APPENDIX II

technical data sheet

Hex Head and Countersunk Tapcon

Drill, Drive, Done

The original masonry fastening system that cuts it's own thread into concrete, brick and hollow block.

Product Advantages

- Fast installation, Drill, Drive, Done
- Available in M5 and M6 and in lengths from 32 - 125mm, to cover a wide number of applications
- Every box includes a free 'close tolerance' masonry bit
- Replaces small diameter expansion anchors, plugs and screws in light to medium duty applications
- No need to pre-spot holes, no inserts are required
- Removable - Adjustable
- Can be installed close to edges
- Slotted Hex and Phillips flat head styles give flexibility in applications
- Excellent corrosion protection
- Available in 410 Stainless Steel (Price on application)
- Fire resistant

Substrates

- Concrete
- Masonry
- Blockwork
- Pre-cast hollow concrete beams
- Wood

Approvals

SBCCi Approved 9759
Metro-Dade Approved 02 - 0311 - 03
ICBO Approved 3370

Specification

Diameter	5mm and 6mm
Thread form	Reversed Hi-Lo®
Point type	Nail
Finish	Blue Climaseal

Corrosion - Salt spray results (ASTM B117)

Kesternich Results (DIN 5008, 2.0L) = 30 Cycles - 10% or less red rust
Salt Spray Results (ASTM B117) = 750 Hours - 10% or less red rust

1. With Condrive Sleeve off and drill bit exposed, drill pilot hole deeper than recommended anchor embedment. Snap correct anchor socket / drive bit onto end of Condrive Sleeve. Slide Condrive Sleeve over drill bit.
2. Insert head of Tapcon anchor into Hex or Phillips socket.
3. Put point of anchor into pre-drilled hole and drive until anchor is fully seated.
4. Ensure that the drilling tool is not set to hammer action during installation.

Head Styles

Phillips Flat Head

5mm Diameter: P2 Phillips Flat Head
6mm Diameter: P3 Phillips Flat Head

Slotted Hex Washer Head

5mm Diameter: 6.5mm Slotted Hex Washered Head
6mm Diameter: 8mm Slotted Hex Washered Head

Mechanical and Electrical Applications

Fixing Electrical Accessories
- Saddles
- Conduit clips
- Back boxes
- P Clips
- Cable clips
- Cable cleats

Services
- Ductwork
- Cable trays, channel
- Suspended ceilings

Steel and Concrete Applications

Timber to Concrete
- Formwork
- Battens
- Base plates
- Plywood backer boards

Metalwork
- Railings, hand rails
- Gates, brackets and signs
- Fire protection and exterior insulation systems to masonry

construction fixings

BASF

The Chemical Company

PRODUCT DATA

3 03 01 00 **Maintenance of Concrete**

EMACO® P24

Water-based epoxy-cementitious bonding agent and rebar coating

Description

Emaco® P24 is a water-based epoxy-cementitious bonding agent. It will bond concrete and mortar up to 24 hours after application. Emaco® P24 is also used to coat and protect rebar.

Yield

One unit of Emaco® P24 bonding agent will yield 2.7 mixed gallons (10.2 L). The coverage is 80 ft^2/ gallon (2.0 m^2/L) at a thickness of 20 mils (0.5 mm).

Packaging

Emaco® P24 bonding agent is a 3-part system consisting of:

Part A:
0.42 gallons (1.6 L) epoxy resin

Part B:
0.42 gallons (1.6 L) epoxy hardener

Part C:
31 lbs (14.1 kg) cementitious component

Shelf Life

1 year when properly stored

Storage

Store in unopened containers at 60 to 80° F (16 to 27° C) in clean, dry conditions. If Part A or Part B freeze, discard.

Features	Benefits
• 24-hour window for topping application	Provides jobsite flexibility
• VOC compliant	Environmentally friendly
• Integral corrosion inhibitor	Additional protection for reinforcing steel
• High alkalinity similar to concrete	Compatible with cementitious materials
• Premeasured units	No measuring required
• Open time 24 hours	Allows flexibility in forming and pouring procedures
• Blue color	Facilitates proper coverage

Where to Use

APPLICATION

- Bonding plastic concrete to hardened concrete
- Coating steel rebar to protect against corrosion
- Areas where short open times prevent the use of traditional epoxies

How to Apply

Surface Preparation

1. Remove deteriorated concrete around rusting rebar to expose sound concrete. The clean substrate must be alkaline (pH above 9.5) and free of harmful salts, oil, rust, dust, and other contaminants.

