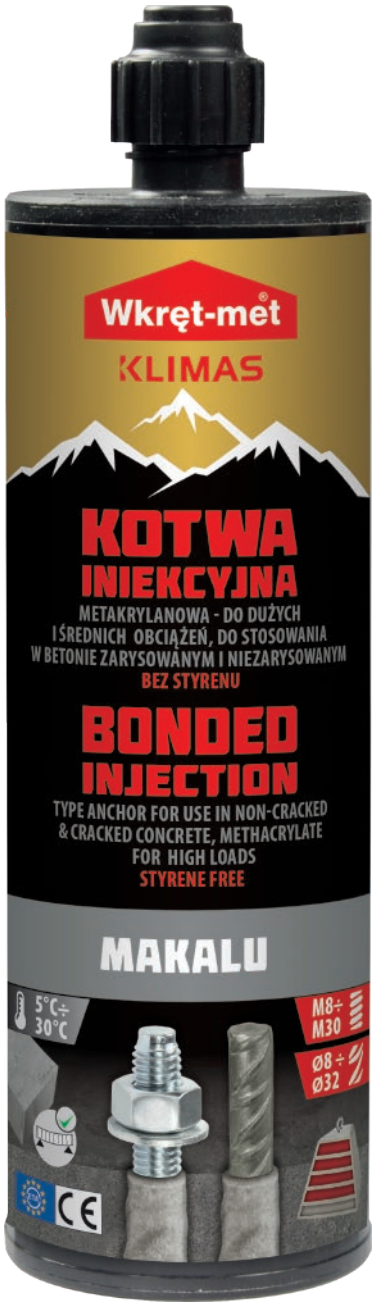
# WCF-EASF/WCF-EASF-E/WCF-EASF-C

**Injection methacrylate anchors - for large and medium loads**
**for use use with cracked and non-cracked concrete zones, without styrene**

ETA-15/0702
for threaded rods and rebars calculations according to TR 029 and to CEN/TS 1992-4

ETA-15/0703
for rebars calculations in accordance with EC2 EN 1992-1-1




## Description

Methacrylic two-component (1:10) injection anchor without styrene. For professional use for reliable, durable connections. Anchor used to set in threaded rods and rebars into concrete substrates. Content: 410 ml; Working temperatures for hardened anchor: -40˚C to +80˚C

## Substrate material

- Cracked and non-cracked concrete (option 1) C20/25 through C50/60;
- Reinforced and non-reinforced concrete;
- Dry, wet concrete and flooded holes (Cat 2);
- Deep anchoring - rebars, calculations in accordance with EC2 EN 1992-1-1;
- Non-cracked concrete (option 7) C12/15 through C50/60;
- Reinforced and non-reinforced concrete;
- Dry and wet concrete;

## Related rods

- Threaded rods M8-M30 made of galvanized steel grades: 4.6, 5.8, 8.8, 10.9;
- Threaded rods M8-M30 made of stainless steel grades: A4-70, A4-80;
- Threaded rods M8-M30 made of HCR steel: 1.4529;
- Galvanized or hot-dip galvanized rods;
- Rebars: Ø8, Ø10, Ø12, Ø16, Ø20, Ø25, Ø32, grade: B,C;
- Rebars (post installed in accordance with TR023/EC2): Ø8, Ø10, Ø12, Ø14, Ø16, Ø20, Ø25, class: B, C;

## Application temperatures

| 5°C ÷ 30°C | 15°C ÷ 40°C | -10°C ÷ 20°C | |
|---|---|---|---|
| WCF-EASF-410 | WCF-EASF-E-410 | WCF-EASF-C-410* | *Does not apply deep anchoring |

## Features and advantages

| | |
|---|---|
| **Wide range of applications** | Connection of steel structures (railings, handrails); reinforcement of building elements, bridges and other construction structures; post installing rebars; structural connections to anchored rebars (connections to walls, pillars, foundations), calculation method according to TR 029, CEN/TS 1992-4 and to EC2 EN 1992-1-1; |
| **Styrene-free** | Does not release volatile styrene compounds, making it safe for people and suitable for indoor areas; |
| **Normal recipe, summer and winter** | Can be used in various working conditions:<br>WCF-EASF - for normal installation conditions +5˚C to +30˚C;<br>WCF-EASF-E - for summer (tropical) installation conditions +15˚C to +40˚C;<br>WCF-EASF-C - for winter installation conditions -10˚C to +20˚C; |
| **No stress in substrate during installation** | It allows for installation near the edges without risking cracking of the substrate |
| **Installation in cracked concrete** | Ability to install threaded rods in the tension zone of the reinforced concrete, cracked concrete, such as slabs, beams, |
| **Long life** | Valid for use within 12 months in normal storage conditions |
| **Content 410 ml - coaxial cartridge** | Increased volume - 410 ml for large work scope, the coaxial cartridge eliminates problems during application and allows for use of every $cm^3$ of the product |

# WCF-EASF/WCF-EASF-E/WCF-EASF-C

**Injection methacrylate anchors - for large and medium loads**
**for use use with cracked and non-cracked concrete zones, without styrene**

**TABLE 1 Ordering list**

| | Code | [°C] | Pcs. |
|---|---|---|---|
| 410ml | WCF-EASF-410 | 5 ÷ 30 | 12 |
| | WCF-EASF-E-410 | 15 ÷ 40 | 12 |
| | WCF-EASF-C-410 | -10 ÷ 20 | 12 |

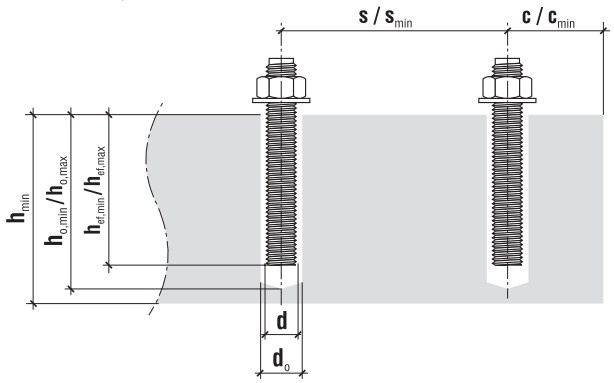



**TABLE 2 Installation parameters - threaded rods**

| Parameters | | | | ROD SIZE | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | M8 | M10 | M12 | M16 | M20 | M24 | M27 | M30 |
| Threaded rod diameter | | d | [mm] | 8 | 10 | 12 | 16 | 20 | 24 | 27 | 30 |
| Hole diameter | | $d_0$ | [mm] | 10 | 12 | 14 | 18 | 22 | 26 | 30 | 35 |
| For minimum embedment depth = 8d | Min. embedment depth | $h_{ef,min}$ | [mm] | 64 | 80 | 96 | 128 | 160 | 192 | 216 | 240 |
| | Min. hole depth | $h_{0,min}$ | [mm] | 69 | 85 | 101 | 133 | 165 | 197 | 221 | 245 |
| | Min. distance from the edge | $c_{min}$ | [mm] | 35 | 40 | 50 | 65 | 80 | 96 | 110 | 120 |
| | Min. spacing between connector centres | $s_{min}$ | [mm] | 35 | 40 | 50 | 65 | 80 | 96 | 110 | 120 |
| Maximum anchoring depth = 20d | Max. embedment depth | $h_{ef,max}$ | [mm] | 160 | 200 | 240 | 320 | 400 | 480 | 540 | 600 |
| | Max. crevice depth | $h_{0,max}$ | [mm] | 165 | 205 | 245 | 325 | 405 | 485 | 545 | 605 |
| | Min. distance from the edge | $c_{min}$ | [mm] | 80 | 100 | 120 | 160 | 200 | 240 | 270 | 300 |
| | Min. spacing between connector centres | $s_{min}$ | [mm] | 80 | 100 | 120 | 160 | 200 | 240 | 270 | 300 |
| Min. base material thickness | | $h_{min}$ | [mm] | $h_{ef}$+30 mm > 100 mm | | | | $h_{ef}+2*d_0$ | | | |
| Torque | | $T_{inst}$ | [Nm] | 10 | 20 | 40 | 80 | 150 | 200 | 240 | 275 |

**TABLE 3 Curing time**

| Substrate temp [°C] | Resin type | -10 ÷ -5 | -5 ÷ 0 | 0 ÷ 5 | 5 ÷ 10 | 10 ÷ 15 | 15 ÷ 20 | 20 ÷ 25 | 25 ÷ 30 | 30 ÷ 35 | 35 ÷ 40 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Working time [min.] | EASF | - | - | - | 10 | 8 | 6 | 5 | 4 | - | - |
| | EASF-E | - | - | - | - | - | 15 | 10 | 7.5 | 5 | 3.5 |
| | EASF-C | 50 | 15 | 10 | 5 | 5 | 5 | 1.4 | - | - | - |
| Hardening time [min] | EASF | - | - | - | 145 | 85 | 75 | 50 | 40 | - | - |
| | EASF-E | - | - | - | - | - | 300 | 145 | 85 | 50 | 40 |
| | EASF-C | 720 | 100 | 75 | 50 | 50 | 50 | 20 | - | - | - |

