☐ Submittal ☐ Substitution Request

To: _____

Firm: _____

Project: _____

Product Specified: _____

Specified Location:_____

Attached information includes product description, installation instructions and technical data needed for review and evaluation of the submittal request.

Submitted By:

Name: _____ Signature: _____

Firm: _____

Address: _____

_____

Phone: _____ Fax: _____

Email: _____ Submittal Date: _____

For Architect / Engineer Use:

Reviewed, Accepted ~ No Exceptions: _____ Make Corrections as Noted: _____

Revise and Resubmit: _____ Rejected: _____

Brief explanation for corrections needed, revisions needed or why rejected:

_____

_____

_____

_____

_____

_____

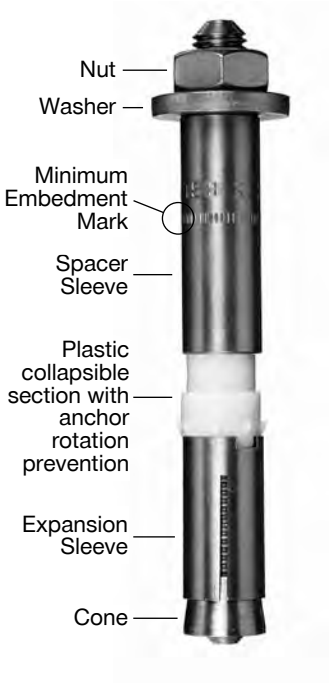
3.3.3 HSL Heavy Duty Expansion Anchor

3.3.3.1 Product Description

HSL-I M12 Flush Anchor with Torque Nut

HSLG-R Stainless Steel with Threaded Rod

Flush mount applications accommodated by short removable stud



The Hilti HSL Heavy Duty Sleeve Anchor is a torque controlled expansion bolt designed for high performance in static and dynamic load applications. HSL anchors are available in metric sizes from 12 mm to 20 mm diameters.

Product Features

- High load capacity
- Spacer sleeve provides enhanced shear capacity
- Force controlled expansion
- Reliable pull-down of part fastened to overcome gaps
- Suitable for dynamic loading (fatigue, seismic, and shock loading)
- No spinning of anchor in hole when tightening bolt or nut
- Good performance in Hilti Matched Tolerance DD-B or DD-C Diamond Core Bit holes

Guide Specifications

Expansion Anchors Carbon (Stainless) steel anchor consists of threaded rod, sleeve, expansion sleeve, expansion cone and collapsible plastic sleeve, (nut) and washer. Anchors shall be torque controlled expansion bolt as manufactured by Hilti.

Installation Refer to Section 3.3.3.4

Dynamic Loading

The HSL anchor has been tested under shock, seismic and fatigue (2×10^6 cycles) loading conditions. Contact your Hilti Field Engineer for additional information.

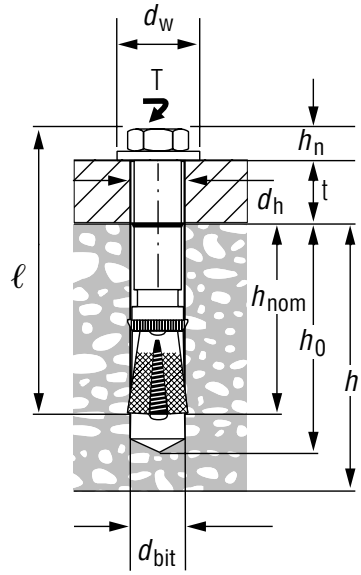
3.3.3.2 Material Specifications

Carbon Steel Bolt or threaded rod conform to ISO 898-1, Class 8.8, $f_y \geq 93$ ksi, $f_u \geq 116$ ksi
Carbon Steel expansion sleeve conforms to DIN 2393, Grade ST-52-3
Carbon Steel nut conforms to DIN 934, Grade 8, $f_u \geq 116$ ksi
Stainless steel threaded rod conforms to DIN 267, Type A4-70, $f_y = 65$ ksi, $f_u \geq 102$ ksi
Stainless steel expansion sleeve conforms to DIN 17440, $f_u \geq 102$ ksi
Stainless Steel cone conforms to DIN 17440, $f_u \geq 102$ ksi
Stainless Steel washer conforms to DIN 17441, 74 ksi $\leq f_u \leq$ 103 ksi
Stainless Steel nut conforms to DIN 934
Collapsible sleeve is made of Acetal resin plastic
Carbon Steel cone conforms to DIN 1654, Type CQ35, $f_u \geq 87$ ksi
Carbon Steel washer conforms to DIN 1544, Grade ST37, $f_u \geq 91$ ksi