2. Remove rust and mill scale by gritblasting. Blast steel to white metal. Follow gritblasting with vacuuming or oil-free dry-air blast (refer to SSPC-SP-10 or NACE-2).

3. The surface should be saturated surface-dry (SSD) without any standing water.

4. For additional information, refer to International Concrete Repair Institute (ICRI) Surface Preparation Guidelines for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Oxidation (No. 03730).

Mixing

Pour contents of Part A and Part B into a clean mixing bucket and blend the 2 components for 2 minutes. Slowly add all of Part C. Never add water. Use a Jiffy paddle and a drill to properly mix the product.

NOTE: Mix the entire unit; do not mix partial units.

Application

Apply with a stiff-bristled broom or sprayer. With any method, be sure to work the bonding agent thoroughly into the substrate. When Emaco® P24 is used as a bonding agent, the appropriate thickness is 20 mils (0.5 mm); when used for reinforcement protection, the minimum thickness is 20 mils (0.5 mm) (2 coats of 10 mils [0.25 mm] each).

Keep bonding agent protected in direct sunlight and in temperatures above 95° F (35 °C).

Clean Up

Clean up with soap and water. Dried material must be removed mechanically.

Protection and Repair

BASF

The Chemical Company

PRODUCT DATA

3 03 01 00 **Maintenance of Concrete**

LA40 REPAIR MORTAR

Pourable and pumpable pre-extended micro concrete

Description

LA40 Repair Mortar is a one-component shrinkage-compensated micro concrete. It is designed for large volume repairs, including structural elements, typically in applications from 2" (51 mm) to full depth.

Yield

0.43 ft^3 per 55 lb (0.012 m^3/25 kg) bag

Packaging

55 lb (25 kg) bags

Shelf Life

1 year when properly stored

Storage

Store in unopened containers at 60 to 80° F (16 to 27° C) in clean, dry conditions.

Features	Benefits
• High bond strength	Self-bonding to SSD concrete substrates
• Shrinkage compensated	Dual expansion system compensates for shrinkage in plastic and hardened states
• High early strength	Reduces form cycle time
• Low permeability	Protects against carbon dioxide and chloride intrusion
• Excellent freeze/thaw resistance	Durable in cold, wet environments
• Flowable	Placement by pumping or pouring into congested locations
• One component	Only the site addition of clean water is required
• Self-compacting	Minimizes honeycombing; displaces air without vibration

Where to Use

APPLICATION

- Large volume structural repairs
- Repair or replacement of spandrel beams, columns, balcony edges
- Partial or full-depth placements of structural concrete elements
- Parking garages
- Water and wastewater tanks
- Tunnels, dams, bridges
- Marine structures

LOCATION

- Interior or exterior

SUBSTRATE

- Concrete

How to Apply

Surface Preparation

CONCRETE

1. Area being repaired must be structurally sound and fully cured.

2. Perimeter cut the edges of the repair to a depth of at least 3/8" (9 mm) to avoid featheredging and to provide a square edge.

3. Break out the concrete to the sawn edge and across the entire repair.

4. Mechanically abrade and clean the surface to remove any dust, unsound or contaminated material, oil, paint, grease, or corrosion deposits. Do not use a method of surface preparation that could damage the concrete.

5. Where breaking out is not required, roughen the surface and remove any laitance by light scabbling or

Protection and Repair

Construction

Sikadur® 31, Hi-Mod Gel (1:1 Mix Ratio)

High-modulus, high-strength, structural, epoxy paste adhesive

Description

Sikadur 31, Hi-Mod Gel, is a 2-component, 100% solids, solvent-free, moisture-tolerant, high-modulus, high-strength, structural epoxy paste adhesive. It conforms to the current ASTM C-881, Types I and IV, Grade-3, Class-B/C and AASHTO M-235 specifications.

Where to Use

- Structural bonding of concrete, masonry, metals, wood, etc. to a maximum glue line of ⅛ in. (3 mm).
- Grout bolts, dowels, and pins.
- Seals cracks and around injection ports prior to pressure-injection grouting.
- Interior, vertical, and overhead repair of concrete as an epoxy mortar binder.
- As a pick-proof sealant around windows, doors, lock-ups etc. inside correctional facilities.

Advantages

- Meets physical requirements of ASTM C-881 Types I, II & IV, Grade 3, Classes B & C.
- Suitable for potable water contact, meets NSF/ANSI Standard 61.
- Excellent adhesion to concrete, masonry, metals, wood, and most structural materials.
- Paste consistency ideal for vertical and overhead repair of concrete.
- Fast-setting and strength-producing adhesive.
- Convenient easy mix ratio A:B = 1:1 by volume.

