



HSL-3-R EXPANSION ANCHOR

Technical Datasheet

Update: Jan-23





HSL-3-R expansion anchor

Ultimate-performance heavy-duty expansion anchor

| Anchor versions | | Benefits |
|-----------------|--|---|
| | | <ul style="list-style-type: none"> - Suitable for cracked concrete C20/25 to C50/60 - Suitable for all dynamic loads: seismic C1, shock and fatigue - Can be installed with hammer or Hollow drilling^{a)} for same performance - Top shear performance due to high strength expansion and shear sleeves - Length can be customized to a specific project need - Easily removable for temporary fastening or retrofit |
| | | |
| | | |

a) Condition valid only for size M12, M16 & M20

| Base material | | Load conditions | | | |
|-------------------------|----------------------------|--------------------------|-------------------------------|---------------|------------------------------------|
| | | | | | |
| Concrete (non-cracked) | Concrete (cracked) | Static/ quasi-static | Seismic ETA-C1 | Shock | Fire resistance |
| Installation conditions | | Other information | | | |
| | | | | | |
| Hammer drilled holes | Hollow drill-bits drilling | Variable embedment depth | European Technical Assessment | CE conformity | PROFIS Engineering design Software |
| | | | | | |
| | | | | | Corrosion resistance |

Approvals/certificates

| Description | Authority / Laboratory | No. / Date of issue |
|---|---------------------------------|--------------------------|
| European technical Assessment ^{a)} | CSTB, Marne-la-Vallée | ETA-02/0042 / 2017-11-22 |
| Fire test report | CSTB, Marne-la-Vallée | ETA-02/0042 / 2017-11-22 |
| ICC-ES report incl. seismic ^{b)} | ICC evaluation service | ESR 1545 / 2019-04 |
| Shock approval | Civil Protection of Switzerland | BZS D 08-601 |

a) All data given in this section according to ETA-02/0042, issue 2017-07-20.

b) For more details on Technical Data according to ICC please consult the relevant HNA FTM.

Static and quasi-static resistance (for a single anchor)

All data in this section applies to:

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- Steel failure
- Minimum base material thickness
- Concrete C 20/25, $f_{ck,cube}=25 \text{ N/mm}^2$
- Values for Hollow drill-bits drilling only applicable for M12, M16 and M20.

Effective anchorage depth ^{a)}

| Anchor size | | | M8 | | | M10 | | | M12 | | |
|---------------------------|----------|------|-----------------|-----------------|------------|-----------------|-----------------|------------|-----------------|-----------------|------------|
| Effective anchorage depth | h_{ef} | [mm] | $h_{ef,1}^{b)}$ | $h_{ef,2}^{b)}$ | $h_{ef,3}$ | $h_{ef,1}^{b)}$ | $h_{ef,2}^{b)}$ | $h_{ef,3}$ | $h_{ef,1}^{b)}$ | $h_{ef,2}^{b)}$ | $h_{ef,3}$ |
| | | | 60 | 80 | 100 | 70 | 90 | 110 | 80 | 105 | 130 |
| Anchor size | | | M16 | | | M20 | | | | | |
| Effective anchorage depth | h_{ef} | [mm] | $h_{ef,1}$ | $h_{ef,2}$ | $h_{ef,3}$ | $h_{ef,1}$ | $h_{ef,2}$ | $h_{ef,3}$ | | | |
| | | | 100 | 125 | 150 | 125 | 155 | 185 | | | |

a) HSL-3-SKR only available in sizes M8-M12

b) HSL-3-SKR can only be set in position 1.

