



The following excerpt are pages from the North American Product Technical Guide, Volume 2: Anchor Fastening, Edition 19.

Please refer to the publication in its entirety for complete details on this product including data development, product specifications, general suitability, installation, corrosion and spacing and edge distance guidelines.

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To consult directly with a team member regarding our anchor fastening products, contact Hilti's team of technical support specialists between the hours of 7:00am – 6:00pm CST.





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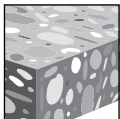
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3.2.6 HVU CAPSULE ADHESIVE ANCHORING SYSTEM

PRODUCT DESCRIPTION

HVU Capsule Adhesive Anchoring System with Threaded Rod, Rebar, and HIS-N Inserts

Mortar Systems		Features and Benefits
	Hilti HVU Capsule	<ul style="list-style-type: none"> • High loading capacity • Small edge distance and anchor spacing allowance • Excellent dynamic load resistance • Wide range of installation temperatures
	Hilti HAS Threaded Rod (with chisel point)	<ul style="list-style-type: none"> • Excellent elevated temperature performance • Excellent performance in freezing and thawing conditions
	Rebar	<ul style="list-style-type: none"> • No hole brushing required—just blow out hole with compressed air—makes installation fast and easy
	Hilti HIS-N	



Uncracked concrete

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3.2.6

Approvals/Listings	
European Technical Approval	ETA-05/0255 ETA-05/0256 ETA-05/0257
U.S. Green Building Council	LEED® Credit 4.1-Low Emitting Materials



MATERIAL SPECIFICATIONS

For material specifications for Hilti HAS anchor rods and Hilti HIS-N inserts, please refer to section 3.2.8.

DESIGN DATA IN CONCRETE PER ALLOWABLE STRESS DESIGN



Permissible Base Materials		Grout-filled concrete masonry	Permissible drilling method		Hammer drilling with carbide tipped drill bit
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Table 1 - Hilti HAS rod installation specifications installed with Hilti HVU adhesive anchoring system

Setting information	Symbol	Units	Nominal anchor diameter						
			3/8	1/2	5/8	3/4	7/8	1	1-1/4
Drill bit diameter	d_o	in.	7/16	9/16	11/16	7/8	1	1-1/8	1-3/8
Standard effective embedment One capsule	$h_{ef, std}$	in. (mm)	3-1/2 (90)	4-1/4 (110)	5 (125)	6-5/8 (170)	6-5/8 (170)	8-1/4 (210)	12 (305)
Installation torque	T_{inst}	ft-lb (Nm)	18 (24)	30 (41)	75 (102)	150 (203)	175 (237)	235 (319)	400 (540)
Minimum base material thickness	$h_{ef} = h_{nom}$	in. (mm)	5-1/2 (140)	6-1/4 (160)	7 (180)	8-1/2 (220)	8-1/2 (220)	10-1/2 (270)	15 (380)
	$h_{ef} \neq h_{nom}$	in. (mm)	1.0 hef+2 (51)	1.0 hef+2 (51)	1.0 hef+2 (51)	1.0 hef+2 (51)	1.0 hef+2 (51)	1.0 hef+2-1/4 (57)	1.0 hef+3 (76)
Recommended Hilti rotary hammer drill			TE 1...30		TE 1...60	TE 50...60		TE 50...80	

Table 2 - Hilti HIS-N and HIS-RN installation specifications with Hilti HVU adhesive anchoring system

Setting information	Symbol	Units	Thread size				
			3/8-16 UNC	1/2-13 UNC	5/8-11 UNC	3/4-10 UNC	
HVU capsule			1/2x4-1/4	5/8x5	7/8x6-5/8	1x8-1/4	
Outside diameter of insert	d	in.	0.65	0.81	1.00	1.09	
Nominal bit diameter	d_o	in.	11/16	7/8	1-1/8	1-1/4	
Effective embedment	h_{ef}	in. (mm)	4-3/8 (110)	5 (125)	6-5/8 (170)	8-1/4 (210)	
Bolt engagement	minimum maximum	h_s	in.	3/8	1/2	5/8	3/4
			in.	15/16	1-3/16	1-1/2	1-7/8
Installation torque	T_{inst}	ft-lb (Nm)	18 (24)	30 (41)	75 (102)	150 (203)	
Minimum concrete thickness	h_{min}	in. (mm)	6-3/8 (162)	7-1/2 (191)	10 (254)	12-3/8 (314)	

Table 3 - Rebar installation specifications with Hilti HVU adhesive anchoring system

Setting information	Symbol	Units	Rebar size				
			#4	#5	#6	#7	#8
Nominal bit diameter ¹	d_o	in.	5/8	3/4	7/8	1	1-1/8
Standard effective embedment	$h_{ef, std}$	in. (mm)	4-1/4 (110)	5 (125)	6-5/8 (170)	6-5/8 (170)	8-1/4 (210)

¹ Rebar diameters may vary. The rebar must be at least 4 inches longer than the embedment to accommodate the setting equipment.

Figure 1 – Hilti HAS rod specifications

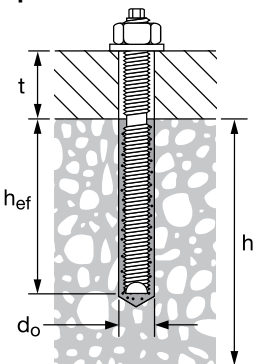


Figure 2 – Hilti HIS-N and HIS-RN specifications

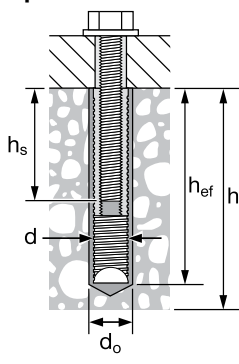


Table 4 - CA rebar installation specifications with Hilti HVU adhesive anchor system

Rebar size			10M	15M	20M	25M
d_o	Drill bit diameter ^{1,2}	in. or mm	9/16	13/16	1	32mm
$h_{ef} = h_{nom}$	std. depth of embed. = capsule length	mm (in.)	90 (3-1/2)	125 (5)	170 (6-5/8)	210 (8-1/4)

¹ Rebar diameters may vary; the witnessed test was performed using the above mentioned drill bit diameters. Rebar must have a minimum length 4" greater than embedment to accommodate the setting equipment.

² Hilti matched tolerance carbide tipped drill bits

Combined shear and tension loading

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

Table 5 - Hilti HVU allowable and ultimate bond/concrete capacity for Hilti HAS rods in normal-weight concrete^{1,2}

