Attached are page(s) from the 2008 Hilti North American Product Technical Guide. For complete details on this product, including data development, product specifications, general suitability, installation, corrosion, and spacing & edge distance guidelines, please refer to the Technical Guide, or contact Hilti.

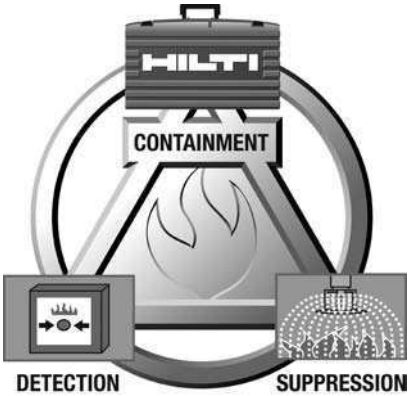
Hilti, Inc.
5400 South 122nd East Avenue
Tulsa, OK 74146

1-800-879-8000
www.hilti.com

PROFIS:
The World's Most Powerful Anchor Design Software

- Easy to Learn – Start working in just minutes
- Fast and Powerful – Produce detailed designs quickly
- Specify with Confidence – The largest number of approvals and latest design codes

No charge.
Download now at **www.us.hilti.com** or **www.hilti.ca**



Firestop Systems

When it comes to Life Safety and building code compliance, Hilti provides complete solutions with a wide range of products and unmatched technical support.

- Firestop Systems Guides
  - Through Penetrations
  - Joint Penetrations
- FACT Program
- FS 411
- BASIC Training
- Engineering Judgements
- Firestop Design Center online at **www.us.hilti.com** or **www.hilti.ca**

Hilti Diaphragm Deck Design

The Hilti Diaphragm Deck Design Program allows designers to quickly and accurately design roof deck and composite floor deck diaphragms.

- Ability to design with innovative Hilti fasteners for frame and sidelap connection
- Creates easy to use load tables with span ranges based on user input
- Allows for different safety factors depending on load type, building code and field quality control
- Direct link to Hilti website

Hilti Online

- Technical Library
- Design Centers
- Interactive Product Advisors
- Full-line Product Catalog
- Online Ordering
- Maps to Hilti locations
- "Contact Us" program to answer your questions

MI – Industrial Pipe Support Technical Guide

A guide to specifying the Hilti modular pipe support system for medium to heavy loads without welding.

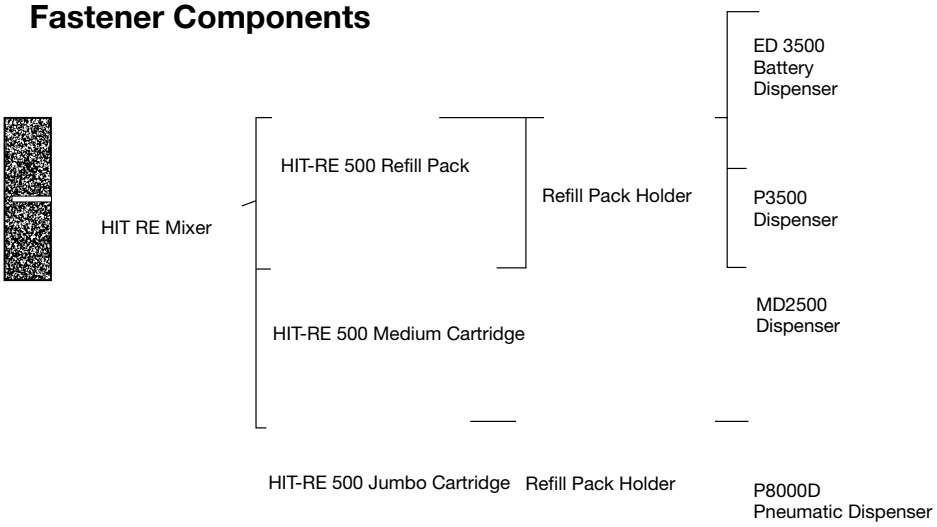
- MI System is the ideal solution for pipes up to 24 in. diameter
- Reliable fastenings without welds
- Easily installed

HIT-RE 500 Epoxy Adhesive Anchoring System 4.2.7

4.2.7.1 Product Description

4.2.7.1	Product Description
4.2.7.2	Material Specifications
4.2.7.3	Technical Data
4.2.7.4	Installation Instructions
4.2.7.5	Ordering Information

Fastener Components



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 may be used in underwater fastenings and for oversized holes up to 2 times the rod diameter (2-1/2" rod and 3" max. hole diameter) and for diamond-cored holes.

