | |
| F | [kN] | 11,9 | 14,3 | 19,0 | 23,8 | 35,7 | 35,7 | 45,2 | 45,2 |
| $\delta_{N0}$ | [mm] | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 |
| $\delta_{N\infty}$ | [mm] | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 |
| Cracked concrete | | | | | | | | | |
| F | [kN] | 5,7 | 9,5 | 14,3 | 16,7 | 23,8 | 28,6 | 28,6 | 28,6 |
| $\delta_{N0}$ | [mm] | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,6 | 0,6 | 0,7 |
| $\delta_{N\infty}$ | [mm] | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
| Shear load | | | | | | | | | |
| F | [kN] | 3,5 | 5,5 | 8,0 | 15,0 | 23,3 | 33,6 | 43,7 | 53,4 |
| $\delta_{V0}$ | [mm] | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 |
| $\delta_{V\infty}$ | [mm] | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 |

**Table C6:** Displacement of rebar under tension and shear load

| Size | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
|---|---|---|---|---|---|---|---|---|
| Tension load | | | | | | | | |
| Uncracked concrete | | | | | | | | |
| F | [kN] | 7,6 | 11,9 | 16,7 | 28,6 | 35,7 | 45,2 | 66,7 |
| $\delta_{N0}$ | [mm] | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 |
| $\delta_{N\infty}$ | [mm] | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 |
| Cracked concrete | | | | | | | | |
| F | [kN] | 5,7 | 9,5 | 11,9 | 19,0 | 23,8 | 28,6 | 35,7 |
| $\delta_{N0}$ | [mm] | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,6 |
| $\delta_{N\infty}$ | [mm] | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
| Shear load | | | | | | | | |
| F | [kN] | 6,6 | 10,3 | 14,8 | 26,3 | 41,1 | 64,3 | 105,3 |
| $\delta_{V0}$ | [mm] | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 |
| $\delta_{V\infty}$ | [mm] | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 |

**Table C7:** Seismic performance category C1

| Size | | | M12 | M16 | M20 |
|---|---|---|---|---|---|
| **Tension load** | | | | | |
| **Steel failure** | | | | | |
| Characteristic resistance grade **4.6** | $N_{Rk,s,eq,C1}$ | [kN] | 34 | 63 | 98 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 2,00 | |
| Characteristic resistance grade **5.8** | $N_{Rk,s,eq,C1}$ | [kN] | 42 | 79 | 123 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade **8.8** | $N_{Rk,s,eq,C1}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade **10.9** | $N_{Rk,s,eq,C1}$ | [kN] | 84 | 157 | 245 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance **A2-70, A4-70** | $N_{Rk,s,eq,C1}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| Characteristic resistance **A4-80** | $N_{Rk,s,eq,C1}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,60 | |
| Characteristic resistance **1.4529** | $N_{Rk,s,eq,C1}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance **1.4565** | $N_{Rk,s,eq,C1}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| **Characteristic resistance to pull-out** | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,p,eq,C1}$ | [N/mm²] | 5,2 | 6,6 | 6,8 |
| Installation safety factor | $\gamma_2=\gamma_{inst}$ | [-] | | 1,0 | |

| **Shear load** | | | | | |
|---|---|---|---|---|---|
| Steel failure without lever arm | | | | | |
| Characteristic resistance grade **4.6** | $V_{Rk,s,eq,C1}$ | [kN] | 13 | 19 | 29 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,67 | |
| Characteristic resistance grade **5.8** | $V_{Rk,s,eq,C1}$ | [kN] | 17 | 24 | 37 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade **8.8** | $V_{Rk,s,eq,C1}$ | [kN] | 27 | 38 | 59 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade **10.9** | $V_{Rk,s,eq,C1}$ | [kN] | 34 | 47 | 74 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance **A2-70**, **A4-70** | $V_{Rk,s,eq,C1}$ | [kN] | 24 | 33 | 51 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic resistance **A4-80** | $V_{Rk,s,eq,C1}$ | [kN] | 27 | 38 | 59 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance **1.4529** | $V_{Rk,s,eq,C1}$ | [kN] | 24 | 33 | 51 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance **1.4565** | $V_{Rk,s,eq,C1}$ | [kN] | 24 | 33 | 51 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic shear load resistance $V_{Rk,s,eq}$ in the Table C7 shall be multiplied by following reduction factor for **hot-dip galvanized** commercial standard rods | | | | | |
| Reduction factor for hot-dip galvanized rods | $\alpha_{v,h\text{-}dg,c1}$ | [-] | 0,44 | 0,58 | 0,58 |
| Factor for annular gap | $\alpha_{gap}$ | [-] | | 0,5 | |