Characteristic resistance

| Anchor size | | | M8 | | | M10 | | | M12 | | | | |
|-----------------------------|-----------------------------------|--|----------|------|------|-------|-------|-------|-------|-------|------|------|------|
| Non-cracked concrete | | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-SKR ^{a)} | | N_{Rk} | [kN] | 20,0 | 20,0 | 20,0 | 28,8 | 40,6 | 40,6 | 35,2 | 50,0 | 50,0 |
| | HSL-3-GR | | | | 20,0 | 20,0 | 20,0 | 28,8 | 40,6 | 40,6 | 35,2 | 50,0 | 50,0 |
| Shear | HSL-3-R / HSL-3-SKR ^{a)} | | V_{Rk} | [kN] | 45,7 | 50,9 | 50,9 | 57,6 | 63,9 | 63,9 | 70,4 | 82,8 | 82,8 |
| | HSL-3-GR | | | | 40,3 | 40,3 | 40,3 | 58,9 | 58,9 | 58,9 | 70,4 | 78,7 | 78,7 |
| Cracked concrete | | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-SKR ^{a)} | | N_{Rk} | [kN] | 12,0 | 12,0 | 12,0 | 16,0 | 16,0 | 16,0 | 24,6 | 24,0 | 24,0 |
| | HSL-3-GR | | | | 12,0 | 12,0 | 12,0 | 16,0 | 16,0 | 16,0 | 24,6 | 24,0 | 24,0 |
| Shear | HSL-3-R / HSL-3-SKR ^{a)} | | V_{Rk} | [kN] | 32,0 | 49,3 | 50,9 | 40,3 | 58,8 | 63,9 | 49,3 | 74,1 | 82,8 |
| | HSL-3-GR | | | | 32,0 | 40,3 | 40,3 | 40,3 | 58,8 | 58,9 | 49,3 | 74,1 | 78,7 |
| Anchor size | | | M16 | | | M20 | | | | | | | |
| Non-cracked concrete | | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR | | N_{Rk} | [kN] | 49,2 | 65,0 | 65,0 | 68,8 | 95,0 | 95,0 | | | |
| Shear | HSL-3-R | | V_{Rk} | [kN] | 98,4 | 127,7 | 127,7 | 137,5 | 154,8 | 154,8 | | | |
| | HSL-3-GR | | | | 98,4 | 129,5 | 129,5 | 137,5 | 151,9 | 151,9 | | | |
| Anchor size | | | M16 | | | M20 | | | | | | | |
| Cracked concrete | | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR | | N_{Rk} | [kN] | 34,4 | 36,0 | 36,0 | 48,1 | 50,0 | 50,0 | | | |
| Shear | HSL-3-R | | V_{Rk} | [kN] | 68,9 | 96,3 | 126,5 | 96,3 | 132,9 | 154,8 | | | |
| | HSL-3-GR | | | | 68,9 | 96,3 | 126,5 | 96,3 | 132,9 | 151,9 | | | |

a) HSL-3-SKR can only be set in position 1.



Design resistance

| Anchor size | | | | M8 | | | M10 | | | M12 | | |
|-----------------------------|-----------------------------------|--|----------------------|------------|------|-------|------------|-------|-------|------|------|------|
| Non-cracked concrete | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-SKR ^{a)} | | N _{Rd} [kN] | 13,3 | 13,3 | 13,3 | 19,2 | 21,7 | 21,7 | 23,5 | 31,6 | 31,6 |
| | HSL-3-GR | | | 13,3 | 13,3 | 13,3 | 19,2 | 27,1 | 27,1 | 23,5 | 33,3 | 33,3 |
| Shear | HSL-3-R / HSL-3-SKR ^{a)} | | V _{Rd} [kN] | 30,5 | 40,7 | 40,7 | 38,4 | 41,0 | 41,0 | 46,9 | 53,1 | 53,1 |
| | HSL-3-GR | | | 30,5 | 32,2 | 32,2 | 38,4 | 47,1 | 47,1 | 46,9 | 63,0 | 63,0 |
| Cracked concrete | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-SKR ^{a)} | | N _{Rd} [kN] | 8,0 | 8,0 | 8,0 | 10,7 | 10,7 | 10,7 | 16,4 | 16,0 | 16,0 |
| Shear | HSL-3-R / HSL-3-SKR ^{a)} | | V _{Rd} [kN] | 21,3 | 32,9 | 40,7 | 26,9 | 39,2 | 41,0 | 32,9 | 49,4 | 53,1 |
| | HSL-3-GR | | | 21,3 | 32,2 | 32,2 | 26,9 | 39,2 | 47,1 | 32,9 | 49,4 | 63,0 |
| Anchor size | | | | M16 | | | M20 | | | | | |
| Non-cracked concrete | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR | | N _{Rd} [kN] | 32,8 | 43,3 | 43,3 | 45,8 | 63,3 | 63,3 | | | |
| Shear | HSL-3-R / HSL-3-GR | | V _{Rd} [kN] | 65,6 | 81,9 | 81,9 | 91,7 | 99,2 | 99,2 | | | |
| | HSL-3-GR | | | 65,6 | 91,7 | 103,6 | 91,7 | 121,5 | 121,5 | | | |
| Cracked concrete | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR | | N _{Rd} [kN] | 23,0 | 24,0 | 24,0 | 33,5 | 33,3 | 33,3 | | | |
| Shear | HSL-3-R | | V _{Rd} [kN] | 45,9 | 64,2 | 81,9 | 64,2 | 88,6 | 99,2 | | | |
| | HSL-3-GR | | | 45,9 | 64,2 | 84,3 | 64,2 | 88,6 | 115,5 | | | |

