HSL4
EXPANSION ANCHOR

Technical Datasheet

Update: Jun-21

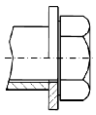
tracefast

http://hilti.to/traceable-fastener

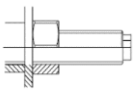
HSL4 expansion anchor

Ultimate-performance heavy-duty expansion anchor

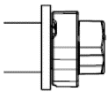
Anchor versions

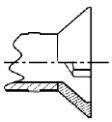
HSL4
Bolt version
(M8-M24)

HSL4-G
Threaded rod version
(M8-M24)

HSL4-B
Safety cap version
(M12-M24)

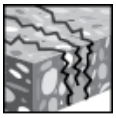
HSL4-SK
Countersunk version
(M8-M12)

Benefits

- Suitable for cracked concrete C20/25 to C50/60
- Suitable for seismic C1 and C2, shock, fire and fatigue
- Installation with hammer drilling, diamond drilling and hollow drill bit available for same performance
- Top shear performance due to high strength expansion and shear sleeves
- HSL4-B special safety cap ensures proper installation torque even without calibrated torque wrench
- Tracefast improves quality assurance of anchor installation by making every fastener uniquely identifiable and allowing easy documentation
- Easily removable for temporary and machine fastening applications or retrofit needs

Base material

Concrete (uncracked)

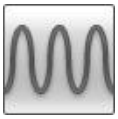


Concrete (cracked)

Load conditions

Static/ quasi-static

Seismic ETA-C1, C2

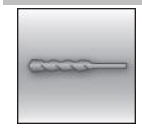


Fatigue ETA

Shock

Fire resistance ETA

Installation conditions



Hammer drilled holes

Diamond cored holes

Hollow drill bit drilling

Variable embedment depth

AT Tool

Tracefast

Other information

European Technical Assessment

CE conformity

Nuclear power plant approval

PROFIS Engineering Design Software

Approvals/certificates

Description	Authority / Laboratory	No. / Date of issue
European technical Assessment [a)]	CSTB, Marne-la-Vallèe	ETA-19/0556 / 2020-01-20
Fire test report	CSTB, Marne-la-Vallèe	ETA-19/0556 / 2020-01-20
European technical Assessment [b)]	CSTB, Marne-la-Vallèe	ETA-19/0858 / 2020-02-17
ICC-ES report incl. seismic [c)]	ICC evaluation service	ESR 4386 / 2020-03
Shock approval	Civil Protection of Switzerland	BZS D 19-601
ACI 349-01 nuclear suitability	Hilti, Inc. Plano, Texas	2021-01-19

a) All data for static or seismic load cases given in this section according to ETA-19/0556, issued 2020-01-20.
b) All data for fatigue relevant load cases given in this section according to ETA-19/0858, issued 2020-02-17.
c) 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_c = 20 N/mm²

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**			**M24**		
Eff. Anchorage depth	h_{ef}	[mm]	$h_{ef,1}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}$	$h_{ef,2}$	$h_{ef,3}$
			100	125	150	125	155	185	150	180	210

d) HSL4-SK only available in sizes M8-M12, HSL4-B only available in sizes M12-M24
e) HSL4-SK can only be set in position 1.

Characteristic resistance

Anchor size				M8			M10			M12		
Non-cracked concrete												
Tension N_{Rk}	HSL4 / HSL4-B HSL4-G HSL4-SK[a)]		[kN]	22,9	*29,3*	*29,3*	28,8	42,0	*46,4*	35,2	52,9	*67,4*
Shear V_{Rk}	HSL4 / HSL4-B		[kN]	*31,1*	*31,1*	*31,1*	*60,5*	*60,5*	*60,5*	*89,6*	*89,6*	*89,6*
	HSL4-G		[kN]	*26,1*	*26,1*	*26,1*	*41,8*	*41,8*	*41,8*	*59,3*	*59,3*	*59,3*
	HSL4-SK[a)]	t_{fix}	[mm]	≥11	-	-	≥11	-	-	≥13	-	-
		V_{Rk}	[kN]	*31,1*	-	-	*60,5*	-	-	*89,6*	-	-
		t_{fix}	[mm]	<11	-	-	<11	-	-	<13	-	-
		V_{RK}	[kN]	*14,6*	-	-	*23,2*	-	-	*33,7*	-	-
Cracked concrete												
Tension N_{Rk}	HSL4 / HSL4-B HSL4-G HSL4-SK[a)]		[kN]	12,0	12,0	12,0	16,0	16,0	16,0	24,6	24,0	24,0
Shear V_{Rk}	HSL4 / HSL4-B		[kN]	*31,1*	*31,1*	*31,1*	52,4	*60,5*	*60,5*	66,5	*89,6*	*89,6*
	HSL4-G		[kN]	*26,1*	*26,1*	*26,1*	*41,8*	*41,8*	*41,8*	*59,3*	*59,3*	*59,3*
	HSL4-SK[a)]	t_{fix}	[mm]	≥11	-	-	≥11	-	-	≥13	-	-
		V_{Rk}	[kN]	*31,1*	-	-	52,4	-	-	66,5	-	-
		t_{fix}	[mm]	<11	-	-	<11	-	-	<13	-	-
		V_{Rk}	[kN]	*14,6*	-	-	23,2	-	-	33,7	-	-
Anchor size				**M16**			**M20**			**M24**		
Non-cracked concrete												
Tension N_{Rk}	HSL4 / HSL4-B HSL4-G		[kN]	49,2	65,0	65,0	68,8	94,9	95,0	90,4	100	100
Shear V_{Rk}	HSL4 / HSL4-B		[kN]	138	*159*	*159*	*186*	*186*	*186*	*205*	*205*	*205*
	HSL4-G		[kN]	*121*	*121*	*121*	*155*	*155*	*155*	*205*	*205*	*205*
Cracked concrete												
Tension N_{Rk}	HSL4 / HSL4-B HSL4-G		[kN]	34,4	36,0	36,0	48,1	50,0	50,0	63,3	65,0	65,0
Shear V_{Rk}	HSL4 / HSL4-B		[kN]	96,4	135	*159*	183	*186*	*186*	202	*205*	*205*
	HSL4-G		[kN]	96,4	*121*	*121*	*155*	*155*	*155*	202	*205*	*205*

