



HSL-3 / HSL-3-R EXPANSION ANCHOR

Technical Datasheet

Update: Oct-18





HSL-3 / 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 and C2^{a)}, shock and fatigue - Can be installed with hammer or diamond drilling for same performance - Top shear performance due to high strength expansion and shear sleeves - Automatic torque control with HSL-3-B - Length can be customized to a specific project need - Easily removable for temporary fastening or retrofit

a) Condition valid only for HSL-3 carbon steel version

Base material		Load conditions				
Concrete (non-cracked)	Concrete (cracked)	Static/ quasi-static	Seismic ETA-C1, C2	Fatigue	Shock	Fire resistance
Installation conditions		Other information				
Hammer drilled holes	Diamond cored holes	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)c)}	ICC evaluation service	ESR 1545 / 2017-01
Shock approval ^{c)}	Civil Protection of Switzerland	BZS D 08-601
Fire performance ^{c)}	Exova Warringtonfire	WF 327804/A / 2013-07-10
ACI 349-01 nuclear suitability ^{c)}	Wollmershauser consulting	WC 11-02 / 2011-09

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.

c) Certificate valid only for HSL-3 / HSL-3-G / HSL-3-B / HSL-3-SK / HSL-3-SH

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 HSL-3-R, HSL-3-SKR and HSL-3-GR only applicable for hammer drilling.

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

a) HSL-3-SH, HSL-3-SK and HSL-3-SKR only available in sizes M8-M12

b) HSL-3-SH, HSL-3-SK and HSL-3-SKR can only be set in position 1.

Characteristic resistance

Anchor size		M8			M10			M12			
Non-cracked concrete											
Tension N_{Rk}	HSL-3 / HSL-3-B HSL-3-G HSL-3-SH / HSL-3-SK ^{a)}	[kN]	23,5	29,3	29,3	29,6	43,1	46,6	36,1	54,3	67,4
	HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR	[kN]	20,0	20,0	20,0	29,6	40,6	40,6	36,1	54,3	59,0
Shear V_{Rk}	HSL-3 / HSL-3-B	[kN]	31,1	31,1	31,1	59,2	60,5	60,5	72,3	89,6	89,6
	HSL-3-G	[kN]	26,1	26,1	26,1	41,8	41,8	41,8	59,3	59,3	59,3
	HSL-3-SH / HSL-3-SK ^{a)}	[kN]	31,1	-	-	59,2	-	-	72,3	-	-
	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
	HSL-3-GR	[kN]	40,3	40,3	40,3	58,9	58,9	58,9	72,3	78,7	78,7
Cracked concrete											
Tension N_{Rk}	HSL-3 / HSL-3-B HSL-3-G HSL-3-SH / HSL-3-SK ^{a)}	[kN]	12,0	12,0	12,0	16,0	16,0	16,0	25,8	24,0	24,0
	HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR	[kN]	12,0	12,0	12,0	16,0	16,0	16,0	25,8	24,0	24,0
Shear V_{Rk}	HSL-3 / HSL-3-B	[kN]	30,1	31,1	31,1	42,2	60,5	60,5	51,5	77,5	89,6
	HSL-3-G	[kN]	26,1	26,1	26,1	41,8	41,8	41,8	51,5	59,3	59,3
	HSL-3-SH / HSL-3-SK ^{a)}	[kN]	30,1	-	-	42,2	-	-	51,5	-	-
	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
	HSL-3-GR	[kN]	33,5	40,3	40,3	42,2	58,9	58,9	51,5	77,5	78,7
Anchor size		M16			M20			M24			
Non-cracked concrete											
Tension N_{Rk}	HSL-3 / HSL-3-B HSL-3-G	[kN]	50,5	65,0	65,0	70,6	95,0	95,0	92,8	100,0	100,0
	HSL-3-R HSL-3-GR	[kN]	50,5	65,0	65,0	70,6	95,0	95,0	-	-	-
Shear V_{Rk}	HSL-3 / HSL-3-B	[kN]	101,0	141,2	158,5	141,2	186,0	186,0	185,5	204,5	204,5
	HSL-3-G	[kN]	101,0	120,6	120,6	141,2	155,3	155,3	185,5	204,5	204,5
	HSL-3-R	[kN]	101,0	128,2	128,2	141,2	145,2	145,2	-	-	-
	HSL-3-GR	[kN]	101,0	129,5	129,5	141,2	151,9	151,9	-	-	-

