HILTI

HTE 50

Anchoring and doweling adhesive for transportation applications (Rebar)

On the job. Every day.

Hilti. Outperform. Outlast.

Keep your transportation projects moving.

HTE 50 Transportation Epoxy

At Hilti we take every construction connection seriously. Continuing our tradition of industry leadership in anchoring products, we are introducing the newest addition to our portfolio of chemical adhesives: HTE 50 Transportation Epoxy for rebar doweling and other applications on transportation projects.*

Ideal for transportation applications including roads, bridges, railways and airstrips, the HTE 50 is versatile enough for other important structural applications, too. And as with every Hilti anchoring product, the HTE 50 comes with expert technical support and service. On the job. Every day.

*Contact Hilti for the current State DOT approval list.

Applications

- Transportation applications on roads, bridges, railways and airstrips
- Rebar dowels for concrete pavement
- Concrete repair, widening and renovations

Outperform

- High quality adhesive for multiple applications
- Hard cartridge for added durability
- Variety of sizes to fit application needs
- High quality dispensers
- Onsite training available to help increase productivity
- Onsite Engineering support
- Direct sales force for jobsite support
- Tools and products to complete a variety of applications

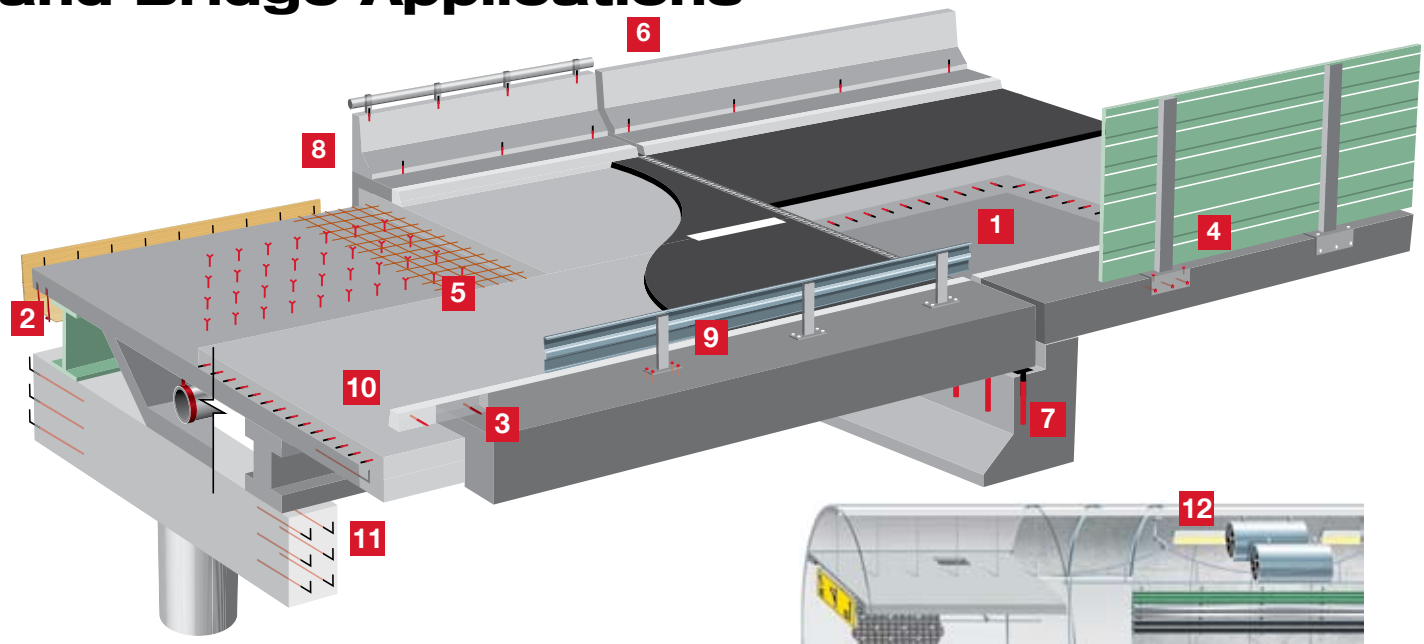
Order Information

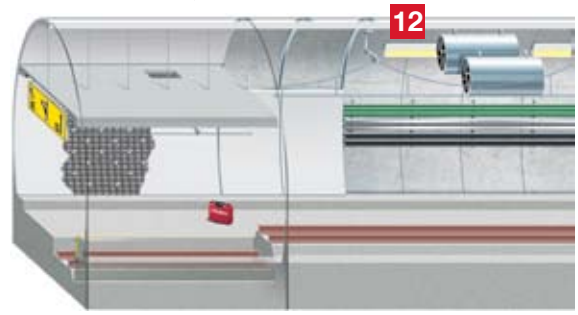
Description	Package Contents	Item No.
16 oz / 437 ml	2 MC (40 cartridges) + 1 Manual Dispenser	03451317
16 oz / 437 ml	5 MC (100 cartridges) + 2 Manual Dispensers	03451318
31.8 oz / 940 ml	5 MC (50 cartridges) + 2 Manual Dispensers	03451321
31.8 oz / 940 ml	1/2 Pallet (180 cartridges) + 1 Pneumatic Dispenser	03451464
31.8 oz / 940 ml	1 Pallet (360 cartridges) + 1 Pneumatic Dispenser	03451466
15 Gallon Kit	1 Kit — (2) 5 gal pails of part A, (1) 5 gal pail of part B	03451304
15 Gallon Kit	1 Pallet (9 Kits)	03451305

NOTE: Other packages without dispensers as well as separate additional dispensers without product are available. Please contact your Hilti Account Manager to fulfill your needs.

