

HDI(-L) and HDI(-L)+ Drop-in Anchor

1.1 Product Description

Hilti HDI(-L) and HDI(-L)+ Drop-in Anchors are internally threaded, flush mounted expansion anchors for use in concrete.

Product Features

HDI(-L) and HDI(-L) +

- Anchor, setting tool and Hilti drill bit form a matched tolerance system to provide reliable fastenings
- Allows shallow embedment without sacrificing performance
- Lip provides flush installation, consistent anchor depth, and easy rod alignment for the HDI-L and HDI-L+
- Lip allows accurate flush surface setting, independent of hole depth for the HDI-L and HDI-L+
- Ideal for repetitive fastenings with threaded rods of equal length

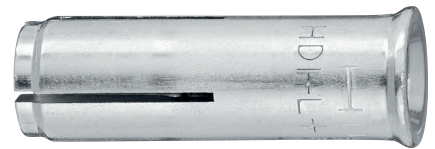
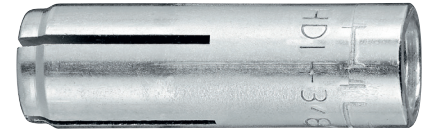
- HDI+ and HDI-L+ have an innovative stepped plug that reduces number of hammer blows by up to 50%
- HDI+ and HDI-L+ can be installed with the new HKD-TE-CX system (stop drill bit and machine setting tool) for improved productivity

Guide Specifications

Expansion Anchor Expansion anchors shall be flush or shell type and zinc plated in accordance with ASTM B633, SC 1, Type III. Anchors shall be Hilti HDI/HDI-L/HDI+/HDI-L+ anchors as supplied by Hilti.

Installation Install shell or flush type anchors in holes drilled with Hilti carbide tipped drill bits. Install anchors as per Manufacturer's Printed Installation Instructions (MPII).

1.1	Product Description
1.2	Material Specifications
1.3	Technical Data
1.4	Installation Instructions
1.5	Ordering Information



1.2 Material Specifications

HDI and HDI-L 1/4", 1/2", 5/8" and 3/4" are manufactured from mild carbon steel which is plated with a zinc finish for corrosion protection in accordance with ASTM B633, SC 1, Type III

HDI stainless steel material meets the requirements of AISI 303

HDI+ and HDI-L+ 3/8" are manufactured from mild carbon steel which is plated with a zinc finish for corrosion protection in accordance with ASTM B633, SC 1, Type III

Listings/Approvals

FM (Factory Mutual)

Pipe Hanger Components for Automatic Sprinkler Systems (HDI+ and HDI-L+ 3/8, HDI and HDI-L 1/2-3/4)

UL (Underwriters Laboratories)

UL 203 Pipe Hanger Equipment for Fire Protection Services (HDI+ and HDI-L+ 3/8, HDI and HDI-L 1/2-3/4)



1.3 Technical Data

Table 1 - HDI(-L) and HDI(-L)+ Specification Table

Details	Anchor Size	in.	HDI+/HDI-L+		HDI/HDI-L		HDI	
			3/8	1/4	1/2	5/8	3/4	
d _{bit} nominal bit diameter		in.	1/2	3/8	5/8	27/32	1	
h _{nom} std. depth of embedment		in.	1-9/16	1	2	2-9/16	3-3/16	
ℓ anchor length		(mm)	(40)	(25)	(51)	(65)	(81)	
h ₁ hole depth								
ℓ _{th} useable thread length		in.	5/8	7/16	11/16	7/8	1-3/8	
		(mm)	(15)	(11)	(17)	(22)	(34)	
threads per inch		-	16	20	13	11	10	
h min. base material thickness		in.	3-1/8	3	4	5-1/8	6-3/8	
		(mm)	(79)	(76)	(102)	(130)	(162)	
T _{inst} installation torque		ft-lb	11	4	22	37	80	
		(Nm)	(14.9)	(5.4)	(29.8)	(50.2)	(108.5)	

