



HSL-3-R EXPANSION ANCHOR

Technical Datasheet

Update: Oct-20





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 Anchor 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, $f_{ck,cube}=25$ N/mm²
- Values for Hollow drill-bits drilling only applicable for M12, M16 and M20.

Effective anchorage depth ^{a)}

Anchor size		M8			M10			M12		
Eff. Anchorage depth	h_{ef} [mm]	$h_{ef,1}^{b)}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}^{b)}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}^{b)}$	$h_{ef,2}$	$h_{ef,3}$
		60	80	100	70	90	110	80	105	130
Anchor size		M16			M20					
Eff. 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)}	[kN]	20,0	20,0	20,0	29,6	40,6	40,6	36,1	54,3	59,0
N_{Rk}	HSL-3-GR										
Shear	HSL-3-R / HSL-3-SKR ^{a)}	[kN]	44,4	44,4	44,4	59,2	62,7	62,7	72,3	81,4	81,4
V_{Rk}	HSL-3-GR										
Cracked concrete											
Tension	HSL-3-R / HSL-3-SKR ^{a)}	[kN]	12,0	12,0	12,0	16,0	16,0	16,0	25,8	24,0	24,0
N_{Rk}	HSL-3-GR										
Shear	HSL-3-R / HSL-3-SKR ^{a)}	[kN]	33,5	44,4	44,4	42,2	61,5	62,7	51,5	77,5	81,4
V_{Rk}	HSL-3-GR										
Anchor size		M16			M20						
Non-cracked concrete											
Tension	HSL-3-R	[kN]	50,5	65,0	65,0	70,6	95,0	95,0			
N_{Rk}	HSL-3-GR										
Shear	HSL-3-R	[kN]	101,0	128,2	128,2	141,2	145,2	145,2			
V_{Rk}	HSL-3-GR										
Anchor size		M16			M20						
Cracked concrete											
Tension	HSL-3-R	[kN]	36,0	36,0	36,0	50,3	50,0	50,0			
N_{Rk}	HSL-3-GR										
Shear	HSL-3-R	[kN]	72,0	100,6	128,2	100,6	138,9	145,2			
V_{Rk}	HSL-3-GR										

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

Effective anchorage depth ^{a)}

Anchor size		M8			M10			M12		
Eff. Anchorage depth	h_{ef} [mm]	$h_{ef,1}^{b)}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}^{b)}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}^{b)}$	$h_{ef,2}$	$h_{ef,3}$
		60	80	100	70	90	110	80	105	130
Anchor size		M16			M20					
Eff. 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.



Design resistance

Anchor size			M8			M10			M12		
Non-cracked concrete											
Tension N_{Rd}	HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR	[kN]	13,3	13,3	13,3	19,7	21,7	21,7	24,1	31,6	31,6
Shear V_{Rd}	HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR	[kN]	31,3	35,5	35,5	39,4	40,2	40,2	48,2	52,2	52,2
			31,3	32,2	32,2	39,4	47,1	48,2	63,0	63,0	67,3
Cracked concrete											
Tension N_{Rd}	HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR	[kN]	8,0	8,0	8,0	10,7	10,7	10,7	17,2	16,0	16,0
Shear V_{Rd}	HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR	[kN]	22,3	34,3	35,5	28,2	40,2	40,2	34,4	51,6	52,2
			22,3	32,2	32,2	28,1	41,0	47,1	34,3	51,6	63,0

Anchor size			M16			M20		
Non-cracked concrete								
Tension N_{Rd}	HSL-3-R HSL-3-GR	[kN]	33,7	43,3	43,3	47,1	63,3	63,3
Shear V_{Rd}	HSL-3-R HSL-3-GR	[kN]	67,3	82,2	82,2	93,1	93,1	93,1
			67,3	94,1	103,6	94,1	121,5	121,5
Cracked concrete								
Tension N_{Rd}	HSL-3-R HSL-3-GR	[kN]	24,0	24,0	24,0	33,5	33,3	33,3
Shear V_{Rd}	HSL-3-R HSL-3-GR	[kN]	48,0	67,1	82,2	67,1	92,6	93,1
			48,0	67,1	88,2	67,1	92,6	120,8

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

Effective anchorage depth ^{a)}

Anchor size			M8			M10			M12		
Eff. Anchorage depth	h_{ef}	[mm]	$h_{ef,1}^{b)}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}^{b)}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}^{b)}$	$h_{ef,2}$	$h_{ef,3}$
			60	80	100	70	90	110	80	105	130
Anchor size			M16			M20					
Eff. 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.

