Attached are page(s) from the 2011 Hilti North American Product Tech Guide. For complete details on this product, including data development, product specifications, general suitability, installation, corrosion, and spacing and edge distance guidelines, please refer to the Technical Guide, or contact Hilti.

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1-800-879-8000
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3.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

Listings/Approvals

NSF/ANSI Std 61
certification for use in potable water
Europan Technical Approval
ETA-04/0027
ETA-08/0105

Independent Code Evaluation

LEED®: Credit 4.1-Low Emitting Materials

The Leadership in Energy and Environmental Design (LEED®) Green Building Rating system™ is the nationally accepted benchmark for the design, construction and operation of high performance green buildings.

3.2.7.1 Product Description

The Hilti HIT-RE 500 System is a high strength, two part epoxy adhesive. The system consists of a side-by-side adhesive refill pack, a mixing nozzle, a HIT dispenser with refill pack holder, and either a threaded rod, rebar, HIS internally threaded insert or smooth epoxy coated bar. HIT-RE 500 is specifically designed for fastening into solid base materials such as concrete, grout, stone or solid masonry.
HIT-RE 500 is also suitable for use under exceptional conditions such as:

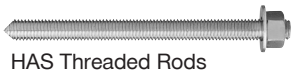
- Underwater Fastenings
- Oversized Holes
- Diamond Cored Holes

To meet specific handling requirements for those conditions, refer to instructions for use and/or contact Hilti for assistance.

Product Features

- Superior bond performance
- Use in diamond cored or pneumatic drilled holes.
- Under water up to 165 feet (50 m)
- Meets DOT requirements for most states; contact the Hilti Technical Staff
- Meets requirements of ASTM C 881-90, Type IV, Grade 2 and 3, Class A, B, C except gel times
- Meets requirements of AASHTO specification M235, Type IV, Grade 3, Class A, B, C except gel times
- Mixing tube provides proper mixing, eliminates measuring errors and minimizes waste
- Contains no styrene; virtually odorless
- Extended temperature range from 23°F to 104°F (–5°C to 40°C)
- Excellent weathering resistance; Resistance against elevated temperatures
- Suitable for oversized holes

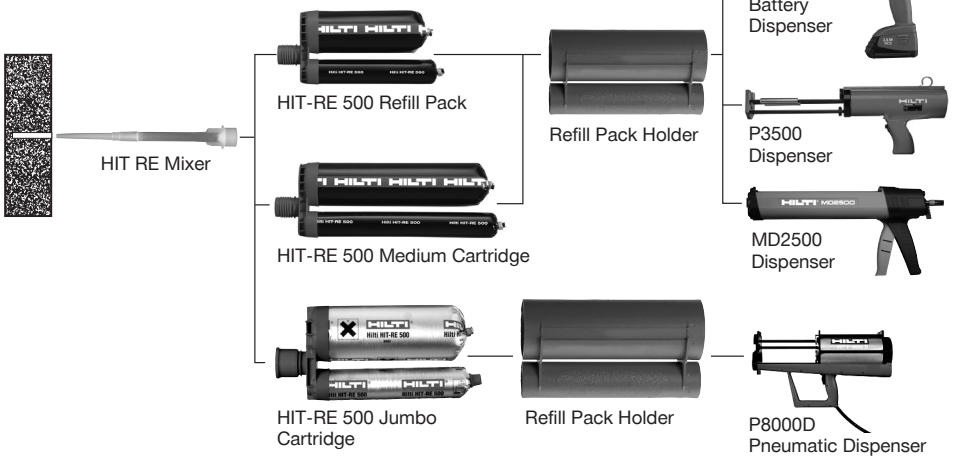
Fastener Components


HAS Threaded Rods


HIS Internally Threaded Inserts


Rebar (supplied by contractor)


Smooth, epoxy coated bar (supplied by contractor)



HIT-RE 500 Epoxy Adhesive Anchoring System 3.2.7

Guide Specifications

Master Format Section:

Previous	2004 Format	
03250	**03 16 00**	(Concrete Anchors)

Related Sections:

03200	**03 20 00**	(Concrete Reinforcing)
05050	**05 50 00**	(Metal Fabrications)
05120	**05 10 00**	(Structural Metal Framing)

Injectable adhesive shall be used for installation of all reinforcing steel dowels or threaded anchor rods and inserts into existing concrete. Adhesive shall be furnished in side-by-side refill packs which keep component A and component B separate. Side-by-side packs shall be designed to compress during use to minimize waste volume. Side-by-side packs shall also be designed to accept static mixing nozzle which thoroughly blends component A and component B and allows injection directly into drilled hole. Only injection tools and static mixing nozzles as supplied by manufacturer shall be used. Manufacturer's instructions shall be followed. Injection adhesive shall be formulated to include resin and hardener to provide optimal curing speed as well as high strength and stiffness. Typical curing time at 68°F (20°C) shall be approximately 12 hours.

Injection adhesive shall be HIT-RE 500, as furnished by Hilti.

Anchor Rods Shall be furnished with chamfered ends so that either end will accept a nut and washer. Alternatively, anchor rods shall be furnished with a 45 degree chisel point on one end to allow for easy insertion into the adhesive-filled hole. Anchor rods shall be manufactured to meet the following requirements:

1. ISO 898 Class 5.8

2. ASTM A 193, Grade B7 (high strength carbon steel anchor);

3. AISI 304 or AISI 316 stainless steel, meeting the requirements of ASTM F 593 (condition CW).

Special order length HAS Rods may vary from standard product.

Nuts and Washers Shall be furnished to meet the requirements of the above anchor rod specifications.

3.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

3.2.7.2 Material Specifications

Material Properties for HIT-RE 500 – Cured Adhesive

Bond Strength ASTM C882-91[1] 2 day cure 7 day cure	 12.4 MPa 12.4 MPa	 1800 psi 1800 psi
Compressive Strength ASTM D-695-96[1]	82.7 MPa	12,000 psi
Compressive Modulus ASTM D-695-96[1]	1493 MPa	0.22 x 10^6 psi
Tensile Strength 7 day ASTM D-638-97	43.5 MPa	6310 psi
Elongation at break ASTM D-638-97	2.0%	2.0%
Heat Deflection Temperature ASTM D-648-95	63°C	146°F
Absorption ASTM D-570-95	0.06%	0.06%
Linear Coefficient of Shrinkage on Cure ASTM D-2566-86	0.004	0.004
Electrical resistance DIN IEC 93 (12.93)	6.6 x 10^{13} Ω/m	1.7 x 10^{12}Ω/in.