**The anchor shall be used with minimum rupture elongation after fracture $A_5$ equal to 19%.**

**Table C8:** Seismic performance category C2

| Size | | | M12 | M16 | M20 |
|---|---|---|---|---|---|
| **Tension load** | | | | | |
| **Steel failure** | | | | | |
| Characteristic resistance grade **4.6** | $N_{Rk,s,eq,C2}$ | [kN] | 34 | 63 | 98 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 2,00 | |
| Characteristic resistance grade **5.8** | $N_{Rk,s,eq,C2}$ | [kN] | 42 | 79 | 123 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade **8.8** | $N_{Rk,s,eq,C2}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade **10.9** | $N_{Rk,s,eq,C2}$ | [kN] | 84 | 157 | 245 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance **A2-70, A4-70** | $N_{Rk,s,eq,C2}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| Characteristic resistance **A4-80** | $N_{Rk,s,eq,C2}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,60 | |
| Characteristic resistance **1.4529** | $N_{Rk,s,eq,C2}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance **1.4565** | $N_{Rk,s,eq,C2}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| **Characteristic resistance to pull-out** | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,p,eq,C2}$ | [N/mm²] | 3,5 | 4,0 | 4,5 |
| Installation safety factor | $\gamma_2=\gamma_{inst}$ | [-] | | 1,0 | |

| **Shear load** | | | | | |
|---|---|---|---|---|---|
| Steel failure without lever arm | | | | | |
| Characteristic resistance grade **4.6** | $V_{Rk,s,eq,C2}$ | [kN] | 13 | 18 | 28 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,67 | |
| Characteristic resistance grade **5.8** | $V_{Rk,s,eq,C2}$ | [kN] | 16 | 22 | 35 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade **8.8** | $V_{Rk,s,eq,C2}$ | [kN] | 25 | 36 | 56 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade **10.9** | $V_{Rk,s,eq,C2}$ | [kN] | 32 | 45 | 70 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance **A2-70**, **A4-70** | $V_{Rk,s,eq,C2}$ | [kN] | 22 | 31 | 49 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic resistance **A4-80** | $V_{Rk,s,eq,C2}$ | [kN] | 25 | 36 | 56 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance **1.4529** | $V_{Rk,s,eq,C2}$ | [kN] | 22 | 31 | 49 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance **1.4565** | $V_{Rk,s,eq,C2}$ | [kN] | 22 | 31 | 49 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic shear load resistance $V_{Rk,s,eq}$ in the Table C8 shall be multiplied by following reduction factor for **hot-dip galvanized** commercial standard rods | | | | | |
| Reduction factor for hot-dip galvanized rods | $\alpha_{v,h\text{-}dg,c2}$ | [-] | 0,46 | 0,61 | 0,61 |
| Factor for annular gap | $\alpha_{gap}$ | [-] | | 0,5 | |

**Table C9:** Displacement under tensile and shear load - seismic category C2

| Size | | M12 | M16 | M20 |
|---|---|---|---|---|
| $\delta_{N,eq(DLS)}$ | [mm] | 0,20 | 0,40 | 0,77 |
| $\delta_{N,eq(ULS)}$ | [mm] | 0,76 | 0,74 | 1,68 |
| $\delta_{V,eq(DLS)}$ | [mm] | 5,29 | 4,12 | 4,94 |
| $\delta_{V,eq(ULS)}$ | [mm] | 10,20 | 90,5 | 10,99 |

**The anchor shall be used with minimum rupture elongation after fracture $A_5$ equal to 19%.**

## 8 APPROPRIATE TECHNICAL DOCUMENTATION AND/OR - SPECIFIC TECHNICAL DOCUMENTATION

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

Name : Tomasz Gutowski
Function: Corporate Standardization and Approvals
At Warsaw on 19 July 2018

. . . . . .

Name : Tatiana Ageyeva
Function: Standardization and Approvals
At Warsaw on 19 July 2018

. . . . . .

End of information as required by Regulation (EU) No 305/2011

## RELATED DECLARATION OF PERFORMANCE

| Product Name | Harmonised technical specification | DoP Number |
|---|---|---|
| Sika AnchorFix®-3030 for rebar connection | ETA 17/0693 | 10823672 |

## FULL CE MARKING

CE

17

Sika Services AG, Zurich, Switzerland

DoP No. 66629518

EAD 330499-00-0601

Notified Body 1020

Bonded injection type anchor for use in cracked and uncracked concrete

**Reaction to fire -** Anchorages satisfy requirements for Class A1

**Resistance to fire** - No performance determined

**Anchorages subject to:**

- Static and quasi-static load
- Seismic actions category C1 (max w = 0,5 mm): threaded rod size M12, M16, M20
- Seismic actions category C2 (max w = 0,8 mm): threaded rod size M12, M16, M20

**Base materials**

- Cracked and uncracked concrete
- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum and C50/60 at maximum according EN 206:2013.