3.3.3.3 Technical Data

Table 1 - HSL Specifications

Details			HSL Anchor Thread Diameter (mm)					
			12	12	16	16	20	20
d_{bit}	nominal bit dia.	mm	18		24		28	
h_O	min. hole depth	mm	100		125		150	
		(in.)	(4)		(5)		(6)	
h_{nom}	min. depth of embedment	mm	80		105		130	
		(mm)	(3-3/16)		(4-1/8)		(5-1/8)	
t	Max. thickness fastened	mm	25	50	25	50	30	60
		(mm)	(1)	(2)	(1)	(2)	(1-1/8)	(2-1/4)
ℓ	anchor length	mm	120	145	148	173	183	213
		(mm)	(4-3/4)	(5-3/4)	(5-3/4)	(6-3/4	(7-1/4)	(8-3/8)
h_n	head height + washer	mm	11		14		17	
		(in.)	(7/16)		(9/16)		(11/16)	
T_{inst}	installation torque	Nm	80		200		400	
		(ft lb)	(60)		(150)		(300)	
	wrench size (mm)	HSL/HSLG	19		24		30	
d_h	min. dia. fixture hole	mm	22		28		33	
		(in.)	(13/16)		(1-1/8)		(1-5/16)	
d_w	washer diameter	mm	30		40		45	
		(in.)	(1-3/16)		(1-9/16)		(1-3/4)	
h_{min}	min. base material thickness	mm	160		180		220	
		(in.)	(6-1/4)		(7)		(8-3/4)	



3.3.3 HSL Heavy Duty Expansion Anchor

Table 2 - Stainless Steel HSLG-R Allowable Loads in Normal-Weight Concrete

Anchor Diameter	Embedment Depth mm (in.)	13.8 MPa (2000 psi)		20.7 MPa (3000 psi)		27.6 MPa (4000 psi)		41.4 MPa (6000 psi)	
		Tension kN (lb)	Shear kN (lb)	Tension kN (lb)	Shear kN (lb)	Tension kN (lb)	Shear kN (lb)	Tension kN (lb)	Shear kN (lb)
M10	75 (3)	6.8 (1535)	13.7 (3090)	9.1 (2055)	14.8 (3325)	11.5 (2575)	15.8 (3560)	11.5 (2595)	16.4 (3690)
M12	80 (3-3/16)	8.7 (1960)	20.2 (4540)	11.3 (2530)	21.8 (4890)	13.8 (3105)	23.3 (5245)	17.5 (3925)	25.0 (5615)
M16	105 (4-1/8)	17.6 (3965)	34.7 (7805)	20.9 (4705)	39.9 (8965)	24.2 (5450)	45.0 (10125)	30.7 (6900)	46.9 (10550)
M20	130 (5-1/8)	25.1 (5650)	52.9 (11900)	30.7 (6910)	58.7 (13195)	36.4 (8175)	64.5 (14490)	44.5 (10005)	64.5 (14490)

Table 3 - Stainless Steel HSLG-R Ultimate Loads in Normal-Weight Concrete

Anchor Diameter	Embedment Depth mm (in.)	13.8 MPa (2000 psi)		20.7 MPa (3000 psi)		27.6 MPa (4000 psi)		41.4 MPa (6000 psi)	
		Tension kN (lb)	Shear kN (lb)	Tension kN (lb)	Shear kN (lb)	Tension kN (lb)	Shear kN (lb)	Tension kN (lb)	Shear kN (lb)
M10	75 (3)	23.8 (5350)	47.8 (10785)	31.9 (7165)	51.6 (11595)	40.0 (8985)	55.2 (12410)	40.3 (9055)	57.3 (12880)
M12	80 (3-3/16)	30.4 (6830)	70.5 (15845)	39.3 (8830)	75.9 (17070)	48.2 (10835)	81.4 (18300)	60.9 (13700)	87.1 (19590)
M16	105 (4-1/8)	61.6 (13840)	121.1 (27220)	73.0 (16420)	139.1 (31270)	84.5 (19005)	157.1 (35320)	107.0 (24065)	163.7 (36800)
M20	130 (5-1/8)	87.7 (19715)	184.7 (41510)	107.3 (24115)	204.7 (46025)	126.9 (28520)	224.8 (50540)	155.3 (34910)	224.8 (50540)

Table 4 - HSL-I M12 Allowable Loads in 4000 psi Normal Weight Concrete[1]