Product Features

- Superior bond performance
- Use in diamond cored or pneumatic drilled holes and 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
- Seismic qualified per IBC®/IRC® 2003, IBC®/IRC® 2000 and UBC® 1997 (ICC-ES AC58). Please refer to ESR-1682.

Listings/Approvals

City of Los Angeles
Research Report #25514
NSF/ANSI Std 61
certification for use in potable water
Europan Technical Approval
ETA-04/0027
ETA-04/0028
ETA-04/0029

Code Compliance

IBC®/IRC® 2003 (ICC-ES AC58)
IBC®/IRC® 2000 (ICC-ES AC58)
UBC® 1997 (ICC-ES AC58)
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.

Components

HAS Threaded Rods

HIS Internally Threaded Inserts

Rebar (supplied by contractor)

Smooth, epoxy coated bar (supplied by contractor)

4.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

Guide Specifications

Master Format Section:

03250 (Concrete accessories)

Related Sections:

03200 (Concrete Reinforcing-Reinforcing Accessories)
05050 (Metal Fabrication)
05120 (Structural Steel; Masonry Accessories)

Injectable adhesive shall be used for installation of all reinforcing steel dowels or threaded anchor rods and inserts into new or 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

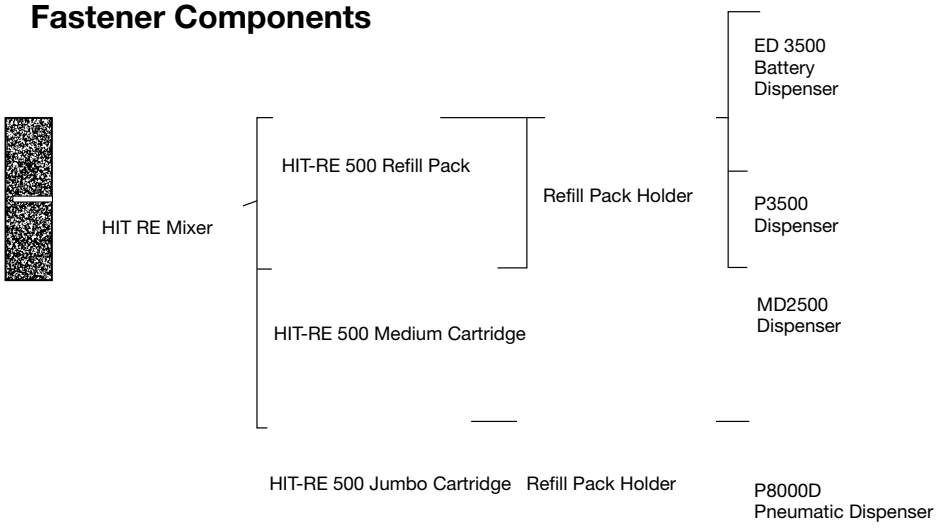
2. ASTM A 193, Grade B7 (high strength carbon steel anchor);

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.

Fastener Components



4.2.7.2 Material Specifications

Material Properties for HIT-RE 500 – Cured Adhesive

Bond Strength ASTM C882-91[1]		
2 day cure	12.4 MPa	1800 psi
7 day cure	12.4 MPa	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

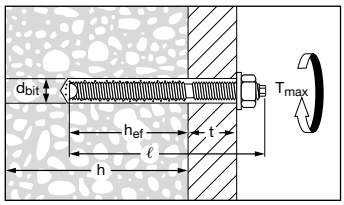
Material Specifications	Mechanical Properties f_y ksi (MPa)	Mechanical Properties min. f_u ksi (MPa)
Standard HAS-E rod material meets the requirements of ISO 898 Class 5.8	58 (400)	72.5 (500)
High Strength or 'Super HAS' rod material meets the requirements of ASTM A 193, Grade B7	105 (724)	125 (862)
Stainless HAS rod material meets the requirements of ASTM F 593 (304/316) Condition CW 3/8" - 5/8"	65 (448)	100 (689)
Stainless HAS rod material meets the requirements of ASTM F 593 (304/316) Condition CW 3/4" -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 ASTM A 563, Grade DH		
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 436		
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 steel rod materials.

4.2.7.3 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.	3-3/8	4-1/2	5-5/8	6-3/4	7-7/8	9	11-1/4
			(mm)	(90)	(110)	(143)	(171)	(200)	(229)	(286)
T_{max} max. tightening torque	HAS-E Rods	Embed. ≥ h_{nom}	ft lb (N·m)	18 (24)	30 (41)	75 (102)	150 (203)	175 (237)	235 (319)	400 (540)
	HAS SS HAS-Super	Embed. < h_{nom}	ft lb (N·m)	15 (20)	20 (27)	50 (68)	105 (142)	125 (169)	165 (224)	280 (375)
h	min. base material thickness		(in.)	1.5 h_{ef}						
Approx. 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



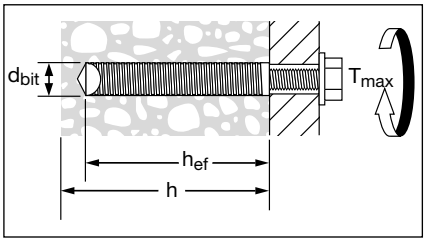
1 Use matched tolerance carbide tipped bits or Hilti matched tolerance DD-B or DD-C diamond core bits.