**Setting instruction**

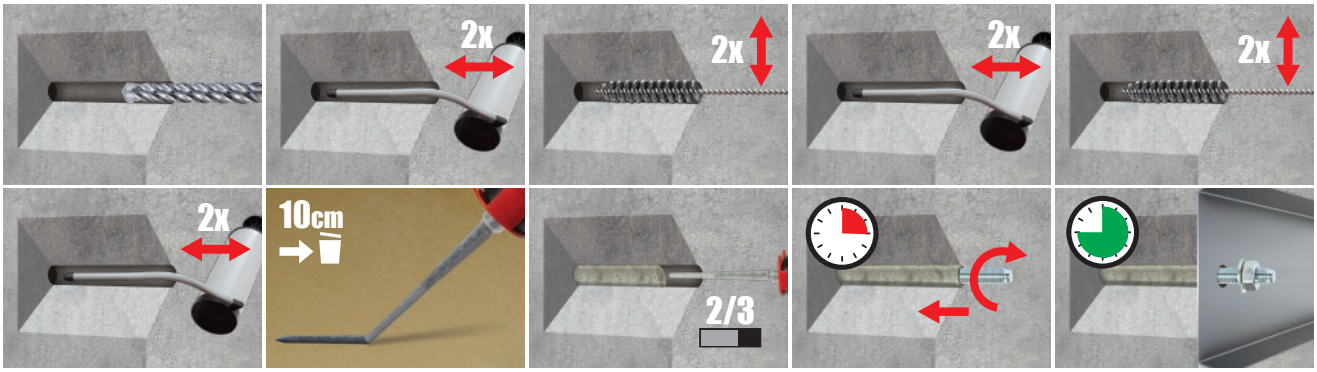


**TABLE 4A: Loading resistances for tension in non-cracked concrete - threaded rods**

| Rod size | Hole diameter [mm] | Torque $T_{inst}$ [Nm] | Loading resistances of individual anchors installed into non-cracked concrete C20/25 maintaining basic installation conditions - characteristic and designed values | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Minimal value of {pull-out failure - $N_{R,p}$ [kN] ; concrete cone failure - $N_{R,c}$ [kN]} | | | | | | | | | | | | | | | | | | Steel wear - $N_{R,s}$ [kN] | | | | | |
| | | | Safety factor - $\gamma_{Mc}$ = 1,8 - M8-M24, $\gamma_{Mc}$ = 2,1 - M27-M30 | | | | | | | | | | | | | | | | | | $\gamma_{Ms}$=2 | $\gamma_{Ms}$=1.5 | | $\gamma_{Ms}$=1.4 | $\gamma_{Ms}$=1.87 | $\gamma_{Ms}$=1.6 |
| | | | Embedment depth $h_{ef}$ [mm] | | | | | | | | | | | | | | | | | | Steel grade | | | | | |
| | | | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 540 | 600 | 4.6 | 5.8 | 8.8 | 10.9 | A4-70 | A4-80 |
| M8 | 10 | 10 | 15.08 | 20.11 | 25.13 | 30.16 | 35.19 | 40.21 | - | - | - | - | - | - | - | - | - | - | - | - | 14.64 | 18.30 | 29.28 | 36.60 | 25.62 | 29.28 |
| | | | 8.38 | 11.17 | 13.96 | 16.76 | 19.55 | 22.34 | - | - | - | - | - | - | - | - | - | - | - | - | 7.32 | 12.20 | 19.52 | 26.14 | 13.73 | 18.30 |
| M10 | 12 | 20 | - | 23.88 | 29.85 | 35.81 | 41.78 | 47.75 | 53.72 | 59.69 | - | - | - | - | - | - | - | - | - | - | 23.20 | 29.00 | 46.40 | 58.00 | 40.60 | 46.40 |
| | | | - | 13.26 | 16.58 | 19.90 | 23.21 | 26.53 | 29.85 | 33.16 | - | - | - | - | - | - | - | - | - | - | 11.60 | 19.33 | 30.93 | 41.43 | 21.75 | 29.00 |
| M12 | 14 | 40 | - | - | 35.81 | 42.98 | 50.14 | 57.30 | 64.47 | 71.63 | 78.79 | 85.95 | - | - | - | - | - | - | - | - | 33.72 | 42.15 | 67.44 | 84.30 | 59.01 | 67.44 |
| | | | - | - | 19.90 | 23.88 | 27.86 | 31.83 | 35.81 | 39.79 | 43.77 | 47.75 | - | - | - | - | - | - | - | - | 16.86 | 28.10 | 44.96 | 60.21 | 31.61 | 42.15 |
| M16 | 18 | 80 | - | - | - | - | 63.33 | 72.38 | 81.43 | 90.48 | 99.53 | 108.57 | 126.67 | 144.76 | - | - | - | - | - | - | 62.80 | 78.50 | 125.60 | 157.00 | 109.90 | 125.60 |
| | | | - | - | - | - | 35.19 | 40.21 | 45.24 | 50.27 | 55.29 | 60.32 | 70.37 | 80.42 | - | - | - | - | - | - | 31.40 | 52.33 | 83.73 | 112.14 | 58.88 | 78.50 |
| M20 | 22 | 150 | - | - | - | - | - | 85.45 | 96.13 | 106.81 | 117.50 | 128.18 | 149.54 | 170.90 | 192.27 | 213.63 | - | - | - | - | 98.00 | 122.50 | 196.00 | 245.00 | 171.50 | 196.00 |
| | | | - | - | - | - | - | 47.47 | 53.41 | 59.34 | 65.28 | 71.21 | 83.08 | 94.95 | 106.81 | 118.68 | - | - | - | - | 49.00 | 81.67 | 130.67 | 175.00 | 91.88 | 122.50 |
| M24 | 26 | 200 | - | - | - | - | - | - | - | 120.64 | 132.70 | 144.76 | 168.89 | 193.02 | 217.15 | 241.27 | 265.40 | 289.53 | - | - | 141.20 | 176.50 | 282.40 | 353.00 | 247.10 | 282.40 |
| | | | - | - | - | - | - | - | - | 67.02 | 73.72 | 80.42 | 93.83 | 107.23 | 120.64 | 134.04 | 147.45 | 160.85 | - | - | 70.60 | 117.67 | 188.27 | 252.14 | 132.38 | 176.50 |
| M27 | 30 | 240 | - | - | - | - | - | - | - | - | 121.30 | 132.32 | 154.38 | 176.43 | 198.49 | 220.54 | 242.59 | 264.65 | 297.73 | - | 183.60 | 229.50 | 367.20 | 459.00 | 321.30 | 367.20 |
| | | | - | - | - | - | - | - | - | - | 57.76 | 63.01 | 73.51 | 84.02 | 94.52 | 105.02 | 115.52 | 126.02 | 141.78 | - | 91.80 | 153.00 | 244.80 | 327.86 | 172.13 | 229.50 |
| M30 | 35 | 275 | - | - | - | - | - | - | - | - | - | 124.41 | 145.14 | 165.88 | 186.61 | 207.35 | 228.08 | 248.81 | 279.92 | 311.02 | 224.40 | 280.50 | 448.80 | 561.00 | 392.70 | 448.80 |
| | | | - | - | - | - | - | - | - | - | - | 59.24 | 69.12 | 78.99 | 88.86 | 98.74 | 108.61 | 118.48 | 133.29 | 148.10 | 112.20 | 187.00 | 299.20 | 400.71 | 210.38 | 280.50 |

Data for a single anchor without influence of distance or effects of spacing between the anchors.
As the spacing and distance decreases, the values given should be multiplied by reduction coefficients from tables 7 and 8

Characteristic values  Design values

# WCF-EASF/WCF-EASF-E/WCF-EASF-C

**Injection methacrylate anchors - for large and medium loads for use use with cracked and non-cracked concrete zones, without styrene**

# WCF-EASF/WCF-EASF-E/WCF-EASF-C

**Injection methacrylate anchors - for large and medium loads**
**for use use with cracked and non-cracked concrete zones, without styrene**