Nominal anchor diameter	Embed. depth ³ in.	Adhesive capsule(s) required	HVU allowable bond/concrete capacity				HVU ultimate bond/concrete capacity			
			Tensile		Shear		Tensile		Shear	
			$f'_c = 2,000$ psi lb (kN)	$f'_c = 4,000$ psi lb (kN)	$f'_c = 2,000$ psi lb (kN)	$f'_c = 4,000$ psi lb (kN)	$f'_c = 2,000$ psi lb (kN)	$f'_c = 4,000$ psi lb (kN)	$f'_c = 2,000$ psi lb (kN)	$f'_c = 4,000$ psi lb (kN)
3/8	3-1/2 (90)	(1) 3/8 x 3-1/2	2,085 (9.3)	2,595 (11.5)	3,335 (14.8)	4,710 (21.0)	8,345 (37.1)	10,380 (46.2)	10,000 (44.5)	14,120 (62.8)
	5-1/4 (133)	(2) 3/8 x 3-1/2	2,325 (10.3)	4,185 (18.6)	6,120 (27.2)	8,655 (38.5)	9,295 (41.3)	16,730 (74.4)	18,360 (81.7)	25,960 (115.5)
	7 (178)	(2) 3/8 x 3-1/2	4,405 (19.6)	4,895 (21.8)	9,420 (41.9)	13,330 (59.3)	17,630 (78.4)	19,590 (87.1)	28,260 (125.7)	39,980 (177.8)
1/2	4-1/4 (110)	(1) 1/2 x 4-1/4	3,250 (14.5)	4,735 (21.1)	5,450 (24.2)	7,280 (32.4)	12,990 (57.8)	18,940 (84.2)	15,440 (68.7)	21,840 (97.1)
	6-3/8 (162)	(1) 1/2 x 4-1/4 & (1) 3/8 x 3-1/2	4,890 (21.8)	5,455 (24.3)	9,455 (42.1)	13,375 (59.5)	19,565 (87.0)	21,815 (97.0)	28,360 (126.2)	40,120 (178.5)
	8-1/2 (216)	(2) 1/2 x 4-1/4	6,700 (29.8)	7,545 (33.6)	14,560 (64.8)	20,590 (91.6)	26,810 (119.3)	30,190 (134.3)	43,680 (194.3)	61,760 (274.7)
5/8	5 (125)	(1) 5/8 x 5	3,970 (17.7)	5,245 (23.3)	7,350 (32.7)	10,390 (46.2)	15,890 (70.7)	20,970 (93.3)	22,040 (98.0)	31,160 (138.6)
	7-1/2 (184)	(1) 5/8 x 5 & (1) 1/2 x 4-1/4	5,770 (25.7)	10,465 (46.6)	13,495 (60.0)	19,080 (84.9)	23,080 (102.7)	41,865 (186.2)	40,480 (180.1)	57,240 (254.6)
	10 (254)	(2) 5/8 x 5	11,700 (52.0)	12,835 (57.1)	20,775 (92.4)	29,375 (130.7)	46,795 (208.2)	51,340 (228.4)	62,320 (277.2)	88,120 (392.0)
3/4	6-5/8 (170)	(1) 3/4 x 6-5/8	6,080 (27.0)	8,615 (38.3)	12,270 (54.6)	17,355 (77.2)	24,330 (108.2)	34,470 (153.3)	36,800 (163.7)	52,060 (231.6)
	10 (254)	(1) 3/4 x 6-5/8 & (1) 1/2 x 4-1/4	9,110 (40.5)	14,835 (66.0)	22,755 (101.2)	32,180 (143.1)	36,445 (162.1)	59,350 (264.0)	68,260 (303.6)	96,540 (429.4)
	13-1/4 (337)	(2) 3/4 x 6-5/8	15,220 (67.7)	15,310 (68.1)	34,700 (154.4)	49,080 (218.3)	60,875 (270.8)	61,230 (272.4)	104,100 (463.1)	147,240 (655.0)
7/8	6-5/8 (170)	(1) 7/8 x 6-5/8	7,145 (31.8)	9,130 (40.6)	13,110 (58.3)	18,535 (82.4)	28,580 (127.1)	36,525 (162.5)	39,320 (174.9)	55,600 (247.3)
	10 (254)	(2) 3/4 x 6-5/8	10,475 (46.6)	18,970 (84.4)	24,575 (109.3)	34,755 (154.6)	41,905 (186.4)	75,870 (337.5)	73,720 (327.9)	104,260 (463.8)
	13-1/4 (337)	(2) 7/8 x 6-5/8	16,475 (73.3)	23,055 (102.6)	34,780 (154.7)	53,010 (235.8)	65,895 (293.1)	92,220 (410.2)	112,440 (500.2)	159,020 (707.4)
1	8-1/4 (210)	(1) 1 x 8-1/4	8,640 (38.4)	13,425 (59.7)	19,690 (87.6)	27,840 (123.8)	34,560 (153.7)	53,695 (238.8)	59,060 (262.7)	83,520 (371.5)
	12-3/8 (314)	(2) 7/8 x 6-5/8	14,665 (65.2)	23,450 (104.3)	36,170 (160.9)	51,150 (227.5)	58,665 (261.0)	93,800 (417.2)	108,500 (482.6)	153,440 (682.5)
	16-1/2 (419)	(2) 1 x 8-1/4	26,645 (118.5)	30,805 (137.0)	55,690 (247.7)	78,750 (350.3)	106,580 (474.1)	123,220 (548.1)	167,060 (743.1)	236,240 (1050.8)
1-1/4	12 (305)	(1) 1-1/4 x 12	19,175 (85.3)	23,920 (106.4)	38,615 (171.8)	54,610 (242.9)	76,740 (341.4)	95,680 (425.6)	115,840 (515.3)	163,820 (728.7)
	15 (381)	(1) 1-1/4 x 12 & (1) 1 x 8-1/4	24,750 (110.1)	26,855 (119.5)	53,960 (240.0)	76,315 (339.5)	99,000 (440.4)	107,420 (477.8)	161,880 (720.1)	228,940 (1018.4)
	18 (457)	(1) 1-1/4 x 12 & (2) 1 x 8-1/4	29,535 (131.4)	37,920 (168.7)	70,935 (315.5)	100,320 (446.2)	118,140 (525.5)	151,680 (674.7)	212,800 (946.6)	300,960 (1338.7)

1 Influence factors for spacing and/or edge distance are applied to concrete/bond values above, and then compared to the steel value.

The lesser of the values is to be used for the design.

2 Average ultimate concrete shear capacity based on Strength Design method.

3 Contact Hilti for the use of alternate embedment other than those tested and listed above.

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Table 6 - Allowable steel strength for carbon steel and stainless steel Hilti HAS rods¹

Nominal anchor diameter	HAS-E ISO 898 Class 5.8		HAS-E B7 ASTM A193 B7		HAS-R Stainless AISI 304/316 SS	
	Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)
3/8	2,640 (11.7)	1,360 (6.0)	4,555 (20.3)	2,345 (10.4)	3,645 (16.2)	1,875 (8.3)
1/2	4,700 (20.9)	2,420 (10.8)	8,100 (36.0)	4,170 (18.5)	6,480 (28.8)	3,335 (14.8)
5/8	7,340 (32.7)	3,780 (16.8)	12,655 (56.3)	6,520 (29.0)	10,125 (45.0)	5,215 (23.2)
3/4	10,570 (47.0)	5,445 (24.2)	18,225 (81.1)	9,390 (41.8)	12,390 (55.1)	6,385 (28.4)
7/8	14,385 (64.0)	7,410 (33.0)	24,805 (110.3)	12,780 (56.9)	16,865 (75.0)	8,690 (38.6)
1	18,790 (83.6)	9,680 (43.0)	32,400 (144.1)	16,690 (74.2)	22,030 (98.0)	11,350 (50.5)
1-1/4	29,360 (130.6)	15,125 (67.3)	50,620 (225.2)	26,080 (116.0)	34,425 (153.1)	17,735 (78.9)

¹ Steel strength as defined in AISC Manual of Steel Construction (ASD):

Tensile = $0.33 \times F_u \times \text{nominal area}$

Shear = $0.17 \times F_u \times \text{nominal area}$

Table 7 - Ultimate steel strength for carbon steel and stainless steel Hilti HAS rods¹

Nominal anchor diameter	HAS-E ISO 898 Class 5.8			HAS-E B7 ASTM A193 B7			HAS-R Stainless AISI 304/316 SS		
	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)	Yield lb (kN)	Tensile lb (kN)	Shear lb (kN)
3/8	4,495 (20.0)	6,005 (26.7)	3,605 (16.0)	8,135 (36.2)	10,350 (43.4)	6,210 (27.6)	5,035 (22.4)	8,280 (36.8)	4,970 (22.1)
1/2	8,230 (36.6)	10,675 (47.5)	6,405 (28.5)	14,900 (66.3)	18,405 (79.0)	11,040 (49.1)	9,225 (41.0)	14,720 (65.5)	8,835 (39.3)
5/8	13,110 (58.3)	16,680 (74.2)	10,010 (44.5)	23,730 (105.6)	28,760 (125.7)	17,260 (76.8)	14,690 (65.3)	23,010 (102.4)	13,805 (61.4)
3/4	19,400 (86.3)	24,020 (106.9)	14,415 (64.1)	35,120 (156.2)	41,420 (185.7)	24,850 (110.5)	15,050 (66.9)	28,165 (125.3)	16,800 (75.2)
7/8	26,780 (119.1)	32,695 (145.4)	19,620 (87.3)	48,480 (215.7)	56,370 (256.9)	33,825 (150.5)	20,775 (92.4)	38,335 (170.5)	23,000 (102.3)
1	35,130 (156.3)	42,705 (190.0)	25,625 (114.0)	63,600 (282.9)	73,630 (337.0)	44,180 (196.5)	27,255 (121.2)	50,070 (222.7)	30,040 (133.6)
1-1/4	56,210 (250.0)	66,730 (296.8)	40,035 (178.1)	101,755 (452.6)	115,050 (511.8)	69,030 (307.1)	43,610 (194.0)	78,235 (348.0)	46,940 (208.8)

¹ Steel strength as defined in AISC Manual of Steel Construction 2nd Ed. (LRFD):

Yield = $F_y \times \text{tensile stress area}$

Tensile = $0.75 \times F_u \times \text{nominal area}$

Shear = $0.45 \times F_u \times \text{nominal area}$

Table 8 - Hilti HVU allowable bond or concrete capacity and steel strength for Hilti HIS-N and HIS-RN inserts^{1,2}

