Welcome to the RED HEAD® Product and Resource Book

Our Product and Resource Book is not just a catalog of the quality RED HEAD Anchoring Systems so many of you have come to rely on, but a resource guide to give you the information you need to help you work better, faster and easier.

This highly detailed Application Section allows you to look up your trade or specialty, view a variety of practical applications and receive simple product recommendations. Along with the product recommendations you'll notice page numbers for easy reference to the product selection and specifications pages.

We are continuing the consolidation of our Adhesive Anchoring System under the RED HEAD brand name. The adhesive anchoring products and formulas remain, providing versatile solutions.

As always this Product and Resource Book continues to provide a wealth of valuable information including: product approvals/listings, applications, selection charts, performance tables and installation steps.

Remember, if you ever need more information about ITW RED HEAD products, technology and service, contact your local distributor, or look on the back cover for a complete listing of ITW RED HEAD facilities. We welcome your calls and feedback, and look forward to answering any questions you might have.

www.itwredhead.com

RED HEAD®
CONCRETE ANCHORING SPECIALISTS

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Fastening Applications Guide

Anchoring Systems

Trubolt | Trubolt+ | Trubolt+ SS | LDT | Dynabolt

Multi-Set | Tapcon+ | Tapcon Original | Tapcon Maxi-Set

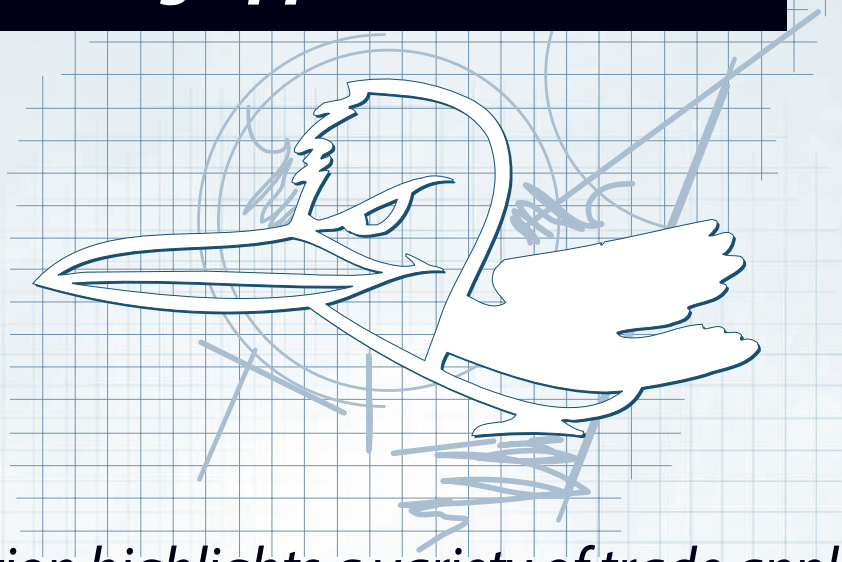
Tapcon SCOTS | Tapcon XL | Tapcon StormGuard | Boa Coil

RED HEAD Adhesive Anchoring Systems

RED HEAD Mechanical Anchoring Systems

(See itwredhead.com for info on retired adhesives A7 & S7)

RED HEAD®
Fastening Applications Guide

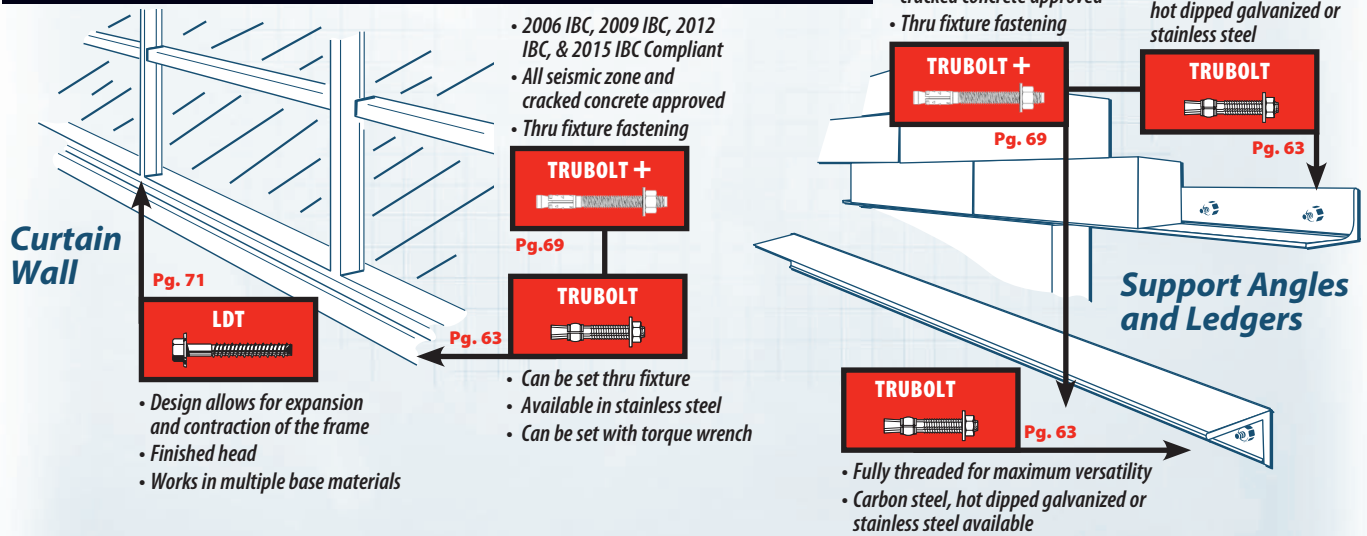


This section highlights a variety of trade applications and provides information that will assist you in selecting the best fastening system for your application.

While these are not to be considered complete, they will give you an idea of how contractors use our products.

For example, on the Electrical Contractor page, you will find applications, such as junction box/panel boards and suspended lighting. Next to the diagrams are the product name(s) and page number in this catalog where you will find complete information on these products needed for that particular application.

Curtain Wall Applications



For seismic recognition, see ICC-ES evaluation reports.

For installation guidelines for your application, please contact our Technical Services Department at 1-800-848-5611.

Electrical Contractor Applications

Junction Box/ Panel Boards

HAMMERSET Pg. 100

- Simple to install
- Drill hole, hammer into hole

TAPCON Pg. 88

- Counter sunk flathead style for flush installation
- Works in concrete or block
- Available in 3/16" and 1/4" diameters

Conduit Clip

HAMMERSET Pg. 100

- Simple to install
- Drill hole, hammer into hole

Suspended Lighting

- Available in special 3/8" version for precast planks
- Available in sizes 1/4" thru 3/4" internal thread diameters

MULTI-SET DROP-IN Pg. 80

- 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Used with Rod Coupler

Transformers Switch Gear Electrical Enclosures

- Used with rod coupler
- 1/4" to 1" diameters

TRUBOLT Pg. 63

TRUBOLT + Pg. 69

- Available in carbon, hot dipped galvanized, 304 and 316 stainless steel

- 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

Unistrut-Cable Tray/Conduit

MULTI-SET DROP-IN Pg. 80

- Available in special 3/8" version for precast planks
- Available in sizes 1/4" thru 3/4" internal thread diameters

Light Standards Poles

- Ideal for closely spaced groups of anchors

A7+ ADHESIVE Pg. 23

C6+/G5 ADHESIVE Pg. 39/46

- "Stress Free" anchor–can be used close to edges or in close spacing pattern

Wall Mounted Lighting

DYNABOLT Pg. 85

- Counter sunk and threshold head styles also available
- Works in concrete, block and brick

LDT Pg. 71

- Works in solid concrete, hollow block and brick
- Cuts a thread into the mounted surface
- Finished head appearance

Suspended Pipe or Conduit

- Available in special 3/8" version for precast planks
- Available in sizes 1/4" thru 3/4" internal thread diameters

MULTI-SET DROP-IN Pg. 80

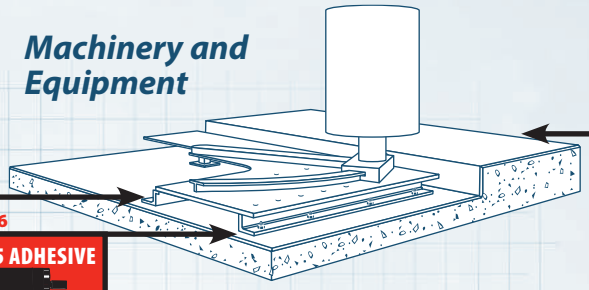
For seismic recognition, see ICC-ES evaluation reports.

For installation guidelines for your application, please contact our Technical Services Department at 1-800-848-5611.

Mechanical Contractor Applications

NOTE:
*C6+ and G5 both can be used for **oversized** holes when repairing pumps and machinery anchoring.*

Machinery and Equipment

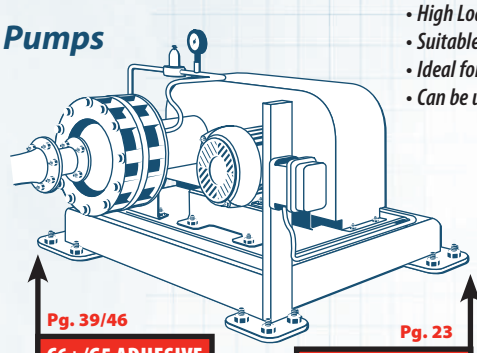


Pg. 71
LDT
- *Removable*

Pg. 39/46
C6+/G5 ADHESIVE
- *High Load Capacity*
- *Suitable for use close to edge of slab*
- *Ideal for moderate to hot climates*
- *Can be used for oversized holes*

Pg. 23
A7+
- *Vibration resistant*
- *Quick-Cure*

Pumps



Pg. 39/46
C6+/G5 ADHESIVE
- *Corrosion resistant*
- *Vibration resistant*
- *NSF Approved*

Pg. 23
A7+ ADHESIVE
- *Quick -Cure*
- *Vibration Resistant*

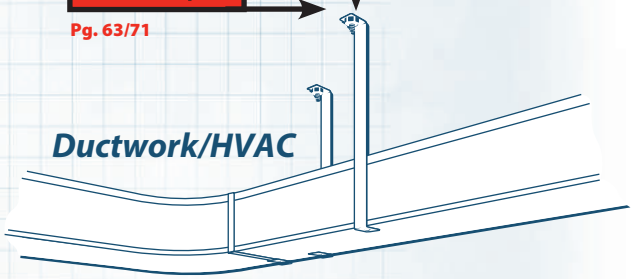
Ductwork/HVAC

- *Carbon, hot dipped galvanized, 304 and 316 stainless steel*
- *1/4" to 1" diameters*

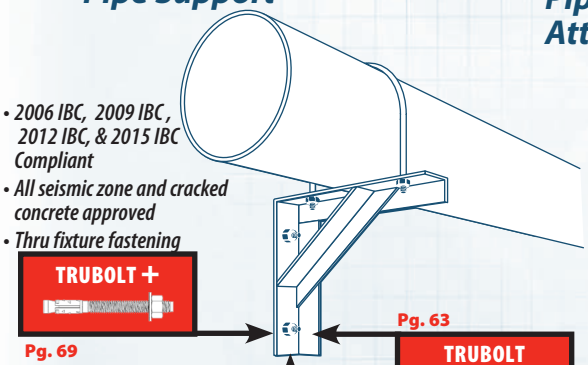
TRUBOLT/LDT
Pg. 63/71

- *Simple to install–drill hole and screw in*
- *Fire resistant*

TAPCON
Pg. 88



Heavy-Duty Pipe Support



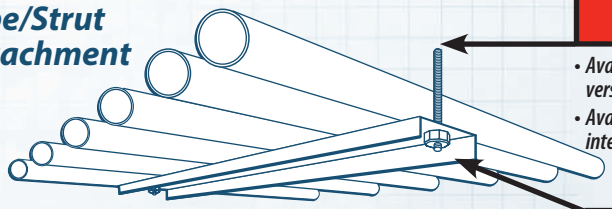
- *2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant*
- *All seismic zone and cracked concrete approved*
- *Thru fixture fastening*

TRUBOLT +
Pg. 69

Pg. 63
TRUBOLT
- *Carbon, hot dipped galvanized, 304 and 316 stainless steel*
- *1/4" to 1" diameters*

Pg. 39/46
C6+/G5 ADHESIVE
- *High load capacity*
- *Corrosion resistant*
- *NSF Approved*

Pipe/Strut Attachment

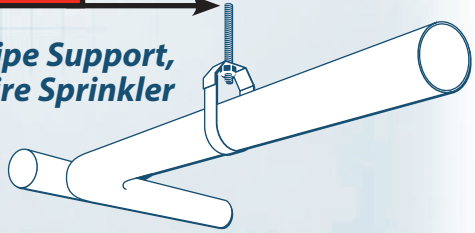


MULTI-SET DROP-IN
- *Available in special 3/8" & 1/2" version for prestressed concrete*
- *Available in 1/4" thru 3/4" internal thread diameters*

Pg. 63
TRUBOLT
- *Available in special 3/8" & 1/2" version for prestressed concrete*
- *Available in 1/4" thru 3/4" internal thread diameters*
- *Available in carbon, hot dipped galvanized, 304 and 316 stainless steel*

MULTI-SET DROP-IN
Pg. 80

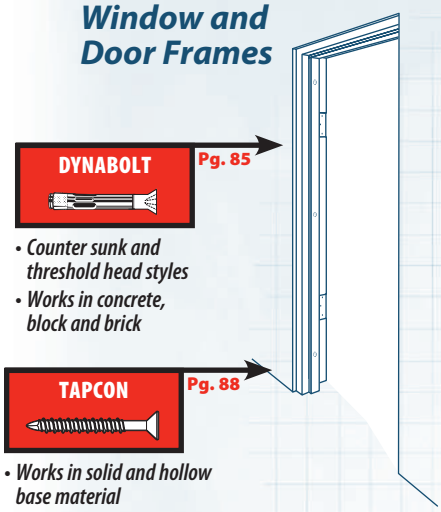
Pipe Support, Fire Sprinkler



For seismic recognition, see ICC-ES evaluation reports.
For installation guidelines for your application, please contact our Technical Services Department at 1-800-848-5611.

Drywall Contractor & Carpenter *Applications*

Window and Door Frames



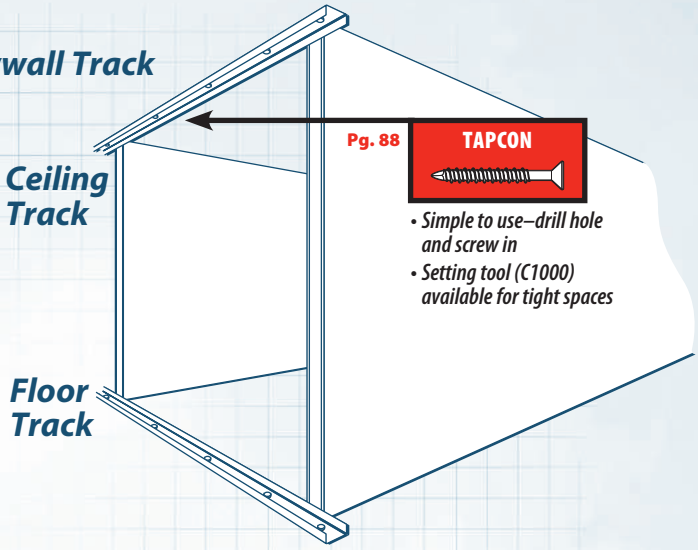
DYNABOLT Pg. 85

- Counter sunk and threshold head styles
- Works in concrete, block and brick

TAPCON Pg. 88

- Works in solid and hollow base material
- Removable
- Can be set flush with Phillips head if counter sunk

Drywall Track



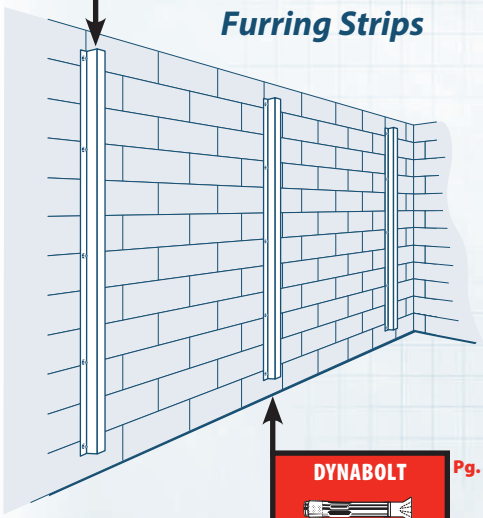
Ceiling Track

Floor Track

TAPCON Pg. 88

- Simple to use–drill hole and screw in
- Setting tool (C1000) available for tight spaces

Furring Strips



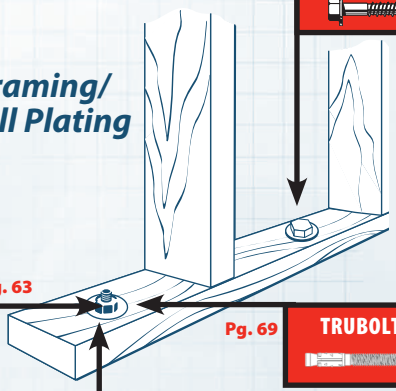
TAPCON Pg. 88

- Counter sunk flathead style for flush installation
- Works in concrete or block
- Available in 3/16" and 1/4" diameters

DYNABOLT Pg. 85

- Counter sunk and threshold head styles
- Works in concrete, block and brick

Framing/ Sill Plating



LDT Pg. 71

- Drill hole, install by hand or impact wrench

TRUBOLT Pg. 63

- Full threaded for maximum versatility
- Metro-Dade Approved
- Other approvals on page 66

TRUBOLT + Pg. 69

- 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

C6+/G5 ADHESIVE Pg. 39/46

- High load capacity
- Corrosion resistant
- NSF Approved
- Used for slower cure projects

A7+ ADHESIVE Pg. 23

- Fast cure
- Works in damp wet conditions
- Use A7+ with threaded rod for this appplication

For seismic recognition, see ICC-ES evaluation reports.

For installation guidelines for your application, please contact our Technical Services Department at 1-800-848-5611.

Acoustical Ceiling Installer Applications

- *Single piece design*
- *Drill hole, hammer wedge into hole, pull down with claw hammer*

TIE WIRE WEDGE

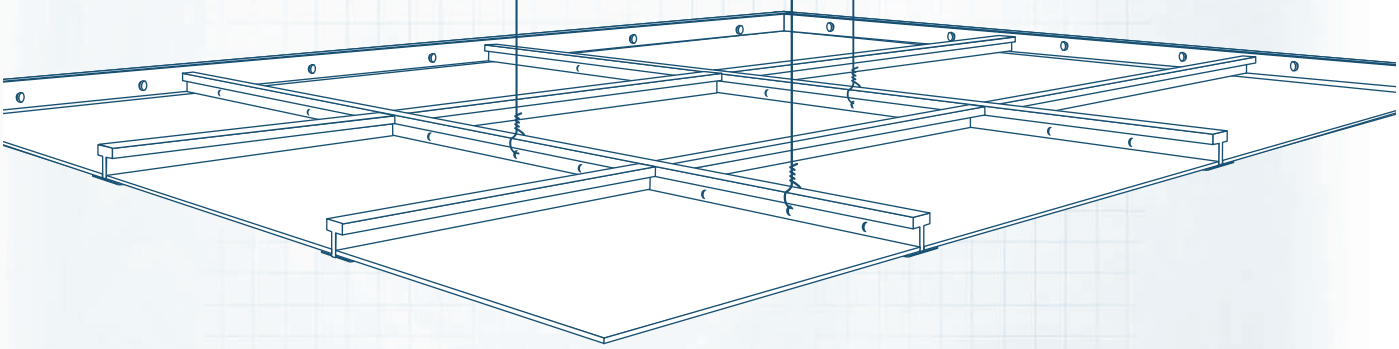
- *Tapcon used with angle clip*
- *Simple to use, drill hole and drive Tapcon*

TAPCON Pg. 88

Pg. 85 **DYNABOLT TIE WIRE**

- *9/32nd hole*
- *Ideal for concrete brick, and block*
- *Carbon steel*

Acoustical Ceiling



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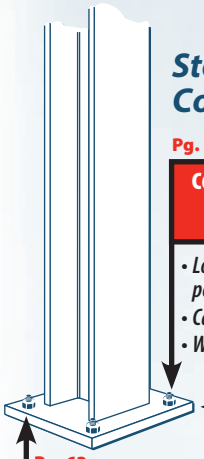
Steel Erector *Applications*

Steel Beams/ Columns



Pg. 39/46

C6+/G5 ADHESIVE

- Longer working time for positioning of steel
- Can be used in oversized holes
- Works in wet/damp conditions

Pg. 23 **A7+ ADHESIVE**

- Ideal for closely spaced groups of anchors

Pg. 63 **TRUBOLT**

- Full threaded for maximum versatility
- Metro-Dade Approved
- Other approvals on page 66

Stairs and Ladders

- 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

TRUBOLT + Pg. 69

TRUBOLT Pg. 63

- Can be set thru fixture
- Fast and immediate loading

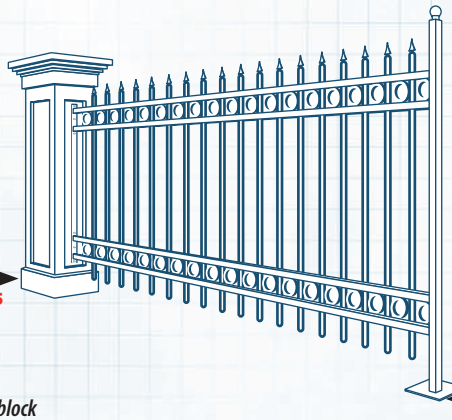
Pg. 23 **A7+ ADHESIVE**

- Fast cure
- Works in damp wet conditions
- Use A7 with threaded rod for this appplication

Pg. 71 **LDT**

- Finished head
- Removable
- For use in concrete

Ornamental Iron



DYNABOLT Pg. 85

- Multiple head styles
- Ideal for concrete, brick and block
- Carbon and stainless steel

Pg. 23 **A7+ ADHESIVE**

- Fast cure
- Works in damp wet conditions
- Use A7 with threaded rod for this appplication

Hand Railings

- Full threaded for maximum versatility
- Metro-Dade Approved
- Other approvals on page 66

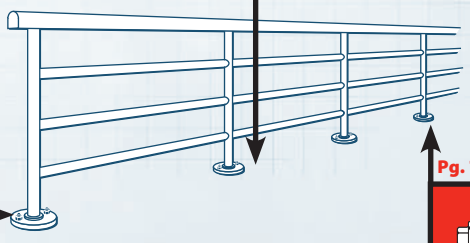
TRUBOLT Pg. 63

Pg. 23 **A7+ ADHESIVE** **DYNABOLT** Pg. 85

- Quick cure
- Works in damp wet conditions
- Works in concrete & masonry

- Multiple head styles
- Ideal for concrete, brick and block
- Carbon and stainless steel

Protective Railings and Fencing



- 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

TRUBOLT + Pg. 69

Pg. 71 **LDT**

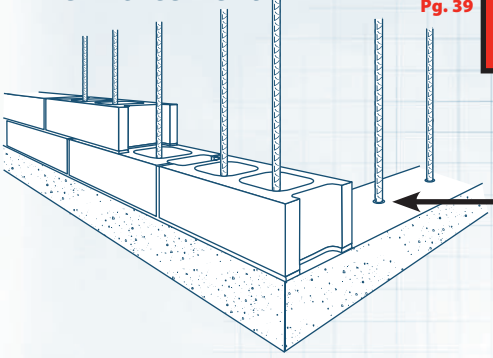
- Finished head
- Removable
- For use in concrete

For seismic recognition, see ICC-ES evaluation reports.

For installation guidelines for your application, please contact our Technical Services Department at 1-800-848-5611.

Concrete & Masonry Contractor Applications

Concrete Block Reinforcement



- NSF /ANSI 61
- Vibration resistant
- Corrosion resistant

Pg. 39 **C6+ ADHESIVE**

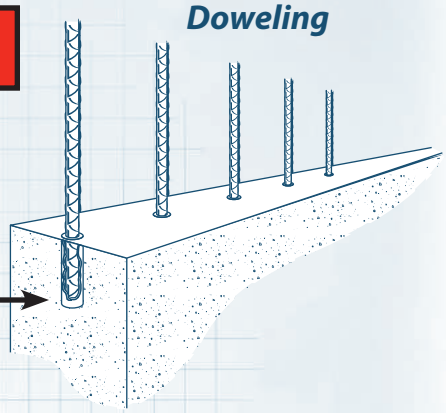
- Slow curing adhesive–ideal for moderate to hot climates

Pg. 46 **G5 ADHESIVE**

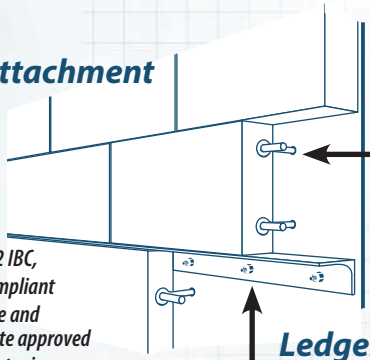
Pg. 23 **A7+ ADHESIVE**

- Fast curing adhesive–ideal for moderate to cold climates

Rebar Doweling



Stone Attachment



- 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

Pg. 69 **TRUBOLT +**

Pg. 63 **TRUBOLT**

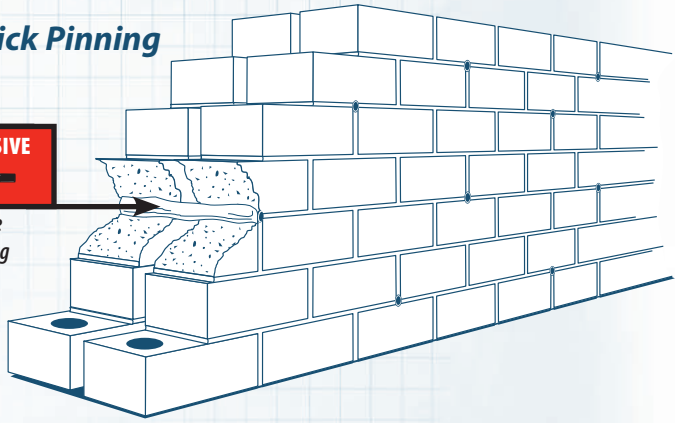
- Fully threaded for maximum versatility
- Available in carbon, hot dipped galvanized and stainless steel

Ledger Angle Attachment

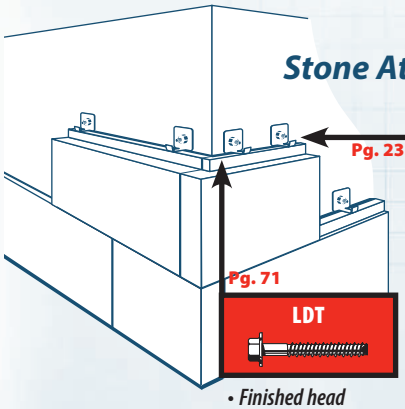
Pg. 23 **A7+ ADHESIVE**

- Compact space
- No-drip–no sag formula
- Easy clean up

Brick Pinning



Stone Attachment



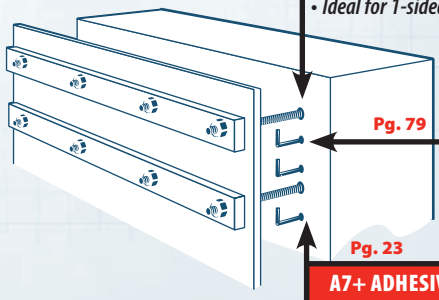
Pg. 23 **A7+ ADHESIVE**

- High load capacity in concrete block
- No drip–no sag formula
- Easy clean up

Pg. 71 **LDT**

- Finished head
- Removable
- For use in concrete

Concrete Formwork



Pg. 80 **COIL THREAD DROP-IN ANCHOR**

- Designed for 1/2" and 3/4" coil rods
- Ideal for 1-sided forming

Pg. 79 **BOA COIL**

- High shear strength
- Removable
- Reusable

Pg. 23 **A7+ ADHESIVE**

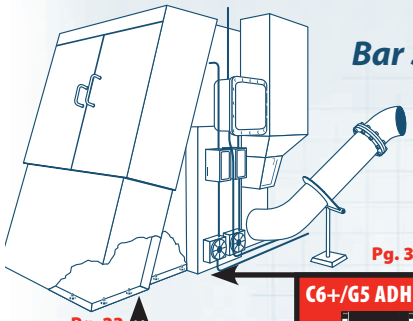
- Fast curing adhesive for rebar doweling

For seismic recognition, see ICC-ES evaluation reports.

For installation guidelines for your application, please contact our Technical Services Department at 1-800-848-5611.

Water & Waste Water Treatment Applications

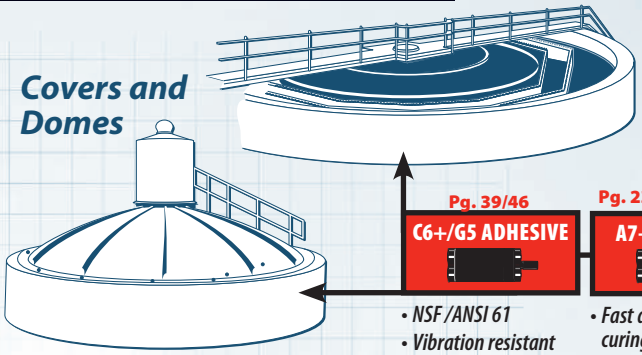
Bar Screens



Pg. 23
A7+ ADHESIVE
- Fast dispensing, fast curing adhesive
- Works in wet conditions
- NSF Approved

Pg. 39/46
C6+/G5 ADHESIVE
- NSF /ANSI 61
- Vibration resistant
- Corrosion resistant

Covers and Domes



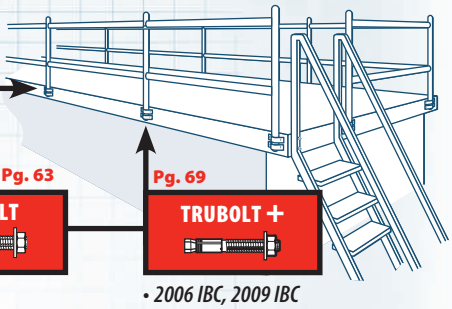
Pg. 39/46
C6+/G5 ADHESIVE
- NSF /ANSI 61
- Vibration resistant
- Corrosion resistant

Pg. 23
A7+ ADHESIVE
- Fast dispensing, fast curing adhesive
- Works with epoxy coated dowels

Weirs and Gates

Railings and Ladders

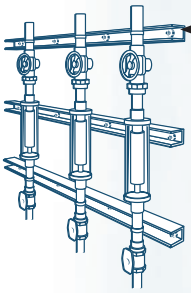
Pg. 23/39/46
C6+/G5/A7+ ADHESIVE
- NSF /ANSI 61
- Vibration resistant
- Install close to edge



Pg. 63
TRUBOLT
- Heavy duty
- 360˚ hole contact
- 304 and 316 stainless steel

Pg. 69
TRUBOLT +
- 2006 IBC, 2009 IBC 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

Instrumentation and Controls



Pg. 63
TRUBOLT
- Multiple head styles
- Heavy duty
- 304 and 316 stainless steel

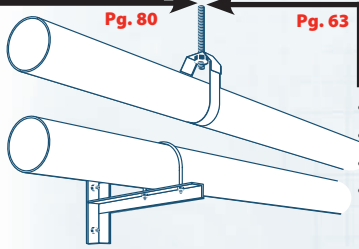
Pg. 69
TRUBOLT +
- 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

Pipe Supports

- Special 3/8" version for prestressed concrete
- Available in 1/4" thru 3/4" internal diameters
- Stainless steel available

MULTI-SET

Pg. 80

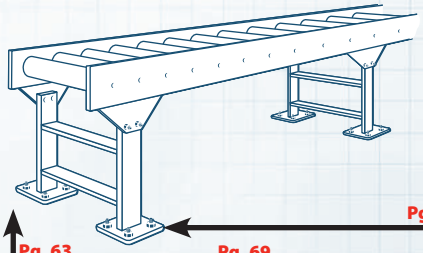


Pg. 69
TRUBOLT +

Pg. 63
TRUBOLT
- Multiple head styles
- Heavy duty
- 360˚ hole contact
- 304 and 316 stainless steel

- 2006 IBC, 2009 IBC 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

Conveyors

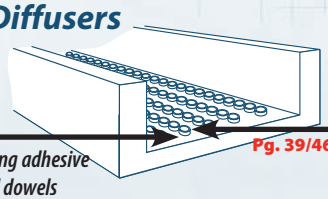


Pg. 71
LDT
- Finished head
- Removable
- Install by hand or with impact wrench

Pg. 63
TRUBOLT
- Fully threaded for maximum versatility
- Available in 304, 316 stainless, carbon, and galvanized steel

Pg. 69
TRUBOLT +
- 2006 IBC , 2009 IBC 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

Diffusers

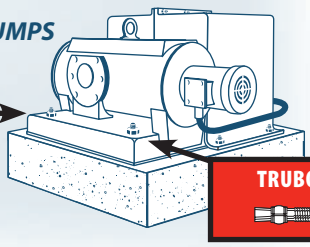


Pg. 23
A7+ ADHESIVE
- Fast dispensing, fast curing adhesive
- Works with epoxy coated dowels
- NSF Approved

Pg. 39/46
C6+/G5 ADHESIVE
- NSF /ANSI 61
- Vibration resistant
- Corrosion resistant
- Can be installed underwater

Pumps

Pg. 39/46
C6+/G5 ADHESIVE
- NSF /ANSI 61
- Vibration resistant
- Corrosion resistant
- Can be used in oversize holes



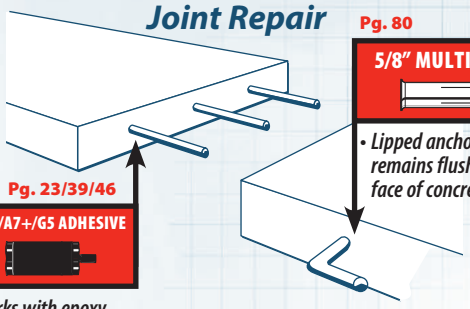
Pg. 63
TRUBOLT

For seismic recognition, see ICC-ES evaluation reports.

For installation guidelines for your application, please contact our Technical Services Department at 1-800-848-5611.

Highway & Bridge Contractor Applications

Concrete Pavement Lane Addition and Joint Repair

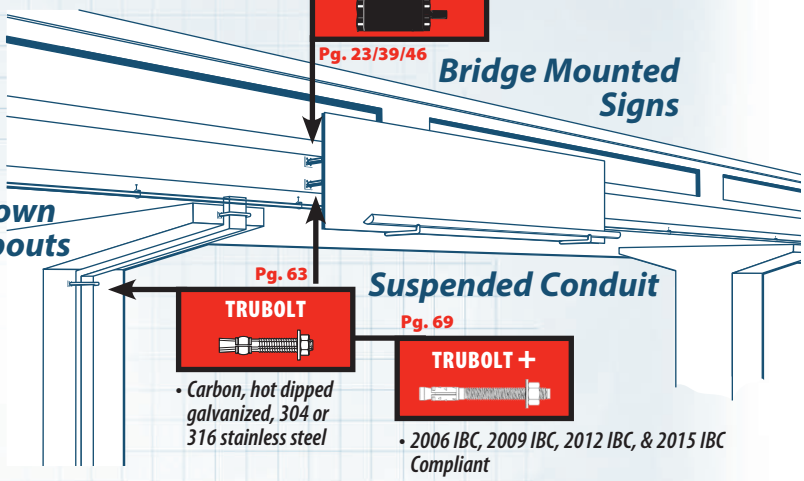


Pg. 80
5/8" MULTI-SET
- Lipped anchor– remains flush with face of concrete

Pg. 23/39/46
C6+/A7+/G5 ADHESIVE
- Works with epoxy coated dowels

"J" Bolt
- With or without lip

Bridge Mounted Signs



- Can be used overhead

C6+/A7+/G5 ADHESIVE
Pg. 23/39/46

Down Spouts

Suspended Conduit

Pg. 63
TRUBOLT
- Carbon, hot dipped galvanized, 304 or 316 stainless steel

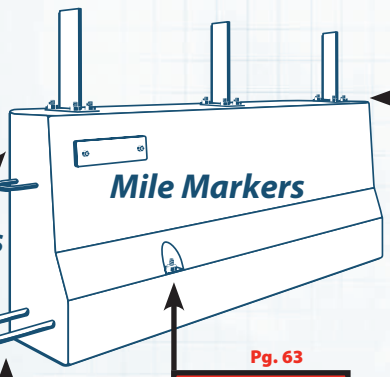
Pg. 69
TRUBOLT +
- 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

Glare Screens

Pg. 23
A7+ ADHESIVE
- Fast curing
- Can be used in damp or water filled holes

Wire Loops

Mile Markers



Rebar Doweling

Pg. 23/39/46
A7+/C6+ ADHESIVE
- Can be used in damp or water filled holes

Pg. 63
TRUBOLT
- Carbon, hot dipped galvanized, 304 or 316 stainless steel

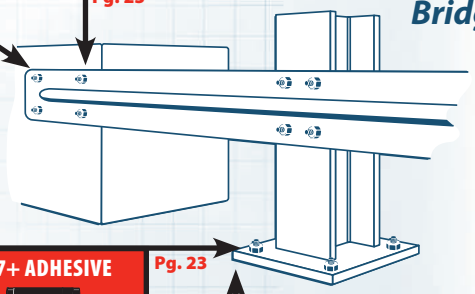
Pg. 63
TRUBOLT
Pg. 71
LDT
- Finished head
- Removable
- Install by hand or with impact wrench

Temporary Fastening of Jersey Barriers to Concrete

- Can be used in wet/damp conditions
- Fast cure
- Easy to pump

A7+ ADHESIVE
Pg. 23

Guard Rail Attachments to Bridges



A7+ ADHESIVE
Pg. 23
- Can be used in wet/ damp conditions
- Fast cure
- Easy to pump
- Suitable for use close to edge of slab

Steel Guard Rail Post Attachment to Concrete

Pg. 39/46
C6+/G5 ADHESIVE
- High Load Capacity
- Suitable for use close to edge of slab
- Ideal for moderate to hot climates
- Can be used for oversized holes

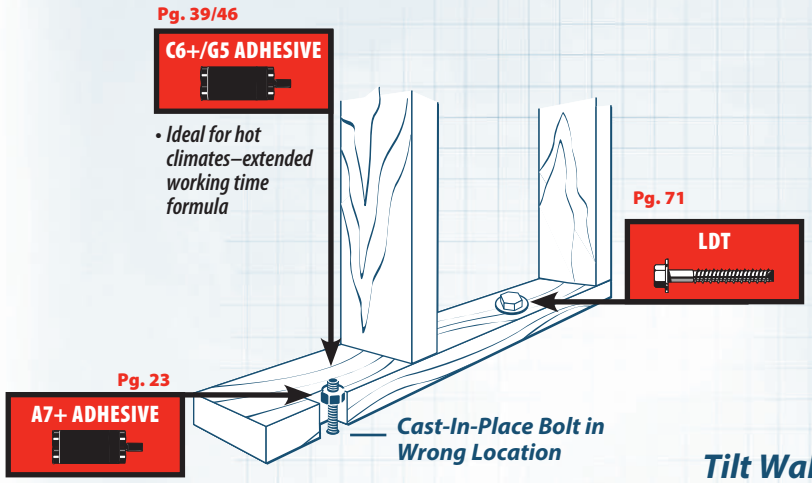
For seismic recognition, see ICC-ES evaluation reports.
For installation guidelines for your application, please contact our Technical Services Department at 1-800-848-5611.

Department of Transportation Approvals & Listings

For approvals contact local engineering on a per project basis.
Call your local RED HEAD sales person for more information.

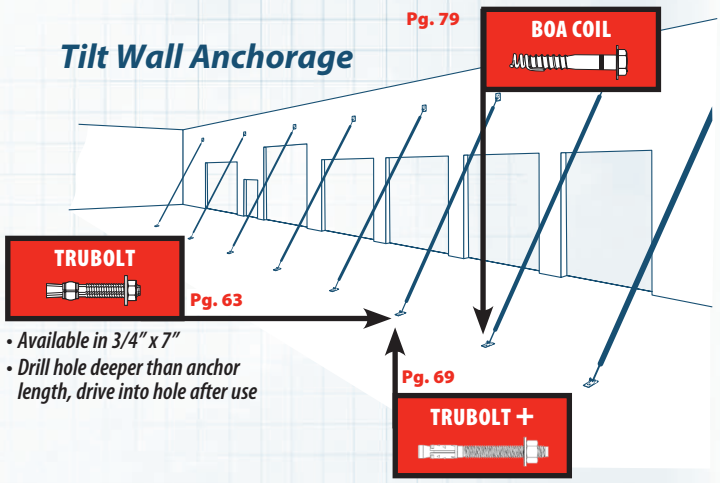
General Contractor Applications

Replacement of Misplaced Anchors



• Damp holes or underwater
• Dispenses and cures faster in cold weather

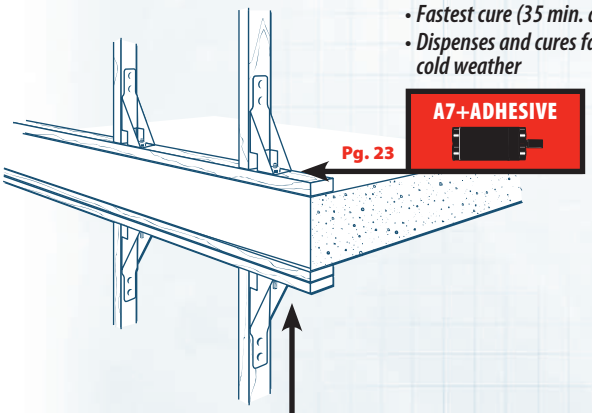
Tilt Wall Anchorage



• Available in 3/4" x 7"
• Drill hole deeper than anchor length, drive into hole after use

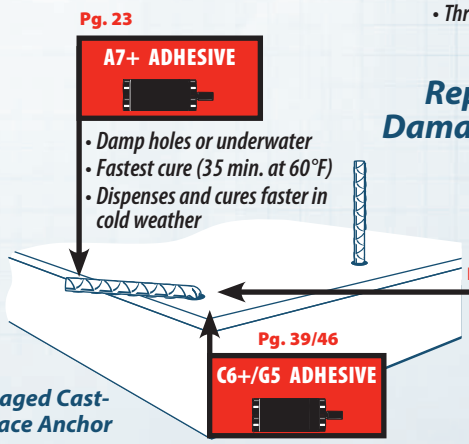
• 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
• All seismic zone and cracked concrete approved
• Thru fixture fastening

Seismic Hold Downs



• High Load Capacity
• Suitable for use close to edge of slab
• Ideal for moderate to hot climates
• Can be used for oversized holes

Replacement of Damaged Anchors



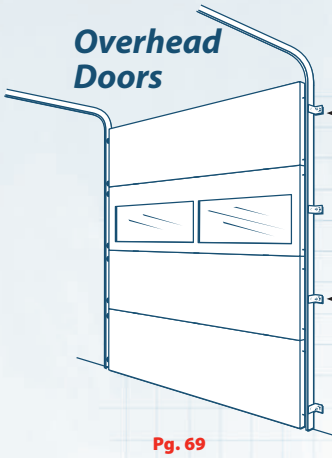
• Extended working time–ideal for warm to hot climates
• Can be used in oversize holes

For seismic recognition, see ICC-ES evaluation reports.