Description	Anchor Length	Embedment	Tension	Shear
	(mm)	(mm)	(lb)	(lb)
HSL - I M12 65/80	113	65	2,335	2,265
	130	80	3,150	2,350

1 Allowable loads calculated using a 4:1 factor of safety.

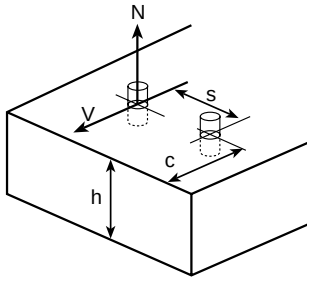
Combined Shear and Tension Loading

$$\left(\frac{N_d}{N_{rec}}\right)^{5/3} + \left(\frac{V_d}{V_{rec}}\right)^{5/3} \leq 1.0$$

Refer to Section 3.1.8.3

HSL Heavy Duty Expansion Anchor 3.3.3

Anchor Spacing and Edge Distance Guidelines



Anchor Spacing Adjustment Factors

s = Actual Spacing

s_{min} = 1.0 h_{nom}

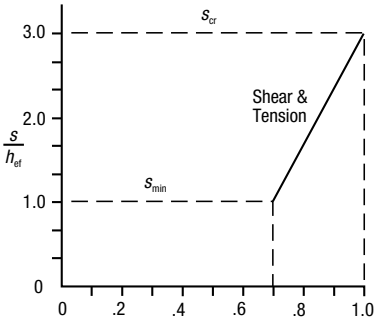
s_{cr} = 3.0 h_{ef}

Edge Distance Adjustment Factors

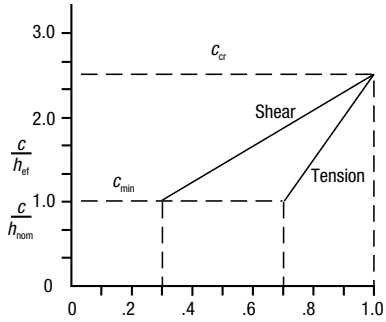
c = Actual Edge Distance

c_{min} = 1.0h_{nom} c_{cr} = 2.5 h_{ef}	Tension
c_{min} = 1.0 h_{nom} c_{cr} = 2.5 h_{nom}	Shear

Anchor Size	h_{nom} in.	h_{nom} (mm)
M10	75	(3)
M12	80	(3-3/16)
M16	105	(4-1/8)
M20	130	(5-1/8)



Anchor Spacing Adjustment Factor (f_A)



Edge Distance Adjustment Factor (f_{RV}, f_{RN})

h_{ef} - actual embedment depth

h_{nom} - standard embedment depth

Load Adjustment Factors (Anchor Spacing) f_A						Load Adjustment Factors (Edge Disdtance) f_R									
Tension/Shear						Tension f_{RN}						Shear f_{RV}			
Spacing s		Anchor Diameter				Edge Distance c		Anchor Diameter				Anchor Diameter			
mm	(in.)	M10	M12	M16	M20	mm	(in.)	M10	M12	M16	M20	M10	M12	M16	M20
65	(2-1/2)					65	(2-1/2)								
75	(3)	.70				75	(3)	.70				.30			
80	(3-1/8)	.71	.70			80	(3-1/8)	.71	.70			.33	.30		
105	(4-1/8)	.76	.74	.70		105	(4-1/8)	.78	.76	.70		.48	.44	.30	
130	(5-1/8)	.81	.79	.73	.70	130	(5-1/8)	.85	.83	.74	.70	.64	.59	.41	.30
155	(6-1/8)	.86	.84	.77	.72	155	(6-1/8)	.91	.88	.79	.73	.80	.74	.52	.39
175	(6-7/8)	.90	.87	.80	.75	162	(6-3/8)	.93	.90	.80	.75	.84	.78	.55	.41
195	(7-5/8)	.94	.91	.82	.77	187	(7-3/8)	1.0	.96	.85	.78	1.0	.92	.66	.50
225	(8-7/8)	1.0	.97	.87	.80	200	(7-7/8)		1.0	.88	.80		1.0	.72	.55
240	(9-3/8)		1.0	.89	.82	225	(8-7/8)		1.0	.92	.84		1.0	.83	.64
275	(10-3/4)			.94	.86	265	(10-3/8)			1.0	.91			1.0	.79
315	(12-3/8)			1.0	.91	275	(10-3/4)			1.0	.92			1.0	.82
350	(13-3/4)				.95	300	(11-3/4)			1.0	.96			1.0	.91
395	(15-1/2)				1.0	325	(12-3/4)				1.0				1.0
430	(17)					350	(13-3/4)				1.0				1.0
470	(18-1/2)					390	(15-3/8)								