Thread size	Embed. depth in.	Adhesive capsule(s) required	HVU allowable bond/concrete capacity ²	Allowable bolt strength ²			
			Tensile lb (kN)	ASTM A325 carbon steel		ASTM F593 stainless steel	
				Tensile ¹ lb (kN)	Shear ¹ lb (kN)	Tensile ¹ lb (kN)	Shear ¹ lb (kN)
3/8-16 UNC	4-3/8 (110)	(1) 1/2 x 4-1/4	3,180 (14.1)	4,370 (19.4)	2,250 (10.0)	3,645 (16.2)	1,875 (8.3)
1/2-13 UNC	5 (127)	(1) 5/8 x 5	4,570 (20.3)	7,775 (34.6)	4,005 (17.8)	6,480 (28.8)	3,335 (14.8)
5/8-11 UNC	6-5/8 (168)	(1) 7/8 x 6-5/8	7,460 (33.2)	12,150 (54.0)	6,260 (27.8)	10,125 (45.0)	5,215 (23.2)
3/4-10 UNC	8-1/4 (210)	(1) 1 x 8-1/4	9,165 (40.8)	17,495 (77.8)	9,010 (40.1)	12,395 (55.1)	6,385 (28.4)

Table 9 - Hilti HVU ultimate bond or concrete capacity and steel strength for Hilti HIS-N and HIS-RN inserts^{1,2}

Thread size	Embed. depth in.	Adhesive capsule(s) required	HVU ultimate bond/concrete capacity ²	Steel bolt strength ²			
			Tensile lb (kN)	ASTM A325 carbon steel		ASTM F593 stainless steel	
				Tensile ¹ lb (kN)	Shear ¹ lb (kN)	Tensile ¹ lb (kN)	Shear ¹ lb (kN)
3/8-16 UNC	4-3/8 (110)	(1) 1/2 x 4-1/4	12,715 (56.6)	9,935 (44.2)	5,960 (26.5)	8,280 (36.8)	4,970 (22.1)
1/2-13 UNC	5 (127)	(1) 5/8 x 5	18,275 (81.3)	17,665 (78.6)	10,600 (47.2)	14,720 (65.5)	8,835 (39.3)
5/8-11 UNC	6-5/8 (168)	(1) 7/8 x 6-5/8	29,840 (132.7)	27,610 (122.8)	16,565 (73.7)	23,010 (102.4)	13,805 (61.4)
3/4-10 UNC	8-1/4 (210)	(1) 1 x 8-1/4	36,660 (163.1)	39,760 (176.9)	23,855 (106.1)	28,165 (125.3)	16,900 (75.1)

1 Use lower value of either bond/concrete capacity or steel strength. Minimum concrete compressive strength f'_c is 2,000 psi.

2 Steel values in accordance with AISC

ASTM A325 bolts $F_y = 92 \text{ ksi}$, $F_u = 120 \text{ ksi}$
 ASTM F593 (AISI 304/316) $F_y = 65 \text{ ksi}$, $F_u = 100 \text{ ksi}$ for 3/8- through 5/8-in.
 $F_y = 45 \text{ ksi}$, $F_u = 85 \text{ ksi}$ for 3/4-in.

Allowable load values Ultimate load values
 Tension = $0.33 \times F_u \times A_{nom}$ Tension = $0.75 \times F_u \times A_{nom}$
 Shear = $0.17 \times F_u \times A_{nom}$ Shear = $0.45 \times F_u \times A_{nom}$

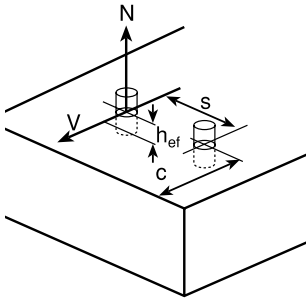
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Table 10 - Hilti HVU ultimate bond capacity and steel strength for rebar in concrete

Rebar size	Embedment depth in.	Adhesive capsule(s) required	HVU ultimate bond concrete strength ¹				Grade 60 rebar ¹	
			$f'_c = 2000$ psi lb (kN)	$f'_c = 3000$ psi lb (kN)	$f'_c = 4000$ psi lb (kN)	$f'_c = 6000$ psi lb (kN)	Yield strength lb (kN)	Tensile strength lb (kN)
#4	4-1/4 (108)	(1) 1/2 X 4-1/4	9,680 (43.1)	10,980 (48.8)	12,270 (54.6)	14,850 (66.1)	12,000 (53.4)	18,000 (80.1)
	6-3/8 (162)	(1) 1/2 X 4-1/4 & (1) 3/8 X 3-1/2	14,520 (64.6)	16,460 (73.2)	18,400 (81.9)	22,280 (99.1)		
	8-1/2 (216)	(2) 1/2 x 4-1/4	19,360 (86.1)	21,950 (97.6)	24,530 (109.1)	29,710 (132.2)		
#5	5 (127)	(1) 5/8 X 5	15,000 (66.7)	16,920 (75.3)	18,830 (83.8)	2,2650 (100.8)	18,600 (82.7)	27,900 (124.1)
	7-1/2 (184)	(1) 5/8 X 5 & (1) 1/2 X 4-1/4	22,490 (100.4)	25,370 (112.9)	28,240 (125.6)	33,980 (151.1)		
	10 (254)	(2) 5/8 X 5	29,990 (133.4)	33,820 (150.4)	37,650 (167.5)	45,310 (201.5)		
#6	6-5/8 (168)	(1) 7/8 X 6-5/8	21,020 (93.5)	24,250 (107.9)	27,470 (122.2)	33,930 (150.9)	26,400 (117.4)	39,600 (176.1)
	10 (254)	(2) 3/4 X 6-5/8	31,530 (140.3)	36,370 (161.8)	41,210 (183.3)	50,890 (226.4)		
	13-1/4 (337)	(2) 7/8 X 6-5/8	42,040 (187.0)	48,500 (215.7)	54,950 (244.4)	67,850 (301.8)		
#7	6-5/8 (168)	(1) 1 X 8-1/4	23,650 (105.2)	27,280 (121.3)	30,910 (137.5)	38,170 (169.8)	36,000 (160.1)	54,000 (240.2)
	10 (254)	(2) 3/4 X 6-5/8	35,470 (157.8)	40,920 (182.0)	46,360 (206.2)	57,250 (254.7)		
	13-1/4 (337)	(2) 1 X 8-1/4	47,300 (210.4)	54,560 (242.7)	61,810 (274.9)	76,330 (339.5)		
#8	8-1/4 (210)	(1) 1 X 8-1/4 & (1) 5/8 X 5	35,640 (158.5)	40,500 (180.2)	45,360 (201.8)	55,080 (245.0)	47,400 (210.8)	71,100 (316.3)
	12-3/8 (314)	(1) 7/8 X 6-5/8 & (1) 1 X 8-1/4	53,460 (237.8)	60,750 (270.2)	68,040 (302.7)	82,610 (367.5)		
	16-1/2 (419)	(2) 1 X 8-1/4 & (1) 3/4 X 6-5/8	71,270 (317.0)	80,990 (360.3)	90,710 (403.5)	110,150 (490.0)		

¹ Use lower of either bond/concrete or steel strength.

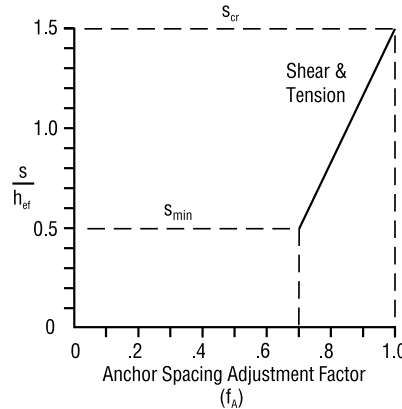
Figure 3 - Anchor spacing and edge distance in concrete



<p>Spacing tension/shear</p> $s_{min} = 0.5 h_{ef}$ $s_{cr} = 1.5 h_{ef}$ $f_A = 0.3(s/h_{ef}) + 0.55$ for $s_{cr} > s > s_{min}$
<p>Edge distance tension</p> $c_{min} = 0.5 h_{ef}$ $c_{cr} = 1.5 h_{ef}$ $f_{RN} = 0.4(c/h_{ef}) + 0.40$ for $c_{cr} > c > c_{min}$
<p>Edge distance shear ⊥ toward edge</p> $c_{min} = 0.5 h_{ef}$ $c_{cr} = 2.0 h_{ef}$ $f_{RV1} = 0.54(c/h_{ef}) - 0.09$ for $c_{cr} > c > c_{min}$
<p>Edge distance shear to or away from edge</p> $c_{min} = 0.5 h_{ef}$ $c_{cr} = 2.0 h_{ef}$ $f_{RV2} = 0.36(c/h_{ef}) + 0.28$ for $c_{cr} > c > c_{min}$