2 Assumes no waste.

4.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

HIT-RE 500 Installation Specification Table for HIS Inserts

Details \ HIS Insert		in.	3/8	1/2	5/8	3/4
		(mm)	(9.5)	(12.7)	(15.9)	(19.1)
d_{bit} bit diameter[1, 2]		in.	11/16	7/8	1-1/8	1-1/4
h_{nom} std. embed. depth		in.	4-1/4	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
		(N·m)	(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, 3]	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, 2]	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[2]							
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

$$\left(\frac{N_d}{N_{rec}}\right)^{5/3} + \left(\frac{V_d}{V_{rec}}\right)^{5/3} \leq 1.0 \text{ (Ref. Section 4.1.8.3)}$$

HIT-RE 500 Epoxy Adhesive Anchoring System 4.2.7

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 (33.4)	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)	40840 (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 (231.3)	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 (282.5)	51520 (229.2)	72860 (324.1)
	10-1/2 (267)	14705 (65.4)	16185 (72.0)	26440 (117.6)	37390 (166.3)	58820 (261.7)	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 (189.4)
	9 (229)	13845 (61.6)	17365 (77.2)	22435 (99.8)	31720 (141.1)	55380 (246.4)	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 (196.9)	62610 (278.5)
	11-1/4 (286)	24610 (109.5)	31620 (140.7)	35050 (155.9)	49570 (220.5)	98430 (437.9)	126480 (562.6)	105140 (467.7)	148710 (661.4)
	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 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 Concrete Capacity Design (CCD) method for standard and deep embedment and based on testing for shallow embedment.

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

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

4.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

Allowable Steel Strength for Carbon Steel & 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 & 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

HIT-RE 500 Epoxy Adhesive Anchoring System 4.2.7

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[1] lb (kN)	Shear[1] lb (kN)	Tensile[1] lb (kN)	Shear[1] lb (kN)
3/8 (9.5)	**4-1/4** (108)	**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[2]		Ultimate 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[1] lb (kN)	Shear[1] lb (kN)	Tensile[1] lb (kN)	Shear[1] lb (kN)
3/8 (9.5)	**4-1/4** (108)	**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 = $0.33 \times F_u \times A_{nom}$	Tension = $0.75 \times F_u \times A_{nom}$
Shear = $0.17 \times F_u \times A_{nom}$	Shear = $0.45 \times F_u \times A_{nom}$

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

4.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

HIT-RE 500 Ultimate Bond Strength and Steel Strength for Rebar in Concrete[1]

Nominal Rebar Size	Embed. 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)			31155 (138.6)				
#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)			104060 (462.9)				
#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)			161675 (719.2)				

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.

HIT-RE 500 Epoxy Adhesive Anchoring System 4.2.7

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

Rebar Size	Embedment Depth mm (in)	HIT-RE 500 Tensile Bond Strength				Strength Properties of Metric Rebar	
		f'_c = 14 MPa		f'_c = 28 MPa		f'_c = 400 MPa	
		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** (6950)	**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 bond strength or steel strength.

3 Minimum concrete thickness must be equal to 1.5 times the anchor embedment.

4 Testing done with imperial rebar in same size holes.

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.

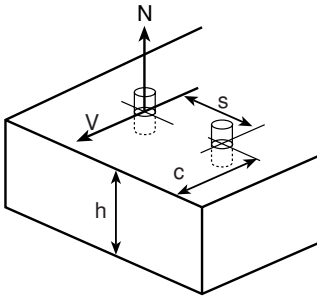
7 Ultimate tensile concrete/bond loads represent the average values obtained in testing.

HIT-RE 500 Ultimate Tensile 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)		

4.2.7 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.

