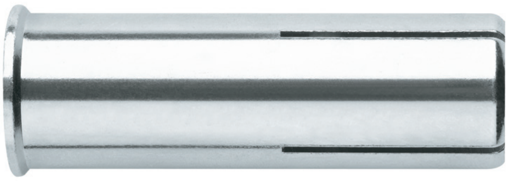
# Expansion by impact anchor with female thread, for use in non-cracked concrete

## HE-CL

ETA Assessed Option 7 for structural use and ETA assessed for non structural use. Zinc-plated steel.



# PRODUCT INFORMATION

### DESCRIPTION
Mechanical anchor, with female thread, for expansion by impact.

### OFFICIAL DOCUMENTATION
- CE-1219-CPR-0078.
- CE-1219-CPR-0079.
- ETA 14/0135 option 7.
- ETA 14/0068 for multiple use for non-structural applications in concrete.
- Declaration of performance DoP HEHO.

### SIZES
M6x25 to M16x65.

### DESIGN LOAD RANGE
From 3,5 to 12,6 kN (non-cracked).

PLUS kg.

### BASE MATERIAL
Concrete class C20/25 to C50/60 non-cracked (Structural).
Concrete class C12/15 to C50/60 (Non-structural).


Stone


Concrete


Reinforced Concrete

### ASSESSMENTS
- Option 7 (non-cracked concrete).
- Multiple use.

CE ETA

14
Técnicas Expansivas S.L.
Segador 13. Logroño. Spain
ETA 14/0135, ETA 14/0068
1219
Structural / non structural fixings in concrete

FIRE RESISTANCE

### CHARACTERISTICS AND BENEFITS
- Easy installation
- Working by deformation.
- Use in non-craked concrete
- Use for medium-heavy duty loads.
- Pre-installation of the fixture.
- For static and quasi-static loads.
- Can be unninstalled leaving the surface clear (leaves the exansion item and the cone inside the drill hole).
- Screw isn't supllied.
- Available in INDEXcal. INDEXcal

### MATERIALS
**Sleeve:** carbon steel, zinc-plated ≥ 5 µm.
**Cone:** carbon steel, zinc-plated ≥ 5 µm.

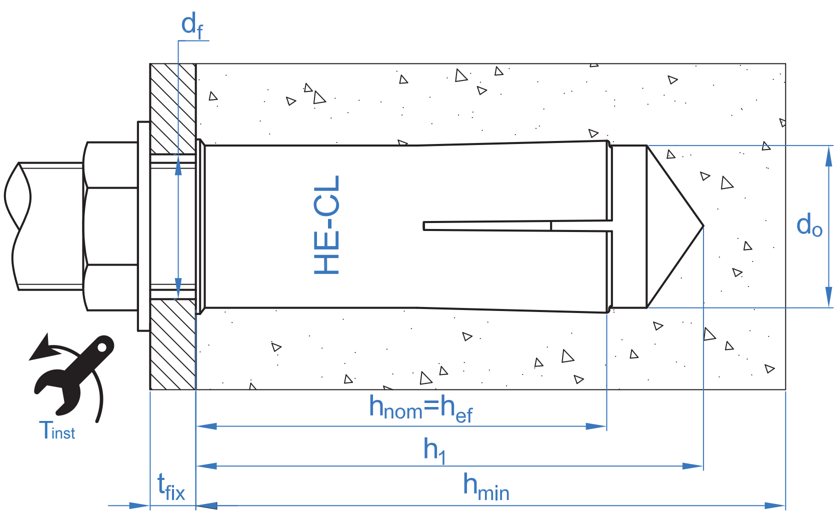
Z ZINC

### APPLICATIONS
- Fixings in suspendes ceilings, sprinkler and ventilation systems.
- Structural fixings, fittings in interiors and/or exteriors.
- Fixings of threaded rods.

# STRUCTUAL APPLICATION

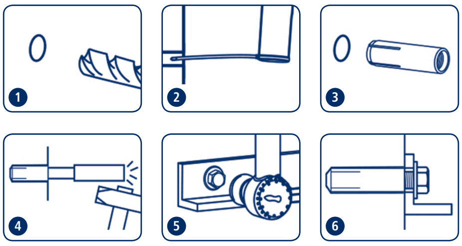
| MECHANICAL PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|
| METRIC | | | M6 | M8 | M10 | M12 | M16 |
| $A_s$ | (mm²) | Threaded area section | 20,1 | 36,6 | 58 | 84,3 | 157 |
| STEEL GRADE OF THE SCREW | | | 4.6 | 4.8 | 5.6 | 5.8 | 6.8 |
| $f_{uk}$ | (N/mm²) | Screw characteristic resistance | 400 | 400 | 500 | 500 | 600 |

| INSTALLATION DATA | | | | | | | |
|---|---|---|---|---|---|---|---|
| Metric | | | M6 | M8 | M10 | M12 | M16 |
| Code | | | HECLOM06 | HECLOM08 | HECLOM10 | HECLOM12 | HECLOM16 |
| $d_0$ | Nominal diameter of drill bit | [mm] | 8 | 10 | 12 | 15 | 20 |
| $T_{ins}$ | Installation torque moment | [Nm] | 4 | 11 | 17 | 38 | 60 |
| $d_f \leq$ | Diameter of clearance hole in the fixture | [mm] | 7 | 9 | 12 | 14 | 18 |
| $h_1$ | Drill hole depth | [mm] | 27 | 33 | 43 | 54 | 70 |
| $h_{nom}$ | Installation depth | [mm] | 25 | 30 | 40 | 50 | 65 |
| $h_{ef}$ | Effective embedment depth | [mm] | 25 | 30 | 40 | 50 | 65 |
| $h_{min}$ | Minimum base material thickness | [mm] | 100 | 100 | 100 | 100 | 130 |
| $s_{cr,N}$ | Critical spacing | [mm] | 75 | 90 | 120 | 150 | 195 |
| $c_{cr,N}$ | Critical edge distance | [mm] | 38 | 45 | 60 | 75 | 98 |
| $s_{cr,sp}$ | Critical distance (splitting) | [mm] | 50 | 60 | 80 | 100 | 130 |
| $c_{cr,sp}$ | Critical edge distance (splitting) | [mm] | 75 | 90 | 120 | 150 | 195 |
| $s_{min}$ | Minimum spacing | [mm] | 60 | 60 | 80 | 100 | 130 |
| $c_{min}$ | Minimum edge distance | [mm] | 105 | 105 | 140 | 175 | 230 |



| Code | INSTALLATION PRODUCTS |
|---|---|
| | Hammer drill |
| BHDSXXXXX | Concrete Drill bits |
| MOBOMBA | Blow pump |
| MORCEPKIT | Cleaning Brush |
| EXHBMXX | Manual expansion tool for drop in anchors |
| | Torque wrench |
| | Hexagonal socket |