Anchor spacing adjustment factors

s = Actual spacing
 h_{ef} = Actual embedment
 $s_{min} = 0.5 h_{ef}$
 $s_{cr} = 1.5 h_{ef}$



Edge distance adjustment factors

c = Actual edge distance
 h_{ef} = Actual embedment
 $c_{min} = 0.5 h_{ef}$ Tension and shear
 $c_{cr} = 1.5 h_{ef}$ Tension
 $c_{cr} = 2.0 h_{ef}$ Shear
 ⊥ = Perpendicular to edge
 || = Parallel to edge

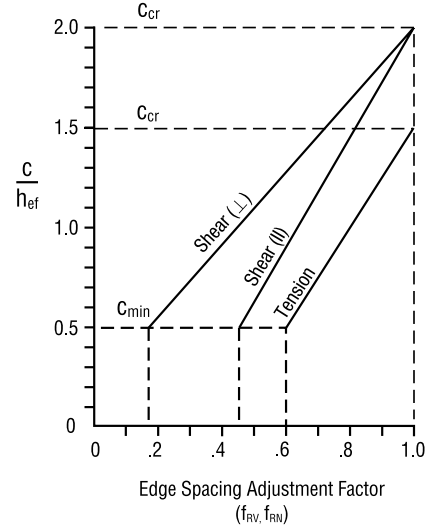


Table 11 - Hilti HVU load adjustment factors for 3/8-in. diameter anchors

Anchor diameter	3/8-in. diameter												
	Spacing tension/shear f_A			Edge distance tension f_{RN}			Edge distance shear (⊥ toward edge) f_{RV1}			Edge distance shear (to or away from edge) f_{RV2}			
Embedment Depth, in.	3-1/2	5-1/4	7	3-1/2	5-1/4	7	3-1/2	5-1/4	7	3-1/2	5-1/4	7	
Spacing (s)/Edge distance (c), in.	1-3/4	0.70		0.60			0.18			0.46			
	2	0.72		0.63			0.22			0.49			
	2-5/8	0.78	0.70	0.70	0.60		0.32	0.18		0.55	0.46		
	3	0.81	0.72		0.74	0.63		0.37	0.22		0.59	0.49	
	3-1/2	0.85	0.75	0.70	0.80	0.67	0.60	0.45	0.27	0.18	0.64	0.52	0.46
	4	0.89	0.78	0.72	0.86	0.70	0.63	0.53	0.32	0.22	0.69	0.55	0.49
	4-1/2	0.94	0.81	0.74	0.91	0.74	0.66	0.60	0.37	0.26	0.74	0.59	0.51
	5-1/4	1.00	0.85	0.78	1.00	0.80	0.70	0.72	0.45	0.32	0.82	0.64	0.55
	6		0.89	0.81		0.86	0.74	0.84	0.53	0.37	0.90	0.69	0.59
	7		0.95	0.85		0.93	0.80	1.00	0.63	0.45	1.00	0.76	0.64
	7-7/8		1.00	0.89		1.00	0.85		0.72	0.52		0.82	0.69
	8-1/2			0.89			0.86		0.78	0.57		0.86	0.72
	9			0.91			0.89		0.84	0.60		0.90	0.74
	10			0.94			0.91		0.94	0.68		0.97	0.79
10-1/2			0.96			0.94		1.00	0.72		1.00	0.82	
12			0.98			0.97			0.84			0.90	
13			1.00			1.00			0.91			0.95	
14									1.00			1.00	

3.2.6

Table 12 - Hilti HVU load adjustment factors for 1/2-in. diameter anchors

Anchor diameter	1/2-in. diameter											
	Spacing tension/shear f_A			Edge distance tension f_{RN}			Edge distance shear (⊥ toward edge) f_{RV1}			Edge distance shear (to or away from edge) f_{RV2}		
Embedment depth, in.	4-1/4	6-3/8	8-1/2	4-1/4	6-3/8	8-1/2	4-1/4	6-3/8	8-1/2	4-1/4	6-3/8	8-1/2
2-1/8	0.70			0.60			0.18			0.46		
3	0.76			0.68			0.29			0.53		
3-3/16	0.78	0.70		0.70	0.60		0.32	0.18		0.55	0.46	
3-1/2	0.80	0.71		0.73	0.62		0.35	0.21		0.58	0.48	
4	0.83	0.74		0.78	0.65		0.42	0.25		0.62	0.51	
4-1/4	0.85	0.75	0.70	0.80	0.67	0.60	0.45	0.27	0.18	0.64	0.52	0.46
5	0.90	0.79	0.73	0.87	0.71	0.64	0.55	0.33	0.23	0.70	0.56	0.49
5-1/2	0.94	0.81	0.74	0.92	0.75	0.66	0.61	0.38	0.26	0.75	0.59	0.51
6	0.97	0.83	0.76	0.96	0.78	0.68	0.67	0.42	0.29	0.79	0.62	0.53
6-3/8	1.00	0.85	0.78	1.00	0.80	0.70	0.72	0.45	0.32	0.82	0.64	0.55
7		0.88	0.80		0.84	0.73	0.80	0.50	0.35	0.87	0.68	0.58
8		0.93	0.83		0.90	0.78	0.93	0.59	0.42	0.96	0.73	0.62
8-1/2		0.95	0.85		0.93	0.80	1.00	0.63	0.45	1.00	0.76	0.64
9		0.97	0.87		0.96	0.82		0.67	0.48		0.79	0.66
9-9/16		1.00	0.89		1.00	0.85		0.72	0.52		0.82	0.69
10			0.90			0.87		0.76	0.55		0.84	0.70
10-1/2			0.92			0.89		0.80	0.58		0.87	0.72
12			0.97			0.96		0.93	0.67		0.96	0.79
12-3/4			1.00			1.00		1.00	0.72		1.00	0.82
14									0.80			0.87
16									0.93			0.96
17									1.00			1.00

Spacing tension/shear
 $s_{min} = 0.5 h_{ef}$ $s_{cr} = 1.5 h_{ef}$
 $f_A = 0.3(s/h_{ef}) + 0.55$
 for $s_{cr} > s > s_{min}$

Edge distance tension
 $c_{min} = 0.5 h_{ef}$ $c_{cr} = 1.5 h_{ef}$
 $f_{RN} = 0.4(c/h_{ef}) + 0.40$
 for $c_{cr} > c > c_{min}$

Edge distance shear
 ⊥ toward edge
 $c_{min} = 0.5 h_{ef}$ $c_{cr} = 2.0 h_{ef}$
 $f_{RV1} = 0.54(c/h_{ef}) - 0.09$
 for $c_{cr} > c > c_{min}$

Edge distance shear
 || to or away from edge
 $c_{min} = 0.5 h_{ef}$ $c_{cr} = 2.0 h_{ef}$
 $f_{RV2} = 0.36(c/h_{ef}) + 0.28$
 for $c_{cr} > c > c_{min}$

Table 13 - Hilti HVU load adjustment factors for 5/8-in. and 3/4-in. diameter anchors