**TABLE 5A: Loading resistances for shearing in non-cracked concrete - threaded rods**

| Rod size | Hole diameter [mm] | Torque $T_{inst}$ [Nm] | Loading resistances of individual anchors installed into non-cracked concrete C20/25 affected by shearing force maintaining basic installation conditions - characteristic and designed values | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Minimal value of {pry-out - $V_{R,p}$ [kN] ; concrete edge failure - $V_{R,c}$ [kN]} | | | | | | | | | | | | | | | | | | Steel failure - $V_{R,s}$ [kN] | | | | | |
| | | | Safety factor - $\gamma_{Mc}$ = 1,5 | | | | | | | | | | | | | | | | | | $\gamma_{Ms}$=1.67 | $\gamma_{Ms}$=1.25 | | $\gamma_{Ms}$=1.5 | $\gamma_{Ms}$=1.56 | $\gamma_{Ms}$=1.33 |
| | | | Embedment depth $h_{ef}$ [mm] | | | | | | | | | | | | | | | | | | Steel grade | | | | | |
| | | | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 540 | 600 | 4.6 | 5.8 | 8.8 | 10.9 | A4-70 | A4-80 |
| M8 | 10 | 10 | 15.63 | 24.12 | 33.76 | 44.40 | 55.96 | 68.37 | - | - | - | - | - | - | - | - | - | - | - | - | 7.32 | 9.15 | 14.64 | 18.30 | 12.81 | 14.64 |
| | | | 10.42 | 16.08 | 22.50 | 29.60 | 37.31 | 45.58 | - | - | - | - | - | - | - | - | - | - | - | - | 4.39 | 7.32 | 11.71 | 12.20 | 8.24 | 10.98 |
| M10 | 12 | 20 | - | 24.85 | 34.78 | 45.75 | 57.66 | 70.45 | 84.05 | 98.41 | - | - | - | - | - | - | - | - | - | - | 11.60 | 14.50 | 23.20 | 29.00 | 20.30 | 23.20 |
| | | | - | 16.57 | 23.19 | 30.50 | 38.44 | 46.97 | 56.03 | 65.61 | - | - | - | - | - | - | - | - | - | - | 6.96 | 11.60 | 18.56 | 19.33 | 13.05 | 17.40 |
| M12 | 14 | 40 | - | - | 35.65 | 46.90 | 59.12 | 72.22 | 86.17 | 100.89 | 116.36 | 132.53 | - | - | - | - | - | - | - | - | 16.86 | 21.08 | 33.72 | 42.15 | 29.51 | 33.72 |
| | | | - | - | 23.77 | 31.27 | 39.41 | 48.15 | 57.44 | 67.26 | 77.57 | 88.35 | - | - | - | - | - | - | - | - | 10.12 | 16.86 | 26.98 | 28.10 | 18.97 | 25.29 |
| M16 | 18 | 80 | - | - | - | - | 61.53 | 75.17 | 89.68 | 105.01 | 121.10 | 137.93 | 173.65 | 211.96 | - | - | - | - | - | - | 31.40 | 39.25 | 62.80 | 78.50 | 54.95 | 62.80 |
| | | | - | - | - | - | 41.02 | 50.11 | 59.79 | 70.00 | 80.73 | 91.95 | 115.77 | 141.30 | - | - | - | - | - | - | 18.84 | 31.40 | 50.24 | 52.33 | 35.33 | 47.10 |
| M20 | 22 | 150 | - | - | - | - | - | 77.59 | 92.57 | 108.38 | 124.99 | 142.36 | 179.22 | 218.75 | 260.76 | 305.09 | - | - | - | - | 49.00 | 61.25 | 98.00 | 122.50 | 85.75 | 98.00 |
| | | | - | - | - | - | - | 51.73 | 61.71 | 72.26 | 83.33 | 94.91 | 119.48 | 145.83 | 173.84 | 203.39 | - | - | - | - | 29.40 | 49.00 | 78.40 | 81.67 | 55.13 | 73.50 |
| M24 | 26 | 200 | - | - | - | - | - | - | - | 111.28 | 128.33 | 146.15 | 183.99 | 224.56 | 267.68 | 313.18 | 360.94 | 410.84 | - | - | 70.60 | 88.25 | 141.20 | 176.50 | 123.55 | 141.20 |
| | | | - | - | - | - | - | - | - | 74.18 | 85.55 | 97.44 | 122.66 | 149.71 | 178.45 | 208.78 | 240.62 | 273.90 | - | - | 42.36 | 70.60 | 112.96 | 117.67 | 79.43 | 105.90 |
| M27 | 30 | 240 | - | - | - | - | - | - | - | - | 130.56 | 148.69 | 187.19 | 228.45 | 272.30 | 318.58 | 367.16 | 417.92 | 497.94 | - | 91.80 | 114.75 | 183.60 | 229.50 | 160.65 | 183.60 |
| | | | - | - | - | - | - | - | - | - | 87.04 | 99.13 | 124.79 | 152.30 | 181.54 | 212.39 | 244.77 | 278.61 | 331.96 | - | 55.08 | 91.80 | 146.88 | 153.00 | 103.28 | 137.70 |
| M30 | 35 | 275 | - | - | - | - | - | - | - | - | - | 151.02 | 190.12 | 232.02 | 276.55 | 323.55 | 372.87 | 424.41 | 505.66 | 591.38 | 112.20 | 140.25 | 224.40 | 280.50 | 196.35 | 224.40 |
| | | | - | - | - | - | - | - | - | - | - | 100.68 | 126.74 | 154.68 | 184.37 | 215.70 | 248.58 | 282.94 | 337.11 | 394.25 | 67.32 | 112.20 | 179.52 | 187.00 | 126.23 | 168.30 |

Data for a single anchor without accounting for distance from the edge or effects of spacing between centres of the anchors.
As the spacing and distance from the edge decreases, the values given should be multiplied by reduction coefficients from tables 7 and 9.

Characteristic values  Design values

**TABLE 4B Carrying capacity for tension in cracked concrete - threaded rods**

| Rod size | Hole diameter [mm] | Torque $T_{inst}$ [Nm] | Loading resistance of individual connectors installed into cracked concrete C20/25 maintaining basic installation conditions - characteristic and designed values | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Minimal value of {pull-out failure - $N_{R,p}$ [kN] ; concrete cone failure - $N_{R,c}$ [kN]} | | | | | | | | | | | | | | | | | Steel failure - $N_{R,s}$ [kN] | | | | | |
| | | | Safety factor - $\gamma_{Mc} = 1,8$ | | | | | | | | | | | | | | | | | $\gamma_{Ms}$=2 | $\gamma_{Ms}$=1.5 | | $\gamma_{Ms}$=1.4 | $\gamma_{Ms}$=1.87 | $\gamma_{Ms}$=1.6 |
| | | | Embedment depth $h_{ef}$[mm] | | | | | | | | | | | | | | | | | Steel grade | | | | | |
| | | | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 540 | 600 | 4.6 | 5.8 | 8.8 | 10.9 | A4-70 | A4-80 |
| M10 | 12 | 20 | - | 11.31 | 14.14 | 16.96 | 19.79 | 22.62 | 25.45 | 28.27 | - | - | - | - | - | - | - | - | - | - | 23.20 | 29.00 | 46.40 | 58.00 | 40.60 | 46.40 |
| | | | - | 6.28 | 7.85 | 9.42 | 11.00 | 12.57 | 14.14 | 15.71 | - | - | - | - | - | - | - | - | - | - | 11.60 | 19.33 | 30.93 | 41.43 | 21.75 | 29.00 |
| M12 | 14 | 40 | - | - | 16.96 | 20.36 | 23.75 | 27.14 | 30.54 | 33.93 | 37.32 | 40.72 | - | - | - | - | - | - | - | - | 33.72 | 42.15 | 67.44 | 84.30 | 59.01 | 67.44 |
| | | | - | - | 9.42 | 11.31 | 13.19 | 15.08 | 16.96 | 18.85 | 20.73 | 22.62 | - | - | - | - | - | - | - | - | 16.86 | 28.10 | 44.96 | 60.21 | 31.61 | 42.15 |
| M16 | 18 | 80 | - | - | - | - | 31.67 | 36.19 | 40.72 | 45.24 | 49.76 | 54.29 | 63.33 | 72.38 | - | - | - | - | - | - | 62.80 | 78.50 | 125.60 | 157.00 | 109.90 | 125.60 |
| | | | - | - | - | - | 17.59 | 20.11 | 22.62 | 25.13 | 27.65 | 30.16 | 35.19 | 40.21 | - | - | - | - | - | - | 31.40 | 52.33 | 83.73 | 112.14 | 58.88 | 78.50 |
| M20 | 22 | 150 | - | - | - | - | - | 40.21 | 45.24 | 50.27 | 55.29 | 60.32 | 70.37 | 80.42 | 90.48 | 100.53 | - | - | - | - | 98.00 | 122.50 | 196.00 | 245.00 | 171.50 | 196.00 |
| | | | - | - | - | - | - | 22.34 | 25.13 | 27.93 | 30.72 | 33.51 | 39.10 | 44.68 | 50.27 | 55.85 | - | - | - | - | 49.00 | 81.67 | 130.67 | 175.00 | 91.88 | 122.50 |
| M24 | 26 | 200 | - | - | - | - | - | - | - | 60.32 | 66.35 | 72.38 | 84.45 | 96.51 | 108.57 | 120.64 | 132.70 | 144.76 | - | - | 141.20 | 176.50 | 282.40 | 353.00 | 247.10 | 282.40 |
| | | | - | - | - | - | - | - | - | 33.51 | 36.86 | 40.21 | 46.91 | 53.62 | 60.32 | 67.02 | 73.72 | 80.42 | - | - | 70.60 | 117.67 | 188.27 | 252.14 | 132.38 | 176.50 |

Data for a single anchor without influence of distance or effects of spacing between the anchors.
As the spacing and distance from the edge decreases, the values given should be multiplied by reduction coefficients from tables 7 and 8.