Technical Data	HTE 50
Product	Epoxy Adhesive
Base material temperature range	41° F to 110° F
Diameter range (rod)	1/2" to 1-1/4"
Diameter range (rebar)	#4 to #10
Cure time at 75° F	Approximately 24 hours
Approvals • ASTM C881: Type I, II, IV and V, Grade 3, Class A, B and C	
Packaging • 16 oz and 31.8 oz cartridges plus 15 gallon bulk kits	

Hilti Solutions for Road and Bridge Applications





Good — Adhesive Performance* — Best

Lower — Performance required by the application* — Higher

Identifier	Application	HTE 50	HY 150-MAX	RE 500-SD
1	Rebar dowels for concrete repair and widening a slab on grade	✓		
2	Fastening temporary formwork	✓		
3	Dowels for miscellaneous concrete, curb and sidewalks	✓		
4	Anchorage of sound barriers	✓		
5	Fasten into existing slab for concrete overlay	✓		
6	Fasten safety railing	✓		
7	Abutment bearing seat anchors	✓	✓	
8	Anchorage of concrete barriers and retaining structures	✓	✓	
9	Anchoring and rebar dowels for concrete safety barriers	✓	✓	
10	Widening of concrete bridge deck		✓	✓
11	Rebar for widening/extending bridge beams and columns		✓	✓
12	Overhead fastenings — signs, tunnel fans, ceiling panels, etc.			✓

* Checkmarks are a general guideline. Project-specific requirements can vary, and necessitate a higher performing adhesive. Project/performance considerations include (but are not limited to), bond strength/capacity, approvals, use in wet/damp/cored holes, tested performance for dynamic loads, cracked concrete conditions, extent of technical documentation, temperature limitations, etc. The project engineer must always verify suitability. Applications that are not checked may be suitable, depending on project requirements — contact Hilti for details. Your local transportation authority may also verify suitability for applications using adhesive anchors.

Adhesive Anchoring Portfolio for Civil Construction

Adhesive anchor	Description	Sizes	Approvals	Cure Time
 HTE 50	Economical two-part epoxy specific to transportation industry applications	16 oz 31.8 oz 15 gal	• ASTM C881: Type I, II, IV and V, Grade 3, Class A, B and C • Various DOT approvals	Slow
 RE 500	High performance epoxy with reliability and versatility in a broad range of applications	11.1 oz 16.9 oz 47.3 oz	• COLA (City of Los Angeles) - RR-25514 • NSF/ANSI standard 61 Certification for potable water • ASTM C881 Type IV, Grade 3, Class A/B/C • Various DOT approvals	Slow
 RE 500 SD	Slow cure epoxy which meets the latest standards for creep, seismic and cracked concrete, compliant with the latest building codes	11.1 oz 16.9 oz 47.3 oz	• ICC-ES (International Code Council) - ESR-2322 • COLA (City of Los Angeles) - RR-25700 • NSF/ANSI standard 61 Certification for potable water • IBC 2006 compliant • IBC 2003 compliant • Various DOT approvals	Slow
 HY 150-MAX	Fast cure hybrid adhesive featuring a high temperature range and meets the latest building code requirments for creep and other un-cracked concrete applications	11.1 oz 16.9 oz 47.3 oz	• ICC-ES (International Code Council) - ESR-2262 (un-cracked concrete) • COLA (City of Los Angeles) - RR-25652 • NSF/ANSI standard 61 Certification for potable water • IBC 2006 compliant • IBC 2003 compliant • Various DOT approvals	Fast

Applications

- Unique system for proper installation of rebar and anchoring elements up to #10 rebar and varying embedment depths
- Time saving system with superior results
- Comprehensive sets of accessories for maximizing HIT performance and increasing productivity
- Consistent performance on virtually every job

Drill

Drill Bits

HAS Rods

HTE 50 Ultimate Bond Strength for Rebar in Normal Weight Concrete[1,4]