a) HSL4-SK can only be set in position 1.

Design resistance

Anchor size				M8			M10			M12		
Non-cracked concrete												
Tension N_{Rd}	HSL4 / HSL4-B HSL4-G HSL4-SK[a)]		[kN]	15,2	*19,5*	*19,5*	19,2	28,0	*30,9*	23,5	35,3	*45,0*
Shear V_{Rd}	HSL4 / HSL4-B		[kN]	*24,9*	*24,9*	*24,9*	*48,4*	*48,4*	*48,4*	63,4	*71,7*	*71,7*
	HSL4-G		[kN]	*20,9*	*20,9*	*20,9*	*33,4*	*33,4*	*33,4*	*47,4*	*47,4*	*47,4*
	HSL4-SK[a)]	t_{fix}	[mm]	≥11	-	-	≥11	-	-	≥13	-	-
		V_{Rd}	[kN]	*24,9*	-	-	*48,4*	-	-	63,4	-	-
		t_{fix}	[mm]	<11	-	-	<11	-	-	<13	-	-
		V_{Rd}	[kN]	*11,7*	-	-	*18,6*	-	-	*27,0*	-	-
Cracked concrete												
Tension N_{Rd}	HSL4 / HSL4-B HSL4-G HSL4-SK[a)]		[kN]	8,0	8,0	8,0	10,7	10,7	10,7	16,4	16,0	16,0
Shear V_{Rd}	HSL4 / HSL4-B		[kN]	20,1	*24,9*	*24,9*	35,0	*48,4*	*48,4*	44,4	66,7	*71,7*
	HSL4-G		[kN]	*20,9*	*20,9*	*20,9*	*33,4*	*33,4*	*33,4*	44,4	*47,4*	*47,4*
	HSL4-SK[a)]	t_{fix}	[mm]	≥11	-	-	≥11	-	-	≥13	-	-
		V_{Rd}	[kN]	20,1	-	-	35,0	-	-	44,4	-	-
		t_{fix}	[mm]	<11	-	-	<11	-	-	<13	-	-
		V_{Rd}	[kN]	*11,7*	-	-	*18,6*	-	-	27,0	-	-
Anchor size				**M16**			**M20**			**M24**		
Non-cracked concrete												
Tension N_{Rd}	HSL4 / HSL4-B HSL4-G		[kN]	32,8	43,3	43,3	45,8	63,3	63,3	60,2	66,7	66,7
Shear V_{Rd}	HSL4 / HSL4-B		[kN]	91,8	*127*	*127*	*149*	*149*	*149*	*164*	*164*	*164*
	HSL4-G		[kN]	91,8	*96,5*	*96,5*	*124*	*124*	*124*	*164*	*164*	*164*
Cracked concrete												
Tension N_{Rd}	HSL4 / HSL4-B HSL4-G		[kN]	23,0	24,0	24,0	32,1	33,3	33,3	42,2	43,3	43,3
Shear V_{Rd}	HSL4 / HSL4-B		[kN]	64,3	89,8	118	122	*149*	*149*	135	*164*	*164*
	HSL4-G		[kN]	64,3	89,8	*96,5*	122	*124*	*124*	135	116	146

a) HSL4-SK can only be set in position 1

Recommended loads [b)]