**Temperature range:**

- T3: -40°C to +70°C (max. short. term temperature +70°C and max. long term temperature +50°C)

**Use conditions (Environmental conditions)**

- (X1) Structures subject to dry internal conditions (zinc coated steel, stainless steel, high corrosion resistance steel).
- (X2) Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel A4, high corrosion resistant steel).
- (X3) Structures subject to external atmospheric exposure and to permanently damp internal condition, if other particular aggressive conditions exist (high corrosion resistant steel).

Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

**Concrete conditions:**

- I1 – installation in dry or wet (water saturated) concrete or flooded hole.
- I2 – installation in water-filled (not sea water) and use in service in dry or wet concrete

**Design:**

- The anchorages are designed in accordance with the EN 1992-4 or EOTA Technical Report TR 055 under the responsibility of an engineer experienced in anchorages and concrete work.

- 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.
- Anchorages under seismic actions (cracked concrete) have to be designed in accordance with EN 1992-4.

**Installation:**

- Hole drilling by hammer 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

- **Table B1**: Installation parameters of threaded rod

| Size | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Nominal drill hole diameter | $Ød_0$ | [mm] | 10 | 12 | 14 | 18 | 22 | 26 | 30 | 35 |
| Cleaning brush | | | S11HF | S14HF | S14/15HF | S22HF | S24HF | S31HF | S31HF | S38HF |
| Torque moment | max $T_{fixt}$ | [Nm] | 10 | 20 | 40 | 80 | 120 | 160 | 180 | 200 |
| Embedment depth for $h_{ef,min}$ | $h_{ef}$ | [mm] | 60 | 60 | 70 | 80 | 90 | 96 | 108 | 120 |
| Embedment depth for $h_{ef,max}$ | $h_{ef}$ | [mm] | 160 | 200 | 240 | 320 | 400 | 480 | 540 | 600 |
| Depth of drill hole | $h_0$ | [mm] | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 |
| Minimum edge distance | $c_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 50 | 60 |
| Minimum spacing | $s_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 50 | 60 |
| Minimum thickness of member | $h_{min}$ | [mm] | $h_{ef}$ + 30 mm ≥ 100 mm | | | $h_{ef}$ + $2d_0$ | | | | |

- **Table B2**: Installation parameters of rebar

| Size | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
|---|---|---|---|---|---|---|---|---|---|
| Nominal drill hole diameter | $Ød_0$ | [mm] | 12 | 14 | 16 | 20 | 25 | 32 | 40 |
| Cleaning brush | | | S12/13HF | S14/15HF | S18HF | S22HF | S27HF | S35HF | S43HF |
| Torque moment | max $T_{fixt}$ | [Nm] | 10 | 20 | 40 | 80 | 120 | 180 | 200 |
| Min. embedment depth | | | | | | | | | |
| Embedment depth for $h_{ef,min}$ | $h_{ef}$ | [mm] | 60 | 60 | 70 | 80 | 90 | 100 | 128 |
| Embedment depth for $h_{ef,max}$ | $h_{ef}$ | [mm] | 160 | 200 | 240 | 320 | 400 | 500 | 640 |
| Depth of drill hole | $h_0$ | [mm] | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 | $h_{ef}$+5 |
| Minimum edge distance | $c_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 70 |
| Minimum spacing | $s_{min}$ | [mm] | 40 | 40 | 40 | 40 | 50 | 50 | 70 |
| Minimum thickness of member | $h_{min}$ | [mm] | $h_{ef}$ + 30 mm ≥ 100 mm | | | $h_{ef}$ + $2d_0$ | | | |

- **Table B3**: Cleaning

| All diameters |
|---|
| - 2 x blowing |
| - 2 x brushing |
| - 2 x blowing |
| - 2 x brushing |
| - 2 x blowing |

- **Table B4**: Minimum curing time

| Base Material Temperature [°C] | Cartridge Temperature [°C] | T Work [mins] | T Load [hrs] |
|---|---|---|---|
| +5 | Minimum +10 | 300 | 24 |
| +5°C to +10 | | 150 | |
| +10°C to +15 | +10°C to +15 | 40 | 18 |
| +15°C to +20 | +15°C to +20 | 25 | 12 |
| +20°C to +25 | +20°C to +25 | 18 | 8 |
| +25°C to +30 | +25°C to +30 | 12 | 6 |
| +30°C to +35 | +30°C to +35 | 8 | 4 |
| +35°C to +40 | +35°C to +40 | 6 | 2 |
| **Ensure cartridge is ≥ 10°C** | | | |

- T Work is typical gel time at highest base material temperature in the range.
- T Load is minimum set time required until load can be applied at the lowest temperature in the range.