Anchor diameter	5/8-in. diameter												3/4-in. diameter																
	Spacing tension/shear f_A			Edge distance tension f_{RN}			Edge distance shear (⊥ toward edge) f_{RV1}			Edge distance shear (to or away from edge) f_{RV2}			Spacing tension/shear f_A			Edge distance tension f_{RN}			Edge distance shear (⊥ toward edge) f_{RV1}			Edge distance shear (to or away from edge) f_{RV2}							
Embedment depth, in.	5	7-1/2	10	5	7-1/2	10	5	7-1/2	10	5	7-1/2	10	5	7-1/2	10	6-5/8	10	13-1/4	6-5/8	10	13-1/4	6-5/8	10	13-1/4	6-5/8	10	13-1/4		
2-1/2	0.70			0.60			0.18			0.46																			
3-5/16	0.75			0.67			0.27			0.52			0.70			0.60			0.18							0.46			
3-3/4	0.78	0.70		0.70	0.60		0.32	0.18		0.55	0.46		0.72			0.63			0.22							0.48			
4	0.79	0.71		0.72	0.61		0.34	0.20		0.57	0.47		0.73			0.64			0.24							0.50			
4-1/2	0.82	0.73		0.76	0.64		0.40	0.23		0.60	0.50		0.75			0.67			0.28							0.52			
5	0.85	0.75	0.70	0.80	0.67	0.60	0.45	0.27	0.18	0.64	0.52	0.46	0.78	0.70		0.70	0.60		0.32	0.18					0.55	0.46			
5-1/2	0.88	0.77	0.72	0.84	0.69	0.62	0.50	0.31	0.21	0.68	0.54	0.48	0.80	0.72		0.73	0.62		0.36	0.21					0.58	0.48			
6	0.91	0.79	0.73	0.88	0.72	0.64	0.56	0.34	0.23	0.71	0.57	0.50	0.82	0.73		0.76	0.64		0.40	0.23					0.61	0.50			
6-5/8	0.95	0.82	0.75	0.93	0.75	0.67	0.63	0.39	0.27	0.76	0.60	0.52	0.85	0.75	0.70	0.80	0.67	0.60	0.45	0.27	0.18	0.64	0.52	0.46					
7	0.97	0.83	0.76	0.96	0.77	0.68	0.67	0.41	0.29	0.78	0.62	0.53	0.87	0.76	0.71	0.82	0.68	0.61	0.48	0.29	0.20	0.66	0.53	0.47					
7-1/2	1.00	0.85	0.78	1.00	0.80	0.70	0.72	0.45	0.32	0.82	0.64	0.55	0.89	0.78	0.72	0.85	0.70	0.63	0.52	0.32	0.22	0.69	0.55	0.48					
8		0.87	0.79		0.83	0.72	0.77	0.49	0.34	0.86	0.66	0.57	0.91	0.79	0.73	0.88	0.72	0.64	0.56	0.34	0.24	0.71	0.57	0.50					
9		0.91	0.82		0.88	0.76	0.88	0.56	0.40	0.93	0.71	0.60	0.96	0.82	0.75	0.94	0.76	0.67	0.64	0.40	0.28	0.77	0.60	0.52					
9-15/16		0.95	0.85		0.93	0.80	0.98	0.63	0.45	1.00	0.76	0.64	1.00	0.85	0.78	1.00	0.80	0.70	0.72	0.45	0.32	0.82	0.64	0.55					
10		0.95	0.85		0.93	0.80	1.00	0.63	0.45		0.76	0.64		0.85	0.78		0.80	0.70	0.73	0.45	0.32	0.82	0.64	0.55					
11-1/4		1.00	0.89		1.00	0.85		0.72	0.52		0.82	0.69		0.89	0.80		0.85	0.74	0.83	0.52	0.37	0.89	0.69	0.59					
12			0.91			0.88		0.77	0.56		0.86	0.71		0.91	0.82		0.88	0.76	0.89	0.56	0.40	0.93	0.71	0.61					
13			0.94			0.92		0.85	0.61		0.90	0.75		0.94	0.84		0.92	0.79	0.97	0.61	0.44	0.99	0.75	0.63					
13-1/4			0.95			0.93		0.86	0.63		0.92	0.76		0.95	0.85		0.93	0.80	1.00	0.63	0.45	1.00	0.76	0.64					
15			1.00			1.00		1.00	0.72		1.00	0.82		1.00	0.89		1.00	0.85		0.72	0.52		0.82	0.69					
18									0.88			0.93			0.96			0.94		0.88	0.64		0.93	0.77					
20									1.00			1.00			1.00			1.00		1.00	0.73		1.00	0.82					
22																					0.81			0.88					
24																						0.89			0.93				
26-1/2																						1.00			1.00				

Table 14 - Hilti HVU load adjustment factors for 7/8-in. diameter anchors

Anchor diameter	7/8-in. diameter												
	Spacing tension/shear f_A			Edge distance tension f_{RN}			Edge distance shear (⊥ toward edge) f_{RV1}			Edge distance shear (to or away from edge) f_{RV2}			
Embedment depth, in.	6-5/8	10	13-1/4	6-5/8	10	13 1/4	6-5/8	10	13-1/4	6-5/8	10	13-1/4	
Spacing (s)/Edge distance (c), in.	3-5/16	0.70		0.60			0.18			0.46			
	4	0.73		0.64			0.24			0.50			
	4-1/2	0.75		0.67			0.28			0.52			
	5	0.78	0.70	0.70	0.60		0.32	0.18		0.55	0.46		
	6	0.82	0.73		0.76	0.64		0.40	0.23		0.61	0.50	
	6-5/8	0.85	0.75	0.70	0.80	0.67	0.60	0.45	0.27	0.18	0.64	0.52	0.46
	7	0.87	0.76	0.71	0.82	0.68	0.61	0.48	0.29	0.20	0.66	0.53	0.47
	8	0.91	0.79	0.73	0.88	0.72	0.64	0.56	0.34	0.24	0.71	0.57	0.50
	9	0.96	0.82	0.75	0.94	0.76	0.67	0.64	0.40	0.28	0.77	0.60	0.52
	9-15/16	1.00	0.85	0.78	1.00	0.80	0.70	0.72	0.45	0.32	0.82	0.64	0.55
	10		0.85	0.78		0.80	0.70	0.73	0.45	0.32	0.82	0.64	0.55
	11		0.88	0.80		0.84	0.73	0.81	0.50	0.36	0.88	0.68	0.58
	12		0.91	0.82		0.88	0.76	0.89	0.56	0.40	0.93	0.71	0.61
	13		0.94	0.84		0.92	0.79	0.97	0.61	0.44	0.99	0.75	0.63
	13-1/4		0.95	0.85		0.93	0.80	1.00	0.63	0.45	1.00	0.76	0.64
	14		0.97	0.87		0.96	0.82		0.67	0.48		0.78	0.66
	15		1.00	0.89		1.00	0.85		0.72	0.52		0.82	0.69
	16			0.91			0.88		0.77	0.56		0.86	0.71
	18			0.96			0.94		0.88	0.64		0.93	0.77
	20			1.00			1.00		1.00	0.73		1.00	0.82
22									0.81			0.88	
24									0.89			0.93	
26-1/2									1.00			1.00	

Spacing tension/shear
 $s_{min} = 0.5 h_{ef}$ $s_{cr} = 1.5 h_{ef}$
 $f_A = 0.3(s/h_{ef}) + 0.55$
 for $s_{cr} > s > s_{min}$

Edge distance tension
 $c_{min} = 0.5 h_{ef}$ $c_{cr} = 1.5 h_{ef}$
 $f_{RN} = 0.4(c/h_{ef}) + 0.40$
 for $c_{cr} > c > c_{min}$

Edge distance shear
 ⊥ toward edge
 $c_{min} = 0.5 h_{ef}$ $c_{cr} = 2.0 h_{ef}$
 $f_{RV1} = 0.54(c/h_{ef}) - 0.09$
 for $c_{cr} > c > c_{min}$

Edge distance shear
 || to or away from edge
 $c_{min} = 0.5 h_{ef}$ $c_{cr} = 2.0 h_{ef}$
 $f_{RV2} = 0.36(c/h_{ef}) + 0.28$
 for $c_{cr} > c > c_{min}$

Table 15 - Hilti HVU load adjustment factors for 1-in. and 1-1/4-in. diameter anchors