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)

$c_{min} = 0.5\ h_{ef}$, $c_{cr} = 2.0\ h_{ef}$

$f_{RV2} = 0.36(c/h_{ef}) + 0.28$

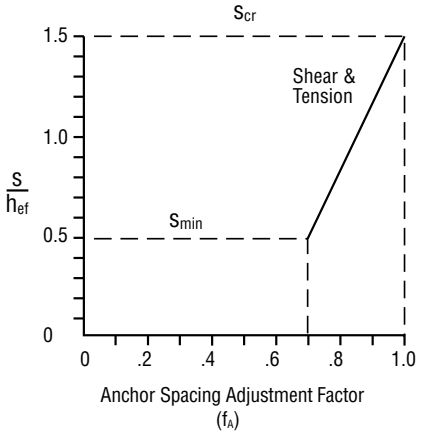
for $c_{cr} > c > c_{min}$

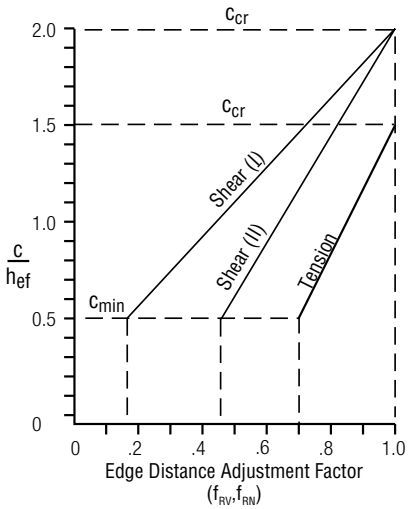
Anchor Spacing Adjustment Factors

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 Anchor

Anchor Diameter:		3/8" diameter											
Adjustment Factor		Spacing Tension/Shear, f_A			Edge Distance Tension, f_{RN}			Edge Distance Shear, f_{RV1} (⊥ toward edge)			Edge Distance Shear, f_{RV2} (II to or away from edge)		
Embed. 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	0.23		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

HIT-RE 500 Epoxy Adhesive Anchoring System 4.2.7

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 1/2" Diameter Anchor

Anchor Diameter:		1/2" diameter											
Adjustment Factor		Spacing Tension/Shear, f_A			Edge Distance Tension, f_{RN}			Edge Distance Shear, f_{RV1} (⊥ toward edge)			Edge Distance Shear, f_{RV2} (II to or away from edge)		
Embed. 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
Spacing (s)/Edge Distance (c), in.	1												
	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

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, f_{RV1} (⊥ toward edge)			Edge Distance Shear, f_{RV2} (II to or away from edge)			Spacing Tension/Shear f_A			Edge Distance Tension f_{RN}			Edge Distance Shear, f_{RV1} (⊥ toward edge)			Edge Distance Shear, f_{RV2} (II to or away from edge)		
Embed. 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

4.2.7 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.

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 Anchor

Anchor Diameter:		7/8" diameter											
Adjustment Factor		Spacing Tension/Shear, f_A			Edge Distance Tension, f_{RN}			Edge Distance Shear, f_{RV1} (⊥ toward edge)			Edge Distance Shear, f_{RV2} (II to or away from edge)		
Embed. 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

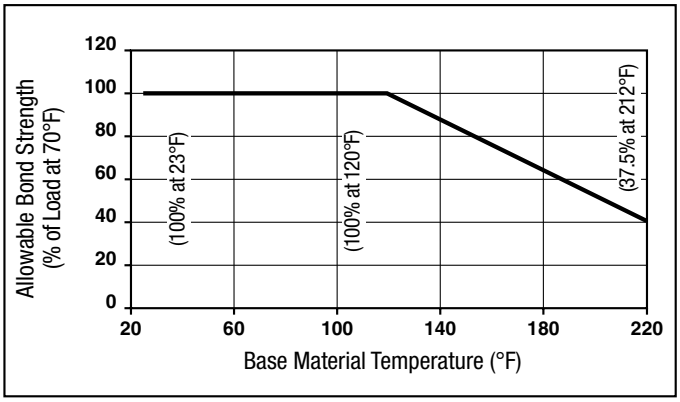
Anchor Diameter		1" diameter												1-1/4" diameter											
Adjustment Factor		Spacing Tension/Shear f_A			Edge Distance Tension f_{RN}			Edge Distance Shear, f_{RV1} (⊥ toward edge)			Edge Distance Shear, f_{RV2} (II to or away from edge)			Spacing Tension/Shear f_A			Edge Distance Tension f_{RN}			Edge Distance Shear, f_{RV1} (⊥ toward edge)			Edge Distance Shear, f_{RV2} (II to or away from edge)		
Embed. 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		0.79	0.73		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		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

HIT-RE 500 Epoxy Adhesive Anchoring System 4.2.7

Resistance of HIT-RE 500 to Chemicals

Chemical	Chemicals Tested	Resistant	Not Resistant
Alkalinize (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%) { concrete was		-
	Nitric acid (10%) { dissolved by acid		-
	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	+	

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 Table1 (100% of working load)

Base Material Temperature °F	Base Material Temperature °C	Approx. Full Curing Time
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 Table1 (25% of working load)