**Table C1:** Design method EN 1992-4
Characteristic values of resistance to tension load of threaded rod

| **Steel failure – Characteristic resistance** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Size** | | | **M8** | **M10** | **M12** | **M16** | **M20** | **M24** | **M27** | **M30** |
| Steel grade **4.6** | $N_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 2,00 | | | | | | | |
| Steel grade **5.8** | $N_{Rk,s}$ | [kN] | 18 | 29 | 42 | 79 | 123 | 177 | 230 | 281 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Steel grade **8.8** | $N_{Rk,s}$ | [kN] | 29 | 46 | 67 | 126 | 196 | 282 | 367 | 449 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Steel grade **10.9** | $N_{Rk,s}$ | [kN] | 37 | 58 | 84 | 157 | 245 | 353 | 459 | 561 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | | | | | | |
| Stainless steel grade **A2-70, A4-70** | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 172 | 247 | 321 | 393 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,87 | | | | | | | |
| Stainless steel grade **A4-80** | $N_{Rk,s}$ | [kN] | 29 | 46 | 67 | 126 | 196 | 282 | 367 | 449 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,60 | | | | | | | |
| Stainless steel grade **1.4529** | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 172 | 247 | 321 | 393 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Stainless steel grade **1.4565** | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 172 | 247 | 321 | 393 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,87 | | | | | | | |
| **Combined pullout and concrete cone failure in concrete C20/25** | | | | | | | | | |
| **Size** | | | **M8** | **M10** | **M12** | **M16** | **M20** | **M24** | **M27** | **M30** |
| **Characteristic bond resistance in uncracked concrete** | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,ucr}$ | [N/mm²] | 17 | 15 | 15 | 12 | 12 | 12 | 11 | 9,5 |
| **Dry, wet concrete, flooded hole** | | | | | | | | | |
| Partial safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,0 | | | | | | | |
| Factor for uncracked concrete | C25/30 | [-] | 1,02 | | | | | | | |
| | C30/37 | | 1,04 | | | | | | | |
| | C35/45 | | 1,06 | | | | | | | |
| | C40/50 | | 1,07 | | | | | | | |
| | C45/55 | | 1,08 | | | | | | | |
| | C50/60 | | 1,09 | | | | | | | |
| **Characteristic bond resistance in cracked concrete** | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,cr}$ | [N/mm²] | 10 | 10 | 10 | 9,5 | 9 | 9 | 6 | 6 |
| **Dry, wet concrete, flooded hole** | | | | | | | | | |
| Partial safety factor | $\gamma_2$ [1] = $\gamma_{inst}$ [2] | [-] | 1,0 | | | | | | | |
| Factor for cracked concrete | C25/30 | [-] | 1,02 | | | | | | | |
| | C30/37 | | 1,04 | | | | | | | |
| | C35/45 | | 1,06 | | | | | | | |
| | C40/50 | | 1,07 | | | | | | | |
| | C45/55 | | 1,08 | | | | | | | |
| | C50/60 | | 1,09 | | | | | | | |
| **Concrete cone failure** | | | | | | | | | |
| Factor for concrete cone failure for uncracked concrete | $k_1$ [1] | [-] | 10,1 | | | | | | | |
| | $k_{ucr,N}$ [2] | | 11 | | | | | | | |
| Factor for concrete cone failure for cracked concrete | $k_1$ [1] | | 7,2 | | | | | | | |
| | $k_{cr,N}$ [2] | | 7,7 | | | | | | | |
| Edge distance | $c_{cr,N}$ | [mm] | $1{,}5h_{ef}$ | | | | | | | |
| **Splitting failure** | | | | | | | | | |
| Size | | | **M8** | **M10** | **M12** | **M16** | **M20** | **M24** | **M27** | **M30** |
| Edge distance | $c_{cr,sp}$ | [mm] | $2 \bullet h_{ef}$ | | | | | | | |
| Spacing | $s_{cr,sp}$ | [mm] | $2 \bullet c_{cr,sp}$ | | | | | | | |
| Partial safety factor | $\gamma_{Msp}$ | [-] | 1,5 | | | | | | | |

[1] Design according EOTA Technical Report TR 055
[2] Design according EN 1992-4:2016