a) HSL-3-SKR only available in sizes M8-M12

Recommended loads ^{b)}

| Anchor size | | | | M8 | | | M10 | | | M12 | | |
|-----------------------------|-----------------------------------|--|-----------------------|------------|------|------|------------|------|------|------|------|------|
| Non-cracked concrete | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-SKR ^{a)} | | N _{Rec} [kN] | 9,5 | 9,5 | 9,5 | 13,7 | 15,5 | 15,5 | 16,8 | 22,5 | 22,5 |
| | HSL-3-GR | | | 9,5 | 9,5 | 9,5 | 13,7 | 19,3 | 19,3 | 16,8 | 23,8 | 23,8 |
| Shear | HSL-3-R / HSL-3-SKR ^{a)} | | V _{Rec} [kN] | 21,8 | 29,1 | 29,1 | 27,4 | 29,3 | 29,3 | 33,5 | 37,9 | 37,9 |
| | HSL-3-GR | | | 21,8 | 23,0 | 23,0 | 27,4 | 33,7 | 33,7 | 33,5 | 45,0 | 45,0 |
| Cracked concrete | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-SKR ^{a)} | | N _{Rec} [kN] | 5,7 | 5,7 | 5,7 | 7,6 | 7,6 | 7,6 | 11,7 | 11,4 | 11,4 |
| | HSL-3-GR | | | 5,7 | 5,7 | 5,7 | 7,6 | 7,6 | 7,6 | 11,7 | 11,4 | 11,4 |
| Shear | HSL-3-R / HSL-3-SKR ^{a)} | | V _{Rec} [kN] | 15,2 | 23,5 | 29,1 | 19,2 | 28,0 | 29,3 | 23,5 | 35,3 | 37,9 |
| | HSL-3-GR | | | 15,2 | 23,0 | 23,0 | 19,2 | 28,0 | 33,7 | 23,5 | 35,3 | 45,0 |
| Anchor size | | | | M16 | | | M20 | | | | | |
| Non-cracked concrete | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR | | N _{Rec} [kN] | 23,4 | 31,0 | 31,0 | 32,7 | 45,2 | 45,2 | | | |
| Shear | HSL-3-R / HSL-3-GR | | V _{Rec} [kN] | 46,9 | 58,5 | 58,5 | 65,5 | 70,9 | 70,9 | | | |
| | HSL-3-GR | | | 46,9 | 65,5 | 74,0 | 65,5 | 86,8 | 86,8 | | | |
| Cracked concrete | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR | | N _{Rec} [kN] | 16,4 | 17,1 | 17,1 | 22,9 | 23,8 | 23,8 | | | |
| Shear | HSL-3-R | | V _{Rec} [kN] | 32,8 | 45,8 | 58,5 | 45,8 | 63,3 | 70,9 | | | |
| | HSL-3-GR | | | 32,8 | 45,8 | 60,2 | 45,8 | 63,3 | 82,5 | | | |

a) HSL-3-SKR only available in sizes M8-M12.

b) With overall partial safety factor for action $\gamma = 1,4$. The partial safety factors for action depend on the type of loading and shall be taken from national regulations.



Fire resistance

All data in this section applies to:

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- Steel failure
- Minimum base material thickness
- Concrete C 20/25, $f_{ck,cyl} = 20 \text{ N/mm}^2$
- partial safety factor for resistance under fire exposure $\gamma_{M,fi}=1,0$ (in absence of other national regulations)

Effective anchorage depth^{a)}

| Anchor size | | | M8 | | | M10 | | | M12 | | |
|---------------------------|----------|------|-----------------|-----------------|------------|-----------------|-----------------|------------|-----------------|-----------------|------------|
| Effective anchorage depth | h_{ef} | [mm] | $h_{ef,1}^{b)}$ | $h_{ef,2}^{b)}$ | $h_{ef,3}$ | $h_{ef,1}^{b)}$ | $h_{ef,2}^{b)}$ | $h_{ef,3}$ | $h_{ef,1}^{b)}$ | $h_{ef,2}^{b)}$ | $h_{ef,3}$ |
| | | | 60 | 80 | 100 | 70 | 90 | 110 | 80 | 105 | 130 |
| Anchor size | | | M16 | | | M20 | | | | | |
| Effective anchorage depth | h_{ef} | [mm] | $h_{ef,1}$ | $h_{ef,2}$ | $h_{ef,3}$ | $h_{ef,1}$ | $h_{ef,2}$ | $h_{ef,3}$ | | | |
| | | | 100 | 125 | 150 | 125 | 155 | 185 | | | |

a) HSL-3-SKR only available in sizes M8-M12

b) HSL-3-SKR can only be set in position 1.

Characteristic resistance

| Anchor size | | | | M8 | | | M10 | | | M12 | | |
|---------------------------|--------------------------------|-------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Fire exposure R30 | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR / HSL-3-SKR | $N_{Rk,fi}$ | [kN] | 0,7 | 0,7 | 0,7 | 1,5 | 1,5 | 1,5 | 2,5 | 2,5 | 2,5 |
| Shear | HSL-3-R / HSL-3-GR / HSL-3-SKR | $V_{Rk,fi}$ | [kN] | 0,7 | 0,7 | 0,7 | 1,5 | 1,5 | 1,5 | 2,5 | 2,5 | 2,5 |
| Fire exposure R120 | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR / HSL-3-SKR | $N_{Rk,fi}$ | [kN] | 0,4 | 0,4 | 0,4 | 0,8 | 0,8 | 0,8 | 1,3 | 1,3 | 1,3 |
| Shear | HSL-3-R / HSL-3-GR / HSL-3-SKR | $V_{Rk,fi}$ | [kN] | 0,4 | 0,4 | 0,4 | 0,8 | 0,8 | 0,8 | 1,3 | 1,3 | 1,3 |
| Anchor size | | | | M16 | | | M20 | | | | | |
| Fire exposure R30 | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR / HSL-3-SKR | $N_{Rk,fi}$ | [kN] | 4,7 | 4,7 | 4,7 | 7,4 | 7,4 | 7,4 | | | |
| Shear | HSL-3-R / HSL-3-GR / HSL-3-SKR | $V_{Rk,fi}$ | [kN] | 4,7 | 4,7 | 4,7 | 7,4 | 7,4 | 7,4 | | | |
| Fire exposure R120 | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR / HSL-3-SKR | $N_{Rk,fi}$ | [kN] | 2,5 | 2,5 | 2,5 | 3,9 | 3,9 | 3,9 | | | |
| Shear | HSL-3-R / HSL-3-GR / HSL-3-SKR | $V_{Rk,fi}$ | [kN] | 2,5 | 2,5 | 2,5 | 3,9 | 3,9 | 3,9 | | | |