1 Minimum values obtained as the result of tests at three cure temperatures (23, 40, 60°F).

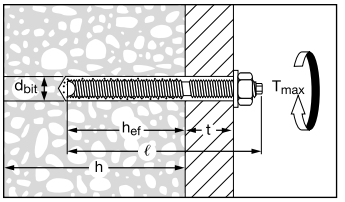
Material Specifications	**Mechanical Properties**			
	f_y ksi (MPa)		min. f_u ksi (MPa)	
Standard HAS-E rod material meets the requirements of ISO 898 Class 5.8	58	(400)	72.5	(500)
High Strength or 'Super HAS' rod material meets the requirements of ASTM A 193, Grade B7	105	(724)	125	(862)
Stainless HAS rod material meets the requirements of ASTM F 593 (AISI 304/316) Condition CW 3/8" to 5/8"	65	(448)	100	(689)
Stainless HAS rod material meets the requirements of ASTM F 593 (AISI 304/316) Condition CW 3/4" to 1-1/4"	45	(310)	85	(586)
HIS Insert 11MnPb30+C Carbon Steel conforming to DIN 10277-3	54.4	(375)	66.7	(460)
HIS-R Insert X5CrNiMo17122 K700 Stainless Steel conforming to DIN EN 10088-3	50.8	(350)	101.5	(700)
HAS Super & HAS-E Standard Nut Material meets the requirements of SAE J995 Grade 5				
HAS Stainless Steel Nut material meets the requirements of ASTM F 594				
HAS-E Carbon Steel and Stainless Steel Washers meet dimensional requirements of ANSI B18.22.1 Type A Plain				
HAS Super & HAS-E Standard Washers meet the requirements of ASTM F 884, HV				
All HAS-E & HAS Super Rods (except 7/8") & HAS-E Standard, HIS inserts, nuts & washers are zinc plated to ASTM B 633 SC 1				
7/8" Standard HAS-E & HAS Super rods hot-dip galvanized in accordance with ASTM A 153				

Note: Special Order steel rod material may vary from standard materials.

3.2.7.3 Technical Data

HIT-RE 500 Installation Specification Table for HAS Threaded Rods

Details			HAS Rod Size	in. (mm)	3/8 (9.5)	1/2 (12.7)	5/8 (15.9)	3/4 (19.1)	7/8 (22.2)	1 (25.4)	1-1/4 (31.8)
d_{bit}	bit diameter[1]			in.	7/16	9/16	3/4	7/8	1	1-1/8	1-3/8
h_{nom}	std. depth of embed.			in. (mm)	3-3/8 (90)	4-1/2 (110)	5-5/8 (143)	6-3/4 (171)	7-7/8 (200)	9 (229)	11-1/4 (286)
T_{max} max. tightening torque	HAS-E Rods HAS SS HAS-Super	Embed ≥ h_{nom}		ft lb (Nm)	18 (24)	30 (41)	75 (102)	150 (203)	175 (237)	235 (319)	400 (540)
		Embed < h_{nom}		ft lb (Nm)	15 (20)	20 (27)	50 (68)	105 (142)	125 (169)	165 (224)	280 (375)
h	min. base material thickness			-	1.5 hef						
Approximate number of fastenings per cartridge at standard embedment[2]											
Small Cartridge					52	28	11	7	5	4	2
Medium Cartridge					84	45	18	11	8	6	3
Jumbo Cartridge					255	137	56	37	27	19	12



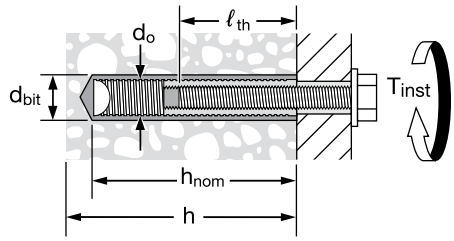
1 Use matched tolerance carbide tipped bits or Hilti matched tolerance DD-B or DD-C diamond core bits.

2 Assumes no waste.

HIT-RE 500 Epoxy Adhesive Anchoring System 3.2.7

HIT-RE 500 Installation Specification Table for HIS Inserts

Details \ HIS Insert		in. (mm)	3/8 (9.5)	1/2 (12.7)	5/8 (15.9)	3/4 (19.1)
d_{bit}	bit diameter[1]	in.	11/16	7/8	1-1/8	1-1/4
d_o	outside diameter	in.	0.65	0.81	1	1.09
h_{nom}	std. embed. depth	in.	4-3/8	5	6-5/8	8-1/4
		(mm)	(110)	(125)	(170)	(210)
ℓ_{th}	useable thread length	in.	1	1-3/16	1-1/2	2
		(mm)	(25)	(30)	(40)	(50)
T_{max}	Max. tightening torque	ft-lb	18	35	80	160
		(Nm)	(24)	(47)	(108)	(217)
h	min. base material thickness	in.	6-3/8	7-1/2	10	12-3/8
		(mm)	(162)	(191)	(254)	(314)
Approx. number of fastenings per cartridge at standard embedment[2]						
Small Cartridge			27	16	6	4
Medium Cartridge			49	30	11	8
Jumbo Cartridge			168	105	38	27



1 Use matched tolerance carbide tipped bits or Hilti matched tolerance DD-B or DD-C diamond core bits.

2 Assumes no waste.

HIT-RE 500 Installation Specification Table for Rebar in Concrete

Details \ Rebar Size		No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11
Bit diameter[1,2]	in.	1/2	5/8	3/4	7/8	1	1-1/8	1-3/8	1-1/2	1-3/4
h_{nom} std. embed. depth	in.	3-3/8	4-1/2	5-5/8	6-3/4	7-7/8	9	10-1/8	11-1/4	12-3/8
	(mm)	(86)	(114)	(143)	(171)	(200)	(229)	(257)	(286)	(314)
Approx. number of fastenings per cartridge at standard embedment[3]										
Small Cartridge		44	25	16	11	8	6	3	2	1
Medium Cartridge		72	41	27	18	13	10	5	3	2
Jumbo Cartridge		221	125	83	56	41	31	14	11	7

1 Rebar diameters may vary. Use smallest drill bit which will accommodate rebar.

2 Use matched tolerance carbide tipped bits or Hilti matched tolerance DD-B or DD-C diamond core bits.

3 Assumes no waste.

HIT-RE 500 Installation Specification Table for Metric Rebar in Concrete (Canada Only)

Details \ Rebar Size		10M	15M	20M	25M	30M	35M
Bit diameter[1]	in.	5/8	3/4	1	1-1/8	1-3/8	1-3/4
h_{nom} std. embed. depth	(mm)	115	145	200	230	260	315
Approx. number of fastenings per cartridge at standard embedment[3]							
Small Cartridge		20	17	5	6	3	1
Medium Cartridge		32	28	9	10	5	2
Jumbo Cartridge		98	84	27	31	16	7

1 Rebar diameters may vary. Use smallest bit which will accommodate rebar.

2 Assumes no waste.

Combined Shear and Tension Loading

$$\left(\frac{N_d}{N_{rec}}\right)^{5/3} + \left(\frac{V_d}{V_{rec}}\right)^{5/3} \leq 1.0 \text{ (Ref. Section 3.1.8.3)}$$

3.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

HIT-RE 500 Allowable and Ultimate Bond/Concrete Capacity for HAS Rods in Normal Weight Concrete[1,2,3,4]