**INSTALLATION**



# HE-CL

## Resistances in C12/15 and from C20/25 to C50/60 concrete for an isolated anchor, without effects of edge distance or spacing

**Characteristic Resistance $N_{Rk}$ and $V_{Rk}$**

TENSION

| Metric | | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|---|
| $N_{Rk}$ | Non-cracked concrete | [kN] | 6,3 | 8,2 | 12,7 | 17,8 | 26,4 |

SHEAR

| Metric | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|
| $V_{Rk}$ | STEEL CLASS 4.6 | 4,0 | 7,3 | 11,6 | 16,8 | 31,4 |
| | STEEL CLASS 4.8 | 4,0 | 8,3 | 9,1 | 17,8 | 31,4 |
| | STEEL CLASS 5.6 | 5,0 | 9,1 | 9,1 | 17,8 | 39,2 |
| | STEEL CLASS 5.8 | 5,0 | 8,3 | 9,1 | 17,8 | 32,5 |
| | STEEL CLASS 6.8 | 6,3 | 8,3 | 9,1 | 17,8 | 32,5 |
| | STEEL CLASS 8.8 | 6,3 | 8,3 | 9,1 | 17,8 | 32,5 |

**Design Resistance $N_{Rd}$ and $V_{Rd}$**

TENSION

| Metric | | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|---|
| $N_{Rd}$ | Non-cracked concrete | [kN] | 3,5 | 4,6 | 6,1 | 8,5 | 12,6 |

SHEAR

| Metric | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|
| $V_{Rd}$ | STEEL CLASS 4.6 | 5,0 | 9,1 | 9,1 | 17,8 | 39,2 |
| | STEEL CLASS 4.8 | 3,2 | 5,5 | 7,3 | 11,9 | 25,1 |
| | STEEL CLASS 5.6 | 3,0 | 5,4 | 5,4 | 11,9 | 23,5 |
| | STEEL CLASS 5.8 | 4,0 | 5,5 | 7,3 | 11,9 | 26,0 |
| | STEEL CLASS 6.8 | 4,2 | 5,5 | 7,3 | 11,9 | 26,0 |
| | STEEL CLASS 8.8 | 4,2 | 5,5 | 7,3 | 11,9 | 26,0 |

**Maximum Loads Recommended $N_{rec}$ and $V_{rec}$**

TENSION

| Metric | | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|---|
| $N_{rec}$ | Non-cracked concrete | [kN] | 2,5 | 3,3 | 4,4 | 6,1 | 9,0 |

SHEAR

| Metric | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|
| $V_{rec}$ | STEEL CLASS 4.6 | 3,6 | 6,5 | 6,5 | 12,7 | 28,0 |
| | STEEL CLASS 4.8 | 2,3 | 3,9 | 5,2 | 8,5 | 17,9 |
| | STEEL CLASS 5.6 | 2,1 | 3,9 | 3,9 | 8,5 | 16,8 |
| | STEEL CLASS 5.8 | 2,9 | 3,9 | 5,2 | 8,5 | 18,6 |
| | STEEL CLASS 6.8 | 3,0 | 3,9 | 5,2 | 8,5 | 18,6 |
| | STEEL CLASS 8.8 | 3,0 | 3,9 | 5,2 | 8,5 | 18,6 |

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## Simplified calculation method

European Technical Assessment ETA 14/0135

Simplified version of the calculation method according to ETAG 001, annex C. Resistance is calculated according to the data shown in assessment ETA 14/0135.

- Influence of concrete strength.
- Influence of edge distance.
- Influence of spacing between anchors.
- Influence of reinforcements.
- Influence of base material thickness.
- Influence of load application angle.
- Valid for a group of two anchors.

The calculation method is based on the following simplification: **Different loads do not act on individual anchors, without eccentricity.**

INDEXcal
For a more accurate calculation and to take more constructive provisions into account, we recommend using our calculation program INDEXcal. It may be easily downloaded from our website **www.indexfix.com**

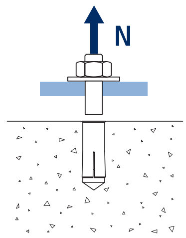
## TENSION LOADS

- Steel design resistance: $N_{Rd,s}$
- Pull-out design resistance: $N_{Rd,p} = N^o_{Rd,p} \cdot \Psi_c$
- Concrete cone design resistance: $N_{Rd,c} = N^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{s,N} \cdot \Psi_{c,N} \cdot \Psi_{re,N}$
- Concrete splitting design resistance: $N_{Rd,sp} = N^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{s,sp} \cdot \Psi_{c,sp} \cdot \Psi_{re,N} \cdot \Psi_{h,sp}$

**Steel Design resistance**

$N_{Rd,s}$

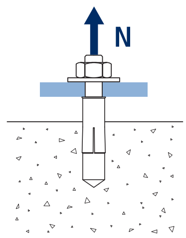
| | Metric | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|
| $N^o_{Rd}$ | STEEL CLASS 4.6 | 4,0 | 7,3 | 11,6 | 16,9 | 31,4 |
| | STEEL CLASS 4.8 | 5,3 | 9,7 | 12,1 | 22,5 | 41,9 |
| | STEEL CLASS 5.6 | 5,1 | 9,2 | 9,1 | 21,1 | 39,3 |
| | STEEL CLASS 5.8 | 6,7 | 11,7 | 12,1 | 23,4 | 43,3 |
| | STEEL CLASS 6.8 | 8,1 | 11,7 | 12,1 | 23,4 | 43,3 |
| | STEEL CLASS 8.8 | 8,7 | 11,7 | 12,1 | 23,4 | 43,3 |




**Pull-out design resistance**

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

| | Metric | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|---|
| $N^o_{Rd,p}$ | Non-cracked concrete | [kN] | - | - | - | - | - |