Anchor diameter	1-in. diameter												1-1/4-in. diameter												
	Spacing tension/shear f_A			Edge distance tension f_{RN}			Edge distance shear (⊥ toward edge) f_{RV1}			Edge distance shear (to or away from edge) f_{RV2}			Spacing tension/shear f_A			Edge distance tension f_{RN}			Edge distance shear (⊥ toward edge) f_{RV1}			Edge distance shear (to or away from edge) f_{RV2}			
Embedment depth, in.	8-1/4	12-3/8	16-1/2	8-1/4	12-3/8	16-1/2	8-1/4	12-3/8	16-1/2	8-1/4	12-3/8	16-1/2	8-1/4	12-3/8	16-1/2	12	15	18	12	15	18	12	15	18	
Spacing (s)/Edge distance (c), in.	4-1/8	0.70		0.60			0.18			0.46															
	4-1/2	0.71		0.62			0.20			0.48															
	5	0.73		0.64			0.24			0.50															
	6	0.77		0.69			0.30			0.54			0.70			0.60			0.18			0.46			
	6-3/16	0.78	0.70	0.70	0.60	0.60	0.32	0.18		0.55	0.46		0.70			0.61			0.19			0.47			
	7	0.80	0.72		0.74	0.63	0.37	0.22		0.59	0.48		0.73			0.63			0.23			0.49			
	7-1/2	0.82	0.73		0.76	0.64		0.40	0.24		0.61	0.50		0.74	0.70			0.65	0.60		0.25	0.18		0.51	0.46
	8-1/4	0.85	0.75	0.70	0.80	0.67	0.60	0.45	0.27	0.18	0.64	0.52	0.46	0.76	0.72			0.68	0.62		0.28	0.21		0.53	0.48
	9	0.88	0.77	0.71	0.84	0.69	0.62	0.50	0.30	0.20	0.67	0.54	0.48	0.78	0.73	0.70	0.70	0.64	0.60	0.32	0.23	0.18	0.55	0.50	0.46
	10	0.91	0.79	0.73	0.88	0.72	0.64	0.56	0.35	0.24	0.72	0.57	0.50	0.80	0.75	0.72	0.73	0.67	0.62	0.36	0.27	0.21	0.58	0.52	0.48
	11	0.95	0.82	0.75	0.93	0.76	0.67	0.63	0.39	0.27	0.76	0.60	0.52	0.83	0.77	0.73	0.77	0.69	0.64	0.41	0.31	0.24	0.61	0.54	0.50
	12-3/8	1.00	0.85	0.78	1.00	0.80	0.70	0.72	0.45	0.32	0.82	0.64	0.55	0.86	0.80	0.76	0.81	0.73	0.68	0.47	0.36	0.28	0.65	0.58	0.53
	13		0.87	0.79		0.82	0.72	0.76	0.48	0.34	0.85	0.66	0.56	0.88	0.81	0.77	0.83	0.75	0.69	0.50	0.38	0.30	0.67	0.59	0.54
	14		0.89	0.80		0.85	0.74	0.83	0.52	0.37	0.89	0.69	0.59	0.90	0.83	0.78	0.87	0.77	0.71	0.54	0.41	0.33	0.70	0.62	0.56
	16		0.94	0.84		0.92	0.79	0.96	0.61	0.43	0.98	0.75	0.63	0.95	0.87	0.82	0.93	0.83	0.76	0.63	0.49	0.39	0.76	0.66	0.60
	16-1/2		0.95	0.85		0.93	0.80	1.00	0.63	0.45	1.00	0.76	0.64	0.96	0.88	0.83	0.95	0.84	0.77	0.65	0.50	0.41	0.78	0.68	0.61
	18		0.99	0.88		0.98	0.84		0.70	0.50		0.80	0.67	1.00	0.91	0.85	1.00	0.88	0.80	0.72	0.56	0.45	0.82	0.71	0.64
	18-9/16		1.00	0.89		1.00	0.85		0.72	0.52		0.82	0.69		0.92	0.86		0.90	0.81	0.75	0.58	0.47	0.84	0.73	0.65
	22-1/2			0.96			0.95		0.89	0.65		0.93	0.77		1.00	0.93		1.00	0.90	0.92	0.72	0.59	0.96	0.82	0.73
	24			0.99			0.98		0.96	0.70		0.98	0.80			0.95			0.93	1.00	0.77	0.63	1.00	0.86	0.76
24-3/4			1.00			1.00		1.00	0.72		1.00	0.82			0.96			0.95		0.80	0.65	0.87	0.78		
27									0.79			0.87			1.00			1.00		0.88	0.72	0.93	0.82		
30									0.89			0.93								1.00	0.81	1.00	0.88		
33									1.00			1.00									0.90		1.00	0.94	
36																					1.00		1.00	1.00	

3.2.6

MATERIAL PROPERTIES

Table 16 - Hilti HVU adhesive chemical resistance

Chemical/Liquid	% by Weight	Not resistant	Partially resistant	Resistant
Acetic acid	conc. 10%		•	•
Acetone		•		
Ammonia	25% 5%	•	•	
Ammonium nitrate	10%			•
Ammonium sulphate	10%			•
Carbolic acid solution (Phenol)	10%	•		
Carbon tetrachloride	conc.			•
Caustic soda	40%			•
Sodium hydroxide	20%			•
Chlorinated lime solution	conc.			•
Citric acid	10%			•
Common salt solution	10%			•
Communal waste water				•
Diesel oil				•
Ethanol	96%		•	
Ethylene glycol	conc.			•
Formic acid	10%			•
Hydrochloric acid	20%		•	
Hydrogen peroxide	30% 5%		•	•
Lactic acid	50% 10%			•
Machine oil				•
Methanol	conc.	•		
Methyl isobutyl ketone	conc.			•
Mixture of amines	Vol% ¹			•
Mixture of aromatic hydrocarbons	Vol% ²			•
Nitric acid	40% 20%	•	•	
Petrol/Gasoline				•
Phosphoric acid	40% 20%			•
2-Propanol	conc.			•
Propylene glycol	conc.			•
Sodium carbonate	10%			•
Sodium Silicate (pH=14)	50%			•
Sulphuric acid	40% 20%			•
Xylene	conc.			•

1 35 Vol% Triethanolamine, 30 Vol% n-Butylamine and 35 Vol% N,N-Dimethylaniline

2 60 Vol% Toluene, 30 Vol% Xylene and 10 Vol% Methyl-naphthalene

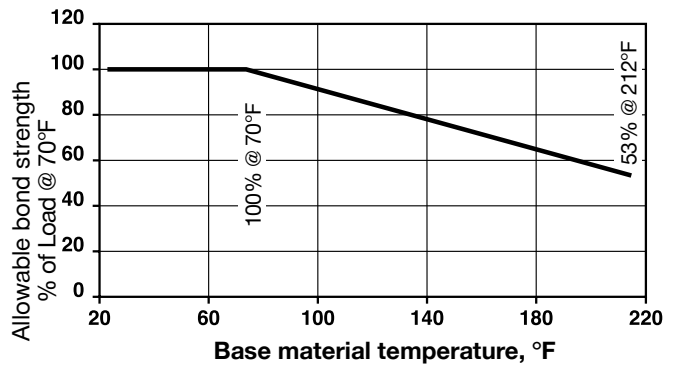
Samples of the HVU Resin were immersed in the various chemical compounds for up to one year. At the end of the test period, the samples were analyzed. Any samples showing no visible damage and having less than a 25% reduction in bending (flexural) strength were classified as Resistant. Samples that had slight damage, such as small cracks, chips, etc. or reduction in bending strength of 25% or more, were classified as Partially Resistant. Samples that were heavily damaged or destroyed were classified as Not Resistant.

INSTALLATION INSTRUCTIONS

Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded online at www.hilti.com. Because of the possibility of changes, always verify that downloaded IFU 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 IFU.

Note: In actual use, the majority of the resin is encased in the concrete, leaving very little surface area exposed. In some cases, this would allow the HVU system to be used where it would be exposed to the Partially Resistant chemical compounds.

Figure 4 - Influence of temperature on bond strength^{1,2}



- 1 Temperature of concrete test sample is maintained at temperature, removed from the controlled environment and tested to failure.
- 2 Long-term creep test in accordance with ICC-ES Acceptance Criteria AC58.

Table 17 - Hilti HVU capsule volume

Size	(in ³)
HVU 3/8 (M10)	0.37
HVU 1/2 (M12)	0.61
HVU 5/8 (M16)	1.04
HVU 3/4	2.07
HVU 7/8 (M20)	2.62
HVU 1 (M24)	4.21
HVU 1-1/4 (M32)	9.46

Table 18 - Full cure time

Base material temperature		Full cure time
°F	°C	
23	-5	5 hr
32	0	1 hr
50	10	30 min
above 68	20	20 mn

Table 19 - Influence of high energy radiation

Radiation exposure ^{1,2}	Detrimental effect	Recommendation for use
< 10 Mrad	Insignificant	Full Use
10 - 100 Mrad	Moderate	Restricted use $F_{rec.} = 0.5 F_{perm.}$
> 100 Mrad	Medium to strong	No recommendation for use

1 Mrad = Megarad

2 Dosage over life span.

ORDERING INFORMATION

HVU adhesive capsule



HVU adhesive capsules

HVU anchor system with threaded rods ^{2,3,4}			Setting nuts ^{2,3}		
Capsule size	Qty	Description	Qty	Hole dia	Std embed
HVU 3/8 x 3-1/2	10	3/8	10	7/16	3-1/2
HVU 1/2 x 4-1/4	10	1/2	10	9/16	4-1/4
HVU 5/8 x 5	10	5/8	5	11/16	5
HVU 3/4 x 6-5/8	5	3/4	5	7/8	6-5/8
HVU 7/8 x 6-5/8	5	7/8	5	1	6-5/8
HVU 1 x 8-1/4	5	1	5	1-1/8	8-1/4
HVU 1-1/4 x 12	4	1-1/4	5	1-3/8	12