Anchor Diameter in (mm)	Embedment Depth in (mm)	HIT-RE 500 Allowable Bond/Concrete Capacity				HIT-RE 500 Ultimate Bond/Concrete Capacity			
		Tensile		Shear		Tensile		Shear	
		f'_c = 2000 psi (13.8 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 2000 psi (13.8 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 2000 psi (13.8 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 2000 psi (13.8 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)
3/8 (9.5)	1-3/4 (44)	645 (2.9)	1095 (4.9)	1510 (6.7)	2135 (9.5)	2580 (11.5)	4370 (19.4)	4530 (20.2)	6405 (28.4)
	3-3/8 (86)	2190 (9.7)	2585 (11.5)	3155 (14.0)	4460 (19.8)	8760 (39.0)	10345 (46.0)	9460 (42.1)	13380 (59.5)
	4-1/2 (114)	2420 (10.8)	2585 (11.5)	4855 (21.6)	6860 (30.5)	9685 (43.1)	10335 (46.0)	14560 (64.8)	20580 (91.5)
1/2 (12.7)	2-1/4 (57)	1130 (5.0)	1965 (8.7)	2510 (11.2)	3550 (15.8)	4530 (20.2)	7860 (35.0)	7525 (33.5)	10640 (47.3)
	4-1/2 (114)	4045 (18.0)	5275 (23.5)	5610 (25.0)	7935 (35.3)	16185 (72.0)	21095 (93.8)	16820 (74.8)	23800 (105.9)
	6 (152)	4775 (21.2)	5380 (23.9)	8635 (38.4)	12210 (54.3)	19095 (84.9)	21520 (95.7)	25900 (115.2)	36620 (162.9)
5/8 (15.9)	2-7/8 (73)	1690 (7.5)	3045 (13.5)	5245 (23.3)	7420 (33.0)	6770 (30.1)	12175 (54.2)	15735 (70.0)	22250 (99.0)
	5-5/8 (143)	6560 (29.2)	7355 (32.7)	8760 (39.0)	12395 (55.1)	26240 (116.7)	29420 (130.9)	26280 (116.9)	37180 (165.4)
	7-1/2 (190)	7320 (32.6)	7515 (33.4)	13615 (60.6)	19080 (84.9)	29290 (130.3)	30060 (133.7)	40480 (180.1)	57240 (254.6)
3/4 (19.1)	3-3/8 (86)	2310 (10.3)	4515 (20.1)	7335 (32.6)	10370 (46.1)	9250 (41.1)	18065 (80.4)	22000 (97.9)	31108 (138.4)
	6-3/4 (172)	8670 (38.6)	10755 (47.8)	12615 (56.1)	17840 (79.4)	34685 (154.3)	43020 (191.4)	37840 (168.3)	53520 (238.1)
	9 (229)	10385 (46.2)	12995 (57.8)	19430 (86.4)	27470 (122.2)	41535 (184.8)	51985 (231.2)	58280 (259.2)	82400 (366.5)
7/8 (22.2)	4 (101)	3005 (13.4)	5665 (25.2)	7795 (34.7)	11020 (49.0)	12030 (53.5)	22670 (100.8)	23375 (104.0)	33050 (147.0)
	7-7/8 (200)	12495 (55.6)	15875 (70.6)	17175 (76.4)	24290 (108.0)	49975 (222.3)	63495 (282.4)	51520 (229.2)	72860 (324.1)
	10-1/2 (267)	14705 (65.4)	16185 (72.0)	26440 (117.6)	37390 (166.3)	58820 (261.6)	64730 (287.9)	79320 (352.8)	112160 (498.9)
1 (25.4)	4-1/2 (114)	3945 (17.5)	8440 (37.5)	10035 (44.6)	14190 (63.1)	15790 (70.2)	33765 (150.2)	30104 (133.9)	42565 (189.3)
	9 (229)	13845 (61.6)	17365 (77.2)	22435 (99.8)	31720 (141.1)	55380 (246.3)	69465 (309.0)	67300 (299.4)	95160 (423.3)
	12 (305)	17935 (79.8)	17935 (79.8)	34535 (153.6)	48830 (217.2)	71740 (319.1)	71740 (319.1)	103600 (460.8)	146480 (651.6)
1-1/4 (31.8)	5-5/8 (143)	5760 (25.6)	12815 (57.0)	14760 (65.7)	20870 (92.8)	23045 (102.5)	51270 (228.1)	44280 (197.0)	62610 (278.5)
	11-1/4 (286)	24610 (109.5)	31620 (140.7)	35050 (155.9)	49570 (220.5)	98430 (437.8)	126480 (562.6)	105140 (467.7)	148710 (661.5)
	15 (381)	34130 (151.8)	35270 (156.9)	53960 (240.0)	76300 (339.4)	136525 (607.3)	141090 (627.6)	161880 (720.1)	228900 (1018.2)

1 Influence factors for spacing and/or edge distance are applied to allowable 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 for standard and deep embedment and based on testing for shallow embedment.

3 All values based on holes drilled with carbide bit and installed per manufacturer's instructions. Ultimate tensile concrete/bond loads represent the average values obtained in testing.

4 For all underwater applications up to 165 feet/50m depth reduce the tabulated concrete/bond values 30% to account for reduced mechanical properties of saturated concrete.

HIT-RE 500 Epoxy Adhesive Anchoring System 3.2.7

Allowable Steel Strength for Carbon Steel and Stainless Steel HAS Rods[1]

Rod Diameter in (mm)	HAS-E Standard ISO 898 Class 5.8		HAS Super ASTM A 193 B7		HAS SS AISI 304/316 SS	
	Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)
3/8 (9.5)	2640 (11.7)	1360 (6.0)	4555 (20.3)	2345 (10.4)	3645 (16.2)	1875 (8.3)
1/2 (12.7)	4700 (20.9)	2420 (10.8)	8100 (36.0)	4170 (18.5)	6480 (28.8)	3335 (14.8)
5/8 (15.9)	7340 (32.7)	3780 (16.8)	12655 (56.3)	6520 (29.0)	10125 (45.0)	5215 (23.2)
3/4 (19.1)	10570 (47.0)	5445 (24.2)	18225 (81.1)	9390 (41.8)	12390 (55.1)	6385 (28.4)
7/8 (22.2)	14385 (64.0)	7410 (33.0)	24805 (110.3)	12780 (56.9)	16865 (75.0)	8690 (38.6)
1 (25.4)	18790 (83.6)	9680 (43.0)	32400 (144.1)	16690 (74.2)	22030 (98.0)	11350 (50.5)
1-1/4 (31.8)	29360 (130.6)	15125 (67.3)	50620 (225.2)	26080 (116.0)	34425 (153.1)	17735 (78.9)

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

Tensile = 0.33 x F_u x Nominal Area
Shear = 0.17 x F_u x Nominal Area

Ultimate Steel Strength for Carbon Steel and Stainless Steel HAS Rods[1]

