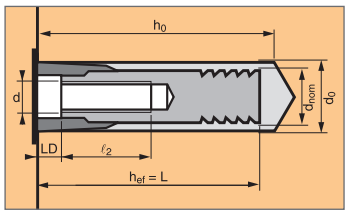
ETA
European Technical Approval

**ETA Option 7**
n° 05/0111 (EPOMAX)
n° 05/0112




## Applications

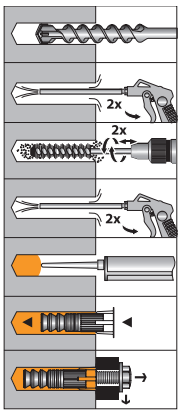
- Fixing steel framed structures
- Fixing machinery (resistant to vibration)
- Insulated fixings (public lighting, cable trays, etc) (high dielectric strength, 10 000 volts, with EPCON 530/200 resin)
- Waterproof fixings (dams, etc)
- Fixing protective barriers and safety rails

## Material

- **Body ATP:** S 300 pb NFA 35561
- **Body ATP (stainless steel A4):** X2Cr Ni Mo 17-12-2
- **Centering cap ATP high density PE**

## Installation

Premium cleaning*




***Premium cleaning:**

- Blow with compressed air X2
- Clean with a brush attached to a drilling machine X2
- Blow with compressed air X2

# Female chemical anchoring for heavy loads

## Technical data

| SPIT ATP | Max. anchor depth (mm) $h_{ef}$ | Min thick of base material (mm) $h_{min}$ | Threaded length (mm) $l_2$ | Depth of threaded start (mm) LD | Ø thread (mm) d | Drilling depth (mm) $h_o$ | Ø drill bit (mm) $d_o$ | Total rod length (mm) L | Total capsule length (mm) $L_p$ | Max. tighten torque 5.8 A4 screw (Nm) $T_{inst}$ | Max. tighten torque 8.8 screw (Nm) $T_{inst}$ | Eurocode Zn | Eurocode st. steel |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ATP M8x60 | 60 | 100 | 20 | 4,5 | 8 | 65 | 14 | 60 | 80 | 10 | 15 | 062770 | 062860 |
| ATP M10x65 | 65 | 100 | 25 | 7 | 10 | 70 | 20 | 65 | 85 | 22 | 30 | 062480 | 062960 |
| ATP M12x75 | 75 | 100 | 30 | 8 | 12 | 75 | 24 | 75 | 107 | 36 | 70 | 062760 | 063100 |
| ATP M12x120* | 120 | 180 | 38 | 5 | 12 | 125 | 18 | 120 | 107 | 36 | 70 | 062500 | - |
| ATP M16x125 | 125 | 180 | 40 | 9,5 | 16 | 130 | 28 | 125 | 162 | 80 | 120 | 052800 | - |
| ATP M20x170 | 170 | 225 | 50 | 12,5 | 20 | 175 | 35 | 170 | 200 | 120 | 200 | 062810 | - |

EPOMAX and Epcon C8 resin can be used with ATP female studs

* No ETA approval

## Anchor mechanical properties

| | M8 | M10 | M12 | M16 | M20 |
|---|---|---|---|---|---|
| **Body ATP in zinc coatd steel** | | | | | |
| $f_{uk}$ (N/mm²) Min. tensile strength | 520 | 520 | 520 | 520 | 520 |
| $f_{yk}$ (N/mm²) Yield strength | 420 | 420 | 420 | 420 | 420 |
| **Body ATP in stainless steel** | | | | | |
| $f_{uk}$ (N/mm²) Min. tensile strength | 650 | 650 | 650 | - | - |
| $f_{yk}$ (N/mm²) Yield strength | 350 | 350 | 350 | - | - |

## Working time and curing time

| Ambient temperature (°C) | Working time | Curing time | |
|---|---|---|---|
| | | Dry concrete | Wet concrete |
| 40°C | 1 min | 30 min | 60 min |
| 30°C | 3 min | 35 min | 1 hour 10 min |
| 20°C | 6 min | 40 min | 1 hour 20 min |
| 10°C | 11 min | 60 min | 2 hours |
| 0°C | 22 min | 3 hours 30 min | hours |

**Note:** minimum installation temperature: -5°C

The loads specified on this page are derived from internal test results. For results derived from CC Methodology, please see overleaf. The data given in the pages "CC - Method" have to be applied.