Anchor size		M16			M20			M24			
Cracked concrete											
Tension N_{Rk}	HSL-3 / HSL-3-B HSL-3-G	[kN]	36,0	36,0	36,0	50,3	50,0	50,0	66,1	65,0	65,0
	HSL-3-R HSL-3-GR		36,0	36,0	36,0	50,3	50,0	50,0	-	-	-
Shear V_{Rk}	HSL-3 / HSL-3-B	[kN]	72,0	100,6	132,3	100,6	138,9	181,2	132,3	173,9	204,5
	HSL-3-G		72,0	100,6	120,6	100,6	138,9	155,3	132,3	173,9	204,5
	HSL-3-R		72,0	100,6	128,2	100,6	138,9	145,2	-	-	-
	HSL-3-GR		72,0	100,6	129,5	100,6	138,9	151,9	-	-	-

a) HSL-3-SH, HSL-3-SK and 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			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) HSL-3-SH, HSL-3-SK and HSL-3-SKR only available in sizes M8-M12

b) HSL-3-SH, HSL-3-SK and 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 / HSL-3-B HSL-3-G HSL-3-SH / HSL-3-SK ^{a)}	[kN]	13,0	19,5	19,5	19,7	28,7	31,1	24,1	36,2	44,9
	HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR		13,3	13,3	13,3	19,7	21,7	21,7	24,1	31,6	31,6
Shear V_{Rd}	HSL-3 / HSL-3-B	[kN]	24,9	24,9	24,9	39,4	48,4	48,4	48,2	71,7	71,7
	HSL-3-G		20,9	20,9	20,9	33,4	33,4	33,4	47,4	47,4	47,4
	HSL-3-SH / HSL-3-SK ^{a)}		24,9	-	-	39,4	-	-	48,2	-	-
	HSL-3-R, HSL-3-SKR ^{a)}		31,3	35,5	35,5	39,4	40,2	40,2	48,2	52,2	52,2
	HSL-3-GR		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 / HSL-3-B HSL-3-G HSL-3-SH / HSL-3-SK ^{a)}	[kN]	6,7	6,7	6,7	10,7	10,7	10,7	17,2	16,0	16,0
	HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR		8,0	8,0	8,0	10,7	10,7	10,7	17,2	16,0	16,0
Shear V_{Rd}	HSL-3 / HSL-3-B	[kN]	20,1	24,9	24,9	28,1	41,0	48,4	34,3	51,6	71,1
	HSL-3-G		20,1	20,9	20,9	28,1	33,4	33,4	34,3	47,4	47,4
	HSL-3-SH / HSL-3-SK ^{a)}		20,1	-	-	28,1	-	-	34,3	-	-
	HSL-3-R, HSL-3-SKR ^{a)}		22,3	34,3	35,5	28,2	40,2	40,2	34,4	51,6	52,2
	HSL-3-GR		22,3	32,2	32,2	28,1	41,0	47,1	34,3	51,6	63,0

Anchor size		M16			M20			M24			
Non-cracked concrete											
Tension N_{Rd}	HSL-3 / HSL-3-B HSL-3-G	[kN]	33,7	43,3	43,3	47,1	63,3	63,3	61,8	66,7	66,7
	HSL-3-R HSL-3-GR		33,7	43,3	43,3	47,1	63,3	63,3	-	-	-
Shear V_{Rd}	HSL-3 / HSL-3-B	[kN]	67,3	94,1	123,7	94,1	129,9	148,8	123,7	162,6	163,6
	HSL-3-G		67,3	94,1	96,5	94,1	124,2	124,2	123,7	162,6	163,6
	HSL-3-R		67,3	82,2	82,2	93,1	93,1	93,1	-	-	-
	HSL-3-GR		67,3	94,1	103,6	94,1	121,5	121,5	-	-	-
Cracked concrete											
Tension N_{Rd}	HSL-3 / HSL-3-B HSL-3-G	[kN]	24,0	24,0	24,0	33,5	33,3	33,3	44,1	43,3	43,3
	HSL-3-R HSL-3-GR		24,0	24,0	24,0	33,5	33,3	33,3	-	-	-
Shear V_{Rd}	HSL-3 / HSL-3-B	[kN]	48,0	67,1	88,2	67,1	92,6	120,8	88,2	115,9	146,1
	HSL-3-G		48,0	67,1	88,2	67,1	92,6	120,8	88,2	115,9	146,1
	HSL-3-R		48,0	67,1	82,2	67,1	92,6	93,1	-	-	-
	HSL-3-GR		48,0	67,1	88,2	67,1	92,6	120,8	-	-	-