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

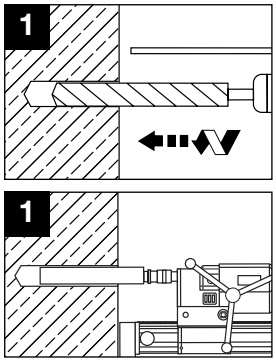
Gel Time Table1 (Approximate)

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

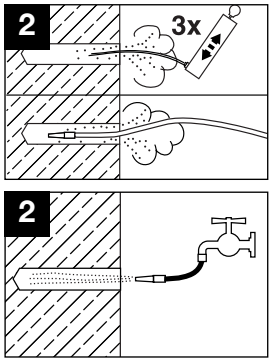
1 Minimum product temperature must be maintained above 41°F (5°C) prior/during installation.

4.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

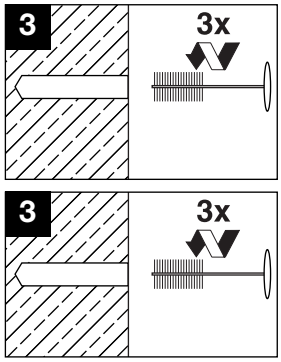
4.2.7.4 Installation Instructions



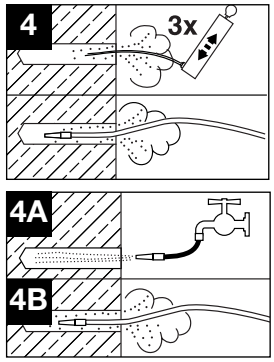
1. Drill anchor hole using carbide or diamond core bits.



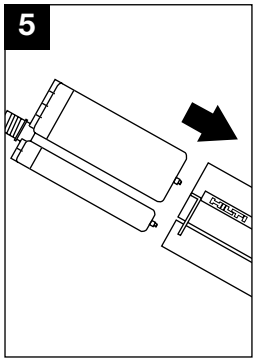
2. Insert air nozzle to bottom of hole and blow out hole using a pump, or compressed air. For underwater applications and diamond coring, flush until water runs clear from hole.



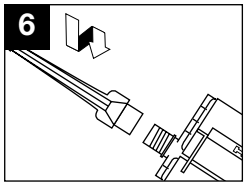
3. Clean hole with a nylon or wire brush. Proper hole cleaning is essential.



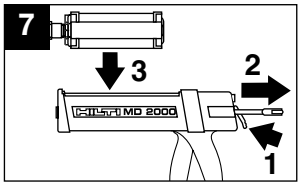
4. Insert air nozzle to bottom of hole and blow out hole using a pump, or compressed air. For underwater applications and diamond coring, flush until water runs clear from hole. Remove water (e.g. vacuum or comp. air).



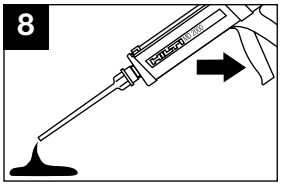
5. Insert refill pack into holder. Remove cap covering threaded projection.



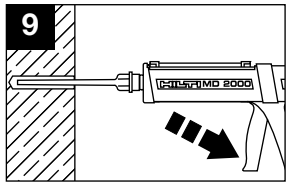
6. Screw on static mixer.



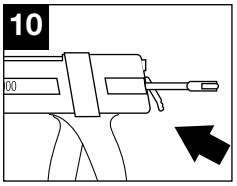
7. Put holder into dispenser.



8. **Discard first three trigger pulls of adhesive from each refill pack or cartridge.**

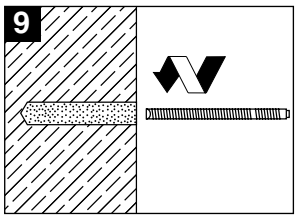


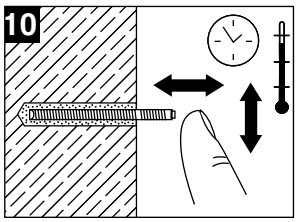
9. Inject adhesive into hole starting at the bottom until 1/2 to 2/3 full. Use mixer filler tube extensions when needed to reach the hole bottom.