**Table C2:** Design method EN 1992-4
Characteristic values of resistance to tension load of rebar

| **Steel failure – Characteristic resistance** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Size** | | | **Ø8** | **Ø10** | **Ø12** | **Ø16** | **Ø20** | **Ø25** | **Ø32** |
| Rebar BSt 500 S | $N_{Rk,s}$ | [kN] | 28 | 43 | 62 | 111 | 173 | 270 | 442 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,4 | | | | | | |

| **Pullout failure in concrete C20/25** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Size** | | | **Ø8** | **Ø10** | **Ø12** | **Ø16** | **Ø20** | **Ø25** | **Ø32** |
| **Characteristic bond resistance in uncracked concrete** | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,ucr}$ | [N/mm²] | 13 | 13 | 13 | 12 | 12 | 12 | 8 |
| **Dry and wet concrete** | | | | | | | | | |
| Installation safety factor | $\gamma_2$[1] = $\gamma_{inst}$[2] | [-] | 1,0 | | | | | | |
| **Flooded hole** | | | | | | | | | |
| Installation safety factor | $\gamma_2$[1] = $\gamma_{inst}$[2] | [-] | 1,2 | | | | | | |
| Factor for uncracked concrete C25/30 | $\psi_c$ | [-] | 1,02 | | | | | | |
| Factor for uncracked concrete C30/37 | $\psi_c$ | [-] | 1,04 | | | | | | |
| Factor for uncracked concrete C35/45 | $\psi_c$ | [-] | 1,06 | | | | | | |
| Factor for uncracked concrete C40/50 | $\psi_c$ | [-] | 1,07 | | | | | | |
| Factor for uncracked concrete C45/55 | $\psi_c$ | [-] | 1,08 | | | | | | |
| Factor for uncracked concrete C50/60 | $\psi_c$ | [-] | 1,09 | | | | | | |
| **Characteristic bond resistance in cracked concrete** | | | | | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,cr}$ | [N/mm²] | 8 | 11 | 10 | 10 | 9 | 8,5 | 6 |
| **Dry and wet concrete** | | | | | | | | | |
| Installation safety factor | $\gamma_2$[1] = $\gamma_{inst}$[2] | [-] | 1,0 | | | | | | |
| **Flooded hole** | | | | | | | | | |
| Installation safety factor | $\gamma_2$[1] = $\gamma_{inst}$[2] | [-] | 1,2 | | | | | | |
| Factor for cracked concrete C25/30 | $\psi_c$ | [-] | 1,02 | | | | | | |
| Factor for cracked concrete C30/37 | $\psi_c$ | [-] | 1,04 | | | | | | |
| Factor for cracked concrete C35/45 | $\psi_c$ | [-] | 1,06 | | | | | | |
| Factor for cracked concrete C40/50 | $\psi_c$ | [-] | 1,07 | | | | | | |
| Factor for cracked concrete C45/55 | $\psi_c$ | [-] | 1,08 | | | | | | |
| Factor for cracked concrete C50/60 | $\psi_c$ | [-] | 1,09 | | | | | | |

| **Concrete cone failure** | | | |
|---|---|---|---|
| Factor for concrete cone failure for uncracked concrete | $k_1$[1] | [-] | 10,1 |
| | $k_{ucr,N}$[2] | | 11 |
| Factor for concrete cone failure for cracked concrete | $k_1$[1] | | 7,2 |
| | $k_{cr,N}$[2] | | 7,7 |
| Edge distance | $c_{cr,N}$ | [mm] | $1{,}5h_{ef}$ |

| **Splitting failure** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | | | **Ø8** | **Ø10** | **Ø12** | **Ø16** | **Ø20** | **Ø25** | **Ø32** |
| Edge distance | $c_{cr,sp}$ | [mm] | $2 \bullet h_{ef}$ | | | | | | |
| Spacing | $s_{cr,sp}$ | [mm] | $2 \bullet c_{cr,sp}$ | | | | | | |
| Partial safety factor Dry and wet concrete | $\gamma_{Msp}$ | [-] | 1,5 | | | | | | |
| Partial safety factor Flooded hole | $\gamma_{Msp}$ | [-] | 1,8 | | | | | | |

[1] Design according EOTA Technical Report TR 055
[2] Design according EN 1992-4:2016

**Table C3:** Design method EN 1992-4
Characteristic values of resistance to shear load of threaded rod

| **Steel failure without lever arm** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Size** | | | **M8** | **M10** | **M12** | **M16** | **M20** | **M24** | **M27** | **M30** |
| Steel grade **4.6** | $V_{Rk,s}$ | [kN] | 7 | 12 | 17 | 31 | 49 | 71 | 92 | 112 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,67 | | | | | | | |
| Steel grade **5.8** | $V_{Rk,s}$ | [kN] | 9 | 15 | 21 | 39 | 61 | 88 | 115 | 140 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade **8.8** | $V_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade **10.9** | $V_{Rk,s}$ | [kN] | 18 | 29 | 42 | 79 | 123 | 177 | 230 | 281 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,5 | | | | | | | |
| Stainless steel grade **A2-70, A4-70** | $V_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | 161 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Stainless steel grade **A4-80** | $V_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | | | | | | |
| Stainless steel grade **1.4529** | $V_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | 161 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Stainless steel grade **1.4565** | $V_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | 161 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Characteristic resistance of group of fasteners | | | | | | | | | | |
| Ductility factor $k_7$ = 1,0 for steel with rupture elongation $A_5$ > 8% | | | | | | | | | | |