a) HSL-3-SH, HSL-3-SK and 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			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) HSL-3-SH, HSL-3-SK and HSL-3-SKR only available in sizes M8-M12

b) HSL-3-SH, HSL-3-SK and 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 / HSL-3-B HSL-3-G	[kN]	9,3	14,0	14,0	14,1	20,5	22,2	17,2	25,9	32,1
	HSL-3-SH / HSL-3-SK ^{a)} HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR		9,5	9,5	9,5	14,1	15,5	15,5	17,2	22,5	22,5
48,1	HSL-3 / HSL-3-B	[kN]	17,8	17,8	17,8	28,2	34,6	34,6	34,4	51,2	51,2
	HSL-3-G		14,9	14,9	14,9	23,9	23,9	23,9	33,9	33,9	33,9
	HSL-3-SH / HSL-3-SK ^{a)}		17,8	-	-	28,2	-	-	34,4	-	-
	HSL-3-R, HSL-3-SKR ^{a)}		22,4	25,4	25,4	28,2	28,7	28,7	34,4	37,3	37,3
	HSL-3-GR		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 / HSL-3-B HSL-3-G	[kN]	4,8	4,8	4,8	7,6	7,6	7,6	12,3	11,4	11,4
	HSL-3-SH / HSL-3-SK ^{a)} HSL-3-R / HSL-3-SKR ^{a)} HSL-3-GR		5,7	5,7	5,7	7,6	7,6	7,6	12,3	11,4	11,4
Shear V_{Rec}	HSL-3 / HSL-3-B	[kN]	14,3	17,8	17,8	20,1	29,3	34,6	24,5	36,9	50,8
	HSL-3-G		14,3	14,9	14,9	20,1	23,9	23,9	24,5	33,9	33,9
	HSL-3-SH / HSL-3-SK ^{a)}		14,3	-	-	20,1	-	-	24,5	-	-
	HSL-3-R, HSL-3-SKR ^{a)}		15,9	24,5	25,4	20,1	28,7	28,7	24,5	36,9	37,3
	HSL-3-GR		15,9	23,0	23,0	20,1	29,3	33,7	24,5	36,9	45,0

Anchor size		M16			M20			M24			
Non-cracked concrete											
Tension N_{Rec}	HSL-3 / HSL-3-B HSL-3-G	[kN]	24,0	31,0	31,0	33,6	45,2	45,2	44,2	47,6	47,6
	HSL-3-R HSL-3-GR		24,0	31,0	31,0	33,6	45,2	45,2	-	-	-
Shear V_{Rec}	HSL-3 / HSL-3-B	[kN]	48,1	67,2	88,4	67,2	92,8	106,3	88,4	116,1	116,9
	HSL-3-G		48,1	67,2	68,9	67,2	88,7	88,7	88,4	116,1	116,9
	HSL-3-R		48,1	58,7	58,7	66,5	66,5	66,5	-	-	-
	HSL-3-GR		48,1	67,2	74,0	67,2	86,8	86,8	-	-	-
Cracked concrete											
Tension N_{Rec}	HSL-3 / HSL-3-B HSL-3-G	[kN]	17,1	17,1	17,1	24,0	23,8	23,8	31,5	31,0	31,0
	HSL-3-R HSL-3-GR		17,1	17,1	17,1	24,0	23,8	23,8	-	-	-
Shear V_{Rec}	HSL-3 / HSL-3-B	[kN]	34,3	47,9	63,0	47,9	66,2	86,3	63,0	82,8	104,3
	HSL-3-G		34,3	47,9	63,0	47,9	66,2	86,3	63,0	82,8	104,3
	HSL-3-R		34,3	47,9	58,7	47,9	66,2	66,5	-	-	-
	HSL-3-GR		34,3	47,9	63,0	47,9	66,2	86,3	-	-	-

a) HSL-3-SH, HSL-3-SK and 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, $f_{ck,cube}=25 \text{ N/mm}^2$
- $\alpha_{gap} = 0,5$
- Values for HSL-3-R, HSL-3-SKR and HSL-3-GR only applicable for hammer drilling