For installation guidelines for your application, please contact our Technical Services Department at 1-800-848-5611.

Material Handling Applications

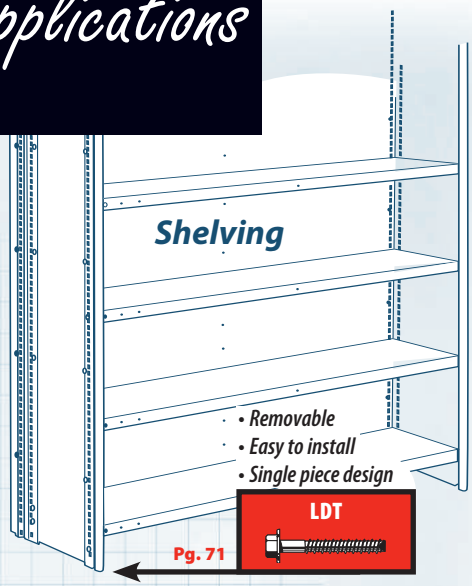
Overhead Doors



LDT — Pg. 71
- Hand installation block or concrete

A7+ ADHESIVE WITH UMBRELLA — Pg. 52
- High load in hollow block or concrete

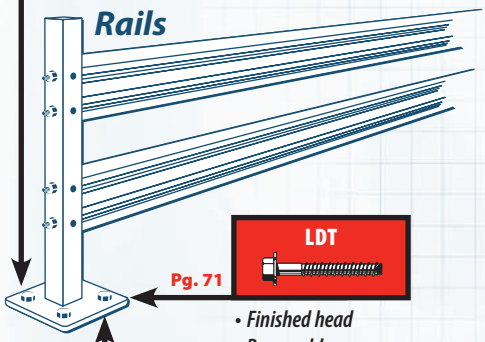
Shelving



- Removable
- Easy to install
- Single piece design

LDT — Pg. 71

Rails



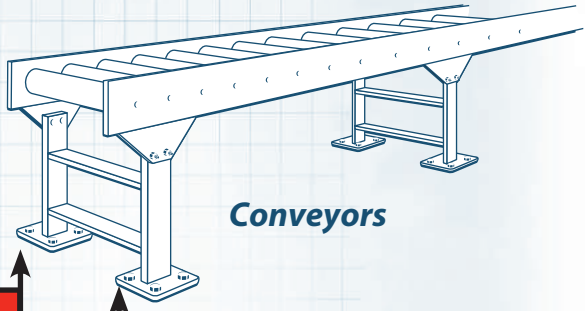
TRUBOLT WEDGE — Pg. 63
- Thru fixture fastening
- Available in hot-dipped galvanized steel, stainless steel

TRUBOLT + — Pg. 69
- 2006 IBC , 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

LDT — Pg. 71
- Finished head
- Removable
- Installs with impact wrench

A7+ ADHESIVE — Pg. 23
- Fast curing
- Impact resistant
- Non-sag formula

Conveyors



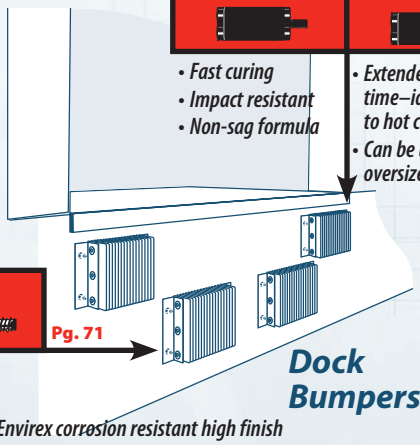
LDT — Pg. 71
- Finished head
- Removable
- Installs with impact wrench
- Single piece design

TRUBOLT WEDGE — Pg. 63
- Thru fixture fastening
- Installs fast with no spotting of holes

TRUBOLT + — Pg. 69
- 2006 IBC , 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

A7+ ADHESIVE — Pg. 23
- Fast curing
- Impact resistant
- Non-sag formula

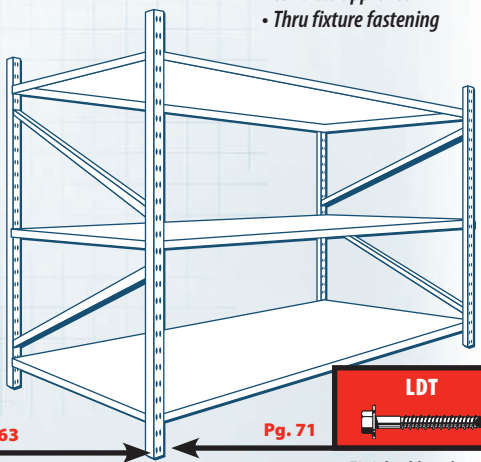
C6+/G5 ADHESIVE — Pg. 39/46
- Extended working time–ideal for warm to hot climates
- Can be used in oversize holes



LDT — Pg. 71
- Finished head
- Removable
- Available with Envirex corrosion resistant high finish

Dock Bumpers

Racks



TRUBOLT + — Pg. 69
- 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

TRUBOLT WEDGE — Pg. 63
- Thru fixture fastening
- Installs fast with no spotting of holes

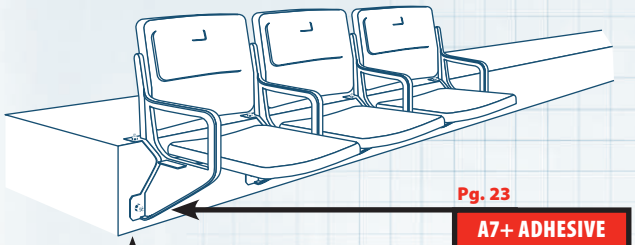
LDT — Pg. 71
- Finished head
- Removable
- Installs with impact wrench
- Single piece design

For seismic recognition, see ICC-ES evaluation reports.

For installation guidelines for your application, please contact our Technical Services Department at 1-800-848-5611.

Specialty Applications

Stadium Seating

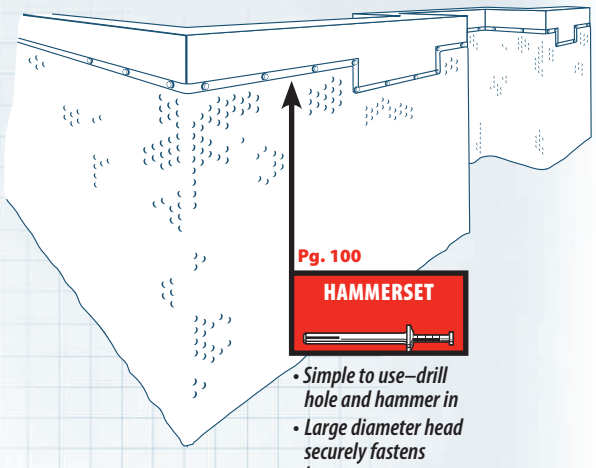


Pg. 23
A7+ ADHESIVE
- Corrosion resistant
- Normal weight or lightweight concrete
- Used in major stadiums across the country

Pg. 69
TRUBOLT +
- 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

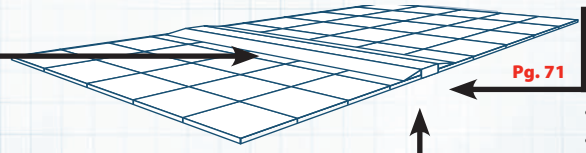
Pg. 63
TRUBOLT
- Corrosion resistant
- Normal weight or lightweight concrete
- Used in major stadiums across the country
- Immediate loading

Basement Wrap



Pg. 100
HAMMERSET
- Simple to use–drill hole and hammer in
- Large diameter head securely fastens basement wrap

Expansion Joints



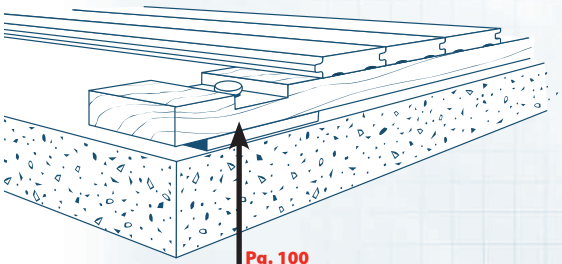
Pg. 69
TRUBOLT +
- 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

TRUBOLT WEDGE
Pg. 63
- High load capacity
- Fast installation

Pg. 71
LDT
- Finished head
- Removable
- Installs by hand or with impact wrench

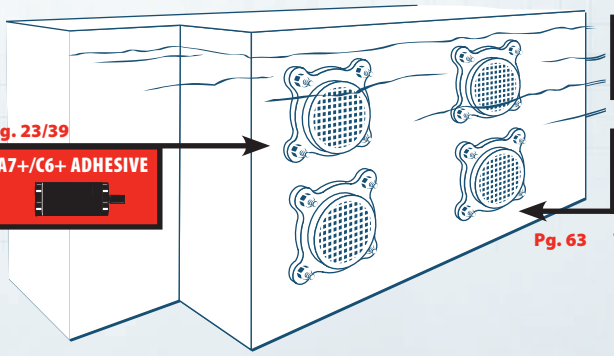
Pg. 39/46
C6+/G5 ADHESIVE
- High load capacity
- Suitable for use close to edge of slab

Flooring Systems



Pg. 100
HAMMERSET
- Simple to use–drill hole and hammer in

Underwater Installation



Pg. 23/39
A7+/C6+ ADHESIVE

- 2006 IBC, 2009 IBC, 2012 IBC, & 2015 IBC Compliant
- All seismic zone and cracked concrete approved
- Thru fixture fastening

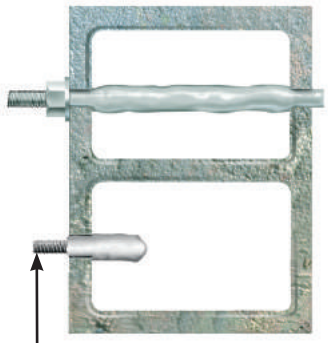
TRUBOLT +
Pg. 69
TRUBOLT WEDGE
Pg. 63
- Vibration resistant
- Corrosion resistant
- Available in 316 stainless steel

For seismic recognition, see ICC-ES evaluation reports.
For installation guidelines for your application, please contact our Technical Services Department at 1-800-848-5611.

RED HEAD®
CONCRETE ANCHORING SPECIALISTS

The Inside Story About Mechanical and Adhesive Anchors

Types, Base Materials, Installation Procedures and More



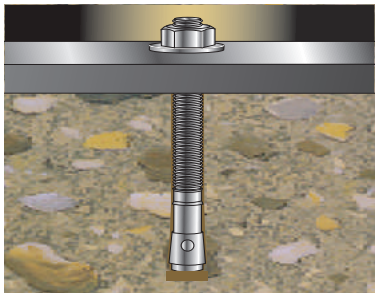
Top View

For attachments to single face of block, see page 50 for information on "umbrella anchors" and "stubby screens"

HOLLOW CONCRETE BLOCK

Maximum holding strength in concrete block can be obtained by fastening to both the front and back of the block using an adhesive screen tube and threaded rod.

TYPES OF ANCHORS



Expansion Type—

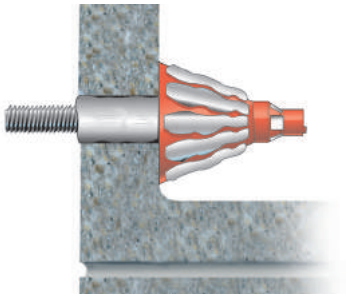
Tension loads are transferred to the base material through a portion of the anchor that is expanded inside the drill hole.

Examples: Red Head Trubolts, Dynabolts, Multi-Set II Anchors and Hammer-Sets

Adhesive Type—

Resistance to tension loads is provided by the presence of an adhesive between the threaded rod (or rebar) and the inside walls of the drill hole.

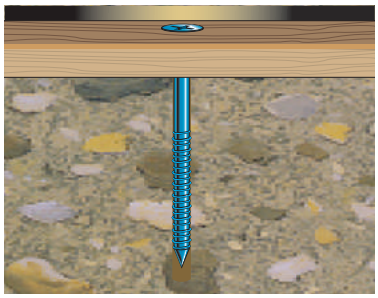
Examples: A7+, C6+, and G5 Adhesives



Keying Type—

Holding strength comes from a portion of an anchor that is expanded into a hollow space in a base material that contains voids such as concrete block or brick.

Examples: Adhesive Umbrella Anchors



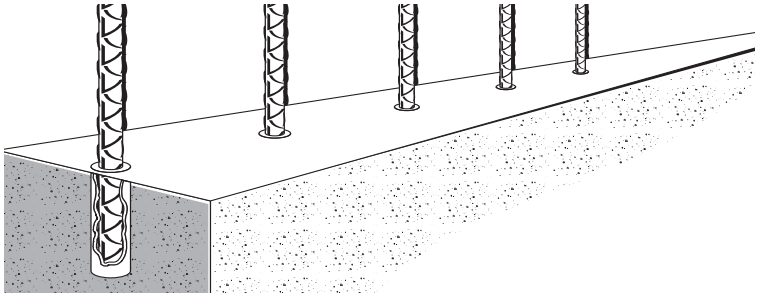
Mechanical Interlocking Type—

Tension loads are resisted by threads on the fastener engaging with threads cut into the base material.

Examples: LDT, Tapcon and E-Z Ancors

Anchoring Working Principles

BASE MATERIALS



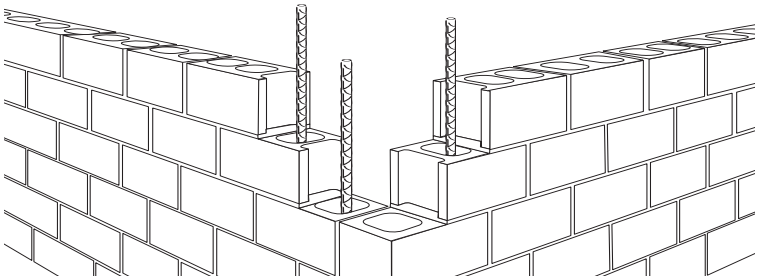
Concrete

Normal Weight Concrete is made from Portland cement, coarse and fine aggregates, water and various admixtures. The proportioning of these components controls the strength of the concrete. In the United States, concrete strength is specified by the compressive strength* of concrete test cylinders. These test cylinders measure six inches in diameter by 12 inches in length and are tested on the 28th day after they are produced.

Lightweight Concrete consists of the same components (cement, coarse and fine aggregates, water and admixtures) as normal weight concrete, except it is made with lightweight aggregate. One of the most common uses of lightweight concrete has been as a structural fill of steel decking in the construction of strong, yet light floor systems.

Typical fasteners for both normal weight and lightweight concrete include Trubolt Wedge Anchors, LDT Self-Threading Anchors, Dynabolt Sleeve Anchors, Multi-Set II Drop-In Anchors, Stud Anchors and Adhesive Anchoring Systems.

* Compressive strengths shown in this catalog were the actual strengths at the time of testing. The load values listed were determined by testing in un-reinforced concrete.



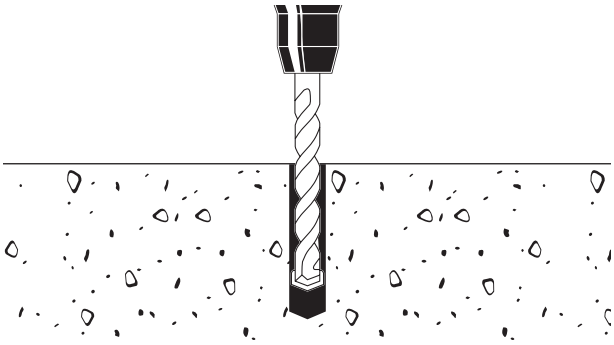
Masonry

Grout-Filled Concrete Block consists of three components: concrete, mortar and grout. The mortar is designed to join the units into an integral structure with predictable performance properties. Typical fasteners for grout-filled block include Dynabolt Sleeve Anchors, and C6+, or A7+ Adhesive Anchoring Systems.

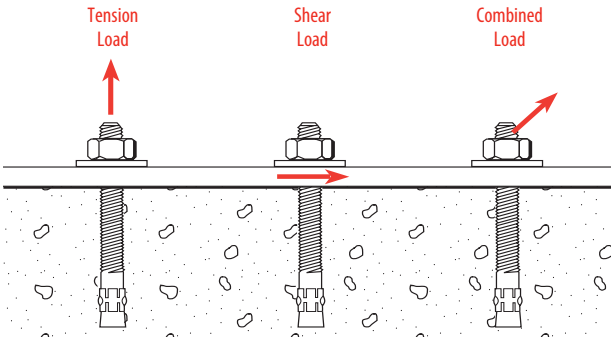
Hollow Concrete Block, Brick and Clay Tile are grouped together because they require special anchoring products that can be installed into a substrate that contains voids and still provide reliable holding values. Typical fasteners used in hollow block, brick and clay tile include Dynabolt Sleeve Anchors, Tapcon Self-Tapping Concrete Anchors, Adhesives with Screen Tubes and Adhesives used with the Umbrella Anchor.

INSTALLATION PROCEDURES

Anchor drill holes are typically produced using carbide tipped drill bits and rotary hammer drills. Look at the product sections of this catalog for the correct drill hole diameter and depth of each type of anchoring system.



Careful cleaning of the anchor drill hole is important in order to obtain the best possible functioning of the anchor system. For each product in this catalog, detailed installation instructions are provided. Suggested clamping torques and curing times (for adhesive anchors) are also provided.



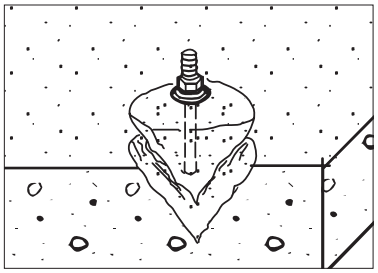
Loading

Holding values for the following types of loading are provided in this catalog:

- **Tension loads—** when load is applied along the axis of the anchor
- **Shear loads—** when the loads are applied perpendicular to the axis of the anchor
- **Combined loads—** when both tension and shear loads are applied to an anchor, a combined loading equation is provided to determine the maximum loads that can be applied to the anchor at the same time

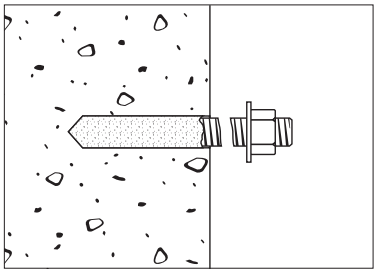
MODES OF FAILURE

When anchors are loaded to their maximum capacity, several different types (modes) of failure are possible depending on the type of anchor, strength of the base material, embedment depth, location of the anchor, etc. Common modes of failure include:



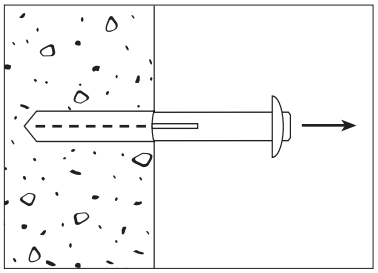
Concrete Spall Cone—

Occurs at shallow embedments where the resistance of the base material is less than the resistance of the anchor and the base material fails.



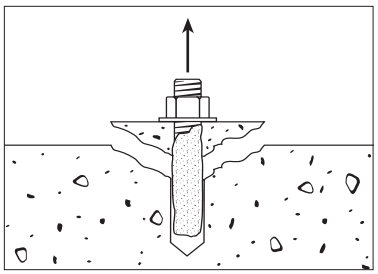
Steel Breakage—

The capacity of the anchorage exceeds the tensile or shear strength of the steel anchor or rod material.



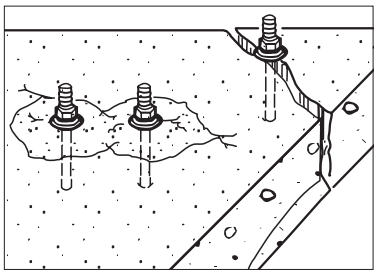
Anchor Pullout—

Base material adjacent to the extension portion of an anchor crushes, resulting in the anchor pulling out of the hole until the capacity of the spall cone is reached, at which point the concrete will spall. This type of failure happens more commonly when anchors are set with deep embedment depths.



Bond Failure—

Shear failure of the adhesive at rod-adhesive interface or adhesive-base material interface. Occurs more commonly in deep embedments using high strength steel rods.



Edge Distance and Spacing Reduction—

Reduces the holding values, when anchors are placed too close to the edge. This also occurs when two or more anchors are spaced closely together. See suggested edge distance, anchor spacing distances and reduction values in the product sections.

Anchoring
Selection Chart

Anchor Selection Chart		Adhesive Anchors			Screw Anchors		Expansion Anchors					
							Torque-Set				Hammer-Set	
		A7+	C6+	G5	LDT	Tapcon	Trubolt	Trubolt+	Dynabolt	Boa Coil	Drop-In	Hammer-Set
Base Material	Uncracked Concrete	A7+	C6+	G5	LDT	TAP	TRU	TRU+	DYNA	BOA	DROP	HAMM
	Cracked Concrete	A7+	C6+	G5				TRU+				
	Lightweight Concrete					TAP	TRU	TRU+	DYNA		DROP	
	Lightweight Concrete on Metal Deck				LDT		TRU	TRU+			DROP	
	Hollow Core Concrete										DROP	
	Grout Filled Concrete Block	A7+			LDT				DYNA			
	Hollow Concrete Block	A7+			LDT	TAP			DYNA			
	Solid Brick	A7+										
	Drywall											
Hole Conditions	Oversized Holes	A7+	C6+	G5								
	Water Saturated Concrete	A7+	C6+	G5	LDT	TAP	TRU	TRU+	DYNA	BOA	DROP	HAMM
	Water-filled Holes	A7+	C6+	G5	LDT	TAP	TRU	TRU+	DYNA	BOA	DROP	HAMM
	Submerged	A7+	C6+	G5								
	No Hole Cleaning Procedures											
Application Requirements	Through Fixture Fastening	A7+	C6+	G5	LDT	TAP	TRU	TRU+	DYNA	BOA		HAMM
	Immediate Loading				LDT	TAP	TRU	TRU+	DYNA	BOA	DROP	HAMM
	Finished Head or Flush Surface				LDT	TAP			DYNA	BOA	DROP	HAMM
	Easy to Remove				LDT	TAP				BOA		
	Seismic	A7+	C6+	G5				TRU+				
	Cyclic Loading	A7+	C6+	G5			TRU	TRU+				
	High Temperature Resistance	A7+	C6+	G5	LDT	TAP	TRU	TRU+	DYNA	BOA	DROP	HAMM
	Sustained Load	A7+	C6+	G5	LDT	TAP	TRU	TRU+	DYNA	BOA	DROP	
Corrosion Resistance	Zinc Plated	A7+	C6+	G5			TRU	TRU+	DYNA	BOA	DROP	HAMM
	Hot-Dipped Galvanized	A7+	C6+	G5			TRU					
	304 Stainless Steel	A7+	C6+	G5			TRU		DYNA			
	316 Stainless Steel	A7+	C6+	G5			TRU	TRU+			DROP	
	410 Stainless Steel	A7+	C6+	G5	LDT	TAP						
	Trade Secret Coating				LDT	TAP						
Anchor Diameters	3/16"					TAP						HAMM
	1/4"	A7+				TAP	TRU		DYNA		DROP	HAMM
	5/16"					TAP			DYNA			
	3/8"	A7+	C6+	G5	LDT		TRU	TRU+	DYNA		DROP	
	1/2"	A7+	C6+	G5	LDT		TRU	TRU+	DYNA	BOA	DROP	
	5/8"	A7+	C6+	G5	LDT		TRU	TRU+	DYNA	BOA	DROP	
	3/4"	A7+	C6+	G5	LDT		TRU	TRU+	DYNA	BOA	DROP	
	7/8"	A7+	C6+	G5								
	1"	A7+	C6+	G5			TRU					
	1-1/4"	A7+	C6+	G5								
	Rebar Sizes	#3-11	#3-8,10	#3-10								
At 70°F	Working Time (minutes)	5	11	15								
	Cure Time (minutes)	45	420	1440								

RED HEAD®

truspec

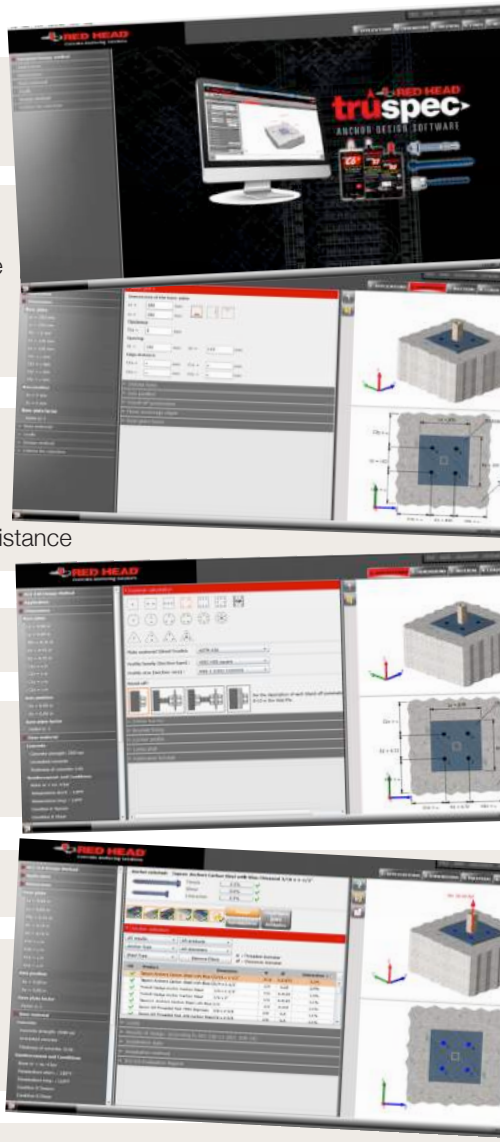
ANCHOR CALCULATION SOFTWARE

Access Software at: ITWRedHead.com

Design concrete anchoring connections in minutes!

Use Truspec to become an expert who can easily design post-installed concrete anchoring connections in accordance with ACI 318.

VIEW	• Customize anchor layouts or choose from a wide selection of pre-configured options	• Tips on how to navigate and use the Anchor Calculation Software
DESIGN	• Design post-installed anchor connections according to ACI 318 • Optimize performance via intuitive base plate thickness calculator and design comparison mode	• Design in accordance with ICC-ES AC 308 and ACI 355.4 adhesive temperature requirements
MODEL	• Select, sort, and filter according to the most efficient anchoring product type and size • Attachment with single or multiple anchor points	• Simultaneous moment forces in x-, y-, z- axis • Minimum edge distance • Minimum anchor spacing distance
INTERACT WITH	• Real-time 3D animations and graphics	
CALCULATE	• Critical values for total strength design of anchor connections	• Values in US Customary or Metric Units
PREDICT	• Mode of failure for anchor connections	
RECOMMEND	• Most efficient anchoring method (adhesive or mechanical anchors) • Most efficient anchor size	
BUILD A PRINTED OR PDF REPORT	• Including Anchor Calculation Data • Detailed Calculations for Anchor Design • 3D Image of Anchor Calculation	• ESR Report(s) • Code cross-references



isit our web site for the most
www.itwredhead.com

truspec
ANCHOR CALCULATION SOFTWARE

Use TruSpec Anchor Calculation Software to become an expert on:

Adhesive Anchoring Solutions

A7+ Adhesive

- Fast Curing Hybrid Epoxy
- Can be used in water filled holes
- Can be used in more applications than the competition

G5 Adhesive

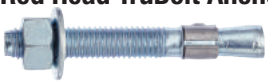
- High Strength Epoxy
- Ideal for warm weather

C6+ Adhesive

- High Strength Epoxy
- Approved for cracked concrete and seismic zones

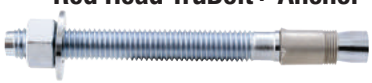
Mechanical Anchoring Solutions

Red Head TruBolt Anchor



- Dependable, heavy duty, inspectable, wedge expansion anchor

Red Head TruBolt+ Anchor



- Dependable wedge anchor approved for seismic

Red Head Tapcon +

- Concrete Screw anchor with seismic approvals

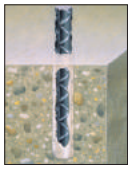
Threaded Rod Anchoring Solutions

Sammys for Cracked Concrete

- Self-tapping screw anchor for cracked concrete, seismic, and standard applications

RED HEAD®
ADHESIVE ANCHORING SPECIALISTS

Adhesive Anchoring Selection Guide


Doweling into Concrete with Rebar


Fastening to Concrete with Threaded Rod

Solid Concrete Applications

A7+ *Fast Dispensing, Fast Curing Acrylic*

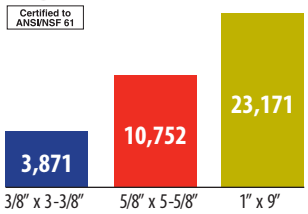
Install more anchors in less time

5 fluid oz. (150 ml) kit, 9.5 fluid oz. (280 ml) and 28 fluid oz. (825 ml) cartridges

- Solid or hollow base materials
- Dispenses easier and faster
- Use in dry, saturated, and water-filled holes
- Fastest cure (35 min. at 60°F)
- Dispenses and cures faster in cold weather
- Can be used in smaller diameter holes
- No-drip formula
- Hand dispensable 28-oz. cartridge
- 18 month shelf life
- NSF/ANSI 61

BASE MATERIAL (F°/C°)	GEL/WORKING TIME	FULL CURE TIME
110°/ 43°	1.5 minutes	45 minutes
90°/ 32°	3 minutes	45 minutes
70°/ 21°	5 minutes	45 minutes
50°/ 10°	15 minutes	90 minutes
30°/ -1°	35 minutes	4 hours
14°/ -10°	35 minutes	24 hours

NSF® Certified to ANSI/NSF 61



C6+ *High Strength Epoxy for All Conditions*

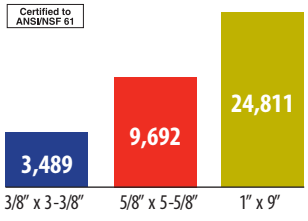
Delivers better load performance

10 fluid oz. (250 ml) cartridges
20 fluid oz. (600 ml) cartridges

- 35% greater bond strength than the closest competition in 70°F concrete
- Better performance in dry, saturated, and water-filled conditions
- Oversized and Diamond cored holes
- Safe and durable
- Approved for cracked concrete and seismic zones
- 24 month shelf life
- NSF/ANSI 61

BASE MATERIAL[1] (F°/C°)	WORKING TIME[2]	FULL CURE TIME
104°/ 40°	3 minutes	3 hours
95°/ 35°	4 minutes	4 hours
86°/ 30°	6 minutes	5 hours
77°/ 25°	8 minutes	6 hours
72°/ 22°	11 minutes	7 hours
59°/ 15°	15 minutes	8 hours
50°/ 10°	20 minutes	12 hours
40°/ 4.4°	20 minutes	24 hours

NSF® Certified to ANSI/NSF 61



G5 *High Strength Epoxy Tested to ICC-ES AC308*

15 min. working time; 24 hour cure time (Per AC308) (70°F)

MADE IN USA

22 fluid oz. (650 ml) cartridge

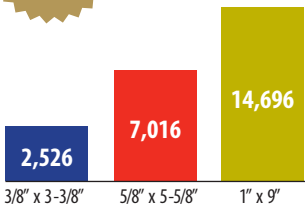
- Solid base materials
- Fire rated: tested up to 4hrs FRP
- Works in dry, damp, saturated, and underwater applications
- Gives more time to install anchors
- Easier to install anchors in hot weather
- Odorless
- Oversized and cored holes
- Improved wet/water filled
- Resist wind loads
- 18 month shelf life
- 100% solid (No V.O.C.)
- NSF/ANSI 61

BASE MATERIAL (F°/C°)	WORKING TIME	FULL CURE TIME
110°/ 43°	9 minutes	24 hours
90°/ 32°	9 minutes	24 hours
70°/ 20°	15 minutes	24 hours

NSF® Certified to ANSI/NSF 61

RECOGNIZED WORLDWIDE Fire Tested BS476 4 Hrs FRP

International Standard Fire Resistance Performance



[1] Diameter x Embedment in 4000 psi concrete.

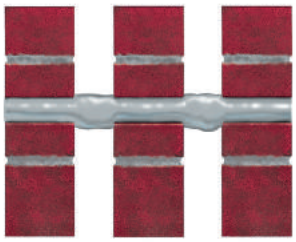
[2] All loads given in pounds.

[3] Calculated using the ICCES threaded rod data in uncracked, dry concrete with periodic inspection. Temperature range A.

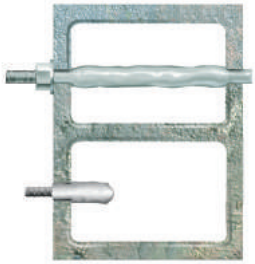
*Red Head A7+ replaced Epcon A7 and S7. For information on the retired A7 and S7 adhesives, please visit www.itwredhead.com

Hollow Base Material Applications

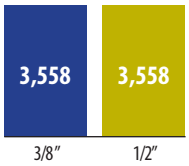
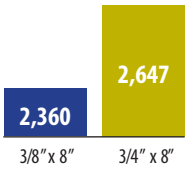
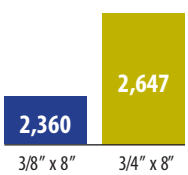
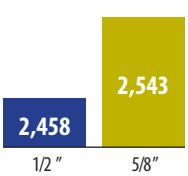
Use the following accessories with the A7+ adhesive anchoring system for all of your hollow base material applications.



Brick Pinning



Fastening to hollow concrete block

SYSTEM ACCESSORIES	KEY FEATURES	ULTIMATE TENSILE[1,2] PERFORMANCE (LBS)
Umbrella Anchor  Umbrella Anchor **Makes it possible to use adhesive for fastening to the face of hollow block or tile** (see page 53)	■ Highest hold in hollow block ■ 1/4", 3/8", or 1/2" rods ■ Fasten to front face of blocks ■ Creates large bearing surface inside block to achieve high loads	A7+ 
Nylon Screens  **Makes it possible to use adhesive for fastening to hollow block or brick walls** (see page 56)	■ 3/8" to 3/4" diameter sizes ■ 30%-50% lower cost than stainless screens ■ Special design makes screens easier to insert through block or brick ■ Does not get bent or crushed ■ Corrosion resistant	A7+ 
Stainless Steel Screens  **Makes it possible to use adhesive for fastening to hollow block or brick walls** (see page 56)	■ 1/4" & 3/4" diameter sizes ■ Corrosion resistant ■ Available in 1/4" thicknesses	A7+ 
Stubby Screens  **Makes it possible to use adhesive for fastening to the face of hollow block or tile** (see page 53)	■ 1/4", 3/8", 1/2", 5/8" diameter sizes ■ Fasten to front face of block ■ Anchor remains perpendicular in wall	A7+ 

[1]Testing performed in hollow concrete block. [2]Diameter x Embedment.

RED HEAD®
ADHESIVE ANCHORING SPECIALISTS

A7+

The Most Versatile Quick Cure Adhesive

A7P-10 A7P-28

APPLICATIONS / USES

- Concrete dowelling (slabs, walls, columns)
- Steel framing (columns, beams, ledgers)
- Brick pinning and CMU reinforcement
- Architectural metal fastening (railings, signage)
- Mechanical, electrical, and plumbing attachment
- Vibratory equipment anchoring
- Overhead and horizontal anchors

DESCRIPTION

Quick Curing Hybrid Epoxy Adhesive

RED HEAD A7+ is a high-strength, fast-cure adhesive that is designed to securely anchor threaded rod and rebar to cured concrete and masonry. A7+ is one of the most versatile achoring solutions on the market, suitable for use in an extremely wide range of applications and environmental conditions.

- Qualified for use in concrete, brick, block, and clay tile
- ICC-ES approved for cracked concrete and seismic applications (ICC-ES ESR 3903).
- Cures in only 45 minutes (at base temperature of 70°F/21°C)
- No extra time required for drying saturated concrete or water-filled holes
- Easy pumping even in cold temperatures
- Low odor - suitable for use indoors and in occupied buildings
- Optimum viscosity simplifies use in overhead and horizontal holes
- 18-month storage life minimizes waste and risk of using expired product
- Rugged cartirdge resists breakage due to rough handling or cold temperatures
- Store between 32ºF and 95ºF in a cool, dry place.

ADVANTAGES

- All weather formula
- Works in damp holes and underwater applications
- Fast curing time, 45 minutes at 70°F
- ICC-ES Evaluation Report ESR-3903 (Concrete) and ESR-3951 (Masonry)
- NSF 61 Listed, certified got use in conjuntion with drinking water systems
- Fast & easy dispensing, even 28 ounce cartridge can be hand dispensed
- Formula for use in solid and hollow base materials
- Suitable for oversized and diamond cored holes with increased depths

Curing Times

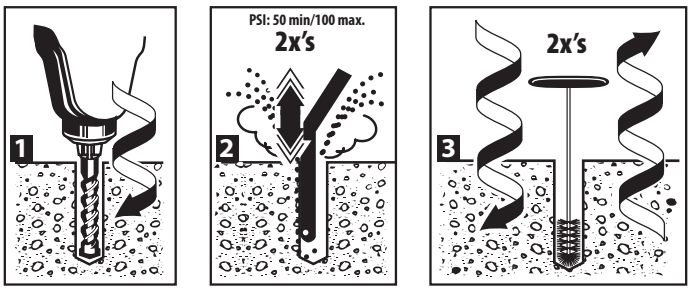
CONCRETE (F°)	ADHESIVE (F°)	GEL TIME	FULL CURE TIME
110	110	1.5 minutes	45 minutes
90	90	3 minutes	45 minutes
70	70	5 minutes	45 minutes
50	50	15 minutes	90 minutes
30	30	35 minutes	4 hours
14	30	35 minutes	24 hours

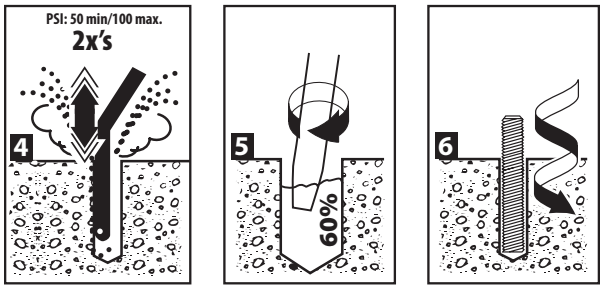
Most Competitive Spacing and Edge Distance

NOMINAL ANCHOR DIAMETER (IN.)	MINIMUM SPACING (IN.)	MINIMUM EDGE DISTANCE (IN.)
3/8	15/16	15/16
1/2	1-1/2	1-1/2
5/8	2-1/2	2-1/2
3/4	3	3
7/8	3-1/2	3-1/2
1	4	4
1-1/4	5	5

ITW Red Head®
Call our toll free number **800-848-5611** or visit our web site for the most current product and technical information at **www.itwredhead.com**

INSTALLATION STEPS





* Damp, submerged and underwater applications require 4x's air, 4x's brushing and 4x's air

PACKAGING

1. Disposable, self-contained cartridge system capable of dispensing both components in the proper mixing ratio
2. Acrylic components dispensed through a static mixing nozzle that thoroughly mixes the material and places the material at the base of the pre-drilled hole
3. Cartridge markings: Include manufacturer's name, batch number and best-used-by date, mix ratio by volume, ANSI hazard classification, and appropriate ANSI handling precautions

APPROVALS/LISTINGS

ICC-ES ESR-3903 for Cracked and Uncracked concrete including all Seismic Zones

ICC-ES ESR-3951 for masonry

IBC 2006/2009/2012/2015 Compliant

NSF/ANSI Standard 61

For the most current approvals/listings visit: www.itwredhead.com

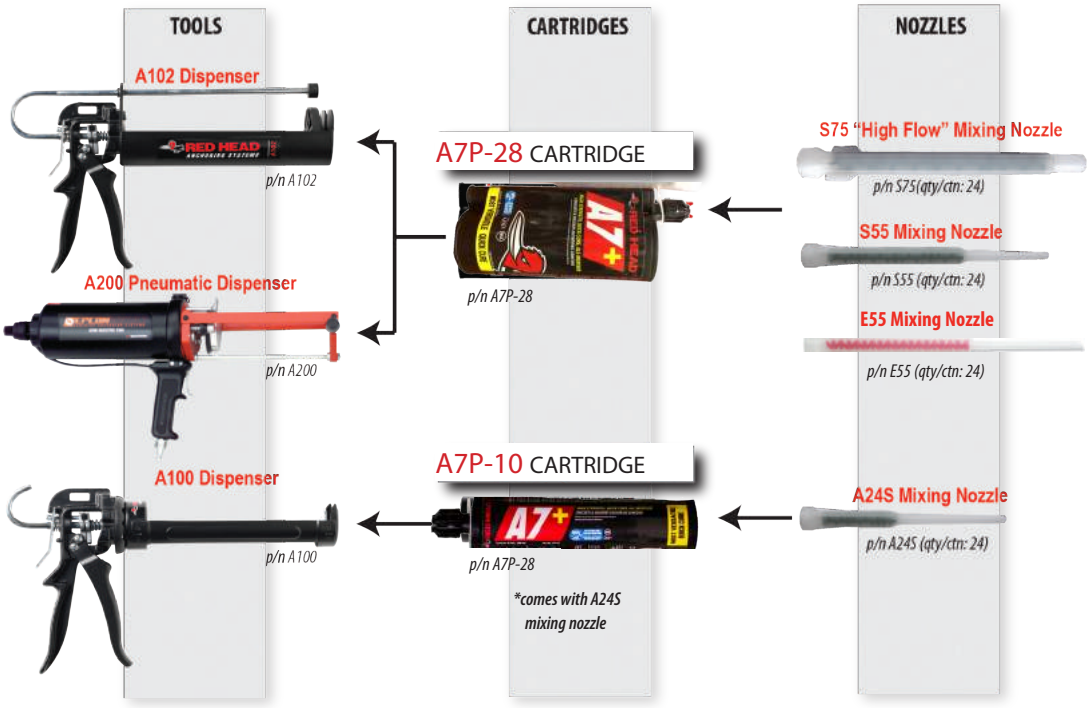
APPLICATIONS

Water Treatment Facilities

The best-in-class in edge and spacing distance of Red Head A7+ and its ability to work in water have make it a great fit for waste water treatment plants.