Characteristic values  Design values

# WCF-EASF/WCF-EASF-E/WCF-EASF-C

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**Injection methacrylate anchors - for large and medium loads**
**for use use with cracked and non-cracked concrete zones, without styrene**

**TABLE 5B Loading resistance for shearing in cracked concrete - threaded rods**

| Rod size | Hole diameter [mm] | Torque $T_{inst}$ [Nm] | Carrying capacity of individual connectors installed into cracked concrete C20/25 affected by cutting force maintaining basic installation conditions - specific values and calculated values | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Minimal value of {pry-out - $V_{R,p}$ [kN] ; concrete edge failure - $V_{R,c}$ [kN]} | | | | | | | | | | | | | | | | | | Steel wear - $V_{R,s}$ [kN] | | | | | |
| | | | Safety factor - $\gamma_{Mc}$ = 1,5 | | | | | | | | | | | | | | | | | | $\gamma_{Ms}$=1.67 | $\gamma_{Ms}$=1.25 | | $\gamma_{Ms}$=1.5 | $\gamma_{Ms}$=1.56 | $\gamma_{Ms}$=1.33 |
| | | | Embedment depth $h_{ef}$ [mm] | | | | | | | | | | | | | | | | | | Steel grade | | | | | |
| | | | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 540 | 600 | 4.6 | 5.8 | 8.8 | 10.9 | A4-70 | A4-80 |
| M10 | 12 | 20 | - | 17.60 | 24.64 | 32.41 | 39.58 | 45.24 | 50.89 | 56.55 | - | - | - | - | - | - | - | - | - | - | 11.60 | 14.50 | 23.20 | 29.00 | 20.30 | 23.20 |
| | | | - | 11.74 | 16.42 | 21.60 | 26.39 | 30.16 | 33.93 | 37.70 | - | - | - | - | - | - | - | - | - | - | 6.96 | 11.60 | 18.56 | 19.33 | 13.05 | 17.40 |
| M12 | 14 | 40 | - | - | 25.26 | 33.22 | 41.87 | 51.16 | 61.03 | 67.86 | 74.64 | 81.43 | - | - | - | - | - | - | - | - | 16.86 | 21.08 | 33.72 | 42.15 | 29.51 | 33.72 |
| | | | - | - | 16.84 | 22.15 | 27.92 | 34.11 | 40.69 | 45.24 | 49.76 | 54.29 | - | - | - | - | - | - | - | - | 10.12 | 16.86 | 26.98 | 28.10 | 18.97 | 25.29 |
| M16 | 18 | 80 | - | - | - | - | 43.58 | 53.25 | 63.52 | 74.38 | 85.78 | 97.70 | 123.00 | 144.76 | - | - | - | - | - | - | 31.40 | 39.25 | 62.80 | 78.50 | 54.95 | 62.80 |
| | | | - | - | - | - | 29.05 | 35.50 | 42.35 | 49.59 | 57.19 | 65.13 | 82.00 | 96.51 | - | - | - | - | - | - | 18.84 | 31.40 | 50.24 | 52.33 | 35.33 | 47.10 |
| M20 | 22 | 150 | - | - | - | - | - | 54.96 | 65.57 | 76.77 | 88.54 | 100.84 | 126.95 | 154.95 | 180.96 | 201.06 | - | - | - | - | 49.00 | 61.25 | 98.00 | 122.50 | 85.75 | 98.00 |
| | | | - | - | - | - | - | 36.64 | 43.71 | 51.18 | 59.03 | 67.23 | 84.63 | 103.30 | 120.64 | 134.04 | - | - | - | - | 29.40 | 49.00 | 78.40 | 81.67 | 55.13 | 73.50 |
| M24 | 26 | 200 | - | - | - | - | - | - | - | 78.82 | 90.90 | 103.53 | 130.33 | 159.07 | 189.60 | 221.83 | 255.66 | 289.53 | - | - | 70.60 | 88.25 | 141.20 | 176.50 | 123.55 | 141.20 |
| | | | - | - | - | - | - | - | - | 52.55 | 60.60 | 69.02 | 86.89 | 106.04 | 126.40 | 147.89 | 170.44 | 193.02 | - | - | 42.36 | 70.60 | 112.96 | 117.67 | 79.43 | 105.90 |

Data for a single anchor without influence of distance or effects of spacing between the anchors.
As the spacing and distance from the edge decreases, the values given should be multiplied by reduction coefficients from tables 7 and 9.

Characteristic values  Design values

# WCF-EASF/WCF-EASF-E/WCF-EASF-C

## Injection methacrylate anchors - for large and medium loads for use use with cracked and non-cracked concrete zones, without styrene

**TABLE 6 Base installation conditions allowing for maintaining loading resistances from tables 4AB - 5AB**

| Parameter | Rod size | Formula | Embedment depth $h_{ef}$ [mm] | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 540 | 600 |
| Distance from the edge - c[mm] | M8-M30 | c=1,5*hef | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 420 | 480 | 540 | 600 | 660 | 720 | 810 | 900 |
| Anchor spacing - s[mm] | M8-M30 | s=3*hef | 180 | 240 | 300 | 360 | 420 | 480 | 540 | 600 | 660 | 720 | 840 | 960 | 1080 | 1200 | 1320 | 1440 | 1620 | 1800 |

**TABLE 7 Reduction factors for tension and shearing - effects of anchor spacing, "s"**

| Effects of anchor spacing (reduction coefficient) - $\Psi_{sn,v}$ | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $s/h_{ef}$ | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2 | 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 | 2.7 | 2.8 | 2.9 | ≥3 |
| M8-M30 | 0.58 | 0.6 | 0.62 | 0.63 | 0.65 | 0.67 | 0.68 | 0.7 | 0.72 | 0.73 | 0.75 | 0.77 | 0.78 | 0.8 | 0.82 | 0.83 | 0.85 | 0.87 | 0.88 | 0.9 | 0.92 | 0.93 | 0.95 | 0.97 | 0.98 | 1 |

Spacing between anchors cannot be lower than 0.5 of embedment depth ($h_{ef}$)

| | |
|---|---|
| $0,5\ h_{ef} < s < 3\ h_{ef}$ | M8-M30 |

**TABLE 8 Reduction factors for tension - effects of distance from the edge "c"**

| Effects of anchor distance from the edge (reduction coefficient) - $\Psi_{sn,v}$ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $c/h_{ef}$ | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 | 1.1 | 1.2 | 1.3 | 1.4 | ≥1,5 |
| M8-M30 | 0.53 | 0.57 | 0.62 | 0.67 | 0.71 | 0.76 | 0.81 | 0.85 | 0.90 | 0.95 | 1.00 |

Distance from the edge cannot be lower than 0,5 of embedment depth ($h_{ef}$)

| | |
|---|---|
| $0,5\ h_{ef} < c < 1,5\ h_{ef}$ | M8-M30 |

**TABLE 9 Reduction factors for shearing - effects of distance from the edge "c"**

| Effects of anchor distance from the edge (reduction coefficient) - $\Psi_{cv}$ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $c/h_{ef}$ | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | ≥1.5 |
| M8-M30 | 0.23 | 0.29 | 0.36 | 0.43 | 0.50 | 0.58 | 0.66 | 0.74 | 0.82 | 0.91 | 1.00 |

Distance from the edge cannot be lower than 0,5 of embedment depth ($h_{ef}$)

| | |
|---|---|
| $0,5\ h_{ef} < c < 1,5\ h_{ef}$ | M8-M30 |

**TABLE 10 Consumption - threaded rods**

| Rod size | Hole diameter [mm] | Torque $T_{inst}$ [Nm] | Estimated number of anchors made from one cartridge 410 ml | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Embedment depth $h_{ef}$ [mm] | | | | | | | | | | | | | | | | | |
| | | | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 540 | 600 |
| M8 | 10 | 10 | 116 | 87 | 70 | 58 | 50 | 44 | - | - | - | - | - | - | - | - | - | - | - | - |
| M10 | 12 | 20 | - | 60 | 48 | 40 | 35 | 30 | 27 | 24 | - | - | - | - | - | - | - | - | - | - |
| M12 | 14 | 40 | - | - | 36 | 30 | 25 | 22 | 20 | 18 | 16 | 15 | - | - | - | - | - | - | - | - |
| M16 | 18 | 80 | - | - | - | - | 15 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | - | - | - | - | - | - |
| M20 | 22 | 150 | - | - | - | - | - | 9 | 8 | 7 | 7 | 6 | 5 | 4 | 4 | 4 | - | - | - | - |
| M24 | 26 | 200 | - | - | - | - | - | - | - | 5 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 2 | - | - |
| M27 | 30 | 240 | - | - | - | - | - | - | - | - | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | - |
| M30 | 35 | 275 | - | - | - | - | - | - | - | - | - | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 |