Characteristic resistance

| Anchor size | | | | M8 | | | M10 | | | M12 | | |
|---------------------------|--------------------------------|-------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Fire exposure R30 | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR / HSL-3-SKR | $N_{Rk,fi}$ | [kN] | 0,7 | 0,7 | 0,7 | 1,5 | 1,5 | 1,5 | 2,5 | 2,5 | 2,5 |
| Shear | HSL-3-R / HSL-3-GR / HSL-3-SKR | $V_{Rk,fi}$ | [kN] | 0,7 | 0,7 | 0,7 | 1,5 | 1,5 | 1,5 | 2,5 | 2,5 | 2,5 |
| Fire exposure R120 | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR / HSL-3-SKR | $N_{Rk,fi}$ | [kN] | 0,4 | 0,4 | 0,4 | 0,8 | 0,8 | 0,8 | 1,3 | 1,3 | 1,3 |
| Shear | HSL-3-R / HSL-3-GR / HSL-3-SKR | $V_{Rk,fi}$ | [kN] | 0,4 | 0,4 | 0,4 | 0,8 | 0,8 | 0,8 | 1,3 | 1,3 | 1,3 |
| Anchor size | | | | M16 | | | M20 | | | | | |
| Fire exposure R30 | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR / HSL-3-SKR | $N_{Rk,fi}$ | [kN] | 4,7 | 4,7 | 4,7 | 7,4 | 7,4 | 7,4 | | | |
| Shear | HSL-3-R / HSL-3-GR / HSL-3-SKR | $V_{Rk,fi}$ | [kN] | 4,7 | 4,7 | 4,7 | 7,4 | 7,4 | 7,4 | | | |
| Fire exposure R120 | | | | | | | | | | | | |
| Tension | HSL-3-R / HSL-3-GR / HSL-3-SKR | $N_{Rk,fi}$ | [kN] | 2,5 | 2,5 | 2,5 | 3,9 | 3,9 | 3,9 | | | |
| Shear | HSL-3-R / HSL-3-GR / HSL-3-SKR | $V_{Rk,fi}$ | [kN] | 2,5 | 2,5 | 2,5 | 3,9 | 3,9 | 3,9 | | | |

For more information about different failure modes and fire resistance times please see the full ETA-02/0042 report.

Materials

Mechanical properties

| Anchor size | | | | M8 | M10 | M12 | M16 | M20 |
|-------------------------------------|-----------|----------------|----------------------|------|------|-------|-------|-------|
| HSL-3-R, HSL-3-GR, HSL-3-SKR | | | | | | | | |
| Nominal tensile strength | | f_{uk} | [N/mm ²] | 700 | 700 | 700 | 700 | 700 |
| Yield strength | HSL-3-R | f_{yk} | [N/mm ²] | 560 | 450 | 450 | 450 | 450 |
| | HSL-3-SKR | | | 560 | 560 | 560 | 560 | 560 |
| | HSL-3-GR | | | 560 | 560 | 560 | 560 | 560 |
| Stressed cross-section | | A_s | [mm ²] | 36,6 | 58,0 | 84,3 | 157 | 245 |
| Moment of resistance | | W | [mm ³] | 31,3 | 62,5 | 109,4 | 277,1 | 540,6 |
| Characteristic bending resistance | | $M^{0}_{Rk,s}$ | [Nm] | 26,2 | 52,3 | 91,7 | 233,1 | 454,4 |