Anchor size				M8			M10			M12		
Non-cracked concrete												
Tension N_{Rec}	HSL4 / HSL4-B HSL4-G HSL4-SK[a)]		[kN]	10,9	*13,9*	*13,9*	13,7	20,0	*22,1*	16,8	25,2	*32,1*
Shear V_{Rec}	HSL4 / HSL4-B		[kN]	*17,8*	*17,8*	*17,8*	*34,6*	*34,6*	*34,6*	45,3	*51,2*	*51,2*
	HSL4-G		[kN]	*14,9*	*14,9*	*14,9*	*23,9*	*23,9*	*23,9*	*33,9*	*33,9*	*33,9*
	HSL4-SK[a)]	t_{fix}	[mm]	≥11	-	-	≥11	-	-	≥13	-	-
		V_{Rec}	[kN]	*17,8*	-	-	*34,6*	-	-	45,3	-	-
		t_{fix}	[mm]	<11	-	-	<11	-	-	<13	-	-
		V_{Rec}	[kN]	*8,3*	-	-	*13,3*	-	-	*19,3*	-	-
Cracked concrete												
Tension N_{Rec}	HSL4 / HSL4-B HSL4-G HSL4-SK[a)]		[kN]	5,7	5,7	5,7	7,6	7,6	7,6	11,7	11,4	11,4
Shear V_{Rec}	HSL4 / HSL4-B		[kN]	*17,8*	*17,8*	*17,8*	25,0	*34,6*	*34,6*	31,7	47,6	*51,2*
	HSL4-G		[kN]	*14,9*	*14,9*	*14,9*	*23,9*	*23,9*	*23,9*	31,7	*33,9*	*33,9*
	HSL4-SK[a)]	t_{fix}	[mm]	≥11	-	-	≥11	-	-	≥13	-	-
		V_{Rec}	[kN]	*17,8*	-	-	25,0	-	-	31,7	-	-
		t_{fix}	[mm]	<11	-	-	<11	-	-	<13	-	-
		V_{Rec}	[kN]	*8,3*	-	-	*13,3*	-	-	*19,3*	-	-
Anchor size				**M16**			**M20**			**M24**		
Non-cracked concrete												
Tension N_{Rec}	HSL4 / HSL4-B HSL4-G		[kN]	23,4	31,0	31,0	32,7	45,2	45,2	43,0	47,6	47,6
Shear V_{Rec}	HSL4 / HSL4-B		[kN]	65,6	*90,6*	*90,6*	*106*	*106*	*106*	*117*	*117*	*117*
	HSL4-G		[kN]	65,6	*68,9*	*68,9*	*88,7*	*88,7*	*88,7*	*117*	*117*	*117*
Cracked concrete												
Tension N_{Rec}	HSL4 / HSL4-B HSL4-G		[kN]	16,4	17,1	17,1	22,9	23,8	23,8	30,1	31,0	31,0
Shear V_{Rec}	HSL4 / HSL4-B		[kN]	45,9	64,2	84,3	87,1	*106*	*106*	96,4	*117*	*117*
	HSL4-G		[kN]	45,9	64,2	*68.9*	87,1	*88,7*	*88,7*	96,4	*117*	*117*

a) HSL4-SK only available in sizes M8-M12, HSL4-B only available in sizes M12-M24

b) With overall partial safety factor for action γ = 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_c = 20 N/mm²
- α_{gap} = 0,5

Effective anchorage depth for seismic C2 a)

Anchor size			M10			M12					
Eff. Anchorage depth	h_{ef}	[mm]	$h_{ef,1}$ b)	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}$ b)	$h_{ef,2}$	$h_{ef,3}$			
			70	90	110	80	105	130			
Anchor size			**M16**			**M20**			**M24**		
Eff. Anchorage depth	h_{ef}	[mm]	$h_{ef,1}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}$	$h_{ef,2}$	$h_{ef,3}$
			100	125	150	125	155	185	150	180	210

a) HSL4-SK only available in sizes M8-M12, HSL4-B only available in sizes M12-M24
b) HSL4-SK can only be set in position 1.

Characteristic resistance in case of seismic category C2

Anchor size				M10			M12					
Tension $N_{Rk,seis}$	HSL4 / HSL4-B HSL4-G		[kN]	12,2	12,2	12,2	20,9	25,8	25,8			
	HSL4-SK			12,2	-	-	20,9	-	-			
Shear $V_{Rk,seis}$	HSL4 / HSL4-B		[kN]	*12,7*	*12,7*	*12,7*	*15,3*	*15,3*	*15,3*			
	HSL4-G			*11,3*	*11,3*	*11,3*	*11,3*	*11,3*	*11,3*			
	HSL4-SK	t_{fix}	[mm]	≥11	-	-	≥13	-	-			
		$V_{Rk,seis}$	[kN]	*12,7*	-	-	*15,3*	-	-			
Anchor size				**M16**			**M20**			**M24**		
Tension $N_{Rk,seis}$	HSL4 / HSL4-B HSL4-G		[kN]	29,3	34,2	34,2	40,1	40,1	40,1	45,9	45,9	45,9
Shear $V_{Rk,seis}$	HSL4 / HSL4-B		[kN]	*30,9*	*30,9*	*30,9*	*39,1*	*39,1*	*39,1*	*44,0*	*44,0*	*44,0*
	HSL4-G			*22,3*	*22,3*	*22,3*	*25,1*	*25,1*	*25,1*	*38,9*	*38,9*	*38,9*

Design resistance in case of seismic category C2

Anchor size				M10			M12					
Tension $N_{Rd,seis}$	HSL4 / HSL4-B HSL4-G		[kN]	8,1	8,1	8,1	14,0	17,2	17,2			
	HSL4-SK			8,1	-	-	14,0	-	-			
Shear $V_{Rd,seis}$	HSL4 / HSL4-B		[kN]	*10,2*	*10,2*	*10,2*	*12,2*	*12,2*	*12,2*			
	HSL4-G			*9,0*	*9,0*	*9,0*	*9,0*	*9,0*	*9,0*			
	HSL4-SK	t_{fix}	[mm]	≥11	-	-	≥13	-	-			
		$V_{Rd,seis}$	[kN]	*10,2*	-	-	*12,2*	-	-			
Anchor size				**M16**			**M20**			**M24**		
Tension $N_{Rd,seis}$	HSL4 / HSL4-B HSL4-G		[kN]	19,5	22,8	22,8	26,7	26,7	26,7	30,6	30,6	30,6
Shear $V_{Rd,seis}$	HSL4 / HSL4-B		[kN]	*24,7*	*24,7*	*24,7*	*31,2*	*31,2*	*31,2*	*35,2*	*35,2*	*35,2*
	HSL4-G			*17,8*	*17,8*	*17,8*	*20,1*	*20,1*	*20,1*	*31,1*	*31,1*	*31,1*

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**			**M24**		
Eff. Anchorage depth	h_{ef}	[mm]	$h_{ef,1}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}$	$h_{ef,2}$	$h_{ef,3}$	$h_{ef,1}$	$h_{ef,2}$	$h_{ef,3}$
			100	125	150	125	155	185	150	180	210

a) HSL4-SK only available in sizes M8-M12, HSL4-B only available in sizes M12-M24
b) HSL4-SK can only be set in position 1.