Typical Data *(Material and curing conditions @ 73°F (23°C) and 50% R.H.)*

RESULTS MAY DIFFER BASED UPON STATISTICAL VARIATIONS DEPENDING UPON MIXING METHODS AND EQUIPMENT, TEMPERATURE, APPLICATION METHODS, TEST METHODS, ACTUAL SITE CONDITIONS AND CURING CONDITIONS.

Shelf Life 2 years in original, unopened containers

Storage Conditions Store dry at 40°-95°F (4°-35°C). **Condition material to 65°-85°F (18°-29°C) before using.**

Color Gray

Mixing Ratio Component 'A' : Component 'B' = 1:1 by volume

Consistency Non-sag paste

Pot Life Approximately 60 minutes @ 73°F. (500 gram mass)

Tack-Free Time 1.5 - 2.5 hours at 30 mils. thick

Tensile Properties (ASTM D-638)

7 day	Tensile Strength	3,300 psi (22.7 MPa)
	Elongation at Break	0.9 %

Flexural Properties (ASTM D-790)

7 day	Flexural Strength (Modulus of Rupture)	6,100 psi (42.0 MPa)
	Tangent Modulus of Elasticity in Bending	1.67 X 10^6 psi (11,520 MPa)

Shear Strength (ASTM D-732) **7 day** Shear Strength 4,600 psi (31.7 MPa)

Bond Strength (ASTM C-882)

Hardened Concrete to Hardened Concrete:

2 day	**(dry cure)**	2,200 psi (15.2 MPa)
2 day	**(moist cure)**	2,400 psi (16.5 MPa)
14 day	**(moist cure)**	2,900 psi (20.0 MPa)

Hardened Concrete to Steel:

2 day (dry cure) 2,900 psi (20.0 MPa)

Tensile Bond Strength (Pull-off Method, Dyna, ASTM C-1583-04)

2 day 420 psi (2.9 MPa)

Heat Deflection Temperature (ASTM D-648) **7 day** (Fiber Stress Loading = 264 psi) 135°F (57°C)

Water Absorption (ASTM D-570) **24 hour** 0.07%

Compressive strength (ASTM D-695) psi (MPa)

	40°F (4°C)* **	73°F (23°C)* **	90°F (32°C)* **
2 hour	-	-	450 (3.1)
4 hour	-	800 (5.5)	10,500 (72.4)
8 hour	-	8,500 (58.6)	12,200 (84.1)
16 hour	700 (4.8)	10,500 (72.4)	13,000 (89.6)
1 day	6,000 (41.4)	13,000 (89.6)	15,000 (103.4)
3 day	11,000 (75.8)	14,000 (96.5)	16,000 (110.3)
7 day	12,900 (88.9)	15,000 (103.4)	16,000 (110.3)
14 day	13,500 (93.0)	15,400 (106.1)	16,000 (110.3)
28 day	14,000 (96.5)	16,000 (110.3)	16,000 (110.3)

Compressive Modulus of Elasticity (ASTM D-695) **7 day** 7.95 X 10^5 psi (5,485 MPa)

* Material cured and tested at temperatures indicated.

** See Limitations section for further information.

Construction

Coverage	1 gal. yields 231 cu. in. (3,785 cm^3) of epoxy paste adhesive. 1 gal. (3.8 L) mixed with 1 gal. (3.8 L) by loose volume of oven-dried aggregate yields approximately 346 cu. in. (5,670 cm^3) of epoxy mortar.
Packaging	1 gal. and 3 gal. (11.4 L) units.