Rod Diameter in (mm)	HAS-E Standard ISO 898 Class 5.8			HAS Super ASTM A 193 B7			HAS SS 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 (9.5)	4495 (20.0)	6005 (26.7)	3605 (16.0)	8135 (36.2)	10350 (43.4)	6210 (27.6)	5035 (22.4)	8280 (36.8)	4970 (22.1)
1/2 (12.7)	8230 (36.6)	10675 (47.5)	6405 (28.5)	14900 (66.3)	18405 (79.0)	11040 (49.1)	9225 (41.0)	14720 (65.5)	8835 (39.3)
5/8 (15.9)	13110 (58.3)	16680 (74.2)	10010 (44.5)	23730 (105.6)	28760 (125.7)	17260 (76.8)	14690 (65.3)	23010 (102.4)	13805 (61.4)
3/4 (19.1)	19400 (86.3)	24020 (106.9)	14415 (64.1)	35120 (156.2)	41420 (185.7)	24850 (110.5)	15050 (66.9)	28165 (125.3)	16800 (75.2)
7/8 (22.2)	26780 (119.1)	32695 (145.4)	19620 (87.3)	48480 (215.7)	56370 (256.9)	33825 (150.5)	20775 (92.4)	38335 (170.5)	23000 (102.3)
1 (25.4)	35130 (156.3)	42705 (190.0)	25625 (114.0)	63600 (282.9)	73630 (337.0)	44180 (196.5)	27255 (121.2)	50070 (222.7)	30040 (133.6)
1-1/4 (31.8)	56210 (250.0)	66730 (296.8)	40035 (178.1)	101755 (452.6)	115050 (511.8)	69030 (307.1)	43610 (194.0)	78235 (348.0)	46940 (208.8)

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

Yield = F_y x Tensile Stress Area
Tensile = 0.75 x F_u x Nominal Area
Shear = 0.45 x F_u x Nominal Area

3.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

HIT-RE 500 Allowable Bond/Concrete Capacity and Steel Strength for HIS Carbon Steel and HIS-R Stainless Steel Internally Threaded Inserts

Anchor Diameter in (mm)	Embedment Depth in (mm)	HIT-RE 500 Allowable Bond/Concrete Capacity[2]		Steel Bolt Strength[1,2]			
		Tensile $f'_c \geq 2000$ psi (13.8 MPa) lb (kN)	Shear $f'_c \geq 2000$ psi (13.8 MPa) lb (kN)	ASTM A 325 Carbon Steel		ASTM F 593 Stainless Steel	
				Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)
3/8 (9.5)	4-3/8 (110)	2870 (12.8)	1565 (7.0)	4370 (19.4)	2250 (10.0)	3645 (16.2)	1875 (8.3)
1/2 (12.7)	5 (127)	4530 (20.1)	2890 (12.9)	7775 (34.6)	4005 (17.8)	6480 (28.8)	3335 (14.8)
5/8 (15.9)	6-5/8 (168)	8255 (36.7)	4635 (20.6)	12150 (54.0)	6260 (27.8)	10125 (45.0)	5215 (23.2)
3/4 (19.1)	8-1/4 (210)	9030 (40.1)	6695 (29.8)	17945 (77.8)	9010 (40.1)	12395 (55.1)	6385 (28.4)

HIT-RE 500 Ultimate Bond/Concrete Capacity and Steel Strength for HIS Carbon Steel and HIS-R Stainless Steel Internally Threaded Inserts

Anchor Diameter in (mm)	Embedment Depth in (mm)	HIT-RE 500 Ultimate Bond/Concrete Capacity		Ultimate Bolt Strength[1]			
		Tensile $f'_c \geq 2000$ psi (13.8 MPa) lb (kN)	Shear $f'_c \geq 2000$ psi (13.8 MPa) lb (kN)	ASTM A 325 Carbon Steel		ASTM F 593 Stainless Steel	
				Tensile lb (kN)	Shear lb (kN)	Tensile lb (kN)	Shear lb (kN)
3/8 (9.5)	4-3/8 (110)	11480 (51.0)	6260 (27.8)	9935 (44.2)	5960 (26.5)	8280 (36.8)	4970 (22.1)
1/2 (12.7)	5 (127)	18115 (80.5)	11565 (51.4)	17665 (78.6)	10600 (47.2)	14720 (65.5)	8835 (39.3)
5/8 (15.9)	6-5/8 (168)	33025 (146.9)	18550 (82.5)	27610 (122.8)	16565 (73.7)	23010 (102.4)	13805 (61.4)
3/4 (19.1)	8-1/4 (210)	36125 (160.6)	26775 (119.1)	39760 (176.9)	23855 (106.1)	28165 (125.3)	16900 (75.1)

1 Steel values in accordance with AISC
ASTM A 325 bolts: F_y = 92 ksi , F_u = 120 ksi
ASTM F 593 (AISI 304/316): F_y = 65 ksi, F_u = 100 ksi for 3/8” thru 5/8”
F_y = 45 ksi, F_u = 85 ksi for 3/4”

Allowable Load Values	**Ultimate Load Values**
Tension = 0.33 x F_u x A_{nom}	Tension = 0.75 x F_u x A_{nom}
Shear = 0.17 x F_u x A_{nom}	Shear = 0.45 x F_u x A_{nom}

2 Use lower value of either allowable bond/concrete capacity or steel strength.

HIT-RE 500 Epoxy Adhesive Anchoring System 3.2.7

HIT-RE 500 Ultimate Bond Capacity and Steel Strength for Rebar in Concrete

Nominal Rebar Size	Embedment Depth in. (mm)	Concrete Compressive Strength						Grade 60 Rebar	
		f'_c = 2000 psi (13.8 MPa)			f'_c = 4000 psi (27.6 MPa)				
		Ultimate Bond Strength lb (kN)	Embed. to Develop Yield Strength[1] in. (mm)	Embed. to Develop Tensile Strength[1] in. (mm)	Ultimate Bond Strength lb (kN)	Embed. to Develop Yield Strength[1] in. (mm)	Embed. to Develop Tensile Strength[1] in. (mm)	Yield Strength lb (kN)	Tensile Strength lb (kN)
#3	3-3/8 (86)	10105 (45.0)	2-1/4 (57)	3-3/8 (86)	10810 (48.1)	2-1/8 (54)	3-1/4 (84)	6600 (29.4)	9900 (44.0)
	4-1/2 (114)	10920 (48.6)			10810 (48.1)				
#4	4-1/2 (114)	15980 (71.1)	3-3/8 (86)	5-5/8 (143)	18540 (82.5)	3 (76)	4-3/8 (111)	12000 (53.4)	18000 (80.1)
	6 (152)	18830 (83.8)			18655 (83.0)				
#5	5-5/8 (143)	20630 (91.8)	5-1/8 (130)	8-7/8 (225)	27790 (123.6)	3-7/8 (98)	5-3/4 (146)	18600 (82.7)	27900 (124.1)
	7-1/2 (191)	24870 (110.6)			27790 (128.6)				
#6	6-3/4 (171)	33695 (149.9)	5-3/8 (136)	9-3/8 (238)	44675 (198.7)	4 (102)	6 (152)	26400 (117.4)	39600 (176.2)
	9 (229)	38960 (173.3)			44870 (200.0)				
#7	7-7/8 (200)	40525 (180.3)	7 (178)	12-3/8 (314)	59340 (264.0)	4-7/8 (124)	7-1/4 (184)	36000 (160.1)	54000 (240.2)
	10-1/2 (267)	48460 (215.6)			61720 (274.6)				
#8	9 (229)	63940 (284.4)	8-1/4 (210)	12-7/8 (327)	72820 (323.9)	5-7/8 (149)	8-7/8 (225)	47400 (210.9)	71100 (316.3)
	12 (305)	69610 (309.7)			72950 (324.5)				
#9	10-1/8 (257)	72245 (321.4)	8-1/2 (216)	13 (330)	81235 (361.4)	7-1/2 (191)	12 (305)	60000 (266.9)	90000 (400.4)
	13-1/2 (343)	94205 (419.1)			84015 (373.7)				
#10	11-1/4 (286)	92000 (409.3)	9-3/8 (238)	17-7/8 (454)	96725 (430.3)	8-7/8 (225)	14 (356)	76200 (339.0)	114300 (508.5)
	15 (381)	95850 (426.4)			97070 (431.8)				
#11	12-3/8 (314)	118615 (527.6)	9-7/8 (251)	18-3/4 (476)	123120 (547.7)	9-1/2 (241)	16-1/2 (419)	93600 (416.4)	140400 (624.6)
	16-1/2 (419)	123570 (549.7)			123790 (550.7)				

1 Based on comparison of average ultimate adhesive bond test values versus minimum yield and ultimate tensile strength of rebar. For more information, contact Hilti.