Recommended loads ^{b)}

Anchor size			M8			M10			M12		
Non-cracked concrete											
Tension N_{Rec}	HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR	[kN]	9,5	9,5	9,5	14,1	15,5	15,5	17,2	22,5	22,5
Shear V_{Rec}	HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR	[kN]	22,4	25,4	25,4	28,2	28,7	28,7	34,4	37,3	37,3
			22,4	23,0	23,0	28,2	33,7	33,7	34,4	45,0	45,0
Cracked concrete											
Tension N_{Rec}	HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR	[kN]	5,7	5,7	5,7	7,6	7,6	7,6	12,3	11,4	11,4
Shear V_{Rec}	HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR	[kN]	15,9	24,5	25,4	20,1	28,7	28,7	24,5	36,9	37,3
			15,9	23,0	23,0	20,1	29,3	33,7	24,5	36,9	45,0

Anchor size			M16			M20		
Non-cracked concrete								
Tension	HSL-3-R	[kN]	24,0	31,0	31,0	33,6	45,2	45,2
N_{Rd}	HSL-3-GR							
Shear	HSL-3-R	[kN]	48,1	58,7	58,7	66,5	66,5	66,5
V_{Rec}	HSL-3-GR			48,1	67,2	74,0	67,2	86,8
Cracked concrete								
Tension	HSL-3-R	[kN]	17,1	17,1	17,1	24,0	23,8	23,8
N_{Rd}	HSL-3-GR							
Shear	HSL-3-R	[kN]	34,3	47,9	58,7	47,9	66,2	66,5
V_{Rec}	HSL-3-GR			34,3	47,9	63,0	47,9	66,2

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 thy type of loading and shall be taken from national regulations.

Seismic 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, $f_{ck,cube}=25$ N/mm²
- $\alpha_{gap} = 0,5$
- Values for Hollow drill-bits drilling only applicable for M12, M16 and M20

Effective anchorage depth for seismic C1 ^{a)}

Anchor size			M8			M10			M12		
Eff. Anchorage depth	h_{ef}	[mm]	$h_{ef,1}^{b)}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}^{b)}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}^{b)}$	$h_{ef,2}$	$h_{ef,3}$
			60	80	100	70	90	110	80	105	130
Anchor size			M16			M20					
Eff. 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 in case of seismic category C1

Anchor size			M8			M10			M12		
Tension	HSL-3-R / HSL-3-SKR	[kN]	12,0	12,0	12,0	16,0	16,0	16,0	21,9	24,0	24,0
$N_{Rk,seis}$											
Shear	HSL-3-R / HSL-3-SKR	[kN]	5,2	5,2	5,2	12,9	12,9	12,9	14,0	14,0	14,0
$V_{Rk,seis}$											
Anchor size			M16			M20					
Tension	HSL-3-R / HSL-3-SKR	[kN]	30,6	36,0	36,0	42,8	50,0	50,0			
$N_{Rk,seis}$											
Shear	HSL-3-R / HSL-3-SKR	[kN]	29,6	29,6	29,6	29,6	29,6	29,6			
$V_{Rk,seis}$											

Design resistance in case of seismic category C1

Anchor size			M8			M10			M12		
Tension	HSL-3-R / HSL-3-SKR	[kN]	8,0	8,0	8,0	10,7	10,7	10,7	14,6	16,0	16,0
$N_{Rd,seis}$											
Shear	HSL-3-R / HSL-3-SKR	[kN]	4,2	4,2	4,2	8,3	8,3	8,3	9,0	9,0	9,0
$V_{Rd,seis}$											
Anchor size			M16			M20			M24		
Tension	HSL-3-R / HSL-3-SKR	[kN]	20,4	24,0	24,0	28,5	33,3	33,3	-	-	-
$N_{Rd,seis}$											
Shear	HSL-3-R / HSL-3-SKR	[kN]	19,0	19,0	19,0	19,0	19,0	19,0	-	-	-
$V_{Rd,seis}$											