How to Use

Surface Preparation	Surface must be clean and sound. It may be dry or damp, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes, and any other contaminants. **Preparation Work: Concrete** - Should be cleaned and prepared to achieve a laitance and contaminant free, open textured surface by blastcleaning or equivalent mechanical means. **Steel** - Should be cleaned and prepared thoroughly by blastcleaning.
Mixing	**Pre-mix each component**. Proportion 1 part Component 'B' to 1 part Component 'A' by volume into a clean pail. Mix thoroughly for 3 minutes with Sika paddle on low-speed (400- 600 rpm) drill until uniform in color. Mix only that quantity which can be used within its pot life. Prior to mixing, material should be conditioned to 65°-85°F (18°-29°C). To prepare an epoxy mortar, slowly add up to 1 part, by loose volume of an oven-dried aggregate, to 1 part of the mixed Sikadur 31, Hi-Mod Gel, and mix until uniform in consistency.
Application	**As a structural adhesive -** Apply the neat mixed Sikadur 31, Hi-Mod Gel to the prepared substrates. Work into the substrate for positive adhesion. Secure the bonded unit firmly into place until the adhesive has cured. Glue line should not exceed 1/8-in. (3 mm). **To seal cracks for injection grouting -** Place the neat mixed material over the cracks to be pressure injected and around each injection port. Allow sufficient time to set before pressure injecting. **For interior vertical and overhead patching -** Place the prepared mortar in void, working the material into the prepared substrate, filling the cavity. Strike off level. Lifts should not exceed 1-in (25 mm). **As a pick-proof sealant -** Use automated or manual method. Apply an appropriate size bead of material around the area being sealed. Seal with neat Sikadur 31, Hi-Mod Gel.
Limitations	■ **THE NTSB HAS STATED THAT THIS PRODUCT IS APPROVED FOR SHORT TERM LOADS ONLY AND SHOULD NOT BE USED IN SUSTAINED TENSILE LOAD ADHESIVE ANCHORING APPLICATIONS WHERE ADHESIVE FAILURE COULD RESULT IN A PUBLIC SAFETY RISK. CONSULT A DESIGN PROFESSIONAL PRIOR TO USE.** ■ Components of original 2:1 mix ratio formulation of Sikadur 31, Hi-Mod Gel cannot be cross-mixed with components of Sikadur 31, Hi-Mod Gel (NEW 1:1 Mix Ratio) formulation. ■ Minimum substrate and ambient temperature 40°F (4°C). ■ Do not thin. Solvents will prevent proper cure. ■ When preparing an epoxy mortar, use oven-dried aggregate only. ■ Maximum epoxy mortar thickness is 1 in. (25 mm) per lift. ■ Epoxy mortar is for interior use only. Material is a vapor barrier after cure. ■ Minimum age of concrete must be 21-28 days, depending upon curing and drying conditions, for mortar applications. ■ Porous substrates must be tested for moisture-vapor transmission prior to mortar applications. ■ Not for sealing cracks under hydrostatic pressure. ■ Not an aesthetic product. Color may alter due to variations in lighting and/or UV exposure.
WARNING	**Component 'A' - IRRITANT, SENSITIZER.** Contains epoxy resin, silica, and calcium carbonate. Causes eye irritation. May cause skin/respiratory irritations. Prolonged and/or repeated contact with skin may cause allergic reaction/sensitization. Harmful if swallowed. **Deliberate concentrations of vapors for purposes of inhalation is harmful and can be fatal.** **Component 'B' - CORROSIVE, SENSITIZER, IRRITANT.** Contains Amines, silica quartz (sand), and calcium carbonate. Contact with skin and eyes causes severe burns. Causes eye/skin/respiratory irritation. Prolonged and/or repeated contact may cause allergic reaction/sensitization. Harmful if swallowed. **Deliberate concentrations of vapors for purposes of inhalation is harmful and can be fatal.** Cured material, if sanded, may result in exposure to a chemical known to the State of California to cause cancer.
First Aid	**Eyes** - Hold eyelids apart and flush thoroughly with water for 15 minutes. **Skin** - Remove contaminated clothing. Wash skin thoroughly for 15 minutes with soap and water. **Inhalation** - Remove person to fresh air. **Ingestion** - Do not induce vomiting. Contact a physician. **In all cases, contact a physician immediately if symptoms persist.**
Handling & Storage	Avoid direct contact with eyes and skin. Wear chemical resistant gloves/goggles/clothing. Avoid breathing vapors. Use with adequate general and local exhaust ventilation. Use a properly fitted NIOSH approved respirator. Wash thoroughly after handling product. Remove contaminated clothing and launder before reuse. Store product in a closed container in a cool, dry place.

Clean Up

Avoid contact. Wear chemical resistant clothing/gloves/goggles. In absence of adequate ventilation, use a properly fitted NIOSH respirator. Uncured material can be removed with solvent. Follow solvent manufacturer's instructions for use and warnings. Cured material (when Component 'A' combined with Component 'B') can only be removed mechanically. In case of spill, ventilate area and contain spill. Collect with absorbent material. Dispose of in accordance with current, applicable local, state and federal regulations.