## Number of fixings per cartridge

| Anchor size | M8x60 | M10x65 | M12x75 | M12x120 | M16x125 |
|---|---|---|---|---|---|
| Drilling Ø (mm) | 14 | 20 | 24 | 18 | 28 |
| Drilling depth (mm) | 65 | 70 | 80 | 125 | 130 |
| **Number of fixings for one cartridge** | | | | | |
| EPCON C8 450 ml* | 112 | 42 | 30 | 34 | 11 |
| EPOMAX 150 ml | 31 | 11 | 8 | 9 | 3 |
| EPOMAX 345 ml | 72 | 27 | 19 | 22 | 7 |
| EPOMAX 380 ml | 80 | 30 | 21 | 24 | 8 |

* All published performance values on pages 76 - 79 are for Epomax Vinylester Resin. For Epcon C8 performance values contact the Technical Helpline.

## Ultimate ($N_{Ru,m}$, $V_{Ru,m}$) / characteristic loads ($N_{Rk}$, $V_{Rk}$) in kN

Mean Ultimate loads are derived from test results in admissible service conditions, and characteristic loads are statistically determined.

### TENSILE

| Anchor size | M8 | M10 | M12 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|
| **Screw grade 5.8 / A4-70** | | | | | | |
| $h_{ef}$ | 60 | 65 | 75 | 120 | 125 | 170 |
| $N_{Ru,m}$ | 20,3 | 32,2 | 46,8 | 46,8 | 87,2 | 136,1 |
| $N_{Rk}$ | 18,3 | 29,0 | 42,2 | 42,2 | 78,5 | 122,5 |
| **Screw grade 8.8** | | | | | | |
| $h_{ef}$ | 60 | 65 | 75 | 120 | 125 | 170 |
| $N_{Ru,m}$ | 26,6 | 41,2 | 57,1 | 91,3 | 111,0 | 188,8 |
| $N_{Rk}$ | 16,7 | 25,8 | 35,8 | 57,3 | 69,6 | 118,5 |

### SHEAR

| Anchor size | M8 | M10 | M12 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|
| **Screw grade 5.8** | | | | | | |
| $V_{Ru,m}$ | 11,34 | 18,18 | 26,28 | 26,28 | 48,96 | 76,14 |
| $V_{Rk}$ | 9,45 | 15,15 | 21,9 | 21,9 | 40,8 | 63,45 |
| **Screw grade 8.8** | | | | | | |
| $V_{Ru,m}$ | 17,46 | 27,9 | 40,5 | 40,5 | 55,26 | 121,86 |
| $V_{Rk}$ | 14,55 | 23,25 | 33,75 | 33,75 | 46,05 | 101,55 |
| **Screw grade A4-70** | | | | | | |
| $V_{Ru,m}$ | 15,27 | 24,47 | 35,38 | 35,38 | 65,91 | 102,50 |
| $V_{Rk}$ | 12,72 | 20,39 | 29,48 | 29,48 | 54,92 | 85,41 |

## Design Loads ($N_{Rd}$, $V_{Rd}$) for one anchor without edge or spacing influence in kN

$$N_{Rd} = \frac{N_{Rk}^{*}}{\gamma_{Mc}} \qquad V_{Rd} = \frac{V_{Rk}^{*}}{\gamma_{Ms}}$$

*Derived from test results

### TENSILE

| Anchor size | M8 | M10 | M12 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|
| **Screw grade 5.8 / A4-70** | | | | | | |
| $h_{ef}$ | 60 | 65 | 75 | 120 | 125 | 170 |
| $N_{Rd}$ | 12,2 | 19,3 | 28,1 | 28,1 | 52,3 | 81,7 |
| **Screw grade 8.8** | | | | | | |
| $h_{ef}$ | 60 | 65 | 75 | 120 | 125 | 170 |
| $N_{Rd}$ | 11,1 | 17,2 | 23,9 | 38,2 | 46,4 | 79,0 |