Effective anchorage depth for seismic C2^{a)}

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

a) HSL-3-SH and HSL-3-SK can only be set in position 1 and only available in sizes M8-M12.

Characteristic resistance in case of seismic category C2

Anchor size		M10			M12			M16			M20			
Tension $N_{Rk,seis}$	HSL-3 / HSL-3-B HSL-3-G	[kN]	12,2	12,2	12,2	21,9	25,8	25,8	30,6	34,2	34,2	40,1	40,1	40,1
	HSL-3-SH / HSL-3-SK		12,2	-	-	21,9	-	-	-	-	-	-	-	-
Shear $V_{Rk,seis}$	HSL-3 / HSL-3-B	[kN]	9,4	9,4	9,4	13,2	13,2	13,2	25,4	25,4	25,4	39,1	39,1	39,1
	HSL-3-G		9,0	9,0	9,0	11,3	11,3	11,3	22,3	22,3	22,3	25,1	25,1	25,1
	HSL-3-SH / HSL-3-SK		9,4	-	-	13,2	-	-	-	-	-	-	-	-

Design resistance in case of seismic category C2

Anchor size		M10			M12			M16			M20			
Tension $N_{Rd,seis}$	HSL-3 / HSL-3-B HSL-3-G	[kN]	8,1	8,1	8,1	14,6	17,2	17,2	20,4	22,8	22,8	26,7	26,7	26,7
	HSL-3-SH / HSL-3-SK		8,1	-	-	14,6	-	-	-	-	-	-	-	-
Shear $V_{Rd,seis}$	HSL-3 / HSL-3-B	[kN]	7,5	7,5	7,5	10,5	10,5	10,5	20,3	20,3	20,3	31,2	31,2	31,2
	HSL-3-G		7,2	7,2	7,2	9,0	9,0	9,0	17,8	17,8	17,8	20,1	20,1	20,1
	HSL-3-SH / HSL-3-SK		7,5	-	-	10,5	-	-	-	-	-	-	-	-

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) HSL-3-SH, HSL-3-SK and HSL-3-SKR only available in sizes M8-M12

b) HSL-3-SH, HSL-3-SK and HSL-3-SKR can only be set in position 1.

Characteristic resistance in case of seismic category C1

Anchor size			M8			M10			M12		
Tension $N_{Rk,seis}$	HSL-3 / HSL-3-B HSL-3-G	[kN]	12,0	12,0	12,0	16,0	16,0	16,0	21,9	24,0	24,0
	HSL-3-SH / HSL-3-SK		12,0	-	-	16,0	-	-	21,9	-	-
	HSL-3-R / HSL-3-SKR		12,0	12,0	12,0	16,0	16,0	16,0	21,9	24,0	24,0
Shear $V_{Rk,seis}$	HSL-3 / HSL-3-B	[kN]	8,9	8,9	8,9	22,1	22,1	22,1	29,1	29,1	29,1
	HSL-3-G		7,5	7,5	7,5	15,3	15,3	15,3	19,3	19,3	19,3
	HSL-3-SH / HSL-3-SK ^{a)}		8,9	-	-	22,1	-	-	29,1	-	-
	HSL-3-R / HSL-3-SKR		5,2	5,2	5,2	12,9	12,9	12,9	14,0	14,0	14,0
Anchor size			M16			M20			M24		
Tension $N_{Rk,seis}$	HSL-3 / HSL-3-B HSL-3-G	[kN]	30,6	36,0	36,0	42,8	50,0	50,0	56,2	65,0	65,0
	HSL-3-R / HSL-3-SKR		30,6	36,0	36,0	42,8	50,0	50,0	56,2	65,0	65,0
	HSL-3 / HSL-3-B		57,1	57,1	57,1	54,9	54,9	54,9	81,8	81,8	81,8
Shear $V_{Rk,seis}$	HSL-3-G	[kN]	43,4	43,4	43,4	45,8	45,8	45,8	-	-	-
	HSL-3-R / HSL-3-SKR		29,6	29,6	29,6	29,6	29,6	29,6	-	-	-