**Concrete cone design resistance**

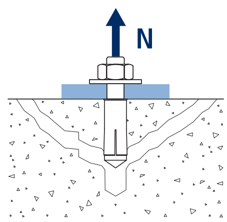
$N_{Rd,c} = N^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{s,N} \cdot \Psi_{c,N} \cdot \Psi_{re,N}$

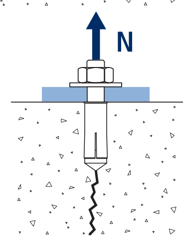
**Concrete splitting design resistance***

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

| | Metric | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|---|
| $N^o_{Rd,c}$ | Non-cracked concrete | [kN] | 3,5 | 4,6 | 6,1 | 8,5 | 12,6 |

*Concrete splitting design resistance must only be considered for non-cracked concrete



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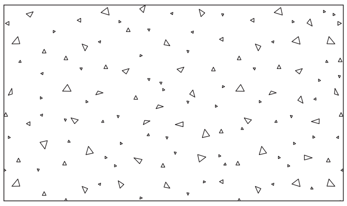
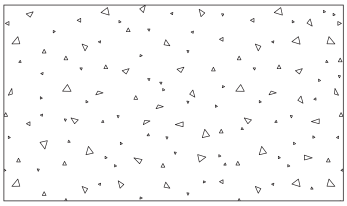
## Coefficients of influence

| Influence of concrete strength resistance in pul-out failure $\Psi_c$ | | | | | | |
|---|---|---|---|---|---|---|
| | | M6 | M8 | M10 | M12 | M16 |
| $\Psi_c$ | C 20/25 | 1,00 | 1,00 | 1,00 | 1,00 | 1,00 |
| | C 30/37 | 1,02 | 1,22 | 1,15 | 1,15 | 1,22 |
| | C 40/50 | 1,04 | 1,41 | 1,29 | 1,28 | 1,41 |
| | C 50/60 | 1,05 | 1,55 | 1,37 | 1,37 | 1,55 |

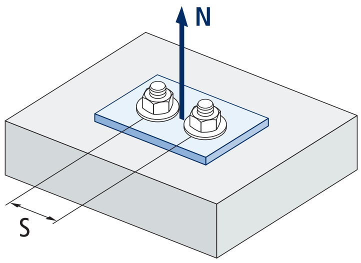


| Influence of concrete strength in concrete cone and splitting failure $\Psi_b$ | | | | | | |
|---|---|---|---|---|---|---|
| | | M6 | M8 | M10 | M12 | M16 |
| $\Psi_b$ | C 20/25 | 1,00 | | | | |
| | C 30/37 | 1,22 | | | | |
| | C 40/50 | 1,41 | | | | |
| | C 50/60 | 1,55 | | | | |



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

# HE-CL

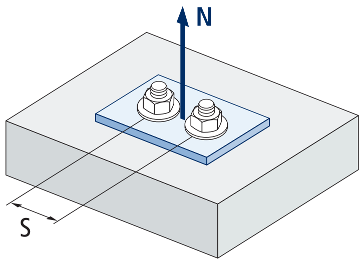



$$\Psi_{s,N} = 0,5 + \frac{s}{2 \cdot s_{cr,N}} \leq 1$$

| Influence of spacing (concrete cone) $\Psi_{s,N}$ | | | | | |
|---|---|---|---|---|---|
| s [mm] | HE-CL | | | | |
| | M6 | M8 | M10 | M12 | M16 |
| 60 | 0,90 | 0,83 | | | |
| 65 | 0,93 | 0,86 | | | |
| 70 | 0,97 | 0,89 | | Invalid value | |
| 75 | 1,00 | 0,92 | | | |
| 80 | | 0,94 | 0,83 | | |
| 85 | | 0,97 | 0,85 | | |
| 90 | | 1,00 | 0,88 | | |
| 95 | | | 0,90 | | |
| 100 | | | 0,92 | 0,83 | |
| 105 | | | 0,94 | 0,85 | |
| 110 | | | 0,96 | 0,87 | |
| 115 | | | 0,98 | 0,88 | |
| 120 | | | 1,00 | 0,90 | |
| 125 | | | | 0,92 | |
| 130 | | | | 0,93 | 0,83 |
| 135 | | | | 0,95 | 0,85 |
| 140 | | | | 0,97 | 0,86 |
| 145 | | | | 0,98 | 0,87 |
| 150 | | | | 1,00 | 0,88 |
| 155 | | | | | 0,90 |
| 160 | | | | | 0,91 |
| 165 | | | | | 0,92 |
| 170 | | | | | 0,94 |
| 175 | | | Value without reduction = 1 | | 0,95 |
| 180 | | | | | 0,96 |
| 185 | | | | | 0,97 |
| 190 | | | | | 0,99 |
| 195 | | | | | 1,00 |

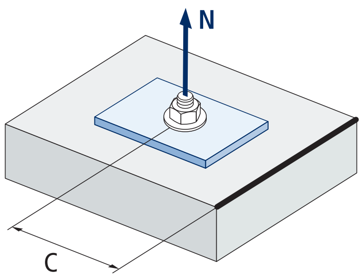
## HE-CL

| Influence of spacing (concrete splitting) $\Psi_{s,sp}$ | | | | | |
|---|---|---|---|---|---|
| s [mm] | HE-CL | | | | |
| | M6 | M8 | M10 | M12 | M16 |
| 60 | 0,70 | 0,67 | | | |
| 70 | 0,73 | 0,69 | | | |
| 80 | 0,77 | 0,72 | 0,67 | **Invalid value** | |
| 90 | 0,80 | 0,75 | 0,69 | | |
| 100 | 0,83 | 0,78 | 0,71 | 0,67 | |
| 110 | 0,87 | 0,81 | 0,73 | 0,68 | |
| 120 | 0,90 | 0,83 | 0,75 | 0,70 | |
| 130 | 0,93 | 0,86 | 0,77 | 0,72 | 0,67 |
| 140 | 0,97 | 0,89 | 0,79 | 0,73 | 0,68 |
| 150 | 1,00 | 0,92 | 0,81 | 0,75 | 0,69 |
| 160 | | 0,94 | 0,83 | 0,77 | 0,71 |
| 170 | | 0,97 | 0,85 | 0,78 | 0,72 |
| 180 | | 1,00 | 0,88 | 0,80 | 0,73 |
| 190 | | | 0,90 | 0,82 | 0,74 |
| 200 | | | 0,92 | 0,83 | 0,76 |
| 210 | | | 0,94 | 0,85 | 0,77 |
| 220 | | | 0,96 | 0,87 | 0,78 |
| 230 | | | 0,98 | 0,88 | 0,79 |
| 240 | | | 1,00 | 0,90 | 0,81 |
| 250 | | | | 0,92 | 0,82 |
| 260 | | | | 0,93 | 0,83 |
| 270 | | | | 0,95 | 0,85 |
| 280 | | | | 0,97 | 0,86 |
| 290 | | | | 0,98 | 0,87 |
| 300 | | | | 1,00 | 0,88 |
| 310 | | | | | 0,90 |
| 320 | | | | | 0,91 |
| 330 | | | | | 0,92 |
| 340 | | | | | 0,94 |
| 350 | | **Value without reduction = 1** | | | 0,95 |
| 360 | | | | | 0,96 |
| 370 | | | | | 0,97 |
| 380 | | | | | 0,99 |
| 390 | | | | | 1,00 |