Roadway Doweling

A7+ dispenses so quickly and rebar inserts so easily that contractors find installed costs are lower than many other products including grout for doweling.



A7P–28 fl. oz. Ordering Information

PART NUMBER	DESCRIPTION	BOX QTY
 A7P-28	28 Fluid Ounce Cartridge A7+ Each cartirdge comes with a S55 Nozzle	4
E55	Mixing Nozzle for A7P-28 and G5-22 Cartridge Nozzle diameter fits 3/8" to 5/8" holes. (overall length of nozzle 14")	24
 A102	*Largest hand dispensable cartridge—still easy to dispense* Hand Dispenser for A7P-28 Cartridge	1

PART NUMBER	DESCRIPTION	BOX QTY
 S55	Mixing Nozzle for A7P-28 Cartridge Nozzle diameter fits holes for 3/8" diameter & larger anchors (overall length of nozzle 10")	6
 A200	Pneumatic Dispenser for A7P-28 Cartridge	1
E25-6	6-Foot Straight Tubing (Used when holes are deeper) (can cut to proper size) (.39 in I.D. x .43 in. O.D.)	24

ESTIMATING TABLE

A7+
28 Fluid Ounce Cartridge

Number of Anchoring Installations per Cartridge* Using Reinforcing Bar with A7+ Adhesive in Solid Concrete

REBAR	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
#3	7/16	558.2	279.1	186.1	139.5	111.6	93.0	79.7	69.8	62.0	55.8	50.7	46.5	42.9	39.9	37.2
#4	5/8	273.5	136.7	91.2	68.4	54.7	45.6	39.1	34.2	30.4	27.3	24.9	22.8	21.0	19.5	18.2
#5	3/4	189.9	95.0	63.3	47.5	38.0	31.7	27.1	23.7	21.1	19.0	17.3	15.8	14.6	13.6	12.7
#6	7/8	139.5	69.8	46.5	34.9	27.9	23.3	19.9	17.4	15.5	14.0	12.7	11.6	10.7	10.0	9.3
#7	1	106.8	53.4	35.6	26.7	21.4	17.8	15.3	13.4	11.9	10.7	9.7	8.9	8.2	7.6	7.1
#8	1-1/8	84.4	42.2	28.1	21.1	16.9	14.1	12.1	10.6	9.4	8.4	7.7	7.0	6.5	6.0	5.6
#9	1-1/4	68.4	34.2	22.8	17.1	13.7	11.4	9.8	8.5	7.6	6.8	6.2	5.7	5.3	4.9	4.6
#10	1-1/2	47.5	23.7	15.8	11.9	9.5	7.9	6.8	5.9	5.3	4.7	4.3	4.0	3.7	3.4	3.2
#11	1-3/4	34.9	17.4	11.6	8.7	7.0	5.8	5.0	4.4	3.9	3.5	3.2	2.9	2.7	2.5	2.3

*The estimated number of anchoring installations per cartridge is based upon calculations of filling the hole 60% full of adhesive per the recommendation in our installation instructions. Hole volumes are calculated using ANSI tolerance carbide tipped drill bits. These estimates do not account for any waste.

ESTIMATING TABLE

A7+
28 Fluid Ounce Cartridge

Number of Anchoring Installations per Cartridge* Using Threaded Rod with A7+ Adhesive in Solid Concrete

ROD (in.)	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1/4	5/16	1094.0	547.0	364.7	273.5	218.8	182.3	156.3	136.7	121.6	109.4	99.5	91.2	84.2	78.1	72.9
3/8	7/16	558.2	279.1	186.1	139.5	111.6	93.0	79.7	69.8	62.0	55.8	50.7	46.5	42.9	39.9	37.2
1/2	9/16	337.7	168.8	112.6	84.4	67.5	56.3	48.2	42.2	37.5	33.8	30.7	28.1	26.0	24.1	22.5
5/8	3/4	189.9	95.0	63.3	47.5	38.0	31.7	27.1	23.7	21.1	19.0	17.3	15.8	14.6	13.6	12.7
3/4	7/8	139.5	69.8	46.5	34.9	27.9	23.3	19.9	17.4	15.5	14.0	12.7	11.6	10.7	10.0	9.3
7/8	1	106.8	53.4	35.6	26.7	21.4	17.8	15.3	13.4	11.9	10.7	9.7	8.9	8.2	7.6	7.1
1	1-1/8	84.4	42.2	28.1	21.1	16.9	14.1	12.1	10.6	9.4	8.4	7.7	7.0	6.5	6.0	5.6
1-1/4	1-3/8	56.5	28.3	18.8	14.1	11.3	9.4	8.1	7.1	6.3	5.7	5.1	4.7	4.3	4.0	3.8
1-1/2	1-5/8	40.5	20.2	13.5	10.1	8.1	6.7	5.8	5.1	4.5	4.0	3.7	3.4	3.1	2.9	2.7

*The estimated number of anchoring installations per cartridge is based upon calculations of filling the hole 60% full of adhesive per the recommendation in our installation instructions. Hole volumes are calculated using ANSI tolerance carbide tipped drill bits. These estimates do not account for any waste.

A7P–10 fl. oz. Ordering Information

PART NUMBER	DESCRIPTION	BOX QTY
 A7P-10	9.5 Fluid Ounce Cartridge with Nozzle	6
 A24S	Mixing Nozzle for A7P-10 Cartridge Nozzle diameter fits 3/8" to 5/8" holes (overall length of nozzle 6-3/8")	24
 A100	Hand Dispenser Designed for A7P-10 Cartridge Contractor Quality 26:1 Thrust Ratio	1

ESTIMATING TABLES

A7+
9.5 Fluid Ounce Cartridge

Number of Anchoring Installations per Cartridge* Using Reinforcing Bar with A7+ Adhesive in Solid Concrete

ROD (In.)	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES									
		1	2	3	4	5	6	7	8	9	10
#3	7/16	189.4	94.7	63.1	47.4	37.9	31.6	27.1	23.7	21.0	18.9
#4	5/8	92.8	46.4	30.9	23.2	18.6	15.5	13.3	11.6	10.3	9.3
#5	3/4	64.5	32.2	21.5	16.1	12.9	10.7	9.2	8.1	7.2	6.4
#6	7/8	47.4	23.7	15.8	11.8	9.5	7.9	6.8	5.9	5.3	4.7
#7	1	36.3	18.1	12.1	9.1	7.3	6.0	5.2	4.5	4.0	3.6
#8	1-1/8	28.6	14.3	9.5	7.2	5.7	4.8	4.1	3.6	3.2	2.9
#9	1-1/4	23.2	11.6	7.7	5.8	4.6	3.9	3.3	2.9	2.6	2.3
#10	1-1/2	16.1	8.1	5.4	4.0	3.2	2.7	2.3	2.0	1.8	1.6
#11	1-3/4	11.8	5.9	3.9	3.0	2.4	2.0	1.7	1.5	1.3	1.2

ESTIMATING TABLES

A7+
9.5 Fluid Ounce Cartridge

Number of Anchoring Installations per Cartridge* Using Threaded Rod with A7+ Adhesive in Solid Concrete

ROD (In.)	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES									
		1	2	3	4	5	6	7	8	9	10
1/4	5/16	371.3	185.6	123.8	92.8	74.3	61.9	53.0	46.4	41.3	37.1
3/8	7/16	189.4	94.7	63.1	47.4	37.9	31.6	27.1	23.7	21.0	18.9
1/2	9/16	114.6	57.3	38.2	28.6	22.9	19.1	16.4	14.3	12.7	11.5
5/8	3/4	64.5	32.2	21.5	16.1	12.9	10.7	9.2	8.1	7.2	6.4
3/4	7/8	47.4	23.7	15.8	11.8	9.5	7.9	6.8	5.9	5.3	4.7
7/8	1	36.3	18.1	12.1	9.1	7.3	6.0	5.2	4.5	4.0	3.6
1	1-1/8	28.6	14.3	9.5	7.2	5.7	4.8	4.1	3.6	3.2	2.9
1-1/4	1-3/8	19.2	9.6	6.4	4.8	3.8	3.2	2.7	2.4	2.1	1.9
1-1/2	1-5/8	13.7	6.9	4.6	3.4	2.7	2.3	2.0	1.7	1.5	1.4

A7P–5 fl. oz. Ordering Information

PART NUMBER	DESCRIPTION	BOX QTY
 A7P-500KIT	Convenient Dispensing Kit Packaged in a Solid Plastic Shell with (1) A500 Plastic Dispenser (1) A7P-5 Cartridge and (1) A24 Nozzle Nozzle diameter fits 3/8″ to 5/8″ holes	8

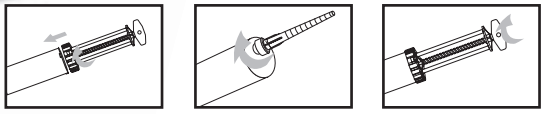
PART NUMBER	DESCRIPTION	BOX QTY
 A7P-501KIT	Convenient Dispensing Kit Packaged in a Solid Plastic Shell with (1) A501 Plastic Dispenser (1) A7P-5 Cartridge and (1) A24 Nozzle Nozzle diameter fits 3/8″ to 5/8″ holes	8

AVAILABLE WITH YOUR CHOICE OF TWO, EASY DISPENSING SYSTEMS

A500 PLASTIC DISPENSER

Attaches directly to cartridge allowing for easy hand dispensing. **No extra tools are required.**

Simple Assembly and Dispensing

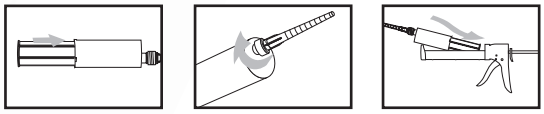


1. Twist-lock dispenser onto cartridge.
2. Thread nozzle onto cartridge.
3. Turn lever in order to dispense adhesive.

A501 CAULKING GUN ADAPTOR

Allows cartridge to work with most standard caulking guns (caulking gun supplied by contractor).

Simple Assembly and Dispensing



1. Push adaptor tightly against back of cartridge.
2. Thread nozzle onto cartridge.
3. Place assembly in caulking gun and dispense adhesive.

EASY PACKAGING!

A500 and A501 kits are perfect for both counter or pegboard hanging display.

A7P-500KIT

A7P-501KIT

ESTIMATING TABLES

A7+ 5 Fluid Ounce Cartridge

Number of Anchoring Installations per Cartridge* Using Reinforcing Bar with A7+ Adhesive in Solid Concrete

REBAR	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES							
		1	2	3	4	5	6	7	8
#3	7/16	101.5	50.7	33.8	25.4	20.3	16.9	14.5	12.7
#4	5/8	49.7	24.9	16.6	12.4	9.9	8.3	7.1	6.2
#5	3/4	34.5	17.3	11.5	8.6	6.9	5.8	4.9	4.3
#6	7/8	25.4	12.7	8.5	6.3	5.1	4.2	3.6	3.2
#7	1	19.4	9.7	6.5	4.9	3.9	3.2	2.8	2.4
#8	1-1/8	15.3	7.7	5.1	3.8	3.1	2.6	2.2	1.9
#9	1-1/4	12.4	6.2	4.1	3.1	2.5	2.1	1.8	1.6

*The estimated number of anchoring installations per cartridge is based upon calculations of filling the hole 60% full of adhesive per the recommendation in our installation instructions. Hole volumes are calculated using ANSI tolerance carbide tipped drill bits. These estimates do not account for any waste.

ESTIMATING TABLES

A7+ 5 Fluid Ounce Cartridge

Number of Anchoring Installations per Cartridge* Using Threaded Rod with A7+ Adhesive in Solid Concrete

ROD (in.)	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES							
		1	2	3	4	5	6	7	8
1/4	5/16	198.9	99.5	66.3	49.7	39.8	33.2	28.4	24.9
3/8	7/16	101.5	50.7	33.8	25.4	20.3	16.9	14.5	12.7
1/2	9/16	61.4	30.7	20.5	15.3	12.3	10.2	8.8	7.7
5/8	3/4	34.5	17.3	11.5	8.6	6.9	5.8	4.9	4.3
3/4	7/8	25.4	12.7	8.5	6.3	5.1	4.2	3.6	3.2
7/8	1	19.4	9.7	6.5	4.9	3.9	3.2	2.8	2.4
1	1-1/8	15.3	7.7	5.1	3.8	3.1	2.6	2.2	1.9

*The estimated number of anchoring installations per cartridge is based upon calculations of filling the hole 60% full of adhesive per the recommendation in our installation instructions. Hole volumes are calculated using ANSI tolerance carbide tipped drill bits. These estimates do not account for any waste.

PERFORMANCE TABLE

A7+ Quick-Cure Adhesive

Average Ultimate Tension and Shear Loads [1,2,3] for Threaded Rod Installed in Solid Concrete

THREADED ROD DIA. In. (mm)	DRILL HOLE DIAMETER In. (mm)	MAX. CLAMPING FORCE AFTER PROPER CURE Ft.-Lbs. (Nm)	EMBEDMENT IN CONCRETE In. (mm)	2000 PSI (13.8 MPa) CONCRETE		4000 PSI (27.6 MPa) CONCRETE	
				ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)
3/8 (9.5)	7/16 (11.1)	13 - 18 (17-24)	1-1/2 (38.1)	N/A	N/A	3,734 (16.6)	4,126 (18.3)
			3-3/8 (85.7)	5,852 (26.0)	5,220 (23.2)	10,977 (48.8)	5,220 (23.2)
			4-1/2 (114.3)	7,729 (34.4)	5,220 (23.2)	11,661 (51.9)	5,220 (23.2)
1/2 (12.7)	9/16 (14.3)	22 - 25 (29-33)	2 (50.8)	N/A	N/A	6,022 (26.8)	8,029 (35.7)
			4-1/2 (114.3)	10,798 (48.0)	8,029 (35.7)	17,162 (76.3)	8,029 (35.7)
			6 (152.4)	14,210 (63.2)	8,029 (35.7)	17,372 (77.3)	8,029 (35.7)
5/8 (15.9)	3/4 (19.1)	55 - 80 (74-108)	2-1/2 (63.5)	N/A	N/A	7,330 (32.6)	11,256 (50.1)
			5-5/8 (142.9)	16,417 (73.0)	15,967 (71.0)	26,504 (117.9)	15,967 (71.0)
			7-1/2 (190.5)	18,747 (83.4)	15,967 (71.0)	29,381 (130.7)	15,967 (71.0)
3/4 (19.1)	7/8 (22.2)	106 - 160 (143-216)	3 (76.2)	N/A	N/A	8,634 (38.4)	20,126 (89.5)
			6-3/4 (171.5)	18,618 (82.8)	20,126 (89.5)	29,727 (132.2)	20,126 (89.5)
			9 (228.6)	23,934 (106.5)	20,126 (89.5)	37,728 (167.8)	20,126 (89.5)
7/8 (22.2)	1 (25.4)	185 - 250 (250-338)	3-1/2 (88.9)	N/A	N/A	13,650 (60.7)	20,920 (92.9)
			7-7/8 (200.0)	N/A	29,866 (132.9)	44,915 (199.8)	29,866 (132.9)
			10-1/2 (266.7)	36,881 (164.1)	29,866 (132.9)	48,321 (215.0)	29,866 (132.9)
1 (25.4)	1-1/8 (28.6)	276 - 330 (374-447)	4 (101.6)	N/A	N/A	16,266 (72.2)	33,152 (147.5)
			9 (228.6)	32,215 (143.3)	37,538 (167.0)	48,209 (214.5)	37,538 (167.0)
			12 (304.8)	46,064 (204.9)	37,538 (167.0)	63,950 (284.5)	37,538 (167.0)
1-1/4 (31.8)	1-3/8 (34.9)	370 - 660 (501-894)	5 (127.0)	N/A	N/A	21,838 (97.1)	33,152 (147.5)
			11-1/4 (285.8)	45,962 (204.5)	58,412 (259.8)	56,715 (252.3)	58,412 (259.8)
			15 (381.0)	62,208 (276.7)	58,412 (259.8)	84,385 (375.4)	58,412 (259.8)

1 Allowable working loads for the single installations under static loading should not exceed 25% capacity or the allowable load of the anchor rod. **Divide by 4.**

2 Ultimate load values in 2000 and 4000 psi stone aggregate concrete. Ultimate loads are indicated for the embedment shown in the Embedment in Concrete column. Performance values are based on the use of high strength threaded rod (ASTM A193 Gr. B7). The use of lower strength rods will result in lower ultimate tension and shear loads.

3 Linear interpolation may be used for intermediate spacing and edge distances.

PERFORMANCE TABLE

A7+ Quick-Cure Adhesive

Allowable Tension Loads[1] for Threaded Rod Installed in Solid Concrete

THREADED ROD DIA. In. (mm)	DRILL HOLE DIAMETER In. (mm)	MIN. EMBEDMENT DEPTH In. (mm)	ALLOWABLE TENSION LOAD BASED ON ADHESIVE BOND STRENGTH		ALLOWABLE TENSION LOAD BASED ON STEEL STRENGTH		
			2000 PSI (13.8 MPa) CONCRETE Lbs. (kN)	4000 PSI (27.6 MPa) CONCRETE Lbs. (kN)	ASTM A307 (SAE 1018) Lbs. (kN)	ASTM A193 GR. B7 (SAE 4140) Lbs. (kN)	ASTM F593 AISI 304 SS Lbs. (kN)
3/8 (9.5)	7/16 (11.1)	1-1/2 (38.1)	N/A	934 (4.2)	2,080 (9.3)	4,340 (19.3)	3,995 (17.8)
		3-3/8 (85.7)	1,460 (6.5)	2,740 (12.2)	2,080 (9.3)	4,340 (19.3)	3,995 (17.8)
		4-1/2 (114.3)	1,930 (8.6)	2,915 (13.0)	2,080 (9.3)	4,340 (19.3)	3,995 (17.8)
1/2 (12.7)	9/16 (14.3)	2 (50.8)	N/A	1,505 (6.7)	3,730 (16.6)	7,780 (34.6)	7,155 (31.8)
		4-1/2 (114.3)	2,700 (12.0)	4,290 (19.1)	3,730 (16.6)	7,780 (34.6)	7,155 (31.8)
		6 (152.4)	3,550 (15.8)	4,340 (19.3)	3,730 (16.6)	7,780 (34.6)	7,155 (31.8)
5/8 (15.9)	3/4 (19.1)	2-1/2 (63.5)	N/A	1,832 (8.2)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
		5-5/8 (142.9)	4,100 (18.3)	6,625 (29.5)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
		7-1/2 (190.5)	4,685 (20.8)	7,345 (32.7)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
3/4 (19.1)	7/8 (22.2)	3 (76.2)	N/A	2,158 (9.6)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
		6-3/4 (171.5)	4,655 (20.7)	7,430 (33.1)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
		9 (228.6)	5,980 (26.6)	9,430 (42.0)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
7/8 (22.2)	1 (25.4)	3-1/2 (88.9)	N/A	3,413 (15.2)	11,600 (51.6)	25,510 (113.5)	20,835 (92.7)
		7-7/8 (200.0)	N/A	11,230 (49.9)	11,600 (51.6)	25,510 (113.5)	20,835 (92.7)
		10-1/2 (266.7)	9,220 (41.0)	12,080 (53.7)	11,600 (51.6)	25,510 (113.5)	20,834 (92.7)
1 (25.4)	1-1/8 (28.6)	4 (101.6)	N/A	4,067 (18.1)	15,180 (67.5)	31,620 (140.7)	26,560 (118.1)
		9 (228.6)	8,050 (35.8)	12,050 (53.6)	15,180 (67.5)	31,620 (140.7)	26,560 (118.1)
		12 (304.8)	11,515 (51.2)	15,985 (71.1)	15,180 (67.5)	31,620 (140.7)	26,560 (118.1)
1-1/4 (31.8)	1-3/8 (34.9)	5 (127.0)	N/A	5,460 (24.3)	23,800 (105.9)	49,580 (220.6)	34,670 (154.2)
		11-1/4 (285.8)	11,490 (51.1)	14,175 (63.1)	23,800 (105.9)	49,580 (220.6)	34,670 (154.2)
		15 (381.0)	15,550 (69.2)	21,095 (93.8)	23,800 (105.9)	49,580 (220.6)	34,670 (154.2)

1 Use lower value of either bond or steel strength for allowable tensile load.

PERFORMANCE TABLE

A7+ Quick-Cure Adhesive

Allowable Shear Loads[1] for Threaded Rod Installed in Solid Concrete

THREADED ROD DIA. In. (mm)	DRILL HOLE DIAMETER In. (mm)	MIN. EMBEDMENT DEPTH In. (mm)	ALLOWABLE SHEAR LOAD BASED ON CONCRETE STRENGTH		ALLOWABLE SHEAR LOAD BASED ON STEEL STRENGTH		
			2000 PSI (13.8 MPa) CONCRETE Lbs. (kN)	4000 PSI (27.6 MPa) CONCRETE Lbs. (kN)	ASTM A307 (SAE 1018) Lbs. (kN)	ASTM A193 GR. B7 (SAE 4140) Lbs. (kN)	ASTM F593 AISI 304 SS Lbs. (kN)
3/8 (9.5)	7/16 (11.1)	1-1/2 (38.1)	N/A	1,031 (4.6)	1,040 (4.6)	2,170 (9.7)	1,995 (8.9)
		3-3/8 (85.7)	1,305 (5.8)	1,305 (5.8)	1,040 (4.6)	2,170 (9.7)	1,995 (8.9)
1/2 (12.7)	9/16 (14.3)	2 (50.8)	N/A	2,005 (8.9)	1,870 (8.3)	3,895 (17.3)	3,585 (15.9)
		4-1/2 (114.3)	2,005 (8.9)	2,005 (8.9)	1,870 (8.3)	3,895 (17.3)	3,585 (15.9)
5/8 (15.9)	3/4 (19.1)	2-1/2 (63.5)	N/A	2,814 (12.5)	2,940 (13.1)	6,125 (27.2)	5,635 (25.1)
		5-5/8 (142.9)	3,990 (17.8)	3,990 (17.8)	2,940 (13.1)	6,125 (27.2)	5,635 (25.1)
3/4 (19.1)	7/8 (22.2)	3 (76.2)	N/A	5,030 (22.4)	4,250 (18.9)	8,855 (39.4)	7,440 (33.1)
		6-3/4 (171.5)	5,030 (22.4)	5,030 (22.4)	4,250 (18.9)	8,855 (39.4)	7,440 (33.1)
7/8 (22.2)	1 (25.4)	3-1/2 (88.9)	N/A	5,230 (23.3)	5,800 (25.8)	12,760 (56.8)	10,730 (47.7)
		7-7/8 (200.0)	7,465 (33.2)	7,465 (33.2)	5,800 (25.8)	12,760 (56.8)	10,730 (47.7)
1 (25.4)	1-1/8 (28.6)	4 (101.6)	N/A	8,288 (36.9)	7,590 (33.8)	15,810 (70.3)	13,285 (59.1)
		9 (228.6)	9,385 (41.7)	9,385 (41.7)	7,590 (33.8)	15,810 (70.3)	13,285 (59.1)
1-1/4 (31.8)	1-3/8 (34.9)	5 (127.0)	N/A	8,288 (36.9)	11,900 (52.9)	24,790 (100.3)	18,840 (83.8)
		11-1/4 (285.8)	14,600 (64.9)	14,600 (64.9)	11,900 (52.9)	24,790 (100.3)	18,840 (83.8)

1 Use lower value of either concrete or steel strength for allowable shear load.

PERFORMANCE TABLE

A7+ Quick-Cure Adhesive

Average Ultimate Tension Loads[1,2,3] for Reinforcing Bar Installed in Solid Concrete

REINFORCING BAR DIA. In. (mm)	EMBEDMENT IN CONCRETE In. (mm)	2000 PSI (13.8 MPa) CONCRETE ULTIMATE TENSION Lbs. (kN)	4000 PSI (27.6 MPa) CONCRETE ULTIMATE TENSION Lbs. (kN)	ULTIMATE TENSILE AND YIELD STRENGTH GRADE 60 REBAR	
				MINIMUM YIELD STRENGTH Lbs. (kN)	MINIMUM ULTIMATE TENSILE STRENGTH Lbs. (kN)
# 3 (9.5)	3-3/8 (85.7)	6,180 (27.5)	8,324 (37.0)	6,600 (29.4)	9,900 (44.0)
	4-1/2 (114.3)	7,560 (33.6)	11,418 (50.8)	6,600 (29.4)	9,900 (44.0)
# 4 (12.7)	4-1/2 (114.3)	9,949 (44.3)	16,657 (74.1)	12,000 (53.4)	18,000 (80.1)
	6 (152.4)	15,038 (66.9)	17,828 (79.3)	12,000 (53.4)	18,000 (80.1)
# 5 (15.9)	5-5/8 (142.9)	14,012 (62.3)	20,896 (93.0)	18,600 (82.7)	27,900 (124.1)
	7-1/2 (190.5)	16,718 (74.4)	26,072 (116.0)	18,600 (82.7)	27,900 (124.1)
# 6 (19.1)	6-3/4 (171.5)	21,247 (94.5)	26,691 (118.7)	26,400 (117.4)	39,600 (176.2)
	9 (228.6)	33,325 (148.2)	37,425 (166.5)	26,400 (117.4)	39,600 (176.2)
# 7 (22.2)	7-7/8 (200.0)	N/A	40,374 (179.6)	36,000 (160.1)	54,000 (240.2)
	10-1/2 (266.7)	38,975 (173.4)	46,050 (204.8)	36,000 (160.1)	54,000 (240.2)
# 8 (25.4)	9 (228.6)	35,600 (158.4)	47,311 (210.5)	47,400 (210.9)	71,100 (316.3)
	12 (304.8)	41,010 (182.4)	66,140 (294.2)	47,400 (210.9)	71,100 (316.3)
# 9 (28.6)	10-1/8 (257.2)	N/A	57,221 (254.5)	60,000 (266.9)	90,000 (400.4)
	13-1/2 (342.9)	N/A	79,966 (355.7)	60,000 (266.9)	90,000 (400.4)
# 10 (31.8)	11-1/4 (285.8)	49,045 (218.2)	73,091 (325.1)	76,200 (339.0)	114,300 (508.5)
	15 (381.0)	69,079 (307.3)	83,295 (370.5)	76,200 (339.0)	114,300 (508.5)
# 11 (34.9)	12-3/8 (314.3)	63,397 (282.0)	75,047 (333.8)	93,600 (416.4)	140,400 (624.6)
	16-1/2 (419.1)	81,707 (363.5)	91,989 (409.2)	93,600 (416.4)	140,400 (624.6)

1 Allowable working loads for the single installations under static loading should not exceed 25% capacity or the allowable load of the anchor rod.

2 Ultimate load values in 2000 and 4000 psi stone aggregate concrete. Ultimate loads are indicated for the embedment shown in the Embedment in Concrete column. Performance values are based on the use of minimum Grade 60 reinforcing bar. The use of lower strength rods will result in lower ultimate tension loads.

3 SHEAR DATA: Provided the distance from the rebar to the edge of the concrete member exceeds 1.25 times the embedment depth of the rebar, calculate the ultimate shear load for the rebar anchorage as 60% of the ultimate tensile strength of the rebar.

PERFORMANCE TABLE

A7+ Quick-Cure Adhesive

Recommended Edge Distance Requirements for Shear Loads Installed in Solid Concrete

ANCHOR DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	CRITICAL EDGE DISTANCE In. (mm) 100% LOAD CAPACITY)	INTERPOLATED EDGE DISTANCE In. (mm) (80% LOAD CAPACITY)	INTERPOLATED EDGE DISTANCE In. (mm) (50% LOAD CAPACITY)	MINIMUM EDGE DISTANCE In. (mm) (10% LOAD CAPACITY)
3/8 (9.5)	3-3/8 (85.7)	4-3/16 (106.4)	3-7/16 (87.3)	2-5/16 (58.7)	13/16 (20.6)
1/2 (12.7)	4-1/2 (114.3)	5-5/8 (142.9)	4-5/8 (117.5)	3-1/8 (79.4)	1-1/8 (28.6)
5/8 (15.9)	5-5/8 (142.9)	7 (177.8)	5-3/4 (146.1)	3-1/8 (79.4)	1-3/8 (34.9)
3/4 (19.1)	6-3/4 (171.5)	8-7/16 (214.2)	6-15/16 (176.2)	4-5/8 (117.5)	1-5/8 (41.3)
1 (25.4)	9 (228.6)	11-1/4 (285.8)	9-1/4 (235.0)	6-1/4 (158.8)	2-1/4 (57.2)
1-1/4 (31.8)	11-1/4 (285.8)	14-1/16 (357.2)	11-5/8 (295.3)	7-7/8 (200.0)	2-7/8 (73.0)

PERFORMANCE TABLE

A7+ Quick-Cure Adhesive

Recommended Edge Distance Requirements for Tension Loads Installed in Solid Concrete

ANCHOR DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	CRITICAL EDGE DISTANCE In. (mm) (100% LOAD CAPACITY)	INTERPOLATED EDGE DISTANCE In. (mm) (90% LOAD CAPACITY)	INTERPOLATED EDGE DISTANCE In. (mm) (80% LOAD CAPACITY)	MINIMUM EDGE DISTANCE In. (mm) (70% LOAD CAPACITY)
3/8 (9.5)	3-3/8 (85.7) 4-1/2 (114.3)	2-1/2 (63.5) 3-3/8 (85.7)	1-15/16 (49.2) 2-5/8 (66.7)	1-3/8 (34.9) 1-7/8 (47.6)	13/16 (26.2) 1-1/8 (28.6)
1/2 (12.7)	4-1/2 (114.3) 6 (152.4)	3-3/8 (85.7) 4-1/2 (114.3)	2-5/8 (66.7) 3-1/2 (88.9)	1-7/8 (47.6) 2-1/2 (63.5)	1-1/8 (28.6) 1-1/2 (38.1)
5/8 (15.9)	5-5/8 (142.9) 7-1/2 (190.5)	4-3/16 (106.4) 5-5/8 (142.9)	3-1/4 (82.6) 4-3/8 (111.1)	2-5/16 (58.7) 3-1/8 (79.4)	1-3/8 (34.9) 1-7/8 (47.6)
3/4 (19.1)	6-3/4 (171.5) 9 (228.6)	5-1/16 (128.6) 6-3/4 (171.5)	3-15/16 (100.0) 5-1/4 (133.4)	2-13/16 (71.4) 3-3/4 (95.3)	1-5/8 (15.9) 2-1/4 (57.2)
1 (25.4)	9 (228.6) 12 (304.8)	6-3/4 (171.5) 9 (228.6)	5-1/4 (133.4) 7 (177.8)	3-3/4 (95.3) 5 (127.0)	2-1/4 (57.2) 3 (76.2)
1-1/4 (31.8)	11-1/4 (285.8) 15 (381.0)	8-7/16 (214.3) 11-1/4 (285.8)	6-9/16 (166.7) 8-3/4 (222.2)	4-3/4 (120.7) 6-1/4 158.8)	2-7/8 (73.0) 3-3/4 (95.3)

REFERENCE TABLE

A7+ Quick-Cure Adhesive

Allowable Stress Design Reference Tables

A7+ Adhesive Edge/Spacing Distance Load Factor Summary for Installation of Threaded Rod and Reinforcing Bar [1, 2]

LOAD FACTOR	DISTANCE FROM EDGE OF CONCRETE
Critical Edge Distance—Tension	
100% Tension Load →	0.75 x Anchor Embedment
Minimum Edge Distance—Tension	
70% Tension Load →	0.25 x Anchor Embedment
Critical Edge Distance—Shear	
100% Shear Load →	1.25 x Anchor Embedment
Minimum Edge Distance—Shear	
10% Shear Load →	0.25 x Anchor Embedment

LOAD FACTOR	DISTANCE FROM ANOTHER ANCHOR
Critical Spacing—Tension	
100% Tension Load →	1.25 x Anchor Embedment
Minimum Spacing—Tension	
80% Tension Load →	0.25 x Anchor Embedment
Critical Spacing—Shear	
100% Shear Load →	1.25 x Anchor Embedment
Minimum Spacing—Shear	
25% Shear Load →	0.25 x Anchor Embedment

1 Use linear interpolation for load factors at edge distances or spacing distances between critical and minimum.

2 Anchors are affected by multiple combination of spacing and/or edge distance loading and direction of the loading. Use the product of tension and shear loading factors in design.

Combined Tension and Shear Loading—for A7+ Adhesive Anchors

Allowable loads for anchors under tension and shear loading at the same time (combined loading) will be lower than the allowable loads for anchors subjected to 100% tension or 100% shear. Use the following equation to evaluate anchors in combined loading conditions:

$$\left(\frac{Na}{Ns}\right)^{5/3} + \left(\frac{Va}{Vs}\right)^{5/3} \leq 1$$

Na = **Applied Service Tension Load**

Ns = **Allowable Tension Load**

Va = **Applied Service Shear Load**

Vs = **Allowable Shear Load**

STRENGTH DESIGN TABLE

A7+
Quick-Cure Adhesive

Rebar- ASTM A615 Grade 60 Steel in Uncracked Concrete - Tension (lbf) and Shear (lbf)

Rebar	Anchor Diameter (in.)	Embedment Depth (in.)	Tension (lbf)					Shear (lbf)
			2500 psi	3000 psi	4000 psi	5000 psi	6000 - 8000 psi	2500 - 8000 psi
#3	3/8	3 3/8	3,663	3,663	3,663	3,663	3,663	3,564
		4 1/2	4,884	4,884	4,884	4,884	4,884	3,564
		7 1/2	6,435	6,435	6,435	6,435	6,435	3,564
#4	1/2	4 1/2	7,446	7,523	7,523	7,523	7,523	6,480
		6	10,030	10,030	10,030	10,030	10,030	6,480
		10	11,700	11,700	11,700	11,700	11,700	6,480
#5	5/8	5 5/8	10,406	11,399	11,542	11,542	11,542	10,044
		7 1/2	15,389	15,389	15,389	15,389	15,389	10,044
		12 1/2	18,135	18,135	18,135	18,135	18,135	10,044
#6	3/4	6 3/4	13,679	14,871	14,871	14,871	14,871	14,256
		9	19,827	19,827	19,827	19,827	19,827	14,256
		15	25,740	25,740	25,740	25,740	25,740	14,256
#7	7/8	7 7/8	17,237	18,883	19,467	19,467	19,467	19,440
		10 1/2	25,955	25,955	25,955	25,955	25,955	19,440
		17 1/2	35,100	35,100	35,100	35,100	35,100	19,440
#8	1	9	21,060	23,070	25,115	25,115	25,115	25,596
		12	32,424	33,486	33,486	33,486	33,486	25,596
		20	46,215	46,215	46,215	46,215	46,215	25,596
#9	1 1/8	10 3/16	25,363	27,638	31,472	31,472	31,472	32,400
		13 1/2	38,845	41,816	41,816	41,816	41,816	32,400
		22 9/16	58,500	58,500	58,500	58,500	58,500	32,400
#10	1 1/4	11 1/2	30,491	33,018	38,477	43,019	46,227	41,148
		15 1/4	46,406	50,835	58,699	61,261	61,261	41,148
		25 7/16	74,295	74,295	74,295	74,295	74,295	41,148

Tabulated values are for estimation puposes only and should not be used for design (please use our TruSpec anchorage design software at www.itwredhead.com)
Tabulated values represent design strengths per ACI 318 for a single anchor in adequate concrete thickness, not near an edge nor adjacent achnorage, not for sustained nor seismic loading
Bond strengths are for dry, cracked concrete with periodic inspection.
Bond strengths are for Temperature Range A (maximum long term temperature 110F, maximum short term temp 130F).

STRENGTH DESIGN TABLE

A7+
Quick-Cure Adhesive

Threaded Rod- ASTM A193 B7 in Uncracked Concrete

Anchor Diameter (in.)	Embedment Depth (in.)	Tension (lbf)					Shear (lbf)
		2500 psi	3000 psi	4000 psi	5000 pso	6000 psi - 8000 psi	2500 psi - 8000 psi
3/8	3 3/8	3,871	3,871	3,871	3,871	3,871	3,777
	4 1/2	5,161	5,161	5,161	5,161	5,161	3,777
	7 1/2	7,268	7,268	7,268	7,268	7,268	3,777
1/2	4 1/2	6,881	6,881	6,881	6,881	6,881	6,916
	6	9,175	9,175	9,175	9,175	9,175	6,916
	10	13,305	13,305	13,305	13,305	13,305	6,916
5/8	5 5/8	10,406	10,406	10,406	10,406	10,406	11,018
	7 1/2	14,336	14,336	14,336	14,336	14,336	11,018
	12 1/2	21,188	21,188	21,188	21,188	21,188	11,018
3/4	6 3/4	13,679	14,984	14,984	14,984	15,483	16,309
	9	20,644	20,644	20,644	20,644	20,644	16,309
	15	31,358	31,358	31,358	31,358	31,358	16,309
7/8	7 7/8	17,237	17,740	17,740	17,740	17,740	22,510
	10 1/2	23,654	23,654	23,654	23,654	23,654	22,510
	17 1/2	39,423	39,423	39,423	39,423	39,423	22,510
1	9	21,060	23,070	23,070	23,070	23,171	29,530
	12	30,894	30,894	30,894	30,894	30,894	29,530
	20	51,491	51,491	51,491	51,491	51,491	29,530
1 1/4	11 1/2	30,419	33,322	38,477	43,019	43,738	47,242
	15 1/4	46,406	50,835	57,962	57,962	57,962	47,242
	25 7/16	90,855	90,855	90,855	90,855	90,855	47,242

Tabulated values are for estimation puposes only and should not be used for design (please use our TruSpec anchorage design software at www.itwredhead.com)
Tabulated values represent design strengths per ACI 318 for a single anchor in adequate concrete thickness, not near an edge nor adjacent achnorage, not for sustained nor seismic loading
Bond strengths are for dry, cracked concrete with periodic inspection.
Bond strengths are for Temperature Range A (maximum long term temperature 110F, maximum short term temp 130F).

STRENGTH DESIGN TABLE

A7+ Quick-Cure Adhesive

Threaded Rod in 2,500 - 8,000 psi Uncracked Concrete - Tension (lbf) and Shear (lbf)

Anchor Diameter (in.)	Embedment Depth (in.)	Carbon Steel A36		Stainless Steel F593		ASTM A193 B7 Threaded Rod	
		Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)
3/8	3 3/8	3,375	1,755	3,871	2,280	3,871	3,777
	4 1/2	3,375	1,755	4,787	2,280	5,161	3,777
	7 1/2	3,375	1,755	4,787	2,280	7,268	3,777
1/2	4 1/2	6,173	3,211	6,881	4,044	6,881	6,916
	6	6,173	3,211	8,762	4,044	9,175	6,916
	10	6,173	3,211	8,762	4,044	13,305	6,916
5/8	5 5/8	9,833	5,116	10,752	6,441	10,752	11,018
	7 1/2	9,833	5,116	13,956	6,441	14,336	11,018
	12 1/2	9,833	5,116	13,956	6,441	21,188	11,018
3/4	6 3/4	14,550	7,566	15,483	7,614	15,483	16,309
	9	14,550	7,566	16,500	7,614	20,644	16,309
	15	14,550	7,566	16,500	7,614	31,358	16,309
7/8	7 7/8	17,740	10,446	17,740	10,533	17,740	22,510
	10 1/2	20,085	10,446	22,822	10,533	23,654	22,510
	17 1/2	20,085	10,446	22,822	10,533	39,423	22,510
1	9	23,171	13,702	23,171	13,818	23,171	29,530
	12	26,348	13,702	29,936	13,818	30,894	29,530
	20	26,348	13,702	29,936	13,818	51,491	29,530
1 1/4	11 1/2	38,477	21,925	38,477	22,092	38.477	47,242
	15 1/4	42,158	21,925	47,869	22,092	57,049	47,242
	25 7/16	42,158	21,925	47,869	22,092	90,855	47,242

Tabulated values are for estimation puposes only and should not be used for design (please use our TruSpec anchorage design software at www.itwredhead.com)
Tabulated values represent design strengths per ACI 318 for a single anchor in adequate concrete thickness, not near an edge nor adjacent achnorage, not for sustained nor seismic loading
Bond strengths are for dry, cracked concrete with periodic inspection.
Bond strengths are for Temperature Range A (maximum long term temperature 110F, maximum short term temp 130F).

STRENGTH DESIGN TABLE

A7+
Quick-Cure Adhesive

Rebar- ASTM A615 Grade 60 Steel in Cracked Concrete - Tension (lbf) and Shear (lbf)

Rebar	Anchor Diameter (in.)	Embedment Depth (in.)	Tension (lbf) 2500 - 8000 psi concrete	Shear (lbf) 2500 - 8000 psi concrete
#3	3/8	3 3/8	1,651	2,311
		4 1/2	2,201	3,082
		7 1/2	3,669	3,564
#4	1/2	4 1/2	2,935	4,109
		6	3,914	5,479
		10	6,523	6,480
#5	5/8	5 5/8	4,586	6,421
		7 1/2	6,115	8,561
		12 1/2	10,192	10,044
#6	3/4	6 3/4	5,117	7,164
		9	6,823	9,552
		15	11,372	14,256
#7	7/8	7 7/8	6,965	9,751
		10 1/2	9,287	13,002
		17 1/2	15,478	19,440
#8	1	9	9,097	12,736
		12	12,130	16,982
		20	20,216	25,596
#9	1 1/8	10 3/16	11,616	16,262
		13 1/2	15,434	21,607
		22 9/16	25,726	32,400
#10	1 1/4	11 1/2	17,447	24,426
		15 1/4	23,121	32,369
		25 7/16	38,592	41,148

Tabulated values are for estimation puposes only and should not be used for design (please use our TruSpec anchorage design software at www.itwredhead.com)
Tabulated values represent design strengths per ACI 318 for a single anchor in adequate concrete thickness, not near an edge nor adjacent achnorage, not for sustained nor seismic loading
Bond strengths are for dry, cracked concrete with periodic inspection.
Bond strengths are for Temperature Range A (maximum long term temperature 110F, maximum short term temp 130F).