Characteristic resistance in case of seismic category C1

Anchor size				M8			M10			M12		
Tension $N_{Rk,seis}$	HSL4 / HSL4-B HSL4-G		[kN]	12,0	12,0	12,0	16,0	16,0	16,0	20,9	24,0	24,0
	HSL4-SK			12,0	-	-	16,0	-	-	21,9	-	-
Shear $V_{Rk,seis}$	HSL4 / HSL4-B		[kN]	*8,9*	*8,9*	*8,9*	*22,1*	*22,1*	*22,1*	28,3	*29,1*	*29,1*
	HSL4-G			*7,5*	*7,5*	*7,5*	*15,3*	*15,3*	*15,3*	*19,3*	*19,3*	*19,3*
	HSL4-SK [a]	t_{fix}	[mm]	≥11	-	-	≥11	-	-	≥13	-	-
		$V_{Rk,seis}$	[kN]	*8,9*	-	-	*22,1*	-	-	28,3	-	-
Anchor size				**M16**			**M20**			**M24**		
Tension $N_{Rk,seis}$	HSL4 / HSL4-B HSL4-G		[kN]	29,3	36,0	36,0	40,9	50,0	50,0	53,8	65,0	65,0
Shear $V_{Rk,seis}$	HSL4 / HSL4-B		[kN]	41,0	*57,1*	*57,1*	*54,9*	*54,9*	*54,9*	*81,8*	*81,8*	*81,8*
	HSL4-G			41,0	*43,4*	*43,4*	*45,8*	*45,8*	*45,8*	-	-	-

Design resistance in case of seismic category C1

Anchor size				M8			M10			M12		
Tension $N_{Rd,seis}$	HSL4 / HSL4-B HSL4-G		[kN]	8,0	8,0	8,0	10,7	10,7	10,7	14,0	16,0	16,0
	HSL4-SK			8,0	-	-	10,7	-	-	14,0	-	-
Shear $V_{Rd,seis}$	HSL4 / HSL4-B		[kN]	*7,1*	*7,1*	*7,1*	14,9	*17,7*	*17,7*	18,8	*23,3*	*23,3*
	HSL4-G			*6,0*	*6,0*	*6,0*	*12,2*	*12,2*	*12,2*	*15,4*	*15,4*	*15,4*
	HSL4-SK [a]	t_{fix}	[mm]	≥11	-	-	≥11	-	-	≥13	-	-
		$V_{Rk,seis}$	[kN]	*7,1*	-	-	14,9	-	-	18,8	-	-
Anchor size				**M16**			**M20**			**M24**		
Tension $N_{Rd,seis}$	HSL4 / HSL4-B HSL4-G		[kN]	19,5	24,0	24,0	27,3	33,3	33,3	35,8	43,3	43,3
Shear $V_{Rd,seis}$	HSL4 / HSL4-B		[kN]	27,3	38,2	*45,6*	*43,9*	*43,9*	*43,9*	57,4	*65,4*	*65,4*
	HSL4-G			27,3	*34,7*	*34,7*	*36,6*	*36,6*	*36,6*	-	-	-

Fatigue resistance

All data in this section applies to:

- Correct setting using Hilti seismic filling set (See setting instruction)
- No edge distance and spacing influence
- Minimum base material thickness
- Concrete C 20/25, f_c = 20 N/mm²
- Only applicable to HSL4-G version

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

Characteristic resistance under tension, shear and combined fatigue load in concrete

Anchor size			M16			M20		
Tension fatigue load								
Steel failure								
Characteristic resistance	$\Delta N_{Rk,s,0,\infty}$	[kN]	8,3			12,0		
Partial factor	$\gamma_{Ms,N,fat}$	[-]	1,35					
Concrete failure								
Effective anchorage depth	$h_{ef,i}$	[mm]	100	125	150	125	155	185
Characteristic resistance	$\Delta N_{Rk,c,0,\infty}$	[kN]	0,5 $N_{Rk,c}$[1)]					
Characteristic resistance	$\Delta N_{Rk,p,0,\infty}$	[kN]	0,4 $N_{Rk,p}$[2)]					
Characteristic resistance	$\Delta N_{Rk,sp,0,\infty}$	[kN]	0,5 $N_{Rk,sp}$[3)]					
Characteristic resistance	$\Delta N_{Rk,cb,0,\infty}$	[kN]	0,5 $N_{Rk,cb}$[4)]					
Partial factor	$\gamma_{Mc,fat}$	[-]	1,5					
Load transfer factor for fastener group	ψ_{FN}	[-]	0,5					
Shear fatigue load								
Steel failure								
Characteristic resistance	$\Delta V_{Rk,s,0,\infty}$	[kN]	8,0			10,0		
Partial factor	$\gamma_{Ms,V,fat}$	[-]	1,35					
Concrete failure								
Effective length of fastener	$l_f = h_{ef}$	[mm]	100	125	150	125	155	185
Diameter of anchor	d_{nom}	[mm]	24			28		
Characteristic resistance	$\Delta V_{Rk,c,0,\infty}$	[-]	0,5 $V_{Rk,c}$[5)]					
Characteristic resistance	$\Delta V_{Rk,cp,0,\infty}$	[-]	0,5 $V_{Rk,cp}$[6)]					
Partial factor	$\gamma_{Mc,fat}$	[-]	1,5					
Load transfer factor for fastener group	ψ_{FV}	[-]	0,5					
Combined fatigue load								
Exponent for combined fatigue load	α_{sn}	[-]	0,7					
	α_c	[-]	1,5					

[1) 2) 3) 4)] $N_{Rk,c}$, $N_{Rk,p}$, $N_{Rk,sp}$ and $N_{Rk,cb}$ according to ETA-19/0556.