$$\Psi_{s,sp} = 0{,}5 + \frac{s}{2 \cdot s_{cr,sp}} \leq 1$$

# HE-CL




$$\Psi_{c,sp} = 0{,}35 + \frac{0{,}5 \cdot c}{C_{cr,sp}} + \frac{0{,}15 \cdot c^2}{C_{cr,sp}{}^2} \leq 1$$

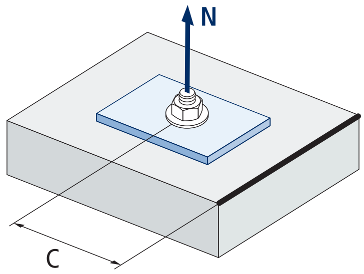
| Influence of concrete edge distance (splitting) $\Psi_{c,sp}$ | | | | | |
|---|---|---|---|---|---|
| s [mm] | HE-CL | | | | |
| | M6 | M8 | M10 | M12 | M16 |
| 60 | | | | | |
| 65 | | | | | |
| 70 | | | | | |
| 75 | | | | | |
| 80 | | | **Invalid value** | | |
| 85 | | | | | |
| 90 | | | | | |
| 95 | | | | | |
| 100 | | | | | |
| 105 | 1,00* | 1,00* | | | |
| 110 | | | | | |
| 115 | | | | | |
| 120 | | | | | |
| 125 | | | | | |
| 130 | | | | | |
| 135 | | | | | |
| 140 | | | 1,00* | | |
| 145 | | | | | |
| 150 | | | | | |
| 155 | | | | | |
| 160 | | | | | |
| 165 | | | | | |
| 170 | | | | | |
| 175 | | | | 1,00* | |
| 180 | | | | | |
| 185 | | | | | |
| 190 | | | | | |
| 195 | | | | | |
| 200 | | | | | |
| 205 | | **Value without reduction = 1** | | | |
| 210 | | | | | |
| 215 | | | | | |
| 220 | | | | | |
| 225 | | | | | |
| 230 | | | | | 1,00* |

*nstallation below the minimum concrete edge distance is not allowed

# HE-CL

| Influence of concrete edge distance (concrete cone) $\Psi_{c,N}$ | | | | | |
|---|---|---|---|---|---|
| s [mm] | HE-CL | | | | |
| | M6 | M8 | M10 | M12 | M16 |
| 60 | | | | | |
| 65 | | | | | |
| 70 | | | | | |
| 75 | | | | | |
| 80 | | | **Invalid value** | | |
| 85 | | | | | |
| 90 | | | | | |
| 95 | | | | | |
| 100 | | | | | |
| 105 | 1,00* | 1,00* | | | |
| 110 | | | | | |
| 115 | | | | | |
| 120 | | | | | |
| 125 | | | | | |
| 130 | | | | | |
| 135 | | | | | |
| 140 | | | 1,00* | | |
| 145 | | | | | |
| 150 | | | | | |
| 155 | | | | | |
| 160 | | | | | |
| 165 | | | | | |
| 170 | | | | | |
| 175 | | | | 1,00* | |
| 180 | | | | | |
| 185 | | | | | |
| 190 | | | | | |
| 195 | | | | | |
| 200 | | | | | |
| 205 | | **Value without reduction = 1** | | | |
| 210 | | | | | |
| 215 | | | | | |
| 220 | | | | | |
| 225 | | | | | |
| 230 | | | | | 1,00* |

*nstallation below the minimum concrete edge distance is not allowed

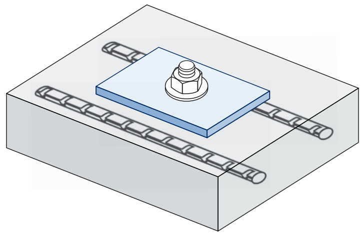



$$\Psi_{c,N} = 0,35 + \frac{0,5 \cdot c}{C_{cr,N}} + \frac{0,15 \cdot c^2}{C_{cr,N}{}^2} \leq 1$$

# HE-CL

| Influence of reinforcements $\Psi_{re,N}$ | | | | | |
|---|---|---|---|---|---|
| | HE-CL | | | | |
| $\Psi_{re,N}$ | M6 | M8 | M10 | M12 | M16 |
| | 0,625 | 0,650 | 0,700 | 0,750 | 0,825 |

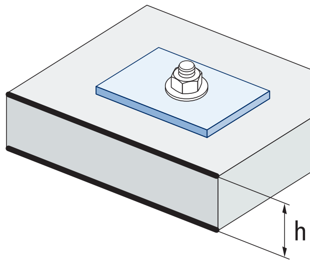
*This factor only applies for a high density of reinforcements. If in the area of the anchor there are reinforcements with a distancing of ≥ 150 mm (any diameter) or with a diameter ≤ 10 mm and a distancing of ≥ 100 mm, a $f_{re,N}$ = 1 factor may be applied.



$$\Psi_{re,N} = 0,5 + \frac{h_{ef}}{200} \leq 1$$

| Influence of base material thickness $\Psi_{h,sp}$ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | HE-CL | | | | | | | | | | |
| $\Psi_{h,sp}$ | h/hef | 2,00 | 2,20 | 2,40 | 2,60 | 2,80 | 3,00 | 3,20 | 3,40 | 3,60 | ≥ 3,68 |
| | fh | 1,00 | 1,07 | 1,13 | 1,19 | 1,25 | 1,31 | 1,37 | 1,42 | 1,48 | 1,50 |