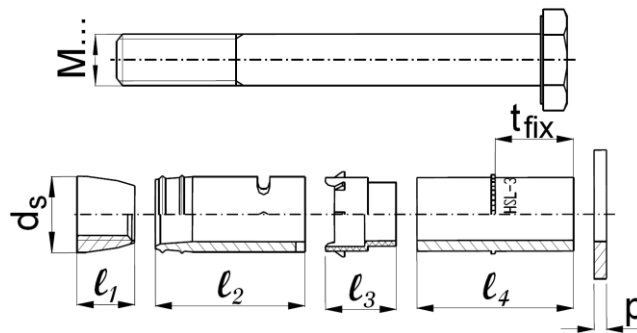
Material quality

| Part | | Material |
|----------------------------------|---------------------|--|
| Stainless Steel | | |
| HSL-3-R HSL-3-GR HSL-3-SKR | Cone | Stainless steel A4, coated |
| | Expansion sleeve | Stainless steel A4 |
| | Collapsible element | Plastic element |
| | Distance sleeve | Stainless steel A4 |
| HSL-3-R | Washer | Stainless steel A4, coated |
| | Hexagonal bolt | Stainless steel A4, coated, rupture elongation $\geq 12\%$ |
| HSL-3-GR | Hexagonal nut | Stainless steel A4, coated |
| | Threaded rod | Stainless steel A4, coated, rupture elongation $\geq 12\%$ |
| HSL-3-SKR | Countersunk bolt | Stainless steel A4, coated, rupture elongation $\geq 12\%$ |
| | Cup washer | Stainless steel A4, coated |



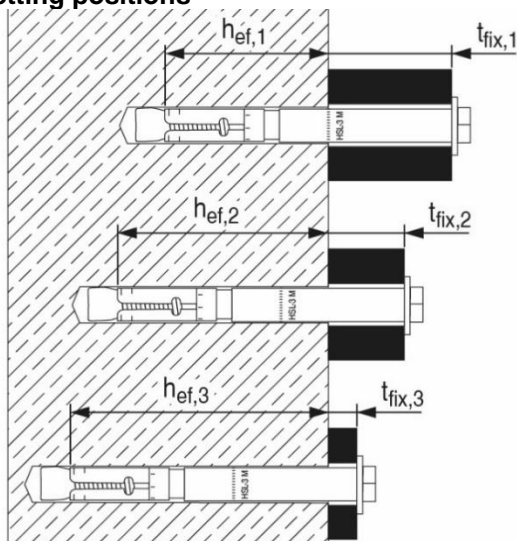
Anchor dimensions of HSL-3-R, HSL-3-GR, HSL-3-SKR

| Anchor version | Thread size | t_{fix} [mm] | | d_s [mm] | l_1 [mm] | l_2 [mm] | l_3 [mm] | l_4 [mm] | | p [mm] |
|----------------|-------------|----------------|-----|------------|------------|------------|------------|------------|-------|----------|
| | | min | max | | | | | min | max | |
| HSL-3-R | M8 | 5 | 200 | 11,9 | 12 | 32 | 15,2 | 34 | 54 | 2 |
| | M10 | 5 | 200 | 14,8 | 14 | 36 | 17,2 | 38 | 58 | 3 |
| | M12 | 5 | 200 | 17,6 | 17 | 40 | 20 | 48 | 73 | 3 |
| | M16 | 10 | 200 | 23,6 | 20 | 54,4 | 24,4 | 49,5 | 74,5 | 4 |
| | M20 | 10 | 200 | 27,6 | 20 | 57 | 31,5 | 71 | 101 | 4 |
| HSL-3-GR | M8 | 5 | 200 | 11,9 | 12 | 32 | 15,2 | 34 | 114 | 2 |
| | M10 | 5 | 200 | 14,8 | 14 | 36 | 17,2 | 38 | 118 | 3 |
| | M12 | 5 | 200 | 17,6 | 17 | 40 | 20 | 48 | 123 | 3 |
| | M16 | 10 | 200 | 23,6 | 20 | 54,4 | 24,4 | 49,5 | 124,5 | 4 |
| | M20 | 10 | 200 | 27,6 | 20 | 57 | 31,5 | 71 | 141 | 4 |
| HSL-3-SKR | M8 | 10 | 20 | 11,9 | 12 | 32 | 15,2 | 18,2 | 28,2 | 2 |
| | M10 | 20 | | 14,8 | 14 | 36 | 17,2 | 32,2 | | 3 |
| | M12 | 25 | | 17,6 | 17 | 40 | 20 | 40 | | 3 |



Setting information

Setting positions a)



Setting position ①

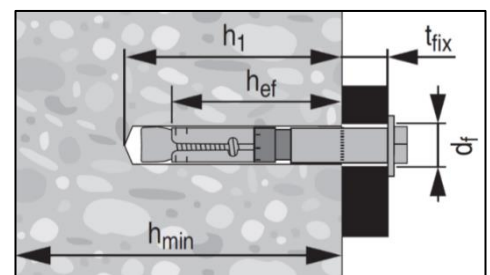
①

Setting position ②

②

Setting position ③

③



a) HSL-3-SKR can only be set in position 1.