s_{min} = 1.0 h_{nom} s_{cr} = 3.0 h_{ef}

$$f_A = 0.15 \frac{s}{h_{ef}} + 0.55$$

for $s_{cr} > s > s_{min}$

c_{min} = 1.0 h_{nom} c_{cr} = 2.5 h_{ef}

$$f_{RN} = (0.30) \left(\frac{c - 1.0\, h_{nom}}{2.5\, h_{ef} - 1.0\, h_{nom}} \right) + 0.70$$

for $c_{cr} > c > c_{min}$

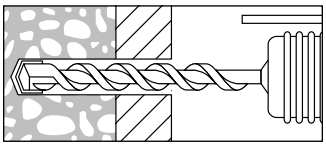
c_{min} = 1.0 h_{nom} c_{cr} = 2.5 h_{nom}

$$f_{RV} = 0.47 \frac{c}{h_{nom}} - 0.17$$

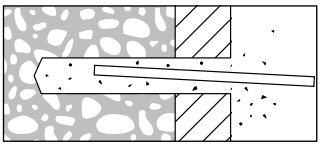
for $c_{cr} > c > c_{min}$

3.3.3 HSL Heavy Duty Expansion Anchor

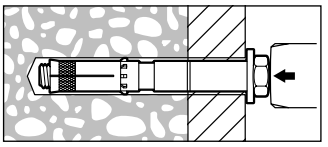
3.3.3.4 Installation Instructions



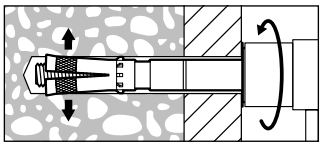
1. Drill a hole with the prescribed Hilti metric carbide or diamond core bit. **Note:** the HSL can be installed in a bottomless hole.



2. Clean the hole using compressed air.



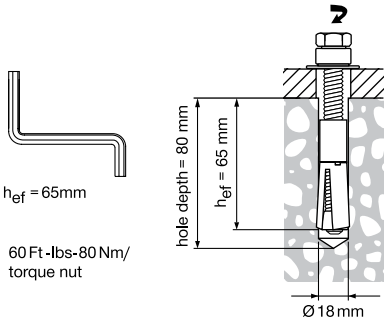
3. Using a hammer, tap the pre-assembled anchor through the object being anchored and into the hole. The anchor should be seated firmly against the base plate. **Note:** Do not expand the anchor by hand before tapping it into the hole.



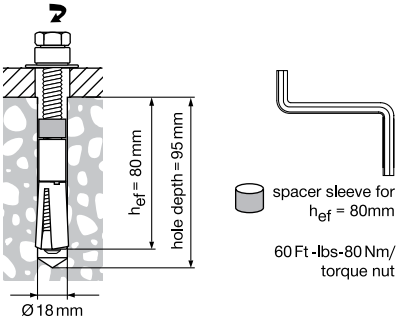
4. Tighten bolt or nut to the specified torque, using a torque wrench.

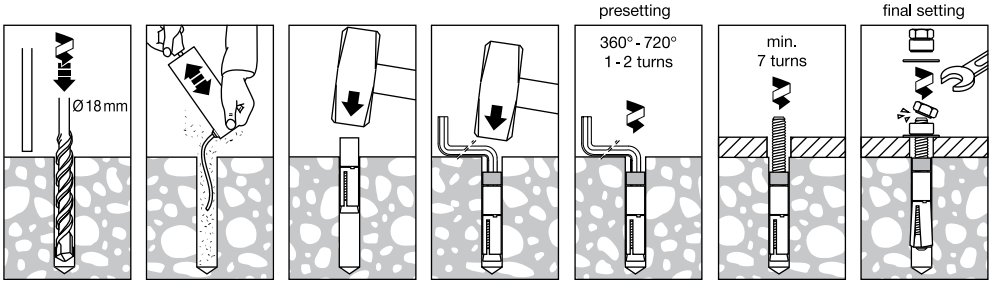
Setting Instructions for the HSL-I M12-0 65/80

HSL-I M12-0 65



HSL-I M12-0 80





3.3.3.5 Ordering Information

HSLG-R Stainless Steel Anchor
Material: Stainless Steel type 316

Description	Box Qty
HSLG-R M 10/20	20
HSLG-R M 12/25	20
HSLG-R M 16/25	10
HSLG-R M 20/30	6

HSL-I Flush Anchor
(Internally Threaded)

Description	Box Qty
HSL-I M12 65/80	20