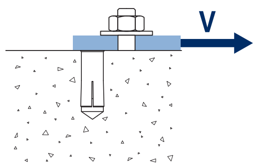
$$\Psi_{h,sp} = \left(\frac{h}{2 \cdot h_{ef}}\right)^{2/3} \leq 1,5$$




## SHEAR LOADS

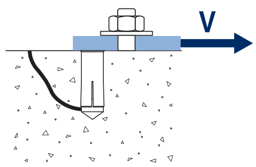
- Steel design resistance without lever arm: $V_{Rd,s}$
- Pry-out design resistance: $V_{Rd,cp} = k \cdot N^o_{Rd,c}$
- Concrete edge design resistance: $V_{Rd,c} = V^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{se,V} \cdot \Psi_{c,V} \cdot \Psi_{re,V} \cdot \Psi_{\alpha,V} \cdot \Psi_{h,V}$

| Steel design resistance | | | | | | |
|---|---|---|---|---|---|---|
| $V_{Rd,s}$ | | | | | | |
| Metric | | M6 | M8 | M10 | M12 | M16 |
| $V_{Rd,s}$ | STEEL CLASS 4.6 | 2,4 | 4,4 | 6,9 | 10,1 | 18,8 |
| | STEEL CLASS 4.8 | 3,2 | 5,8 | 7,3 | 13,4 | 25,1 |
| | STEEL CLASS 5.6 | 3,0 | 5,4 | 5,4 | 12,6 | 23,5 |
| | STEEL CLASS 5.8 | 4,0 | 7,0 | 7,3 | 14,0 | 26,0 |
| | STEEL CLASS 6.8 | 4,8 | 7,0 | 7,3 | 14,0 | 26,0 |
| | STEEL CLASS 8.8 | 5,2 | 7,0 | 7,3 | 14,0 | 26,0 |

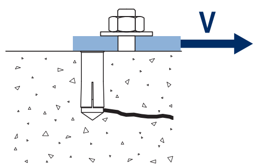



| Pry-out design resistance* | | | | | |
|---|---|---|---|---|---|
| $V_{Rd,cp} = k \cdot N^o_{Rd,c}$ | | | | | |
| Metric | M6 | M8 | M10 | M12 | M16 |
| k | 1 | 1 | 1 | 1 | 2 |

* $N^o_{Rd,c}$ Concrete cone design resistance for tension loads



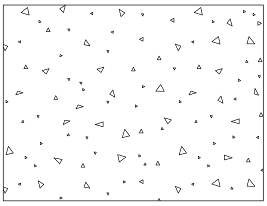

| Concrete edge resistance | | | | | | | |
|---|---|---|---|---|---|---|---|
| $V_{Rd,c} = V^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{se,V} \cdot \Psi_{c,V} \cdot \Psi_{re,V} \cdot \Psi_{\alpha,V} \cdot \Psi_{h,V}$ | | | | | | | |
| Metric | | | M6 | M8 | M10 | M12 | M16 |
| $V^o_{Rd,c}$ | Non-cracked concrete | [kN] | 2,2 | 2,9 | 4,7 | 6,8 | 10,3 |



# HE-CL

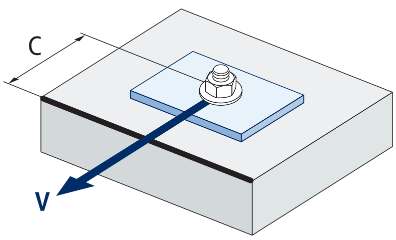
## Coefficients of influence

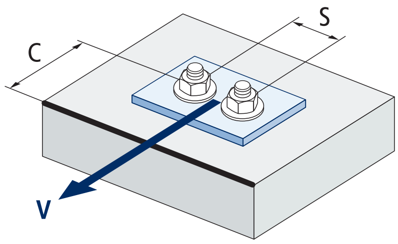
| Influence of concrete strength in concrete edge failure $\Psi_b$ | | | | | | |
|---|---|---|---|---|---|---|
| | | M6 | M8 | M10 | M12 | M16 |
| $\Psi_b$ | C 20/25 | 1,00 | | | | |
| | C 30/37 | 1,22 | | | | |
| | C 40/50 | 1,41 | | | | |
| | C 50/60 | 1,55 | | | | |



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

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

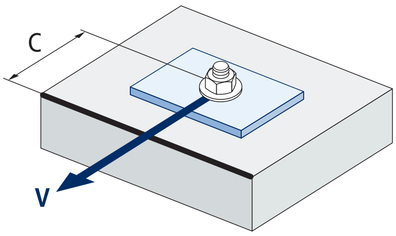



$$\Psi_{se,V} = \left(\frac{c}{h_{ef}}\right)^{1,5}$$

$$\Psi_{se,V} = \left(\frac{c}{h_{ef}}\right)^{1,5} \cdot \left(1 + \frac{s}{3 \cdot c}\right) \cdot 0,5 \leq \left(\frac{c}{h_{ef}}\right)^{1,5}$$