STRENGTH DESIGN TABLE

A7+
Quick-Cure Adhesive

Threaded Rod in 2,500 - 8,000 psi Cracked Concrete - Tension (lbf) and Shear (lbf)

Anchor Diameter (in.)	Embedment Depth (in.)	Tension (lbf)	Shear (lbf)		
			Carbon Steel A36	Stainless Steel F593	ASTM A193 B7 Threaded Rod
3/8	3 3/8	2,318	1,755	2,280	3,245
	4 1/2	3,091	1,755	2,280	3,777
	7 1/2	5,151	1,755	2,280	3,777
1/2	4 1/2	3,071	3,211	4,044	4,300
	6	4,095	3,211	4,044	5,733
	10	6,825	3,211	4,044	6,916
5/8	5 5/8	5,224	5,116	6,441	7,314
	7 1/2	6,965	5,116	6,441	9,752
	12 1/2	11,609	5,116	6,441	11,018
3/4	6 3/4	7,785	7,566	7,614	10,899
	9	10,380	7,566	7,614	14,532
	15	17,300	7,566	7,614	16,309
7/8	7 7/8	8,275	10,446	10,533	11,585
	10 1/2	11,033	10,446	10,533	15,446
	17 1/2	18,388	10,446	10,533	22,510
1	9	10,186	13,702	13,818	14,260
	12	13,581	13,702	13,818	19,014
	20	22,635	13,702	13,818	29,530
1 1/4	11 1/2	17,172	21,925	22,092	24,041
	15 1/4	22,757	21,925	22,092	31,860
	25 7/16	37,984	21,925	22,092	47,242

Tabulated values are for estimation puposes only and should not be used for design (please use our TruSpec anchorage design software at www.itwredhead.com)
Tabulated values represent design strengths per ACI 318 for a single anchor in adequate concrete thickness, not near an edge nor adjacent achnorage, not for sustained nor seismic loading
Bond strengths are for dry, cracked concrete with periodic inspection.
Bond strengths are for Temperature Range A (maximum long term temperature 110F, maximum short term temp 130F).

MASONRY DESIGN TABLE

A7+ Quick-Cure Adhesive

Grout-filled Concrete Block: Allowable Tension and Shear Loads based on Steel Design Information for U.S. Customary Unit Threaded Rod [1, 2, 3]

Anchor Diameter (in.)	Tension (lb)			Shear (lb)		
	ASTM A307 F_u = 60 ksi	ASTM A193 Grade B7 F_u = 125 ksi	ASTM F593 SS 304 F_u = 100 ksi	ASTM A307 F_u = 60 ksi	ASTM A193 Grade B7 F_u = 125 ksi	ASTM F593 SS 304 F_u = 100 ksi
3/8	2,185	4,555	3,645	1,125	2,345	1,875
1/2	3,885	8,100	6,480	2,000	4,170	3,335
5/8	6,075	12,655	10,125	3,130	6,520	5,215
3/4	8,750	18,225	12,390	4,505	9,390	6,385

For SI: 1 inch = 25.4mm, 1 lbf = 4.45N, 1ft-lbf = 1.356 N-M, 1 psi = 0.006895 MPa

[1]Allowable load used in the design must be the lesser of bond values and tabulated steel element values.

[2]Allowable tension and shear loads for threaded rods to resist short term loads, such as wind or seismic, must be calculated in accordance with Section 4.1 as applicable.

[3]Allowable steel loads are based on allowable tension and shear stresses equal to 0.33X Fu and 0.17xFu, respectively.

MASONRY DESIGN TABLE

A7+ Quick-Cure Adhesive

Grout-filled Concrete Block: Allowable Tension Loads for Threaded Rod [1, 2, 3, 4, 7, 9, 10, 11, 12]

Anchor Diameter (in.)	Minimum Embedment (inches)	Load at s_{cr} and c_{cr} (lb)	Spacing[5]			Edge Distance[6]		
			Critical s_{cr} (inches)	Minimum s_{min} (inches)	Load reduction factor for s_{min} [8]	Critical c_{cr} (inches)	Minimum c_{min} (inches)	Load reduction factor for c_{min} [8]
3/8	3 3/8	1,125	13.5	4	1.00	12	4	1.00
1/2	4 1/2	1,695	18	4	0.60	20	4	0.90
5/8	5 5/8	2,015	22.5	4	0.60	20	4	0.90
3/4	6 3/4	3,145	27	4	0.60	20	4	0.63

MASONRY DESIGN TABLE

A7+ Quick-Cure Adhesive

Grout-filled Concrete Block: Allowable Shear Loads for Threaded Rod [1, 2, 3, 4, 7, 9, 10, 11, 12]

Anchor Diameter (in.)	Minimum Embedment (inches)	Load at s_{cr} and c_{cr} (lb)	Spacing[5]			Edge Distance[6]		
			Critical s_{cr} (inches)	Minimum s_{min} (inches)	Load reduction factor for s_{min} [8]	Critical c_{cr} (inches)	Minimum c_{min} (inches)	Load reduction factor for c_{min} [8]
3/8	3 3/8	750	13.5	4	0.50	12	4	0.95
1/2	4 1/2	1,520	18	4	0.50	20	4	0.44
5/8	5 5/8	2,285	22.5	4	0.50	12	4	0.26
3/4	6 3/4	2,345	27	4	0.50	20	4	0.26

For SI: 1 inch = 25.4mm, 1 lbf = 0.0044 kN, 1 ksi = 6.894 MPa. (Refer to Table 4 for footnotes)

[1]All values are for anchors installed in fully grouted concrete masonry with minimum masonry strength of 1500 psi (10.3 MPa). Concrete masonry units must be light-, medium, or normal-weight conforming to ASTM C 90. Allowable loads have been calculated using a safety factor of 5.0.

[3]Anchors may be installed in any location in the face of the masonry wall (cell, web, bed joint) as shown in Figure 2.

[4]A maximum of two anchors may be installed in a single masonry cell in accordance with the spacing and edge or end distance requirements. Embedment is measured from the outside surface of the concrete masonry unit to the embedded end of the anchor. See Figure 2 of this report.

[5]The critical spacing distance, scr, is the anchor spacing where full load values in the table may be used. The minimum spacing distance, smin, is the minimum anchor spacing for which values are available and installation is permitted. Spacing distance is measured from the centerline to centerline between two anchors.

[6]The critical edge or end distance, ccr, is the distance where full load values in the table may be used. The minimum edge or end distance, cmin, is the minimum distance for which values are available and installation is permitted. Edge or end distance is measured from anchor centerline to the closest unrestrained edge.

[7]The tabulated values are applicable for anchors in the ends of grout-filled concrete masonry units where minimum edge distances are maintained.

[8]Load values for anchors installed less than scr and ccr must be multiplied by the appropriate load reduction factor based on actual spacing (s) or edge distance (c). Load factors are multiplicative; both spacing and edge reduction factors must be considered.

[9]Linear interpolation of load values between minimum spacing (smin) and critical spacing (scr) and between minimum edge or end distance (cmin) and critical edge or end distance (ccr) is permitted.

[10]Concrete masonry width (wall thickness) must be equal to or greater than 1.5 times the anchor embedment depth (e.g. 3/8-inch- and 1/2-inch-diameter anchors are permitted in minimum nominally 6-inch-thick concrete masonry). The 5/8- and 3/4-inch-diameter anchors must be installed in minimum nominally 8-inch-thick concrete masonry.

[11]Allowable loads must be the lesser of the adjusted masonry or bond values tabulated above and the steel strength values given in Table 2.

[12]Tabulated allowable bond loads must be adjusted for increased in-service base material temperatures in accordance with Figure 1, as applicable.

MASONRY DESIGN TABLE

A7+ Quick-Cure Adhesive

Grout-filled Concrete Block: Allowable Tension and Shear Loads for Rebar [1, 2, 3]

Rebar Size	Tension (lb)	Shear (lb)
	ASTM A615, Grade 60	ASTM A615, Grade 60
No. 3	3,270	1,685
No. 4	5,940	3,060
No. 5	9,205	4,745
No. 6	13,070	6,730

For SI: 1 inch = 25.4mm, 1 lbf = 4.45N, 1ft-lbf = 1.356 N-M, 1 psi = 0.006895 MPa

1Allowable load used in the design must be the lesser of bond values and tabulated steel element values.

2Allowable tension and shear loads for threaded rods to resist short term loads, such as wind or seismic, must be calculated in accordance with Section 4.1 as applicable.

3Allowable steel loads are based on allowable tension and shear stresses equal to 0.33X Fu and 0.17xFu, respectively.

MASONRY DESIGN TABLE

A7+ Quick-Cure Adhesive

Grout-filled Concrete Block: Allowable Tension Loads for Rebar [1, 2, 3, 4, 7, 9, 10, 11, 12]

Anchor Diameter (in.)	Minimum Embedment (inches)	Load at s_{cr} and c_{cr} (lb)	Spacing[5]			Edge Distance[6]		
			Critical s_{cr} (inches)	Minimum s_{min} (inches)	Load reduction factor for s_{min} [8]	Critical c_{cr} (inches)	Minimum c_{min} (inches)	Load reduction factor for c_{min} [8]
3/8	3 3/8	1,530	13.5	4	1.00	12	4	1.00
1/2	4 1/2	1,845	18	4	0.60	20	4	0.90
5/8	5 5/8	2,465	22.5	4	0.60	20	4	0.90
3/4	6 3/4	2,380	27	4	0.60	20	4	0.63

MASONRY DESIGN TABLE

A7+ Quick-Cure Adhesive

Grout-filled Concrete Block: Allowable Shear Loads for Rebar [1, 2, 3, 4, 7, 9, 10, 11, 12]

Anchor Diameter (in.)	Minimum Embedment (inches)	Load at s_{cr} and c_{cr} ⊥ to edge (lb)	Spacing[5]			Edge Distance[6]		
			Critical s_{cr} (inches)	Minimum s_{min} (inches)	Load reduction factor for s_{min} [8]	Critical c_{cr} (inches)	Minimum c_{min} (inches)	Load reduction factor for c_{min} [8]
3/8	3 3/8	1,410	13.5	4	0.50	12	4	0.95
1/2	4 1/2	1,680	18	4	0.50	20	4	0.44
5/8	5 5/8	3,245	22.5	4	0.50	12	4	0.26
3/4	6 3/4	4,000	27	4	0.50	20	4	0.26

For SI: 1 inch = 25.4 mm; 1 lbf = 0.0044 kN, 1 ksi = 6.894 MPa.

(The following footnotes apply to both Tables 6 and 7)

1All values are for anchors installed in fully grouted concrete masonry with minimum masonry strength of 1500 psi (10.3 MPa). Concrete masonry units must be light-, medium, or normal-weight conforming to ASTM C 90. Allowable loads have been calculated using a safety factor of 5.0.

3Anchors may be installed in any location in the face of the masonry wall (cell, web, bed joint) as shown in figure 2.

4A maximum of two anchors may be installed in a single masonry cell in accordance with the spacing and edge or end distance requirements. Embedment is measured from the outside surface of the concrete masonry unit to the embedded end of the anchor. See Figure 2 of this report.

5The critical spacing distance, scr, is the anchor spacing where full load values in the table may be used. The minimum spacing distance, smin, is the minimum anchor spacing for which values are available and installation is permitted. Spacing distance is measured from the centerline to centerline between two anchors.

6The critical edge or end distance, ccr, is the distance where full load values in the table may be used. The minimum edge or end distance, cmin, is the minimum distance for which values are available and installation is permitted. Edge or end distance is measured from anchor centerline to the closest unrestrained edge.

7The tabulated values are applicable for anchors in the ends of grout-filled concrete masonry units where minimum edge distances are maintained.

8Load values for anchors installed less than scr and ccr must be multiplied by the appropriate load reduction factor based on actual spacing (s) or edge distance (c). Load factors are multiplicative; both spacing and edge reduction factors must be considered.

9Linear interpolation of load values between minimum spacing (smin) and critical spacing (scr) and between minimum edge or end distance (cmin) and critical edge or end distance (ccr) is permitted.

10Concrete masonry width (wall thickness) must be equal to or greater than 1.5 times the anchor embedment depth (e.g. No. 3 and No. 4 reinforcing bars are permitted in minimum nominally 6-inch-thick concrete masonry). No. 5 and No. 6 reinforcing bars must be installed in minimum nominally 8-inch-thick concrete masonry.

11Allowable loads must be the lesser of the adjusted masonry or bond values tabulated above and the steel strength values given in Table 4.

12Tabulated allowable bond loads must be adjusted for increased in-service base material temperatures in accordance with Figure 1, as applicable.

RED HEAD®
ADHESIVE ANCHORING SPECIALISTS

C6+

High Strength Epoxy for All Conditions

C6P-20

DESCRIPTION/SUGGESTED SPECIFICATIONS*

*Suggested Specifications see page 44

One product for most environmental conditions and weather conditions

Design and use with confidence with Epcon C6+ featuring 35% greater bond strength than the closest competition in 70° cracked concrete, and better performance in dry, saturated and water filled conditions.

ADVANTAGES

- Higher average bond strength than competition in cracked concrete
- Excellent performance in diamond cored and oversized holes.
- Better performance in dry, saturated, and water-filled conditions.
- Safe & durable to use at job sites (cartridges vs. sausage packs)
- Simplifies specification process by providing a comprehensive list of 3rd-party approvals
- 24-month shelf life.
- One formula for both **solid** and **hollow** base materials.

Easy to open, snap-off tip, no cutting required

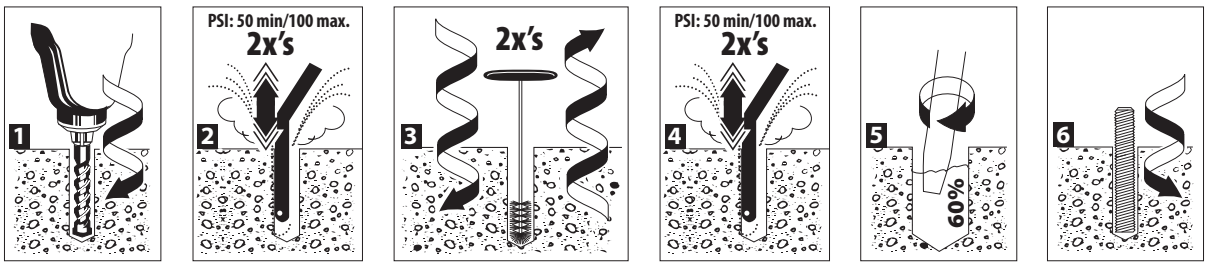
Curing Times

BASE MATERIAL (F°/C°)	GEL TIME[2]	FULL CURE TIME
104°/ 40°	3 minutes	3 hours
95°/ 35°	4 minutes	4 hours
86°/ 30°	6 minutes	5 hours
77°/ 25°	8 minutes	6 hours
72°/ 22°	11 minutes	7 hours
59°/ 15°	15 minutes	8 hours
50°/ 10°	20 minutes	12 hours
40°/ 4.4°	20 minutes	24 hours

[1] For concrete temperatures between 40-50°F adhesive must be maintained at a minimum of 50°F during installation.

[2] Gel time is max time from the end of mixing to when the insertion of the threaded rod or rebar into the adhesive shall be completed.

INSTALLATION STEPS



**Damp, submerged, and underwater applications require 4x's aire, 4x's brushing, and 4x's air*

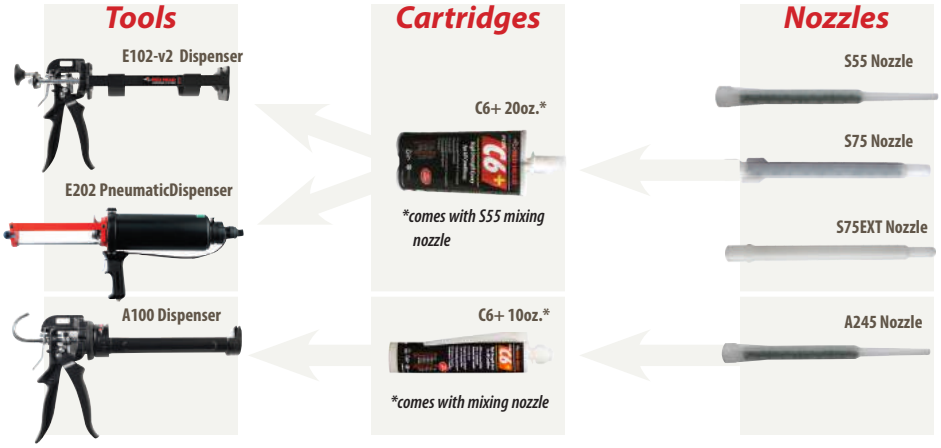
APPROVALS/LISTINGS

- ICC-ES ESR Report No. 3577, approved for Cracked, Uncracked, and all Seismic Zones (A~F)
- Florida Building Code
- IBC 2003/2006/2009/2012/2015
- IRC 2003/2006/2009/2012/2015
- NSF/ANSI 61

For the most current approvals/listings visit: www.itw-redhead.com

**nozzle included in purchase*

Selection Guide



Product Category	Part No.	Description	Carton Qty
Epcon C6+ Epoxy			
Epcon C6+ 20 fl. Oz cartridge	C6P-20	Epcon C6+ 20 fl. oz cartridge	6
Epcon C6+ 10 fl. Oz cartridge	C6P-10	Epcon C6+ 10 fl. oz cartridge, installs with 10oz. dispensing tool	6
Mixing Nozzles			
Mixing Nozzle	A24S	Mixing Nozzle for C6P-10	24
Mixing Nozzle	S55	Mixing Nozzle for C6P-20	24
High Flow Mixing Nozzle	S75	High Flow Nozzle for C6P-20 (for 5/8" diameter hole or larger)	24
Mixing Nozzle Extension	S75EXT	Nozzle Extension For S75 High Flow Nozzle	24
Dispensing Guns			
Dispensing Gun - 10 oz.	A100	Manual Dispenser for C6P-10	1
Dispensing Gun - 20 oz.	E102-V2	Manual Dispenser for C6P-20	1
Pneumatic Dispensing Gun - 20 oz.	E202	Pneumatic Dispenser for C6P-20	1
Piston Plug			
Piston plugs for deep embedment installations greater than 10"	PL-5834	Piston Plug for 5/8" and ¾" diameter anchors	10
	PL-7810	Piston Plug for 7/8" and 1" diameter anchors	10
	PL-1250	Piston Plug for 1-1/4" diameter anchors	10
Extension Tubing			
6-Foot Straight Tubing	E916-6	6-Foot Straight Tubing for use with piston plugs	1

Wire Brushes	Part No.	Anchor Dia.	Rebar	Drill Bit Dia.	Brush Dia.	Overall Length	Qty
3/8" Diameter Brush	WB-038	3/8"	No.3	7/16"	5/8"	4-7/8"	10
1/2" Diameter Brush	WB-012	1/2"	No. 4	9/16"	3/4"	4-7/8"	10
5/8" Diameter Brush	WB-058	5/8"	No.5	3/4"	1"	4-7/8"	10
3/4" Diameter Brush	WB-034	3/4"	No.6	7/8"	1-1/4"	4-7/8"	10
7/8" Diameter Brush	WB-078	7/8"	No. 7	1"	1-1/2"	5-1/8"	10
1" Diameter Brush	WB-010	1"	No.7	1-1/8"	1-5/8"	5-1/4"	10
1-1/4" Diameter Brush	WB-125	1-1/4"	No. 10	1-3/8"	1-3/4"	5-1/4"	10
Brush Extension	ESDS-38	Wire brush 12" usable extension with SDS+ adaptor					1
Brush Extension	EHAN-38	Wire brush 12" usable extension with T-Handle					1

Hole Plugs	Part No.	Hole Diameter	Qty
3/8" Diameter Hole Plug	E038	7/16"	25
1/2" Diameter Hole Plug	E012	9/16"	25
5/8" Diameter Hole Plug	E058	3/4"	20
3/4" Diameter Hole Plug	E034	7/8"	20
7/8" Diameter Hole Plug	E078	1"	10
1" Diameter Hole Plug	E010	1-1/8"	10

SB038 - 3/8" Diameter Brush

PL-7810 - Piston plug for 7/8" and 1" diameter anchors

C6P-20
20 Fluid Ounce Cartridge
Number of Anchoring Installations Per Cartridge*
Using Reinforcing Bar with C6+ Adhesive in Solid Concrete

REBAR	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
#3	7/16	558.2	279.1	186.1	139.5	111.6	93.0	79.7	69.8	62.0	55.8	50.7	46.5	42.9	39.9	37.2
#4	5/8	273.5	136.7	91.2	68.4	54.7	45.6	39.1	34.2	30.4	27.3	24.9	22.8	21.0	19.5	18.2
#5	3/4	189.9	95.0	63.3	47.5	38.0	31.7	27.1	23.7	21.1	19.0	17.3	15.8	14.6	13.6	12.7
#6	7/8	139.5	69.8	46.5	34.9	27.9	23.3	19.9	17.4	15.5	14.0	12.7	11.6	10.7	10.0	9.3
#7	1	106.8	53.4	35.6	26.7	21.4	17.8	15.3	13.4	11.9	10.7	9.7	8.9	8.2	7.6	7.1
#8	1-1/8	84.4	42.2	28.1	21.1	16.9	14.1	12.1	10.6	9.4	8.4	7.7	7.0	6.5	6.0	5.6
#9	1-1/4	68.4	34.2	22.8	17.1	13.7	11.4	9.8	8.5	7.6	6.8	6.2	5.7	5.3	4.9	4.6
#10	1-1/2	47.5	23.7	15.8	11.9	9.5	7.9	6.8	5.9	5.3	4.7	4.3	4.0	3.7	3.4	3.2
#11	1-3/4	34.9	17.4	11.6	8.7	7.0	5.8	5.0	4.4	3.9	3.5	3.2	2.9	2.7	2.5	2.3

*The estimated number of anchoring installations per cartridge is based upon calculations of filling the hole 60% full of adhesive per the recommendation in our installation instructions. Hole volumes are calculated using ANSI tolerance carbide tipped drill bits. These estimates do not account for any waste.

C6P-20
20 Fluid Ounce Cartridge
Number of Anchoring Installations Per Cartridge*
Using Threaded Rod with C6+ Adhesive in Solid Concrete

ROD (In.)	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1/4	5/16	795.7	397.8	265.2	198.9	159.1	132.6	113.7	99.5	88.4	79.6	72.3	66.3	61.2	56.8	53.0
3/8	7/16	406.0	203.0	135.3	101.5	81.2	67.7	58.0	50.7	45.1	40.6	36.9	33.8	31.2	29.0	27.1
1/2	9/16	245.6	122.8	81.9	61.4	49.1	40.9	35.1	30.7	27.3	24.6	22.3	20.5	18.9	17.5	16.4
5/8	3/4	138.1	69.1	46.0	34.5	27.6	23.0	19.7	17.3	15.3	13.8	12.6	11.5	10.6	9.9	9.2
3/4	7/8	101.5	50.7	33.8	25.4	20.3	16.9	14.5	12.7	11.3	10.1	9.2	8.5	7.8	7.2	6.8
7/8	1	77.7	38.9	25.9	19.4	15.5	13.0	11.1	9.7	8.6	7.8	7.1	6.5	6.0	5.6	5.2
1	1-1/8	61.4	30.7	20.5	15.3	12.3	10.2	8.8	7.7	6.8	6.1	5.6	5.1	4.7	4.4	4.1
1-1/4	1-3/8	41.1	20.5	13.7	10.3	8.2	6.8	5.9	5.1	4.6	4.1	3.7	3.4	3.2	2.9	2.7
1-1/2	1-5/8	29.4	14.7	9.8	7.4	5.9	4.9	4.2	3.7	3.3	2.9	2.7	2.5	2.3	2.1	2.0

*The estimated number of anchoring installations per cartridge is based upon calculations of filling the hole 60% full of adhesive per the recommendation in our installation instructions. Hole volumes are calculated using ANSI tolerance carbide tipped drill bits. These estimates do not account for any waste.

C6P-10
8.5 Fluid Ounce Cartridge
Number of Anchoring Installations Per Cartridge*
Using Reinforcing Bar with C6+ Adhesive in Solid Concrete

REBAR	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES									
		1	2	3	4	5	6	7	8	9	10
#3	7/16	169.1	84.6	56.4	42.3	33.8	28.2	24.2	21.1	18.8	16.9
#4	5/8	82.9	41.4	27.6	20.7	16.6	13.8	11.8	10.4	9.2	8.3
#5	3/4	57.6	28.8	19.2	14.4	11.5	9.6	8.2	7.2	6.4	5.8
#6	7/8	42.3	21.1	14.1	10.6	8.5	7.0	6.0	5.3	4.7	4.2
#7	1	32.4	16.2	10.8	8.1	6.5	5.4	4.6	4.0	3.6	3.2
#8	1-1/8	25.6	12.8	8.5	6.4	5.1	4.3	3.7	3.2	2.8	2.6
#9	1-1/4	20.7	10.4	6.9	5.2	4.1	3.5	3.0	2.6	2.3	2.1
#10	1-1/2	14.4	7.2	4.8	3.6	2.9	2.4	2.1	1.8	1.6	1.4
#11	1-3/4	10.6	5.3	3.5	2.6	2.1	1.8	1.5	1.3	1.2	1.1

*The estimated number of anchoring installations per cartridge is based upon calculations of filling the hole 60% full of adhesive per the recommendation in our installation instructions. Hole volumes are calculated using ANSI tolerance carbide tipped drill bits. These estimates do not account for any waste.

C6P-10
8.5 Fluid Ounce Cartridge

Number of Anchoring Installations Per Cartridge* Using Threaded Rod with C6+ Adhesive in Solid Concrete

ROD (In.)	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES									
		1	2	3	4	5	6	7	8	9	10
1/4	5/16	331.5	165.8	110.5	82.9	66.3	55.3	47.4	41.4	36.8	33.2
3/8	7/16	169.1	84.6	56.4	42.3	33.8	28.2	24.2	21.1	18.8	16.9
1/2	9/16	102.3	51.2	34.1	25.6	20.5	17.1	14.6	12.8	11.4	10.2
5/8	3/4	57.6	28.8	19.2	14.4	11.5	9.6	8.2	7.2	6.4	5.8
3/4	7/8	42.3	21.1	14.1	10.6	8.5	7.0	6.0	5.3	4.7	4.2
7/8	1	32.4	16.2	10.8	8.1	6.5	5.4	4.6	4.0	3.6	3.2
1	1-1/8	25.6	12.8	8.5	6.4	5.1	4.3	3.7	3.2	2.8	2.6
1-1/4	1-3/8	17.1	8.6	5.7	4.3	3.4	2.9	2.4	2.1	1.9	1.7
1-1/2	1-5/8	12.3	6.1	4.1	3.1	2.5	2.0	1.8	1.5	1.4	1.2

*The estimated number of anchoring installations per cartridge is based upon calculations of filling the hole 60% full of adhesive per the recommendation in our installation instructions. Hole volumes are calculated using ANSI tolerance carbide tipped drill bits. These estimates do not account for any waste.

PACKAGING

1. Disposable, self-contained cartridge system capable of dispensing both epoxy components in the proper mixing ratio
2. Epoxy components dispensed through a static mixing nozzle that thoroughly mixes the material, and places the epoxy at the base of the pre-drilled hole
3. Cartridge markings: Include manufacturer's name, batch number and best-used-by date, mix ratio by volume, ANSI hazard classification, and appropriate ANSI handling precautions

SUGGESTED SPECIFICATIONS

EPOXY ADHESIVE

High Strength EPOXY ADHESIVE:

1. Two component resin and hardener, non-sag paste, insensitive to moisture, grey in color, suitable for extreme temperature ranges, for all conditions or substrate materials.
2. Meets NSF Standard 61, certified for use in conjunction with drinking water systems.
3. Works in wet, damp, and submerged hole.
4. Extended Shelf life: Best if used within 2 years.
5. Oversized and/or diamond cored holes permitted.
6. Recommended storage: 40°F - 80°F

PERFORMANCE TABLE

Bond Strength Design Information For Fractional Threaded Rod [1,7]

Design Information		Symbol	Units	Nominal Threaded Rod Diameter						
				3/8"	1/2"	5/8"	3.4"	7/8"	1"	1-1/4"
Minimum Effective Installation Depth		$h_{ef,min}$	in	1-5/8"	2"	2-1/2"	3-1/2"	4	4	5
			mm	60	70	79	89	102	102	127
Maximum Effective Installation Depth		$h_{ef,max}$	in	7-1/2	10	12-1/2	15	17-1/2	20	25
			mm	191	254	318	381	445	508	635
Temperature Range A,[2,5]	Characteristic Bond Strength in Uncracked Concrete	$\tau_{k,uncr}$	psi	1,350						
			N/mm²	9.3						
	Characteristic Bond Strength in Cracked Concrete	$\tau_{k,cr}$	psi	1,150	1,090	1,025	965	900	840	715
			N/mm²	7.9	7.5	7.1	5.1	4.7	4.4	3.8
Temperature Range B,[3,5]	Characteristic Bond Strength in Uncracked Concrete	$\tau_{k,uncr}$	psi	1,030						
			N/mm²	7.1						
	Characteristic Bond Strength in Cracked Concrete	$\tau_{k,cr}$	psi	875	830	780	735	685	640	545
			N/mm²	6.1	5.7	5.4	5.1	4.7	4.4	3.8
Temperature Range C,[4,5]	Characteristic Bond Strength in Uncracked Concrete	$\tau_{k,uncr}$	psi	725						
			N/mm²	5.0						
	Characteristic Bond Strength in Cracked Concrete	$\tau_{k,cr}$	psi	620	620	620	620	620	620	620
			N/mm²	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Permissible Installation Conditions[6]	Dry Concrete	ϕ_d	Periodic Inspection	0.65						
	Water-saturated Concrete	ϕ_{ws}		0.55			0.65			
	Water-filled Hole	ϕ_{wf}		0.65						
	Submerged Concrete	ϕ_{sub}		0.65						0.55
	Dry Concrete	ϕ_d	Continuous Inspection	0.65						
	Water-saturated Concrete	ϕ_{ws}		0.65						
	Water-filled Hole	ϕ_{wf}		0.65						
	Submerged Concrete	ϕ_{sub}		0.65						

For SI: 1 inch= 25.4 mm, 1 in.² = 645.16 mm², 1 lb = 0.004448 kN

[1] Bond strength values correspond to concrete compressive strength $f'c = 2,500$ psi. Bond strength values must not be increased for increased concrete compressive strength.

[2] Temperature Range A= Maximum Long Term Temperature: 110°F (43°C); Maximum Short Term Temperature: 130°F (55°C)

[3] Temperature Range B= Maximum Long Term Temperature: 110°F (43°C); Maximum Short Term Temperature: 162°F (72°C)

[4] Temperature Range C = Maximum Long Term Temperature: 110°F (43°C); Maximum Short Term Temperature: 176°F (80°C)5Short-term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long-term concrete temperatures are roughly constant over significant periods of time.

[6] The tabulated value of¢ applies when the load combinations of Section 1605.2 of the IBC, or ACI 318 Section 9.2 are used in accordance with ACI 318 D.4.3. If the load combinations of ACI 318 Appendix Care used, the appropriate value of ϕ must be determined in accordance with ACI318 D.4.4.

[7] For sustained loads, bond strengths must be multiplied by 0.73.

[8] See ICC-ES ESR 3577 for further design information in accordance with ACI 318

PERFORMANCE TABLE

Bond Strength Design Information For Fractional Reinforcing Bar [1,7]

Design Information		Symbol	Units	Nominal Threaded Bar Diameter						
				No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 10
Minimum Effective Installation Depth		$h_{ef,min}$	in	1-5/8"	2"	2-1/2"	3-1/2"	4	4	5
			mm	60	70	79	89	102	102	127
Maximum Effective Installation Depth		$h_{ef,max}$	in	7-1/2	10	12-1/2	15	17-1/2	20	25
			mm	191	254	318	381	445	508	635
Temperature Range A, [2,5]	Characteristic Bond Strength in Uncracked Concrete	$\tau_{k,uncr}$	psi	1,350						
			N/mm²	9.3						
	Characteristic Bond Strength in Cracked Concrete	$\tau_{k,cr}$	psi	1,150	1,090	1,025	965	900	840	715
			N/mm²	7.9	7.5	7.1	5.1	4.7	4.4	3.8
Temperature Range B, [3,5]	Characteristic Bond Strength in Uncracked Concrete	$\tau_{k,uncr}$	psi	1,030						
			N/mm²	7.1						
	Characteristic Bond Strength in Cracked Concrete	$\tau_{k,cr}$	psi	875	830	780	735	685	640	545
			N/mm²	6.1	5.7	5.4	5.1	4.7	4.4	3.8
Temperature Range C, [4,5]	Characteristic Bond Strength in Uncracked Concrete	$\tau_{k,uncr}$	psi	725						
			N/mm²	5.0						
	Characteristic Bond Strength in Cracked Concrete	$\tau_{k,cr}$	psi	620	620	620	620	620	620	620
			N/mm²	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Permissible Installation Conditions[6]	Dry Concrete	ϕ_d	Periodic Inspection	0.65						
	Water-saturated Concrete	ϕ_{ws}		0.55			0.65			
	Water-filled Hole	ϕ_{wf}		0.65						
	Submerged Concrete	ϕ_{sub}		0.65						0.55
	Dry Concrete	ϕ_d	Continuous Inspection	0.65						
	Water-saturated Concrete	ϕ_{ws}		0.65						
	Water-filled Hole	ϕ_{wf}		0.65						
	Submerged Concrete	ϕ_{sub}		0.65						

For 51: 1 inch= 25.4 mm, 1 in.^{2} = 645.16 mm^2, 1 lb = 0.004448 kN

[1] Bond strength values correspond to concrete compressive strength f c = 2,500 psi. Bond strength values must not be increased for increased concrete compressive strength.

[2] Temperature Range A= Maximum Long Term Temperature: 110' F (43 ' C); Maximum Short Term Temperature: 130'F (55' C)

[3] Temperature Range B =Maximum Long Term Temperature: 110'F (43 ' C); Maximum Short Term Temperature: 162'F (72'C)

[4] Temperature Range C =Maximum Long Term Temperature: 110'F (43'C); Maximum Short Term Temperature: 176' F (80' C)

[5] Short-term elevated concrete temperatures are those that occur over brief intervals, e.g., as a result of diurnal cycling. Long-term concrete temperatures are roughly constant over significant periods of time.

[6] The tabulated value of ¢ applies when the load combinations of Section 1605.2 of the IBC, or ACI 318 Section 9.2 are used in accordance with ACI 318 D.4.3. If the load combinations of ACI 318 Appendix Care used, the appropriate value of Ø must be determined in accordance with ACI 318 D.4.4.

[7] For sustained loads, bond strengths must be multiplied by 0.73.

[8] See ICC-ES ESR 3577 for further design information in accordance with ACI 318

PERFORMANCE TABLE

C6+ Epoxy Adhesive

Allowable Tension Loads[1,2,3] for Threaded Rod Installed in Solid Concrete

THREADED ROD DIA In. (mm)	EMBEDMENT DEPTH In. (mm)	ALLOWABLE TENSION LOAD BASED ON ADHESIVE BOND STRENGTH		ALLOWABLE TENSION LOAD BASED ON STEEL STRENGTH		
		2000 PSI (13.8 MPa) CONCRETE Lbs. (kN)	4000 PSI (27.6 MPa) CONCRETE Lbbs. (kN)	ASTM A307 (SAE 1018) Lbs. (kN)	ASTM A193 GR. B7 (SAE 4140) Lbs. (kN)	ASTM F593 AISI 304 SS Lbs. (kN)
3/8 (9.5)	3-3/8 (85.7)	1,800 (8.0)	2,110 (9.4)	2,080 (9.3)	4,340 (19.3)	3,995 (17.8)
	4-1/2 (114.3)	2,080 (9.2)	2,505 (11.1)			
1/2 (12.7)	4-1/2 (114.3)	3,315 (14.8)	4,420 (19.7)	3,730 (16.6)	7,780 (34.6)	7,155 (31.8)
	6 (152.4)	4,780 (21.3)	4,900 (21.8)			
5/8 (15.9)	5-5/8 (142.9)	4,425 (19.7)	6,130 (27.3)	11,250 (50.0)	12,230 (54.4)	11,250 (50.0)
	7-1/2 (190.5)	5,660 (25.2)	7,190 (32.0)			
3/4 (19.1)	6-3/4 (171.5)	7,195 (32.0)	7,885 (35.1)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
	9 (228.6)	7,940 (35.3)	10,345 (46.0)			
7/8 (22.2)	7-7/8 (200.0)	8,810 (39.2)	9,430 (41.9)	11,600 (51.6)	25,510 (113.5)	20,835 (92.7)
	10-1/2 (266.7)	N/A	12,080 (57.0)			
1 (25.4)	9 (228.6)	10,085 (44.9)	11,970 (53.3)	15,180 (67.5)	31,620 (140.7)	26,560 (118.1)
	12 (304.8)	12,180 (54.2)	15,545 (69.2)			
1-1/4 (31.8)	11-1/4 (285.8)	13,915 (61.9)	14,245 (63.4)	23,800 (105.9)	49,580 (220.6)	34,670 (154.2)
	15 (381.0)	16,340 (72.7)	19,930 (88.7)			

PERFORMANCE TABLE

C6+ Epoxy Adhesive — Allowable Shear Loads[1,2,3] for Threaded Rod Installed in Solid Concrete

THREADED ROD DIA. In. (mm)	MINIMUM EMBEDMENT DEPTH In. (mm)	ALLOWABLE SHEAR LOAD BASED ON CONCRETE STRENGTH			ALLOWABLE SHEAR LOAD BASED ON STEEL STRENGTH		
		2000 PSI (13.8 MPa) CONCRETE Lbs. (kN)	4000 PSI (27.6 MPa) CONCRETE Lbs. (kN)	6000 PSI (41.4 MPa) CONCRETE Lbs. (kN)	ASTM A307 (SAE 1018) Lbs. (kN)	ASTM A193 GR. B7 (SAE 4140) Lbs. (kN)	ASTM F593 AISI 304 SS Lbs. (kN)
3/8 (9.5)	3-3/8 (85.7)	1,300 (5.8)	1,465 (6.5)	1,500 (6.7)	1,040 (4.6)	2,170 (9.7)	1,995 (8.9)
1/2 (12.7)	4-1/2 (114.3)	2,855 (12.7)	3,145 (14.0)	3,145 (14.0)	1,870 (8.3)	3,895 (17.3)	3,585 (15.9)
5/8 (15.9)	5-5/8 (142.9)	4,575 (20.3)	4,950 (22.0)	4,950 (22.0)	2,940 (13.1)	6,125 (27.2)	5,635 (25.1)
3/4 (19.1)	6-3/4 (171.5)	6,430 (28.6)	6,430 (28.6)	6,430 (28.6)	4,250 (18.9)	8,855 (39.4)	7,440 (33.1)
7/8 (22.2)	7-7/8 (200.0)	N/A	7,575 (33.7)	8,140 (36.2)	5,800 (25.8)	12,760 (56.8)	10,730 (47.7)
1 (25.4)	9 (228.6)	9,630 (42.8)	10,085 (44.9)	11,600 (51.6)	7,590 (33.8)	15,810 (70.3)	13,285 (59.1)
1-1/4 (31.8)	11-1/4 (285.8)	16,270 (72.4)	16,270 (72.4)	16,270 (72.4)	11,900 (52.9)	24,790 (110.3)	18,840 (83.8)

1 Use lower value of either concrete or steel strength for allowable shear load.
2 Allowable loads taken from ICC Evaluation Report #4285 (formerly ICBO).
3 Linear interpolation may be used for intermediate spacing and edge distances.

PERFORMANCE TABLE

C6+ Epoxy Adhesive — Average Ultimate Tension and Shear Loads[1,2,3] for Threaded Rod Installed in Grout Filled Concrete Block

THREADED ROD DIA.	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR LOCATION In. (mm)	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)
3/8 (9.5)	7/16 (11.1)	3 (76.2)	GROUTED CELL	4,862 (21.6)	N/A
1/2 (12.7)	5/8 (15.9)	3 (76.2)	GROUTED CELL	4,953 (22.0)	N/A
1/2 (12.7)	5/8 (15.9)	6 (152.4)	GROUTED CELL	8,214 (36.5)	N/A
5/8 (15.9)	3/4 (19.1)	5 (127.0)	GROUTED CELL	7,355 (32.7)	N/A
3/4 (19.1)	7/8 (22.2)	6 (152.4)	Note 1	17,404 (77.4)	19,588 (87.1)
3/4 (19.1)	7/8 (22.2)	6 (152.4)	Note 2	17,404 (77.4)	8,668 (38.6)

1 Anchor can be located in grouted cell, "T" joint, or bed joint.
2 Anchor can be located in first grouted cell from edge.
3 Allowable working loads for the single installations under static **loading should not exceed 20% (an industry standard) capacity or the allowable load of the anchor rod**. Loads based upon testing with ASTM A193, Grade B7 rods.

C6+ Epoxy Adhesive — Average Ultimate Tension Loads[1,2,3] for Threaded Rod Installed in Solid Concrete, Shallow Embedment

ANCHOR DIAMETER In. (mm)	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT IN CONCRETE In. (mm)	3500 PSI (24.2 MPa) ULTIMATE TENSION Lbs. (kN)
1/4 (6.4)	5/16 (7.9)	1 (25.4)	1,653 (7.4)
		2-1/4 (57.2)	2,818 (12.5)
		3 (76.2)	3,599 (16.0)
3/8 (9.5)	7/16 (11.1)	1-1/2 (38.1)	3,426 (15.2)
1/2 (12.7)	9/16 (14.3)	2 (50.8)	6,100 (27.1)
5/8 (15.9)	3/4 (19.1)	2-1/2 (63.5)	8,775 (39.0)
3/4 (19.1)	7/8 (22.2)	3 (76.2)	12,625 (56.2)
7/8 (22.2)	1 (25.4)	3-1/2 (88.9)	18,650 (83.0)
1 (25.4)	1-1/8 (28.6)	4 (101.6)	25,034 (111.4)
1-1/4 (31.8)	1-3/8 (34.9)	5 (127.0)	37,100 (165.0)

1 Allowable working loads for the single installations under static loading should not exceed 25% capacity or the allowable load of the anchor rod.
2 Ultimate load values in 2000, 4000, and 6000 psi stone aggregate concrete. Ultimate loads are indicated for the embedment shown in the Embedment in Concrete column. Performance values are based on the use of high strength threaded rod (ASTM A193 Gr. B7). The use of lower strength rods will result in lower ultimate tension and shear loads.
3 Linear interpolation may be used for intermediate spacing and edge distances (see page 35).