# WCF-EASF/WCF-EASF-E/WCF-EASF-C

**Injection methacrylate anchors - for large and medium loads**
**for use use with cracked and non-cracked concrete zones, without styrene**

**TABLE 1. Ordering list**

| | Code | [°C] | Pcs. |
|---|---|---|---|
| 410ml | WCF-EASF-410 | 5 ÷ 30 | 12 |
| | WCF-EASF-E-410 | 15 ÷ 40 | 12 |
| | WCF-EASF-C-410 | -10 ÷ 20 | 12 |

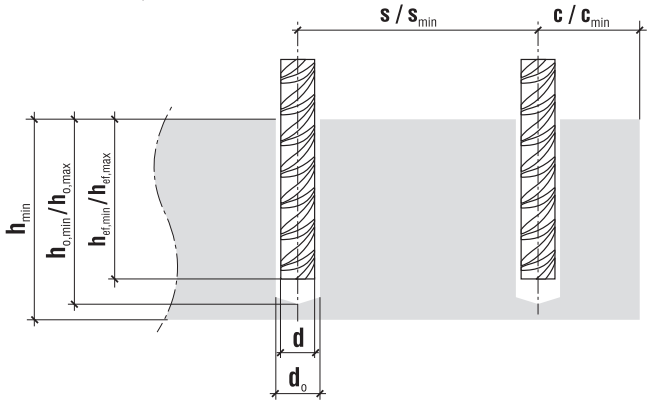


**TABLE 2. Installation parameters - rebars according to the TR029 standard**

| Parameters | | | | ROD SIZE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ø8 | Ø10 | Ø12 | Ø16 | Ø20 | Ø25 | Ø32 |
| Rebar diameter | | d | [mm] | 8 | 10 | 12 | 16 | 20 | 25 | 32 |
| Hole diameter | | $d_0$ | [mm] | 12 | 14 | 16 | 20 | 25 | 32 | 40 |
| For minimum embedment depth = 8d | Min. embedment depth | $h_{ef,min}$ | [mm] | 64 | 80 | 96 | 128 | 160 | 200 | 256 |
| | Min. hole depth | $h_{0,min}$ | [mm] | 69 | 85 | 101 | 133 | 165 | 205 | 261 |
| | Min. distance from the edge | $c_{min}$ | [mm] | 35 | 40 | 50 | 65 | 80 | 100 | 130 |
| | Min. spacing between connector centres | $s_{min}$ | [mm] | 35 | 40 | 50 | 65 | 80 | 100 | 130 |
| Maximum embedment depth = 20d | Max. embedment depth | $h_{ef,max}$ | [mm] | 160 | 200 | 240 | 320 | 400 | 500 | 640 |
| | Max. crevice depth | $h_{0,max}$ | [mm] | 165 | 205 | 245 | 325 | 405 | 505 | 645 |
| | Min. distance from the edge | $c_{min}$ | [mm] | 80 | 100 | 120 | 160 | 200 | 250 | 320 |
| | Min. spacing between connector centres | $s_{min}$ | [mm] | 80 | 100 | 120 | 160 | 200 | 250 | 320 |
| Min. base material thickness | | $h_{min}$ | [mm] | $h_{ef}$+30 mm > 100 mm | | | | $h_{ef}$+2*$d_0$ | | |

**TABLE 3. Curing time**

| Substrate temp [°C] | Resin type | -10 ÷ -5 | -5 ÷ 0 | 0 ÷ 5 | 5 ÷ 10 | 10 ÷ 15 | 15 ÷ 20 | 20 ÷ 25 | 25 ÷ 30 | 30 ÷ 35 | 35 ÷ 40 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Working time [min.] | EASF | - | - | - | 10 | 8 | 6 | 5 | 4 | - | - |
| | EASF-E | - | - | - | - | - | 15 | 10 | 7.5 | 5 | 3.5 |
| | EASF-C | 50 | 15 | 10 | 5 | 5 | 5 | 1.4 | - | - | - |
| Hardening time [min] | EASF | - | - | - | 145 | 85 | 75 | 50 | 40 | - | - |
| | EASF-E | - | - | - | - | - | 300 | 145 | 85 | 50 | 40 |
| | EASF-C | 720 | 100 | 75 | 50 | 50 | 50 | 20 | - | - | - |

**Setting instruction**

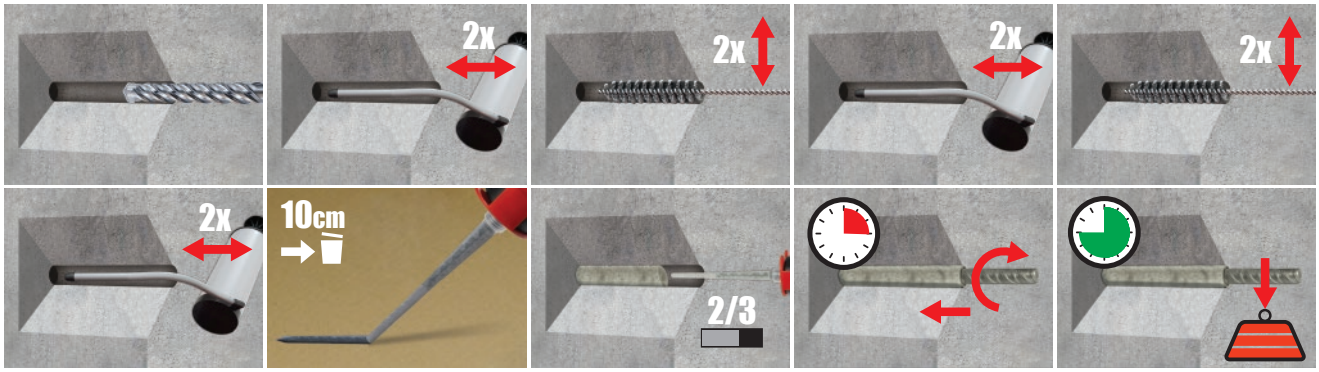

**TABLE 4A Loading resistances for tension on non-cracked concrete - rebars in accordance with TR029**

| Rod size | Hole diameter [mm] | Loading resistances of individual anchors installed into non-cracked concrete C20/25 maintaining basic installation conditions - characteristic and designed values | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimal value of {pull-out failure - $N_{R,p}$ [kN] ; concrete cone failure - $N_{R,c}$ [kN]} | | | | | | | | | | | | | | | | | | | Steel failure - $N_{R,s}$ [kN] | | | |
| | | Safety factor - $\gamma_{Mc} = 1.8$ | | | | | | | | | | | | | | | | | | | $\gamma_{Ms}$ =1.4 | $\gamma_{Ms}$=1.4 | $\gamma_{Ms}$=1.46 | $\gamma_{Ms}$=1.62 |
| | | Embedment depth $h_{ef}$[mm] | | | | | | | | | | | | | | | | | | | Steel grade | | | |
| | | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 280 | 300 | 360 | 400 | 450 | 500 | 550 | 600 | 640 | BSt 500 S | B 500 SP | 34 GS | 18 G2 |
| Ø8 | 12 | 16.59 | 22.12 | 27.65 | 33.18 | 38.70 | 44.23 | - | - | - | - | - | - | - | - | - | - | - | - | - | 27.67 | 28.92 | 25.15 | 24.14 |
| | | 9.22 | 12.29 | 15.36 | 18.43 | 21.50 | 24.57 | - | - | - | - | - | - | - | - | - | - | - | - | - | 19.76 | 20.66 | 17.19 | 14.88 |
| Ø10 | 14 | - | 23.88 | 29.85 | 35.81 | 41.78 | 47.75 | 53.72 | 59.69 | - | - | - | - | - | - | - | - | - | - | - | 43.18 | 45.14 | 39.25 | 37.68 |
| | | - | 13.26 | 16.58 | 19.90 | 23.21 | 26.53 | 29.85 | 33.16 | - | - | - | - | - | - | - | - | - | - | - | 30.84 | 32.24 | 26.82 | 23.22 |
| Ø12 | 16 | - | - | 35.81 | 42.98 | 50.14 | 57.30 | 64.47 | 71.63 | 78.79 | 85.95 | - | - | - | - | - | - | - | - | - | 62.15 | 64.98 | 56.50 | 54.24 |
| | | - | - | 19.90 | 23.88 | 27.86 | 31.83 | 35.81 | 39.79 | 43.77 | 47.75 | - | - | - | - | - | - | - | - | - | 44.39 | 46.41 | 38.61 | 33.43 |
| Ø16 | 20 | - | - | - | - | 63.33 | 72.38 | 81.43 | 90.48 | 99.53 | 108.57 | 126.67 | 135.72 | - | - | - | - | - | - | - | 110.55 | 115.58 | 100.50 | 96.48 |
| | | - | - | - | - | 35.19 | 40.21 | 45.24 | 50.27 | 55.29 | 60.32 | 70.37 | 75.40 | - | - | - | - | - | - | - | 78.96 | 82.55 | 68.68 | 59.46 |
| Ø20 | 25 | - | - | - | - | - | 85.45 | 96.13 | 106.81 | 117.50 | 128.18 | 149.54 | 160.22 | 192.27 | 213.63 | - | - | - | - | - | 172.70 | 180.55 | 157.00 | 150.72 |
| | | - | - | - | - | - | 47.47 | 53.41 | 59.34 | 65.28 | 71.21 | 83.08 | 89.01 | 106.81 | 118.68 | - | - | - | - | - | 123.36 | 128.96 | 107.28 | 92.89 |
| Ø25 | 32 | - | - | - | - | - | - | - | 133.52 | 146.87 | 160.22 | 186.92 | 200.28 | 240.33 | 267.04 | 300.41 | 333.79 | - | - | - | 270.05 | 282.33 | 245.50 | 235.68 |
| | | - | - | - | - | - | - | - | 74.18 | 81.59 | 89.01 | 103.85 | 111.26 | 133.52 | 148.35 | 166.90 | 185.44 | - | - | - | 192.89 | 201.66 | 167.76 | 145.25 |
| Ø32 | 40 | - | - | - | - | - | - | - | - | 121.64 | 132.70 | 154.82 | 165.88 | 199.05 | 221.17 | 248.81 | 276.46 | 304.11 | 331.75 | 353.87 | 442.20 | 462.30 | 402.00 | 385.92 |
| | | - | - | - | - | - | - | - | - | 67.58 | 73.72 | 86.01 | 92.15 | 110.58 | 122.87 | 138.23 | 153.59 | 168.95 | 184.31 | 196.59 | 315.86 | 330.21 | 274.70 | 237.85 |