Materials

Mechanical properties

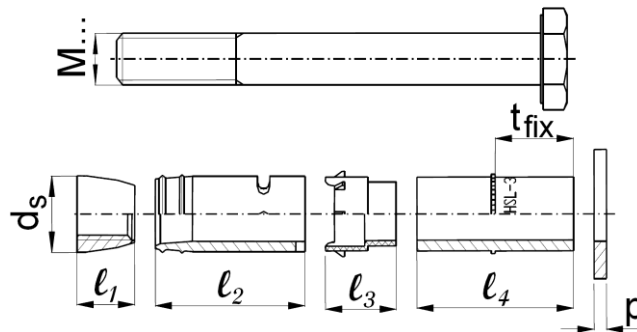
Anchor size	M8	M10	M12	M16	M20
HSL-3-R, HSL-3-GR, HSL-3-SKR					
Nominal tensile strength f_{uk} [N/mm ²]	700	700	700	700	700
Yield strength f_{yk} [N/mm ²]	HSL-3-R	560	450	450	450
	HSL-3-SKR	560	560	560	560
	HSL-3-GR	560	560	560	560
Stressed cross-section A_s [mm ²]	36,6	58,0	84,3	157	245
Moment of resistance W [mm ³]	31,3	62,5	109,4	277,1	540,6
Design bending resistance without sleeve $M_{Rd,s}$ [Nm]	16,8	33,5	58,8	149,4	291,3

Material quality

Part	Material	
Stainless Steel		
HSL-3-R	Cone	Stainless steel A4, coated
	Expansion sleeve	Stainless steel A4
HSL-3-GR	Collapsible element	Plastic element
HSL-3-SKR	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

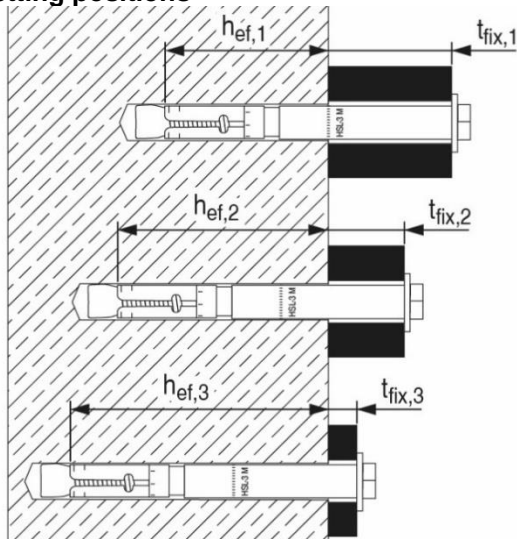
Anchor dimensions of HSL-3-R, HSL-3-GR, HSL-3-SKR

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

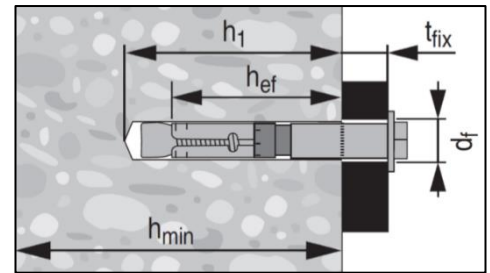
①

Setting position

②

Setting position

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_{fix1} [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					

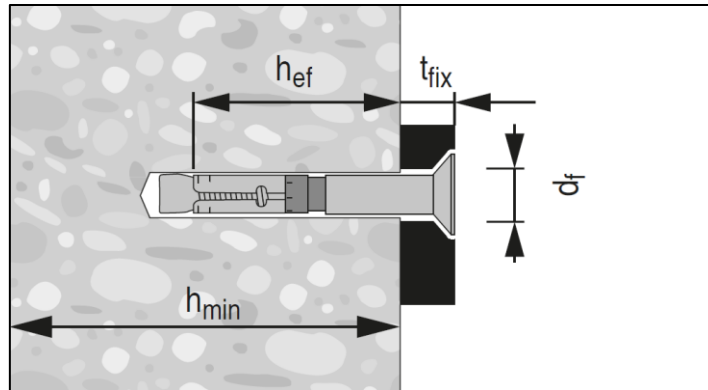
Setting details for HSL-3-GR

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 _{fix1}	[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				