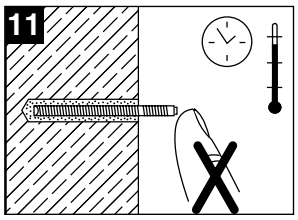


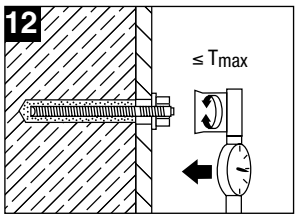
10. Unlock dispenser

Rod

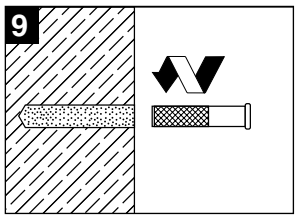


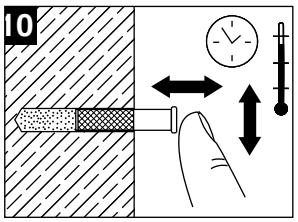


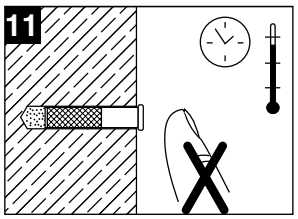


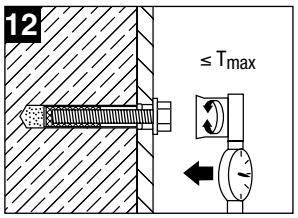


Insert

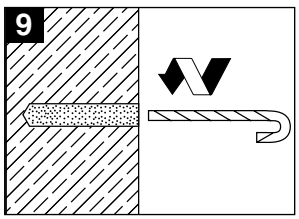




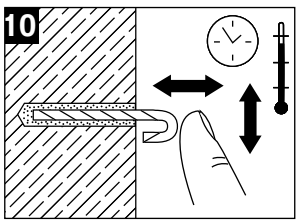




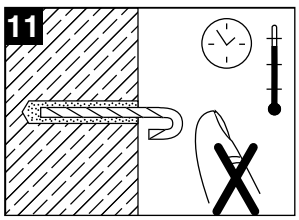
Rebar



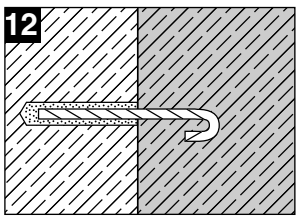
9. Insert rod, threaded insert or rebar. Twist during installation.



10. Fastener may be adjusted during specified gel time.



11. Do not disturb anchor between specified gel time and initial cure time. At the initial cure time the fastener has 25% of full working load. Work may proceed (e.g. tying rebar, setting steel) which will not exceed 25% of the full working load. Do not torque anchor.



12. After full cure time, apply specified torque as required to secure items to be fastened. Do not exceed maximum torque specified.

HIT-RE 500 Epoxy Adhesive Anchoring System 4.2.7

HIT HIT-RE 500 Volume Charts

Threaded Rod Installation

Rod Diameter (in.)	Drill Bit[1] 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.

4.2.7.5 Ordering Information

HIT RE Mixer

HIT-RE 500 Refill Pack HIT-RE 500 Medium Cartridge HIT-RE 500 Jumbo Cartridge

HIT Adhesives

Item No.	Description
340225	HIT-RE 500 11.1 oz (330 ml) Includes (1) Refill Pack and (1) Mixer with filler tube
369251	HIT-RE 500 MC 11.1 oz (330 ml) Includes (25) Refill Packs and (25) Mixers with filler tube
369110	HIT-RE 500 Medium 16.9 oz (500 ml) Includes (20) Refill Packs and (20) Mixers with filler tube
373958	HIT-RE 500 Jumbo 47.3 oz (1400 ml) Includes (4) Jumbo Refill Packs and (4) Mixers

4.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

Dispensers

Battery Powered

Item No.	Ordering designation	
3245363	ED3500 2.0 Ah kit	①

Manual

Item No.	Ordering designation	
371291	MD 1000 Manual Dispenser for HIT-ICE	②
229154	MD 2000 dispenser — includes foil pack holder	③
338853	MD 2500 Manual Dispenser	④
229170	Refill Holder Replacement for MD2000, ED 3500 or P-3000HY dispensers	⑤

Pneumatic Dispenser with 1/4" internally threaded compressed air coupling

Item No.	Ordering designation	
354180	P-3500 dispenser (for foil packs)	⑥
373959	HIT-P8000D pneumatic dispenser (for jumbo cartridges)	⑦
373960	Jumbo pack holder replacement for P8000D	

Mixers and Filler Tubes

Item No.	Ordering designation	Qty/pkg
337111	HIT-RE-M static mixer (suitable for foil pack and jumbo cartridges)	1