Setting details for HSL-3-R

| Anchor version | | M8 | | | M10 | | | M12 | | |
|--|------------------|-----------------------------|-----|-----|--------|-----|-----|-------|-----|-----|
| Nominal diameter of drill bit | d_0 [mm] | 12 | | | 15 | | | 18 | | |
| Max. cutting diameter of drill bit | d_{cut} [mm] | 12,5 | | | 15,5 | | | 18,5 | | |
| Max. diameter of clearance hole in the fixture | d_f [mm] | 14 | | | 17 | | | 20 | | |
| Setting position | i | ① | ② | ③ | ① | ② | ③ | ① | ② | ③ |
| Fixture thickness | $t_{fix,1}$ [mm] | 5-200 | | | 5-200 | | | 5-200 | | |
| Effective fixture thickness | $t_{fix,i}$ | $t_{fix,1}^{1)} - \Delta i$ | | | | | | | | |
| Reduction of fixture thickness | Δi [mm] | 0 | 20 | 40 | 0 | 20 | 40 | 0 | 25 | 50 |
| Effective anchorage depth | $h_{ef,i}$ [mm] | 60 | 80 | 100 | 70 | 90 | 110 | 80 | 105 | 130 |
| Min. depth of drill hole | $h_{1,i}$ [mm] | 80 | 100 | 120 | 90 | 110 | 130 | 105 | 130 | 155 |
| Min. thickness of concrete member | $h_{min,i}$ [mm] | 120 | 170 | 195 | 140 | 195 | 215 | 160 | 225 | 250 |
| Width across flats | SW [mm] | 13 | | | 17 | | | 19 | | |
| Installation torque | T_{inst} [Nm] | 25 | | | 35 | | | 80 | | |
| Anchor version | | M16 | | | M20 | | | | | |
| Nominal diameter of drill bit | d_0 [mm] | 24 | | | 28 | | | | | |
| Max. cutting diameter of drill bit | d_{cut} [mm] | 24,55 | | | 28,55 | | | | | |
| Max. diameter of clearance hole in the fixture | d_f [mm] | 26 | | | 31 | | | | | |
| Setting position | i | ① | ② | ③ | ① | ② | ③ | | | |
| Fixture thickness | $t_{fix,1}$ [mm] | 10-200 | | | 10-200 | | | | | |
| Effective fixture thickness | $t_{fix,i}$ | $t_{fix,1}^{1)} - \Delta i$ | | | | | | | | |
| Reduction of fixture thickness | Δi [mm] | 0 | 25 | 50 | 0 | 30 | 60 | | | |
| Effective anchorage depth | $h_{ef,i}$ [mm] | 100 | 125 | 150 | 125 | 155 | 185 | | | |
| Min. depth of drill hole | $h_{1,i}$ [mm] | 125 | 150 | 175 | 155 | 185 | 215 | | | |
| Min. thickness of concrete member | $h_{min,i}$ [mm] | 200 | 275 | 300 | 250 | 380 | 410 | | | |
| Width across flats | SW [mm] | 24 | | | 30 | | | | | |
| Installation torque | T_{inst} [Nm] | 120 | | | 200 | | | | | |