Nominal Rebar Size	Embed. Depth [in]	Allowable Tension Capacity[5] [lb]	Ultimate Tension Capacity[2] [lb]	Grade 60 Rebar in Tension[3]	
				Yield Strength [lb]	Tensile Strength [lb]
#4	2-1/4	1207	4830	12000	18000
	4-1/2	3596	14382		
	6	4237	16947		
#5	2-13/16	1688	6750	18600	27900
	5-5/8	4642	18567		
	7-1/2	5596	22383		
#6	3 3/8	2218	8873	26400	39600
	6 3/4	7582	30326		
	9	8766	35064		
#7	3-15/16	2795	11181	36000	54000
	7-7/8	9119	36476		
	10-1/2	9298	37190		
#8	4-1/2	3415	13661	47400	71100
	9	13996	55985		
	12	13996	55985		
#9	5-1/16	4642	18567	60000	90000
	10-1/8	15369	61475		
	13-1/2	15369	61475		
#10	5-5/8	6274	25097	76200	114300
	11-1/4	18974	75895		
	15	18974	75895		

1 For $f'_c \geq 2000$ psi. Minimum concrete thickness must be equal to or greater than 1.5 times the anchor embedment

2 Based on comparison of average ultimate adhesive bond test values and bond strength calculations

3 Based on minimum steel strength and cross-sectional area of rebar per ASTM

4 All values based on installation in accordance with Hilti's published installation instruction

5 Based on a factor of safety of 4

Rebar Specification Table

Rebar size:		#4	#5	#6	#7	#8	#9	#10
d_0: bit diameter[1]	in	5/8	3/4	7/8	1	1-1/8	1-3/8	1-1/2
h_{ef}: embedment depth	in	2-1/4 to 6	2-13/16 to 7-1/2	3-3/8 to 9	3-15/16 to 10-1/2	4-1/2 to 12	5-1/16 to 13-1/2	5-5/8 to 15
	(mm)	(57 to 152)	(71 to 191)	(86 to 229)	(100 to 276)	(114 to 305)	(128 to 343)	(143 to 381)
h: min. base material thickness	-	1.5 h_{ef}						

1 Rebar diameters may vary. Use smallest diameter bit that will fit rebar

HTE 50 Adhesive Anchor System

Influence of Anchor Spacing and Edge Distance f_A , f_R

Anchor Size	in	#4	#5	#6	#7	#8	#9/#10
	(mm)	(12.7)	(15.9)	(19.1)	(22.2)	(25.4)	(31.8)
h_{nom}	in	4-1/2	5-5/8	6-3/4	7-7/8	9	11-1/4
	(mm)	(114)	(143)	(171)	(200)	(229)	(286)

h_{nom} = standard embedment depth

Load Adjustment Factors (Anchor Spacing) f_A [1]

Tension/Shear

Spacing s							
in	(mm)	#4	#5	#6	#7	#8	#9/#10
2-1/4	(57)	.70					
2-7/8	(73)	.74	.70				
3	(76)	.75	.71				
3- 3/8	(86)	.78	.73	.70			
4	(102)	.82	.76	.73	.70		
4-1/2	(114)	.85	.79	.75	.72	.70	
5	(127)	.88	.82	.77	.74	.72	
5-5/8	(143)	.93	.85	.80	.76	.74	.70
6	(152)	.95	.87	.82	.78	.75	.71
6-3/4	(171)	1.0	.91	.85	.81	.77	.73
7	(178)		.92	.86	.82	.78	.74
8	(203)		.98	.91	.85	.82	.76
8-3/8	(213)		1.0	.92	.87	.83	.77
10-1/8	(257)			1.0	.94	.89	.82
11-3/4	(289)				1.0	.94	.86
13-1/2	(343)					1.0	.91
16-7/8	(429)						1.0

$s_{min} = 0.5\ h_{ef}$ $\quad s_{cr} = 1.5\ h_{ef}$

$f_A = 0.30\ s/h_{ef} + 0.55$

for $s_{cr} > s > s_{min}$

1 For $h_{ef} \le h_{nom}$ use adjustment factors from table
For $h_{ef} > h_{nom}$ use formula to calculate adjustment factors