| **Steel failure with lever arm** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Size** | | | **M8** | **M10** | **M12** | **M16** | **M20** | **M24** | **M27** | **M30** |
| Steel grade **4.6** | $M^0_{Rk,s}$ | [N.m] | 15 | 30 | 52 | 133 | 260 | 449 | 666 | 900 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,67 | | | | | | | |
| Steel grade **5.8** | $M^0_{Rk,s}$ | [N.m] | 19 | 37 | 66 | 166 | 325 | 561 | 832 | 1125 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade **8.8** | $M^0_{Rk,s}$ | [N.m] | 30 | 60 | 105 | 266 | 519 | 898 | 1332 | 1799 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Steel grade **10.9** | $M^0_{Rk,s}$ | [N.m] | 37 | 75 | 131 | 333 | 649 | 1123 | 1664 | 2249 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | | | | | | |
| Stainless steel grade **A2-70, A4-70** | $M^0_{Rk,s}$ | [N.m] | 26 | 52 | 92 | 233 | 454 | 786 | 1165 | 1574 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| Stainless steel grade **A4-80** | $M^0_{Rk,s}$ | [N.m] | 30 | 60 | 105 | 266 | 519 | 898 | 1332 | 1799 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | | | | | | |
| Stainless steel grade **1.4529** | $M^0_{Rk,s}$ | [N.m] | 26 | 52 | 92 | 233 | 454 | 786 | 1165 | 1574 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | | | | | | |
| Stainless steel grade **1.4565** | $M^0_{Rk,s}$ | [N.m] | 26 | 52 | 92 | 233 | 454 | 786 | 1165 | 1574 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | | | | | | |
| **Concrete pryout failure** | | | | | | | | | | |
| Factor for resistance to pry-out failure | $k_8$ | [-] | 2 | | | | | | | |

| **Concrete edge failure** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Size** | | | **M8** | **M10** | **M12** | **M16** | **M20** | **M24** | **M27** | **M30** |
| Outside diameter of fastener | $d_{nom}$ | [mm] | 8 | 10 | 12 | 16 | 20 | 24 | 27 | 30 |
| Effective length of fastener | $\ell_f$ | [mm] | min ($h_{ef}$, 8 $d_{nom}$) | | | | | | | |

**Table C4:** Design method EN 1992-4
Characteristic values of resistance to shear load of rebar

| **Steel failure without lever arm** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Size** | | | **Ø8** | **Ø10** | **Ø12** | **Ø16** | **Ø20** | **Ø25** | **Ø32** |
| Rebar BSt 500 S | $V_{Rk,s}$ | [kN] | 14 | 22 | 31 | 55 | 86 | 135 | 221 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,5 | | | | | | |
| Characteristic resistance of group of fasteners | | | | | | | | | |
| Ductility factor | $k_7$ = 1,0 for steel with rupture elongation $A_5$ > 8% | | | | | | | | |

| **Steel failure with lever arm** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Size** | | | **Ø8** | **Ø10** | **Ø12** | **Ø16** | **Ø20** | **Ø25** | **Ø32** |
| Rebar BSt 500 S | $M^0_{Rk,s}$ | [N.m] | 33 | 65 | 112 | 265 | 518 | 1013 | 2122 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,5 | | | | | | |
| **Concrete pryout failure** | | | | | | | | | |
| Factor for resistance to pry-out failure | $k_8$ | [-] | 2 | | | | | | |

| **Concrete edge failure** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Size** | | | **Ø8** | **Ø10** | **Ø12** | **Ø16** | **Ø20** | **Ø25** | **Ø32** |
| Outside diameter of fastener | $d_{nom}$ | [mm] | 8 | 10 | 12 | 16 | 20 | 25 | 32 |
| Effective length of fastener | $\ell_f$ | [mm] | min ($h_{ef}$, 8 $d_{nom}$) | | | | | | |

**Table C5:** Displacement of threaded rod under tension and shear load

| Size | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
|---|---|---|---|---|---|---|---|---|---|
| Tension load | | | | | | | | | |
| Uncracked concrete | | | | | | | | | |
| F | [kN] | 11,9 | 14,3 | 19,0 | 23,8 | 35,7 | 35,7 | 45,2 | 45,2 |
| $\delta_{N0}$ | [mm] | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 |
| $\delta_{N\infty}$ | [mm] | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 |
| Cracked concrete | | | | | | | | | |
| F | [kN] | 5,7 | 9,5 | 14,3 | 16,7 | 23,8 | 28,6 | 28,6 | 28,6 |
| $\delta_{N0}$ | [mm] | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,6 | 0,6 | 0,7 |
| $\delta_{N\infty}$ | [mm] | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
| Shear load | | | | | | | | | |
| F | [kN] | 3,5 | 5,5 | 8,0 | 15,0 | 23,3 | 33,6 | 43,7 | 53,4 |
| $\delta_{V0}$ | [mm] | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 |
| $\delta_{V\infty}$ | [mm] | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 |