$\gamma_{Mc}$ = 1,5

### SHEAR

| Anchor size | M8 | M10 | M12 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|
| **Screw grade 5.8** | | | | | | |
| $V_{Rd}$ | 7,6 | 12,1 | 17,5 | 17,5 | 32,6 | 50,8 |
| **Screw grade 8.8** | | | | | | |
| $V_{Rd}$ | 11,6 | 18,6 | 27,0 | 27,0 | 30,7 | 67,7 |
| **Screw grade A4-70** | | | | | | |
| $V_{Rd}$ | 8,2 | 13,1 | 18,9 | 18,9 | 35,2 | - |

$\gamma_{Ms\ 5.8}$ = 1,25 - $\gamma_{Ms\ 8.8}$ = 1,25 for M8 to M12
$\gamma_{Ms\ 8.8}$ = 1,5 for M16 to M20 - $\gamma_{Ms\ A4\text{-}70}$ = 1,56

## Recommended loads ($N_{rec}$, $V_{rec}$) for one anchor without edge or spacing influence in kN

$$N_{Rec} = \frac{N_{Rk}^{*}}{\gamma_{M}\gamma_{F}} \qquad V_{Rec} = \frac{V_{Rk}^{*}}{\gamma_{M}.\gamma_{F}}$$

*Derived from test results

### TENSILE

| Anchor size | M8 | M10 | M12 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|
| **Screw grade 5.8 / A4-70** | | | | | | |
| $h_{ef}$ | 60 | 65 | 75 | 120 | 125 | 170 |
| $N_{Rec}$ | 8,7 | 13,8 | 20,1 | 20,1 | 37,4 | 58,3 |
| **Screw grade 8.8** | | | | | | |
| $h_{ef}$ | 60 | 65 | 75 | 120 | 125 | 170 |
| $N_{Rec}$ | 8,0 | 12,3 | 17,0 | 27,3 | 33,1 | 56,4 |

$\gamma_{Mc}$ = 1,5

### SHEAR

| Anchor size | M8 | M10 | M12 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|
| **Screw grade 5.8** | | | | | | |
| $V_{Rec}$ | 5,4 | 8,7 | 12,5 | 12,5 | 23,3 | 36,3 |
| **Screw grade 8.8** | | | | | | |
| $V_{Rec}$ | 8,3 | 13,3 | 19,3 | 19,3 | 21,9 | 48,4 |
| **Screw grade A4-70** | | | | | | |
| $V_{Rec}$ | 5,8 | 9,3 | 13,5 | 13,5 | 25,1 | - |

$\gamma_{Ms\ 5.8}$ = 1,25 - $\gamma_{Ms\ 8.8}$ = 1,25 for M8 to M12
$\gamma_{Ms\ 8.8}$ = 1,5 for M16 to M20 - $\gamma_{Ms\ A4\text{-}70}$ = 1,56



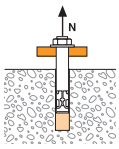






## SPIT CC - Method (values issued from ETA)

### TENSILE in kN

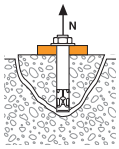



**Pull out resistance for dry, wet** (1) **concrete with premium cleaning**

$$N_{Rd,p} = N^{O}_{Rd,p} . f_b$$

| $N^0_{Rd,p}$ Anchor size | M8 | M10 | M12 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|
| | | | | Design pull-out resistance | | |
| $h_{ef}$ | *60* | *65* | *75* | *120* | *125* | *170* |
| $N^0_{Rd,p}$ | 10,7 | 13,3 | 20,0 | 30,0 | 40,0 | 63,3 |

$\gamma_{Mc} = 1,5$

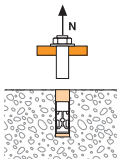



**Concrete cone resistance for dry, wet** (1) **concrete with premium cleaning**

$$N_{Rd,c} = N^{O}_{Rd,c} . f_b . \Psi_s . \Psi_{c,N}$$

| $N^0_{Rd,c}$ Anchor size | M8 | M10 | M12 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|
| | | | | Design cone resistance | | |
| $h_{ef}$ | *60* | *65* | *75* | *120* | *125* | *170* |
| $N^0_{Rd,c}$ | 10,7 | 13,3 | 20,0 | 30,0 | 40,0 | 63,3 |