Data for a single anchor without accounting for distance from the edge or effects of spacing between centres of the anchors.
As the spacing and distance decreases, the values given should be multiplied by reduction coefficients from tables 7 and 8

Characteristic values  Design values

# WCF-EASF/WCF-EASF-E/WCF-EASF-C

**Injection methacrylate anchors - for large and medium loads for use with cracked and non-cracked concrete zones, without styrene**

# WCF-EASF/WCF-EASF-E/WCF-EASF-C

## Injection methacrylate anchors - for large and medium loads for use use with cracked and non-cracked concrete zones, without styrene

**TABLE 5A Loading resistance for shearing in non-cracked concrete - rebars in accordance with TR029**

| Rod size | Hole diameter [mm] | Carrying capacity of individual connectors installed into non-cracked concrete C20/25 affected by cutting force maintaining basic installation conditions - specific values and calculated values | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimal value of {pry-out - $V_{R,p}$ [kN] ; concrete edge failure - $V_{R,c}$ [kN]} | | | | | | | | | | | | | | | | | | | Steel failure - $V_{R,s}$ [kN] | | | |
| | | Safety factor - $\gamma_{Mc}$ = 1,5 | | | | | | | | | | | | | | | | | | | $\gamma_{Ms}$=1.5 | $\gamma_{Ms}$=1.5 | $\gamma_{Ms}$=1.5 | $\gamma_{Ms}$=1.5 |
| | | Embedment depth $h_{ef}$ [mm] | | | | | | | | | | | | | | | | | | | Steel grade | | | |
| | | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 280 | 300 | 360 | 400 | 450 | 500 | 550 | 600 | 640 | BSt 500 S | B 500 SP | 34 GS | 18 G2 |
| Ø8 | 12 | 15.63 | 24.12 | 33.76 | 44.40 | 55.96 | 68.37 | - | - | - | - | - | - | - | - | - | - | - | - | - | 13.83 | 14.46 | 12.58 | 12.07 |
| | | 10.42 | 16.08 | 22.50 | 29.60 | 37.31 | 45.58 | - | - | - | - | - | - | - | - | - | - | - | - | - | 9.22 | 9.64 | 8.38 | 8.05 |
| Ø10 | 14 | - | 24.85 | 34.78 | 45.75 | 57.66 | 70.45 | 84.05 | 98.41 | - | - | - | - | - | - | - | - | - | - | - | 21.59 | 22.57 | 19.63 | 18.84 |
| | | - | 16.57 | 23.19 | 30.50 | 38.44 | 46.97 | 56.03 | 65.61 | - | - | - | - | - | - | - | - | - | - | - | 14.39 | 15.05 | 13.08 | 12.56 |
| Ø12 | 16 | - | - | 35.65 | 46.90 | 59.12 | 72.22 | 86.17 | 100.89 | 116.36 | 132.53 | - | - | - | - | - | - | - | - | - | 31.08 | 32.49 | 28.25 | 27.12 |
| | | - | - | 23.77 | 31.27 | 39.41 | 48.15 | 57.44 | 67.26 | 77.57 | 88.35 | - | - | - | - | - | - | - | - | - | 20.72 | 21.66 | 18.83 | 18.08 |
| Ø16 | 20 | - | - | - | - | 61.53 | 75.17 | 89.68 | 105.01 | 121.10 | 137.93 | 173.65 | 192.49 | - | - | - | - | - | - | - | 55.28 | 57.79 | 50.25 | 48.24 |
| | | - | - | - | - | 41.02 | 50.11 | 59.79 | 70.00 | 80.73 | 91.95 | 115.77 | 128.33 | - | - | - | - | - | - | - | 36.85 | 38.53 | 33.50 | 32.16 |
| Ø20 | 25 | - | - | - | - | - | 77.59 | 92.57 | 108.38 | 124.99 | 142.36 | 179.22 | 198.67 | 260.76 | 305.09 | - | - | - | - | - | 86.35 | 90.28 | 78.50 | 75.36 |
| | | - | - | - | - | - | 51.73 | 61.71 | 72.26 | 83.33 | 94.91 | 119.48 | 132.44 | 173.84 | 203.39 | - | - | - | - | - | 57.57 | 60.18 | 52.33 | 50.24 |
| Ø25 | 32 | - | - | - | - | - | - | - | 111.94 | 129.09 | 147.03 | 185.09 | 205.16 | 269.27 | 315.03 | 375.43 | 439.15 | - | - | - | 135.03 | 141.16 | 122.75 | 117.84 |
| | | - | - | - | - | - | - | - | 74.63 | 86.06 | 98.02 | 123.39 | 136.78 | 179.51 | 210.02 | 250.28 | 292.77 | - | - | - | 90.02 | 94.11 | 81.83 | 78.56 |
| Ø32 | 40 | - | - | - | - | - | - | - | - | 133.89 | 152.48 | 191.95 | 212.76 | 279.21 | 326.65 | 389.25 | 455.29 | 524.60 | 597.01 | 657.07 | 221.10 | 231.15 | 201.00 | 192.96 |
| | | - | - | - | - | - | - | - | - | 89.26 | 101.65 | 127.96 | 141.84 | 186.14 | 217.77 | 259.50 | 303.53 | 349.73 | 398.01 | 438.05 | 147.40 | 154.10 | 134.00 | 128.64 |

Data for a single anchor without influence of distance or effects of spacing between the anchors.
As the spacing and distance from the edge decreases, the values given should be multiplied by reduction coefficients from tables 7 and 9.

Characteristic values  Design values

# WCF-EASF/WCF-EASF-E/WCF-EASF-C

## Injection methacrylate anchors - for large and medium loads for use use with cracked and non-cracked concrete zones, without styrene

**TABLE 6 Base installation conditions allowing for maintaining loading resistances from tables 4A - 5A**

| Parameter | Rod size | Formula | Embedment depth $h_{ef}$ [mm] | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 540 | 600 | 640 |
| Distance from the edge - c[mm] | Ø8-Ø32 | c=1,5*hef | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 420 | 480 | 540 | 600 | 660 | 720 | 810 | 900 | 960 |
| Anchor spacing - s[mm] | Ø8-Ø32 | s=3*hef | 180 | 240 | 300 | 360 | 420 | 480 | 540 | 600 | 660 | 720 | 840 | 960 | 1080 | 1200 | 1320 | 1440 | 1620 | 1800 | 1920 |

**TABLE 7 Reduction factors for tension and shearing - effects of anchor spacing, "s"**

| Effects of anchor spacing (reduction coefficient) - $\Psi_{sn,v}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $s/h_{ef}$ | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2 | 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 | 2.7 | 2.8 | 2.9 | ≥3 |
| Ø8-Ø32 | 0.58 | 0.6 | 0.62 | 0.63 | 0.65 | 0.67 | 0.68 | 0.7 | 0.72 | 0.73 | 0.75 | 0.77 | 0.78 | 0.8 | 0.82 | 0.83 | 0.85 | 0.87 | 0.88 | 0.9 | 0.92 | 0.93 | 0.95 | 0.97 | 0.98 | 1 |