Design resistance in case of seismic category C1

Anchor size			M8			M10			M12		
Tension $N_{Rd,seis}$	HSL-3 / HSL-3-B HSL-3-G	[kN]	6,7	6,7	6,7	10,7	10,7	10,7	14,6	16,0	16,0
	HSL-3-SH / HSL-3-SK		6,7	-	-	10,7	-	-	14,6	-	-
	HSL-3-R / HSL-3-SKR		8,0	8,0	8,0	10,7	10,7	10,7	14,6	16,0	16,0
Shear $V_{Rd,seis}$	HSL-3 / HSL-3-B	[kN]	7,1	7,1	7,1	17,7	17,7	17,7	23,3	23,3	23,3
	HSL-3-G		6,0	6,0	6,0	12,2	12,2	12,2	15,4	15,4	15,4
	HSL-3-SH / HSL-3-SK		7,1	-	-	17,7	-	-	23,3	-	-
	HSL-3-R / HSL-3-SKR		4,2	4,2	4,2	8,3	8,3	8,3	9,0	9,0	9,0
Anchor size			M16			M20			M24		
Tension $N_{Rd,seis}$	HSL-3 / HSL-3-B HSL-3-G	[kN]	20,4	24,0	24,0	28,5	33,3	33,3	37,5	43,3	43,3
	HSL-3-R / HSL-3-SKR		20,4	24,0	24,0	28,5	33,3	33,3	-	-	-
	HSL-3 / HSL-3-B		40,8	45,6	45,6	43,9	43,9	43,9	65,4	65,4	65,4
Shear $V_{Rk,seis}$	HSL-3-G	[kN]	34,7	34,7	34,7	36,6	36,6	36,6	-	-	-
	HSL-3-R / HSL-3-SKR		19,0	19,0	19,0	19,0	19,0	19,0	-	-	-

Materials

Mechanical properties

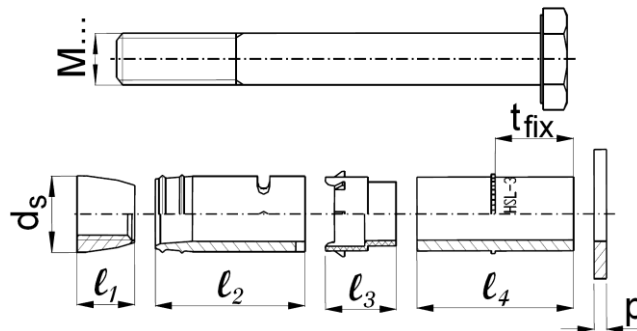
Anchor size		M8	M10	M12	M16	M20	M24
HSL-3, HSL-3-G, HSL-3-B, HSL-3-SH, HSL-3-SK							
Nominal tensile strength f_{uk}	[N/mm ²]	800	800	800	800	830	830
Yield strength f_{yk}	[N/mm ²]	640	640	640	640	640	640
Stressed cross-section A_s	[mm ²]	36,6	58,0	84,3	157	245	353
Moment of resistance W	[mm ³]	31,3	62,5	109,4	277,1	540,6	935,4
Design bending resistance without sleeve $M_{Rd,s}$	[Nm]	24,0	48,0	84,0	212,8	415,2	718,4
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}	HSL-3-R	560	450	450	450	450	-
	HSL-3-SKR						
	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	-
Design bending resistance without sleeve $M_{Rd,s}$	[Nm]	16,8	33,5	58,8	149,4	291,3	-