**Table C6:** Displacement of rebar under tension and shear load

| Size | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
|---|---|---|---|---|---|---|---|---|
| Tension load | | | | | | | | |
| Uncracked concrete | | | | | | | | |
| F | [kN] | 7,6 | 11,9 | 16,7 | 28,6 | 35,7 | 45,2 | 66,7 |
| $\delta_{N0}$ | [mm] | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 |
| $\delta_{N\infty}$ | [mm] | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 | 0,6 |
| Cracked concrete | | | | | | | | |
| F | [kN] | 5,7 | 9,5 | 11,9 | 19,0 | 23,8 | 28,6 | 35,7 |
| $\delta_{N0}$ | [mm] | 0,3 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,6 |
| $\delta_{N\infty}$ | [mm] | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 | 2,0 |
| Shear load | | | | | | | | |
| F | [kN] | 6,6 | 10,3 | 14,8 | 26,3 | 41,1 | 64,3 | 105,3 |
| $\delta_{V0}$ | [mm] | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 |
| $\delta_{V\infty}$ | [mm] | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 | 3,7 |

**Table C7:** Seismic performance category C1

| Size | | | M12 | M16 | M20 |
|---|---|---|---|---|---|
| **Tension load** | | | | | |
| **Steel failure** | | | | | |
| Characteristic resistance grade **4.6** | $N_{Rk,s,eq,C1}$ | [kN] | 34 | 63 | 98 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 2,00 | |
| Characteristic resistance grade **5.8** | $N_{Rk,s,eq,C1}$ | [kN] | 42 | 79 | 123 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade **8.8** | $N_{Rk,s,eq,C1}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance grade **10.9** | $N_{Rk,s,eq,C1}$ | [kN] | 84 | 157 | 245 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance **A2-70, A4-70** | $N_{Rk,s,eq,C1}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| Characteristic resistance **A4-80** | $N_{Rk,s,eq,C1}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,60 | |
| Characteristic resistance **1.4529** | $N_{Rk,s,eq,C1}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance **1.4565** | $N_{Rk,s,eq,C1}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,87 | |
| **Characteristic resistance to pull-out** | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,p,eq,C1}$ | [N/mm²] | 5,2 | 6,6 | 6,8 |
| Installation safety factor | $\gamma_2=\gamma_{inst}$ | [-] | | 1,0 | |

| **Shear load** | | | | | |
|---|---|---|---|---|---|
| Steel failure without lever arm | | | | | |
| Characteristic resistance grade **4.6** | $V_{Rk,s,eq,C1}$ | [kN] | 13 | 19 | 29 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,67 | |
| Characteristic resistance grade **5.8** | $V_{Rk,s,eq,C1}$ | [kN] | 17 | 24 | 37 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade **8.8** | $V_{Rk,s,eq,C1}$ | [kN] | 27 | 38 | 59 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance grade **10.9** | $V_{Rk,s,eq,C1}$ | [kN] | 34 | 47 | 74 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,50 | |
| Characteristic resistance **A2-70, A4-70** | $V_{Rk,s,eq,C1}$ | [kN] | 24 | 33 | 51 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic resistance **A4-80** | $V_{Rk,s,eq,C1}$ | [kN] | 27 | 38 | 59 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,33 | |
| Characteristic resistance **1.4529** | $V_{Rk,s,eq,C1}$ | [kN] | 24 | 33 | 51 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,25 | |
| Characteristic resistance **1.4565** | $V_{Rk,s,eq,C1}$ | [kN] | 24 | 33 | 51 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | | 1,56 | |
| Characteristic shear load resistance $V_{Rk,s,eq}$ in the Table C7 shall be multiplied by following reduction factor for **hot-dip galvanized** commercial standard rods | | | | | |
| Reduction factor for hot-dip galvanized rods | $\alpha_{v,h\text{-}dg,c1}$ | [-] | 0,44 | 0,58 | 0,58 |
| Factor for annular gap | $\alpha_{gap}$ | [-] | | 0,5 | |