Construction

KEEP CONTAINER TIGHTLY CLOSED • KEEP OUT OF REACH OF CHILDREN • NOT FOR INTERNAL CONSUMPTION • FOR INDUSTRIAL USE ONLY

All information provided by Sika Corporation ("Sika") concerning Sika products, including but not limited to, any recommendations and advice relating to the application and use of Sika products, is given in good faith based on Sika's current experience and knowledge of its products when properly stored, handled and applied under normal conditions in accordance with Sika's instructions. In practice, the differences in materials, substrates, storage and handling conditions, actual site conditions and other factors outside of Sika's control are such that Sika assumes no liability for the provision of such information, advice, recommendations or instructions related to its products, nor shall any legal relationship be created by or arise from the provision of such information, advice, recommendations or instructions related to its products. The user of the Sika product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with the full application of the product(s). Sika reserves the right to change the properties of its products without notice. All sales of Sika product(s) are subject to its current terms and conditions of sale which are available at **www.sikausa.com** or by calling 800-933-7452.

Prior to each use of any Sika product, the user must always read and follow the warnings and instructions on the product's most current Technical Data Sheet, product label and Material Safety Data Sheet which are available online at www.sikausa.com or by calling Sika's Technical Service Department at 800-933-7452. Nothing contained in any Sika materials relieves the user of the obligation to read and follow the warnings and instruction for each Sika product as set forth in the current Technical Data Sheet, product label and Material Safety Data Sheet prior to product use.

LIMITED WARRANTY: Sika warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Technical Data Sheet if used as directed within shelf life. User determines suitability of product for intended use and assumes all risks. Buyer's sole remedy shall be limited to the purchase price or replacement of product exclusive of labor or cost of labor. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

Visit our website at www.sikausa.com **1-800-933-SIKA NATIONWIDE**

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Construction

Sikadur® 52

Advanced, very-low-viscosity, moisture-tolerant epoxy injection adhesive

Description	Sikadur 52 is a 2-component, 100% solids, moisture-tolerant, epoxy adhesive. It is a low-viscosity, high-strength adhesive formulated specifically for grouting both dry and damp cracks. It conforms to the current ASTM C-881, Types I and II, Grade-1, Class C and AASHTO M-235 specifications.
Where To Use	▪ Use neat for gravity feed or pressure injection of cracks in structural concrete, masonry, wood, etc. ▪ Seal interior slabs and exterior above grade slabs from water, chlorides and mild chemical attack and to improve wearability.
Advantages	▪ Tenacious crack-sealing grout. ▪ Convenient easy mix ratio A:B = 2:1 by volume. ▪ Advanced low-viscosity structural resin. ▪ Unique, high-strength adhesive for 'can't dry' cracks.
Coverage	1 gal. yields 231 cu. in.
Packaging	3-gal. units.

Typical Data *(Material and curing conditions @ 73°F (23°C) and 50% R.H.)*

RESULTS MAY DIFFER BASED UPON STATISTICAL VARIATIONS DEPENDING UPON MIXING METHODS AND EQUIPMENT, TEMPERATURE, APPLICATION METHODS, TEST METHODS, ACTUAL SITE CONDITIONS AND CURING CONDITIONS.

Shelf Life 2 years in original, unopened containers

Storage Conditions Store dry at 40°-95°F (4°-35°C). **Condition to 65°-75°F (18°-24°C) before using.**

Color Clear, pale yellow.

Mixing Ratio Component 'A': Component 'B' = 2:1 by volume.

Viscosity (Mixed) Approximately 200 cps.

Pot Life Approximately 30 minutes. (60 gram mass)

Tensile Properties (ASTM D-638)

14 day	Tensile Strength	7,900 psi (54 MPa)
	Elongation at Break	3.1%
	Modulus of Elasticity	2.0 X 10^5 psi (1,400 MPa)

Flexural Properties (ASTM D-790)

14 day	Flexural Strength (Modulus of Rupture)	5,400 psi (37.2 MPa)
	Tangent Modulus of Elasticity in Bending	3.8 X 10^5 psi (2,620 MPa)

Shear Strength (ASTM D-732) **14 day** Shear Strength 4,300 psi (29.6 MPa)

Bond Strength (ASTM C-882): Hardened Concrete to Hardened Concrete

2 day (dry cure)	Bond Strength	3,000 psi (20.6 MPa)
14 day (moist cure)	Bond Strength	2,200 psi (15.1 MPa)

Heat Deflection Temperature (ASTM D-648)

14 day 122°F (50°C)
[fiber stress loading = 264 psi (1.8 MPa)]

Water Absorption (ASTM D-570) **7 day** (2 hour boil) 1.5%

Compressive Properties (ASTM D-695)

Compressive Strength, psi (MPa)