PERFORMANCE TABLE

C6+ Epoxy Adhesive

Average Ultimate Tension Loads[1,2,3] for Reinforcing Bar Installed in Solid Concrete

REINFORCING BAR In. (mm)	EMBEDMENT IN CONCRETE In. (mm)	2000 PSI (13.8 MPa) CONCRETE ULTIMATE TENSION Lbs. (kN)	4000 PSI (27.6 MPa) CONCRETE ULTIMATE TENSION Lbs. kN)	ULTIMATE TENSILE AND YIELD STRENGTH GRADE 60 REBAR	
				MINIMUM YIELD STRENGTH Lbs. (kN)	MINIMUM ULTIMATE TENSILE STRENGTH Lbs. (kN)
# 3 (9.5)	3-3/8 (85.7)	7,020 (31.2)	9,200 (40.9)	6,600 (29.4)	9,900 (44.0)
	4-1/2 (114.3)	9,000 (40.1)	11,540 (51.3)	6,600 (29.4)	9,900 (44.0)
# 4 (12.7)	4-1/2 (114.3)	11,940 (53.1)	15,140 (67.3)	12,000 (53.4)	18,000 (80.1)
	6 (152.4)	16,703 (74.3)	18,880 (84.0)	12,000 (53.4)	18,000 (80.1)
# 5 (15.9)	5-5/8 (142.9)	14,120 (62.8)	27,740 (123.4)	18,600 (82.7)	27,900 (124.1)
	7-1/2 (190.5)	20,040 (89.1)	30,727 (136.7)	18,600 (82.7)	27,900 (124.1)
# 6 (19.1)	6-3/4 (171.5)	17,940 (79.8)	29,200 (129.9)	26,400 (117.4)	39,600 (176.2)
	9 (228.6)	25,520 (113.5)	41,640 (185.2)	26,400 (117.4)	39,600 (176.2)
	10 (254.0)	N/A	45,000 (200.2)	26,400 (117.4)	39,600 (176.2)
# 7 (22.2)	7-7/8 (200.0)	N/A	45,850 (204.0)	36,000 (160.1)	54,000 (240.2)
	10-1/2 (266.7)	N/A	60,375 (268.6)	36,000 (160.1)	54,000 (240.2)
	13 (330.2)	N/A	65,300 (290.5)	36,000 (160.1)	54,000 (240.2)
# 8 (25.4)	9 (228.6)	30,960 (137.7)	54,180 (241.1)	47,400 (210.9)	71,100 (316.3)
	12 (304.8)	30,960 (137.7)	65,420 (291.0)	47,400 (210.9)	71,100 (316.3)
	16 (406.4)	N/A	86,700 (385.7)	47,400 (210.9)	71,100 (316.3)
# 9 (28.6)	10-1/8 (257.2)	N/A	61,530 (273.7)	60,000 (266.9)	90,000 (400.4)
	13-1/2 (342.9)	N/A	81,240 (361.4)	60,000 (266.9)	90,000 (400.4)
	19 (482.6)	N/A	108,000 (480.4)	60,000 (266.9)	90,000 (400.4)
# 10 (31.8)	11-1/4 (285.8)	44,600 (198.4)	76,500 (340.3)	76,200 (339.0)	114,300 (508.5)
	15 (381.0)	49,220 (218.9)	82,320 (366.2)	76,200 (339.0)	114,300 (508.5)
	19 (482.6)	N/A	120,000 (533.8)	76,200 (339.0)	114,300 (508.5)

1 Allowable working loads for the single installations under static loading should not exceed 25% ultimate capacity or the allowable load of the anchor rod. **Divide by 4.**

2 Ultimate load values in 2000 and 4000 psi stone aggregate concrete. Ultimate loads are indicated for the embedment shown in the Embedment in Concrete column. Performance values are based on minimum Grade 60 reinforcing bar. The use of lower strength rods will result in lower ultimate tension and shear loads.

3 SHEAR DATA: Provided the distance from the rebar to the edge of the concrete member exceeds 1.25 times the embedment depth of the rebar, calculate the ultimate shear load for the rebar anchorage as 60% of the ultimate tensile strength of the rebar.

C6+ PERFORMANCE REFERENCE TABLES

Combined Tension and Shear Loading—for Adhesive Anchors

Allowable loads for anchors under tension and shear loading at the same time (combined loading) will be lower than the allowable loads for anchors subjected to 100% tension or 100% shear. Use the following equation to evaluate anchors in combined loading conditions:

$$\left(\frac{Na}{Ns}\right)^{5/3} + \left(\frac{Va}{Vs}\right)^{5/3} \leq 1$$

Na **= Applied Service Tension Load**

Ns **= Allowable Tension Load**

Va **= Applied Service Shear Load**

Vs **= Allowable Shear Load**

C6+ Adhesive Edge/Spacing Distance Load Factor Summary for Installation of Threaded Rod and Reinforcing Bar [1,2]

LOAD FACTOR	DISTANCE FROM EDGE OF CONCRETE
Critical Edge Distance—Tension	
100% Tension Load	1.25 x Anchor Embedment (or greater)
Minimum Edge Distance—Tension	
70% Tension Load	0.50 x Anchor Embedment
Critical Edge Distance—Shear	
100% Shear Load	1.25 x Anchor Embedment (or greater)
Minimum Edge Distance—Shear	
30% Shear Load	0.30 x Anchor Embedment

LOAD FACTOR	DISTANCE FROM ANOTHER ANCHOR
Critical Spacing—Tension	
100% Tension Load	1.50 x Anchor Embedment (or greater)
Minimum Spacing—Tension	
75% Tension Load	0.75 x Anchor Embedment
Critical Spacing—Shear	
100% Shear Load	1.50 x Anchor Embedment (or greater)
Minimum Spacing—Shear	
30% Shear Load	0.50 x Anchor Embedment

1 Use linear interpolation for load factors at edge distances or spacing distances between critical and minimum.

2 Anchors are affected by multiple combination of spacing and/or edge distance loading and direction of the loading. Use the product of tension and shear loading factors in design.

RED HEAD®
ADHESIVE ANCHORING SPECIALISTS

G5

High Strength Epoxy Tested in Accordance with ICC-ES AC308

DESCRIPTION/SUGGESTED SPECIFICATIONS*

The 100% epoxy resin and hardener are completely mixed as they are dispensed from the dual cartridge through a static mixing nozzle, directly into the anchor hole.

Compliant with 2015 IBC. Category 1 performance rating. For use in uncracked, cracked concrete and seismic applications.

ADVANTAGES

FORMULATED FOR HOT OR WARM WEATHER

- Fire rated: tested up to 4hrs FRP
- High strength Epoxy
- 15 minute nozzle life at 70° degrees F

Easy to open, snap-off tip, no cutting required

RECOGNIZED WORLDWIDE
Fire Tested BS476 4 Hrs FRP

International Standard Fire Resistance Performance

NON-OFFENSIVE ODOR

- Virtually odorless, can be used indoors

G5-22

Curing Times

MADE IN USA

BASE MATERIAL (F°/C°)	WORKING TIME	FULL CURE TIME
110°/ 43°	9 minutes	24 hours
90°/ 32°	9 minutes	24 hours
70°/ 20°	15 minutes	24 hours

E102-V2

APPLICATIONS

Anchoring a concrete traffic barrier wall to concrete bridge deck.

Steel column anchoring with threaded rod

APPROVALS/LISTINGS

ICC -ES Evaluation Report No. ESR-1137

Conforms to ASTM C881-10; Type II & III, Grade 2, Class C with exception of gel time and elongation

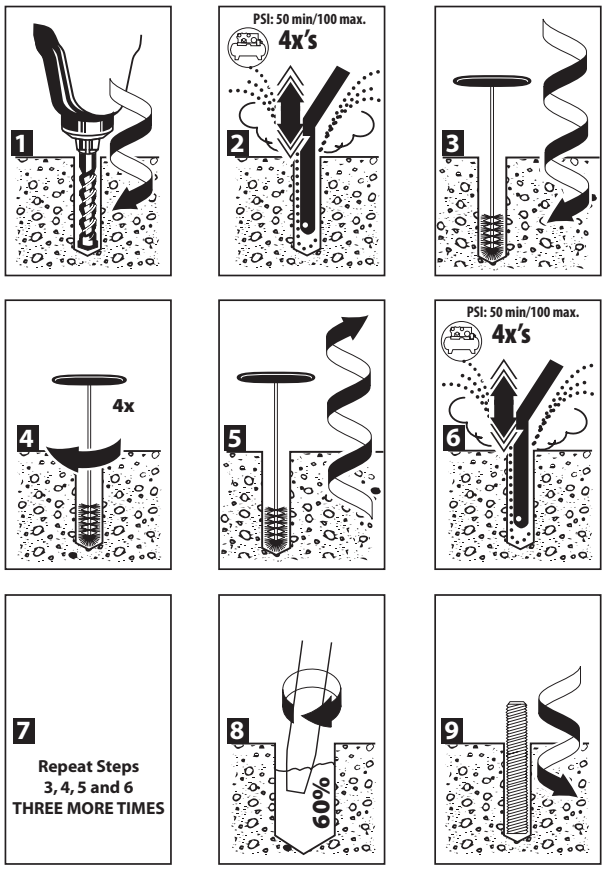
U.S. Department of Transportation Approvals

Certified to ANSI/NSF61

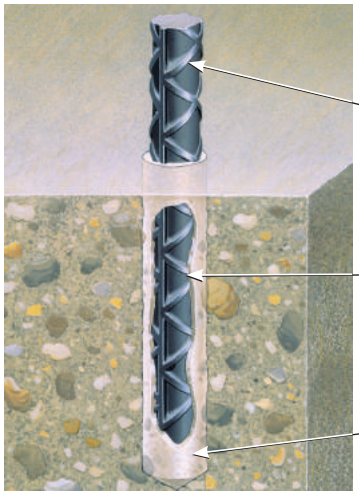
Florida Building Code Approved

For the most current approvals/listings visit: www.itwredhead.com

INSTALLATION STEPS



FEATURES

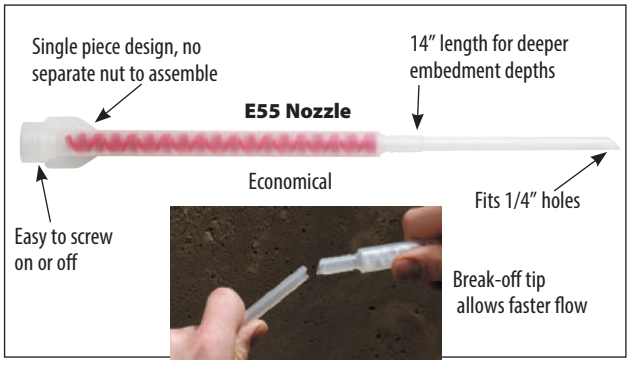


ANCHORAGE TO SOLID CONCRETE

Rebar (shown) or Threaded Rod (carbon or stainless steel) supplied by contractor

G5 adhesive completely fills area between rod and hole creating a stress-free, high load anchorage

Pre-drilled hole in concrete; see performance tables for suggested hole sizes



G5–22 fl. oz. Ordering Information

PART NUMBER	DESCRIPTION	BOX QTY
 G5-22	G5 Adhesive, 22 Fl. Oz. Cartridge	6
 E55	Mixing Nozzle for G5-22 Cartridge Nozzle diameter fits 3/8" to 5/8" holes (overall length of nozzle 14")	24
 E102v2	Hand Dispenser for G5-22 Cartridges Dispenses both 18 oz. and 22 oz. Cartridges	1

PART NUMBER	DESCRIPTION	BOX QTY
 E202	Pneumatic Tool for G5-22 Cartridge	1

Refer to page 56 for ordering information on brushes , hole plugs, and extension tubing for deep holes.

ESTIMATING TABLE

G5 22 Fluid Ounce Cartridge

Number of Anchoring Installations Per Cartridge* Using Reinforcing Bar with G5 Adhesive in Concrete

REBAR	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
#3	7/16	439.8	219.9	146.6	109.9	88.0	73.3	62.8	55.0	48.9	44.0	40.0	36.6	33.8	31.4	29.3
#4	5/8	215.5	107.7	71.8	53.9	43.1	35.9	30.8	26.9	23.9	21.5	19.6	18.0	16.6	15.4	14.4
#5	3/4	149.6	74.8	49.9	37.4	29.9	24.9	21.4	18.7	16.6	15.0	13.6	12.5	11.5	10.7	10.0
#6	7/8	109.9	55.0	36.6	27.5	22.0	18.3	15.7	13.7	12.2	11.0	10.0	9.2	8.5	7.9	7.3
#7	1	84.2	42.1	28.1	21.0	16.8	14.0	12.0	10.5	9.4	8.4	7.7	7.0	6.5	6.0	5.6
#8	1-1/8	66.5	33.3	22.2	16.6	13.3	11.1	9.5	8.3	7.4	6.7	6.0	5.5	5.1	4.8	4.4
#9	1-1/4	53.9	26.9	18.0	13.5	10.8	9.0	7.7	6.7	6.0	5.4	4.9	4.5	4.1	3.8	3.6
#10	1-1/2	37.4	18.7	12.5	9.4	7.5	6.2	5.3	4.7	4.2	3.7	3.4	3.1	2.9	2.7	2.5
#11	1-3/4	27.5	13.7	9.2	6.9	5.5	4.6	3.9	3.4	3.1	2.7	2.5	2.3	2.1	2.0	1.8

*The estimated number of anchoring installations per cartridge is based upon calculations of filling the hole 60% full of adhesive per the recommendation in our installation instructions. Hole volumes are calculated using ANSI tolerance carbide tipped drill bits. These estimates do not account for any waste.

ESTIMATING TABLE

G5 22 Fluid Ounce Cartridge

Number of Anchoring Installations Per Cartridge* Using Threaded Rod with G5 Adhesive in Concrete

ROD (in.)	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1/4	5/16	862.0	431.0	287.3	215.5	172.4	143.7	123.1	107.7	95.8	86.2	78.4	71.8	66.3	61.6	57.5
3/8	7/16	439.8	219.9	146.6	109.9	88.0	73.3	62.8	55.0	48.9	44.0	40.0	36.6	33.8	31.4	29.3
1/2	9/16	266.0	133.0	88.7	66.5	53.2	44.3	38.0	33.3	29.6	26.6	24.2	22.2	20.5	19.0	17.7
5/8	3/4	149.6	74.8	49.9	37.4	29.9	24.9	21.4	18.7	16.6	15.0	13.6	12.5	11.5	10.7	10.0
3/4	7/8	109.9	55.0	36.6	27.5	22.0	18.3	15.7	13.7	12.2	11.0	10.0	9.2	8.5	7.9	7.3
7/8	1	84.2	42.1	28.1	21.0	16.8	14.0	12.0	10.5	9.4	8.4	7.7	7.0	6.5	6.0	5.6
1	1-1/8	66.5	33.3	22.2	16.6	13.3	11.1	9.5	8.3	7.4	6.7	6.0	5.5	5.1	4.8	4.4
1-1/4	1-3/8	44.5	22.3	14.8	11.1	8.9	7.4	6.4	5.6	4.9	4.5	4.0	3.7	3.4	3.2	3.0
1-1/2	1-5/8	31.9	15.9	10.6	8.0	6.4	5.3	4.6	4.0	3.5	3.2	2.9	2.7	2.5	2.3	2.1

*The estimated number of anchoring installations per cartridge is based upon calculations of filling the hole 60% full of adhesive per the recommendation in our installation instructions. Hole volumes are calculated using ANSI tolerance carbide tipped drill bits. These estimates do not account for any waste.

PACKAGING

1. Disposable, self-contained 22 ounce cartridge system capable of dispensing both epoxy components in the proper mixing ratio
2. Epoxy components dispensed through a static mixing nozzle that thoroughly mixes the material and places the epoxy at the base of the pre-drilled hole
3. Cartridge markings: Include manufacturer's name, batch number and best-used-by date, mix ratio by volume, ANSI hazard classification, and appropriate ANSI handling precautions

SUGGESTED SPECIFICATIONS

EPOXY ADHESIVE:

High Strength EPOXY ADHESIVE: USA Made, ARRA Certified

1. Odorless, two component resin and hardener, 100% solids (containing no solvents or VOC's), non-sag paste, insensitive to moisture, grey in color, extended working time.
2. Works in wet, damp, or submerged holes.
3. Conforms to ASTM C881-10; Type II & III, Grade 2, Class C with exception of gel time and elongation.
4. Compressive Strength, ASTM D695-02: 14,797 psi minimum.
5. Heat Deflection Temperature; 200°F minimum.
6. Shelf life: Best if used within 18 months.
7. Formulated for use in concrete.
8. Oversized and/or Core drilled holes permitted.
9. Fire-Resistance Performance of 4 Hours
10. Recommended storage: 50°F - 80°F

PERFORMANCE TABLE

G5 Epoxy Adhesive

Average Ultimate Tension and Shear Loads[1,2,3] for Threaded Rod Installed in Solid Concrete

THREADED ROD DIA. In. (mm)	MAX. CLAMPING FORCE AFTER PROPER CURE Ft.-Lbs. (Nm)	EMBEDMENT CONCRETE In. (mm)	2000 PSI (13.8 MPa) CONCRETE		4000 PSI (27.6 MPa) CONCRETE	
			ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)
3/8 (9.5)	9 (12.2)	3-3/8 (85.7)	5,060 (22.5)	6,227 (27.7)	8,396 (37.3)	6,227 (27.7)
		4-1/2 (114.3)	6,465 (28.8)	6,227 (27.7)	10,490 (46.7)	6,227 (27.7)
1/2 (12.7)	16 (21.6)	4-1/2 (114.3)	10,484 (46.6)	12,016 (53.5)	13,476 (59.9)	12,016 (53.5)
		6 (152.4)	12,392 (55.1)	12,016 (53.5)	19,166 (85.3)	12,016 (53.5)
		7-1/2 (190.5)	N/A	12,016 (53.5)	20,572 (91.5)	12,016 (53.5)
5/8 (15.9)	47 (63.5)	5-5/8 (142.9)	14,634 (65.1)	17,547 (78.1)	20,880 (92.9)	17,547 (78.1)
		7-1/2 (190.5)	20,182 (89.8)	17,547 (78.1)	27,939 (124.3)	17,547 (78.1)
		9-3/8 (238.1)	N/A	17,547 (78.1)	32,249 (143.5)	17,547 (78.1)
3/4 (19.1)	90 (121.5)	6-3/4 (171.5)	18,966 (84.4)	24,918 (110.8)	29,019 (129.1)	24,918 (110.8)
		9 (228.6)	25,988 (115.6)	24,918 (110.8)	43,812 (194.9)	24,918 (110.8)
		11-1/4 (285.8)	N/A	24,918 (110.8)	47,927 (213.2)	24,918 (110.8)
1 (25.4)	276 (372.6)	9 (228.6)	43,804 (194.9)	43,648 (194.2)	53,531 (238.1)	43,648 (194.2)
		12 (304.8)	45,351 (201.6)	43,648 (194.2)	64,022 (284.8)	43,648 (194.2)
		15 (381.0)	N/A	43,648 (194.2)	82,547 (367.2)	43,648 (194.2)

1 Allowable working loads for the single installations under static loading should not exceed 25% (an industry standard) capacity or the allowable load of the anchor rod. **Divide by 4.**

2 Ultimate load values in 2000 and 4000 psi stone aggregate concrete. Ultimate loads are indicated for the embedment shown in the Embedment in Concrete column. Performance values are based on the use of high strength threaded rod (ASTM A193 Gr. B7). The use of lower strength rods will result in lower ultimate tension and shear loads.

3 Linear interpolation may be used for intermediate spacing and edge distances.

PERFORMANCE TABLE

G5 Epoxy Adhesive — Allowable Tension Loads[1] for Threaded Rod Installed in Solid Concrete

THREADED ROD DIA. In. (mm)	MIN. EMBEDMENT DEPTH In. (mm)	ALLOWABLE TENSION LOAD BASED ON EPOXY BOND STRENGTH		ALLOWABLE TENSION LOAD BASED ON STEEL STRENGTH		
		2000 PSI (13.8 MPa) CONCRETE Lbs. (kN)	4000 PSI (27.6 MPa) CONCRETE Lbs. (kN)	ASTM A307 (SAE 1018) Lbs. (kN)	ASTM A193 GR. B7 (SAE 4140) Lbs. (kN)	ASTM F593 AISI 304 SS Lbs. (kN)
3/8 (9.5)	3-3/8 (85.7)	1,265 (5.6)	2,092 (9.3)	2,080 (9.3)	4,340 (19.3)	3,995 (17.8)
	4-1/2 (114.3)	1,616 (7.2)	2,622 (11.7)	2,080 (9.3)	4,340 (19.3)	3,995 (17.8)
1/2 (12.7)	4-1/2 (114.3)	3,004 (13.4)	3,369 (15.0)	3,730 (16.6)	7,780 (34.6)	7,155 (31.8)
	6 (152.4)	3,098 (13.8)	4,791 (21.3)	3,730 (16.6)	7,780 (34.6)	7,155 (31.8)
5/8 (15.9)	5-5/8 (142.9)	3,659 (16.3)	5,220 (23.2)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
	7-1/2 (190.5)	5,046 (22.4)	6,985 (31.1)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
3/4 (19.1)	6-3/4 (171.5)	4,742 (21.1)	7,255 (32.3)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
	9 (228.6)	6,497 (28.9)	10,057 (44.7)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
1 (25.4)	9 (228.6)	10,951 (48.7)	11,209 (49.9)	15,180 (67.5)	31,620 (140.6)	26,560 (118.1)
	12 (304.8)	11,338 (50.4)	15,923 (70.8)	15,180 (67.5)	31,620 (140.6)	26,560 (118.1)

1 Use lower value of either bond or steel strength for allowable tensile load.

2 Linear interpolation may be used for intermediate spacing and edge distances.

PERFORMANCE TABLE

G5 Epoxy Adhesive — Allowable Shear Loads[1,2] for Threaded Rod Installed in Solid Concrete

THREADED ROD DIA. In. (mm)	MIN. EMBEDMENT DEPTH In. (mm)	ALLOWABLE SHEAR LOAD BASED ON CONCRETE STRENGTH		ALLOWABLE SHEAR LOAD BASED ON STEEL STRENGTH		
		2000 PSI (13.8 MPa) CONCRETE Lbs. (kN)	4000 PSI (27.6 MPa) CONCRETE Lbs. (kN)	ASTM A307 (SAE 1018) Lbs. (kN)	ASTM A193 GR. B7 (SAE 4140) Lbs. (kN)	ASTM F593 AISI 304 SS Lbs. (kN)
3/8 (9.5)	3-3/8 (85.7)	1,557 (6.9)	1,557 (6.9)	1,040 (4.6)	2,170 (9.7)	1,995 (8.9)
1/2 (12.7)	4-1/2 (114.3)	3,004 (13.4)	3,004 (13.4)	1,870 (8.3)	3,895 (17.3)	3,585 (15.9)
5/8 (15.9)	5-5/8 (142.9)	4,387 (19.5)	4,387 (19.5)	2,940 (13.1)	6,125 (27.2)	5,635 (25.1)
3/4 (19.1)	6-3/4 (171.5)	6,230 (27.7)	6,230 (27.7)	4,250 (18.9)	8,855 (39.4)	7,440 (33.1)
1 (25.4)	9 (228.6)	10,912 (48.5)	10,912 (48.5)	7,590 (33.8)	15,810 (70.3)	13,285 (59.1)

1 Use lower value of either concrete or steel strength for allowable shear load.

2 Linear interpolation may be used for intermediate spacing and edge distances. (See page 49)

Combined Tension and Shear Loading—for G5 Adhesive Anchors

Allowable loads for anchors under tension and shear loading at the same time (combined loading) will be lower than the allowable loads for anchors subjected to 100% tension or 100% shear. Use the following equation to evaluate anchors in combined loading conditions:

$$\left(\frac{Na}{Ns}\right) + \left(\frac{Va}{Vs}\right) \leq 1$$

Na = Applied Service Tension Load

Ns = Allowable Tension Load

Va = Applied Service Shear Load

Vs = Allowable Shear Load

PERFORMANCE TABLE

G5 Epoxy Adhesive — Average Ultimate Tension Loads[1,2,3] for Reinforcing Bar Installed in Solid Concrete

REINFORCING BAR In. (mm)	EMBEDMENT IN CONCRETE In. (mm)	2000 PSI (13.8 MPa) IN CONCRETE ULTIMATE TENSION Lbs. (kN)	4000 PSI (27.6 MPa) IN CONCRETE ULTIMATE TENSION Lbs. (kN)	ULTIMATE TENSILE AND YIELD STRENGTH GRADE 60 REBAR	
				MINIMUM YIELD STRENGTH Lbs. (kN)	MINIMUM ULTIMATE TENSILE STRENGTH Lbs. (kN)
# 3 (9.5)	3-3/8 (85.7)	7,480 (33.3)	8,090 (35.9)	6,600 (29.4)	9,900 (44.0)
	4-1/2 (114.3)	N/A	10,488 (46.6)	6,600 (29.4)	9,900 (44.0)
# 4 (12.7)	4-1/2 (114.3)	N/A	14,471 (64.4)	12,000 (53.4)	18,000 (80.1)
	6 (152.4)	11,235 (50.0)	20,396 (90.7)	12,000 (53.4)	18,000 (80.1)
# 5 (15.9)	5-5/8 (142.9)	N/A	21,273 (94.6)	18,600 (82.7)	27,900 (124.1)
	7-1/2 (190.5)	18,108 (80.6)	31,863 (141.7)	18,600 (82.7)	27,900 (124.1)
# 6 (19.1)	6-3/4 (171.5)	N/A	27,677 (123.1)	26,400 (117.4)	39,600 (176.2)
	9 (228.6)	29,338 (130.5)	47,879 (212.9)	26,400 (117.4)	39,600 (176.2)
# 7 (22.2)	7-7/8 (200.0)	N/A	43,905 (195.3)	36,000 (160.1)	54,000 (240.2)
	10-1/2 (266.7)	N/A	52,046 (231.5)	36,000 (160.1)	54,000 (240.2)
# 8 (25.4)	9 (228.6)	N/A	55,676 (247.7)	47,400 (210.9)	71,100 (316.3)
	12 (304.8)	48,000 (213.5)	77,358 (344.1)	47,400 (210.9)	71,100 (316.3)
# 9 (28.6)	10-1/8 (257.2)	N/A	62,443 (277.8)	60,000 (266.9)	90,000 (400.4)
	13-1/2 (342.9)	N/A	71,959 (320.1)	60,000 (266.9)	90,000 (400.4)
# 10 (31.8)	11-1/4 (285.8)	N/A	70,165 (312.1)	76,200 (339.0)	114,300 (508.5)
	15 (381.0)	N/A	78,545 (349.4)	76,200 (339.0)	114,300 (508.5)

1 Allowable working loads for the single installations under static loading should not exceed 25% ultimate capacity or the allowable load of the anchor rod. **Divide by 4.**

2 Ultimate load values in 2000 and 4000 psi stone aggregate concrete. Ultimate loads are indicated for the embedment shown in the Embedment in Concrete column. Performance values are based on the use of minimum Grade 60 reinforcing bar. The use of lower strength rods will result in lower ultimate tension and shear loads.

3 SHEAR DATA: Provided the distance from the rebar to the edge of the concrete member exceeds 1.25 times the embedment depth of the rebar, calculate the ultimate shear load for the rebar anchorage as 60% of the ultimate tensile strength of the rebar.

G5 Epoxy Adhesive — Average Ultimate Tension Loads[1,2] for Threaded Rod Installed in Solid Concrete

THREADED ROD In. (mm)	HOLE DIAMETER In. (mm)	EMBEDMENT IN CONCRETE In. (mm)	≥ 3000 PSI (13.8 MPa) IN CONCRETE ULTIMATE TENSION Lbs. (kN)
1-1/2 (38.1)	1-3/4 (44.5)	13 (330.2)	100,250 (490.4)
		17 (431.8)	143,600 (638.8)
		19 (482.6)	150,000 (667.3)
2 (50.8)	2-1/4 (57.2)	16 (406.4)	150,000 (667.3)
		17 (431.8)	169,700 (754.9)

1 Allowable working loads for the single installations under static loading should not exceed 25% ultimate capacity or the allowable load of the anchor rod.

2 Ultimate load values are ≥ 3000 psi in stone aggregate concrete. Ultimate loads are indicated for the embedment shown in the Embedment in Concrete column. Performance values are based on the use of high strength threaded rod (ASTM A193 Gr. B7). The use of lower strength rods will result in lower ultimate tension loads. See chart below.

G5 Adhesive Edge/Spacing Distance Load Factor Summary for Installation of Threaded Rod and Reinforcing Bar [1,2]

LOAD FACTOR	DISTANCE FROM EDGE OF CONCRETE
Critical Edge Distance—Tension	
100% Tension Load →	1.25 x Anchor Embedment
Minimum Edge Distance—Tension	
70% Tension Load →	0.50 x Anchor Embedment
Critical Edge Distance—Shear	
100% Shear Load →	1.25 x Anchor Embedment
Minimum Edge Distance—Shear	
30% Shear Load →	0.30 x Anchor Embedment

LOAD FACTOR	DISTANCE FROM ANOTHER ANCHOR
Critical Spacing—Tension	
100% Tension Load →	1.50 x Anchor Embedment
Minimum Spacing—Tension	
75% Tension Load →	0.75 x Anchor Embedment
Critical Spacing—Shear	
100% Shear Load →	1.50 x Anchor Embedment
Minimum Spacing—Shear	
30% Shear Load →	0.50 x Anchor Embedment

1 Use linear interpolation for load factors at edge distances or spacing distances between critical and minimum.

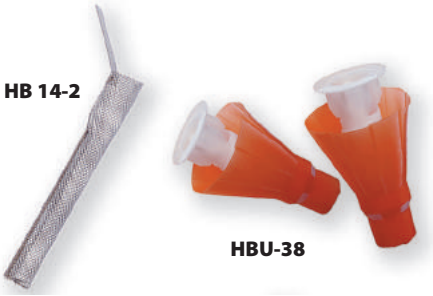
2 Anchors are affected by multiple combination of spacing and/or edge distance loading and direction of the loading. Use the product of tension and shear loading factors in design.

RED HEAD®
ADHESIVE ANCHORING SPECIALISTS

Umbrella Inserts and Stubby Screens

High Performance Adhesive Systems for Fastening to Hollow Base Materials

A7P-28



HB 14-2

HBU-38

DESCRIPTION/ADVANTAGES

Hollow Block Fastening with A7+ Adhesive

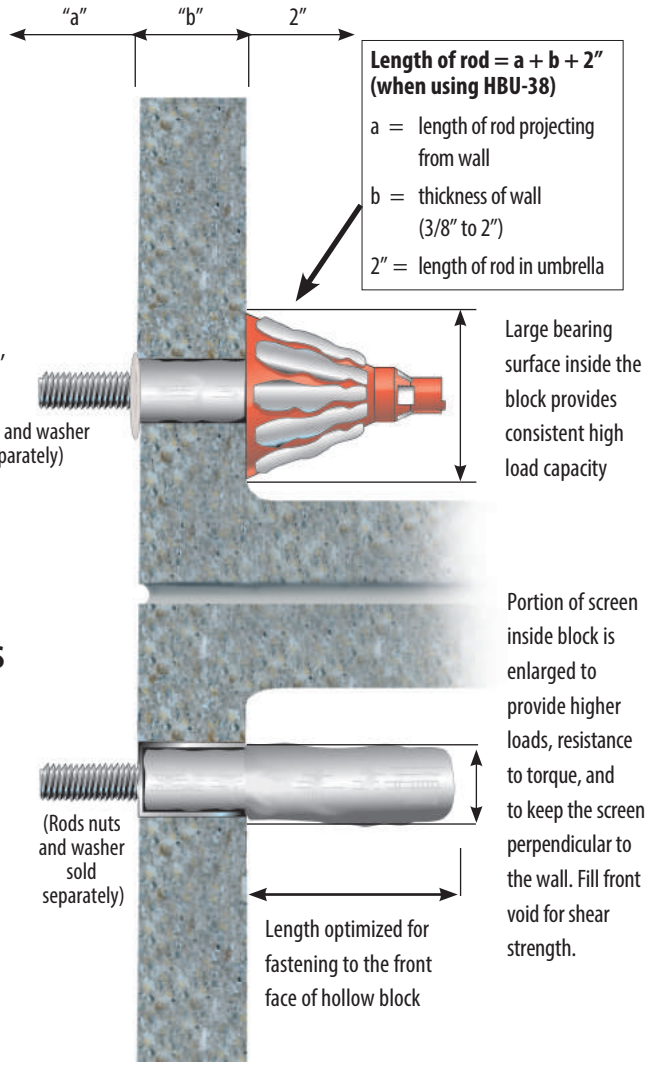
HBU-38

Umbrella Inserts—specially designed for fastening to the face of hollow concrete block, brick, clay tile or terra cotta. Accepts rods 1/4", 3/8" and 1/2"

(Rods nuts and washer sold separately)

STUBBY SCREENS

Specially designed stainless steel screens provide maximum performance for a screen in the front face of hollow concrete block. Screens available for rods 1/4" to 5/8"



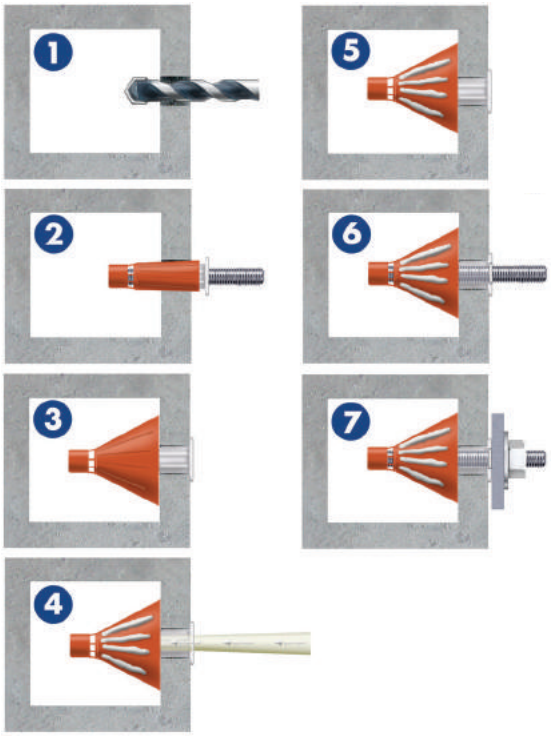
Section View—Concrete Block

COMBINE WITH A7+ OR C6+ TO CREATE AN ADHESIVE FASTENING SYSTEM IDEAL FOR HOLLOW BLOCK, TERRA COTTA, CLAY TILE, MASONRY AND MORE

- Accepts 1/4", 3/8, and 1/2" threaded rods
- Use with A7+ Acrylic adhesive for fast dispensing, fast curing installation
- Use with C6+ Epoxy for fast curing extended working time installation

Umbrella Inserts and Screens

INSTALLATION STEPS



1. Drill 3/4" diameter hole, 3-3/4" deep using rotation only drilling mode and carbide tipped drill bit. Clean out hole with forced air. Complete hole preparation with use of a brush and repeat cleaning with compressed air (leave no dust or slurry).
2. Place umbrella on piece of threaded rod, stretch umbrella over the rod by pulling the white collar back approximately 1". Squeeze orange portion of umbrella and push umbrella into hole.
3. Push umbrella body through the hole and completely into void. Remove threaded rod. (Do not use in solid base materials. For anchoring into block web, ends and mortar joints, use screens.)
4. Dispense and discard a sufficient amount of adhesive from new cartridge until a uniform adhesive mix is achieved. Inject approximately 1-1/2 fl. oz. of adhesive into umbrella (7 to 8 pumps using manual dispenser) to completely fill umbrella.
5. 3/8" rod uses a centering ring (supplied with inserts) to keep rod perpendicular to the wall.
6. Insert rod into the filled umbrella using a slow, soft twisting motion until it contacts the back of umbrella.
7. Wait for appropriate temperature/cure time before tightening fixture to the recommended torque of 10 ft./lbs.

Installation instructions for stubby screens provided on page 56.

SELECTION CHART

Umbrella Inserts

DESCRIPTION	PART NO.	BOX CONTENTS
Umbrella Anchor 	HBU-38	20 Umbrellas 20 Centering Rings

SELECTION CHART

Stubby Screens

PART NO.	DESCRIPTION	QTY/BOX
HB 14-2	1/4" x 2" Stainless Screen	100
HB 38-312	3/8" x 3-1/2" Stainless Screen	100
HB 12-312	1/2" x 3-1/2" Stainless Screen	50
HB 58-412	5/8" x 4-1/2" Stainless Screen	50

ESTIMATING TABLE

Umbrella Inserts

Number of Anchoring Installations Per Cartridge* Using Threaded Rod and Umbrella Inserts with A7+

ROD In (mm)	DRILL HOLE DIA. INCHES	VOLUME OF CARTRIDGE		UMBRELLA INSERT WITH EMBEDMENT OF 3-3/4"
3/8 (9.5)	3/4	A7+	9.5 fluid oz.	6
		A7+	28 fluid oz.	17

* These estimates do not account for waste.

ESTIMATING TABLE

Stubby Screens — Number of Anchoring Installations Per Cartridge* Using Threaded Rod and Stubby Screens with A7+

ROD In (mm)	DRILL HOLE DIA. INCHES	VOLUME OF CARTRIDGE	SCREEN LENGTH PLUS 1 DIAMETER (INCHES)		
			2"	3-1/2"	4-1/2"
1/4 (6.4)	3/8	A7+ 9.5 fluid oz.	48		
		A7+ 28 fluid oz.	135		
3/8 (9.5)	1/2	A7+ 9.5 fluid oz.		21	
		A7+ 28 fluid oz.		62	
1/2 (12.7)	5/8	A7+ 9.5 fluid oz.		15	
		A7+ 28 fluid oz.		43	
5/8 (15.9)	3/4	A7+ 9.5 fluid oz.			11
		A7+ 28 fluid oz.			24

*These estimates do not account for waste.

PERFORMANCE TABLE

Load Values[1, 2] — Using A7+ in Hollow Concrete Block

	ROD DIA. In. (mm)	MAX CLAMPING FORCE AFTER PROPER CURE Ft.-Lbs. (Nm)	DRILL HOLE DIA. In. (mm)	EMBEDMENT (SCREEN LENGTH) In. (mm)	ULTIMATE TENSION Lbs. (Kn)	ULTIMATE SHEAR Lbs. (Kn)
Umbrella	3/8 (9.5)	10 (13)	3/4 (19.1)	3-3/4 (95.3)	3,558 (15.8)	3,109 (13.8)
Stubby Screens	1/4 (6.4)	4 (5)	3/8 (9.5)	2 -1/4 (57.1)	1,550 (6.9)	1,900 (8.5)
	3/8 (9.5)	7 (9)	1/2 (12.7)	3-7/8 (98.4)	1,661 (7.4)	2,071 (9.2)
	1/2 (12.7)	10 (13)	5/8 (15.9)	4 (101.6)	2,458 (10.9)	4,467 (19.9)
	5/8 (15.9)	13 (17)	3/4 (19.1)	5-1/8 (130.2)	2,543 (10.9)	5,047 (22.4)

1 Allowable working loads should not exceed 20% ultimate capacity. Based upon testing using ASTM A193, Grade B7 rod. Divide by 4.

2 The tabulated values are for anchors installed at a minimum 12 inch edge distance and minimum 8 inch spacing.

Screen Tubes

Quality Adhesive Systems for Fastening Through Block and for Brick Pinning Applications

A7P-28

Nylon Screens

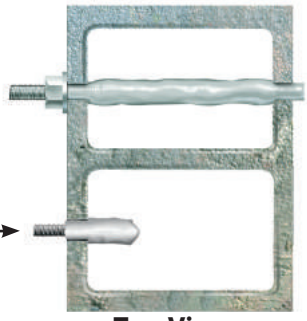
DESCRIPTION/SUGGESTED SPECIFICATIONS

Screens Used with A7+

HOLLOW CONCRETE BLOCK

Maximum holding strength in concrete block can be obtained by fastening to both the front and back of the block using an adhesive screen tube and threaded rod.

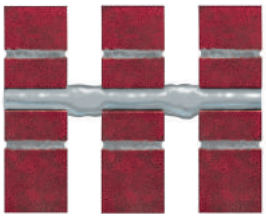
For attachments to single face of block, see page 53 for information on "umbrella anchors" and "stubby screens"



Top View

BRICK WALL

Systems designed for Seismic Retrofit, Brick Pinning or fastening to brick—various lengths and diameters available to accommodate site conditions.



Section

The no-drip feature of A7+ adhesive makes it particularly well suited for brick pinning applications.

ADVANTAGES

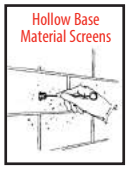
HBP SERIES—NYLON SCREENS

- 30%-50% savings from stainless steel screens
- Comparable performance values
- Easier to insert and span across voids
- Flexible material is less susceptible to damage from crushing

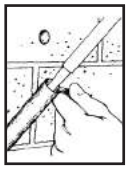
HB SERIES—STAINLESS SCREENS

- Corrosion resistant
- Available in 1/4" to 3/4" diameters
- Special version, "dosage control" available for overhead and underwater installations

INSTALLATION STEPS

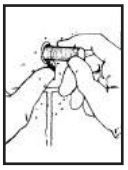


1. Drill hole to the length of the screen plus 1 diameter, using rotation-only drilling mode. Clean out hole with forced air. Complete hole preparation with use of a brush and repeat cleaning with forced air (leave no dust or slurry).



2. When starting new cartridge or new nozzle, dispense and discard enough adhesive until uniform adhesive mix is achieved. Insert the nozzle into the bottom of the screen and fill screen completely full (use extension tube if needed to reach bottom of screen).

3. Insert the filled screen completely into the hole (subflush).



4. While holding the tab of the screen against the wall, hand insert the selected rod slowly into the screen tube with a slow twisting motion. Pull screen flush to face and coat with adhesive. Wait for appropriate cure time before torquing fixture in place.