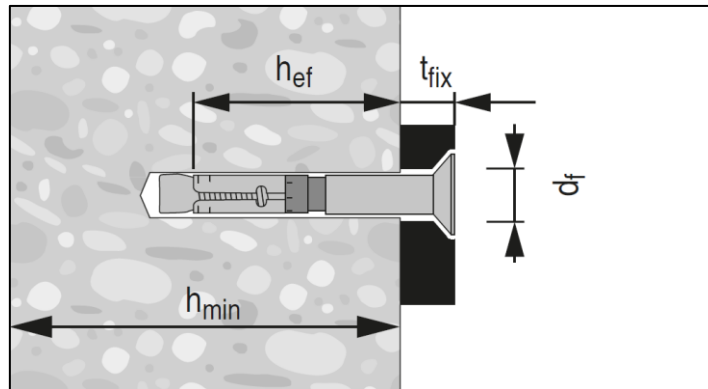
Setting details for HSL-3-GR

| Anchor version | | | | | M8 | | | M10 | | | M12 | | |
|--|--------------------|------|---------------------------------------|-----|-------------------------|--------|-----|-----|-------|-----|-----|--|--|
| Nominal diameter of drill bit | d ₀ | [mm] | 12 | | | 15 | | | 18 | | | | |
| Max. cutting diameter of drill bit | d _{cut} | [mm] | 12,5 | | | 15,5 | | | 18,5 | | | | |
| Max. diameter of clearance hole in the fixture | d _f | [mm] | 14 | | | 17 | | | 20 | | | | |
| Setting position | i | | ① | ② | ③ | ① | ② | ③ | ① | ② | ③ | | |
| Fixture thickness | t _{fix,1} | [mm] | 5-200 | | | 5-200 | | | 5-200 | | | | |
| Effective fixture thickness | t _{fix,i} | | t _{fix,1} ¹⁾ - Δi | | | | | | | | | | |
| Reduction of fixture thickness | Δi | [mm] | 0 | 20 | 40 | 0 | 20 | 40 | 0 | 25 | 50 | | |
| Effective anchorage depth | h _{ef,i} | [mm] | 60 | 80 | 100 | 70 | 90 | 110 | 80 | 105 | 130 | | |
| Min. depth of drill hole | h _{1,i} | [mm] | 80 | 100 | 120 | 90 | 110 | 130 | 105 | 130 | 155 | | |
| Min. thickness of concrete member | h _{min,i} | [mm] | 120 | 170 | 190 ^{a)} / 195 | 140 | 195 | 215 | 160 | 225 | 250 | | |
| Width across flats | SW | [mm] | 13 | | | 17 | | | 19 | | | | |
| Installation torque | T _{inst} | [Nm] | 30 | | | 50 | | | 80 | | | | |
| Anchor version | | M16 | | | M20 | | | | | | | | |
| Nominal diameter of drill bit | d ₀ | [mm] | 24 | | | 28 | | | | | | | |
| Max. cutting diameter of drill bit | d _{cut} | [mm] | 24,55 | | | 28,55 | | | | | | | |
| Max. diameter of clearance hole in the fixture | d _f | [mm] | 26 | | | 31 | | | | | | | |
| Setting position | i | | ① | ② | ③ | ① | ② | ③ | | | | | |
| Fixture thickness | t _{fix,1} | [mm] | 10-200 | | | 10-200 | | | | | | | |
| Effective fixture thickness | t _{fix,i} | | t _{fix,1} ¹⁾ - Δi | | | | | | | | | | |
| Reduction of fixture thickness | Δi | [mm] | 0 | 25 | 50 | 0 | 30 | 60 | | | | | |
| Effective anchorage depth | h _{ef,i} | [mm] | 100 | 125 | 150 | 125 | 155 | 185 | | | | | |
| Min. depth of drill hole | h _{1,i} | [mm] | 125 | 150 | 175 | 155 | 185 | 215 | | | | | |
| Min. thickness of concrete member | h _{min,i} | [mm] | 200 | 275 | 300 | 250 | 380 | 410 | | | | | |
| Width across flats | SW | [mm] | 24 | | | 30 | | | | | | | |
| Installation torque | T _{inst} | [Nm] | 120 | | | 200 | | | | | | | |

Setting details for HSL-3-SKR ^{a)}

| Anchor version | | | | | M8 | | | M10 | | | M12 | | |
|--|-------------------|------|---------|--|----|------|--|-----|------|--|-----|--|--|
| Nominal diameter of drill bit | d ₀ | [mm] | 12 | | | 15 | | | 18 | | | | |
| Max. cutting diameter of drill bit | d _{cut} | [mm] | 12,5 | | | 15,5 | | | 18,5 | | | | |
| Max. diameter of clearance hole in the fixture | d _f | [mm] | 14 | | | 17 | | | 20 | | | | |
| Top diameter of countersunk head in the fixture | d _h | [mm] | 22,5 | | | 25,5 | | | 32,9 | | | | |
| Bottom diameter of countersunk head in the fixture | d _h | [mm] | 11,4 | | | 14,4 | | | 17,4 | | | | |
| Height of the countersunk head in the fixture | h _{cs} | [mm] | 5,8 | | | 6,0 | | | 8,0 | | | | |
| Fixture thickness | t _{fix} | [mm] | 10 – 20 | | | 20 | | | 25 | | | | |
| Effective anchorage depth | h _{ef} | [mm] | 60 | | | 70 | | | 80 | | | | |
| Min. depth of drill hole | h ₁ | [mm] | 80 | | | 90 | | | 105 | | | | |
| Min. thickness of concrete member | h _{min} | [mm] | 120 | | | 140 | | | 160 | | | | |
| Width across flats | SW | [mm] | 5 | | | 6 | | | 8 | | | | |
| Installation torque | T _{inst} | [Nm] | 18 | | | 50 | | | 80 | | | | |

a) HSL-3-SKR can only be set in position 1.



Installation equipment

| Anchor size | M8 | M10 | M12 | M16 | M20 |
|------------------|--------------------------------------|-----|--------------|---------------|-----|
| Rotary hammer | TE 2 – TE 30 | | | TE 40 – TE 80 | |
| Hollow drill bit | - | | TE-CD, TE-YD | | |
| Other tools | blow out pump, hammer, torque wrench | | | | |