HVU anchor system with internal threaded inserts			HIS-S setting tool ¹		
Capsule size	Qty	Description	Drive socket	Hole dia	Std embed
HVU 1/2 x 4-1/4	10	3/8	9/16	11/16	4-1/4
HVU 5/8 x 5	10	1/2	3/4	7/8	5
HVU 7/8 x 6-5/8	5	5/8	15/16	1-1/8	6-5/8
HVU 1 x 8-1/4	5	3/4	1-1/8	1-1/4	8-1/4

HVU anchor system with rebar			Rebar setting tool TE-Y		
Rebar Size	Capsule size	Qty	Description	Hole dia	Std embed
#4	HVU 1/2 x 4-1/4	10	Rebar adapter #4	5/8	4-1/4
#5	HVU 5/8 x 5	10	Rebar adapter #5	13/16	5
#6	HVU 7/8 x 6-5/8	5	Rebar adapter #6	1	6-5/8
#7	HVU 1 x 8-1/4	5	Rebar adapter #7	1-1/8	6-5/8
#8	HVU 5/8 x 5 and HVU 1 x 8-1/4 (both capsules needed)	10 5	Rebar adapter #8	1-1/4	8-1/4



HAS-E-rod



Drive shaft & socket for setting HAS rods and HIS inserts



HIS-N insert



HIS-N setting tool



Rebar



Rebar setting tool

3.2.6

Setting Tools

	Square drive shaft 1/2	Square drive shaft 3/4	Square drive shaft 1
HAS rod diameter	Drive socket	Drive socket	Drive socket
3/8	9/16 x 1/2	-	-
1/2	3/4 x 1/2	3/4 x 3/4	-
5/8	15/16 x 1/2	15/16 x 3/4	-
3/4	-	1-1/8 x 3/4	-
7/8	-	1-7/16 x 3/4	-
1	-	1-1/2 x 3/4	-
1-1/4	-	-	1-7/8 x 1

- 1 All dimensions in inches.
- 2 To be used with appropriate drive socket and drive shaft from selector chart at left. Setting nuts not required with HIS setting tools.
- 3 Setting nuts are required for proper fit of drive socket.
- 4 Setting nuts have a black finished coating except 7/8" which are HDG.

For ordering information for anchor rods and inserts, dispensers, hole cleaning equipment and other accessories, see section 3.2.9.

3.2.7 HAS THREADED RODS AND HIT-Z ANCHOR RODS

Hilti has a full line of threaded rods available in 8 different material and coating types. Our new enhanced carbon steel rods now all meet the requirements of ASTM F1554, which allows engineers to design ductile fastening points with predictable steel failure for seismic applications in the three most common and relevant steel grades 36, 55 and 105.

Hilti still continues to provide the innovative HIT-Z anchor rods with HIT-HY 200. This Hilti SafeSet system provides the ultimate in safety and load capacity combined with 60% faster installation due to zero-cleaning.

The following is the technical data and ordering information for diameters up to 1-1/4" and pre-cut lengths. Contact Hilti for additional information on HAS rod diameters up to 2-1/2" and custom lengths.

Specifications and physical properties of Hilti HAS threaded rods and Hilti HIT-Z anchor rods

Threaded Rod Specification	Units	Specified Ultimate Strength, f_{uta}		Minimum Specified Yield Strength 0.2% Offset, f_{ya}	f_{uta} / f_{ya}	Elongation, Min. %	Reduction of Area, Min. %	Specification for Nuts and Washers
		min.	max. ⁵					
CARBON STEEL HAS-V / HAS-V-36 / HAS-V-36 HDG ASTM F1554, Grade 36 ^{1,2,8} 	psi	58,000	80,000	36,000	1.61	23	40	Nuts: ASTM A563-15 Grade A Washers: ASTM F436 Type 1, circular
	(MPa)	(400)	(552)	(248)				
	psi	75,000	95,000	55,000	1.36	21	30 (3/8" - 2") 22 (2-1/4" - 2-1/2")	
	(MPa)	(517)	(655)	(379)				
HAS-B-105 / HAS-B-105 HDG ASTM A193, Grade B7 ^{1,3} ASTM F1554, Grade 105 ^{1,2,8} 	psi	125,000 ⁽⁶⁾	150,000	105,000	1.19	16 (B7) 15 (Gr. 105)	50 (B7) 45 (Gr. 105)	Nuts: ASTM A194/194M, Grade 2H, Heavy or ASTM A563-15 Grade C Washers: ASTM F436 Type 1, circular
	(MPa)	(862) ⁽⁶⁾	(1,034)	(724)				
HIT-Z Anchor rod (HIT-HY 200 only) Unalloyed carbon steel ¹	psi	94,200	NA	75,300	1.25	8	20	Nuts: ASTM A563 Gr. A Washers: ASTM F844, HV and ANSI B18.22.1 Type A Plain
	(MPa)	(650)		(519)				
STAINLESS STEEL HAS-R 304 / 316 3/8-in. to 5/8-in. AISI Type 304 / 316 ASTM F 593 CW1 ⁴	psi	100,000	150,000	65,000	1.54	20	-	Nuts: ASTM F594 Washers: ASTM A240 and ANSI B18.22.1 Type A Plain
	(MPa)	(690)	(1,034)	(448)				
	psi	85,000	140,000	45,000	1.89	25	-	
	(MPa)	(586)	(966)	(310)				
psi	75,000 ⁽⁷⁾	NA	30,000	2.50 ⁽⁷⁾	30	50		
(MPa)	(517) ⁽⁷⁾		(207)					
HIT-Z-R Anchor rod (HIT-HY 200 only) Grade 316	psi	94,200	NA	75,300	1.25	8	20	
	(MPa)	(650)		(519)				

1 All electroplated carbon steel threaded rods are zinc plated in accordance with ASTM F1941 Fe/Zn 5 AN, with nuts and washers zinc plated in accordance with ASTM B633 SC 1 Type III. All hot-dipped galvanized threaded rods, nuts, and washers are zinc plated in accordance with ASTM F2329.

2 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

3 Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.

4 Standard Steel Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

5 Maximum specified steel strength according to ASTM standard. NA indicates that ASTM standard does not publish a maximum value.

6 For designs according to CSA A23.3-14 Annex D, the maximum value of f_{uta} is 860 MPa (124,700 psi) per clause D.6.1.2.

7 For calculating steel strength, ACI 318-14 section 17.4.1.2 and CSA A23.3-14 clause D.6.1.2 limit the ultimate strength to $1.9 f_{ya}$.

Thus, $f_{uta} = 57,000$ psi (393 MPa) for calculation purposes when determining steel strength in tension (N_{ts}) and shear (V_{sb}).

8 3/8-inch dia. threaded rods are not included in the ASTM F1554 standard. Hilti 3/8-inch dia. HAS-V, HAS-E, and HAS-E-B (incl. HDG) threaded rods meet the chemical composition and mechanical property requirements of ASTM F1554.

ORDERING INFORMATION

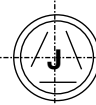
Hilti HIT-Z Anchor rods for Hilti HIT-HY 200 Anchoring system

HIT-Z Carbon Steel		HIT-Z-R 316 Stainless Steel		HIT-Z (-R) Length Code
Description	Qty	Description	Qty	
3/8" x 3-3/8"	40	3/8" x 3-3/8"	40	D
3/8" x 4-3/8"	40	3/8" x 4-3/8"	40	F
3/8" x 5-1/8"	40	3/8" x 5-1/8"	40	H
3/8" x 6-3/8"	40	3/8" x 6-3/8"	40	J
1/2" x 4-1/2"	20	1/2" x 4-1/2"	20	F
1/2" x 6-1/2"	20	1/2" x 6-1/2"	20	J
1/2" x 7-3/4"	20	1/2" x 7-3/4"	20	M
5/8" x 6"	12	5/8" x 6"	12	I
5/8" x 8"	12	5/8" x 8"	12	M
5/8" x 9-1/2"	12	5/8" x 9-1/2"	12	P
3/4" x 6-1/2"	6	3/4" x 6-1/2"	6	J
3/4" x 8-1/2"	6	3/4" x 8-1/2"	6	N
3/4" x 9-3/4"	6	3/4" x 9-3/4"	6	Q

3.2.7



Hilti Rods are now stamped on the end to show grade of steel and overall anchor length!