3.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

HIT-RE 500 Bond Capacity and Steel Strength for Metric Rebar in Concrete (Canada Only) [1, 2, 3, 4, 5, 6, 7]

Rebar Size	HIT-RE 500 Tensile Bond Strength					Strength Properties of Metric Rebar	
		f'_c = 14 MPa		f'_c = 28 MPa		f_y = 400 MPa	f_u = 600 MPa
	Embedment Depth mm (in.)	Ultimate Bond kN (lb)	Allowable Bond kN (lb)	Ultimate Bond kN (lb)	Allowable Bond kN (lb)	Yield Strength kN (lb)	Tensile Strength kN (lb)
10M	115 (4-1/2)	71.1 (15980)	17.8 (3995)	82.5 (18540)	20.6 (4635)	40 (8990)	60 (13490)
	150 (6)	83.8 (18830)	20.9 (4705)	83.0 (18655)	20.7 (4665)		
15M	145 (5-5/8)	91.8 (20630)	22.9 (5155)	123.7 (27810)	30.9 (6945)	80 (17985)	120 (26975)
	190 (7-1/2)	110.6 (24870)	27.6 (6215)	123.6 (27790)	30.9 (6945)		
20M	200 (7-7/8)	180.3 (40525)	45.1 (10130)	264 (59340)	66 (14835)	120 (26975)	180 (40465)
	265 (10-1/2)	215.6 (48460)	53.9 (12115)	274.6 (61720)	68.6 (15430)		
25M	230 (9)	284.4 (63940)	71.0 (15985)	323.9 (72820)	81.0 (18205)	200 (44960)	300 (67440)
	305 (12)	309.7 (69610)	77.4 (17400)	324.5 (72950)	81.1 (18235)		
30M	260 (10-1/8)	321.4 (72245)	80.3 (18060)	361.4 (81235)	90.3 (20305)	280 (62945)	420 (94415)
	345 (13-1/2)	419.1 (94205)	104.8 (23550)	373.7 (84015)	93.4 (21000)		
35M	315 (12-3/8)	527.6 (118615)	131.9 (29650)	547.7 (123120)	136.9 (30780)	400 (89920)	600 (134880)
	420 (16-1/2)	549.7 (123570)	137.4 (30890)	550.7 (123790)	137.6 (30945)		

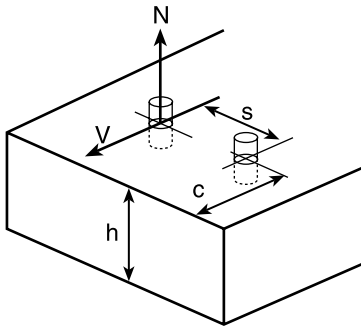
1 Based on minimum steel strength and nominal cross-sectional area of rebar.
2 Use lesser value of allowable bond strength or steel strength.
3 Minimum concrete thickness must be equal to 1.5 times the anchor embedment.
4 Bond/concrete values interpolated from testing done with imperial rebar sizes.
5 Allowable tension for adhesive bond based on a safety factor of 4.0.
6 For anchor spacing and edge distance guidelines, please refer to the following pages.
7 Ultimate tensile concrete/bond loads represent the average values obtained in testing.

HIT-RE 500 Ultimate Tensile Bond Strength for Smooth Epoxy Coated Dowel Bars in Concrete ≥ 2410 psi (15.9 MPa)

Anchor Diameter in. (mm)	Drill Bit Diameter in. (mm)	Embedment Depth in. (mm)	Ultimate Tensile Load lb (kN)
1 (25.4)	1-1/8 (29)	9 (229)	40385 (179.7)
1-1/4 (31.8)	1-3/8 (34.9)		
1-1/2 (38.1)	1-5/8 (41)		

HIT-RE 500 Epoxy Adhesive Anchoring System 3.2.7

Anchor Spacing and Edge Distance Guidelines in Concrete

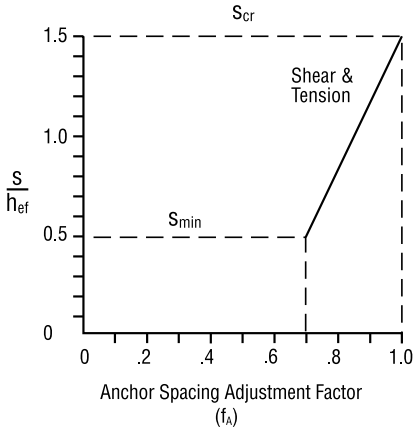


Note: Tables apply for listed embedment depths. Reduction factors for other embedment depths must be calculated using equations below.

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 $c_{min} = 0.5\ h_{ef}$, $c_{cr} = 1.5\ h_{ef}$ $f_{RN} = 0.3(c/h_{ef}) + 0.55$ 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 (II 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 $c_{cr} > c > c_{min}$

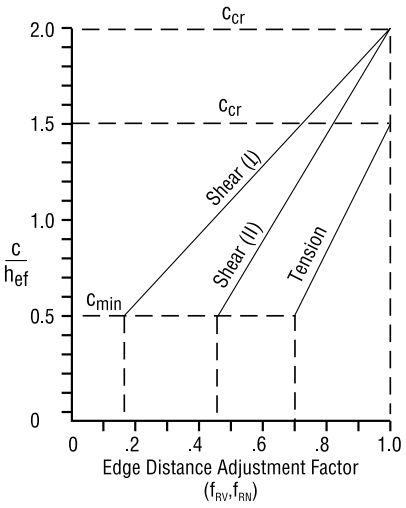
Anchor Spacing Adjustment Factors

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
= $2.0\ h_{ef}$ Shear
⊥ = Perpendicular to edge
II = Parallel to edge