$\gamma_{Mc} = 1,5$

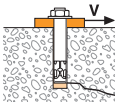



**Steel resistance**

| $N_{Rd,s}$ Anchor size | M8 | M10 | M12 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|
| | | | | Design steel tensile resistance | | |
| **Screw grade 5.8** | | | | | | |
| $N_{Rd,s}$ | 12,0 | 19,3 | 28,0 | 28,0 | 52,0 | 81,2 |
| **Screw grade 8.8** | | | | | | |
| $N_{Rd,s}$ | 19,3 | 30,7 | 44,7 | 44,70 | 73,3 | 122,0 |
| **Screw grade A4-70** | | | | | | |
| $N_{Rd,s}$ | 12,4 | 19,9 | 29,0 | 29,0 | 54,8 | - |

$\gamma_{Ms\ 5.8} = 1,5$ ; $\gamma_{Ms\ 8.8} = 1,5$ ; $\gamma_{Ms\ A4\text{-}70} = 1,86$

### SHEAR in kN

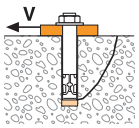



**Concrete edge resistance**

$$V_{Rd,c} = V^{O}_{Rd,c} . f_b . f_{\beta,V} . \Psi_{S-C,V}$$

| $V^0_{Rd,c}$ Anchor size | M8 | M10 | M12 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|
| | | | | Design concrete edge resistance at minimum edge distance ($C_{min}$) | | |
| $h_{ef}$ | *60* | *65* | *75* | *120* | *125* | *170* |
| $C_{min}$ | 40 | 45 | 55 | 65 | 65 | 85 |
| $S_{min}$ | 40 | 45 | 55 | 65 | 65 | 85 |
| $V^0_{Rd,c}$ | 2,5 | 3,4 | 5,0 | 6,5 | 7,3 | 12,5 |

$\gamma_{Mc} = 1,5$

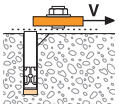



**Pryout failure**

$$V_{Rd,cp} = V^{0}_{Rd,cp} . f_b . \Psi_s . \Psi_{c,N}$$

| $V^0_{Rd,cp}$ Anchor size | M8 | M10 | M12 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|
| | | | | Design pryout resistance | | |
| $h_{ef}$ | *60* | *65* | *75* | *120* | *125* | *170* |
| $V^0_{Rd,cp}$ | 21,3 | 26,7 | 40,0 | 60,0 | 80,0 | 126,7 |

$\gamma_{Mcp} = 1,5$




**Steel resistance**

| $V_{Rd,s}$ Anchor size | M8 | M10 | M12 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|
| | | | | Design steel shear resistance | | |
| **Screw grade 5.8** | | | | | | |
| $V_{Rd,s}$ | 7,4 | 11,6 | 16,9 | 16,9 | 31,2 | 48,8 |
| **Screw grade 8.8** | | | | | | |
| $V_{Rd,s}$ | 11,7 | 18,6 | 27,0 | 27,0 | 36,7 | 60,7 |
| **Screw grade A4-70** | | | | | | |
| $V_{Rd,s}$ | 7,3 | 11,9 | 17,3 | 17,3 | 32,7 | - |

$\gamma_{Ms\ 5.8} = 1,25$ ; $\gamma_{Ms\ 8.8} = 1,25$ for M8 to M12 and
$\gamma_{Ms\ 8.8} = 1,5$ for M16 to M20 ; $\gamma_{Ms\ A4\text{-}70} = 1,56$ for M8 to M16

(1) The concrete in the area of the anchorage is water saturated

$$N_{Rd} = \min(N_{Rd,p} ; N_{Rd,c} ; N_{Rd,s})$$
$$\beta_N = N_{Sd} / N_{Rd} \leq 1$$

$$V_{Rd} = \min(V_{Rd,c} ; V_{Rd,cp} ; V_{Rd,s})$$
$$\beta_V = V_{Sd} / V_{Rd} \leq 1$$