[5) 6)] $V_{Rk,c}$ and $V_{Rk,cp}$ according to ETA-19/0556.

Materials

Mechanical properties [a)]

Anchor size		M8	M10	M12	M16	M20	M24
HSL4, HSL4-G, HSL4-B, HSL4-SK							
Nominal tensile strength f_{uk}	[N/mm²]	800	800	800	800	800	800
Yield strength f_{yk}	[N/mm²]	640	640	640	640	640	640
Stressed cross-section A_s	[mm²]	36,6	58,0	84,3	157	245	353
Moment of resistance W	[mm³]	31,3	62,5	109	277	541	935
Design bending resistance without sleeve $M_{Rd,s}$	[Nm]	24,0	48,0	84,0	213	415	718

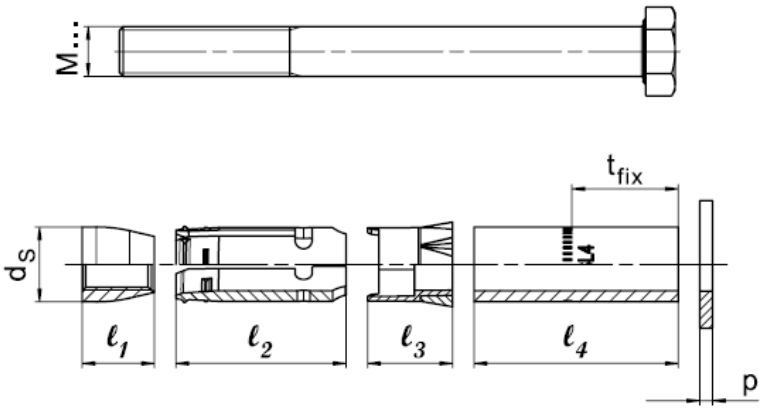
a) HSL4-SK only available in sizes M8-M12, HSL4-B only available in sizes M12-M24

Material quality

Part		Material
Carbon Steel		
HSL4 HSL4-G HSL4-B HSL4-SK	Cone	Carbon steel, galvanized to ≥ 5 µm
	Expansion sleeve	Carbon steel, galvanized to ≥ 5 µm
	Collapsible element	POM + TPE Plastic element
	Distance sleeve	Carbon steel, galvanized to ≥ 5 µm
HSL4	Washer	Carbon steel, galvanized to ≥ 5 µm
	Hexagonal bolt	Carbon steel, galvanized to ≥ 5 µm, rupture elongation ≥ 12%
HSL4-G	Hexagonal nut	Carbon steel, galvanized to ≥ 5 µm
	Threaded rod	Carbon steel, galvanized to ≥ 5 µm, rupture elongation ≥ 12%
HSL4-B	Hexagonal bolt with safety cap	Carbon steel, galvanized to ≥ 5 µm, rupture elongation ≥ 12%
HSL4-SK	Countersunk bolt	Carbon steel, galvanized to ≥ 5 µm, rupture elongation ≥ 12%
	Cup washer	Carbon steel, galvanized to ≥ 5 µm

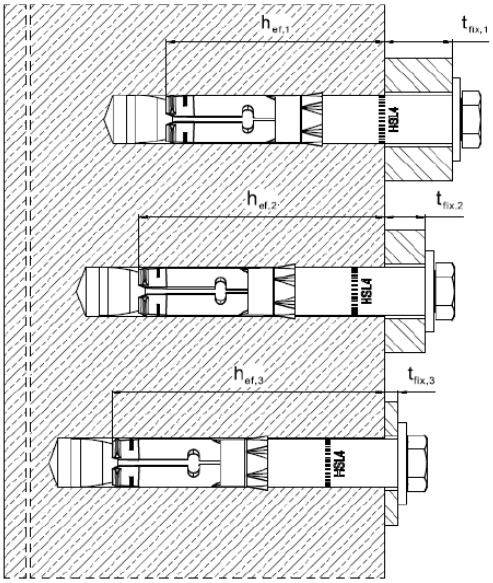
Anchor dimensions of HSL4, HSL4-G, HSL4-B, HSL4-SK

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	
HSL4 HSL4-G	M8	5	200	11,9	12	32	15,2	19	214	2
	M10	5	200	14,8	14	36	17,2	23	218	3
HSL4 HSL4-G HSL4-B	M12	5	200	17,6	17	40	20	28	223	3
	M16	10	200	23,6	20	54,4	24,4	34,5	224,5	4
	M20	10	200	27,6	20	57	31,5	51	241	4
	M24	10	200	31,6	22	65	39	57	247	4
HSL4-SK	M8	6	20	11,9	12	32	15,2	18,2	28,2	2
	M10	6	20	14,8	14	36	17,2	32,2		3
	M12	8	25	17,6	17	40	20	40		3



Setting information

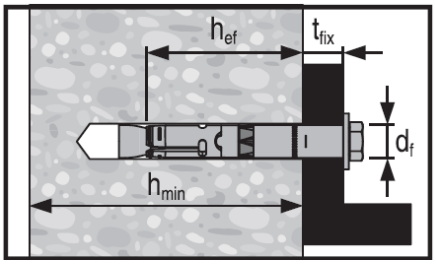
Setting positions [a)]



Setting position ①

Setting position ②

Setting position ③

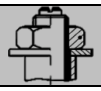


a) HSL4-SK can only be set in position 1.