	40°F* (4°C)*	73°F* (23°C)*	90°F* (32°C)*
8 hour	-	-	90 (0.62)
16 hour	-	3,000 (20.6)	7,300 (50.3)
1 day	-	4,500 (31.0)	8,400 (57.9)
3 day	1,800 (12.4)	10,000 (68.9)	8,700 (60.0)
7 day	6,100 (42.0)	11,300 (77.9)	10,400 (71.7)
14 day	6,800 (46.8)	11,700 (80.6)	10,400 (71.7)
28 day	8,400 (57.9)	12,000 (82.7)	10,400 (71.7)

Compressive Modulus **28 days** 3.5 x 10^5 psi (2,400 MPa)

* Material cured and tested at the temperatures indicated.

Construction

How to Use

Surface Preparation

Surface must be clean and sound. It may be dry or damp, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes and any other contaminants.

Preparation Work: Concrete - Should be cleaned and prepared to achieve a laitance and contaminant free, open textured surface by blastcleaning or equivalent mechanical means.

Steel - Should be cleaned and prepared thoroughly by blastcleaning.

Mixing

Proportion 1 part Component 'B' to 2 parts Component 'A' by volume into a clean pail. Mix thoroughly for 3 minutes with Sika Paddle on low-speed (400-600 rpm) drill until uniformly blended. Mix only that quantity that can be used within its pot life.

Application

To gravity feed cracks - Blow vee-notched crack clean wiith oil-free compressed air. Pour neat Sikadur 52 into vee-notched crack. Continue placement until cracks are completely filled. Prior to filling, seal underside of slab if cracks reflect through.

To pressure inject cracks - Use automated injection equipment or manual method. Set appropriate injection ports based on system used. Seal ports and cracks with Sikadur 31, Hi-Mod Gel, or Sikadur 33.

When the epoxy adhesive seal has cured, inject Sikadur 52 with steady pressure. Consult Technical Service for additional information.

To seal slabs - Spread neat mixture of Sikadur 52 over slab using a roller or squeegee, working material thoroughly into the substrate to ensure penetration. Coverage should be uniform. Coat interior slabs and above-grade exterior slabs only.

Limitations

- Minimum substrate and ambient temperature 40°F (4°C).
- Do not thin. Addition of solvents will prevent proper cure.
- Material is a vapor barrier after cure.
- Not for injection of cracks under hydrostatic pressure at the time of application.
- Do not inject cracks greater than 1/4 in. (6 mm) without consulting Technical Service.
- Do not seal exterior slabs on grade.
- Not an aesthetic product. Color may alter due to variations in lighting and/or UV exposure.

Caution

Component 'A' - Irritant; Sensitizer - Contains epoxy resin. Can cause skin sensitization after prolonged or repeated contact. Skin and eye irritant. High concentrations of vapor may cause respiratory irritation. Avoid skin contact. Use only with adequate ventilation. Use of safety goggles and chemical resistant gloves is recommended. In case of exceedance of PELs, use an appropriate, properly fitted NIOSH approved respirator. Remove contaminated clothing. Consult MSDS for more detailed information.

Component 'B' - Corrosive; Sensitizer Contains amines. Contact with eyes or skin may cause severe burns. Skin and eye irritant. High concentrations of vapor may cause respiratory irritation. Avoid skin contact. Use only with adequate ventilation. Use of safety goggles and chemical-resistant gloves is recommended. In case of exceedance of PELs, use an appropriate, properly fitted NIOSH approved respirator. Remove contaminated clothing. Consult MSDS for more detailed information.

First Aid

Eyes: Hold eyelids apart and flush thoroughly with water for 15 minutes. **Skin:** Remove contaminated clothing. Wash skin thoroughly for 15 minutes with soap and water. **Inhalation:** Remove person to fresh air. **Ingestion:** Do not induce vomiting. **In all cases, contact a physician immediately if symptoms persist.**

Clean Up

Ventilate area. Confine spill. Collect with absorbent material. Dispose of in accordance with current, applicable local, state and federal regulations. Uncured material can be removed with approved solvent. Cured material can only be removed mechanically.

Visit our website at www.sikausa.com **1-800-933-SIKA NATIONWIDE**

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Fracc. Industrial Balvanera
Corregidora, Queretaro
C.P. 76920
Phone: 52 442 2385800
Fax: 52 442 2250537

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.