"J" = HIT-Z
"J" = Length Code



"HV" = HAS-V-36
"6 1/2" = Length



"HE" = HAS-E-55
"6 1/2" = Length



"HB" = HAS-B-105
"6 1/2" = Length



"R1" = 304 SS
"6 1/2" = Length



"R2" = 316 SS
"6 1/2" = Length



Overview of the Hilti HAS standard off-the-shelf anchor rods for Hilti chemical anchoring systems¹



HAS-V does not come with chisel point



HAS-E, HAS-B, and HAS-R all come with chisel point

HAS-V-36/ HAS-V-36 HDG		HAS-E-55		HAS-B-105		HAS-B-105 HDG Hot-dipped galvanized		HAS-R 304 Stainless Steel		HAS-R 316 Stainless Steel	
Description	Qty	Description	Qty	Description	Qty	Description	Qty	Description	Qty	Description	Qty
-	-	3/8" x 3"	20	-	-	-	-	-	-	-	-
3/8" x 4-3/8" ²	20	3/8" x 4-3/8"	20	-	-	-	-	-	-	-	-
3/8" x 5-1/8" ²	20	3/8" x 5-1/8"	20	3/8" x 5-1/8"	20	-	-	3/8" x 5-1/8"	20	3/8" x 5-1/8"	20
3/8" x 8" ²	10	3/8" x 8"	10	-	-	-	-	3/8" x 8"	10	3/8" x 8"	10
-	-	3/8" x 12"	10	-	-	-	-	-	-	-	-
-	-	1/2" x 3-1/8"	20	-	-	-	-	-	-	-	-
1/2" x 4-1/2"	20	1/2" x 4-1/2"	20	-	-	-	-	-	-	-	-
1/2" x 6-1/2"	20	1/2" x 6-1/2"	20	1/2" x 6-1/2"	20	-	-	1/2" x 6-1/2"	20	1/2" x 6-1/2"	20
1/2" x 8" ²	10	1/2" x 8"	10	-	-	1/2" x 8"	10	1/2" x 8"	10	1/2" x 8"	10
-	-	1/2" x 10"	10	-	-	-	-	1/2" x 10"	10	1/2" x 11"	10
-	-	1/2" x 12"	10	-	-	-	-	-	-	1/2" x 12"	10
5/8" x 6"	10	5/8" x 6"	10	-	-	-	-	-	-	-	-
5/8" x 8"	10	5/8" x 8"	10	5/8" x 8"	10	5/8" x 8"	10	5/8" x 7-5/8"	20	5/8" x 7-5/8"	20
5/8" x 10" ²	10	5/8" x 9"	10	-	-	-	-	5/8" x 10"	10	5/8" x 9"	10
5/8" x 12" ²	10	5/8" x 12"	10	-	-	5/8" x 12"	10	-	-	5/8" x 12"	10
-	-	5/8" x 17"	10	-	-	-	-	-	-	-	-
3/4" x 6" ²	10	3/4" x 6"	10	-	-	-	-	-	-	-	-
3/4" x 8"	10	3/4" x 8"	10	-	-	-	-	-	-	-	-
3/4" x 10"	10	3/4" x 10"	10	3/4" x 10"	10	3/4" x 10"	10	3/4" x 9-5/8"	10	3/4" x 9-5/8"	10
-	-	3/4" x 11"	10	-	-	-	-	-	-	3/4" x 10"	10
3/4" x 12" ²	10	3/4" x 12"	10	-	-	-	-	3/4" x 12"	10	-	-
-	-	3/4" x 14"	10	3/4" x 14"	10	3/4" x 14"	10	3/4" x 14"	10	-	-
3/4" x 16" ²	10	3/4" x 17"	10	-	-	-	-	3/4" x 16"	10	3/4" x 16"	10
-	-	3/4" x 19"	8	-	-	3/4"x20"	8	-	-	-	-
-	-	3/4" x 21"	8	-	-	-	-	-	-	-	-
-	-	3/4" x 25"	4	-	-	-	-	-	-	-	-
-	-	7/8" x 10"	10	-	-	7/8" x 10"	10	7/8" x 10"	10	7/8" x 10"	10
-	-	7/8" x 13"	8	-	-	7/8" x 12"	10	-	-	-	-
-	-	-	-	-	-	7/8" x 16"	10	-	-	7/8" x 16"	10
1" x 12"	4	1" x 12"	4	1" x 12"	4	-	-	1" x 12"	4	1" x 12"	4
-	-	1" x 14"	4	1" x 14"	4	-	-	-	-	-	-
-	-	1" x 16"	2	1" x 16"	2	1" x 16"	2	-	-	1" x 16"	2
-	-	1" x 20"	2	1" x 21"	2	1" x 21"	2	-	-	1" x 20"	2
-	-	1-1/4" x 16"	2	1-1/4" x 16"	2	1-1/4" x 16"	2	-	-	-	-
-	-	1-1/4" x 22"	2	1-1/4" x 23"	2	-	-	-	-	-	-




¹ Additional diameters (up to 2-1/2") and lengths are available upon request. Contact Hilti for the full portfolio.

² Not available in hot dipped galvanized.

3.2.8 ADHESIVE ANCHOR ACCESSORIES



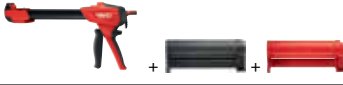


Accessories — dispensers

Battery powered




Description	
HDE 500-A18/A22 compact battery dispenser kit¹ Includes dispenser, (2) compact B 18/22 1.6-Ah Li-Ion batteries, C 4/36 battery charger, black and red cartridge holders in a soft bag.	
HDE 500-A18/A22 industrial battery dispenser kit¹ Includes dispenser, (2) industrial B 18/22 3.3-Ah Li-Ion batteries, C 4/36 battery charger, black and red cartridge holders in a soft bag.	
HDE 500-A18/A22 battery dispenser tool body¹ Includes black and red cartridge holders	
Battery charger C 4/36 Li-Ion 115V Use with all B 14.4, B 18/22 batteries or B 36 batteries	
Battery compact 18/22 1.6-Ah Li-Ion	
Battery industrial B 18/22 3.3-Ah Li-Ion	
HDE 500-A18/22 hard case	

3.2.7

Manual

Description	
MD 1000 manual dispenser¹ For HIT ICE	
HDM 500 manual dispenser with black foil pack holder For use with 11.1 fl oz/330 ml and 16.9 fl oz/500 ml foil packs of HIT-HY 150 MAX, HIT-HY 150 MAX-SD, HIT-RE 500, RE 500-SD, HIT-HY 10 PLUS, HIT-HY 270	
HDM 500 manual dispenser with red foil pack holder For use with 11.1 fl oz/330 ml and 16.9 fl oz/500 ml foil pack adhesives HY 200-A and HY 200-R	
HDM 500 manual dispenser with black and red foil pack holder For use with 11.1 fl oz/330 ml and 16.9 fl oz/500 ml foil pack adhesives HIT-HY 200-A, HIT-HY 200-R, HIT-HY 150 MAX, HIT-HY 150 MAX-SD, HIT-RE 500, HIT-RE 500-SD, HIT-HY 10 PLUS and HIT-HY 270	
HIT-CB 500 black cartridge (foil pack) holder replacement For use with 11.1 fl oz/330 ml and 16.9 fl oz/500 ml foil packs or HIT-HY 150 MAX, HIT-HY 150 MAX-SD, HIT-RE 500, HIT-RE 500-SD, HIT-HY 10 PLUS and HIT-HY 270	
HIT-CR 500 red cartridge (foil pack) holder replacement For use with 11.1 fl oz/330 ml and 16.9 fl oz/500 ml foil pack adhesives HIT-HY 200-A and HIT-HY 200-R	
HDM 500 hard case only, no tool	

Pneumatic with 1/4 female compressed air coupling

Description	
P 3500 pneumatic dispenser¹ For use with HIT 11.1 fl oz/330 ml and 16.9 fl oz/500 ml foil pack	
HIT-P 8000D pneumatic dispenser¹ For use with HIT 47.3 fl oz/1400 ml jumbo foil pack	
P 3500 Cartridge (black foil pack) holder replacement For use with the P 3500 Pneumatic Dispenser and HIT-HY 150 MAX-SD, HIT-HY 150 MAX, HIT-RE 500-SD, HIT-RE 500, HIT-HY 270 and HIT-HY 10 PLUS	

¹ Dispensers not compatible with HIT-HY 200 Adhesive Anchor System.

Color coded cartridge holders with the same quality dispenser

With the introduction of HIT-HY 200 and Safe Set™ Technology, Hilti has introduced a new chemistry with a 5:1 ratio. **All other Hilti adhesive anchor system have a 3:1 mix ratio.** The new technology allows for better performance and both the HDM 500 Manual Dispensers and HDE 500-A18/A22 Battery Dispenser can accept both cartridge ratios. Simply change out the cartridge holder and you can use the dispenser on any jobsite with any Hilti foil pack adhesive.