SELECTION CHART

Screen Tubes

HB Stainless Screen

HBP Nylon Screen

ROD DIA. In. (mm)	SCREEN LENGTH In. (mm)	STAINLESS STEEL SCREENS		NYLON SCREENS	
		PART NO.	QTY/BOX	PART NO.	QTY/BOX
1/4 (6.4)	6 (152.4)	HB 14-6	100		
1/4 (6.4)	8 (203.2)	HB 14-8	100		
1/4 (6.4)	10 (254.0)	HB 14-10	100		
3/8 (9.5)	6 (152.4)			HBP 38-6	50
3/8 (9.5)	8 (203.2)			HBP 38-8	25
3/8 (9.5)	10 (254.0)			HBP 38-10	25
1/2 (12.7)	6 (152.4)			HBP 12-6	50
1/2 (12.7)	8 (203.2)			HBP 12-8	25
1/2 (12.7)	10 (254.0)			HBP 12-10	25
5/8 (15.9)	6 (152.4)			HBP 58-6	40
5/8 (15.9)	8 (203.2)			HBP 58-8	40
5/8 (15.9)	10 (254.0)			HBP 58-10	40
3/4 (19.1)	8 (203.2)	HB 34-8	20		
3/4 (19.1)	10 (254.0)			HBP 34-10	20
3/4 (19.1)	13 (330.2)			HBP 34-13	20

*Not available in standard strength nylon screens. Longer screens available through specials.

ESTIMATING TABLE

Screen Tubes

Number of Holes Per Cartridge* Using Threaded Rod and Screen Tubes with A7+ Adhesives in Hollow Base Material

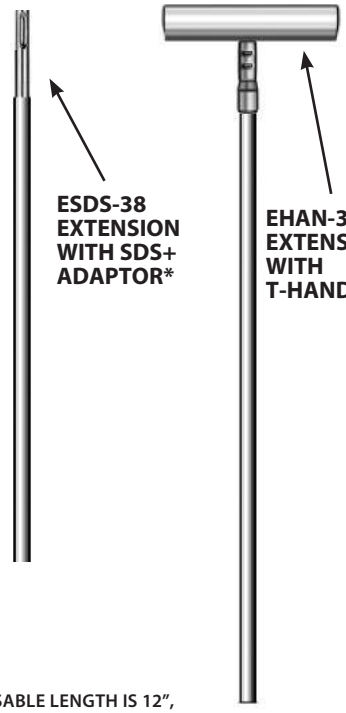
ROD In (mm)	DRILL HOLE DIA. INCHES	VOLUME OF CARTRIDGE	SCREEN LENGTH (INCHES)			
			6″	8″	10″	13″
1/4 (6.4)	3/8	A7 9.5 fluid oz.	16	12	10	
		A7 28 fluid oz.	45	35	28	
3/8 (9.5)	1/2	A7 9.5 fluid oz.	12	10	7.5	
		A7 28 fluid oz.	37	29	23	
1/2 (12.7)	5/8	A7 9.5 fluid oz.	9	6	5	
		A7 28 fluid oz.	26	18	14	
5/8 (15.9)	3/4	A7 9.5 fluid oz.	6	5	4	
		A7 28 fluid oz.	18	14	10	
3/4 (19.1)	7/8	A7 9.5 fluid oz.		3	2.5	1.75
		A7 28 fluid oz.		9	6	5

* These estimates do not account for waste.

RED HEAD®
ADHESIVE ANCHORING SPECIALISTS

Accessories

Wire Brush Extensions



* USABLE LENGTH IS 12",
GOOD FOR ALL HOLES EXCEPT 7/16" DIAMETER

ITW Red Head

Call our toll free number **800-848-5611** or visit our web site for the most current product and technical information at **www.itwredhead.com**

DESCRIPTION/ADVANTAGES

Hole Plugs

Special plugs make overhead installations easier, centers rod in hole, and keeps adhesive off threads

ROD DIAMETER	HOLE DIAMETER	PART #	QTY
3/8″	7/16″	E038	25
1/2″	9/16″	E012	25
5/8″	3/4″	E058	20
3/4″	7/8″	E034	20
7/8″	1″	E078	10
1″	1-1/8″	E010	10
1-1/4″	1-3/8″	E114	10

Piston Plugs

Hole Plugs	Part No.	Hole Diameter	Qty
Piston Plug for 5/8" and 3/4" Diameter Hole	PL-5834	3/4"	25
		7/8"	25
Piston Plug for 7/8" and 1" Diameter Hole	PL-7810	1"	20
		1-1/8"	20
Piston Plug for 1-1/4" Diameter Hole	PL-1250	1-3/8"	10
			10

Wire Brushes

Proper hole cleaning using a brush is essential to achieve optimum performance

1/8″ NPT
(National Pipe Thread Taper)

PART No.	ANCHOR DIA.	REBAR DIA.	DRILL BIT DIA.	OVERALL LENGTH	BRUSH DIA.	QTY/BAG
WB-038	3/8	No. 3	7/16	4-7/8	5/8	10
WB-012	1/2	No. 4	5/8	4-7/8	3/4	10
WB-058	5/8	No. 5	3/4	4-7/8	1.0	10
WB-34	3/4	No. 6	7/8	4-7/8	1-1/4	10
WB-078	7/8	No. 7	1	5-1/8	1-1/2	10
WB-100	1	No. 8	1-1/8	5-1/4	1-5/8	10
WB-125	1-1/4	No. 10	1-3/8	5-1/4	1-3/4	10
ESDS-38	Wire brush 12″ usable extension with SDS+ adaptor					1
EHAN-38	Wire brush 12″ usable extension with T-Handle					1

* Proper hole cleaning using a wire brush is essential to achieve optimum performance.
Brush may be used up to 50 holes depending on concrete strength.
Brushes required for installation of No. 4, No. 8 rebar and larger are available with lead time.

Plastic Extension Tubing

Attaches to Adhesive System nozzles for deep hole installations

DESCRIPTION	PART #	QTY
6-Foot Straight Tubing can cut to proper size (.39 in I.D. x .43 in. O.D.)	E25-6	6
6-Foot Long Extension Tube for use with Piston Plugs	E916-6	1

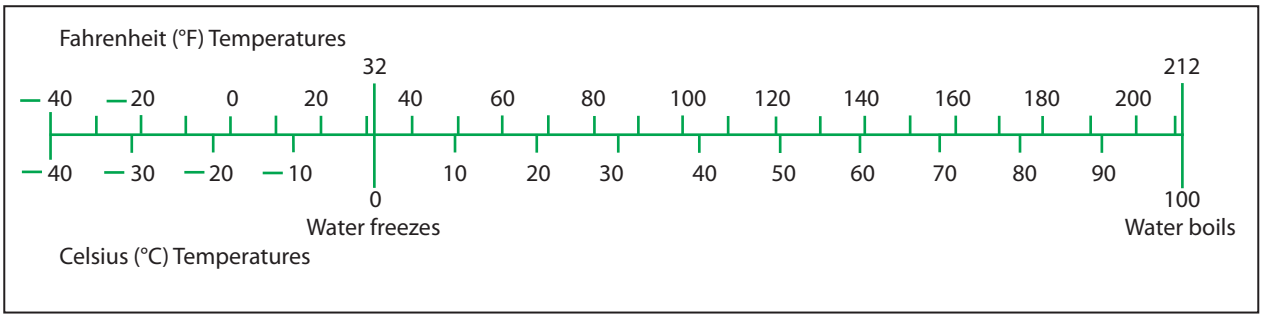
Blow Pump

DESCRIPTION	PART #	QTY/BAG
Blow Pump	BP-10	1

Minimum hole 7/16".

Conversion Table (soft)

6.35 mm	=	1/4″	50 mm	=	2″
9.5 mm	=	3/8″	98 mm	=	3-7/8″
10 mm	=	3/8″	100 mm	=	4″
12 mm	=	1/2″	130 mm	=	5-1/8″
16 mm	=	5/8″	153 mm	=	6″
20 mm	=	3/4″	156 mm	=	6-1/8″
22 mm	=	7/8″	178 mm	=	7″
24 mm	=	1″	183 mm	=	7-1/4″
25 mm	=	1″	190 mm	=	7-1/2″
30 mm	=	1-3/16″	200 mm	=	7-7/8″
35 mm	=	1-3/8″	213 mm	=	8-3/8″
40 mm	=	1-1/2″	250 mm	=	9-7/8″



RED HEAD®
CONCRETE ANCHORING SPECIALISTS

Selection Guide
Anchors for Concrete Applications

ANCHOR TYPE	KEY FEATURES	SIZE RANGE (Inches)
 **Trubolt®** Wedge Anchors 	■ 2015 IBC Compliant ■ Seismic zone (A-B) approved ■ Fully-threaded ■ Length ID head stamped ■ Stainless steel clip ■ Through-fixture fastening	**Diameter:** 1/4 – 1 **Length:** 1-3/4 – 12
 **Trubolt®+** Seismic Wedge Anchors ID STAMP  	■ 2015 IBC Compliant ■ All seismic zone (A-F) and cracked concrete approved ■ Fully-threaded ■ Length ID head stamped ■ Through-fixture fastening	**Diameter:** 3/8, 1/2, 5/8 & 3/4 **Length:** 3 – 8-1/2
 **Trubolt®+ SS** Seismic Wedge Anchors  (see page 72)	■ 2015 IBC Compliant ■ ICC-ES ESR 2427 for Cracked and Uncracked Concrete ■ Patented grooved clip design ■ Meets ductility requirements of ACI 318 D.3 3 ■ Fully threaded ■ Anchor body and clip are Made in the U.S.A.	**Diameter:** 1/2 and 5/8 **Length:** 3-3/4 - 7
 **Large Diameter Tapcon (LDT) and LDTX** Self-Threading Anchor  	■ Anti-rotation serrated washer ■ Extra large hex washer head ■ Length ID head stamped ■ Through-fixture fastening	**LDT with Zinc Plating** **Diameter:** 3/8 – 3/4 **Length:** 1-3/4 – 6-1/4 **LDTX with EnvireX Coating** **Diameter:** 3/8 & 1/2 **Length:** 3 – 5
Tapcon®+ Self-Threading Anchor 	■ Approved for concrete in uncracked, cracked, and seismic conditions ■ Easy installation ■ Blue Climaseal for superior corrosion resistance ■ Removable	**Diameter:** 1/4 – 1/2 **Length:** 2-1/4 – 6
Boa™ Coil Expansion Anchors 	■ Heavy-Duty, Reusable Fastening ■ Easy installation ■ Removable ■ High shear strength ■ Zinc plated carbon steel to ASTM B633, SC1, Type III	**Diameter:** 1/2 – 3/4 **Length:** 3 – 6
 **Multi-Set II®** Drop-In Anchors  RM RL RX CL	■ RM: Flanged body to keep anchor flush with surface of concrete ■ RL: Non-flanged body for recessed setting ■ RX: Designed for hollow core and post tension concrete ■ CL: Designed for one-sided forming, accepts coil rod	**Diameter:** 1/4 – 3/4 **Length:** 1 – 3-3/16 **Diameter:** 1/4 – 3/4 **Length:** 1 – 3-3/16 **Diameter:** 3/8 & 1/2 **Length:** 3/4 - 1 **Diameter:** 1/2 & 3/4 **Length:** 2 & 3-3/16

	CORROSION RESISTANCE	PERFORMANCE	HEAD STYLES	APPROVALS/LISTINGS
Trubolt cont'd	■ Zinc-plated carbon steel to ASTM B633, SC1, Type III ■ Hot dipped galvanized to ASTM A-153 ■ Type 304 and 316 stainless steel	Ultimate Pullout Performance in 4000 psi Concrete up to 26,540 lbs. (1" diameter)	Hex nut Tie-Wire version	ICC Evaluation Service, Inc. ESR-2251 Underwriters Laboratories Factory Mutual Caltrans Meets or exceeds U.S. Government G.S.A. Specification A-A-1923A Type 4 (formerly GSA: FF-S-325 Group II, Type 4, Class 1)
Trubolt+ cont'd	■ Zinc-plated carbon steel to ASTM B633, SC1, Type III	Pullout strength of 4,980 lbs in 2,500 psi Cracked Concrete (1/2" diameter).	Hex nut	ICC Evaluation Service, Inc. # ESR-2427 -Category 1 performance rating -2015 IBC compliant -Meets ACI 318 ductility requirements -Tested in accordance with ACI 355.2 & ICC-ES AC193 -Listed for use in seismic zones A, B, C, D, E, & F -3/8", 1/2", 5/8" and 3/4" diameter anchors listed in ESR-2427 City of Los Angeles - #RR25867 Florida Building Code (FBC)
Trubolt+ SS cont'd	■ Stainless Steel AISI 316	Pullout strength of 4,980 lbs in 2,500 psi Cracked Concrete (1/2" diameter).	Hex nut	ICC-ES ESR 2427 for cracked and uncracked concrete Apprroved for use in ALL SEISMIC ZONES (A-F) 2015 International Building Code (IBC) 2015 International Residential Code (IRC) Florida Building Code (FBC)
LDT cont'd	■ Zinc-plated carbon steel to ASTM B695 & B633 ■ Type 410 stainless steel	Ultimate Pullout Performance in 4,000 psi Concrete up to 23,266 lbs. (3/4" diameter)	Finished bolt style	
	■ Envirex™ coating Approved for use in ACQ and MCQ lumber* *Excessive content of copper in the ACQ and MCQ lumber may affect the anchor finish.			1,000 hours salt spray ASTM B117
Tapcon+ cont'd	■ Blue Climaseal coated for superior corrosion resistance	Ultimate Pullout Performance in 4000 psi Concrete up to 38,500 lbs. (3/4" diameter)	Finished bolt style	ICC-EC ESR 3699
Multi-Set II Drop-In cont'd	■ Zinc-plated carbon steel to ASTM B633, SC1, Type III ■ Type 304 and 316 stainless steel	Ultimate Pullout Performance in 4000 psi Concrete up to 9,480 lbs. (3/4" diameter)	RM: Flanged body RL: Non-flanged body Use any bolt or threaded rod	GSA: A-A-55614 Type 1 (Formerly GSA: FF-S-325 Group VIII) Underwriters Laboratories Factory Mutual Caltrans
Dynabolt cont'd	■ Zinc-plated carbon steel to ASTM B633, SC1, Type III ■ Type 304 stainless steel	Ultimate Pullout Performance in 4000 psi Concrete up to 8,900 lbs. (3/4" diameter)	Flat head Hex nut Acorn nut Tie-Wire Round head Threshold flat head	GSA: A-A-1922A (Formerly GSA: FF-S-325 Group II, Type 3, Class 3) Factory Mutual

Anchors for Concrete Applications

continued from pages 50-51

ANCHOR TYPE		KEY FEATURES	SIZE RANGE (Inches)
Tapcon® Concrete Anchors with Advanced Threadform Technology™	 Original  Maxi-Set  SCOTS  XL  StormGuard		
Hammer-Set™ Nail-drive Anchors		■ Easy installation ■ Low profile head ■ Through-fixture fastening	**Diameter:** 3/16 & 1/4 **Length:** 7/8 – 2
Dynabolt® Masonry Sleeve Anchors	 **For both Hollow and Solid Concrete Applications**	■ Concrete, block and brick ■ Many choices of head styles ■ Through-fixture fastening ■ Available in 304 stainless steel	**Diameter:** 1/4 – 3/4 **Length:** 5/8 – 6-1/4

	CORROSION RESISTANCE	PERFORMANCE	HEAD STYLES	APPROVALS/LISTINGS
Tapcon cont'd	■ Patented Trade Secret Climaseal® coating ■ Type 410 stainless steel	Ultimate Pullout Performance in 4000 psi Concrete up to 2,380 lbs.	Hex head Phillips flat head	**Blue Climaseal™** ICC Evaluation Service, Inc.– ESR-1671 ICC Evaluation Service, Inc.– ESR-2202 Miami-Dade County Florida Building Code **410 Stainless Steel** Miami-Dade County Florida Building Code
	The above is for the Original and 410 SS Tapcon only. For data on other Tapcon products see their product pages as follows: Tapcon Maxi-Set on page 94, Tapcon SCOTS on page 94, Tapcon XL on page 98, and Tapcon StormGuard on page 100.			
Hammer-Set cont'd	■ Zinc alloy	Ultimate Pullout Performance in 4000 psi Concrete up to 793 lbs.	Mushroom head	GSA: A-A-1925A Type 1 (zinc mushroom) (Formerly GSA: FF-S-325 Group V, Type 2, Class 3)
Boa Coil cont'd	■ Zinc plated carbon steel to ASTM B633, SC1, Type III	Ultimate Pullout Performance in 4000 psi Concrete up to 38,500 lbs. (3/4" diameter)	Finished bolt style	

RED HEAD®
CONCRETE ANCHORING SPECIALISTS

Trubolt® Wedge Anchors

Dependable, Heavy-Duty, Inspectable, Wedge Type Expansion Anchor

2015 IBC Compliant

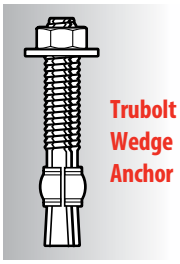
Trubolt®
Wedge Anchors

DESCRIPTION/SUGGESTED SPECIFICATIONS

Wedge Type Anchors—

SPECIFIED FOR ANCHORAGE INTO CONCRETE

Trubolt Wedge anchors feature a stainless steel expansion clip, threaded stud body, nut and washer. Anchor bodies are made of plated carbon steel, hot-dipped galvanized carbon steel, type 304 stainless steel or type 316 stainless steel as identified in the drawings or other notations.



Trubolt Wedge Anchor

The exposed end of the anchor is stamped to identify anchor length. Stampings should be preserved during installation for any subsequent embedment verification.

Use carbide tipped hammer drill bits made in accordance with ANSI B212.15-1994 to install anchors.

Anchors are tested to ACI 355.2 and ICC-ES AC193. Anchors are listed by the following agencies as required by the local building code: ICC-ES, UL, FM, and Caltrans.

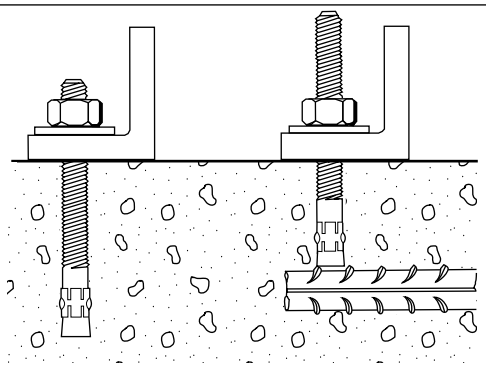
See Appendix B (pages 106-107) for performance values in accordance to 2015 IBC.

ADVANTAGES

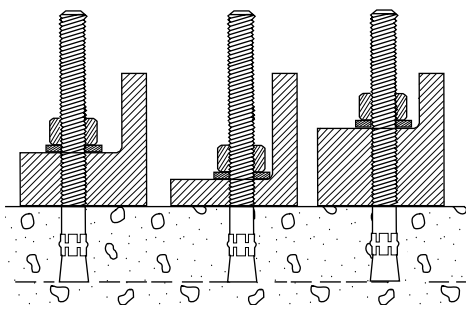
- 2015 International Building Code (IBC) Compliant for 1/4" through 1/2" diameters-carbon steel
- Versatile fully threaded design is standard on sizes up to 1" diameter and 10" length
- Anchor diameter equals hole diameter
- Standard carbon and stainless steel anchors
- Non bottom-bearing, may be used in hole depth exceeding anchor length
- Can be installed through the work fixture, eliminating hole spotting
- Inspectable torque values, indicating proper installation

Fully Threaded Advantage

Trubolt's fully threaded feature eliminates subsurface obstruction problems.



Fully threaded design accommodates various material thicknesses at the same embedment. One anchor length saves time and money.



APPLICATIONS

Anchoring machinery and conveyors is a common wedge anchor application. The Trubolt is fully threaded to allow a large range of embedment and fixture thickness.

LENGTH INDICATION CODE*

CODE	LENGTH OF ANCHOR	CODE	LENGTH OF ANCHOR
A	1-1/2 < 2 (38.1 < 50.8)	K	6-1/2 < 7 (165.1 < 177.8)
B	2 < 2-1/2 (50.8 < 63.5)	L	7 < 7-1/2 (177.8 < 190.5)
C	2-1/2 < 3 (63.5 < 76.2)	M	7-1/2 < 8 (190.5 < 203.2)
D	3 < 3-1/2 (76.2 < 88.9)	N	8 < 8-1/2 (203.2 < 215.9)
E	3-1/2 < 4 (88.9 < 101.6)	O	8-1/2 < 9 (215.9 < 228.6)
F	4 < 4-1/2 (101.6 < 114.3)	P	9 < 9-1/2 (228.6 < 241.3)
G	4-1/2 < 5 (114.3 < 127.0)	Q	9-1/2 < 10 (241.3 < 254.0)
H	5 < 5-1/2 (127.0 < 139.7)	R	10 < 11 (254.0 < 279.4)
I	5-1/2 < 6 (139.7 < 152.4)	S	11 < 12 (279.4 < 304.8)
J	6 < 6-1/2 (152.4 < 165.1)	T	12 < 13 (304.8 < 330.2)

*Located on top of anchor for easy inspection.

FEATURES

TRUBOLT® WEDGE ANCHOR

Length ID Head Stamp—provides for embedment inspection after installation

Fully Threaded Design

Cold-Formed—manufacturing process adds strength

Stainless steel split expansion ring

Anchor Body—available in zinc-plated steel, hot-dipped galvanized steel, 304 stainless steel and 316 stainless steel

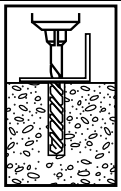
APPROVALS/LISTINGS

Trubolt®
Wedge Anchors

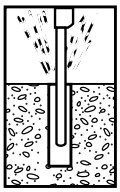
ICC Evaluation Service, Inc. ESR-2251
- – Category 1 performance rating
- – 2015 IBC compliant
- – Meets ACI 318 ductility requirements
- – Tested in accordance with ACI 355.2 and ICC-ES AC193
- – For use in seismic zones A & B
- – 1/4", 3/8" & 1/2" diameter anchors listed in ESR-2251

Underwriters Laboratories
Factory Mutual
Caltrans
Meets or exceeds U.S. Government G.S.A. Specification A-A-1923A Type 4 (formerly GSA: FF-S-325 Group II, Type 4, Class 1)
Made in USA

INSTALLATION STEPS

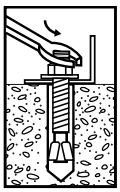


1. Select a carbide drill bit with a diameter equal to the anchor diameter. Drill hole to any depth exceeding the desired embedment. See chart for minimum recommended embedment.



2. Clean hole or continue drilling additional depth to accommodate drill fines.

3. Assemble washer and nut, leaving top of stud exposed through nut. Drive anchor through material to be fastened until washer is flush to surface of material.



4. Expand anchor by tightening nut 3-5 turns past the hand tight position, or to the specified torque requirement.

**** ONLY FOR USE IN CONCRETE****

Trubolt Carbon Steel with Zinc Plating

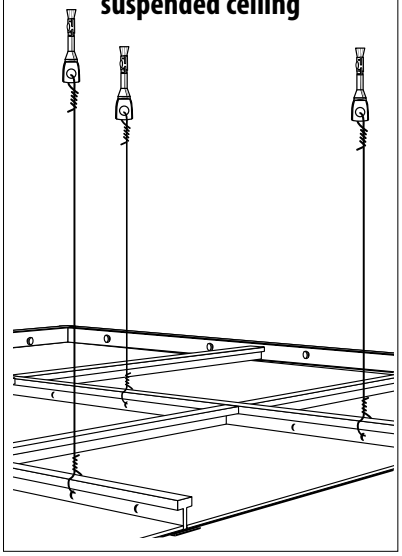
Meets ASTM B633 SC1, Type III specifications for electroplating of 5um = .0002" thickness. This material is well suited for non-corrosive environments.

Typical Applications—Structural Columns, Machinery, Equipment, etc.

Environment—Interior (non-corrosive)

Level of Corrosion—Low

Tie Wire Wedge for hanging suspended ceiling



PART NUMBER	THREAD LENGTH In. (mm)	ANCHOR DIA. & DRILL BIT SIZE (THREADS) PER INCH	OVERALL LENGTH In. (mm)	MAX. THICKNESS OF MATERIAL TO BE FASTENED In. (mm)	QTY/WT PER BOX lbs.	QTY/WT PER MASTER CARTON lbs.
WS-1416	3/4 (19.1)	1/4" - 20	1-3/4 (44.5)	3/8 (9.5)	100/ 3.1	1000/ 32
WS-1422	1-1/4 (31.8)		2-1/4 (57.2)	7/8 (22.2)	100/ 3.6	1000/ 37
WS-1432	2-1/4 (57.2)		3-1/4 (82.6)	1-7/8 (47.6)	100/ 4.7	800/ 39
WS-3822	1-1/8 (28.6)	3/8" - 16	2-1/4 (57.2)	3/8 (9.5)	50/ 4.1	500/ 41
WS-3826	1-5/8 (41.3)		2-3/4 (69.9)	7/8 (22.2)	50/ 4.7	400/ 39
WS-3830	1-3/4 (44.5)		3 (76.2)	1-1/8 (28.6)	50/ 5.0	400/ 41
WS-3836	2-1/2 (63.5)		3-3/4 (95.3)	1-7/8 (47.6)	50/ 5.9	300/ 36
WS-3850	3-3/4 (95.2)		5 (127.0)	3-1/8 (79.4)	50/ 7.4	250/ 38
WS-3870	3-7/8 (98.4)		7 (177.8)	5-1/8 (130.2)	50/ 10.4	250/ 53
WS-1226	1-1/4 (31.8)	1/2" - 13	2-3/4 (69.9)	1/8 (3.2)	25/ 4.6	200/ 38
WS-1236	2-1/4 (57.2)		3-3/4 (95.3)	1 (25.4)	25/ 5.7	150/ 35
WS-1242	2-3/4 (69.9)		4-1/4 (108.0)	1-1/2 (38.1)	25/ 6.2	150/ 38
WS-1244	3 (76.2)		4-1/2 (114.3)	1-3/4 (44.5)	25/ 6.5	150/ 39
WS-1254	4 (101.6)		5-1/2 (139.7)	2-3/4 (69.9)	25/ 7.7	150/ 47
WS-1270	5-1/2 (139.7)		7 (177.8)	4-1/4 (108.0)	25/ 9.3	150/ 57
WS-5834	1-3/4 (44.5)	5/8" - 11	3-1/2 (88.9)	1/8 (3.2)	10/ 3.6	100/ 37
WS-5842	2-1/2 (63.5)		4-1/4 (108.0)	7/8 (22.2)	10/ 4.1	100/ 42
WS-5850	3-1/4 (82.6)		5 (127.0)	1-5/8 (41.3)	10/ 4.7	100/ 48
WS-5860	4-1/4 (107.9)		6 (152.4)	2-5/8 (66.7)	10/ 5.4	50/ 28
WS-5870	5-1/4 (133.4)		7 (177.8)	3-5/8 (92.1)	10/ 6.2	30/ 19
WS-5884	5-3/4 (146.0)		8-1/2 (215.9)	5-1/8 (130.2)	10/ 8.0	30/ 25
WS-58100	5-3/4 (146.0)		10 (254.0)	6-5/8 (168.3)	10/ 9.4	30/ 29
WS-3442	2-3/8 (60.3)	3/4" - 10	4-1/4 (108.0)	1/4 (31.8)	10/ 6.8	60/ 42
WS-3446	2-7/8 (73.0)		4-3/4 (120.7)	3/4 (19.1)	10/ 7.4	60/ 45
WS-3454	3-5/8 (92.1)		5-1/2 (139.7)	1-1/2 (38.1)	10/ 8.1	50/ 41
WS-3462	4-3/8 (111.1)		6-1/4 (158.8)	2-1/4 (57.2)	10/ 9.1	30/ 28
WS-3470	5-1/8 (130.2)		7 (177.8)	3 (76.2)	10/ 9.7	30/ 30
WS-3484	5-3/4 (146.0)		8-1/2 (215.9)	4-1/2 (114.3)	10/ 12.3	30/ 38
WS-34100	5-3/4 (146.0)		10 (254.0)	6 (152.4)	10/ 14.0	30/ 43
WS-34120	1-3/4 (44.5)		12 (304.8)	8 (203.2)	10/ 16.6	30/ 51
WS-7860	2-1/2 (63.5)	7/8" - 9	6 (152.4)	1-3/8 (34.9)	5/ 6.3	25/ 32
WS-7880	2-1/2 (63.5)		8 (203.2)	3-3/8 (85.7)	5/ 8.1	15/ 25
WS-78100	2-1/2 (63.5)		10 (254.0)	5-3/8 (136.5)	5/ 9.8	15/ 30
WS-10060	2-1/2 (63.5)	1" - 8	6 (152.4)	1/2 (12.7)	5/ 8.3	25/ 43
WS-10090	2-1/2 (63.5)		9 (228.6)	3-1/2 (88.9)	5/ 11.6	15/ 36
WS-100120	2-1/2 (63.5)		12 (304.8)	6-1/2 (165.1)	5/ 15.0	15/ 46
TIE WIRE						
TW-1400	N/A	1/4"	2-1/8 (54.0)	9/32-hole (7.1)	100/ 3.6	1000/ 36
TW-1400 K	N/A		2-1/8 (54.0)	9/32-hole (7.1)	BULK	1500/ 73

Trubolt Carbon Steel with Hot-Dipped Galvanizing

Meets ASTM A153 Class specifications for hot-dipped galvanizing > 45um = .002". It is highly recommended for damp, humid environments near coastal regions. Hot-dipped galvanized Trubolts have a coating thickness of zinc that is almost 10 times as thick as electroplating. This creates greater corrosion resistance at a minimal cost.

Typical Applications—Railings, Signage, Awnings, etc.

Environment—Rural/Suburban (exterior environment—essentially unpolluted areas)

Level of Corrosion—Low to Medium

PART NUMBER	THREAD LENGTH In. (mm)	ANCHOR DIA. & DRILL BIT SIZE (THREADS) PER INCH	OVERALL LENGTH In. (mm)	MAX. THICKNESS OF MATERIAL TO BE FASTENED In. (mm)	QTY/WT PER BOX lbs.	QTY/WT PER MASTER CARTON lbs.
WS-1226G	1-1/4 (31.8)	1/2" - 13	2-3/4 (69.9)	1/8 (3.2)	25/ 4.8	200/ 39
WS-1242G	2-3/4 (69.9)		4-1/4 (108.0)	1-1/2 (38.1)	25/ 6.7	150/ 41
WS-1254G	4 (101.6)		5-1/2 (139.7)	2-3/4 (69.9)	25/ 8.0	150/ 49
WS-1270G	5-1/2 (139.7)		7 (177.8)	4-1/4 (108.0)	25/ 9.7	150/ 59
WS-5834G	1-3/4 (44.5)	5/8" - 11	3-1/2 (88.9)	1/8 (3.2)	10/ 3.7	100/ 38
WS-5860G	4-1/4 (107.9)		6 (152.4)	2-5/8 (66.7)	10/ 5.6	50/ 29
WS-3446G	2-7/8 (73.0)	3/4" - 10	4-3/4 (120.7)	3/4 (19.1)	10/ 7.5	60/ 46
WS-3454G	3-5/8 (92.1)		5-1/2 (139.7)	1-1/2 (38.1)	10/ 8.4	50/ 42
WS-3484G	5-3/4 (146.0)		8-1/2 (215.9)	4-1/2 (114.3)	10/ 12.5	30/ 38

Trubolt Type 304 Stainless Steel

Serves many applications well. It withstands rusting in architectural and food processing environments and resists organic chemicals, dye stuffs and many inorganic chemicals.

Typical Applications—Cladding, Stadium Seating, etc.

Environment—Urban (slight to moderate degree of pollution)

Level of Corrosion—Medium

PART NUMBER	THREAD LENGTH In. (mm)	ANCHOR DIA. & DRILL BIT SIZE (THREADS) PER INCH	OVERALL LENGTH In. (mm)	MAX. THICKNESS OF MATERIAL TO BE FASTENED In. (mm)	QTY/WT PER BOX lbs.	QTY/WT PER MASTER CARTON lbs.
WW-1416	3/4 (19.1)	1/4" - 20	1-3/4 (44.5)	3/8 (9.5)	100/ 3.2	1000/ 32
WW-1422	1-1/4 (31.8)		2-1/4 (57.2)	7/8 (22.2)	100/ 3.7	1000/ 37
WW-1432	2-1/4 (57.2)		3-1/4 (82.6)	1-7/8 (47.6)	100/ 4.8	800/ 39
WW-3822	1-1/8 (28.6)	3/8" - 16	2-1/4 (57.2)	3/8 (9.5)	50/ 4.1	500/ 41
WW-3826	1-5/8 (41.3)		2-3/4 (69.9)	7/8 (22.2)	50/ 4.8	400/ 39
WW-3830	1-3/4 (44.5)		3 (76.2)	1-1/8 (28.6)	50/ 5.1	400/ 42
WW-3836	2-1/2 (63.5)		3-3/4 (95.3)	1-7/8 (47.6)	50/ 6.0	300/ 37
WW-3850	3-3/4 (95.3)		5 (127.0)	3-1/8 (79.4)	50/ 7.5	250/ 39
WW-1226	1-1/4 (31.8)	1/2" - 13	2-3/4 (69.9)	1/8 (3.2)	25/ 4.7	200/ 38
WW-1236	2-1/4 (57.2)		3-3/4 (95.3)	1 (25.4)	25/ 5.8	150/ 36
WW-1242	2-3/4 (69.9)		4-1/4 (108.0)	1-1/2 (38.1)	25/ 6.3	150/ 39
WW-1254	3 (76.2)		5-1/2 (139.7)	2-3/4 (69.9)	25/ 7.7	150/ 47
WW-1270	3-1/2 (88.9)		7 (177.8)	4-1/4 (108.0)	25/ 9.4	150/ 57
WW-5834	1-3/4 (44.5)	5/8" - 11	3-1/2 (88.9)	1/8 (3.2)	10/ 3.6	100/ 37
WW-5842	2-1/2 (63.5)		4-1/4 (108.0)	7/8 (22.2)	10/ 4.2	100/ 43
WW-5850	3-1/4 (82.6)		5 (127.0)	1-5/8 (41.3)	10/ 4.8	100/ 49
WW-5860	4-1/4 (107.9)		6 (152.4)	2-5/8 (66.7)	10/ 5.5	50/ 28
WW-5870	3-1/2 (88.9)		7 (177.8)	3-5/8 (92.1)	10/ 6.2	30/ 20
WW-5884	3-1/2 (88.9)		8-1/2 (215.9)	5-1/8 (130.2)	10/ 8.0	30/ 25
WW-3446	2-7/8 (73.0)	3/4" - 10	4-3/4 (120.7)	3/4 (19.1)	10/ 6.7	60/ 41
WW-3454	3-5/8 (92.1)		5-1/2 (139.7)	1-1/2 (38.1)	10/ 7.5	50/ 38
WW-3470	3-1/2 (88.9)		7 (177.8)	3 (76.2)	10/ 9.2	30/ 28
WW-3484	3-1/2 (88.9)		8-1/2 (215.9)	4-1/2 (114.3)	10/ 12.3	30/ 38
WW-34100	1-3/4 (44.5)		10 (254.0)	6 (152.4)	10/ 13.5	30/ 42
WW-10060	2-1/2 (63.5)	1" - 8	6 (152.4)	1/2 (12.7)	5/ 8.3	25/ 43
WW-10090	2-1/2 (63.5)		9 (228.6)	3-1/2 (88.9)	5/ 11.4	15/ 35

* For continuous extreme low temperature applications, use stainless steel.

SELECTION CHARTS

Trubolt Type 316 Stainless Steel

Contains more nickel and chromium than Type 304, and 2%-3% molybdenum, which gives it better corrosion resistance. It is especially more effective in chloride environments that tend to cause pitting.

Typical Applications—Pumps, Diffusers, Gates, Weir Plates, etc.

Environment—Industrial (moderate to heavy atmospheric pollution)

Level of Corrosion—Medium to High

Typical Applications—Tunnels, Dams, Tiles, Lighting Fixtures, etc.

Environment—Marine (heavy atmospheric pollution)

Level of Corrosion—High

PART NUMBER	THREAD LENGTH In. (mm)	ANCHOR DIA. & DRILL BIT SIZE (THREADS) PER INCH	OVERALL LENGTH In. (mm)	MAX. THICKNESS OF MATERIAL TO BE FASTENED In. (mm)	QTY/WT PER BOX lbs.	QTY/WT PER MASTER CARTON lbs.
SWW-1422	1-1/4 (31.8)	1/4" - 20	2-1/4 (57.2)	7/8 (22.2)	100/ 3.7	1000/ 37
SWW-1432	2-1/4 (57.2)		3-1/4 (82.6)	1-1/8 (28.6)	100/ 4.8	1000/ 39
SWW-3822	1-1/8 (28.6)	3/8" - 16	2-1/4 (57.2)	3/8 (9.5)	50/ 4.1	500/ 41
SWW-3826	1-5/8 (41.3)		2-3/4 (69.9)	7/8 (22.2)	50/ 4.8	400/ 39
SWW-3830	1-3/4 (44.5)		3 (76.2)	1-1/8 (28.6)	50/ 5.2	400/ 42
SWW-3836	2-1/2 (63.5)		3-3/4 (95.5)	1-7/8 (47.6)	50/ 6.0	300/ 37
SWW-3850	3-3/4 (95.3)		5 (127.0)	3-1/8 (79.4)	50/ 7.5	250/ 39
SWW-1226	1-1/4 (31.8)	1/2" - 13	2-3/4 (69.9)	1/8 (3.2)	25/ 4.7	200/ 39
SWW-1236	2-1/4 (57.2)		3-3/4 (95.3)	1 (25.4)	25/ 5.8	150/ 36
SWW-1242	2-3/4 (69.9)		4-1/4 (108.0)	1-1/2 (38.1)	25/ 6.5	150/ 40
SWW-1254	3 (76.2)		5-1/2 (139.7)	2-3/4 (69.9)	25/ 7.8	150/ 48
SWW-5842	2-1/2 (63.5)	5/8" - 11	4-1/4 (108.0)	7/8 (22.2)	10/ 4.2	100/ 43
SWW-5850	3-1/4 (82.6)		5 (127.0)	1-5/8 (41.3)	10/ 4.8	100/ 49
SWW-5870	3-1/2 (88.9)		7 (177.8)	3-5/8 (92.1)	10/ 6.7	30/ 21

* For continuous extreme low temperature applications, use stainless steel.

PERFORMANCE TABLE

Trubolt Wedge Anchors

Ultimate Tension and Shear Values (Lbs/kN) in Concrete*

ANCHOR DIA. In. (mm)	INSTALLATION TORQUE Ft. Lbs. (Nm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	f'c = 2000 PSI (13.8 MPa)		f'c = 4000 PSI (27.6 MPa)		f'c = 6000 PSI (41.4 MPa)	
				TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	4 (5.4)	1-1/8 (28.6)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	1,180 (5.2)	1,400 (6.2)	1,780 (7.9)	1,400 (6.2)	1,900 (8.5)	1,400 (6.2)
		1-15/16 (49.2)		2,100 (9.3)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)
		2-1/8 (54.0)		2,260 (10.1)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)
3/8 (9.5)	25 (33.9)	1-1/2 (38.1)		1,620 (7.5)	2,320 (10.3)	2,240 (10.0)	2,620 (11.7)	2,840 (12.6)	3,160 (14.1)
		3 (76.2)		3,480 (15.5)	4,000 (17.8)	5,940 (26.4)	4,140 (18.4)	6,120 (27.2)	4,500 (20.0)
		4 (101.6)		4,800 (21.4)	4,000 (17.8)	5,940 (26.4)	4,140 (18.4)	6,120 (27.2)	4,500 (20.0)
1/2 (12.7)	55 (74.6)	2-1/4 (57.2)		3,455 (20.7)	4,760 (21.2)	4,920 (22.7)	4,760 (21.2)	6,025 (31.3)	7,040 (31.3)
		4-1/8 (104.8)		4,660 (20.7)	7,240 (32.2)	9,640 (42.9)	7,240 (32.2)	10,820 (48.1)	8,160 (36.3)
		6 (152.4)		5,340 (23.8)	7,240 (32.2)	9,640 (42.9)	7,240 (32.2)	10,820 (48.1)	8,160 (36.3)
5/8 (15.9)	90 (122.0)	2-3/4 (69.9)		5,185 (29.3)	7,120 (31.7)	7,180 (31.9)	7,120 (31.7)	9,225 (43.2)	9,616 (42.8
		5-1/8 (130.2)		6,580 (29.3)	9,600 (42.7)	14,920 (66.4)	11,900 (52.9)	16,380 (72.9)	12,520 (55.7)
		7-1/2 (190.5)		7,060 (31.4)	9,600 (42.7)	15,020 (66.8)	11,900 (52.9)	16,380 (72.9)	12,520 (55.7)
3/4 (19.1)	110 (149.2)	3-1/4 (82.6)		6,765 (31.7)	10,120 (45.0)	10,840 (48.2)	13,720 (61.0)	13,300 (59.2)	15,980 (71.1)
		6-5/8 (168.3)		10,980 (48.8)	20,320 (90.4)	17,700 (78.7)	23,740 (105.6)	20,260 (90.1)	23,740 (105.6)
		10 (254.0)		10,980 (48.8)	20,320 (90.4)	17,880 (79.5)	23,740 (105.6)	23,580 (104.9)	23,740 (105.6)
7/8 (22.2)	250 (339.0)	3-3/4 (95.3)		9,290 (42.3)	13,160 (58.5)	14,740 (65.6)	16,580 (73.8)	17,420 (77.5)	19,160 (85.2)
		6-1/4 (158.8)		14,660 (65.2)	20,880 (92.9)	20,940 (93.1)	28,800 (128.1)	24,360 (108.4)	28,800 (128.1)
		8 (203.2)		14,660 (65.2)	20,880 (92.9)	20,940 (93.1)	28,800 (128.1)	24,360 (108.4)	28,800 (128.1)
1 (25.4)	300 (406.7)	4-1/2 (114.3)		11,770 (62.0)	16,080 (71.5)	19,245 (89.8)	22,820 (101.5)	21,180 (94.2)	24,480 (108.9)
		7-3/8 (187.3)		14,600 (64.9)	28,680 (127.6)	23,980 (106.7)	37,940 (168.8)	33,260 (148.0)	38,080 (169.4)
		9-1/2 (241.3)		18,700 (83.2)	28,680 (127.6)	26,540 (118.1)	37,940 (168.8)	33,260 (148.0)	38,080 (169.4)

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

* For Tie-Wire Wedge Anchor, TW-1400, use tension data from 1/4" diameter with 1-1/8" embedment.