Setting parameters for HSL-3-R, HSL-3-GR, HSL-3-SKR

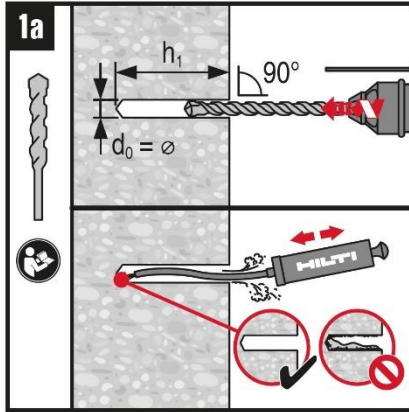
| Anchor size | | M8 | | | M10 | | | M12 | | | M14 | | | M20 | | |
|---------------------------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Setting position | i | ① | ② | ③ | ① | ② | ③ | ① | ② | ③ | ① | ② | ③ | ① | ② | ③ |
| Minimum base material thickness | h_{min} [mm] | 120 | 170 | 195 | 140 | 195 | 215 | 160 | 225 | 250 | 200 | 275 | 300 | 250 | 380 | 410 |
| Non-cracked concrete | | | | | | | | | | | | | | | | |
| Minimum spacing | s_{min} [mm] | 70 | | | 70 | | | 80 | | | 100 | | | 125 | | |
| | for $c \geq$ [mm] | 100 | | | 100 | | | 160 | | | 240 | | | 300 | | |
| Minimum edge distance | c_{min} [mm] | 70 | | | 80 | | | 80 | | | 100 | | | 150 | | |
| | for $s \geq$ [mm] | 140 | | | 160 | | | 240 | | | 240 | | | 300 | | |
| Cracked concrete | | | | | | | | | | | | | | | | |
| Minimum spacing | s_{min} [mm] | 70 | | | 70 | | | 80 | | | 100 | | | 125 | | |
| | for $c \geq$ [mm] | 100 | | | 100 | | | 170 | | | 240 | | | 300 | | |
| Minimum edge distance | c_{min} [mm] | 70 | | | 120 | | | 80 | | | 100 | | | 150 | | |
| | for $s \geq$ [mm] | 140 | | | 160 | | | 240 | | | 240 | | | 300 | | |



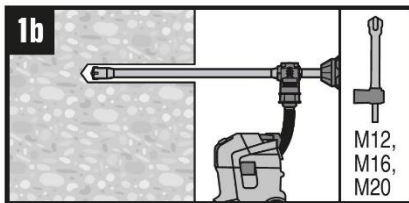
Setting instructions

*For detailed information on installation of each specific HSL-3-R/GR/SKR versions see instruction for use given with the package of the product.

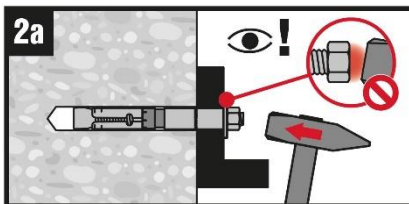
HSL-3-R / HSL-3-GR



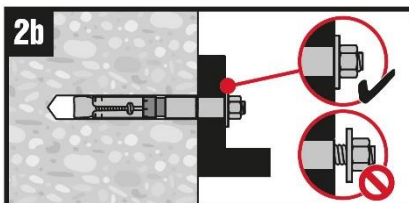
Hammer drilled hole
Drilling and cleaning



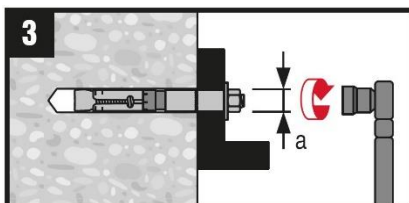
Hammer drilled hole with Hollow Drilled Bit (HDB)
No cleaning required



Insert the anchor with hammer

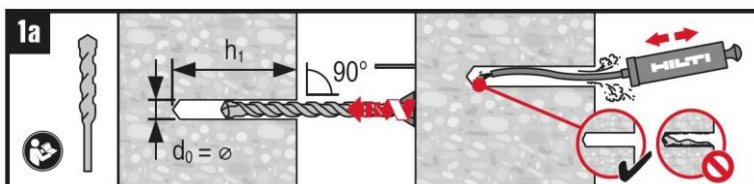


Check

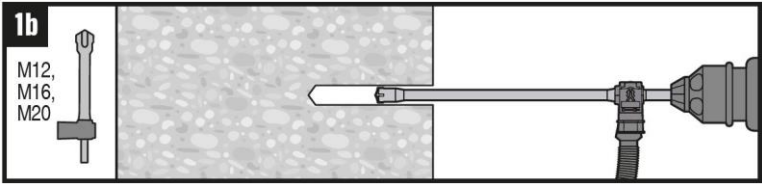


Applying tightening torque

HSL-3-SKR

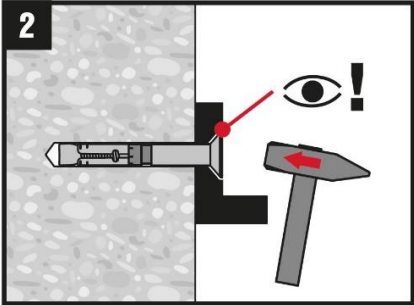


Hammer drilled hole
Drilling and cleaning

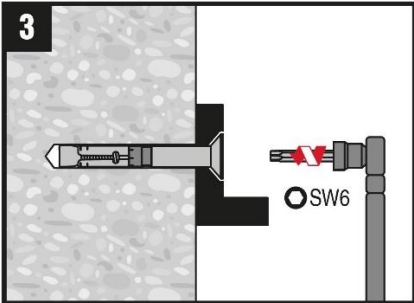


Hammer drilled hole with Hollow Drilled Bit (HDB)

No cleaning required



Insert the anchor with hammer



Applying tightening torque