Load Adjustment Factors for 3/8" Diameter Anchors													
Anchor Diameter		3/8" diameter											
Adjustment Factor		Spacing Tension/Shear f_A			Edge Distance Tension f_{RN}			Edge Distance Shear (⊥ toward edge) f_{RV1}			Edge Distance Shear (II to or away from edge) f_{RV2}		
Embedment Depth, in		1-3/4	3-3/8	4-1/2	1-3/4	3-3/8	4-1/2	1-3/4	3-3/8	4-1/2	1-3/4	3-3/8	4-1/2
Spacing (s)/Edge Distance (c), in.	7/8	0.70			0.70			0.18			0.46		
	1	0.72			0.72			0.22			0.49		
	1 11/16	0.84	0.70		0.84	0.70		0.43	0.18		0.63	0.46	
	2	0.89	0.73		0.89	0.73		0.53	0.22		0.69	0.49	
	2 1/4	0.94	0.75	0.70	0.94	0.75	0.70	0.60	0.27	0.18	0.74	0.52	0.46
	2 5/8	1.00	0.78	0.73	1.00	0.78	0.73	0.72	0.33	0.23	0.82	0.56	0.49
	3		0.82	0.75		0.82	0.75	0.84	0.39	0.27	0.90	0.60	0.52
	3 1/2		0.86	0.78		0.86	0.78	1.00	0.47	0.33	1.00	0.65	0.56
	4		0.91	0.82		0.91	0.82		0.55	0.39		0.71	0.60
	5 1/16		1.00	0.89		1.00	0.89		0.72	0.52		0.82	0.69
	5 1/2			0.92			0.92		0.79	0.57		0.87	0.72
	6			0.95			0.95		0.87	0.63		0.92	0.76
	6 3/4			1.00			1.00		1.00	0.72		1.00	0.82
	8									0.87			0.92
	9									1.00			1.00

3.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

Anchor Spacing and Edge Distance Guidelines in Concrete

Note: Tables apply for listed embedment depths. Reduction factors for other embedment depths must be calculated using equations below.

Load Adjustment Factors for 1/2" Diameter Anchors													
Anchor Diameter		1/2" diameter											
Adjustment Factor		Spacing Tension/Shear f_A			Edge Distance Tension f_{RN}			Edge Distance Shear (⊥ toward edge) f_{RV1}			Edge Distance Shear (II to or away from edge) f_{RV2}		
Embedment Depth, in		2-1/4	4-1/2	6	2-1/4	4-1/2	6	2-1/4	4-1/2	6	2-1/4	4-1/2	6
	1-1/8	0.70			0.70			0.18			0.46		
	1-1/2	0.75			0.75			0.27			0.52		
	1-3/4	0.78			0.78			0.33			0.56		
	2	0.82			0.82			0.39			0.60		
	2-1/4	0.85	0.70		0.85	0.70		0.45	0.18		0.64	0.46	
	2-1/2	0.88	0.72		0.88	0.72		0.51	0.21		0.68	0.48	
	3	0.95	0.75	0.70	0.95	0.75	0.70	0.63	0.27	0.18	0.76	0.52	0.46
	3-3/8	1.00	0.78	0.72	1.00	0.78	0.72	0.72	0.32	0.21	0.82	0.55	0.48
	4		0.82	0.75		0.82	0.75	0.87	0.39	0.27	0.92	0.60	0.52
	4-1/2		0.85	0.78		0.85	0.78	1.00	0.45	0.32	1.00	0.64	0.55
	5		0.88	0.80		0.88	0.80		0.51	0.36		0.68	0.58
	6		0.95	0.85		0.95	0.85		0.63	0.45		0.76	0.64
	6-3/4		1.00	0.89		1.00	0.89		0.72	0.52		0.82	0.69
	7			0.90			0.90		0.75	0.54		0.84	0.70
	8			0.95			0.95		0.87	0.63		0.92	0.76
	9			1.00			1.00		1.00	0.72		1.00	0.82
	10									0.81			0.88
	11									0.90			0.94
	12									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
$c_{min} = 0.5\ h_{ef}$, $c_{cr} = 1.5\ h_{ef}$
$f_{RN} = 0.3(c/h_{ef}) + 0.55$
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 (II 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 $c_{cr} > c > c_{min}$

Load Adjustment Factors for 5/8" and 3/4" Diameter Anchors																										
Anchor Diameter		5/8" diameter												3/4" diameter												
Adjustment Factor		Spacing Tension/Shear f_A			Edge Distance Tension f_{RN}			Edge Distance Shear (⊥ toward edge) f_{RV1}			Edge Distance Shear (II 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 (II to or away from edge) f_{RV2}		
Embedment Depth, in		2-7/8	5-5/8	7-1/2	2-7/8	5-5/8	7-1/2	2-7/8	5-5/8	7-1/2	2-7/8	5-5/8	7-1/2	3-3/8	6-3/4	9	3-3/8	6-3/4	9	3-3/8	6-3/4	9	3-3/8	6-3/4	9
Spacing (s)/Edge Distance (c), in.	1-7/16	0.70			0.70			0.18			0.46														
	1-11/16	0.73			0.73			0.23			0.49			0.70			0.70			0.18			0.46		
	2	0.76			0.76			0.29			0.53			0.73			0.73			0.23			0.49		
	2-13/16	0.84	0.70		0.84	0.70		0.44	0.18		0.63	0.46		0.80			0.80			0.36			0.58		
	3-3/8	0.90	0.73		0.90	0.73		0.54	0.23		0.70	0.50		0.85	0.70		0.85	0.70		0.45	0.18		0.64	0.46	
	3-3/4	0.94	0.75	0.70	0.94	0.75	0.70	0.61	0.27	0.18	0.75	0.52	0.46	0.88	0.72		0.88	0.72		0.51	0.21		0.68	0.48	
	4-5/16	1.00	0.78	0.72	1.00	0.78	0.72	0.72	0.32	0.22	0.82	0.56	0.49	0.93	0.74		0.93	0.74		0.60	0.26		0.74	0.51	
	4-1/2		0.79	0.73		0.79	0.73	0.76	0.34	0.23	0.84	0.57	0.50	0.95	0.75	0.70	0.95	0.75	0.70	0.63	0.27	0.18	0.76	0.52	0.46
	5-1/16		0.82	0.75		0.82	0.75	0.86	0.40	0.27	0.91	0.60	0.52	1.00	0.78	0.72	1.00	0.78	0.72	0.72	0.32	0.21	0.82	0.55	0.48
	5-5/8		0.85	0.78		0.85	0.78	0.97	0.45	0.32	0.98	0.64	0.55		0.80	0.74		0.80	0.74	0.81	0.36	0.25	0.88	0.58	0.51
	5-3/4		0.86	0.78		0.86	0.78	1.00	0.46	0.32	1.00	0.65	0.56		0.81	0.74		0.81	0.74	0.83	0.37	0.26	0.89	0.59	0.51
	6-3/4		0.91	0.82		0.91	0.82		0.56	0.40		0.71	0.60		0.85	0.78		0.85	0.78	1.00	0.45	0.32	1.00	0.64	0.55
	8-7/16		1.00	0.89		1.00	0.89		0.72	0.52		0.82	0.69		0.93	0.83		0.93	0.83		0.59	0.42		0.73	0.62
	10-1/8			0.96			0.96		0.88	0.64		0.93	0.77		1.00	0.89		1.00	0.89		0.72	0.52		0.82	0.69
	11-1/4			1.00			1.00		1.00	0.72		1.00	0.82			0.93			0.93		0.81	0.59		0.88	0.73
	12									0.77			0.86			0.95			0.95		0.87	0.63		0.92	0.76
	13-1/2									0.88			0.93			1.00			1.00		1.00	0.72		1.00	0.82
	15									1.00			1.00									0.81			0.88
	16																					0.87			0.92
	18																					1.00			1.00

HIT-RE 500 Epoxy Adhesive Anchoring System 3.2.7

Anchor Spacing and Edge Distance Guidelines in Concrete

Note: Tables apply for listed embedment depths. Reduction factors for other embedment depths must be calculated using equations below.