Material quality

Part	Material
Carbon Steel	
HSL-3 Cone	Carbon steel, galvanized to $\geq 5 \mu\text{m}$
HSL-3-G Expansion sleeve	Carbon steel, galvanized to $\geq 5 \mu\text{m}$
HSL-3-B Collapsible element	POM Plastic element
HSL-3-SH Distance sleeve	Carbon steel, galvanized to $\geq 5 \mu\text{m}$
HSL-3 Washer	Carbon steel, galvanized to $\geq 5 \mu\text{m}$
HSL-3 Hexagonal bolt	Carbon steel, galvanized to $\geq 5 \mu\text{m}$, rupture elongation $\geq 12\%$
HSL-3-G Hexagonal nut	Carbon steel, galvanized to $\geq 5 \mu\text{m}$
HSL-3-G Threaded rod	Carbon steel, galvanized to $\geq 5 \mu\text{m}$, rupture elongation $\geq 12\%$
HSL-3-B Hexagonal bolt with safety cap	Carbon steel, galvanized to $\geq 5 \mu\text{m}$, rupture elongation $\geq 12\%$
HSL-3-SH Hexagonal socket head screw	Carbon steel, galvanized to $\geq 5 \mu\text{m}$, rupture elongation $\geq 12\%$
HSL-3-SK Countersunk bolt	Carbon steel, galvanized to $\geq 5 \mu\text{m}$, rupture elongation $\geq 12\%$
HSL-3-SK Cup washer	Carbon steel, galvanized to $\geq 5 \mu\text{m}$
Stainless Steel	
HSL-3-R Cone	Stainless steel A4, coated
HSL-3-G 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
HSL-3-R Hexagonal bolt	Stainless steel A4, coated, rupture elongation $\geq 12\%$
HSL-3-GR Hexagonal nut	Stainless steel A4, coated
HSL-3-GR Threaded rod	Stainless steel A4, coated, rupture elongation $\geq 12\%$
HSL-3-SKR Countersunk bolt	Stainless steel A4, coated, rupture elongation $\geq 12\%$
HSL-3-SKR Cup washer	Stainless steel A4, coated

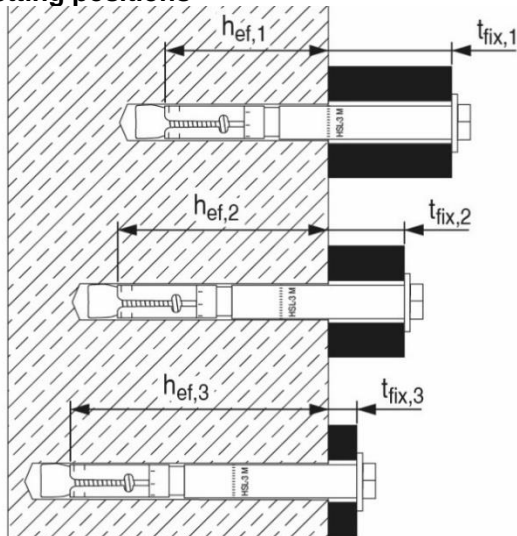
Anchor dimensions of HSL-3, HSL-3-G, HSL-3-B, HSL-3-B, HSL-3-SH, HSL-3-SK

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	
HSL-3	M8	5	200	11,9	12	32	15,2	19	214	2
HSL-3-G	M10	5	200	14,8	14	36	17,2	23	218	3
HSL-3	M12	5	200	17,6	17	40	20	28	223	3
HSL-3-G	M16	10	200	23,6	20	54,4	24,4	34,5	224,5	4
HSL-3-B	M20	10	200	27,6	20	57	31,5	51	241	4
HSL-3	M24	10	200	31,6	22	65	39	57	247	4
HSL-3-SH	M8	5		11,9	12	32	15,2	19		2
	M10	20		14,8	14	36	17,2	38		3
	M12	25		17,6	17	40	20	48		3
HSL-3-SK	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

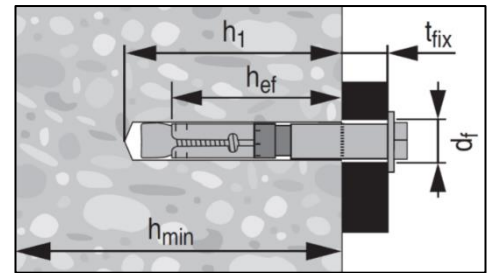
①

Setting position

②

Setting position

③




a) HSL-3-SH, HSL-3-SK and HSL-3-SKR can only be set in position 1.