HTE 50 Adhesive Anchor System

Load Adjustment Factors (Edge Distance) f_R[1]																			
Tension f_{RN}								Shear f_{RV} (⊥ to Edge)						Shear f_{RV} (II to Edge)					
Edge Distance c																			
in	(mm)	#4	#5	#6	#7	#8	#9/#10	#4	#5	#6	#7	#8	#9/#10	#4	#5	#6	#7	#8	#9/#10
2-1/4	(57)	.70						.30						.60					
2-7/8	(73)	.74	.70					.40	.30					.66	.60				
3	(76)	.75	.71					.42	.32					.67	.61				
3-3/8	(86)	.78	.73	.70				.48	.37	.30				.70	.64	.60			
4	(102)	.82	.76	.73	.70			.57	.45	.36	.30			.76	.68	.64	.60		
4-1/2	(114)	.85	.79	.75	.72	.70		.65	.51	.42	.35	.30		.80	.72	.67	.63	.60	
5	(127)	.88	.82	.77	.74	.72		.73	.57	.47	.39	.34		.84	.76	.70	.65	.62	
5-5/8	(143)	.93	.85	.80	.76	.74	.70	.83	.65	.53	.45	.39	.30	.90	.80	.73	.69	.65	.60
6	(152)	.95	.87	.82	.78	.75	.71	.88	.70	.57	.48	.42	.32	.93	.83	.76	.70	.67	.61
6-3/4	(171)	1.0	.91	.85	.81	.77	.73	1.0	.79	.65	.55	.48	.37	1.0	.88	.80	.74	.70	.64
7	(178)		.92	.86	.82	.78	.74		.82	.68	.57	.49	.39		.90	.81	.76	.71	.65
8	(203)		.98	.91	.85	.82	.76		.95	.78	.66	.57	.45		.97	.87	.81	.76	.68
8-3/8	(213)		1.0	.92	.87	.83	.77		1.0	.82	.69	.60	.47		1.0	.92	.83	.77	.70
10-1/8	(257)			1.0	.94	.89	.82			1.0	.85	.74	.58			1.0	.91	.85	.76
11-3/4	(289)				1.0	.94	.86				1.0	.86	.68				1.0	.92	.82
13-1/2	(343)					1.0	.91					1.0	.79					1.0	.88
16-7/8	(429)						1.0						1.0						1.0
$c_{min} = 0.5\ h_{ef}$ $c_{cr} = 1.5\ h_{ef}$ $f_{RN} = 0.30\ c/h_{ef} + 0.55$ for $c_{cr} > c > c_{min}$																			

1 For $h_{ef} \le h_{nom}$ use adjustment factors from table
For $h_{ef} > h_{nom}$ use formula to calculate adjustment factors

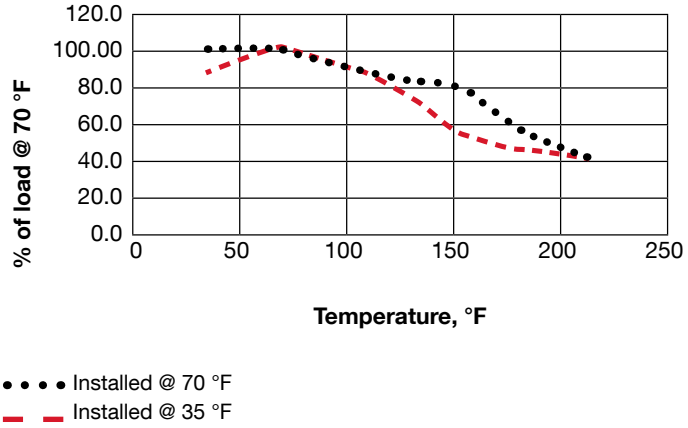
HTE 50 Adhesive Anchor System

Gel/Cure Time (Approximate)[1]

Temperature	Gel Times	Cure Times
41° F (5°C)	60 minutes	60 hours
75° F (24°C)	20 minutes	24 hours
110° F (43°C)	6 minutes	20 hours

1 Times listed above are a function of base material temperature, not ambient air temperature

Influence of Temperature on Bond Strength



Smooth Rod or Bar in Solid Base Material

16 ounces

Rebar or Rod Dia. (in.)		Drill Bit Dia. (in.)	# of Fastenings per Cartridge																							
			Hole Depth (in.)																							
			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
#8	1	1-1/8	13	11	10	9	8	7	7	6	6	5	5	5	4	4	4	4	4	3	3	3	3	3	3	3	3
#9	1-1/8	1-3/8	7	6	5	5	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	1	1	1
#10	1-1/4	1-1/2	6	5	5	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
#11	1-3.8	1-5/8	6	5	5	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1

31.8 ounces

Rebar or Rod Dia. (in.)		Drill Bit Dia. (in.)	# of Fastenings per Cartridge																							
			Hole Depth (in.)																							
			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
#8	1	1-1/8	27	24	21	18	16	15	14	13	12	11	10	10	9	9	8	8	7	7	7	7	6	6	6	6	5
#9	1-1/8	1-3/8	14	12	11	9	8	8	7	7	6	6	5	5	5	4	4	4	4	4	4	3	3	3	3	3	3
#10	1-1/4	1-1/2	13	11	10	9	8	7	6	6	6	5	5	5	4	4	4	4	4	3	3	3	3	3	3	3	3
#11	1-3.8	1-5/8	13	11	10	9	8	7	6	6	6	5	5	5	4	4	4	4	4	3	3	3	3	3	3	3	3

15 gallon

Rebar or Rod Dia. (in.)		Drill Bit Dia. (in.)	# of Fastenings per 15 Gallon Kit																							
			Hole Depth (in.)																							
			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
#8	1	1-1/8	1679	1439	1259	1119	1007	916	839	775	720	672	630	593	560	530	504	480	458	438	420	403	387	373	360	347	336
#9	1-1/8	1-3/8	865	741	648	576	519	472	432	399	371	346	324	305	288	273	259	247	236	226	216	208	200	192	185	179	173
#10	1-1/4	1-1/2	788	675	591	525	473	430	394	364	338	315	295	278	263	249	236	225	215	206	197	189	182	175	169	163	158
#11	1-3.8	1-5/8	805	690	604	537	483	439	402	371	345	322	302	284	268	254	241	230	219	210	201	193	186	179	172	167	161