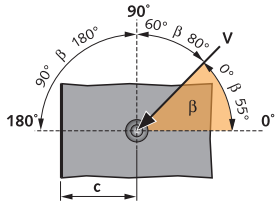
$$\beta_N + \beta_V \leq 1.2$$

### $f_B$ Influence of Concrete

| Concrete class | $f_B$ |
|---|---|
| C20/25 | 1 |
| C30/40 | 1,14 |
| C40/60 | 1,26 |
| C50/60 | 1,34 |

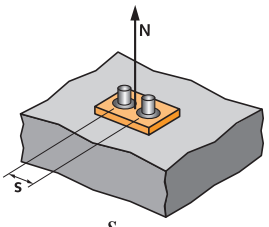
### $f_{\beta,V}$ Influence of Shear Loading Direction

| Angle β [°] | $f_{\beta,V}$ |
|---|---|
| 0 to 55 | 1 |
| 60 | 1.1 |
| 70 | 1.2 |
| 80 | 1.5 |
| 90 to 180 | 2 |



# SPIT CC - Method (values issued from ETA)

## $\Psi_s$ Influence of spacing for concrete cone resistance in tensile load

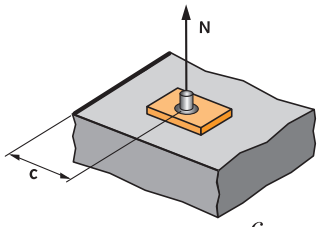



$$\Psi_S = 0{,}5 + \frac{s}{4.h_{ef}}$$

$S_{min} < S < S_{cr,N}$
$S_{cr,N} = 2\ h_{ef}$
$\Psi_S$ must be used for each spacing influenced the anchors group.

| SPACING S | Reduction factor $\Psi_s$ Non-cracked concrete | | | | | |
|---|---|---|---|---|---|---|
| | M8 | M10 | M12 | M12 | M16 | M20 |
| 40 | 0,67 | | | | | |
| 45 | 0,69 | 0,67 | | | | |
| 55 | 0,73 | 0,71 | 0,68 | | | |
| 65 | 0,77 | 0,75 | 0,72 | 0,64 | 0,63 | |
| 85 | 0,85 | 0,83 | 0,78 | 0,65 | 0,67 | 0,60 |
| 100 | 0,92 | 0,88 | 0,83 | 0,71 | 0,70 | 0,65 |
| 120 | 1,00 | 0,96 | 0,90 | 0,75 | 0,74 | 0,68 |
| 130 | | 1,00 | 0,93 | 0,77 | 0,76 | 0,69 |
| 150 | | | 1,00 | 0,81 | 0,80 | 0,72 |
| 200 | | | | 0,92 | 0,90 | 0,79 |
| 250 | | | | 1,00 | 1,00 | 0,87 |
| 300 | | | | | | 0,94 |
| 340 | | | | | | 1,00 |

## $\Psi_{c,N}$ Influence of edge for concrete cone resistance in tensile load

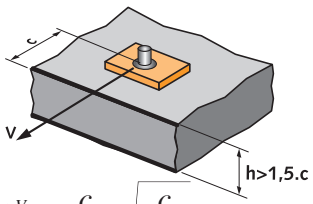



$$\Psi_{c,N} = 0{,}27 + 0{,}725 . \frac{c}{h_{ef}}$$

$C_{min} < C < C_{cr,N}$
$C_{cr,N} = h_{ef}$
$\Psi_{c,N}$ must be used for each distance influenced the anchors group.

| EDGE C | Reduction factor $\Psi_{c,N}$ Non-cracked concrete | | | | | |
|---|---|---|---|---|---|---|
| | M8 | M10 | M12 | M12 | M16 | M20 |
| 40 | 0,75 | | | | | |
| 45 | 0,81 | 0,77 | | | | |
| 55 | 0,93 | 0,88 | 0,80 | | | |
| 65 | 1,00 | 1,00 | 0,90 | 0,66 | 0,65 | 0,55 |
| 85 | | | 1,00 | 0,68 | 0,76 | 0,63 |
| 90 | | | | 0,81 | 0,79 | 0,65 |
| 100 | | | | 0,87 | 0,85 | 0,70 |
| 125 | | | | 1,00 | 1,00 | 0,80 |
| 150 | | | | | | 0,91 |
| 170 | | | | | | 1,00 |