HIT-RE-M Mixer

HIT-RE 500 Epoxy Adhesive Anchoring System 4.2.7

Threaded Rods

HAS Rods 5.8				HAS Super A193, B7 High Strength Rods			HAS-R Rods 304 Stainless Steel			HAS-R Rods 316 Stainless Steel		
Item No. (Box)	Master Carton (MC)	Description (in.)	Qty Box/MC	Item No.	Description	Qty Box	Item No.	Description	Qty Box	Item No.	Description	Qty Box
385417	3432178	3/8 x 3	10/360									
385418	3432179	3/8 x 4-3/8	10/240									
385419	3432180	3/8 x 5-1/8	20/240	68657	3/8x5-1/8	10	385462	3/8x5-1/8	10	3024335	3/8x5-1/8	1
385420	3432181	3/8-8	10/160				385463	3/8 x 8	10			
385421	3432182	3/8 x 12	10/90									
385422	3432183	1/2 x 3-1/8	10/240									
385423	3432184	1/2 x 4-1/2	10/160									
385424	3432185	1/2 x 6-1/2	20/160	68658	1/2x6-1/2	10	385464	1/2x6-1/2	10	3024336	1/2x6-1/2	1
385425	3432239	1/2 x 8	10/120				385465	1/2x8	1			
385426	3432186	1/2 x 10	10/120				385466	1/2x10	1			
										3024337	1/2x11	1
385427	3432187	1/2 x 12	10/80									
385428	3432188	5/8 x 8	20/80	333783	5/8x7-5/8	10	385467	5/8x7-5/8	10	333781	5/8x7-5/8	10
							385468	5/8x10	1			
385429	3432189	5/8 x 9	10/60							3024338	5/8x9	1
385430	3432190	5/8 x 12	10/60							3024339	5/8x12	1
385431	3432191	5/8 x 17	10/40									
385432	3432052	3/4 x 10	10/40	68660	3/4x9-5/8	5	385469	3/4x9-5/8	5	3024340	3/4x9-5/8	1
385433	3432163	3/4 x 11	10/30									
385434	3432164	3/4 x 12	10/30				385470	3/4x12	1			
385435	3432165	3/4 x 14	10/30	3006083	3/4 x 14	5	385471	3/4x14	1			
							385472	3/4x16	1			
385436	3432166	3/4 x 17	10/20									
385437	3432167	3/4 x 19	10/20									
385438	3432168	3/4 x 21	10/20									
385439	3432169	3/4 x 25	10/20									
385440	3432170	7/8 x 10	10/20	68661	7/8x10 (HDG)[1]	5	385473	7/8x10	1			
				3006077	7/8x12 (HDG)[1]	5						
385441	3432171	7/8 x 13	10/20	45259	7/8x16 (HDG)[1]	5						
385442	3432172	1 x 12	4/16	68662	1x12	5	385474	1x12	1	3024341	1x12	4/16
385443	3432173	1 x 14	2/16	3006079	1x14	5						
385444	3432174	1 x 16	2/12	3006080	1x16	5						
385445	3432175	1 x 20	2/12	3006081	1x21	5						
385446	3432176	1-1/4 x 16	4/8	333779	1-1/4x16	4						
385447	3432177	1-1/4 x 22	4/8									
				3006082	1-1/4x23	5						

1 Hot dipped galvanized (7/8" rod only). Coating thickness 2 mils (50.8 µm).

HIS Internally Threaded Inserts

HIS Item No.	HIS-R Item No.	Description	Useable Thread Length (in.)	Qty Box
258020	258029	3/8x4-1/4	1	10
258021	258030	1/2x5	1-3/16	5
258022	258031	5/8x6-5/8	1-1/2	5
258023	258032	3/4x8-1/4	2	5

In The United Sates

PAYMENT TERMS: Net 30 days from date of invoice. Customer agrees to pay all costs incurred by Hilti in collecting any delinquent amounts, including attorney's fees.

FREIGHT: All sales are F.O.B. Destination with transportation allowed via Hilti designated mode. Delivery dates are estimates only. Additional charges for expedited shipments, special handling requirements, and orders below certain dollar amounts shall be the responsibility of Customer. Fuel surcharges may apply depending on market conditions.

CREDIT: All orders sold on credit are subject to Credit Department approval.

RETURN POLICY: Products must be in saleable condition to qualify for return. Saleable condition is defined as unused items in original undamaged packaging and unbroken quantities and in as-new condition. All returns are subject to Hilti inspection and acceptance, and a $125 restocking charge if returned more than 90 days after invoice date. Proof of purchase is required for all returned materials. Special orders products and discontinued items are not eligible for return credit. Dated materials are only returnable in case quantity, and within 30 days after invoice date.

WARRANTY: Hilti warrants that for a period of 12 months from the date it sells a product it will, at its sole option and discretion, refund the purchase price, repair, or replace such product if it contains a defect in material or workmanship. Absence of Hilti's receipt of notification of any such defect within this 12-month period shall constitute a waiver of all claims with regard to such product.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Hilti shall in no event be liable for, and Customer hereby agrees to indemnify Hilti against all claims related to special, direct, indirect, incidental, consequential, or any other damages arising out of or related to the sale, use, or inability to use the product.