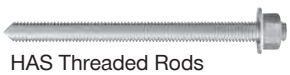
3.2.7.1 Product Description

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

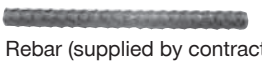
Product Features

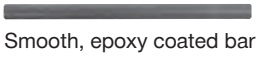
- Superior bond performance
- Use in diamond cored or pneumatic drilled holes.
- Under water up to 165 feet (50 m)
- Meets DOT requirements for most states; contact the Hilti Technical Staff
- Meets requirements of ASTM C 881-90, Type IV, Grade 2 and 3, Class A, B, C except gel times
- Meets requirements 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

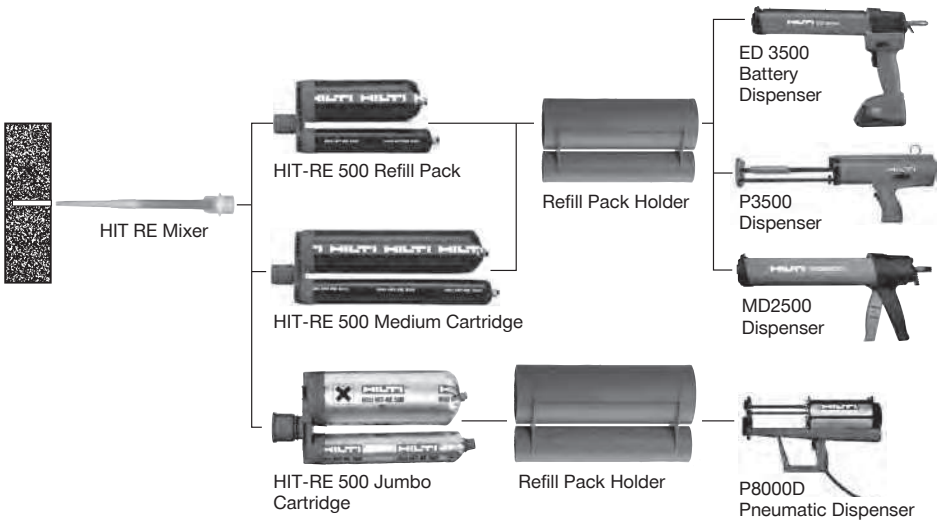
Fastener Components


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).

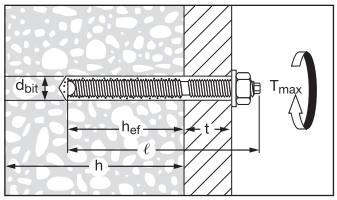
Material Specifications	Mechanical Properties			
	f_y ksi (MPa)		min. f_u ksi (MPa)	
Standard HAS-E rod material meets the requirements of ISO 898 Class 5.8	58	(400)	72.5	(500)
High Strength or 'Super HAS' rod material meets the requirements of ASTM A 193, Grade B7	105	(724)	125	(862)
Stainless HAS rod 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



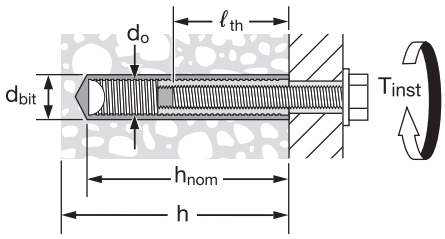
1 Use matched tolerance carbide tipped bits or Hilti matched tolerance DD-B or DD-C diamond core bits.

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 Diameter 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 Diameter 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 f'_c = 2000 psi (13.8 MPa) Ultimate Bond Strength lb (kN)	Embed. to Develop Yield Strength[1] in. (mm)	Embed. to Develop Tensile Strength[1] in. (mm)	Concrete Compressive Strength 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)	Grade 60 Rebar Yield Strength lb (kN)	Grade 60 Rebar 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)		

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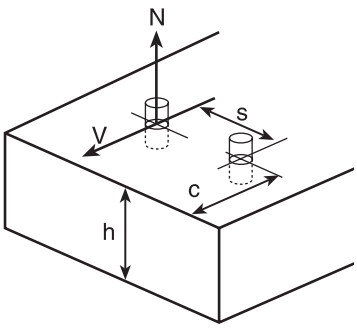
Anchor Spacing and Edge Distance Guidelines in Concrete