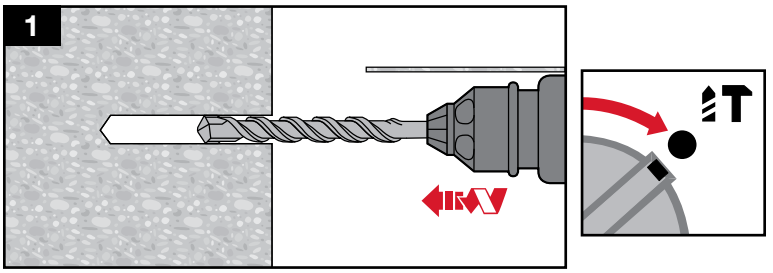
Tables are estimations for the maximum volume expected for each unit. (ie: 16oz cartridge, 31.8oz cartridge, 15 gallon kit) Actual usage may vary depending on waste.

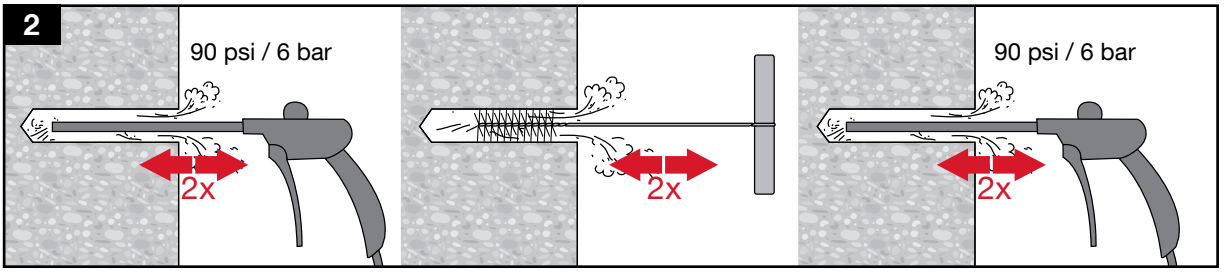
HTE 50 Technical data

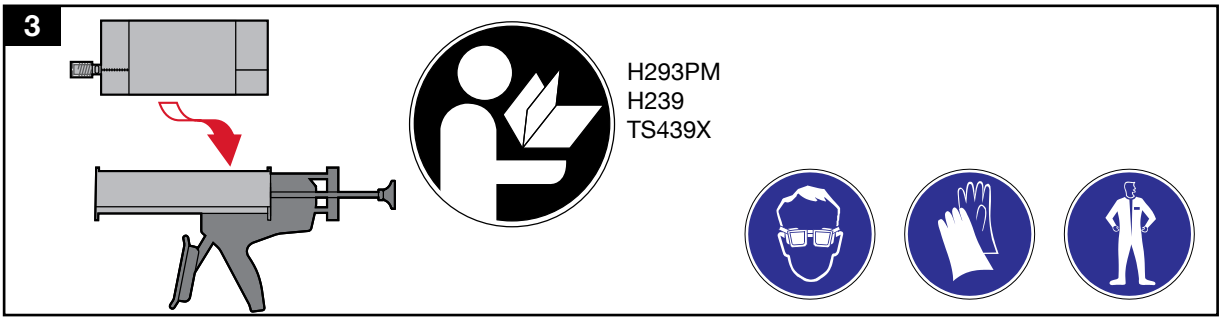
for Hilti HAS Rods and standard threaded rod

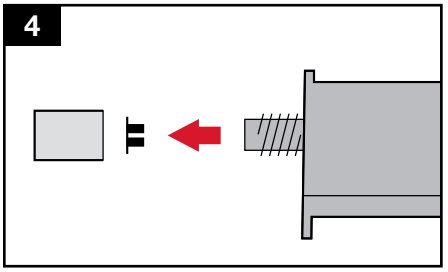
Contact your Hilti Representative or call Hilti Technical Services at **(877) 749-6337** for technical data. A complete submittal package is available for Hilti HAS Rods and standard threaded rod.

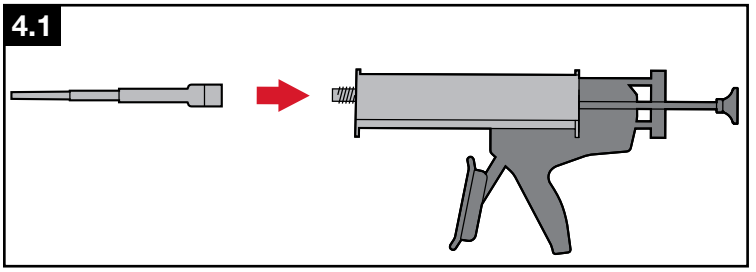
HTE 50 Installation Instructions (Manual and pneumatic dispensers)