Combined Shear and Tension Loading

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

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Table 2 - Carbon Steel HDI(-L) and HDI(-L)+ Allowable Loads in Concrete¹

Anchor size in. (mm)	2000 psi (13.8 MPa)				4000 psi (27.6 MPa)				6000 psi (41.4 MPa)			
	Tension		Shear		Tension		Shear		Tension		Shear	
	HDI(-L)	HDI(-L)+	HDI(-L)	HDI(-L)+	HDI(-L)	HDI(-L)+	HDI(-L)	HDI(-L)+	HDI(-L)	HDI(-L)+	HDI(-L)	HDI(-L)+
1/4 (6.4)	500 (2.2)	-	450 (8.0)	-	570 (2.5)	-	625 (2.8)	-	790 (3.5)	-	700 (3.1)	-
3/8 (9.5)	-	635 (2.8)	-	965 (4.3)	-	920 (4.1)	-	1250 (5.6)	-	1260 (5.6)	-	1500 (6.7)
1/2 (12.7)	1120 (5.0)	-	1500 (6.7)	-	1785 (7.9)	-	1940 (8.6)	-	2345 (10.4)	-	2500 (11.1)	-
5/8 (15.9) ²	1875 (8.3)	-	2500 (11.1)	-	2920 (13.0)	-	3250 (14.5)	-	3715 (16.5)	-	3750 (16.7)	-
3/4 (19.1) ²	2500 (11.1)	-	3875 (17.2)	-	4065 (18.1)	-	5000 (22.2)	-	5565 (24.8)	-	5500 (24.5)	-

1 The ultimate shear and allowable shear values are based on the use of SAE Grade 5 bolts, ($f_y = 85$ ksi, $f_{ult} = 120$ ksi) with the exception of the HDI(-L) 1/4 in $f'_c = 6000$ psi concrete which is based upon the use of a SAE Grade 8 bolt ($f_y = 120$ ksi, $f_{ult} = 150$ ksi).

2 Allowable and Ultimate loads for the 5/8 and 3/4 diameters are applicable only to HDI anchors. HDI-L anchors are not available in these diameters.

Table 3 - Carbon Steel HDI(-L) and HDI(-L)+ Ultimate Loads in Concrete¹

Anchor size in. (mm)	2000 psi (13.8 MPa)				4000 psi (27.6 MPa)				6000 psi (41.4 MPa)			
	Tension		Shear		Tension		Shear		Tension		Shear	
	HDI(-L)	HDI(-L)+	HDI(-L)	HDI(-L)+	HDI(-L)	HDI(-L)+	HDI(-L)	HDI(-L)+	HDI(-L)	HDI(-L)+	HDI(-L)	HDI(-L)+
1/4 (6.4)	1995 (8.9)	-	1800 (8.0)	-	2270 (10.1)	-	2500 (11.1)	-	3150 (14.0)	-	2800 (12.5)	-
3/8 (9.5)	-	2540 (11.3)	-	3850 (17.1)	-	3685 (16.4)	-	5000 (22.2)	-	5035 (22.4)	-	6000 (26.7)
1/2 (12.7)	4470 (19.9)	-	6000 (26.7)	-	7140 (31.8)	-	8500 (37.8)	-	9375 (41.7)	-	10000 (44.5)	-
5/8 (15.9) ²	7500 (33.4)	-	10000 (44.5)	-	11685 (52.0)	-	13000 (57.8)	-	14865 (66.1)	-	15000 (66.7)	-
3/4 (19.1) ²	10000 (44.5)	-	15500 (69.0)	-	16260 (72.3)	-	20000 (89.0)	-	22250 (99.0)	-	22000 (97.9)	-

1 The ultimate shear and allowable shear values are based on the use of SAE Grade 5 bolts, ($f_y = 85$ ksi, $f_{ult} = 120$ ksi) with the exception of the HDI(-L) 1/4 in $f'_c = 6000$ psi concrete which is based upon the use of a SAE Grade 8 bolt ($f_y = 120$ ksi, $f_{ult} = 150$ ksi).

2 Allowable and Ultimate loads for the 5/8 and 3/4 diameters are applicable only to HDI anchors. HDI-L are not available in these diameters.

Table 4 - Allowable Loads in Lightweight Concrete and Lightweight Concrete over Metal Deck^{1,2}

Anchor type and size in. (mm)	Anchor Installed in 3000 psi (20.7 MPa)		Anchor Installed Through Steel Deck Upper Flute		Anchor Installed Through Steel Deck Lower Flute	
	Lt. Wt. Concrete ³		Into 3000 psi (20.7 MPa) Lt. Wt. Concrete ⁴		Into 3000 psi (20.7 MPa) Lt. Wt. Concrete ⁴	
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
HDI(-L) 1/4 (6.4)	465 (2.1)	340 (1.5)	530 (2.4)	335 (1.5)	375 (1.7)	250 (1.1)
HDI(-L)+ 3/8 (9.5)	721 (3.2)	940 (4.2)	810 (3.6)	1010 (4.5)	500 (2.2)	500 (2.2)
HDI(-L) 1/2 (12.7)	1135 (5.0)	1700 (7.6)	1105 (4.9)	1755 (7.8)	625 (2.8)	750 (3.3)
HDI(-L) 5/8 (15.9)	1465 (6.5)	2835 (12.6)	-	-	875 (3.9)	875 (3.9)
HDI(-L) 3/4 (19.1)	2075 (9.2)	3680 (16.4)	-	-	1250 (5.5)	1000 (4.4)

1 The allowable values are based on the use of SAE Grade 2 bolts installed in the anchors.

2 Based on using a safety factor of 4.0.

3 The tabulated shear and tensile values are for anchors installed in structural lightweight concrete having the designated ultimate compressive strength at the time of installation. The concrete must comply with ASTM C 330-05.

4 The tabulated shear and tensile values are for anchors installed through 20 gauge intermediate decking into structural lightweight concrete having the designated ultimate strength at the time of installation. The concrete must comply with ASTM C 330-05. See figure on following page for installation parameters.

Table 5 - Stainless Steel HDI Allowable Loads in Concrete¹

Anchor size in. (mm)	4000 psi (27.6 MPa)		6000 psi (41.4 MPa)	
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
SS HDI - 1/4 (6.4)	480 (2.1)	600 (2.7)	740 (3.3)	600 (2.7)
SS HDI - 3/8 (9.5)	1040 (4.6)	1230 (5.5)	1460 (6.5)	1230 (5.5)
SS HDI - 1/2 (12.7)	1840 (8.2)	2760 (12.4)	2410 (10.7)	2760 (12.3)
SS HDI - 5/8 (15.9)	2630 (11.7)	4510 (20.1)	3770 (16.8)	4510 (20.1)
SS HDI - 3/4 (19.1)	3830 (17.0)	5580 (24.8)	5030 (22.4)	5580 (24.8)

1 The ultimate and allowable shear values are based on the use of Type 18-8 bolts.

Table 6 - Stainless Steel HDI Ultimate Loads in Concrete

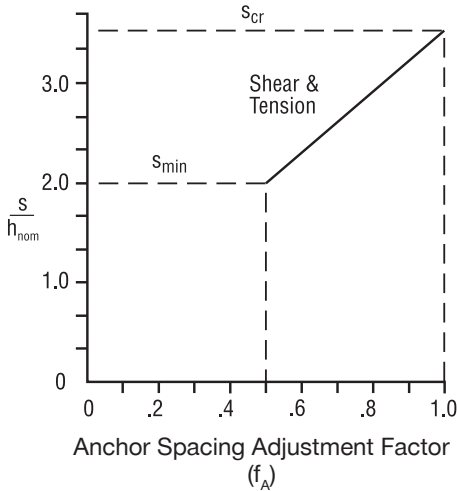
Anchor Size in. (mm)	4000 psi (27.6 MPa)		6000 psi (41.4 MPa)	
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
SS HDI - 1/4 (6.4)	1930 (8.6)	2400 (10.7)	2950 (13.1)	2400 (10.7)
SS HDI - 3/8 (9.5)	4170 (18.5)	4920 (21.9)	5850 (26.0)	4920 (21.9)
SS HDI - 1/2 (12.7)	7350 (32.7)	11040 (49.1)	9630 (42.8)	11040 (49.1)
SS HDI - 5/8 (15.9)	10540 (46.9)	18040 (80.2)	15100 (67.2)	18040 (80.2)
SS HDI - 3/4 (19.1)	15340 (68.2)	22320 (99.3)	20130 (89.5)	22320 (99.3)

HDI(-L) and HDI(-L)+ Drop-in Anchor

Anchor Spacing and Edge Distance Guidelines

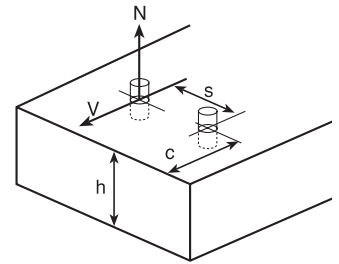
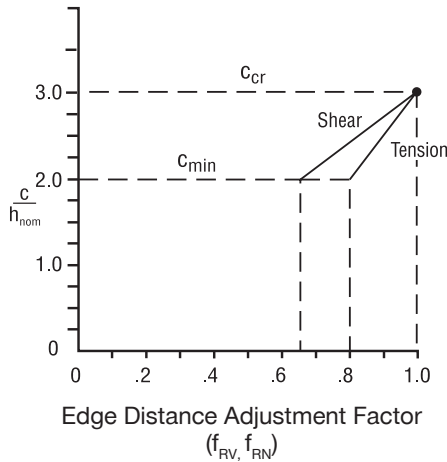
Anchor Spacing Adjustment Factors

- s = Actual Spacing
- $s_{min} = 2.0 h_{nom}$
- $s_{cr} = 3.5 h_{nom}$



Edge Distance Adjustment Factors

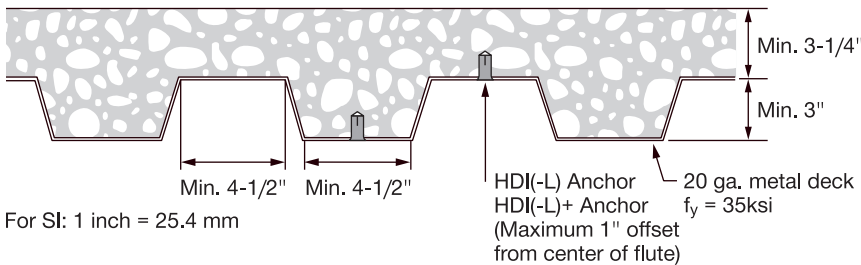
- c = Actual edge distance
- $c_{min} = 2.0 h_{nom}$
- $c_{cr} = 3.0 h_{nom}$



Influence of Anchor Spacing and Edge Distance f_A and f_R

Anchor Size		h_{nom}	
in.	(mm)	in.	(mm)
1/4	(6.4)	1	(25)
3/8	(9.5)	1-9/16	(40)
1/2	(12.7)	2	(51)
5/8	(15.8)	2-9/16	(65)
3/4	(19.1)	3-3/16	(81)

h_{nom} = standard embedment depth



Typical anchor installed through metal deck into lightweight concrete

Load Adjustment Factors for Anchor Spacing f_A							Load Adjustment Factors for Edge Distance f_R											
Tension/Shear Loads							Tension f_{RN}					Shear f_{RV}						
Spacing s		Anchor Diameter					Edge Distance c		Anchor Diameter					Anchor Diameter				
in.	(mm)	1/4	3/8	1/2	5/8	3/4	in.	(mm)	1/4	3/8	1/2	5/8	3/4	1/4	3/8	1/2	5/8	3/4
2	(51)	.50					2	(51)	.80					.65				
2-1/2	(64)	.67					2-1/2	(64)	.90					.83				
3	(76)	.83	.50				3	(76)	1.0	.80				1.0	.65			
3-1/2	(89)	1.0	.58				3-1/2	(89)		.85					.73			
4	(102)		.69	.50			4	(102)		.91	.80				.85	.65		
4-1/2	(114)		.79	.58			4-1/2	(114)		.98	.85				.96	.74		
5	(127)		.90	.67	.50		5	(127)		1.0	.90	.80			1.0	.83	.65	
5-1/2	(140)		1.0	.75	.55		5-1/2	(140)			.95	.83				.91	.70	
6	(152)			.83	.61	.50	6	(152)			1.0	.87				1.0	.77	
7	(178)			1.0	.74	.57	6-1/2	(165)				.91	.80				.84	.65
8	(203)				.87	.67	7	(178)				.95	.84				.91	.72
9	(229)				1.0	.77	8	(203)				1.0	.90				1.0	.83
10	(254)					.88	9	(229)					.96					.94
11	(279)					.98	10	(254)					1.0					1.0
12	(305)					1.0												

$s_{min} = 2.0 h_{nom}$ $s_{cr} = 3.5 h_{nom}$ $f_A = 0.33 \frac{s}{h_{nom}} - 0.17$ for $s_{cr} > s > s_{min}$	$c_{min} = 2.0 h_{nom}$ $c_{cr} = 3.0 h_{nom}$ $f_{RN} = 0.2 \frac{c}{h_{nom}} + 0.4$ for $c_{cr} > c > c_{min}$	$c_{min} = 2.0 h_{nom}$ $c_{cr} = 3.0 h_{nom}$ $f_{RV} = 0.35 \frac{c}{h_{nom}} - 0.05$ for $c_{cr} > c > c_{min}$
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HDI(-L) and HDI(-L)+ Drop-in Anchor

1.4 Installation Instructions

Manufacturer's Printed Installation Instructions (MPII) are included with each product package. They can also be viewed or downloaded at www.us.hilti.com (U.S.) and www.hilti.ca (Canada) -- "Service/Technical Info > Technical Downloads > Anchoring Systems". Because of the possibility of changes, always verify that downloaded MPII are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the MPII.

1.5 Ordering Information

HDI(-L) and HDI(-L)+ Anchors

Carbon Steel

Anchor Thread Size (in.)	Description	Description	Box Qty.
1/4	HDI 1/4	HDI-L 1/4	100
3/8	HDI+ 3/8	HDI-L+ 3/8	50
1/2	HDI 1/2	HDI-L 1/2	50
5/8	HDI 5/8	-	25
3/4	HDI 3/4	-	25

HDI-SS Anchors

Stainless Steel

Anchor Thread Size (in.)	Description	Box Qty.
1/4	HDI 1/4 SS303	100
3/8	HDI 3/8 SS303	50
1/2	HDI 1/2 SS303	50
5/8	HDI 5/8 SS303	25
3/4	HDI 3/4 SS303	25

Setting Tools HDI, HDI-L, and HDI-SS Anchors

Anchor Thread Size (in.)	Description
1/4	HST 1/4 Setting Tool
3/8	HST 3/8 Setting Tool
1/2	HST 1/2 Setting Tool
5/8	HST 5/8 Setting Tool
3/4	HST 3/4 Setting Tool



Setting Tools for HDI+ and HDI-L+

Anchor Thread Size (in.)	Description
3/8	HST 3/8 Setting tool
	HSD-MM 3/8 (TE-C-24SD10 3/8 Setting tool)
	3/8" HDI-TE-CX inclusive of stop drill bit TE-CX-1/2" x 1-9/16"