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

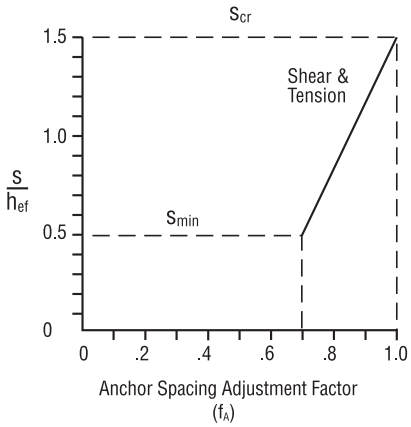
Spacing Tension/Shear $s_{min} = 0.5\ h_{ef}$, $s_{cr} = 1.5\ h_{ef}$ $f_A = 0.3(s/h_{ef}) + 0.55$ for $s_{cr} > s > s_{min}$
Edge Distance Tension $c_{min} = 0.5\ h_{ef}$, $c_{cr} = 1.5\ h_{ef}$ $f_{RN} = 0.3(c/h_{ef}) + 0.55$ for $c_{cr} > c > c_{min}$
Edge Distance Shear (⊥ toward edge) $c_{min} = 0.5\ h_{ef}$, $c_{cr} = 2.0\ h_{ef}$ $f_{RV1} = 0.54(c/h_{ef}) - 0.09$ 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 $c_{cr} > c > c_{min}$

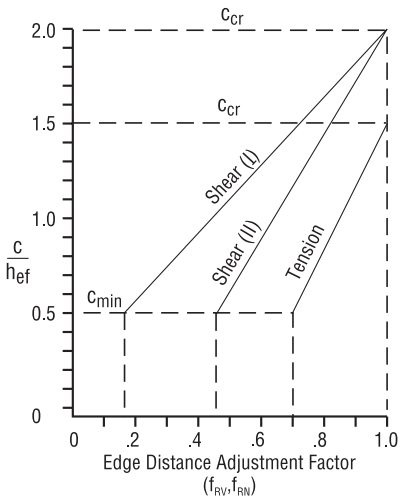
Anchor Spacing Adjustment Factors

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

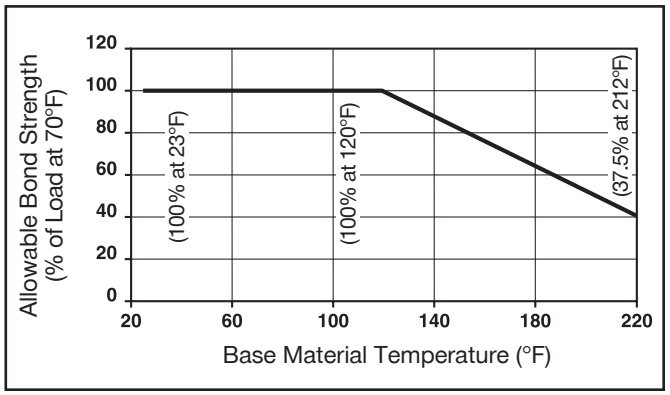
3.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

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 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

MATERIAL SAFETY DATA SHEET

Product name: **HIT–RE 500**

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	25068-38-6	NE	NE	NE
	Bisphenol F epoxy resin	28064-14-4	NE	NE	NE
	Quartz sand	14808-60-7	0.025 mg/m^3 (R)	$\frac{10\ mg/m^3}{\%\ SiO_2 + 2}$	NE
	Alkylglycidyl ether	19136100-5012 *	NE	NE	NE
	Diglycidyl ether	19136100-5013 *	NE	NE	NE
	Siloxanes & silicones	67762-90-7	NE	NE	NE
Part B:	m-xylene diamine	01477-55-0	C: 0.1 / S	C: 0.1 / S	NE
	Aliphatic polyamine	19136100-5014 *	NE	NE	NE
	Quartz sand	14808-60-7	0.025 mg/m^3 (R)	$\frac{10\ mg/m^3}{\%\ SiO_2 + 2}$	NE
	Aluminum oxide	01344-28-1	10 mg/m^3	15 mg/m^3 (T)	NE
	Cement	65997-16-2	NE	NE	NE
	Siloxanes & silicones	67762-90-7	NE	NE	NE

Abbreviations: * = indicates New Jersey Trade Secret Registry Number. **C** = Ceiling. **NE** = None Established. **R** =dust "respirable" fraction. **S** = Skin exposure, including the mucous membranes, eyes, and skin. **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: Gray; B: red / paste. Amine-like odor.	**VOC Content:**	4.0 g/l
Boiling Point:	Approx. 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:	1.5	**pH:**	11 (Part B with 1:1 water)

FIRE AND EXPLOSION HAZARD DATA

Flash Point:	> 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).		

HEALTH HAZARD DATA

Known Hazards:	**Part A:** Eye and skin irritation. Possible skin sensitizer. **Part B:** Corrosive
Signs and Symptoms of Exposure:	**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.