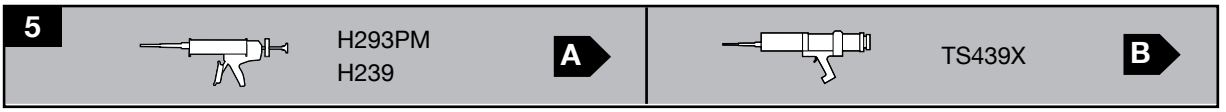


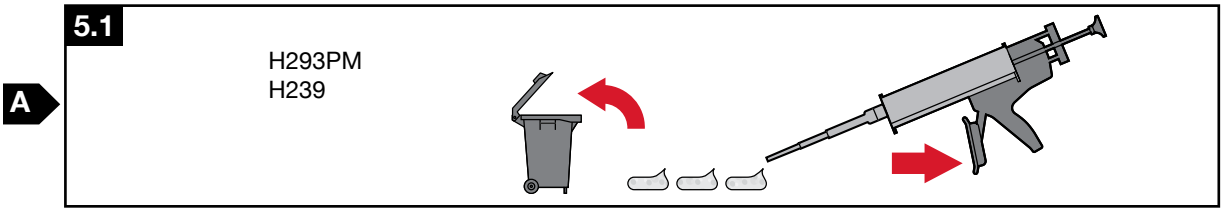


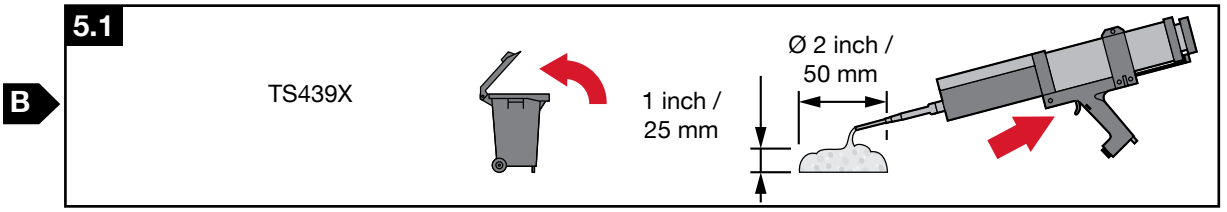




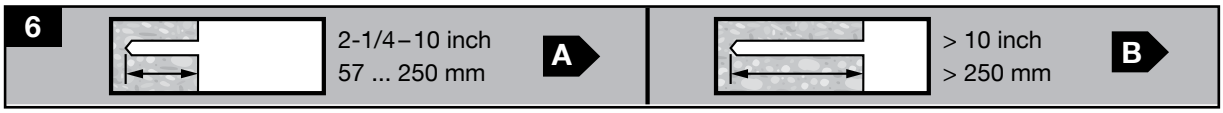


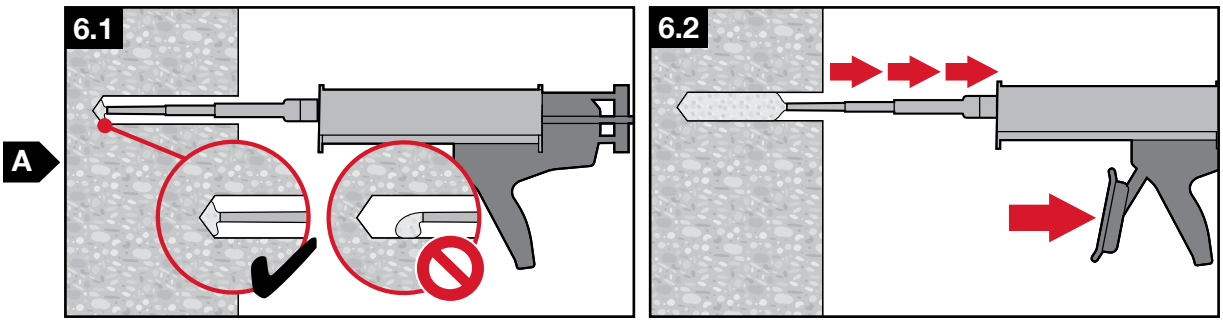


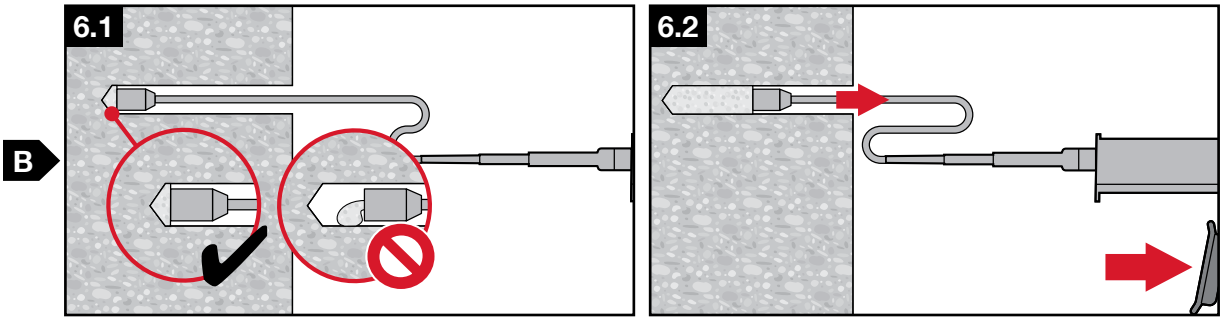


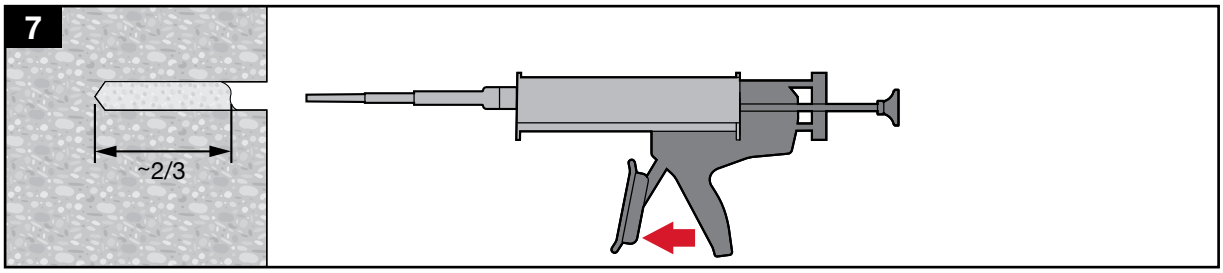


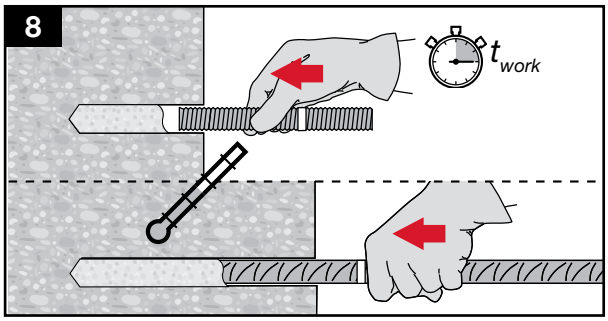
HTE 50 Adhesive Anchor System (Manual and pneumatic dispensers)

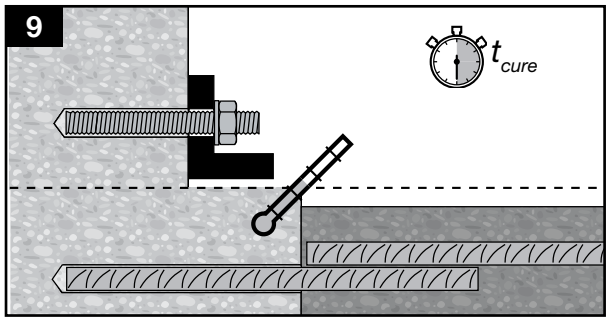












9.1

[°F]	[°C]	t_{work}	t_{cure}
41	5	60 min	60 h
75	24	20 min	24 h
110	43	6 min	20 h

MSDS No.: 325
Revision No.: 000
Revision Date: 05/27/09
Page: 1 of 2

Product name: **HTE 50 - High Strength Transportation Epoxy**
Description: High strength adhesive for anchoring in concrete. (Part A is the large tube)
Supplier: Hilti, Inc. P.O. Box 21148, Tulsa, OK 74121
Emergency # (Chem-Trec.): 1-800-424-9300 (USA, PR, Virgin Islands, Canada); 001 703 527 3887 (other countries)

INGREDIENTS AND EXPOSURE LIMITS

Ingredients:		CAS Number:	TLV:	PEL:	STEL:
Part A:	Bisphenol A epoxy resin	25068-99-8	NE	NE	NE
	Ethylene glycol	107-21-1	NE	NE	C100
	Silica fume	7631-86-9	NE	NE	NE
	Quartz sand	14808-60-7	0.025 mg/m^3 (R)	10 mg/m^3 (R) / % SiO_2 + 2	NE
Part B:	N-Aminoethylpiperazine	140-31-8	NE	NE	NE
	Nonylphenol	84852-15-3	NE	NE	NE
	Ethylene glycol	107-21-1	NE	NE	C100
	Silica fume	7631-86-9	NE	NE	NE
	Quartz sand	14808-60-7	0.025 mg/m^3 (R)	10 mg/m^3 (R) / % SiO_2 + 2	NE

Abbreviations: C = Ceiling. **NE** = None Established. **R** =dust “respirable” fraction. **T** = “total” dust.
TLV = ACGIH Threshold Limit Values. **PEL** = OSHA Permissible Exposure Limits. **STEL** = ACGIH/OSHA Short Term Exposure Limit

PHYSICAL DATA

Appearance and Odor:	A: white; B: gray / paste. Slight ammonia odor.	**VOC Content:**	Not determined.
Boiling Point:	> 212° F	**Vapor Pressure:**	Not determined.
Vapor Density: (air = 1)	Not determined.	**Odor Threshold:**	Not determined.
Evaporation Rate:	Not applicable.	**Solubility in Water:**	Insoluble.
Specific Gravity:	Part A: 1.6 Part B:1.4	**pH:**	Not determined.