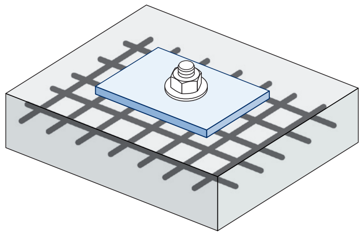
# HE-CL



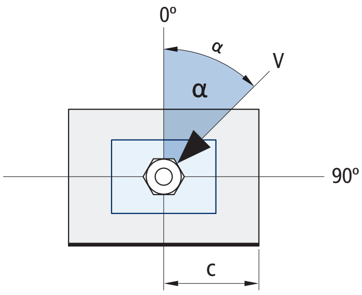

$$\Psi_{c,V} = \left(\frac{d}{c}\right)^{0,20}$$

| Influence of concrete edge distance $\Psi_{c,V}$ | | | | | |
|---|---|---|---|---|---|
| c [mm] | HE-CL | | | | |
| | M6 | M8 | M10 | M12 | M16 |
| 40 | | | | | |
| 45 | | | | | |
| 50 | | | | | |
| 55 | | | | | |
| 60 | | | | | |
| 65 | | | **Invalid value** | | |
| 70 | | | | | |
| 80 | | | | | |
| 85 | | | | | |
| 90 | | | | | |
| 100 | | | | | |
| 105 | 0,56 | 0,60 | | | |
| 110 | 0,56 | 0,59 | | | |
| 120 | 0,55 | 0,58 | | | |
| 125 | 0,54 | 0,58 | | | |
| 130 | 0,54 | 0,57 | | | |
| 135 | 0,54 | 0,57 | | | |
| 140 | 0,53 | 0,56 | 0,59 | | |
| 150 | 0,53 | 0,56 | 0,58 | | |
| 160 | 0,52 | 0,55 | 0,57 | | |
| 170 | 0,51 | 0,54 | 0,57 | | |
| 175 | 0,51 | 0,54 | 0,56 | 0,59 | |
| 180 | 0,51 | 0,54 | 0,56 | 0,58 | |
| 190 | 0,50 | 0,53 | 0,55 | 0,58 | |
| 200 | 0,50 | 0,53 | 0,55 | 0,57 | |
| 210 | 0,49 | 0,52 | 0,54 | 0,56 | |
| 220 | 0,49 | 0,52 | 0,54 | 0,56 | |
| 230 | 0,48 | 0,51 | 0,53 | 0,55 | 0,59 |
| 240 | 0,48 | 0,51 | 0,53 | 0,55 | 0,58 |
| 250 | 0,47 | 0,50 | 0,53 | 0,54 | 0,58 |
| 260 | 0,47 | 0,50 | 0,52 | 0,54 | 0,57 |
| 270 | 0,47 | 0,49 | 0,52 | 0,54 | 0,57 |
| 280 | 0,46 | 0,49 | 0,51 | 0,53 | 0,56 |
| 290 | 0,46 | 0,49 | 0,51 | 0,53 | 0,56 |
| 300 | 0,46 | 0,48 | 0,51 | 0,53 | 0,56 |

| Influence of reinforcements $\Psi_{re,V}$ | | | |
|---|---|---|---|
| | Without perimetral reinforcements | Perimetral reinforcements ≥ Ø12 mm | Perimetral reinforcements with brackets ≤ 100 mm |
| Non-cracked concrete | 1 | 1 | 1 |

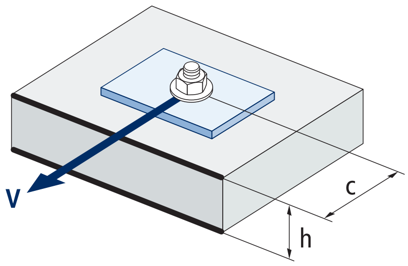


| Influence of load application angle $\Psi_{\alpha,V}$ | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Angle, α(º) | 0° | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° |
| $\Psi_{\alpha,V}$ | 1,00 | 1,01 | 1,05 | 1,13 | 1,24 | 1,40 | 1,64 | 1,97 | 2,32 | 2,50 |




$$\Psi_{\alpha,V} = \sqrt{\frac{1}{(\cos \alpha_V)^2 + \left(\frac{\sin \alpha_V}{2,5}\right)^2}} \geq 1$$

| Influence of base material thickness $\Psi_{h,V}$ | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **HE-CL** | | | | | | | | | |
| h/c | 0,15 | 0,30 | 0,45 | 0,60 | 0,75 | 0,90 | 1,05 | 1,20 | 1,35 | ≥1,5 |
| $\Psi_{h,V}$ | 0,32 | 0,45 | 0,55 | 0,63 | 0,71 | 0,77 | 0,84 | 0,89 | 0,95 | 1,00 |

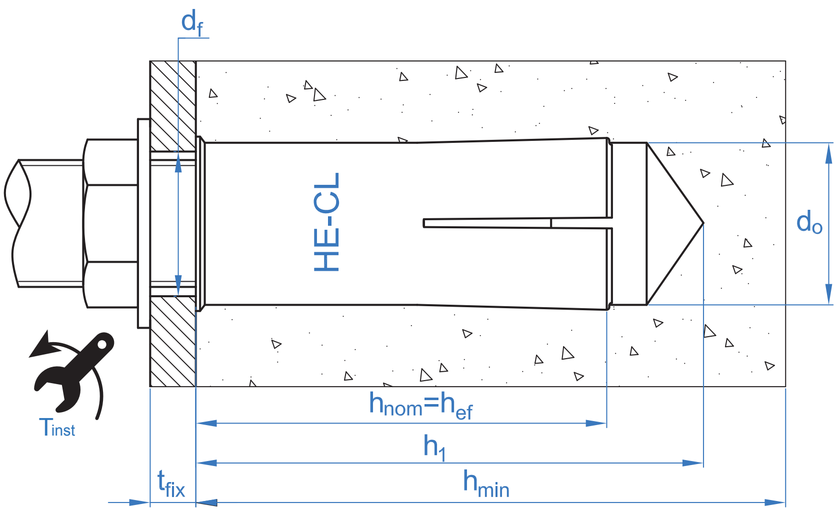



$$\Psi_{h,V} = \left(\frac{h}{1,5 \cdot c}\right)^{0,5} \geq 1,0$$

# NON-STRUCTUAL APPLICATION

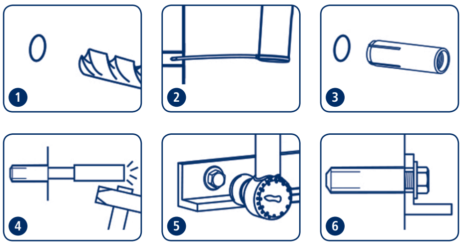
| MECHANICAL PROPERTIES | | | | | | | |
|---|---|---|---|---|---|---|---|
| METRIC | | | M6 | M8 | M10 | M12 | M16 |
| $A_s$ | ($mm^2$) | Threaded area section | 20,1 | 36,6 | 58 | 84,3 | 157 |
| STEEL GRADE OF THE SCREW | | | 4.6 | 4.8 | 5.6 | 5.8 | 6.8 |
| $f_{uk}$ | ($N/mm^2$) | Screw characteristic resistance | 400 | 400 | 500 | 500 | 600 |