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
$c_{min} = 0.5\ h_{ef}$, $c_{cr} = 1.5\ h_{ef}$
$f_{RN} = 0.3(c/h_{ef}) + 0.55$
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
(II 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 $c_{cr} > c > c_{min}$

Load Adjustment Factors for 7/8" Diameter Anchors

Anchor Diameter		7/8" diameter											
Adjustment Factor		Spacing Tension/Shear f_A			Edge Distance Tension f_{RN}			Edge Distance Shear (⊥ toward edge) f_{RV1}			Edge Distance Shear (II to or away from edge) f_{RV2}		
Embedment Depth, in		4	7-7/8	10-1/2	4	7-7/8	10-1/2	4	7-7/8	10-1/2	4	7-7/8	10-1/2
Spacing (s)/Edge Distance (c), in.	2	0.70			0.70			0.18			0.46		
	2-1/2	0.74			0.74			0.25			0.51		
	3	0.78			0.78			0.32			0.55		
	3-1/2	0.81			0.81			0.38			0.60		
	3-15/16	0.85	0.70		0.85	0.70		0.44	0.18		0.63	0.46	
	4-1/2	0.89	0.72		0.89	0.72		0.52	0.22		0.69	0.49	
	5	0.93	0.74		0.93	0.74		0.59	0.25		0.73	0.51	
	5-1/4	0.94	0.75	0.70	0.94	0.75	0.70	0.62	0.27	0.18	0.75	0.52	0.46
	6	1.00	0.78	0.72	1.00	0.78	0.72	0.72	0.32	0.22	0.82	0.55	0.49
	6-1/2		0.80	0.74		0.80	0.74	0.79	0.36	0.24	0.87	0.58	0.50
	7		0.82	0.75		0.82	0.75	0.86	0.39	0.27	0.91	0.60	0.52
	8		0.85	0.78		0.85	0.78	1.00	0.46	0.32	1.00	0.65	0.55
	10		0.93	0.84		0.93	0.84		0.60	0.42		0.74	0.62
	11-13/16		1.00	0.89		1.00	0.89		0.72	0.52		0.82	0.69
	12			0.89			0.89		0.73	0.53		0.83	0.69
	14			0.95			0.95		0.87	0.63		0.92	0.76
	15-3/4			1.00			1.00		1.00	0.72		1.00	0.82
	18									0.84			0.90
	20									0.94			0.97
	21									1.00			1.00

Load Adjustment Factors for 1" and 1-1/4" Diameter Anchors

Anchor Diameter		1" diameter												1-1/4" diameter											
Adjustment Factor		Spacing Tension/Shear f_A			Edge Distance Tension f_{RN}			Edge Distance Shear (⊥ toward edge) f_{RV1}			Edge Distance Shear (II 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 (II to or away from edge) f_{RV2}		
Embedment Depth, in		4-1/2	9	12	4-1/2	9	12	4-1/2	9	12	4-1/2	9	12	5-5/8	11-1/4	15	5-5/8	11-1/4	15	5-5/8	11-1/4	15	5-5/8	11-1/4	15
Spacing (s)/Edge Distance (c), in.	2-1/4	0.70			0.70			0.18			0.46														
	2-3/4	0.73			0.73			0.24			0.50			0.70			0.70			0.18			0.46		
	3	0.75			0.75			0.27			0.52			0.71			0.71			0.20			0.47		
	4	0.82			0.82			0.39			0.60			0.76			0.76			0.29			0.54		
	4-1/2	0.85	0.70		0.85	0.70		0.45	0.18		0.64	0.46		0.79			0.79			0.34			0.57		
	5	0.88	0.72		0.88	0.72		0.51	0.21		0.68	0.48		0.82			0.82			0.39			0.60		
	5-5/8	0.93	0.74		0.93	0.74		0.59	0.25		0.73	0.51		0.85	0.70		0.85	0.70		0.45	0.18		0.64	0.46	
	6	0.95	0.75	0.70	0.95	0.75	0.70	0.63	0.27	0.18	0.76	0.52	0.46	0.87	0.71		0.87	0.71		0.49	0.20		0.66	0.47	
	6-3/4	1.00	0.78	0.72	1.00	0.78	0.72	0.72	0.32	0.21	0.82	0.55	0.48	0.91	0.73		0.91	0.73		0.56	0.23		0.71	0.50	
	7-1/2		0.80	0.74		0.80	0.74	0.81	0.36	0.25	0.88	0.58	0.51	0.95	0.75	0.70	0.95	0.75	0.70	0.63	0.27	0.18	0.76	0.52	0.46
	8-1/4		0.83	0.76		0.83	0.76	0.90	0.41	0.28	0.94	0.61	0.53	0.99	0.77	0.72	0.99	0.77	0.72	0.70	0.31	0.21	0.81	0.54	0.48
	9		0.85	0.78		0.85	0.78	1.00	0.45	0.32	1.00	0.64	0.55	1.00	0.79	0.73	1.00	0.79	0.73	0.77	0.34	0.23	0.86	0.57	0.50
	10		0.88	0.80		0.88	0.80		0.51	0.36		0.68	0.58		0.82	0.75		0.82	0.75	0.87	0.39	0.27	0.92	0.60	0.52
	11		0.92	0.83		0.92	0.83		0.57	0.41		0.72	0.61		0.84	0.77		0.84	0.77	1.00	0.44	0.31	0.98	0.63	0.54
	12		0.95	0.85		0.95	0.85		0.63	0.45		0.76	0.64		0.87	0.79		0.87	0.79		0.49	0.34	1.00	0.66	0.57
	13-1/2		1.00	0.89		1.00	0.89		0.72	0.52		0.82	0.69		0.91	0.82		0.91	0.82		0.56	0.40		0.71	0.60
	14			0.90			0.90		0.75	0.54		0.84	0.70		0.92	0.83		0.92	0.83		0.58	0.41		0.73	0.62
	16-7/8			0.97			0.97		0.92	0.67		0.96	0.79		1.00	0.89		1.00	0.89		0.72	0.52		0.82	0.69
	18			1.00			1.00		1.00	0.72		1.00	0.82			0.91			0.91		0.77	0.56		0.86	0.71
	20									0.81			0.88			0.95			0.95		0.87	0.63		0.92	0.76
	22-1/2									0.92			0.96			1.00			1.00		1.00	0.72		1.00	0.82
	24									1.00			1.00									0.77			0.86
	27																					0.88			0.93
	30																					1.00			1.00