ACCEPTANCE OF ORDER: Acceptance is limited to the express terms contained herein, and terms are subject to change by Hilti without notice. Additional or different terms proposed by Customer are deemed material and are objected to and rejected, but such rejection shall not operate as a rejection of the offer unless it contains variances in the terms of the description, quantity, price or delivery schedule of the goods. Orders are not deemed "accepted" by Hilti unless and until it ships the associated items.

DOMESTIC ORIGIN: Any non-domestic Hilti product will be so identified on shipping documents and invoices for customers who properly identify themselves as a federal government entity. All other customers may obtain such information by written request to Hilti, Inc., Contract Compliance, P.O. Box 21148, Tulsa, Oklahoma 74121. Hilti's Quality Department personnel are the only individuals authorized to warrant the country of origin of Hilti products.

BUSINESS SIZE: Hilti is a large business.

PRICES: Prices are those stated on the order, and unless otherwise noted are based on purchasing all items on the order — pricing for individual products may vary for purchases of different quantities or item combinations. Hilti does not maintain most favored customer records, makes no representation with respect to same, and rejects any price warranty terms proposed by Customer. Hilti's published net price list is subject to change without notice.

CONSENT TO JURISDICTION: All transactions made pursuant hereto shall be deemed to have been made and entered into in Tulsa, Oklahoma. Any and all disputes arising directly or indirectly from such transactions shall be resolved in the courts of the County of Tulsa, State of Oklahoma, to the exclusion of any other court, and any resulting judgment may be enforced by any court having jurisdiction of such an action. All transactions shall be governed by and construed in accordance with the laws of the State of Oklahoma.

INDEMNIFICATION: Customer hereby agrees to indemnify Hilti for any costs, including attorney's fees, incurred by Hilti as a result, in whole or in part, of any violation by Customer of any Federal, State or Local statute or regulation, or of any nationally accepted standard. It shall be Customer's sole responsibility to comply with all applicable laws and regulations regarding the handling,use, transportation, or disposal of products upon taking possession of same.

AUTHORIZATION: HILTI LEGAL DEPARTMENT PERSONNEL ARE THE ONLY INDIVIDUALS AUTHORIZED TO MODIFY THESE TERMS AND CONDITIONS, WARRANT PRODUCT SUITABILITY FOR SPECIFIC APPLICATIONS, OR EXECUTE CUSTOMER DOCUMENTS, AND ANY SUCH ACTION IS NULL AND VOID UNLESS IN WRITTEN FORM SIGNED BY SUCH INDIVIDUAL.

In Canada

PAYMENT TERMS: Net 30 days from date of invoice. Customer agrees to pay all costs incurred by Hilti in collecting delinquent amounts, if any, including reasonable attorney's fees.

FREIGHT: Sales are F.O.B. Destination Point with transportation allowed via Hilti designated mode. Additional charges may apply for expedited delivery, special handling requirements, and order under certain limits. A fuel surcharge may apply depending on market conditions.

CREDIT: All orders sold on credit are subject to Credit Department approval.

RETURN POLICY: Product may be returned prepaid (unless otherwise authorized) to Hilti provided:

i) it is returned by the original purchaser

ii) it is not dated product returned more than 30 days after the original delivery date

iii) it is not discontinued, clearance or special order product

iv) it is unused, in original packaging and in unbroken quantities.

Hilti will inspect product and, if the above requirements are satisfied, will credit to customer the original purchase price. A 15% restocking fee may apply.

WARRANTY: Other than the manufacturer's published warranty, no warranties or conditions, express or implied, written or oral, statutory or otherwise are implied. Any and all conditions and warranties implied by law or by the Sale of Goods Act or any similar statutes of any Province are hereby expressly waived.

TITLE TO PRODUCT: Title to product remains with Hilti until the total purchase price of product is paid.

PRICES: Customer agrees to pay Hilti prices set out on invoice. Customer agrees to pay taxes as indicated on invoice unless Hilti receives acceptable exemption certificates.

INDEMNIFICATION: Customer agrees to use product at own risk and to indemnify Hilti against all liabilities, including legal fees, to third parties arising out of the use or possession thereof. Hilti shall in no event be liable for special, incidental or consequential damages.

CHANGES: Hilti sales personnel are not authorized to modify these Terms and Conditions or modify Customer's credit terms. Terms are subject to change by Hilti with reasonable notice to Customer.

CASH SALES: Payment in full is due prior to goods being released.

QUOTATIONS: All terms and conditions apply once customer agrees to purchase product. Quotations on special promotion products are only valid until end of promotion period.