FIRE AND EXPLOSION HAZARD DATA

Flash Point:	Part A > 300° F Part B >200° F	**Flammable Limits:**	Not applicable.
Extinguishing Media:	CO_2, Dry Chemical, Foam, Water Spray.		
Special Fire Fighting Procedures:	A self-contained breathing apparatus should be worn when fighting fires involving chemicals.		
Unusual Fire and Explosion Hazards:	None known. Thermal decomposition products can be formed including CO_x, NO_x, water and carbon.		

REACTIVITY DATA

Stability:	Stable.	**Hazardous Polymerization:**	Will not occur.
Incompatibility:	Strong acids and oxidizing agents.		
Decomposition Products:	Thermal decomposition can yield CO_x, NO_x, water and carbon.		
Conditions to Avoid:	Avoid temperature extremes that could shorten the shelf-life of this product. (See handling and storage requirements for recommended storage temperatures).		

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HEALTH HAZARD DATA

Known Hazards:	**Part A:** Eye and skin irritation. Possible skin sensitizer. **Part B:** Corrosive
Signs and Symptoms ofExposure:	**Part A:** Can be irritating to the eyes and skin, Can cause skin sensitization with some individuals (itching, redness, swelling). **Part B:** Can cause eye and skin burns. Vapors can be irritating. If swallowed, can cause burns.
Routes of Exposure:	Contact. Inhalation.
Carcinogenicity:	IARC classifies crystalline silica (quartz sand) as a Group I carcinogen based upon evidence among workers in industries where there has been long-term and chronic exposure (via inhalation) to silica dust. This product does not pose a dust hazard; therefore, this classification is not relevant.
Medical Conditions Aggravated by Exposure:	Eye, skin, and respiratory conditions.

EMERGENCY AND FIRST AID PROCEDURES

Eyes:	Flush **immediately** with water for at least 15 minutes. Contact a Physician immediately.
Skin:	Wash **immediately** with soap and water. Launder contaminated clothing before reuse. Contact a Physician if any symptoms occur.
Inhalation:	Move victim to fresh air. Contact a physician if symptoms persist.
Ingestion:	Do not induce vomiting unless directed by a physician. Contact a Physician immediately.
Other:	Referral to a Physician is recommended if there is any question about the seriousness of the injury/ exposure

CONTROL MEASURES AND PERSONAL PROTECTIVE EQUIPMENT

Ventilation:	General (natural or mechanically induced fresh air movements).
Eye Protection:	Chemical goggles recommended.
Skin Protection:	Impermeable (neoprene or rubber) gloves recommended. Other protective clothing as required to prevent skin contact with the adhesive.
Respiratory Protection:	None normally required. Where ventilation is inadequate to control vapors, use a NIOSH approved respirator with organic vapor cartridges.

PRECAUTIONS FOR SAFE HANDLING AND USE

Handling and Storing Precautions:	For industrial use only. Keep away from children. Use with adequate ventilation. Avoid contact with the eyes or skin. Practice good hygiene; i.e. wash after using and before eating or smoking. Store in a cool dry area between 41° and 77° F (5 - 25° C). Keep from freezing.
Spill Procedures:	Scoop up spilled material and place in a metal container for proper disposal.

REGULATORY INFORMATION

Hazard Communication:	This MSDS has been prepared in accordance with the federal OSHA Hazard Communication Standard 29 CFR 1910.1200.
HMIS Codes:	Part A: Health 2, Flammability 1, Reactivity 0, PPE B Part B: Health 3, Flammability 1, Reactivity 0, PPE B
DOT Shipping Name:	Consumer commodity, ORM-D
IATA / ICAO Shipping Name:	Corrosive Solids, n.o.s. (aminoethylpiperazine), Class 8, UN1759, PG III, Ltd Qty
TSCA Inventory Status:	Chemical components listed on TSCA inventory.
SARA Title III, Section 313:	This product contains >2% quartz silica which is subject to reporting under Section 313 of SARA Title III (40 CFR Part 372).
EPA Waste Code(s):	Not regulated by EPA as a hazardous waste
Waste Disposal Methods:	Consult with regulatory agencies or your corporate personnel for disposal methods that comply with local, state, and federal safety, health and environmental regulations.

CONTACTS

Customer Service:	1-800-879-8000	**Technical Service:**	1-800-879-8000
Health / Safety:	1-800-879-6000 Jerry Metcalf (x1003704)		
Emergency # (Chem-Trec):	1-800-424-9300 (USA, PR, Virgin Islands, Canada); 001 703 527 3887 (other countries)		

The information and recommendations contained herein are based upon data believed to be correct; however, no guarantee or warranty of any kind expressed or implied is made with respect to the information provided.