| INSTALLATION DATA | | | | | | | |
|---|---|---|---|---|---|---|---|
| Metric | | | M6 | M8 | M10 | M12 | M16 |
| Code | | | HECLOM06 | HECLOM08 | HECLOM10 | HECLOM12 | HECLOM16 |
| $d_0$ | Nominal diameter of drill bit | [mm] | 8 | 10 | 12 | 15 | 20 |
| $T_{ins}$ | Installation torque moment | [Nm] | 4 | 11 | 17 | 38 | 60 |
| $d_f \leq$ | Diameter of clearance hole in the fixture | [mm] | 7 | 9 | 12 | 14 | 18 |
| $h_1$ | Drill hole depth | [mm] | 27 | 33 | 43 | 54 | 70 |
| $h_{nom}$ | Installation depth | [mm] | 25 | 30 | 40 | 50 | 65 |
| $h_{ef}$ | Effective embedment depth | [mm] | 25 | 30 | 40 | 50 | 65 |
| $h_{min}$ | Minimum base material thickness | [mm] | 100 | 100 | 100 | 100 | 130 |
| $s_{min}$ | Minimum spacing | [mm] | 60 | 80 | 100 | 130 | 160 |
| $c_{min}$ | Minimum edge distance | [mm] | 105 | 140 | 175 | 230 | 280 |
| $s_{cr}$ | Critical spacing | [mm] | 150 | 180 | 240 | 300 | 390 |
| $c_{cr}$ | Critical edge distance | [mm] | 75 | 90 | 120 | 150 | 195 |



| Code | INSTALLATION PRODUCTS |
|---|---|
| | Hammer drill |
| BHDSXXXXX | Concrete Drill bits |
| MOBOMBA | Blow pump |
| MORCEPKIT | Cleaning Brush |
| EXHBMXX | Manual expansion tool for drop in anchors |
| | Torque wrench |
| | Hexagonal socket |

**INSTALLATION**



# HE-CL

## Resistances in C12/15 and from C20/25 to C50/60 concrete for an isolated anchor, without effects of edge distance or spacing

**Characteristic Resistance $F_{Rk}$**

ALL DIRECTIONS LOAD

| Metric | | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|---|
| $F_{Rk}$ | Concrete C12/15 | [kN] | 1,5 | 3,0 | 4,0 | 6,0 | 9,0 |
| | Concrete C20/25 to C50/60 | | 2,0 | 3,0 | 5,0 | 7,5 | 12,0 |

**Design Resistance $F_{Rd}$**

ALL DIRECTIONS LOAD

| Metric | | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|---|
| $F_{Rd}$ | Concrete C12/15 | [kN] | 0,8 | 1,7 | 1,9 | 2,9 | 4,3 |
| | Concrete C20/25 to C50/60 | | 1,1 | 1,7 | 2,4 | 3,6 | 5,7 |

**Maximum Loads Recommended $F_{rec}$**

ALL DIRECTIONS LOAD

| Metric | | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|---|
| $F_{rec}$ | Concrete C12/15 | [kN] | 0,6 | 1,2 | 1,4 | 2,0 | 3,1 |
| | Concrete C20/25 to C50/60 | | 0,8 | 1,2 | 1,7 | 2,6 | 4,1 |

## Simplified calculation method

**European Technical Assessment ETA 14/0068**

Simplified version of the calculation method according to ETAG 001, annex C. Resistance is calculated according to the data shown in assessment ETA 14/0068.

- Influence of concrete strength.
- Influence of edge distance.
- Influence of spacing between anchors.
- Influence of reinforcements.
- Valid for a group of two anchors.

The calculation method is based on the following simplification: **Different loads do not act on individual anchors, without eccentricity.**

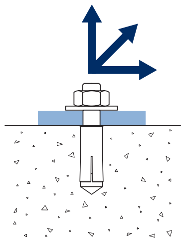
**INDEXcal**
For a more precise calculation and to take more constructive provisions into account, INDEX Fixing Systems is developing a calculation software for multiple use for nonstructural applications in concrete.

# HE-CL

## ALL LOAD DIRECTIONS

• Design resistance for all load directions: $F_{Rd} = F^{o}_{Rd} \cdot \Psi_s \cdot \Psi_c \cdot \Psi_{re}$

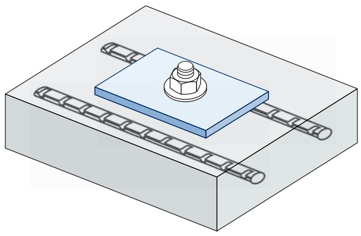
| Design resistance for all load directions | | | | | | |
|---|---|---|---|---|---|---|
| $F_{Rd}$ | | | | | | |
| Metric | | M6 | M8 | M10 | M12 | M16 |
| $F^{o}_{Rd}$ | Concrete C12/15 | 0,8 | 1,7 | 2,2 | 3,3 | 5,0 |
| | Concrete C20/25 to C50/60 | 1,1 | 1,7 | 2,8 | 4,2 | 6,7 |



## Coefficients of influence

| Influence of reinforcements $\Psi_{re,N}$ | | | | | |
|---|---|---|---|---|---|
| | M6 | M8 | M10 | M12 | M16 |
| $\Psi_{re,N}$ | 0,625 | 0,650 | 0,700 | 0,750 | 0,825 |

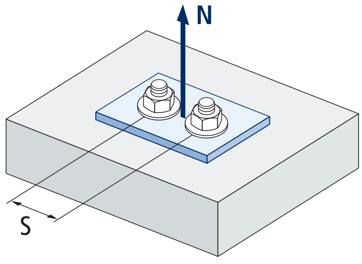
*This factor only applies for a high density of reinforcements. If in the area of the anchor there are reinforcements with a distancing of ≥ 150 mm (any diameter) or with a diameter ≤ 10 mm and a distancing of ≥ 100 mm, a $f_{re,N}$ = 1 factor may be applied.