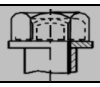
Setting details for HSL4

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	140	195	215	160	225	250
Width across flats	SW	[mm]	13			17			19		
Installation torque	T_{inst}	[Nm]	15			25			60		
Anchor version			**M16**			**M20**			**M24**		
Nominal diameter of drill bit	d_0	[mm]	24			28			32		
Max. cutting diameter of drill bit	d_{cut}	[mm]	24,55			28,55			32,7		
Max. diameter of clearance hole in the fixture	d_f	[mm]	26			31			35		
Setting position	i		①	②	③	①	②	③	①	②	③
Fixture thickness	t_{fix1}	[mm]	10-200			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	0	30	60
Effective anchorage depth	$h_{ef,i}$	[mm]	100	125	150	125	155	185	150	180	210
Min. depth of drill hole	$h_{1,i}$	[mm]	125	150	175	155	185	215	180	210	240
Min. thickness of concrete member	$h_{min,i}$	[mm]	200	275	300	250	380	410	300	405	435
Width across flats	SW	[mm]	24			30			36		
Installation torque	T_{inst}	[Nm]	75			145			210		

Setting details for HSL4-G

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	140	195	215	160	225	250
Width across flats	SW	[mm]	13			17			19		
Installation torque	T_{inst}	[Nm]	20			27			60		
Anchor version			**M16**			**M20**			**M24**		
Nominal diameter of drill bit	d_0	[mm]	24			28			32		
Max. cutting diameter of drill bit	d_{cut}	[mm]	24,55			28,55			32,7		
Max. diameter of clearance hole in the fixture	d_f	[mm]	26			31			35		
Setting position	i		①	②	③	①	②	③	①	②	③
Fixture thickness	t_{fix1}	[mm]	10-200			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	0	30	60
Effective anchorage depth	$h_{ef,i}$	[mm]	100	125	150	125	155	185	150	180	210
Min. depth of drill hole	$h_{1,i}$	[mm]	125	150	175	155	185	215	180	210	240
Min. thickness of concrete member	$h_{min,i}$	[mm]	200	275	300	250	380	410	300	405	435
Width across flats	SW	[mm]	24			30			36		
Installation torque	T_{inst}	[Nm]	70			105			180		

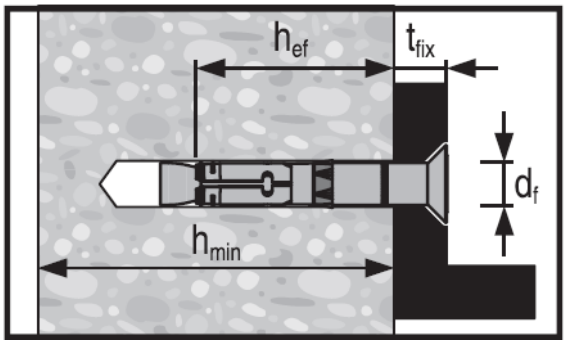
Setting details for HSL4-B

Anchor version			M12			M16			M20			M24		
Nominal diameter of drill bit	d_0	[mm]	18			24			28			32		
Max. cutting diameter of drill bit	d_{cut}	[mm]	18,5			24,55			28,55			32,7		
Max. diameter of clearance hole in the fixture	d_f	[mm]	20			26			31			35		
Setting position	i		①	②	③	①	②	③	①	②	③	①	②	③
Fixture thickness	$t_{fix,1}$	[mm]	5 - 200			10 - 200			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	25	50	0	30	60	0	30	60
Effective anchorage depth	$h_{ef,i}$	[mm]	80	105	130	100	125	150	125	155	185	150	180	210
Min. depth of drill hole	$h_{1,i}$	[mm]	105	130	155	125	150	175	155	185	215	180	210	240
Min. thickness of concrete member	$h_{min,i}$	[mm]	160	225	250	200	275	300	250	380	410	300	405	435
Width across flats	SW	[mm]	24			30			36			41		
Installation torque	T_{inst}	[Nm]	The torque moment is controlled by the safety cap											

Setting details for HSL4-SK [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	5,8	8,0
Min. Fixture thickness	$t_{fix,min}$ [b)]	[mm]	6	6	8
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]	20	32	65

a) HSL4-SK can only be set in position 1.
b) The influence of the thickness of fixture to the characteristic resistance for shear loads, steel failure without lever arm is taken into account



Installation equipment

Anchor size	M8	M10	M12	M16	M20	M24
Rotary hammer	TE 2 – TE 30			TE 40 – TE 80		
Diamond coring	DD 30-W or DD-EC-1 + SPX-T DD 110 / 150 + SPX-L handheld		DD 30-W or DD-EC-1 + SPX-T DD 110 / 150 + SPX-L handheld DD 120 / 160 / 150 + SPX-L		DD 30-W or DD-EC-1 + SPX-T DD 110 / 150 + SPX-L handheld DD 120 / 160 / 150 / 200 / 250 + SPX-L	
Other tools	blow out pump, hammer, torque wrench [1)]					

1) HSL4-B only requires a regular wrench as it automatically ensures correct torque is applied.