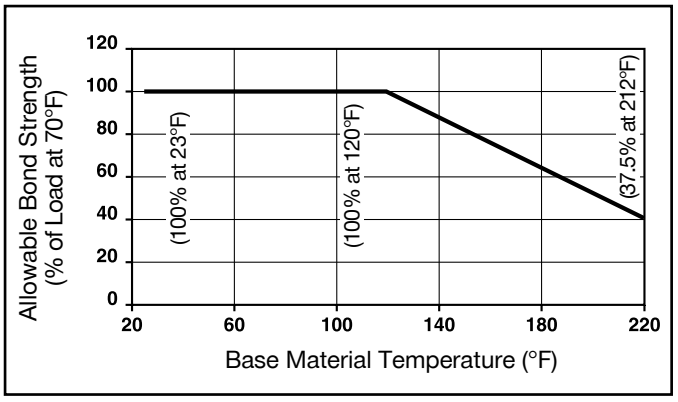
3.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

Resistance of HIT-RE 500 to Chemicals

Chemical	Chemicals Tested	Resistant	Not Resistant
Alkaline (Base material concrete)	Concrete drilling mud (10%) pH=12.6	+	
	Concrete drilling mud (10%) pH=13.2	+	
	Concrete potash solution (10%) pH=14.0	+	
Acids	Acetic acid (10%)*		–
	Nitric acid (10%)*		–
	Hydrochloric acid (10%) 3 month -		–
	Sulfuric acid (10%)		–
Solvents	Benzyl alcohol		–
	Ethanol		–
	Ethyl acetate		–
	Methyl ethyl ketone (MEK)		–
	Trichlorethylene		–
	Xylene (mixture)	+	
Chemicals used on job sites	Concrete plasticizer	+	
	Diesel oil	+	
	Oil	+	
	Petrol	+	
	Oil for form work (forming oil)	+	
Environmental Chemicals	Salt water	+	
	de-mineralized water	+	
	salt spraying test	+	
	SO_2	+	
	Environment/Weather	+	

*Concrete was dissolved by acid.

Influence of Temperature on Bond Strength



Note: Test procedure involves the concrete being held at the elevated temperature for 24 hours then removing it from the controlled environment and testing to failure.

Long term creep test in accordance with AC58 is available; please contact Hilti Technical Services.

Samples of the HIT-RE 500 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 were heavily damaged or destroyed were classified as **"Not Resistant."**

Note: In actual use, the majority of the resin is encased in the base material, leaving very little surface area exposed.

Full Cure Time Table[1] (100% of working load)

Base Material Temperature		Approximate Full Curing Time
°F	°C	
23	–5	72 hours
32	0	50 hours
50	10	24 hours
68	20	12 hours
86	30	8 hours
104	40	4 hours

Initial Cure Time Table[1] (25% of working load)

Base Material Temperature		Approximate Initial Cure Time
°F	°C	
23	–5	36 hours
32	0	25 hours
50	10	12 hours
68	20	6 hours
86	30	4 hours
104	40	2 hours

Gel Time Table[1] (Approximate)

Base Material Temperature		Approximate Gel Time
°F	°C	
23	–5	4 hours
32	0	3 hours
50	10	2 hours
68	20	30 minutes
86	30	20 minutes
104	40	12 minutes

1 Minimum product temperature must be maintained above 41°F (5°C) prior/during installation.

3.2.7.4 Installation Instructions

Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded on-line at www.us.hilti.com (US) and www.hilti.ca (Canada) -- "Service/Technical Info >> Technical Downloads >> Anchoring Systems". 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.

3.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

HIT HIT-RE 500 Volume Charts

Threaded Rod Installation

Rod Diameter (in.)	Drill Bit Diameter (in.)	Adhesive Volume Required per Inch of embedment (in^3)
1/4	5/16	0.055
3/8	7/16	0.095
1/2	9/16	0.133
5/8	3/4	0.261
3/4	7/8	0.326
7/8	1	0.391
1	1-1/8	0.478
1-1/4	1-3/8	0.626

EXAMPLE:

Determine approximate fastenings for 5/8" rod embedded 10" deep.

10 x 0.261 = 2.61 in^3 of adhesive per anchor

16.5 ÷ 2.61 ≈ 6 fastenings per small cartridge

81.8 ÷ 2.61 ≈ 31 fastenings per jumbo cartridge

Rebar Installation

Rod Diameter (in.)	Drill Bit[1] Diameter (in.)	Adhesive Volume Required per Inch of embedment (in^3)
#3 or 3/8	1/2	0.110
#4 or 1/2	5/8	0.146
#5 or 5/8	3/4	0.176
#6 or 3/4	7/8	0.218
#7 or 7/8	1	0.252
#8 or 1	1-1/8	0.299
#9 or 1-1/8	1-3/8	0.601
#10 or 1-1/4	1-1/2	0.659
#11 or 1-3/8	1-3/4	1.037

NOTE:

Useable volume of HIT-RE 500 refill cartridge is 16.5 in^3 (270 ml).

Useable volume of HIT-RE 500 medium refill cartridge is 26.9 in^3 (440 ml).

Useable volume of HIT-RE 500 jumbo refill cartridge is 81.8 in^3 (1340 ml).

Metric Rebar Installation (Canada Only)

Bar Diameter	Drill Bit[1] Diameter (in.)	Adhesive Volume Required per Inch of embedment (in^3)
10M	5/8	0.186
15M	3/4	0.170
20M	1	0.388
25M	1-1/8	0.289
30M	1-3/8	0.481
35M	1-3/4	0.996

1 Rebar diameter may vary. Use smallest drill bit which will accommodate rebar.

3.2.7.5 Ordering Information

HIT RE Mixer

HIT-RE 500 Refill Pack

HIT-RE 500 Medium Cartridge

HIT-RE 500 Jumbo Cartridge

Hit Adhesives

Description	Contents
HIT-RE 500 11.1 oz (330 ml)	Includes (1) Refill Pack and (1) Mixer with filler tube
HIT-RE 500 MC 11.1 oz (330 ml)	Includes (25) Refill Packs and (25) Mixers with filler tube
HIT-RE 500 Medium 16.9 oz (500 ml)	Includes (20) Refill Packs and (20) Mixers with filler tube
HIT-RE 500 Jumbo 47.3 oz (1400 ml)	Includes (4) Jumbo Refill Packs and (4) Mixers

HIT-RE 500 Epoxy Adhesive Anchoring System 3.2.7

Dispensers

Battery Powered

Ordering designation	Contents
ED3500 2.0 Ah kit	①

Manual

Ordering designation	Contents
MD 2000 dispenser — includes foil pack holder	②
MD 2500 Manual Dispenser	③
Refill Holder Replacement for MD2000, ED 3500 or P-3000HY dispensers	④

Pneumatic Dispenser with 1/4" internallythreaded compressed air coupling

Ordering designation	Contents
P-3500 dispenser (for foil packs)	⑤
HIT-P8000D pneumatic dispenser (for jumbo cartridges)	⑥
Jumbo pack holder replacement for P8000D	

Mixers & Filler Tubes

Ordering designation	Qty/Pkg
HIT-RE-M static mixer (suitable for foil pack and jumbo cartridges)	1

HIT-RE-M Mixer

Refer to Section 3.2.6.5 for ordering information of HAS threaded rods and HIS inserts.

Notes