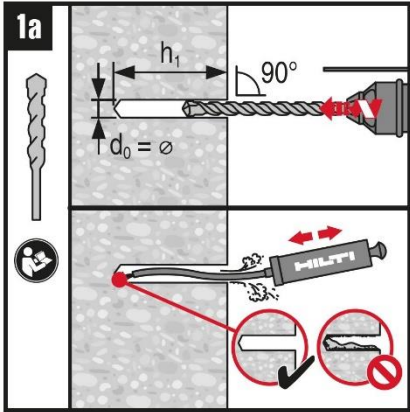
Setting parameters for HSL-3-R, HSL-3-GR, HSL-3-SKR

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		

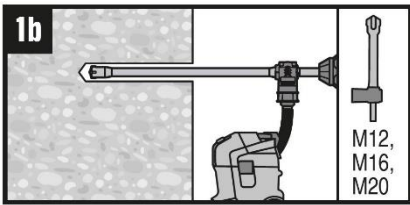
Setting instructions

*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.

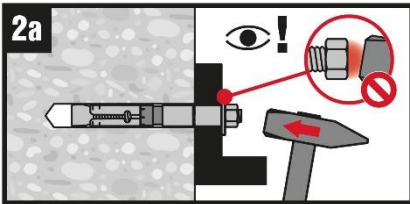
HSL-3-R / HSL-3-GR



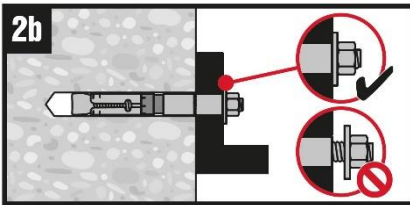
Hammer drilled hole
Drilling and cleaning



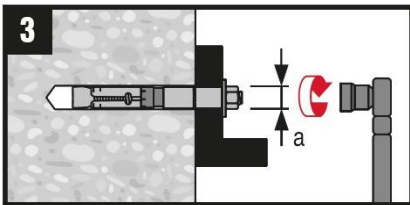
Hammer drilled hole with Hollow Drilled Bit (HDB)
No cleaning required



Insert the anchor with hammer

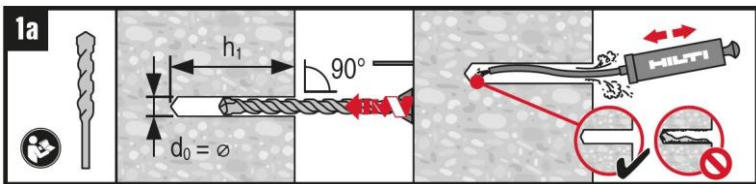


Check

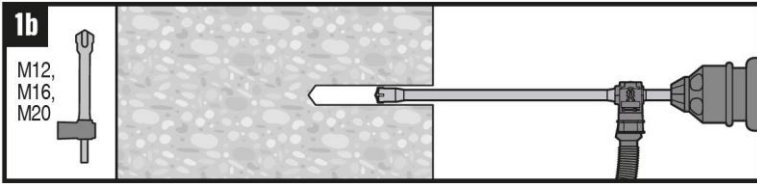


Applying tightening torque

HSL-3-SKR

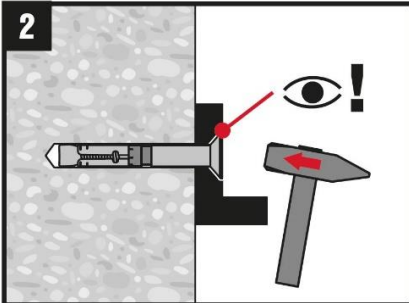


Hammer drilled hole
Drilling and cleaning

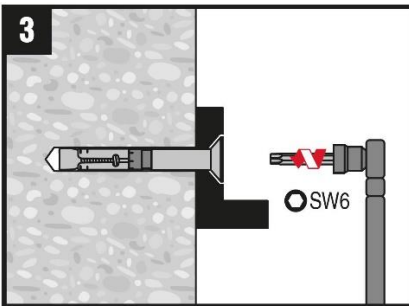


Hammer drilled hole with Hollow Drilled Bit (HDB)

No cleaning required



Insert the anchor with hammer



Applying tightening torque