* For continuous extreme low temperature applications, use stainless steel.

PERFORMANCE TABLE

Trubolt Wedge Anchors

Ultimate Tension and Shear Values (Lbs/kN) in Lightweight Concrete*

ANCHOR DIA. In. (mm)	INSTALLATION TORQUE Ft. Lbs. (Nm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	LIGHTWEIGHT CONCRETE f'c = 3000 PSI (20.7 MPa)		LOWER FLUTE OF STEEL DECK WITH LIGHTWEIGHT CONCRETE FILL f'c = 3000 PSI (20.7 MPa)	
				TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/8 (9.5)	25 (33.9)	1-1/2 (38.1)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	1,175 (5.2)	1,480 (6.6)	1,900 (8.5)	3,160 (14.1)
		3 (76.2)		2,825 (12.6)	2,440 (10.9)	2,840 (12.6)	4,000 (17.8)
1/2 (12.7)	55 (74.6)	2-1/4 (57.2)		2,925 (13.0)	2,855 (12.7)	3,400 (15.1)	5,380 (23.9)
		3 (76.2)		3,470 (15.4)	3,450 (15.3)	4,480 (19.9)	6,620 (29.4)
		4 (101.6)		4,290 (19.1)	3,450 (15.3)	4,800 (21.4)	6,440 (28.6)
5/8 (15.9)	90 (122.0)	3 (76.2)		4,375 (19.5)	4,360 (19.4)	4,720 (21.0)	5,500 (24.5)
		5 (127.0)		6,350 (28.2)	6,335 (28.2)	6,580 (29.3)	9,140 (40.7)
3/4 (19.1)	110 (149.2)	3-1/4 (82.6)		5,390 (24.0)	7,150 (31.8)	5,840 (26.0)	8,880 (39.5)
		5-1/4 (133.4)		7,295 (32.5)	10,750 (47.8)	7,040 (31.3)	N/A

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

PERFORMANCE TABLE

Trubolt Wedge Anchors

Recommended Edge and Spacing Distance Requirements for Shear Loads*

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. EDGE DISTANCE AT WHICH THE LOAD FACTOR APPLIED = .60 In. (mm)	MIN. EDGE DISTANCE AT WHICH THE LOAD FACTOR APPLIED = .20 In. (mm)	SPACING REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE SPACING BETWEEN ANCHORS In. (mm) LOAD FACTOR APPLIED = .40
1/4 (6.4)	1-1/8 (28.6) 1-15/16 (49.2)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	2 (50.8) 1-15/16 (49.2)	1-5/16 (33.3) 1 (25.4)	N/A N/A	3-15/16 (100.0) 3-7/8 (98.4)	2 (50.8) 1-15/16 (49.2)
3/8 (9.5)	1-1/2 (38.1) 3 (76.2)		2-5/8 (66.7) 3-3/4 (95.3)	1-3/4 (44.5) 3 (76.2)	N/A 1-1/2 (38.1)	5-1/4 (133.4) 6 (152.4)	2-5/8 (66.7) 3 (76.2)
1/2 (12.7)	2-1/4 (57.2) 4-1/8 (104.8)		3-15/16 (100.0) 5-3/16 (131.8)	2-9/16 (65.1) 3-1/8 (79.4)	N/A 1-9/16 (39.7)	7-7/8 (200.0) 6-3/16 (157.2)	3-15/16 (100.0) 3-1/8 (79.4)
5/8 (15.9)	2-3/4 (69.9) 5-1/8 (130.2)		4-13/16 (122.2) 6-7/16 (163.5)	3-1/8 (79.4) 3-7/8 (98.4)	N/A 1-15/16 (49.2)	9-5/8 (244.5) 7-11/16 (195.3)	4-13/16 (122.2) 3-7/8 (98.4)
3/4 (19.1)	3-1/4 (82.6) 6-5/8 (168.3)		5-11/16 (144.5) 6-5/16 (160.3)	3-3/4 (95.3) 5 (127.0)	N/A 2-1/2 (63.5)	11-3/8 (288.9) 9-15/16 (252.4)	5-11/16 (144.5) 5 (127.0)
7/8 (22.2)	3-3/4 (95.3) 6-1/4 (158.8)		6-9/16 (166.7) 8-1/2 (215.9)	4-5/16 (109.5) 6-1/4 (158.8)	N/A 3-1/8 (79.4)	13-1/8 (333.4) 12-1/2 (317.5)	6-9/16 (166.7) 6-1/4 (158.8)
1 (25.4)	4-1/4 (108.0) 7-3/8 (187.3)		7-7/8 (200.0) 10-1/16 (255.6)	5-1/8 (130.2) 7-3/8 (187.3)	N/A 3-11/16 (93.7)	15-3/4 (400.1) 14-3/4 (374.7)	7-7/8 (200.0) 7-3/8 (187.3)

* Spacing and edge distances shall be divided by 0.75 when anchors are placed in structural lightweight concrete. Linear interpolation may be used for intermediate spacing and edge distances.

PERFORMANCE TABLE

Trubolt Wedge Anchors

Recommended Edge and Spacing Distance Requirements for Tension Loads*

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE EDGE DISTANCE AT WHICH THE LOAD FACTOR APPLIED = .65 In. (mm)	SPACING REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE SPACING AT WHICH THE LOAD FACTOR APPLIED = .70 In. (mm)
1/4 (6.4)	1-1/8 (28.6) 1-15/16 (49.2) 2-1/8 (54.0)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	2 (50.8) 1-15/16 (49.2) 1-5/8 (41.3)	1 (25.4) 1 (25.4) 13/16 (20.6)	3-15/16 (100.0) 3-7/8 (98.4) 3-3/16 (81.0)	2 (50.8) 1-15/16 (49.2) 1-5/8 (41.3)
3/8 (9.5)	1-1/2 (38.1) 3 (76.2) 4 (101.6)		2-5/8 (66.7) 3 (76.2) 3 (76.2)	1-5/16 (33.3) 1-1/2 (38.1) 1-1/2 (38.1)	5-1/4 (133.4) 6 (152.4) 6 (152.4)	2-5/8 (66.7) 3 (76.2) 3 (76.2)
1/2 (12.7)	2-1/4 (57.2) 4-1/8 (104.8) 6 (152.4)		3-15/16 (100.0) 3-1/8 (79.4) 4-1/2 (114.3)	2 (50.8) 1-9/16 (39.7) 2-1/4 (57.2)	7-7/8 (200.0) 6-3/16 (157.2) 9 (228.6)	3-15/16 (100.0) 3-1/8 (79.4) 4-1/2 (114.3)
5/8 (15.9)	2-3/4 (69.9) 5-1/8 (130.2) 7-1/2 (190.5)		4-13/16 (122.2) 3-7/8 (98.4) 5-5/8 (142.9)	2-7/16 (61.9) 1-15/16 (49.2) 2-13/16 (71.4)	9-5/8 (244.5) 7-1/16 (195.3) 11-1/4 (285.8)	4-13/16 (122.2) 3-7/8 (98.4) 5-5/8 (142.9)
3/4 (19.1)	3-1/4 (82.6) 6-5/8 (168.3) 10 (254.0)		5-11/16 (144.5) 5 (127.0) 7-1/2 (190.5)	2-7/8 (73.0) 2-1/2 (63.5) 3-3/4 (95.3)	11-3/8 (288.9) 9-15/16 (252.4) 15 (381.0)	5-11/16 (144.5) 5 (127.0) 7-1/2 (190.5)
7/8 (22.2)	3-3/4 (95.3) 6-1/4 (158.8) 8 (203.2)		6-9/16 (166.7) 6-1/4 (158.8) 6 (152.4)	3-5/16 (84.1) 3-1/8 (79.4) 3 (76.2)	13-1/8 (333.4) 12-1/2 (317.5) 12 (304.8)	6-9/16 (166.7) 6-1/4 (158.8) 6 (152.4)
1 (25.4)	4-1/2 (114.3) 7-3/8 (187.3) 9-1/2 (241.3)		7-7/8 (200.0) 7-3/8 (187.3) 7-1/8 (181.0)	3-15/16 (100.0) 3-11/16 (93.7) 3-9/16 (90.5)	15-3/4 (400.1) 14-3/4 (374.7) 14-1/4 (362.0)	7-7/8 (200.0) 7-3/8 (187.3) 7-1/8 (181.0)

* Spacing and edge distances shall be divided by 0.75 when anchors are placed in structural lightweight concrete. Linear interpolation may be used for intermediate spacing and edge distances.

Combined Tension and Shear Loading—for Trubolt Anchors

Allowable loads for anchors subjected to combined shear and tension forces are determined by the following equation:

$$(Ps/Pt)^{5/3} + (Vs/Vt)^{5/3} \leq 1$$

Ps = Applied tension load Vs = Applied shear load Pt = Allowable tension load Vt = Allowable shear load

RED HEAD®
CONCRETE ANCHORING SPECIALISTS

Trubolt®+ Seismic Wedge Anchors

2015 IBC Compliant

DESCRIPTION/SUGGESTED SPECIFICATIONS

Seismic Wedge Type Anchors—

Trubolt+ Wedge anchors consist of a high-strength threaded stud body, expansion clip, nut and washer. Anchor bodies are made of plated carbon steel. The expansion clip consists of a split cylindrical ring with undercutting grooves.

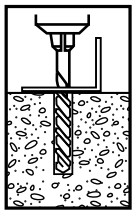
The exposed end of the anchor is stamped to identify anchor length. Stampings should be preserved during installation for any subsequent embedment verification.

Use carbide tipped hammer drill bits made in accordance with ANSI B212.15-1994 to install anchors.

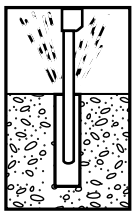
Anchors are tested to ACI 355.2 and ICC-ES AC193. Anchors are listed by the following agencies as required by the local building code: ICC-ES, and City of Los Angeles.

See Appendix C (pages 108-109) for performance values in accordance with 2015 IBC.

INSTALLATION STEPS

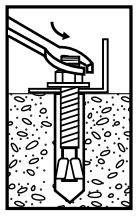


1. Select a carbide drill bit with a diameter equal to the anchor diameter. Drill hole to any depth exceeding the desired embedment. See chart for minimum recommended embedment.



2. Clean hole or continue drilling additional depth to accommodate drill fines

3. Assemble washer and nut, leaving top of stud exposed through nut. Drive anchor through material to be fastened until washer is flush to surface of material.



4. Expand anchor by tightening nut 3-5 turns past the hand tight position, or to the specified torque requirement.

APPROVALS/LISTINGS

ICC Evaluation Service, Inc. # ESR-2427
- -Category 1 performance rating
- -2015 IBC Compliant
- -Meets ACI 318 ductility requirements
- -Tested in accordance with ACI 355.2 and ICC-ES AC193
- -Listed for use in seismic zones A, B, C, D, E, & F
- -3/8", 1/2", 5/8" and 3/4" diameter anchors listed in ESR-2427

City of Los Angeles - #RR25867
Florida Building Code

LENGTH INDICATION CODE*

CODE	LENGTH OF ANCHOR	CODE	LENGTH OF ANCHOR
A	1-1/2 < 2 (38.1 < 50.8)	K	6-1/2 < 7 (165.1 < 177.8)
B	2 < 2-1/2 (50.8 < 63.5)	L	7 < 7-1/2 (177.8 < 190.5)
C	2-1/2 < 3 (63.5 < 76.2)	M	7-1/2 < 8 (190.5 < 203.2)
D	3 < 3-1/2 (76.2 < 88.9)	N	8 < 8-1/2 (203.2 < 215.9)
E	3-1/2 < 4 (88.9 < 101.6)	O	8-1/2 < 9 (215.9 < 228.6)
F	4 < 4-1/2 (101.6 < 114.3)	P	9 < 9-1/2 (228.6 < 241.3)
G	4-1/2 < 5 (114.3 < 127.0)	Q	9-1/2 < 10 (241.3 < 254.0)
H	5 < 5-1/2 (127.0 < 139.7)	R	10 < 11 (254.0 < 279.4)
I	5-1/2 < 6 (139.7 < 152.4)	S	11 < 12 (279.4 < 304.8)
J	6 < 6-1/2 (152.4 < 165.1)	T	12 < 13 (304.8 < 330.2)

*Located on top of anchor for easy inspection.

SELECTION CHART

Trubolt®+ Seismic Wedge Anchors
Carbon Steel with Zinc Plating

Meets ASTM B633 SC1, Type III specifications for electroplating of 5um = .0002" thickness. This coating is well suited for non-corrosive environments.

PART NUMBER	THREAD LENGTH In. (mm)	ANCHOR DIA. & DRILL BIT SIZE (THREADS) PER INCH	OVERALL LENGTH In. (mm)	MAX. THICKNESS OF MATERIAL TO BE FASTENED In. (mm)	QTY/WT PER BOX lbs.	QTY/WT PER MASTER CARTON lbs.
CWS-3830	1-5/8 (41.3)	3/8" - 16	3 (76.2)	5/8 (15.9)	50/ 5.3	400/ 42
CWS-3836	2-3/8 (60.3)	3/8" - 16	3-3/4 (95.3)	1-3/8 (34.9)	50/ 5.9	300/ 35
CWS-3850	3-5/8 (92.1)	3/8" - 16	5 (127.0)	2-5/8 (66.7)	50/ 7.3	250/ 37
CWS-1236	2-1/8 (54.0)	1/2" - 13	3-3/4 (95.3)	3/4 (19.1)	25/ 5.7	150/ 34
CWS-1244	2-7/8 (73.0)	1/2" - 13	4-1/2 (114.3)	1-1/2 (38.1)	25/ 7.0	150/ 40
CWS-1254	3-7/8 (98.4)	1/2" - 13	5-1/2 (139.7)	2-1/2 (63.5)	25/ 8.0	150/ 49
CWS-1270	5-3/8 (136.5)	1/2" - 13	7 (177.8)	4 (101.6)	25/ 9.2	150/ 55
CWS-5850	3-3/16 (81.0)	5/8" - 11	5 (127.0)	1-1/8 (28.6)	10/ 4.7	100/ 48
CWS-5860	4-3/16 (106.4)	5/8" - 11	6 (152.4)	2-1/8 (54.0)	10/ 5.4	50/ 28
CWS-5870	5-3/16 (131.8)	5/8" - 11	7 (177.8)	3-1/8 (79.4)	10/ 6.2	30/ 19
CWS-5884	5-3/4 (146.0)	5/8" - 11	8-1/2 (215.9)	4-5/8 (117.5)	10/ 8.0	30/ 25
CWS-3454	3-5/8 (92.1)	3/4" - 10	5-1/2 (139.7)	1-1/2 (38.1)	50/ 7.6	30/ 38
CWS-3462	4-3/8 (111.1)	3/4" - 10	6-1/4 (158.8)	2-1/4 (57.2)	10/ 8.5	30/ 26
CWS-3470	5-1/8 (130.2)	3/4" - 10	7 (177.8)	3 (76.2)	10/ 9.0	30/ 27
CWS-3484	5-3/4 (146.0)	3/4" - 10	8-1/2 (215.9)	4-1/2 (114.3)	10/ 10.5	30/ 32
CWS-34100	5-3/4 (146.0)	3/4" - 10	10 (254.0)	6 (152.4)	10/ 11.9	30/ 36

Trubolt®+
316 Stainless Steel

DESCRIPTION/SUGGESTED SPECIFICATIONS

Seismic Wedge Type Anchors—

The Trubolt+ Wedge Anchor consists of a high-strength threaded anchor body, expansion clip, hex nut and washer. The anchor body is cold-formed from AISI Type 316 stainless steel materials. The expansion clip is fabricated from Type 316 stainless steel materials. The expansion clip consists of a split cylindrical ring with under cutting grooves at the bottom end.

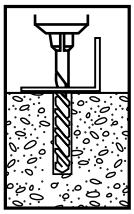
The exposed end of the anchor is stamped to identify anchor length. Stampings should be preserved during installation for any subsequent embedment verification.

Use carbide tipped hammer drill bits made in accordance with ANSI B212.15-1994 to install anchors.

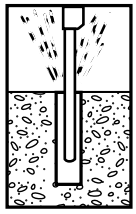
Anchors are tested to ACI 355.2 and ICC-ES AC193. Anchors are listed by the following agencies as required by the local building code: ICC-ES, and City of Los Angeles.

See Appendix C (page 110) for performance values in accordance with 2015 IBC.

INSTALLATION STEPS

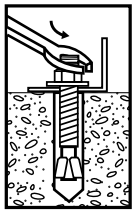


1. Select a carbide drill bit with a diameter equal to the anchor diameter. Drill hole to any depth exceeding the desired embedment. See chart for minimum recommended embedment.



2. Clean hole or continue drilling additional depth to accommodate drill fines.

3. Assemble washer and nut, leaving top of stud exposed through nut. Drive anchor through material to be fastened until washer is flush to surface of material.



4. Expand anchor by tightening nut 3-5 turns past the hand tight position, or to the specified torque requirement.

APPROVALS/LISTINGS

ICC Evaluation Service, Inc. #ESR-2427
- Category 1 performance rating
-2015 IBC Compliant
- Meets ACI 318 ductility requirements
- Tested in accordance with ACI 355.2 and ICC-ES AC193
- Listed for use in Seismic zones A, B, C, D, E & F
- 1/2" and 5/8" diameter anchors listed in ESR-2427

City of Los Angeles - #RR25867

LENGTH INDICATION CODE*

CODE	LENGTH OF ANCHOR	CODE	LENGTH OF ANCHOR
A	1-1/2 < 2 (38.1 < 50.8)	K	6-1/2 < 7 (165.1 < 177.8)
B	2 < 2-1/2 (50.8 < 63.5)	L	7 < 7-1/2 (177.8 < 190.5)
C	2-1/2 < 3 (63.5 < 76.2)	M	7-1/2 < 8 (190.5 < 203.2)
D	3 < 3-1/2 (76.2 < 88.9)	N	8 < 8-1/2 (203.2 < 215.9)
E	3-1/2 < 4 (88.9 < 101.6)	O	8-1/2 < 9 (215.9 < 228.6)
F	4 < 4-1/2 (101.6 < 114.3)	P	9 < 9-1/2 (228.6 < 241.3)
G	4-1/2 < 5 (114.3 < 127.0)	Q	9-1/2 < 10 (241.3 < 254.0)
H	5 < 5-1/2 (127.0 < 139.7)	R	10 < 11 (254.0 < 279.4)
I	5-1/2 < 6 (139.7 < 152.4)	S	11 < 12 (279.4 < 304.8)
J	6 < 6-1/2 (152.4 < 165.1)	T	12 < 13 (304.8 < 330.2)

*Located on top of anchor for easy inspection.

SELECTION CHART

Trubolt®+
Seismic Wedge Anchors
316 Stainless Steel

Meets ASTM B633 SC1, Type III specifications for electroplating of 5um = .0002" thickness. This coating is well suited for non-corrosive environments.

PART NUMBER	THREAD LENGTH In (mm)	ANCHOR DIA. & DRILL BIT SIZE (THREADS) PER INCH	OVERALL LENGTH In. (mm)	MAX. THICKNESS OF MATERIAL TO BE FASTENED In. (mm)	QTY/WT PER BOX lbs.	QTY/WT PER MASTER CARTON lbs.
CSWW-1236	2-1/8 (54.0)	1/2"-13	3-3/4 (95.3)	3/4 (19.1)	25/5.8	150/35
CSWW-1244	2-7/8 (73.0)	1/2"-13	4-1/2 (114.3)	1-1/2 (38.1)	25/6.6	150/40
CSWW-1254	3-7/8 (98.4)	1/2"-13	5-1/2 (139.7)	2-1/2 (63.5)	25/7.9	150/48
CSWW-1270	5-3/8 (136.5)	1/2"-13	7 (177.8)	4 (101.6)	25/9.5	150/57
CSWW-5842	2-7/16 (61.9)	5/8"-11	4-1/2 (114.3)	3/8 (9.5)	10/4.2	100/42
CSWW-5850	3-3/16 (81.0)	5/8"-11	5 (127.0)	1-1/8 (28.6)	10/4.8	100/48

RED HEAD®
CONCRETE ANCHORING SPECIALISTS

Large Diameter Tapcon (LDT) Anchors

Finished head, Removable Anchor

LDT

(3/8" & 1/2") **(5/8" & 3/4") Sawtooth™**

3/8" and 1/2" are available with Envirex™ coating

Uses standard drill bits—no special drill bits to purchase or lose!

DESCRIPTION/SUGGESTED SPECIFICATIONS

Self-threading Anchors —

SPECIFIED FOR ANCHORAGE INTO CONCRETE

LDT Self-threading Anchor

The LDT anchor is a high performance anchor that cuts its own threads into concrete.

Anchor bodies are made of hardened carbon steel and zinc plated, **Grade 5.**

The anchors shall have a finished hex washer head with anti-rotation serrations to prevent anchor back-out. The head of the anchor is stamped with a length identification code for easy inspection.

The hole shall be drilled with carbide tipped hammer drill bits made in accordance to ANSI B212.15-1994.

ADVANTAGES

SAVE TIME

EASILY INSTALLED

- Installs in less than half the time of wedge anchors or adhesive anchors
- Simply drill a pilot hole and drive the LDT anchor by hand or impact

EASILY REMOVED

- No torching or grinding required to remove anchors

SAVE MONEY

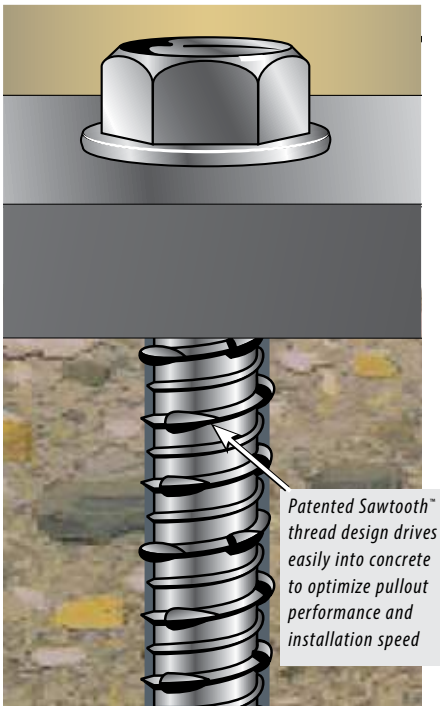
LOWER DRILL BIT COSTS

- Use standard ANSI bits instead of proprietary bits
- Single piece design, no nut and washer to assemble

USE STANDARD ANSI BITS

- No special proprietary bits to purchase or lose
- Reduce chances for anchor failure due to incorrect bit usage

Sawtooth Threads™ diameters available on 5/8" and 3/4"



Patented Sawtooth™ thread design drives easily into concrete to optimize pullout performance and installation speed

IMPROVED PERFORMANCE IN LARGE DIAMETER HOLES

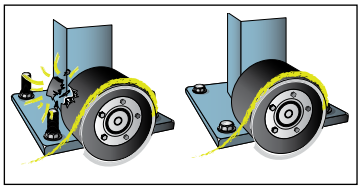
- Superior performance to wedge anchor
- Higher loads in shallow embedments
- Closer edge/spacing distance than mechanical anchors
- More threads for better thread engagement and higher pullout resistance
- Durable induction-hardened tip

EASY INSTALLATION

- Easy 2-step installation, simply drill a pilot hole and drive
- Installs in less than half the time of a wedge anchor
- Efficient thread cutting
- Use standard drill bit sizes
- Single piece design—no nut and washer assembly
- Easily removed

LDT Anchors

APPLICATIONS

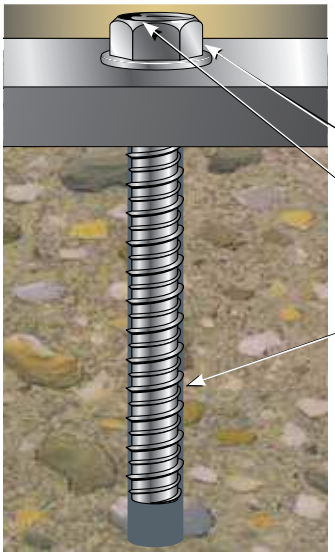


Racking, shelving and conveyors are just a few high volume applications ideal for Large Diameter Tapcon (LDT™). The ease and speed of installation of the LDT can reduce installation time to less than half the time of typical systems used today.

For installation speed, high performance and easy removability, LDT is the anchor of choice.

The LDT's finished head and lack of exposed threads virtually eliminates tire damage on fork lift trucks.

FEATURES



Easy Installation
Installs into concrete by hand or impact wrench

Anti-rotation Serrated Washer
— Prevents anchor back-out

Extra Large Hex Washer Head
— With increased bearing surface

Length Identification Head Stamp
— For embedment inspection after installation

Hi-Lo Threads
— Cuts its own threads into concrete for greater pull-out resistance

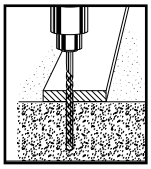
LDT 3/8" and 1/2" are available with *Envirex*™ coating

1,000 hours salt spray ASTM B117. Approved for use in ACQ and MCQ lumber*

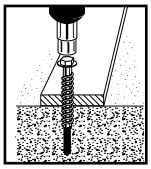
*Excessive content of copper in the ACQ and MCQ lumber may affect the anchor finish.

INSTALLATION STEPS

Installation Steps for Concrete, Lightweight Concrete and Metal Deck



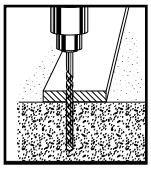
1. Using the proper size carbide bit (see chart) drill "a pilot hole at least 1" deeper than anchor embedment. ""



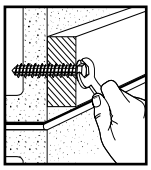
2. Using an **electric impact wrench**, or socket wrench (hand install) insert anchor into hole and tighten anchor until fully seated. (see chart for socket size) (do not over tighten).

Installation Steps for Hollow or Grout-Filled CMU

(3/8" and 1/2" diameter)



1. Using a 5/16" (for 3/8" LDT) or 7/16" (for 1/2" LDT) carbide tipped bit, drill a pilot hole at least 1" deeper than anchor embedment. ""



2. Using a socket wrench insert anchor into hole and hand tighten anchor until fully seated. (9/16" socket for 3/8" and 3/4" socket for 1/2") (do not over tighten).

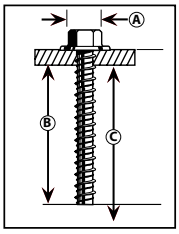
LDT's can be installed by hand or with an impact wrench

Installation by hand—is easy, simply using a socket wrench

Installation by impact wrench—is recommended for faster installations or for high volume projects. Installation with impact wrench—is ***not*** recommended for hollow block.

Selection Chart

LDT Size	ANSI Standard Drill Bit Diameter	Ⓐ Anchor Head (Socket Size) Diameter	Washer Diameter	Ⓑ Minimum Embedment	Ⓒ Hole Depth	USE IN		
						Concrete	CMU Hollow	CMU Grout-filled
LDT 3/8"	5/16"	9/16"	13/16"	1-1/2"	2-1/2"	YES	YES	YES
LDT 1/2"	7/16"	3/4"	1"	2-1/2"	3-1/2"	YES	NO	YES
LDT 5/8"	1/2"	13/16"	1-3/16"	2-3/4"	3-3/4"	YES	NO	YES
LDT 3/4"	5/8"	15/16"	1-5/16"	3-1/4"	4-1/4"	YES	NO	YES



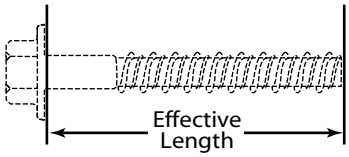
See page 75 for effective lengths and length indication code.

SELECTION CHART

LDT Carbon and Stainless Steel

Carbon Steel with Zinc Plating: Meets ASTM B695 and B633 specifications for zinc plating of 5um = .0002" thickness. This coating is well suited for non-corrosive interior environments.

Carbon Steel with EnvireX Coating: Provides additional corrosion protection for outdoor applications.



PART NUMBER CARBON STEEL ZINC PLATED	PART NUMBER CARBON STEEL EnvireX COATING	PART NUMBER FOR 410 STAINLESS STEEL	ANCHOR DIA. In. (mm)	DRILL BIT DIA. In. (mm)	EFFECTIVE LENGTH In. (mm) (see detail on left)	MAX. THICKNESS OF MATERIAL TO BE FASTENED In. (mm)	QTY/WT PER BOX lbs.	QTY/WT PER MASTER CARTON lbs.
LDT-3816	——	SLDT-3816	3/8 (9.5)	5/16 (7.9)	1-3/4 (44.5)	1/4 (6.4)	50/ 3.0	400/ 24.0
LDT-3824	——	SLDT-3824	3/8 (9.5)	5/16 (7.9)	2-1/2 (63.5)	1 (25.4)	50/ 4.5	400/ 34.0
LDT-3830	LDT-3830 X	SLDT-3830	3/8 (9.5)	5/16 (7.9)	3 (76.2)	1-1/2 (38.1)	50/ 5.0	400/ 40.0
LDT-3840		SLDT-3840	3/8 (9.5)	5/16 (7.9)	4 (101.6)	2-1/2 (63.5)	50/ 6.5	400/ 52.0
LDT-3850	——	SLDT-3850	3/8 (9.5)	5/16 (7.9)	5 (127.0)	3-1/2 (89.0)	40/ 7.5	320/ 60.0
LDT-1230	——	SLDT-1230	1/2 (12.7)	7/16 (11.1)	3 (76.2)	1/2 (12.7)	25/ 4.5	150/ 27.0
LDT-1240	LDT-1240 X	SLDT-1240	1/2 (12.7)	7/16 (11.1)	4 (101.6)	1-1/2 (38.1)	25/ 6.0	150/ 36.6
LDT-1250	LDT-1250 X	SLDT-1250	1/2 (12.7)	7/16 (11.1)	5 (127.0)	2-1/2 (63.5)	25/ 7.6	150/ 45.6
LDT-1260	——	——	1/2 (12.7)	7/16 (11.1)	6 (152.4)	4 (101.6)	20/ 9.0	120/ 54.0
LDT-5830	——	——	5/8 (15.9)	1/2 (12.7)	3 (76.2)	1/4 (6.4)	10/ 3.5	100/ 35.0
LDT-5840	——	——	5/8 (15.9)	1/2 (12.7)	4 (101.6)	1-1/4 (31.8)	10/ 4.0	100/ 40.0
LDT-5850	——	——	5/8 (15.9)	1/2 (12.7)	5 (127.0)	2-1/4 (57.1)	10/ 4.7	100/ 47.0
LDT-5860	——	——	5/8 (15.9)	1/2 (12.7)	6 (152.4)	3-1/4 (82.6)	10/ 5.4	50/ 27.0
LDT-3444	——	——	3/4 (19.1)	5/8 (15.9)	4-1/2 (114.3)	1-1/4 (31.8)	10/ 7.4	50/ 37.0
LDT-3454	——	——	3/4 (19.1)	5/8 (15.9)	5-1/2 (139.7)	2-1/4 (57.1)	10/ 8.1	50/ 40.5
LDT-3462	——	——	3/4 (19.1)	5/8 (15.9)	6-1/4 (158.8)	3 (76.2)	10/ 9.1	30/ 27.3

* The stainless steel LDT's will be gold in color in order to differentiate them from the carbon steel anchors.

DESIGN GUIDE

For proper selection of anchor diameters based upon predrilled holes in base plates and fixtures.

HOLE DIAMETER IN FIXTURE In. (mm)	SUGGESTED LDT DIAMETER In. (mm)
7/16 (11.1)	3/8 (9.5)
1/2 (12.7)	3/8 (9.5)
9/16 (14.3)	1/2 (12.7)
5/8 (15.9)	1/2 (12.7)
3/4 (19.1)	5/8 (15.9)
7/8 (22.2)	3/4 (19.1)

LENGTH INDICATION CODE*

X denotes available with EnvireX™ coating

CODE	LENGTH OF ANCHOR In. (mm)
A	1-1/2 < 2 (38.1 < 50.8)
B	2 < 2-1/2 (50.8 < 63.5)
C	2-1/2 < 3 (63.5 < 76.2)
D	3 < 3-1/2 (76.2 < 88.9)
E	3-1/2 < 4 (88.9 < 101.6)
F	4 < 4-1/2 (101.6 < 114.3)
G	4-1/2 < 5 (114.3 < 127.0)
H	5 < 5-1/2 (127.0 < 139.7)
I	5-1/2 < 6 (139.7 < 152.4)
J	6 < 6-1/2 (152.4 < 165.1)

* Located on top of anchor for easy inspection.

PERFORMANCE TABLE

LDT Anchors

Ultimate Tension and Shear Values (Lbs/kN) in Concrete

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	f'c = 2000 PSI (13.8 MPa)		f'c = 3000 PSI (20.7 MPa)		f'c = 4000 PSI (27.6 MPa)	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/8 (9.5)	1-1/2 (38.1)	1,336 (5.9)	2,108 (9.4)	1,652 (7.3)	2,764 (12.3)	1,968 (8.8)	3,416 (15.2)
	2 (50.8)	1,492 (6.6)	3,036 (13.5)	2,024 (9.0)	3,228 (14.4)	2,552 (11.4)	3,420 (15.2)
	2-1/2 (63.5)	3,732 (16.6)	3,312 (14.7)	3,748 (16.7)	3,364 (15.0)	3,760 (16.7)	3,424 (15.2)
	3-1/2 (88.9)	5,396 (24.0)	3,312 (14.7)	6,624 (29.5)	3,368 (15.0)	7,852 (34.9)	3,428 (15.2)
1/2 (12.7)	2 (50.8)	3,580 (15.9)	5,644 (25.1)	3,908 (17.4)	6,512 (29.0)	4,236 (18.8)	7,380 (32.8)
	3-1/2 (88.9)	7,252 (32.3)	6,436 (28.6)	8,044 (35.8)	7,288 (32.4)	8,836 (39.3)	8,140 (36.2)
	4-1/2 (114.3)	10,176 (45.3)	7,384 (32.8)	10,332 (46.0)	7,968 (35.4)	10,488 (46.7)	8,552 (38.0)
5/8 (15.9)	2-3/4 (69.9)	5,276 (23.5)	8,656 (38.5)	6,560 (29.2)	11,064 (49.2)	7,844 (34.8)	13,476 (59.9)
	3-1/2 (88.9)	7,972 (35.5)	10,224 (45.5)	9,848 (43.8)	12,144 (54.0)	11,724 (52.2)	14,060 (62.5)
	4-1/2 (114.3)	11,568 (51.5)	12,316 (54.8)	13,432 (59.8)	13,580 (60.4)	16,892 (75.1)	14,840 (66.0)
3/4 (19.1)	3-1/4 (82.6)	6,876 (30.6)	7,140 (31.8)	9,756 (43.4)	10,728 (47.7)	12,636 (56.2)	14,316 (63.6)
	4-1/2 (114.3)	10,304 (45.8)	13,120 (58.4)	14,424 (64.2)	16,868 (75.0)	18,540 (82.5)	20,612 (91.7)
	5-1/2 (139.7)	13,048 (58.0)	17,908 (79.7)	18,156 (80.8)	21,718 (96.9)	23,268 (130.5)	25,652 (114.1)

PERFORMANCE TABLE

LDT Anchors

Allowable Tension and Shear Values (Lbs/kN) in Concrete Carbon and Stainless Steel*

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	f'c = 2000 PSI (13.8 MPa)		f'c = 3000 PSI (20.7 MPa)		f'c = 4000 PSI (27.6 MPa)	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/8 (9.5)	1-1/2 (38.1)	334 (1.5)	527 (2.3)	413 (1.8)	691 (3.1)	492 (2.1)	854 (3.8)
	2 (50.8)	373 (1.7)	759 (3.4)	506 (2.2)	807 (3.6)	638 (2.8)	855 (3.8)
	2-1/2 (63.5)	933 (4.2)	828 (3.7)	937 (4.2)	841 (3.7)	940 (4.2)	856 (3.8)
	3-1/2 (88.9)	1,349 (6.0)	828 (3.7)	1,656 (7.4)	842 (3.7)	1,963 (8.7)	857 (3.8)
1/2 (12.7)	2 (50.8)	895 (4.0)	1,411 (6.3)	977 (4.3)	1,628 (7.2)	1,059 (4.7)	1,845 (8.2)
	3-1/2 (88.9)	1,813 (8.0)	1,609 (7.2)	2,011 (8.9)	1,822 (8.1)	2,209 (9.8)	2,035 (9.0)
	4-1/2 (114.3)	2,544 (11.3)	1,846 (8.2)	2,583 (11.5)	1,992 (8.9)	2,622 (11.7)	2,138 (9.5)
5/8 (15.9)	2-3/4 (69.9)	1,319 (5.9)	2,164 (9.7)	1,640 (7.3)	2,766 (12.3)	1,961 (8.7)	3,369 (15.0)
	3-1/2 (88.9)	1,993 (8.9)	2,556 (11.4)	2,462 (10.9)	3,036 (13.5)	2,931 (13.0)	3,515 (15.6)
	4-1/2 (114.3)	2,892 (12.9)	3,079 (13.7)	3,358 (14.9)	3,395 (15.1)	4,223 (18.8)	3,710 (16.5)
3/4 (19.1)	3-1/4 (82.6)	1,719 (7.6)	1,785 (7.9)	2,439 (10.8)	2,682 (11.9)	3,159 (14.0)	3,579 (15.9)
	4-1/2 (114.3)	2,576 (11.5)	3,280 (14.6)	3,606 (16.0)	4,217 (18.7)	4,635 (20.6)	5,153 (22.9)
	5-1/2 (139.7)	3,262 (14.5)	4,477 (19.9)	4,539 (20.2)	5,445 (24.2)	5,817 (25.9)	6,413 (28.5)

* Allowable values are based upon a 4 to 1 safety factor. (Ultimate/4)

PERFORMANCE TABLE

LDT Anchors

Recommended Edge & Spacing Requirements for Tension Loads Carbon and Stainless Steel*

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	AT MIN. EDGE DISTANCE 1-3/4 Inches (44mm)	SPACING DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	LOAD FACTOR APPLIED AT MIN. SPACING DISTANCE 3 Inches (76mm)
3/8 (9.5)	1-1/2 (38.1)	2 (50.8)	70%	6 (152.4)	44%
	2 (50.8)	2 (50.8)	70%	6 (152.4)	44%
	2-1/2 (63.5)	3 (76.2)	70%	6 (152.4)	44%
	3-1/2 (88.9)	4 (101.6)	70%	6 (152.4)	44%
1/2 (12.7)	2 (50.8)	2-1/4 (57.2)	65%	8 (203.2)	27%
	3-1/2 (88.9)	3 (76.2)	65%	8 (203.2)	27%
	4-1/2 (114.3)	4 (101.6)	65%	8 (203.2)	27%
ANCHOR DIA. In. (mm)	**EMBEDMENT DEPTH In. (mm)**	**EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)**	**AT MIN. EDGE DISTANCE 1-3/4 Inches (44mm)**	**SPACING DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)**	**LOAD FACTOR APPLIED AT MIN. SPACING DISTANCE 3.75 Inches (95.2mm)**
5/8 (15.9)	2-3/4 (69.9)	6-1/4 (158.8)	65%	10 (254)	50%
	3-1/2 (88.9)	6-1/4 (158.8)	65%	10 (254)	50%
	4-1/2 (114.3)	6-1/4 (158.8)	65%	10 (254)	50%
ANCHOR DIA. In. (mm)	**EMBEDMENT DEPTH In. (mm)**	**EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)**	**AT MIN. EDGE DISTANCE 1-3/4 Inches (44mm)**	**SPACING DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)**	**LOAD FACTOR APPLIED AT MIN. SPACING DISTANCE 4.5 Inches (114.3mm)**
3/4 (19.1)	3-1/2 (82.6)	7-1/2 (191)	65%	12 (305)	50%
	4-1/2 (114.3)	7-1/2 (191)	65%	12 (305)	50%
	5-1/2 (139.7)	7-1/2 (191)	65%	12 (305)	50%

* Edge and spacing distance shall be divided by .75 when anchors are placed in structural lightweight concrete. Linear interpolation may be used for intermediate spacing and edge distances.

For 5/8" and 3/4" LDT Anchors, the critical edge distance for these anchors is 10 times the anchor diameter. The edge distance of these anchors may be reduced to 1-3/4" provided a 0.65 load factor is used for tension loads, a 0.15 load factor is used for shear loads applied perpendicular to the edge, or a 0.60 load factor is used for shear loads applied parallel to the edge. Linear interpolation may be used for intermediate edge distances.

PERFORMANCE TABLE

LDT Anchors

Recommended Edge & Spacing Requirements for Shear Loads Carbon and Stainless Steel*

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	AT MIN. EDGE DISTANCE 1-3/4 Inches (44mm)	SPACING DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	LOAD FACTOR APPLIED AT MIN. SPACING DISTANCE 3 Inches (76mm)
3/8 (9.5)	1-1/2 (38.1)	3 (76.2)	25%	6 (152.4)	57%
	2 (50.8)	4 (101.6)	25%	6 (152.4)	57%
	2-1/2 (63.5)	5 (127.0)	25%	6 (152.4)	57%
	3-1/2 (88.9)	5 (127.0)	25%	6 (152.4)	57%
1/2 (12.7)	2 (50.8)	5 (127.0)	25%	8 (203.2)	60%
	3-1/2 (88.9)	5 (127.0)	25%	8 (203.2)	60%
	4-1/2 (114.3)	5-1/2 (139.7)	25%	8 (203.2)	60%
5/8 (15.9)	2-3/4 (69.9)	6-1/4 (158.8)	15%**/60%***	10 (254)	75%
	3-1/2 (88.9)	6-1/4 (158.8)	15%**/60%***	10 (254)	75%
	4-1/2 (114.3)	6-1/4 (158.8)	15%**/60%***	10 (254)	75%
3/4 (19.1)	3-1/2 (82.6)	7-1/2 (191)	15%**/60%***	12 (305)	75%
	4-1/2 (114.3)	7-1/2 (191)	15%**/60%***	12 (305)	75%
	5-1/2 (139.7)	7-1/2 (191)	15%**/60%***	12 (305)	75%

* Edge and spacing distances shall be divided by .75 when anchors are placed in structural lightweight concrete. Linear interpolation may be used for intermediate spacing and edge distances.