Spacing between anchors cannot be lower than 0.5 of embedment depth ($h_{ef}$)

| | |
|---|---|
| $0,5\ h_{ef} < s < 3\ h_{ef}$ | Ø8-Ø32 |

**TABLE 8 Reduction factors for tension - effects of distance from the edge "c"**

| Effects of anchor distance from the edge (reduction coefficient) - $\Psi_{sn,v}$ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $c/h_{ef}$ | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 | 1.1 | 1.2 | 1.3 | 1.4 | ≥1,5 |
| Ø8-Ø32 | 0.53 | 0.57 | 0.62 | 0.67 | 0.71 | 0.76 | 0.81 | 0.85 | 0.90 | 0.95 | 1.00 |

Distance from the edge cannot be lower than 0,5 of embedment depth ($h_{ef}$)

| | |
|---|---|
| $0,5\ h_{ef} < c < 1,5\ h_{ef}$ | Ø8-Ø32 |

**TABLE 9 Reduction factors for shearing - effects of distance from the edge "c"**

| Effects of anchor distance from the edge (reduction coefficient) - $\Psi_{cv}$ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $c/h_{ef}$ | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | ≥1.5 |
| Ø8-Ø32 | 0.23 | 0.29 | 0.36 | 0.43 | 0.50 | 0.58 | 0.66 | 0.74 | 0.82 | 0.91 | 1.00 |

Distance from the edge cannot be lower than 0,5 of embedment depth ($h_{ef}$)

| | |
|---|---|
| $0,5\ h_{ef} < c < 1,5\ h_{ef}$ | Ø8-Ø32 |

**TABLE 10 Consumption - rebars**

| Rod size | Hole diameter [mm] | Estimated number of anchors made from one cartridge 410 ml | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Embedment depth $h_{ef}$ [mm] | | | | | | | | | | | | | | | | | | |
| | | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 280 | 300 | 360 | 400 | 450 | 500 | 550 | 600 | 640 |
| Ø8 | 12 | 81 | 60 | 48 | 40 | 35 | 30 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ø10 | 14 | - | 44 | 36 | 30 | 25 | 22 | 20 | 18 | - | - | - | - | - | - | - | - | - | - | - |
| Ø12 | 16 | - | - | 27 | 23 | 19 | 17 | 15 | 14 | 12 | 11 | - | - | - | - | - | - | - | - | - |
| Ø16 | 20 | - | - | - | - | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 6 | - | - | - | - | - | - | - |
| Ø20 | 25 | - | - | - | - | - | 7 | 6 | 6 | 5 | 5 | 4 | 4 | 3 | 3 | - | - | - | - | - |
| Ø25 | 32 | - | - | - | - | - | - | - | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | - | - | - |
| Ø32 | 40 | - | - | - | - | - | - | - | - | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

# WCF-EASF/WCF-EASF-E

## Injection methacrylate anchors - for large and medium loads for use use with cracked and non-cracked concrete zones, without styrene

**TABLE 1 Ordering list**

| | Code | [°C] | Pcs. |
|---|---|---|---|
| 410ml | WCF-EASF-410 | 5 ÷ 30 | 12 |
| | WCF-EASF-E-410 | 15 ÷ 40 | 12 |

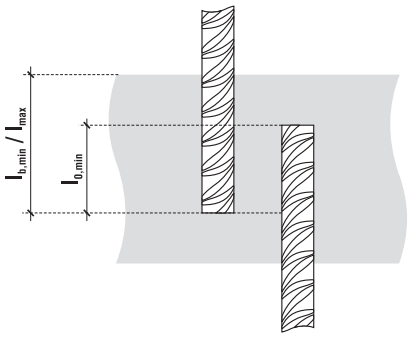


**TABLE 2 Installation parameters - post install rebar connections**

| Parameters | | | ROD SIZE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ø8 | Ø10 | Ø12 | Ø14 | Ø16 | Ø20 | Ø25 |
| Rebar diameter | d | [mm] | 8 | 10 | 12 | 14 | 16 | 20 | 25 |
| Hole diameter | $d_0$ | [mm] | 12 | 14 | 16 | 18 | 20 | 25 | 32 |
| Min. embedment depth - C20/25 | $l_{b,min}$ | [mm] | 113 | 142 | 170 | 198 | 227 | 284 | 354 |
| Min. embedment depth - C50/60 | $l_{b,min}$ | [mm] | 100 | 100 | 120 | 140 | 160 | 200 | 250 |
| Min. anchorage length for overlapping | $l_{0,min}$ | [mm] | 200 | 200 | 200 | 210 | 240 | 300 | 375 |
| Max. embedment depth | $l_{max}$ | [mm] | 400 | 500 | 600 | 700 | 800 | 1000 | 1000 |

Values have been calculated for good bonding conditions and $\alpha_6$=1.0
Min. embedment depth for rebar as an anchor: $l_{b,min}$=max(0,3*$l_{b,rqd}$;10*d;100 mm)
Min. anchorage length for overlapping: $l_{0,min}$=max(0,3*$\alpha_6$*$l_{b,rqd}$;15*d;200 mm)

**TABLE 3 Curing time (post install rebar connections)**

| Substrate temp [°C] | Resin type | 5 ÷ 10 | 10 ÷ 15 | 15 ÷ 20 | 20 ÷ 25 | 25 ÷ 30 | 30 ÷ 35 | 35 ÷ 40 |
|---|---|---|---|---|---|---|---|---|
| Working time [min.] | EASF | 10 | 8 | 6 | 5 | 4 | - | - |
| | EASF-E | - | - | 15 | 10 | 7.5 | 5 | 3.5 |
| Hardening time [min] | EASF | 145 | 85 | 75 | 50 | 40 | - | - |
| | EASF-E | - | - | 300 | 145 | 85 | 50 | 40 |

**TABLE 4 Ultimate limit for resin-concrete connection $f_{bd}$ (hammering drilling)**

| Bar size | Bond stress limit $f_{bd}$ [N/mm²] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Concrete | | | | | | | | |
| | C12/15 | C16/20 | C20/25 | C25/30 | C30/37 | C35/45 | C40/50 | C45/55 | C50/60 |
| Ø8 | 1.6 | 2.0 | 2.3 | 2.7 | 3.0 | 3.4 | 3.7 | 4.0 | 4.3 |
| Ø10 | 1.6 | 2.0 | 2.3 | 2.7 | 3.0 | 3.4 | 3.7 | 4.0 | 4.3 |
| Ø12 | 1.6 | 2.0 | 2.3 | 2.7 | 3.0 | 3.4 | 3.7 | 4.0 | 4.3 |
| Ø14 | 1.6 | 2.0 | 2.3 | 2.7 | 3.0 | 3.4 | 3.7 | 4.0 | 4.3 |
| Ø16 | 1.6 | 2.0 | 2.3 | 2.7 | 3.0 | 3.4 | 3.7 | 4.0 | 4.3 |
| Ø20 | 1.6 | 2.0 | 2.3 | 2.7 | 3.0 | 3.4 | 3.7 | 3.7 | 3.7 |
| Ø25 | 1.6 | 2.0 | 2.3 | 2.7 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

Values provided in this table are correct only for good installation conditions outlined in accordance with EN 1992-1-1. For all other conditions, these values are multiplied by 0.7.
Minimum cover: $c_{min}$=30 mm+0,06*lv≥2*d Minimal installed rebar spacing: a=40 mm≥4*d

# WCF-EASF/WCF-EASF-E

## Injection methacrylate anchors - for large and medium loads for use use with cracked and non-cracked concrete zones, without styrene

**TABLE 5A. Post installed rebar connections in accordance with TR023/EC2 - Design loading resistances for tension [kN] - for anchoring bars in concrete C20/25**

| Bar size | C20/25 concrete | | | | | | | | | | | | | | | | | | | | Steel |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anchorage length $l_b$ [mm] | | | | | | | | | | | | | | | | | | | | BSt 500 S |
| | 110 | 140 | 170 | 200 | 230 | 280 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1000 | $\gamma_{Ms}$=1.15 |
| Ø 8 | 6.36 | 8.09 | 9.83 | 11.56 | 13.30 | 16.19 | 20.23 | 21.87 | - | - | - | - | - | - | - | - | - | - | - | - | 21.87 |
| Ø10 | - | 10.12 | 12.28 | 14.45 | 16.62 | 20.23 | 25.29 | 28.90 | 32.52 | 34.13 | - | - | - | - | - | - | - | - | - | - | 34.13 |
| Ø12 | - | - | 14.74 | 17.34 | 19.94 | 24.28 | 30.35 | 34.68 | 39.02 | 43.35 | 47.69 | 49.13 | - | - | - | - | - | - | - | - | 49.13 |
| Ø14 | - | - | - | 20.23 | 23.27 | 28.32 | 35.41 | 40.46 | 45.52 | 50.58 | 55.64 | 60.70 | 65.75 | 66.96 | - | - | - | - | - | - | 66.96 |
| Ø16 | - | - | - | - | 26.59 | 32.37 | 40.46 | 46.24 | 52.02 | 57.81 | 63.59 | 69.37 | 75.15 | 80.93 | 86.71 | 87.39 | - | - | - | - | 87.39 |
| Ø20 | - | - | - | - | - | 40.46 | 50.58 | 57.81 | 65.03 | 72.26 | 79.48 | 86.71 | 93.93 | 101.16 | 108.38 | 115.61 | 122.84 | 130.06 | 136.52 | - | 136.52 |
| Ø25 | - | - | - | - | - | - | 63.22 | 72.26 | 81.29 | 90.32 | 99.35 | 108.38 | 117.42 | 126.45 | 135.48 | 144.51 | 153.55 | 162.58 | 171.61 | 180.64 | 213.48 |