**The anchor shall be used with minimum rupture elongation after fracture $A_5$ equal to 19%.**

**Table C8:** Seismic performance category C2

| Size | | | M12 | M16 | M20 |
|---|---|---|---|---|---|
| **Tension load** | | | | | |
| **Steel failure** | | | | | |
| Characteristic resistance grade **4.6** | $N_{Rk,s,eq,C2}$ | [kN] | 34 | 63 | 98 |

| | | | | | |
|---|---|---|---|---|---|
| Partial safety factor | $\gamma_{Ms}$ | [-] | 2,00 | | |
| Characteristic resistance grade **5.8** | $N_{Rk,s,eq,C2}$ | [kN] | 42 | 79 | 123 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | |
| Characteristic resistance grade **8.8** | $N_{Rk,s,eq,C2}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | |
| Characteristic resistance grade **10.9** | $N_{Rk,s,eq,C2}$ | [kN] | 84 | 157 | 245 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | |
| Characteristic resistance **A2-70, A4-70** | $N_{Rk,s,eq,C2}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,87 | | |
| Characteristic resistance **A4-80** | $N_{Rk,s,eq,C2}$ | [kN] | 67 | 126 | 196 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,60 | | |
| Characteristic resistance **1.4529** | $N_{Rk,s,eq,C2}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | |
| Characteristic resistance **1.4565** | $N_{Rk,s,eq,C2}$ | [kN] | 59 | 110 | 172 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,87 | | |
| **Characteristic resistance to pull-out** | | | | | |
| Temperature T3: -40°C to +70°C | $\tau_{Rk,p,eq,C2}$ | [N/mm²] | 3,5 | 4,0 | 4,5 |
| Installation safety factor | $\gamma_2=\gamma_{inst}$ | [-] | 1,0 | | |

| | | | | | |
|---|---|---|---|---|---|
| **Shear load** | | | | | |
| Steel failure without lever arm | | | | | |
| Characteristic resistance grade **4.6** | $V_{Rk,s,eq,C2}$ | [kN] | 13 | 18 | 28 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,67 | | |
| Characteristic resistance grade **5.8** | $V_{Rk,s,eq,C2}$ | [kN] | 16 | 22 | 35 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | |
| Characteristic resistance grade **8.8** | $V_{Rk,s,eq,C2}$ | [kN] | 25 | 36 | 56 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | |
| Characteristic resistance grade **10.9** | $V_{Rk,s,eq,C2}$ | [kN] | 32 | 45 | 70 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,50 | | |
| Characteristic resistance **A2-70**, **A4-70** | $V_{Rk,s,eq,C2}$ | [kN] | 22 | 31 | 49 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | |
| Characteristic resistance **A4-80** | $V_{Rk,s,eq,C2}$ | [kN] | 25 | 36 | 56 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,33 | | |
| Characteristic resistance **1.4529** | $V_{Rk,s,eq,C2}$ | [kN] | 22 | 31 | 49 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,25 | | |
| Characteristic resistance **1.4565** | $V_{Rk,s,eq,C2}$ | [kN] | 22 | 31 | 49 |
| Partial safety factor | $\gamma_{Ms}$ | [-] | 1,56 | | |
| Characteristic shear load resistance $V_{Rk,s,eq}$ in the Table C8 shall be multiplied by following reduction factor for **hot-dip galvanized** commercial standard rods | | | | | |
| Reduction factor for hot-dip galvanized rods | $\alpha_{v,h\text{-}dg,c2}$ | [-] | 0,46 | 0,61 | 0,61 |
| Factor for annular gap | $\alpha_{gap}$ | [-] | 0,5 | | |

**Table C9:** Displacement under tensile and shear load - seismic category C2

| Size | | M12 | M16 | M20 |
|---|---|---|---|---|
| $\delta_{N,eq(DLS)}$ | [mm] | 0,20 | 0,40 | 0,77 |
| $\delta_{N,eq(ULS)}$ | [mm] | 0,76 | 0,74 | 1,68 |
| $\delta_{V,eq(DLS)}$ | [mm] | 5,29 | 4,12 | 4,94 |
| $\delta_{V,eq(ULS)}$ | [mm] | 10,20 | 90,5 | 10,99 |

**The anchor shall be used with minimum rupture elongation after fracture $A_5$ equal to 19%.**

http://dop.sika.com

## CE MARKING TO BE PLACED ON THE LABEL

| |
|---|
| CE<br>17 |
| Sika Services AG, Zurich, Switzerland |
| DoP No. 66629518 |
| EAD 330499-00-0601 |
| Notified Body 1020 |
| Bonded injection type anchor for use in cracked and uncracked concrete |
| For details see accompanying documents |
| http://dop.sika.com |

## ECOLOGY, HEALTH AND SAFETY INFORMATION (REACH)

For information and advice on the safe handling, storage and disposal of chemical products, users shall refer to the most recent Safety Data Sheet (SDS) containing physical, ecological, toxicological and other safety related data.

## LEGAL NOTE

**Sika Services AG**
Tueffenwies 16
CH-8048 Zuerich
Switzerland
www.sika.com