Setting parameters for HSL4, HSL4-G, HSL4-B, HSL4-SK [a)]

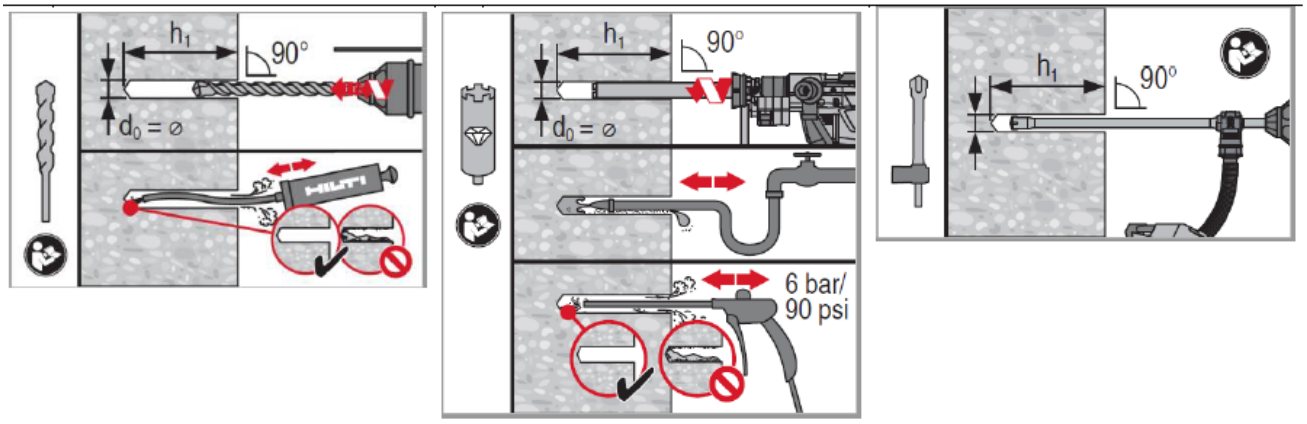
Anchor size			**M8**			**M10**			**M12**		
Setting position [b)]	i		①	②	③	①	②	③	①	②	③
Minimum base material thickness	h_{min}	[mm]	120	170	190	140	195	215	160	225	250
Uncracked concrete											
Minimum spacing	s_{min}	[mm]	60			70			80		
	for c ≥	[mm]	100			100			160		
Minimum edge distance	c_{min}	[mm]	60			70			80		
	for s ≥	[mm]	100			160			240		
Cracked concrete											
Minimum spacing	s_{min}	[mm]	50			70			70		
	for c ≥	[mm]	80			100			140		
Minimum edge distance	c_{min}	[mm]	60			70			70		
	for s ≥	[mm]	80			120			160		
Anchor size			**M16**			**M20**			**M24**		
Setting position	i		①	②	③	①	②	③	①	②	③
Minimum base material thickness	h_{min}	[mm]	200	275	300	250	380	410	300	405	435
Uncracked concrete											
Minimum spacing	s_{min}	[mm]	100			125			150		
	for c ≥	[mm]	240			300			300		
Minimum edge distance	c_{min}	[mm]	100			150			150		
	for s ≥	[mm]	240			300			300		
Cracked concrete											
Minimum spacing	s_{min}	[mm]	80			120			120		
	for c ≥	[mm]	180			220			260		
Minimum edge distance	c_{min}	[mm]	100			120			120		
	for s ≥	[mm]	200			220			280		

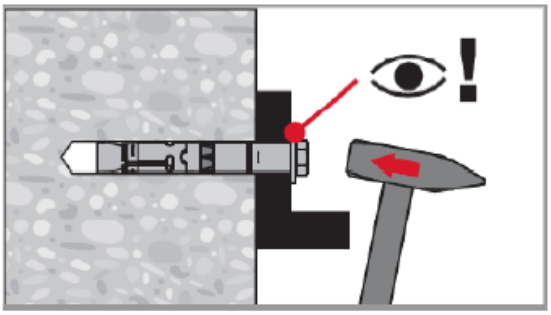
a) HSL4-SK only available in sizes M8-M12, HSL4-B only available in sizes M12-M24
b) HSL4-SK can only be set in position 1.

Setting instructions

***For detailed information on installation of each specific HSL4 version, see instruction for use given with the package of the product.**

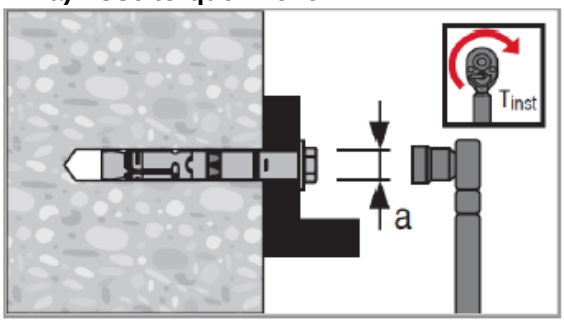
Setting instruction
Hole drilling and cleaning
a) Hammer drilling (HD) with manual cleaning (MC): b) Diamond coring (DD) with flushing and blowing c) Hammer drilling (HD) with hollow dril bit (HDB)
Anchor setting
Hammer setting, check setting