$$\Psi_{re,N} = 0,5 + \frac{h_{ef}}{200} \leq 1$$

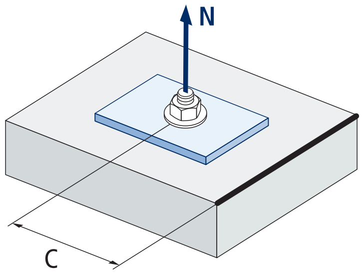
# HE-CL

| Influence of spacing (concrete cone) $\Psi_{s,N}$ | | | | | |
|---|---|---|---|---|---|
| s [mm] | HE-CL | | | | |
| | M6 | M8 | M10 | M12 | M16 |
| 60 | 0,70 | 0,67 | | | |
| 70 | 0,73 | 0,69 | | | |
| 80 | 0,77 | 0,72 | 0,67 | **Invalid value** | |
| 90 | 0,80 | 0,75 | 0,69 | | |
| 100 | 0,83 | 0,78 | 0,71 | 0,67 | |
| 110 | 0,87 | 0,81 | 0,73 | 0,68 | |
| 120 | 0,90 | 0,83 | 0,75 | 0,70 | |
| 130 | 0,93 | 0,86 | 0,77 | 0,72 | 0,67 |
| 140 | 0,97 | 0,89 | 0,79 | 0,73 | 0,68 |
| 150 | 1,00 | 0,92 | 0,81 | 0,75 | 0,69 |
| 160 | | 0,94 | 0,83 | 0,77 | 0,71 |
| 170 | | 0,97 | 0,85 | 0,78 | 0,72 |
| 180 | | 1,00 | 0,88 | 0,80 | 0,73 |
| 190 | | | 0,90 | 0,82 | 0,74 |
| 200 | | | 0,92 | 0,83 | 0,76 |
| 210 | | | 0,94 | 0,85 | 0,77 |
| 220 | | | 0,96 | 0,87 | 0,78 |
| 230 | | | 0,98 | 0,88 | 0,79 |
| 240 | | | 1,00 | 0,90 | 0,81 |
| 250 | | | | 0,92 | 0,82 |
| 260 | | | | 0,93 | 0,83 |
| 270 | | | | 0,95 | 0,85 |
| 280 | | | | 0,97 | 0,86 |
| 290 | | | | 0,98 | 0,87 |
| 300 | | | | 1,00 | 0,88 |
| 310 | | | | | 0,90 |
| 320 | | | | | 0,91 |
| 330 | | | | | 0,92 |
| 340 | | | | | 0,94 |
| 350 | | **Value without reduction = 1** | | | 0,95 |
| 360 | | | | | 0,96 |
| 370 | | | | | 0,97 |
| 380 | | | | | 0,99 |
| 390 | | | | | 1,00 |




$$\Psi_s = 0{,}5 + \frac{s}{2 \cdot s_{cr}} \leq 1$$

# HE-CL




$$\Psi_c = 0{,}35 + \frac{0{,}5 \cdot c}{C_{cr}} + \frac{0{,}15 \cdot c^2}{C_{cr}^{\,2}} \leq 1$$

| Influence of concrete edge distance (concrete cone) $\Psi_{c,N}$ | | | | | |
|---|---|---|---|---|---|
| s [mm] | HE-CL | | | | |
| | M6 | M8 | M10 | M12 | M16 |
| 60 | | | | | |
| 65 | | | | | |
| 70 | | | | | |
| 75 | | | **Invalid value** | | |
| 80 | | | | | |
| 85 | | | | | |
| 90 | | | | | |
| 95 | | | | | |
| 100 | | | | | |
| 105 | 1,00* | 1,00* | | | |
| 110 | | | | | |
| 115 | | | | | |
| 120 | | | | | |
| 125 | | | | | |
| 130 | | | | | |
| 135 | | | | | |
| 140 | | | 1,00* | | |
| 145 | | | | | |
| 150 | | | | | |
| 155 | | | | | |
| 160 | | | | | |
| 165 | | | | | |
| 170 | | | | | |
| 175 | | | | 1,00* | |
| 180 | | | | | |
| 185 | | | | | |
| 190 | | | | | |
| 195 | | | | | |
| 200 | | | | | |
| 205 | | | **Value without reduction = 1** | | |
| 210 | | | | | |
| 215 | | | | | |
| 220 | | | | | |
| 225 | | | | | |
| 230 | | | | | 1,00* |

*installation below the minimum concrete edge distance is not allowed

# HE-CL

## FIRE RESISTANCE

| Characteristic Resistance* | | | | | |
|---|---|---|---|---|---|
| | TENSION | | | | |
| | M6 | M8 | M10 | M12 | M16 |
| RF30 | - | 0,4 | 0,9 | 1,7 | 3,1 |
| RF60 | - | 0,3 | 0,8 | 1,3 | 2,4 |
| RF90 | - | 0,3 | 0,6 | 1,1 | 2 |
| RF120 | - | 0,2 | 0,5 | 0,8 | 1,6 |

*The safety factor for design resistance under fire exposure is $\gamma_{M,fi}$=1 (in abscence of other national regulations). As a eresult the Characteristic Resistance is the same as Design Resistance.

| Maximum Load Recommended | | | | | |
|---|---|---|---|---|---|
| | TENSION | | | | |
| | M6 | M8 | M10 | M12 | M16 |
| RF30 | - | 0,3 | 0,6 | 1,2 | 2,2 |
| RF60 | - | 0,2 | 0,6 | 0,9 | 1,7 |
| RF90 | - | 0,2 | 0,4 | 0,8 | 1,4 |
| RF120 | - | 0,1 | 0,4 | 0,6 | 1,1 |

## RANGE

| Code | Size | Length | | |
|---|---|---|---|---|
| HECLOM06 | M6 x 25 Ø8 | 25 | 100 | 4.000 |
| HECLOM08 | M8 x 30 Ø10 | 30 | 100 | 2.200 |
| HECLOM10 | M10 x 40 Ø12 | 40 | 50 | 1.000 |
| HECLOM12 | M12 x 50 Ø15 | 50 | 50 | 600 |
| HECLOM16 | M16 x 65 Ø20 | 65 | 25 | 250 |
| • HECLOM12D* | M12 x 50 Ø16 | 50 | 50 | 400 |

• Non assessed sizes. Resistance values and installation data are not applicable to these references. For further information, please contact Technical Department.

*Designed for fastening diamond cutting equipment

## EXP

ZINC

Manual expansion tool
for drop-in anchors

| Code | Size | | |
|---|---|---|---|
| EXHBM06 | M6 x 120 | 1 | 10 |
| EXHBM08 | M8 x 120 | 1 | 10 |
| EXHBM10 | M10 x 120 | 1 | 10 |
| EXHBM12 | M12 x 130 | 1 | 10 |
| EXHBM16 | M16 x 145 | 1 | 10 |
| EXHBM20 | M20 x 155 | 1 | 10 |

## Notes