## $\Psi_{s-c,V}$ Influence of spacing and edge distance for concrete edge resistance in shear load

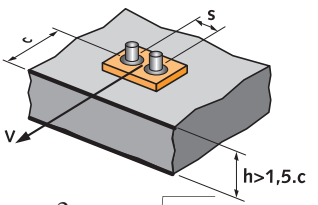



$$\Psi_{s-c,V} = \frac{c}{c_{min}} . \sqrt{\frac{c}{c_{min}}}$$

### For single anchor fastening

| $\frac{C}{C_{min}}$ | 1,0 | 1,2 | 1,4 | 1,6 | 1,8 | 2,0 | 2,2 | 2,4 | 2,6 | 2,8 | 3,0 | 3,2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\Psi_{s-c,V}$ | 1,00 | 1,31 | 1,66 | 2,02 | 2,41 | 2,83 | 3,26 | 3,72 | 4,19 | 4,69 | 5,20 | 5,72 |

Factor $\Psi_{s-c,V}$ Non-cracked concrete

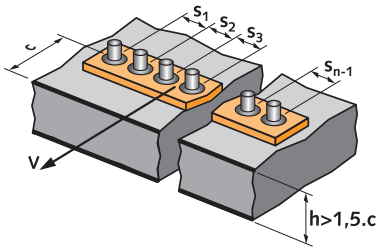



$$\Psi_{s-c,V} = \frac{3.c + s}{6.c_{min}} . \sqrt{\frac{c}{c_{min}}}$$

### For 2 anchors

Factor $\Psi_{s-c,V}$ Non-cracked concrete

| $\frac{S}{C_{min}}$ \ $\frac{C}{C_{min}}$ | 1,0 | 1,2 | 1,4 | 1,6 | 1,8 | 2,0 | 2,2 | 2,4 | 2,6 | 2,8 | 3,0 | 3,2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,0 | 0,67 | 0,84 | 1,03 | 1,22 | 1,43 | 1,65 | 1,88 | 2,12 | 2,36 | 2,62 | 2,89 | 3,16 |
| 1,5 | 0,75 | 0,93 | 1,12 | 1,33 | 1,54 | 1,77 | 2,00 | 2,25 | 2,50 | 2,76 | 3,03 | 3,31 |
| 2,0 | 0,83 | 1,02 | 1,22 | 1,43 | 1,65 | 1,89 | 2,12 | 2,38 | 2,63 | 2,90 | 3,18 | 3,46 |
| 2,5 | 0,92 | 1,11 | 1,32 | 1,54 | 1,77 | 2,00 | 2,25 | 2,50 | 2,77 | 3,04 | 3,32 | 3,61 |
| 3,0 | 1,00 | 1,20 | 1,42 | 1,64 | 1,88 | 2,12 | 2,37 | 2,63 | 2,90 | 3,18 | 3,46 | 3,76 |
| 3,5 | | 1,30 | 1,52 | 1,75 | 1,99 | 2,24 | 2,50 | 2,76 | 3,04 | 3,32 | 3,61 | 3,91 |
| 4,0 | | | 1,62 | 1,86 | 2,10 | 2,36 | 2,62 | 2,89 | 3,17 | 3,46 | 3,75 | 4,05 |
| 4,5 | | | | 1,96 | 2,21 | 2,47 | 2,74 | 3,02 | 3,31 | 3,60 | 3,90 | 4,20 |
| 5,0 | | | | | 2,33 | 2,59 | 2,87 | 3,15 | 3,44 | 3,74 | 4,04 | 4,35 |
| 5,5 | | | | | | 2,71 | 2,99 | 3,28 | 3,71 | 4,02 | 4,33 | 4,65 |
| 6,0 | | | | | | 2,83 | 3,11 | 3,41 | 3,71 | 4,02 | 4,33 | 4,65 |




### For 3 anchors or more

$$\Psi_{s-c,V} = \frac{3.c + s_1 + s_2 + s_3 + \ldots + s_{n-1}}{3\ n\ c} . \sqrt{\frac{c}{c}}$$