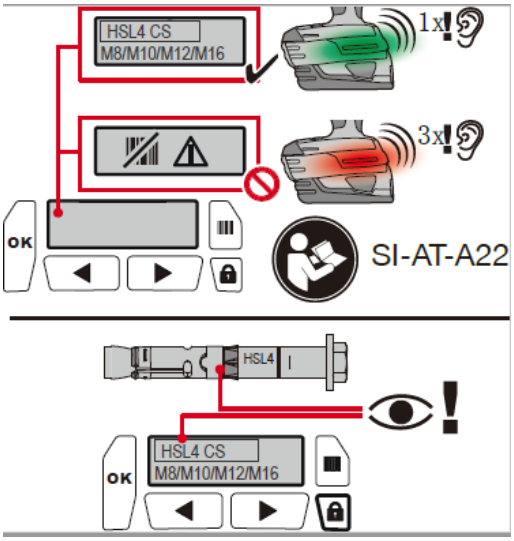


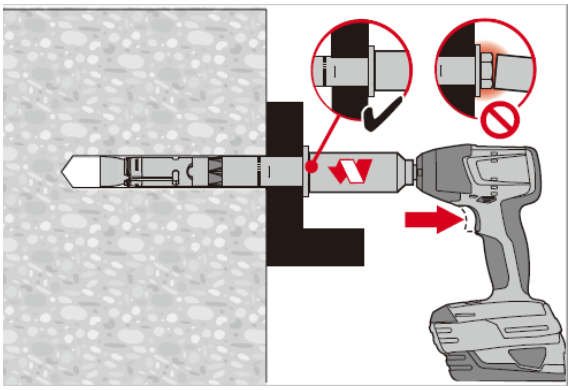
Anchor torqueing for HSL4, HSL4-G, HSL-4-SK	HSL4-B Safety cap

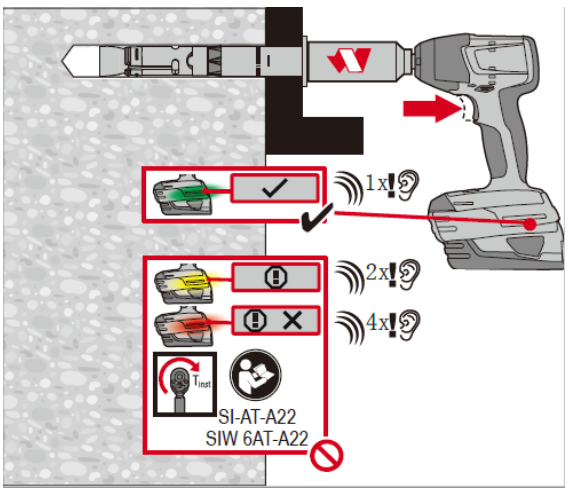
a) Use torque wrench

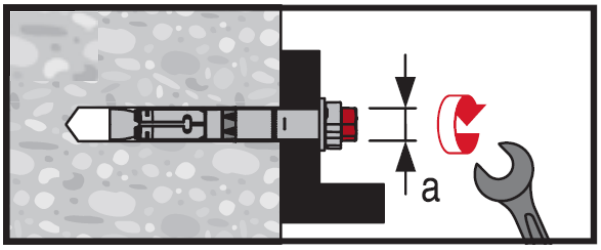


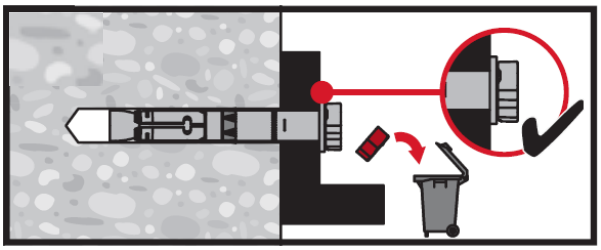
b) Machine torqueing: Only HSL4 and HSL4-G M8 to M16.







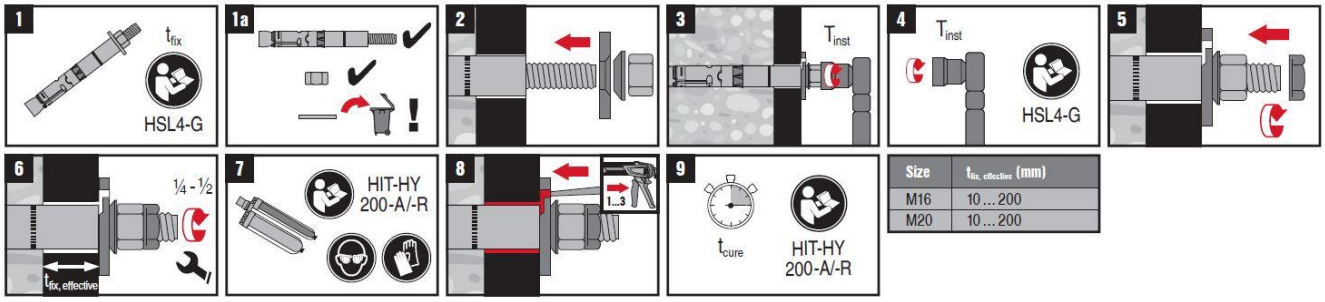




Setting instructions

***For detailed information on installation of HSL4-G version, see instruction for use given with the package of the product.**

Installation instructions for the filling set
HSL4-G



Size	$t_{fix, effective}$ (mm)
M16	10 ... 200
M20	10 ... 200