Setting details for HSL-3 / 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 (HSL-3-R)	T_{inst} [Nm]	25			50 (35)			80		
Anchor version		M16			M20			M24 ^{a)}		
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	$t_{fix,i}$	$t_{fix,1}^{1)} - \Delta i$								
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]	120			200			250		


a) Anchor version M24 only available for HSL-3 carbon steel version.

Setting details for HSL-3-G / 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]	20 (30)			35 (50)			60 (80)				
Anchor version		M16			M20			M24 ^{a)}					
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]	80 (120)			160 (200)			180				

a) Anchor version M24 only available for HSL-3-G carbon steel version.

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

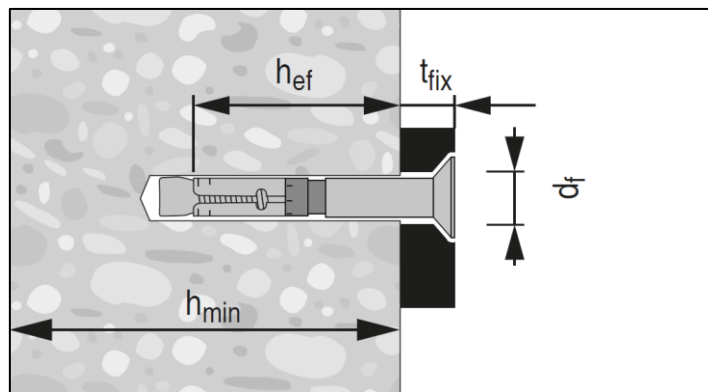
Anchor version		M8	M10	M12
Nominal diameter of drill bit	d_0 [mm]	12	15	18
Max. cutting diameter of drill bit	d_{cut} [mm]	12,5	15,5	18,5
Max. diameter of clearance hole in the fixture	d_f [mm]	14	17	20
Fixture thickness	t_{fix} [mm]	5	20	25
Effective anchorage depth	h_{ef} [mm]	60	70	80
Min. depth of drill hole	h_1 [mm]	85	95	110
Min. thickness of concrete member	h_{min} [mm]	120	140	160
Width across flats	SW [mm]	6	8	10
Installation torque	T_{inst} [Nm]	25	35	60

a) HSL-3-SH, HSL-3-SK and HSL-3-SKR can only be set in position 1.

Setting details for HSL-3-SK / 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]	25 (18)	50	80

a) HSL-3-SH, HSL-3-SK and HSL-3-SKR can only be set in position 1.



Installation equipment

Anchor size	M8	M10	M12	M16	M20	M24
Rotary hammer	TE 2 – TE 30			TE 40 – TE 80		
Diamond coring ¹⁾	DD 30-W + SPX-T				DD 30-W + SPX-T DD 120 + DD-BI	
Other tools	blow out pump, hammer, torque wrench ²⁾					

1) Diamond coring not available for HSL-3-R, HSL-3-GR and HSL-3-SKR anchors.

2) HSL-3-B only requires a regular wrench as it automatically ensures correct torque is applied.

Setting parameters for HSL-3, HSL-3-G, HSL-3-B, HSL-3-SH, HSL-3-SK

Anchor size		M8			M10			M12		
Setting position	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
Minimum spacing	s_{min} [mm]	60			70			80		
	for $c \geq$ [mm]	100			100			160		
Minimum edge distance	c_{min} [mm]	60			70			80		
	for $s \geq$ [mm]	100			160			240		
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
Minimum spacing	s_{min} [mm]	100			125			150		
	for $c \geq$ [mm]	240			300			300		
Minimum edge distance	c_{min} [mm]	100			150			150		
	for $s \geq$ [mm]	240			300			300		

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

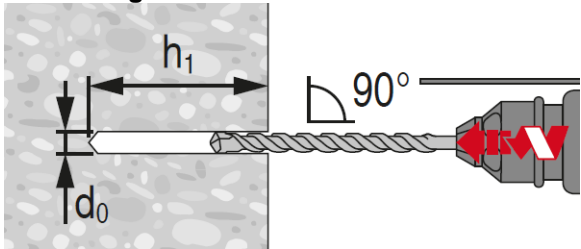
*For detailed information on installation of each specific HSL-3 versions see instruction for use given with the package of the product.