Values provided for good bonding conditions in accordance with EN 1992-1-1 and for α1-α5=1. For other anchoring conditions the values provided should be multiplied by 0.7

**TABLE 5B. Post install rebar connections in accordance with TR023/EC2 - Design loading resistances for tension [kN] - for anchoring bars in concrete C50/60**

| Rod size | C50/60 concrete | | | | | | | | | | | | | | | | | | | | Steel |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anchorage length $l_b$ [mm] | | | | | | | | | | | | | | | | | | | | BSt 500 S |
| | 100 | 120 | 140 | 160 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | $\gamma_{Ms}$=1.15 |
| Ø8 | 10.81 | 12.97 | 15.13 | 17.29 | 21.61 | 21.87 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 21.87 |
| Ø10 | 13.51 | 16.21 | 18.91 | 21.61 | 27.02 | 33.77 | 34.13 | - | - | - | - | - | - | - | - | - | - | - | - | - | 34.13 |
| Ø12 | - | 19.45 | 22.69 | 25.94 | 32.42 | 40.53 | 48.63 | 49.13 | - | - | - | - | - | - | - | - | - | - | - | - | 49.13 |
| Ø14 | - | - | 26.48 | 30.26 | 37.82 | 47.28 | 56.74 | 66.19 | 66.96 | - | - | - | - | - | - | - | - | - | - | - | 66.96 |
| Ø16 | - | - | - | 34.58 | 43.23 | 54.04 | 64.84 | 75.65 | 86.46 | 87.39 | - | - | - | - | - | - | - | - | - | - | 87.39 |
| Ø20 | - | - | - | - | 46.50 | 58.12 | 69.74 | 81.37 | 92.99 | 104.62 | 116.24 | 127.86 | 136.52 | - | - | - | - | - | - | - | 136.52 |
| Ø25 | - | - | - | - | - | 58.90 | 70.69 | 82.47 | 94.25 | 106.03 | 117.81 | 129.59 | 141.37 | 153.15 | 164.93 | 176.71 | 188.50 | 200.28 | 212.06 | 213.48 | 213.48 |

Values provided for good bonding conditions in accordance with EN 1992-1-1 and for α1-α5=1. For other anchoring conditions the values provided should be multiplied by 0.7

**TABLE 6A. Post install rebar connections in accordance with TR023/EC2 - Design loading resistances for tension [kN] - for overlapping bars in concrete C20/25**

| Bar size | C20/25 concrete | | | | | | | | | | | | | | | | | | | | Steel |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Lap length $l_b$ [mm] | | | | | | | | | | | | | | | | | | | | BSt 500 S |
| | 200 | 210 | 240 | 270 | 300 | 375 | 400 | 420 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1000 | $\gamma_{Ms}$=1.15 |
| Ø8 | 11.56 | 12.14 | 13.87 | 15.61 | 17.34 | 21.68 | 21.87 | - | - | - | - | - | - | - | - | - | - | - | - | - | 21.87 |
| Ø10 | 14.45 | 15.17 | 17.34 | 19.51 | 21.68 | 27.10 | 28.90 | 30.35 | 32.52 | 34.13 | - | - | - | - | - | - | - | - | - | - | 34.13 |
| Ø12 | 17.34 | 18.21 | 20.81 | 23.41 | 26.01 | 32.52 | 34.68 | 36.42 | 39.02 | 43.35 | 47.69 | 49.13 | - | - | - | - | - | - | - | - | 49.13 |
| Ø14 | - | 21.24 | 24.28 | 27.31 | 30.35 | 37.93 | 40.46 | 42.49 | 45.52 | 50.58 | 55.64 | 60.70 | 65.75 | 66.96 | - | - | - | - | - | - | 66.96 |
| Ø16 | - | - | 27.75 | 31.21 | 34.68 | 43.35 | 46.24 | 48.56 | 52.02 | 57.81 | 63.59 | 69.37 | 75.15 | 80.93 | 86.71 | 87.39 | - | - | - | - | 87.39 |
| Ø20 | - | - | - | - | 43.35 | 54.19 | 57.81 | 60.70 | 65.03 | 72.26 | 79.48 | 86.71 | 93.93 | 101.16 | 108.38 | 115.61 | 122.84 | 130.06 | 136.52 | - | 136.52 |
| Ø25 | - | - | - | - | - | 67.74 | 72.26 | 75.87 | 81.29 | 90.32 | 99.35 | 108.38 | 117.42 | 126.45 | 135.48 | 144.51 | 153.55 | 162.58 | 171.61 | 180.64 | 213.48 |

Values provided for good bonding conditions in accordance with EN 1992-1-1 and for α1-α5=1. For other anchoring conditions the values provided should be multiplied by 0.7



# WCF-EASF/WCF-EASF-E

## Injection methacrylate anchors - for large and medium loads for use use with cracked and non-cracked concrete zones, without styrene

**TABLE 6B. Post installed rebar connections in accordance with TR023/EC2 - Design loading resistances for tension [kN] - for overlapping bars in concrete C50/60**

| Bar size | C50/60 concrete | | | | | | | | | | | | | | | | | | | | Steel |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Lap length $l_b$ [mm] | | | | | | | | | | | | | | | | | | | | BSt 500 S |
| | 200 | 210 | 240 | 270 | 300 | 350 | 375 | 400 | 420 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | $\gamma_{Ms}$=1.15 |
| Ø8 | 21.61 | 21.87 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 21.87 |
| Ø10 | 27.02 | 28.37 | 32.42 | 34.13 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 34.13 |
| Ø12 | 32.42 | 34.04 | 38.91 | 43.77 | 48.63 | 49.13 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 49.13 |
| Ø14 | - | 39.72 | 45.39 | 51.06 | 56.74 | 66.19 | 66.96 | - | - | - | - | - | - | - | - | - | - | - | - | - | 66.96 |
| Ø16 | - | - | 51.87 | 58.36 | 64.84 | 75.65 | 81.05 | 86.46 | 87.39 | - | - | - | - | - | - | - | - | - | - | - | 87.39 |
| Ø20 | - | - | - | - | 69.74 | 81.37 | 87.18 | 92.99 | 97.64 | 104.62 | 116.24 | 136.52 | - | - | - | - | - | - | - | - | 136.52 |
| Ø25 | - | - | - | - | - | - | 88.36 | 94.25 | 98.96 | 106.03 | 117.81 | 129.59 | 141.37 | 153.15 | 164.93 | 176.71 | 188.50 | 200.28 | 212.06 | 213.48 | 213.48 |

Values provided for good bonding conditions in accordance with EN 1992-1-1 and for α1-α5=1. For other anchoring conditions the values provided should be multiplied by 0.7

**TABLE 7 Consumption - post installed rebar connections**

| Bar size | Hole diameter [mm] | Estimated number of anchors made from one cartridge 410 ml | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Embedment depth $h_{ef}$ [mm] | | | | | | | | | | | | | | | | | | | | |
| | | 100 | 120 | 140 | 160 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1000 |
| Ø8 | 12 | 54 | 45 | 39 | 34 | 27 | 22 | 18 | 16 | 14 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ø10 | 14 | 45 | 38 | 32 | 28 | 23 | 18 | 15 | 13 | 11 | 10 | 9 | - | - | - | - | - | - | - | - | - | - |
| Ø12 | 16 | - | 32 | 28 | 24 | 19 | 16 | 13 | 11 | 10 | 9 | 8 | 7 | 6 | - | - | - | - | - | - | - | - |
| Ø14 | 18 | - | - | 24 | 21 | 17 | 14 | 11 | 10 | 9 | 8 | 7 | 6 | 6 | 5 | 5 | - | - | - | - | - | - |
| Ø16 | 20 | - | - | - | 19 | 15 | 12 | 10 | 9 | 8 | 7 | 6 | 5 | 5 | 5 | 4 | 4 | 4 | - | - | - | - |
| Ø20 | 25 | - | - | - | - | 10 | 8 | 6 | 6 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | - |
| Ø25 | 32 | - | - | - | - | - | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |