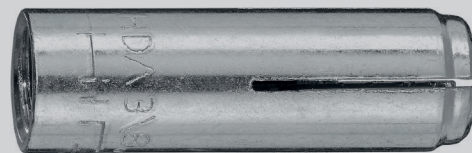




ECONOMICAL MANUAL SET FLUSH ANCHOR

Flush anchor HDV
technical supplement



PRODUCT DESCRIPTION

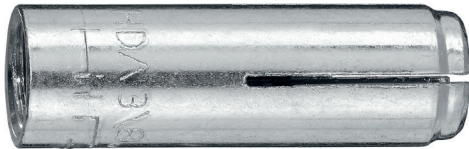
Hilti HDV Drop-in Anchors are internally threaded, flush-mounted expansion anchors for use in concrete.

Product Features

- Anchor, setting tool and Hilti drill bit form a matched tolerance system to provide reliable fastenings
- Allows shallow embedment without sacrificing performance
- Ideal for repetitive fastenings with threaded rods of equal length

Guide Specifications

Expansion anchors shall be flush or shell type and zinc plated in accordance with ASTM B633, SC 1, Type III. Anchors shall be Hilti HDV anchors as supplied by Hilti. Install shell or flush type anchors in holes drilled with Hilti carbide tipped drill bits. Install anchors per Manufacturer's Printed Installation Instructions (MPII).



Listings/Approvals

FM (Factory Mutual)
Pipe Hanger Components for Automatic
Sprinkler Systems (3/8 - 1/2)

UL (Underwriters Laboratories)
UL 203 Pipe Hanger Equipment for Fire Protection
Services (3/8 - 1/2)



MATERIAL SPECIFICATIONS

HDV 1/4", 3/8" and 1/2" 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.

TECHNICAL DATA

Table 1 - HDV Specification Table

Details	Anchor Size	in.	HDV		
			1/4	3/8	1/2
d_{bit}	nominal bit diameter	in.	3/8	1/2	5/8
h_{nom} ℓ h_1	standard depth of embedment anchor length hole depth	in. (mm)	1 (25)	1-9/16 (40)	2 (51)
ℓ_{th}	useable thread length	in. (mm)	7/16 (11)	5/8 (15)	11/16 (17)
	threads per inch		20	16	13
h	minimum base material thickness	in. (mm)	3 (76)	3-1/8 (79)	4 (102)
T_{inst}	installation torque	ft-lb (Nm)	4 (5.4)	11 (14.9)	22 (29.8)

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

Combined Shear and Tension Loading

Table 2 - HDV carbon steel allowable loads in concrete¹

Nominal anchor diameter in.	2000 psi (13.8 MPa)		4000 psi (27.6 MPa)		6000 psi (41.4 MPa)	
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
1/4	385 (1.7)	450 (2.0)	510 (2.3)	625 (2.8)	640 (2.8)	700 (3.1)
3/8	785 (3.5)	965 (4.3)	1070 (4.8)	1250 (5.6)	1360 (6.0)	1500 (6.7)
1/2	1120 (5.0)	1500 (6.7)	1785 (7.9)	2125 (9.5)	2345 (10.4)	2500 (11.1)

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 HDV 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). When using steel bolts with a lower tensile strength, steel failure must be considered.

Table 3 - HDV carbon steel ultimate loads in concrete¹

Nominal anchor diameter in.	2000 psi (13.8 MPa)		4000 psi (27.6 MPa)		6000 psi (41.4 MPa)	
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
1/4	1535 (6.8)	1800 (8.0)	2040 (9.1)	2500 (11.1)	2555 (11.4)	2800 (12.5)
3/8	3130 (13.9)	3850 (17.1)	4275 (19.0)	5000 (22.2)	5430 (24.2)	6000 (26.7)
1/2	4470 (19.9)	6000 (26.7)	7140 (37.8)	8500 (37.8)	9375 (41.7)	10000 (44.5)

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 HDV 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). When using steel bolts with a lower tensile strength, steel failure must be considered.

Table 4 - HDV carbon steel allowable loads in lightweight concrete and lightweight concrete poured over metal deck^{1,2}

Nominal anchor diameter in.	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)
1/4	355 (1.6)	340 (1.5)	405 (1.8)	335 (1.5)	290 (1.3)	250 (1.1)
3/8	665 (3.0)	940 (4.2)	775 (3.4)	1010 (4.5)	440 (2.0)	500 (2.2)
1/2	1135 (5.0)	1700 (7.6)	1105 (4.9)	1755 (7.8)	625 (2.8)	750 (3.5)

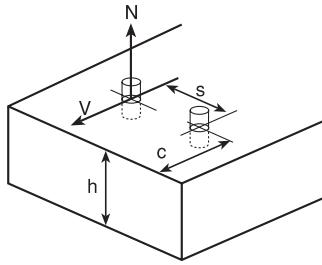
¹ The allowable values are based on the use of SAE Grade 2 bolts installed in the anchors. When using steel bolts with a lower tensile strength, steel failure must be considered.

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.

Anchor spacing and edge distance guidelines



Anchor Spacing Adjustment Factors

s = Actual Spacing

$$s_{\min} = 2.0 h_{\text{nom}}$$

$$s_{\text{er}} = 3.5 h_{\text{nom}}$$

Edge Distance Adjustment Factors

c = Actual Edge Distance

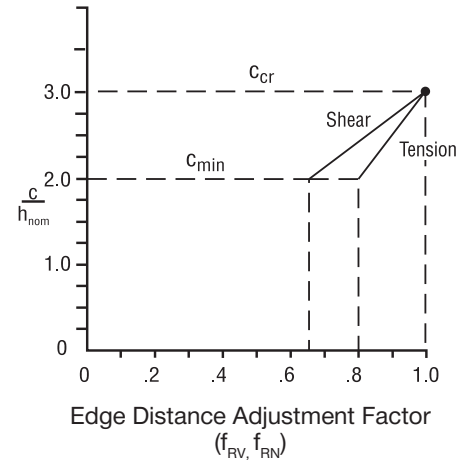
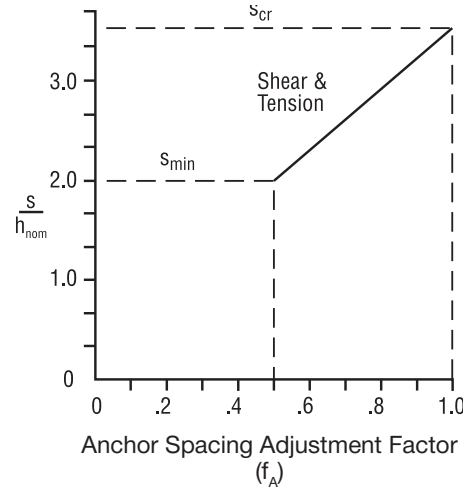
$$c_{\min} = 2.0 h_{\text{nom}}$$

$$c_{\text{er}} = 3.0 h_{\text{nom}}$$

HDV embedment depth for load adjustment factor calculations

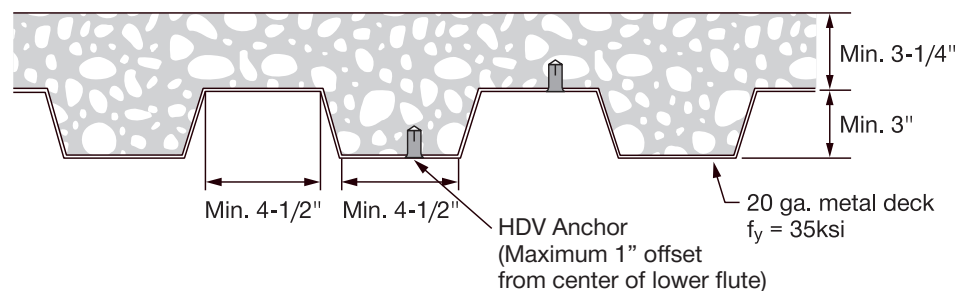
Anchor Size	h_{nom}
in.	in. (mm)
1/4	1 (25)
3/8	1-9/16 (40)
1/2	2 (51)

h_{nom} = standard embedment depth



Load adjustment factors for HDV flush anchors in 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	in. (mm)	1/4	3/8	1/2	1/4	3/8	1/2
2 (51)	.50	n/a	n/a	2 (51)	.80	n/a	n/a	.65	n/a	n/a
2-1/2 (64)	.67	n/a	n/a	2-1/2 (64)	.90	n/a	n/a	.83	n/a	n/a
3 (76)	.83	.50	n/a	3 (76)	1.0	.80	n/a	1.0	.65	n/a
3-1/2 (89)	1.0	.58	n/a	3-1/2 (89)		.85	n/a		.73	n/a
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	5 (127)		1.0	.90		1.0	.83
5-1/2 (140)		1.0	.75	5-1/2 (140)			.95			.91
6 (152)			.83	6 (152)			1.0			1.0
7 (178)			1.0	7 (178)						
8 (203)				8 (178)						



Typical anchor installed through metal deck into lightweight concrete

INSTALLATION INSTRUCTIONS

Manufacturer's Printed Installation Instructions (MPII) are included with each product package. They can also be viewed or downloaded at www.hilti.com (U.S.) and www.hilti.ca (Canada). 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.

ORDERING INFORMATION

HDV Anchors

Carbon Steel		
Anchor Thread Size (in.)	Description	Zpk Qty.
1/4	HDV 1/4	100
3/8	HDV 3/8	50
1/2	HDV 1/2	50

Setting Tools for HDV	
Anchor Thread Size (in.)	Description
1/4	Setting tool HST 1/4
3/8	Setting tool HST 3/8
1/2	Setting tool HST1/2