Setting instruction	
Hammer drilling	
<p>1. Drilling</p>	<p>2. Cleaning</p>
<p>3. Installation</p>	<p>4. Applying tightening torque</p>
Diamond drilling for HSL-3, HSL-3-B, HSL-3-G, HSL-3-SK, HSL-3-SH	
<p>1. Drilling</p>	<p>2. Cleaning</p>
<p>3. Installation</p>	<p>4. Applying tightening torque</p>

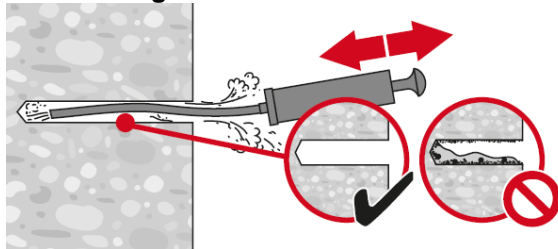
HSL-3-B Safety cap

Hammer drilling

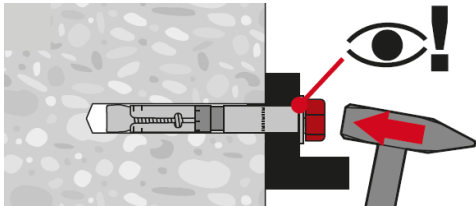
1. Drilling



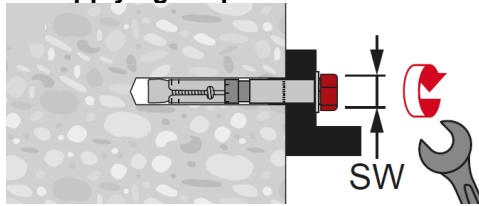
2. Cleaning



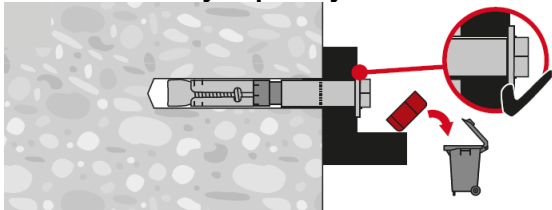
3. Installation



4. Applying torque

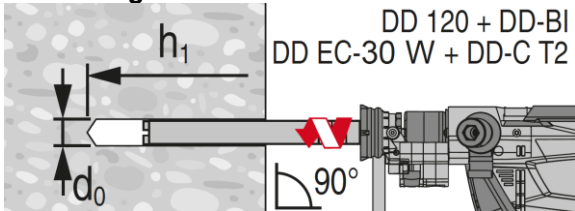


5. Throw safety cap away

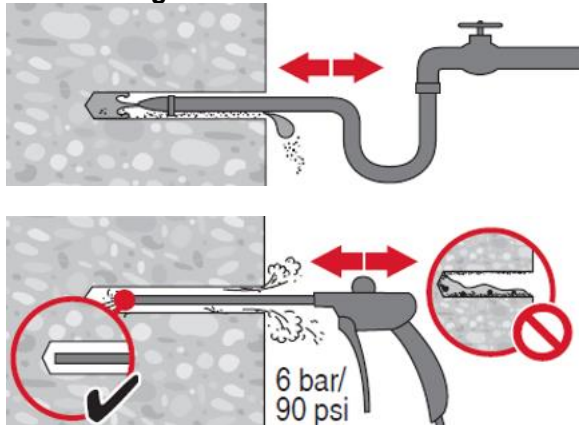


Diamond drilling

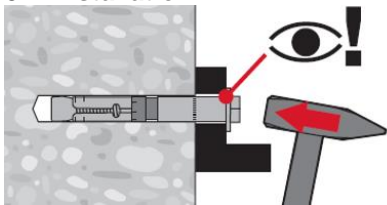
1. Drilling



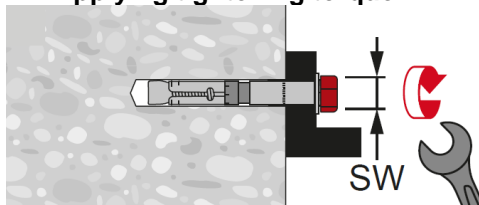
2. Cleaning



3. Installation



4. Applying tightening torque



5. Throw the safety cap away