** 15% = shear load applied perpendicular to the edge

*** 60% = shear load applied parallel to the edge

PERFORMANCE TABLES

LDT Anchors

Ultimate Tension Load (Lbs/kN) in Concrete Block
(anchors should be installed by hand in hollow block)

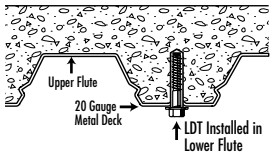
ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	HOLLOW CONCRETE BLOCK		GROUT FILLED CONCRETE BLOCK	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/8 (9.5)	1-1/2 (38.1)	916 (4.1)	3,176 (14.1)	1,592 (7.1)	3,900 (17.3)
1/2 (12.7)	2-1/2 (63.5)	N/A	N/A	5,924 (26.4)	6,680 (29.7)

LDT Anchors

Allowable Tension and Shear* (Lbs/kN) in Concrete Block
(anchors should be installed by hand in hollow block)

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	HOLLOW CONCRETE BLOCK		GROUT FILLED CONCRETE BLOCK	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/8 (9.5)	1-1/2 (38.1)	229 (1.0)	794 (3.5)	398 (1.8)	975 (4.3)
1/2 (12.7)	2-1/2 (63.5)	N/A	N/A	1,481 (6.6)	1,670 (7.4)

* Allowable values are based upon a 4 to 1 safety factor. (Ultimate/4)

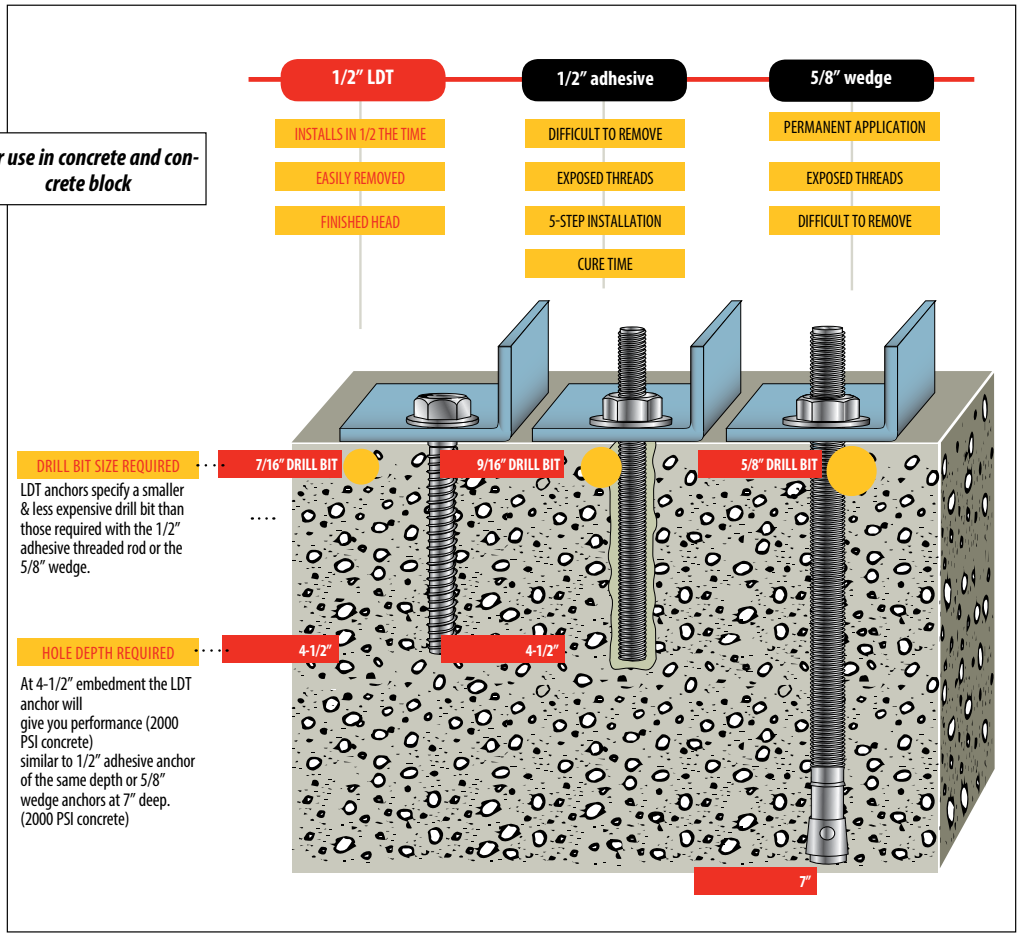


LDT Anchors

Anchoring Overhead in 3000 PSI Lightweight Concrete On Metal Deck

ANCHOR	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT In. (mm)	3000PSI (20.7 MPa) CONCRETE		
				ULTIMATE TENSION LOAD Lbs. (kN)	ALLOWABLE WORKING LOAD Lbs. (kN)
3/8" LDT	5/16 (7.9)	1-1/2 (38.1)	Upper Flute	2,889 (12.9)	722 (3.2)
			Lower Flute	1,862 (8.3)	465 (2.1)

For use in concrete and concrete block



RED HEAD®
CONCRETE ANCHORING SPECIALISTS

Tapcon +

IBC® 2006 COMPLIANT
IBC® 2009 COMPLIANT
IBC® 2012 COMPLIANT

The Original Concrete Screw Anchor

Approved for Cracked, Uncracked, and Seismic Conditions

Tapcon+ out performs traditional wedge anchor products, providing greater load capacity while reducing installation time by up to 50%, offering significant cost-in-place savings on the job site.

Since patenting the original screw anchor for concrete in 1976, Tapcon® products have continued to offer innovative solutions in concrete anchoring. Now, **Tapcon+** is available with International Building Code (IBC) compliance and other third party listings for use in cracked concrete and seismic applications.

In the Engineering Office

- Outperforms wedge anchors in tension, shear, and anchor spacing
- Approved for concrete in cracked, uncracked, and seismic conditions
- Simplicity of installation improves "build-ability" on the job site
- Blue Climaseal® for superior corrosion resistance

On the Job

- Installs faster and easier than wedge anchors – reducing total installed cost and delivering projects faster
- Removable for temporary fixing
- Installs without hammering and precision torque wrench
- One fastening solution for multiple applications and materials
- Does not require onsite inspection

Available Sizes – Tapcon+ and Accessories

Anchor Diameter	Length (Under Head)	**Drill Diameter**	Base Plate Hole Dia.	Quantity (Ctn/Box)	Part No.
1/4"	2-1/4"	1/4"* Tapcon+ or ANSI Bit	3/8"	800 / 100	3511407
	3"			800 / 100	3507407
3/8"	3"	3/8" ANSI	1/2"	400 / 50	3508407
	4"			400 / 50	3509407
1/2"	6"	1/2" ANSI	5/8"	160 / 20	3510407

*Note - 1/4" diameter anchors require tight tolerance drill bit to ensure Category 1 performance.
Use 1/4-7" Tapcon+ SDS drill bit, Part No. 3512909

Applications

Railings

Steel Column Base Plate

Drywall

Racking / Conveyor

ICC ES ESR-3699

CRACKED & UNCRACKED SEISMIC APPROVED

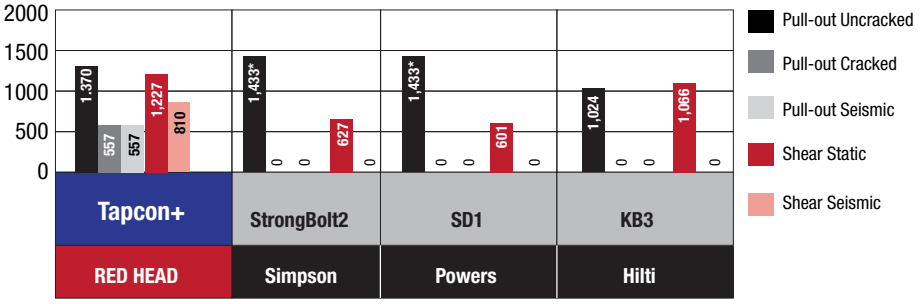
City of Los Angeles (1/4" & 3/8" diameters) and Florida Building Code Compliant

Product Characteristic					
Nominal Diameter	1/4"		3/8"		1/2"
Head Style	Hex Head		Hex Head		Hex Head
Baseplate Hole Diameter	3/8"		1/2"		5/8"
Length (in)	2-1/4	3	3	4	6
Part No.	3511407	3507407	3508407	3509407	3510407
Coating	Blue Climaseal®		Blue Climaseal®		Blue Climaseal®
Point	Bull Nose		Bull Nose		Bull Nose
ICC-ES Report No	ESR-3699		ESR-3699		ESR-3699
Cracked Concrete	Approved		Approved		Approved
Seismic	Approved		Approved		Approved
City of Los Angeles (COLA)	Approved - COLA 25975		Approved - COLA 25975		N/A
Florida Building Code (FBC)	Approved - FL 17072		Approved - FL 17072		Approved - FL 17072

See Appendix D for Tapcon+ Strength Design Performance Values

Performance vs. Wedge Anchor 1/4"

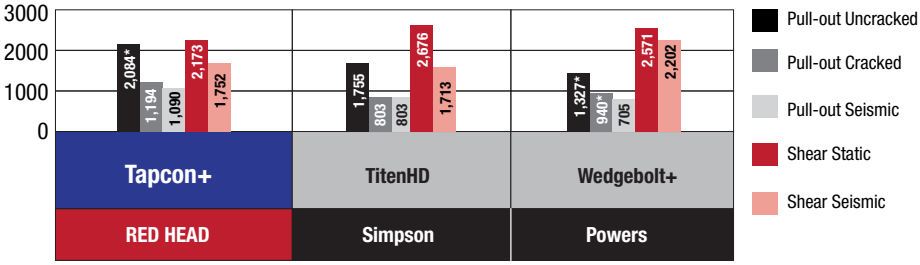
- Cracked concrete and seismic performance at ¼" diameter
- Performance equals wedge anchor performance in uncracked concrete applications



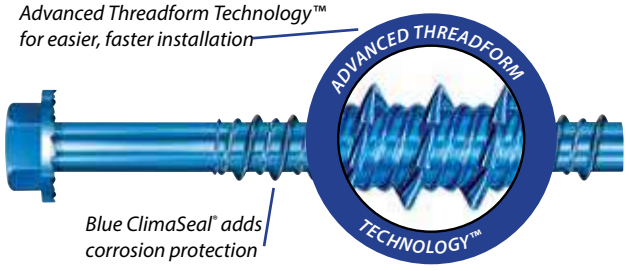
Notes: * Concrete capacity controls failure 2,500 PSI Concrete

Performance vs. Competitive Screw Anchor 3/8"

- Superior pull out compared to Simpson TitenHD™ and Powers Wedgebolt+™ (uncracked, cracked, and seismic)



Notes: * Concrete capacity controls failure2,500 PSI Concrete



Consult ICC-ESR 3699 for a full technical report. Available at www.itwredhead.com

Installation Instructions

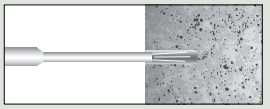
Step 1

Drill a hole that is at least a ¼" deeper than the anchor embedment.

Using

Variable Speed Concrete Hammer Drill & Carbide Drill Bit

1/4 x 7" Tapcon SDS Drill Bit (3512909) or
1/4" ANSI Drill Bit or
3/8" ANSI Drill Bit or
1/2" ANSI Drill Bit

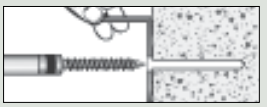


Step 2

Using pressurized air or a vacuum, remove the drilling debris from the hole.

Using

Air Compressor or
Standard Vacuum Cleaner



Step 3

Drive Tapcon+ screw anchor through fixture (bracket, or attachment plate), until fully seated.

Using

Six Point Impact Socket
3/8" Socket for 1/4" Anchors
9/16" Socket for 3/8" Anchors
3/4" Socket for 1/2" Anchors

Impact Wrench
115 Max ft-lbf for 1/4" Anchors
200 Max ft-lbf for 3/8" Anchors
345 Max ft-lbf for 1/2" Anchors

MADE IN USA

RED HEAD®
CONCRETE ANCHORING SPECIALISTS

Boa™ Coil Expansion Anchors

DESCRIPTION/SUGGESTED SPECIFICATIONS

SPECIFIED FOR ANCHORAGE INTO CONCRETE

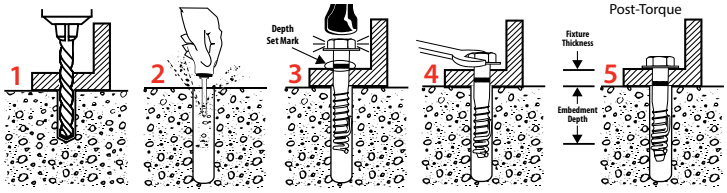
The Boa™ Coil is a high performance expansion anchor providing through fixture fastening and easy removal to keep the job moving. It's reusable with the coil replacement anchors making this anchor a low cost solution.

Ideal combination of value, performance and reusability make the Boa Coil the choice for Forming and tilt-wall contractors.

ADVANTAGES: Easy installation, removable, reusable, high shear strength, **Grade 5 bolt**.

APPLICATIONS: Concrete formwork, load bearing angles, beams and columns, machinery holddown, Jersey barrier, glare screens, light rail/commuter work.

INSTALLATION STEPS



NOTE: To achieve maximum loads the installation process needs to be carried out as follows:

1. Using the fixture as a template, drill the correct diameter and depth hole.
2. Remove debris with vacuum or hand pump.
3. Insert the assembled Boa Coil anchor. (The coil anchor tab points up the anchor.) Tap anchor down to depth set mark and stop.
4. Tighten until washer is firmly held to the fixture and stop. Number of turns to set anchor: 1/2" 3-4 turns, 5/8" and 3/4" 4-5 turns. Ensure washer is tight and snug fit.
5. The anchor is ready to take load. (The bolt can be removed leaving the coil in the hole.)

The Boa coil anchor can be reused up to 3 times in new holes.

SELECTION CHART

Boa Coil Anchors

PART NO.	ANCHOR DIA In. (mm)	SOCKET SIZE In.	DRILL BIT DIA. In. (mm)	HOLE DEPTH In. (mm)	FIXTURE THICKNESS AT MINIMUM EMBEDMENT TO BE FASTENED In. (mm)	QTY/WT PER BOX Lbs.	QTY/WT PER MASTER CTN Lbs.
RHCA-1230	1/2 (12.7)	3/4	1/2 (12.7)	3-1/2 (88.9)	3/8 (9.5)	25 / 4.5	150 / 27.2
RHCA-1240	1/2 (12.7)	3/4	1/2 (12.7)	4-1/2 (114.3)	1-3/8 (35.0)	25 / 5.9	150 / 35.6
RHCA-1254	1/2 (12.7)	3/4	1/2 (12.7)	6 (152.4)	2-7/8 (73.0)	25 / 7.8	150 / 46.9
RHCA-5834	5/8 (15.9)	15/16	5/8 (15.9)	4 (101.6)	3/8 (9.5)	20 / 8.8	120 / 52.5
RHCA-5850	5/8 (15.9)	15/16	5/8 (15.9)	5-1/2 (139.7)	1-7/8 (47.6)	15 / 8.5	90 / 51.0
RHCA-3444	3/4 (19.1)	1-1/8	3/4 (19.1)	5 (127.00)	1/4 (6.4)	10 / 6.4	60 / 38.3
RHCA-3460	3/4 (19.1)	1-1/8	3/4 (19.1)	6-1/2 (165.1)	1-3/4 (44.5)	10 / 8.2	60 / 49.1

Replacement coil available for easy re-use with Red Head Boa Coil Anchors only.

COIL REPLACEMENT PART NO.	QTY/WT PER BOX Lbs.	QTY/WT PER MASTER CTN Lbs.
RHC-12 (1/2")	100 / 2.8	600/16.9
RHC-58 (5/8")	100 / 2.2	600/13.1
RHC-34 (3/4")	100 / 1.3	600/7.5

PERFORMANCE TABLES

Boa Coil Anchors — Ultimate concrete/steel capacity in concrete[1]

ANCHOR DIAMETER In. (mm)	HOLE DIA. In. (mm)	EFFECTIVE EMBEDMENT DEPTH In. (mm)	FIXTURE HOLE DIA. In. (mm)	TURNS TO SET ANCHOR	ULTIMATE CONCRETE CAPACITY (2) (3)						ULTIMATE STEEL STRENGTH (4) LBS. (kN)	
					2,000 PSI (13.8 MPa)		4,000 PSI (27.6 MPa)		6,000 PSI (41.4 MPa)			
					TENSION (5) Lbs. (kN)	SHEAR Lbs. (kN)	TENSION (5) Lbs. (kN)	SHEAR Lbs. (kN)	TENSION (5) Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/2 (12.7)	1/2 (12.7)	2 (50.8)	9/16 (14.3)	3-4	4,039 (17.9)	6,070 (27.0)	5,715 (25.4)	8,590 (38.2)	6,994 (31.1)	10,516 (46.8)	19,384 (86.2)	14,456 (64.3)
		3 (76.2)	9/16 (14.3)	3-4	7,403 (32.9)	12,082 (53.7)	10,471 (46.6)	17,089 (76.0)	12,822 (57.0)	20,937 (93.1)		
5/8 (15.9)	5/8 (15.9)	2-3/8 (60.3)	11/16 (17.5)	4-5	5,291 (23.5)	8,800 (39.1)	7,483 (33.3)	12,445 (55.4)	9,162 (40.8)	15,242 (67.8)	30,152 (134.1)	21,937 (97.6)
		3-7/8 (98.4)	11/16 (17.5)	4-5	10,855 (48.3)	19,999 (89.0)	15,355 (68.3)	28,285 (125.8)	18,802 (83.6)	34,636 (154.0)		
3/4 (19.1)	3/4 (19.1)	3-1/4 (82.6)	13/16 (20.6)	4-5	8,479 (37.7)	16,567 (73.7)	11,991 (53.3)	23,427 (104.2)	14,682 (65.3)	28,690 (127.6)	43,360 (192.9)	32,031 (142.5)
		4-1/2 (114.3)	13/16 (20.6)	4-5	13,555 (60.3)	27,239 (121.2)	19,171 (85.3)	38,518 (171.3)	23,478 (104.4)	47,173 (209.8)		

(1) Use lower value of either concrete or steel (2) Concrete capacity based on Concrete Capacity Design method and verified by test data (3) Influence factors must be applied to concrete strength values
(4) Steel strength based on .57 Fu Ag for shear and 0.75 Fu Ag for tension (5) Test results when reused four times; maximum 20% reduction in tensile capacity; no reduction in shear

Boa Coil Anchors — Allowable concrete/steel capacity in concrete[1]

ANCHOR DIAMETER In. (mm)	HOLE DIA. In. (mm)	EFFECTIVE EMBEDMENT DEPTH In. (mm)	FIXTURE HOLE DIA. In. (mm)	TURNS TO SET ANCHOR	RECOMMENDED WORKING LOADS IN CONCRETE (2) (3)						ALLOWABLE STEEL STRENGTH (4) LBS. (kN)	
					2,000 PSI (13.8 MPa)		4,000 PSI (27.6 MPa)		6,000 PSI (41.4 MPa)			
					TENSION (5) Lbs. (kN)	SHEAR Lbs. (kN)	TENSION (5) Lbs. (kN)	SHEAR Lbs. (kN)	TENSION (5) Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/2 (12.7)	1/2 (12.7)	2 (50.8)	9/16 (14.3)	3-4	1,011 (4.5)	1,517 (6.7)	1,430 (6.4)	2,147 (9.5)	1,751 (7.8)	2,629 (11.7)	8,529 (37.9)	5,579 (24.8)
		3 (76.2)	9/16 (14.3)	3-4	1,852 (8.2)	3,020 (13.4)	2,619 (11.6)	4,272 (19.0)	3,208 (14.3)	5,234 (23.3)		
5/8 (15.9)	5/8 (15.9)	2-3/8 (60.3)	11/16 (17.5)	4-5	1,324 (5.9)	2,200 (9.8)	1,872 (8.3)	3,111 (13.8)	2,293 (10.2)	3,810 (16.9)	13,266 (59.0)	8,466 (37.7)
		3-7/8 (98.4)	11/16 (17.5)	4-5	2,715 (12.1)	5,000 (22.2)	3,840 (17.1)	7,071 (31.5)	4,703 (20.9)	8,660 (38.5)		
3/4 (19.1)	3/4 (19.1)	3-1/4 (82.6)	13/16 (20.6)	4-5	2,121 (9.4)	4,141 (18.4)	2,999 (13.3)	5,556 (24.7)	3,673 (16.3)	7,172 (31.9)	19,078 (84.9)	12,362 (55.0)
		4-1/2 (114.3)	13/16 (20.6)	4-5	3,390 (15.1)	6,810 (30.3)	4,794 (21.3)	9,630 (42.8)	5,872 (26.2)	11,793 (52.4)		

(1) Use lower value of either concrete or steel (2) Safety factor 4 (3) Influence factors must be applied to concrete strength values (4) Steel strength based on .22 Fu Ag for shear and 0.33 Fu Ag for tension
(5) Test results when reused four times; maximum 20% reduction in tensile capacity; no reduction in shear

RED HEAD
CONCRETE ANCHORING SPECIALISTS

Multi-Set II® Drop-In Anchors

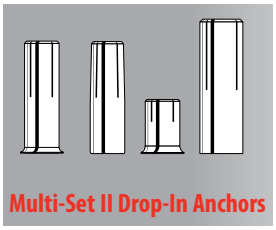
Internally Threaded Heavy-Duty Anchoring Systems

DESCRIPTION/SUGGESTED SPECIFICATIONS

Drop-In, Shell-Type Anchors—

SPECIFIED FOR ANCHORAGE INTO CONCRETE

Drop-In, shell-type anchors feature an internally threaded, all-steel shell with expansion cone insert and flush embedment lip. Anchors are manufactured from zinc-plated carbon steel, 18-8 stainless steel and 316 stainless steel.



Multi-Set II Drop-In Anchors

Anchors should be installed with carbide tipped hammer drill bits made in accordance to ANSI B212.15-1994 specifications.

Anchors should be tested to ASTM E488 criteria and listed by ICC-ES. Anchors should also be listed by the following agencies as required by the local building code: UL, FM, City of Los Angeles, California State Fire Marshal and Caltrans.

ADVANTAGES

Depth Charge Stop Drill and RX Drop-In Anchors

Ideal for Hollow-Core, Pre-Cast Plank and Post Tension Slabs

DepthCharge™ Stop Drill

- Optimized for use in hollow-core, pre-cast plank and post-tension slabs
- Lip keeps anchor flush during installation
- Shallow drilling—fast installation

RX Drop-In Anchor

See page 81 for kits

RM Drop-In Anchor

- Lipped anchor body keeps anchor flush
- Easy installation
- Keeps all rods same length
- Easy inspection
- Available in carbon steel, 18-8 and 316 stainless steel

RL Drop-In Anchor

- Below surface setting for easy patch work

Coil Thread Anchor

- Quick thread attachment—ideal for 1 sided forming
- Use coil rod on job
- 2 diameters (1/2" and 3/4")

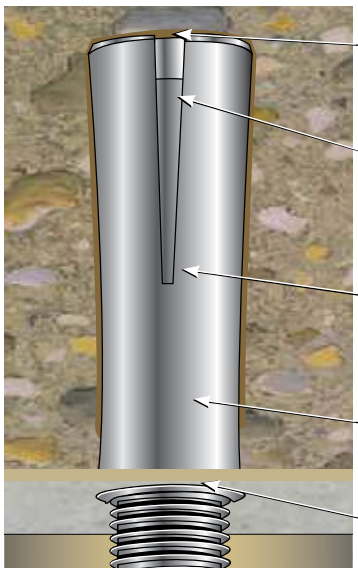
APPLICATIONS

Pumps and heavy piping are common applications for larger diameter Multi-Set Drop-In Anchors.

Cable tray and strut suspended from concrete ceilings are ideal Multi-Set applications. In post-tension or hollow-core slabs use the RX-38.

The Multi-Set Anchor is the standard for pipe-hanging. The RM version has a retainer lip to keep all anchors flush at the surface, keeping all your threaded rod the same length.

FEATURES



Expander Slots—allow for easy setting and superior performance

Cone Insert—that expands the anchor when driven with setting tool and hammer

Body—available in zinc-plated steel, 18-8 stainless steel, and 316 stainless steel

Easy Depth Inspection—keeps threaded rod drop lengths consistent

Retainer Lip—to keep anchor flush with surface

For use with threaded rods or headed bolts (supplied by contractor)

APPROVALS/LISTINGS

Meets or exceeds U.S. Government G.S.A. Specification A-A-55614 Type 1 (Formerly GSA: FF-S-325 Group VIII)

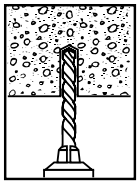
Underwriters Laboratories

Factory Mutual

Caltrans

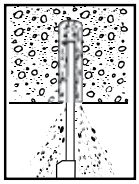
For the most current approvals/listings visit: www.itw-redhead.com

INSTALLATION STEPS

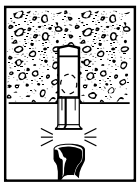


To set anchor flush with surface:

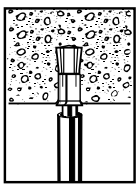
1. Drill hole to required embedment (see Table on page 69).



2. Clean hole with pressurized air.



3. Drive anchor flush with surface of concrete.



4. Expand anchor with setting tool provided (see chart on page 69). Anchor is properly expanded when shoulder of setting tool is flush with top of anchor.

SELECTION CHART

Multi-Set II Depth Charge Bits

PART NUMBER	DESCRIPTION FEATURE BENEFITS	DRILLING DEPTH
DCX-138	3/8″ Depth Charge Stop Drill	3/4″
DCX-112	1/2″ Depth Charge Stop Drill	1″

DepthCharge™ Stop Drill

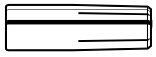
- Shoulder prevents over drilling. Less likely to hit reinforcing steel or post-tension cable in concrete
- No wasted time or energy drilling deeper than necessary
- Prevents anchor from dropping too far into hole below work surface

Multi-Set II
Drop-In Anchors

PART NUMBER RT-138
1 setting tool per master carton
(See above for part numbers.)

PART NUMBER RTX-138
For use with RX-38 only.

PART NUMBER RTX-112
For use with RX-12 only.

USER TYPE / APPLICATION	BASE MATERIAL	CORROSION RESISTANCE LEVEL	DROP-IN ANCHOR TYPE	PART NUMBER	SETTING TOOL PART NUMBER*	BOLT SIZE-THREADS PER INCH	DRILL BIT DIA. In. (mm)	THREAD DEPTH In. (mm)	EMBEDMENT MIN. HOLE DEPTH*** In. (mm)	QTY/WT PER BOX lbs.	QTY/WT PER MASTER CTN lbs. *
HVAC/Fire Sprinkler Plumber (Pipe-fitter)	Solid concrete/ lightweight fill deck	Low	RM 	RM-14	RT-114	1/4″ - 20	3/8 (9.5)	3/8 (9.5)	1 (25.4)	100/ 2.6	1000/ 28
				RM-38	RT-138	3/8″ - 16	1/2 (12.7)	1/2 (12.7)	1-5/8 (41.3)	50/ 3.4	500/ 36
				RM-12	RT-112	1/2″ - 13	5/8 (15.9)	3/4 (19.1)	2 (50.8)	50/ 5.8	400/ 49
				RM-58	RT-158	5/8″ - 11	7/8 (22.2)	1 (25.4)	2-1/2 (63.5)	25/ 7.8	125/ 41
				RM-34	RT-134	3/4″ - 10	1 (25.4)	1-1/4 (31.8)	3-3/16 (81.0)	25/11.9	100/ 49
	Hollow-core pre-cast or Post-tension	Low	RX 	RX-38	RTX-138	3/8″ - 16	1/2 (12.7)	3/8 (9.5)	3/4 (19.1)	100/ 3.5	1000/ 36
				RX-12	RTX-112	1/2″ - 13	5/8 (15.9)	1/2 (12.7)	1 (25.4)	50/ 3.0	500/ 31
	Solid concrete/ lightweight fill deck	Medium	SRM** 18-8 S.S. 	SRM-14	RT-114	1/4″ - 20	3/8 (9.5)	3/8 (9.5)	1 (25.4)	100/ 2.7	1000/ 28
				SRM-38	RT-138	3/8″ - 16	1/2 (12.7)	1/2 (12.7)	1-5/8 (41.3)	50/ 3.4	500/ 36
				SRM-12	RT-112	1/2″ - 13	5/8 (15.9)	3/4 (19.1)	2 (50.8)	50/ 6.0	400/ 50
				SRM-58	RT-158	5/8″ - 11	7/8 (22.2)	1 (25.4)	2-1/2 (63.5)	25/ 7.9	125/ 42
				SRM-34	RT-134	3/4″ - 10	1 (25.4)	1-1/4 (31.8)	3-3/16 (81.0)	25/12.0	100/ 50
concrete	Solid	High 316 S.S.	SSRM** SSRM-12	RT-112	1/2″ - 13	5/8	(15.9) 3/4	(19.1) 2	(50.8) 50/	6.0	400/50
Concrete Contractor, General Contractor, Highway	Solid concrete	Low	CL-Coil Threaded 	CL-12	RT-112	1/2″ - 6	5/8 (15.9)	3/4 (19.1)	2 (50.8)	50/ 5.7	400/ 47
				CL-34	RT-134	3/4″ - 4.5	1 (25.4)	1-1/4 (31.8)	3-3/16 (81.0)	25/11.9	100/ 49
Concrete Cutting/ Sawing Contractor/ Misc. Metal	Solid concrete/ lightweight fill deck	Low	RL (w/o lip) 	RL-14	RT-114	1/4″ - 20	3/8 (9.5)	3/8 (9.5)	1 (25.4)	100/ 2.6	1000/ 28
				RL-38	RT-138	3/8″ - 16	1/2 (12.7)	1/2 (12.7)	1-5/8 (41.3)	50/ 3.4	500/ 36
				RL-12	RT-112	1/2″ - 13	5/8 (15.9)	3/4 (19.1)	2 (50.8)	50/ 5.8	400/ 49
				RL-58	RT-158	5/8″ - 11	7/8 (22.2)	1 (25.4)	2-1/2 (63.5)	25/ 7.8	125/ 41
				RL-34	RT-134	3/4″ - 10	1 (25.4)	1-1/4 (31.8)	3-3/16 (81.0)	25/11.9	100/ 49

* 1 setting tool per master carton. ** For continuous extreme low temperature, use stainless steel.

***Embedment is equal to overall length of Drop-In Anchor

Multi-Set II
RX Drop-In Kits

Part No.	Description
RX-38	3/8″ drop-in using 1/2″ drill bit
RTX-138	Setting Tool
DCX-138	Depth Charge Stop Drill

Part No.	Description
RX-12	1/2″ drop-in using 5/8″ drill bit
RTX-112	Setting Tool
DCX-112	Depth Charge Stop Drill

Multi-Set II Drop-In Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Concrete*

BOLT DIA. In. (mm)	DRILL BIT SIZE In. (mm)	MIN. EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	TENSION Lbs. (kN)			SHEAR Lbs. (kN)
				f'c = 2000 PSI (13.8 MPa)	f'c = 4000 PSI (27.6 MPa)	f'c = 6000 PSI (41.4 MPa)	f'c >2000 PSI (13.8 MPa)
1/4 (6.4)	3/8 (9.5)	1 (25.4)	RM, RL or CL-Carbon or SRM-18-8 S.S. or SSRM-316 S.S.	1,680 (7.5)	2,360 (10.5)	2,980 (13.3)	1,080 (4.8)
3/8 (9.5)	1/2 (12.7)	1-5/8 (41.3)		2,980 (13.3)	3,800 (16.9)	6,240 (27.8)	3,160 (14.1)
1/2 (12.7)	5/8 (15.9)	2 (50.8)		3,300 (14.7)	5,840 (26.0)	8,300 (36.9)	4,580 (20.4)
5/8 (15.9)	7/8 (22.2)	2-1/2 (63.5)		5,500 (24.5)	8,640 (38.4)	11,020 (49.0)	7,440 (33.1)
3/4 (19.1)	1 (25.4)	3-3/16 (81.0)		8,280 (36.8)	9,480 (42.2)	12,260 (54.5)	10,480 (46.6)

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

* For continuous extreme low temperature applications, use stainless steel.

Multi-Set II Drop-In Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Lightweight Concrete*

BOLT DIA. In. (mm)	DRILL BIT SIZE In. (mm)	MINIMUM EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	LIGHTWEIGHT CONCRETE f'c = 3000 PSI (20.7 MPa)		LOWER FLUTE OF STEEL DECK WITH LIGHTWEIGHT CONCRETE FILL f'c = 3000 PSI (20.7 MPa)	
				TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/8 (9.5)	1/2 (12.7)	1-5/8 (39.7)	RM, RL or CL-Carbon or SRM-18-8 S.S. or SSRM-316 S.S.	2,035 (9.1)	1,895 (8.4)	3,340 (14.9)	4,420 (19.6)
1/2 (12.7)	5/8 (15.9)	2 (50.8)		2,740 (12.2)	2,750 (12.2)	3,200 (14.2)	4,940 (22.0)
5/8 (15.9)	7/8 (22.2)	2-1/2 (63.5)		4,240 (18.9)	4,465 (19.9)	5,960 (26.5)	5,840 (26.0)
3/4 (19.1)	1 (25.4)	3-3/16 (81.0)		5,330 (23.7)	6,290 (28.0)	8,180 (36.4)	9,120 (40.6)

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

Multi-Set II Drop-In Anchors — Recommended Edge and Spacing Distance Requirements*

BOLT DIA. In. (mm)	DRILL BIT SIZE In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. EDGE DISTANCE AT WHICH LOAD FACTOR APPLIED =.80 FOR TENSION =.70 FOR SHEAR In. (mm)	SPACING REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE SPACING BETWEEN ANCHORS LOAD FACTOR APPLIED =.80 FOR TENSION =.55 FOR SHEAR In. (mm)
1/4 (6.4)	3/8 (9.5)	1 (25.4)	RM, RL or CL-Carbon or SRM-18-8 S.S. or SSRM-316 S.S.	1-3/4 (44.5)	7/8 (22.2)	3-1/2 (88.9)	1-3/4 (44.5)
3/8 (9.5)	1/2 (12.7)	1-5/8 (41.3)		2-7/8 (73.0)	1-7/16 (36.5)	5-11/16 (144.5)	2-7/8 (73.0)
1/2 (12.7)	5/8 (15.9)	2 (50.8)		3-1/2 (88.9)	1-3/4 (44.5)	7 (177.8)	3-1/2 (88.9)
5/8 (15.9)	7/8 (22.2)	2-1/2 (63.5)		4-3/8 (111.1)	2-3/16 (55.6)	8-3/4 (222.3)	4-3/8 (111.1)
3/4 (19.1)	1 (25.4)	3-3/16 (81.0)		5-5/8 (142.9)	2-13/16 (71.4)	11-3/16 (284.2)	5-5/8 (142.9)

* Spacing and edge distances shall be divided by 0.75 when anchors are placed in structural lightweight concrete. Linear interpolation may be used for intermediate spacing and edge distances.

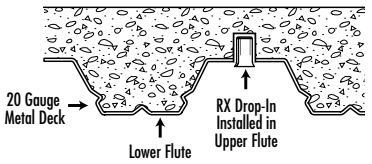
Multi-Set II Drop-In Anchors — Ultimate Tension and Shear Values (Lbs/kN) for RX-series (3/4" and 1" Embedment)*

BOLT DIA. In. (mm)	DRILL BIT SIZE In. (mm)	EMBEDMENT In. (mm)	2500 PSI (17.2 MPa) CONCRETE		4000 PSI (27.6 MPa) CONCRETE		HOLLOW CORE	
			TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/8 (9.5)	1/2 (12.7)	3/4 (19.1)	1,571 (7.0)	2,295 (10.2)	1,987 (8.8)	2,903 (12.9)	1,908 (8.5)	2,401 (10.7)
1/2 (12.7)	5/8 (15.9)	1 (25.4)	2,113 (9.4)	2,585 (11.5)	2,673 (11.9)	3,270 (14.5)	2,462 (11.0)	2,401 (10.7)

* The tabulated values are for RX anchors installed at a minimum of 12 diameters on center and minimum edge distance of 6 diameters for 100 percent anchor efficiency. Spacing and edge distance may be reduced to 6 diameters spacing and 3 diameter edge distance provided the values are reduced 50 percent. Linear Interpolation may be used for intermediate spacings and edge margins.

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

Multi-Set II Drop-In Anchors — Anchoring Overhead in 3000 PSI Lightweight Concrete On Metal Deck



ANCHOR	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT In. (mm)	3000PSI (20.7 MPa) CONCRETE		
				ULTIMATE TENSION LOAD Lbs. (kN)	ALLOWABLE WORKING LOAD Lbs. (kN)
RX-38 Drop-In	1/2 (12.7)	3/4 (19.1)	Upper Flute	1,410 (6.3)	353 (1.6)
			Lower Flute	1,206 (5.4)	301 (1.3)

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

Combined Tension and Shear Loading—for Multi-Set Anchors

Allowable loads for anchors subjected to combined shear and tension forces are determined by the following equation:

$$(Ps/Pt)^{5/3} + (Vs/Vt)^{5/3} \leq 1$$

Ps = Applied tension load **Vs = Applied shear load** **Pt = Allowable tension load** **Vt = Allowable shear load**

RED HEAD®
CONCRETE ANCHORING SPECIALISTS

Dynabolt® Sleeve Anchors

Versatile, Medium-Duty Sleeve Anchor

Dynabolt
Hex Nut Sleeve Anchor

DESCRIPTION/SUGGESTED SPECIFICATIONS

Sleeve Type Anchors—

SPECIFIED FOR ANCHORAGE INTO CONCRETE, GROUT-FILLED CONCRETE BLOCK, HOLLOW CONCRETE BLOCK AND BRICK

Dynabolt Masonry Sleeve Anchor

Sleeve type anchors feature a split expansion sleeve over a threaded stud bolt body and integral expander, nut and washer.

Anchors are made of Plated Carbon Steel, or Type 18-8 Stainless Steel.

Anchors should be installed with carbide tipped hammer drill bits made in accordance to ANSI B212.15-1994.

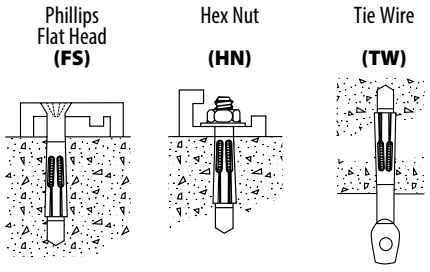
Anchors are tested to ASTM E488 criteria.

ADVANTAGES

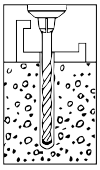
- Anchor diameter equals hole diameter
- Available in hex head and three other head styles
- Available 1/4 - 3/4" diameter up to 6-1/4" length
- Zinc plated carbon steel and 304 stainless steel
- Provides full 360° hole contact over large area and reduces concrete stress
- Heavy-loading capacity
- Preassembled for faster, easier installations
- Dynabolt can be installed through object to be fastened
- Sleeve design improves holding power
- No pre-spotting of holes necessary

Available Head Styles

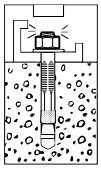
Full range of head style, corrosion protection, and sizes makes the Dynabolt Sleeve the right product for almost any application.



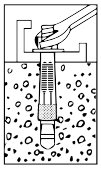
INSTALLATION STEPS



1. Use a carbide tipped drill bit whose diameter is equal to the anchor. See Chart to determine proper size bit for anchor used. Dnll hole to any depth exceeding minimum embedment. Clean hole.



2. Insert assembled anchor through fixture and into hole so that washer or head is flush with materials to be fastened.



3. Expand anchor by tightening nut or head 2 to 3 turns.

APPROVALS/LISTINGS

Meets or exceeds U.S. Government G.S.A. Specification A-A-1922A (Formerly GSA: FF-S-325 Group II, Type 3, Class 3)

Factory Mutual

APPLICATIONS

Electrical junction boxes are common applications for the Dynabolt Sleeve anchor because it works well in solid concrete, concrete block, and brick. It is also available in several finished head styles.

The Dynabolt Sleeve anchor works well in hollow materials like brick and block. It is available in zinc-plated carbon steel and 304 stainless steel.

Door and window frames are commonly attached to the structure with Dynabolt Sleeve anchors because of their finished & threshold head styles and performance in block & brick.

SELECTION CHART

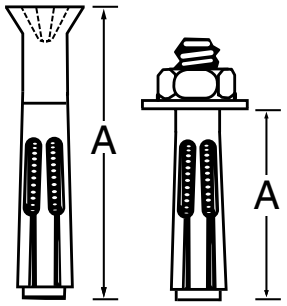
Dynabolt
Carbon Steel with Zinc Plating

Typical Applications—Shelf ledgers, electrical boxes, conduit

Environment—Interior (non-corrosive)

Level of Corrosion—Low

*** Effective Anchor Length**



HEAD STYLE	PART NUMBER	ANCHOR DIA. & DRILL BIT SIZE	EFFECTIVE ANCHOR LENGTH* In. (mm)	BOLT DIA./ THREADS PER INCH	MIN. EMBEDMENT In. (mm)	MAX. THICKNESS OF MATERIAL TO BE FASTENED In. (mm)	QTY/WT PER BOX lbs.	QTY/WT PER MASTER CARTON lbs.
HEX NUT	HN-1614	5/16″	1-1/2 (38.1)	1/4″ /20	1-1/4 (31.8)	1/4 (6.4)	100/ 4.0	1000/ 41
	HN-3817	3/8″	1-7/8 (47.6)	5/16″ /18	1-1/2 (38.1)	3/8 (9.5)	50/ 3.5	500/ 36
	HN-3830		3 (76.2)	5/16″ /18	1-1/2 (38.1)	1-1/2 (38.1)	50/ 4.9	400/ 40
	HN-1222	1/2″	2-1/4 (57.2)	3/8″ /16	1-7/8 (47.6)	3/8 (9.5)	25/ 3.3	250/ 34
	HN-1230		3 (76.2)	3/8″ /16	1-7/8 (47.6)	1-1/8 (28.6)	25/ 4.0	200/ 33
	HN-1240		4 (101.6)	3/8″ /16	1-7/8 (47.6)	2-1/8 (54.0)	25/ 5.3	200/ 44
	HN-5830	5/8″	3 (76.2)	1/2″ /13	2 (50.8)	1 (25.4)	25/ 7.0	150/ 46
	HN-5842		4-1/4 (108.0)	1/2″ /13	2 (50.8)	2-1/4 (57.2)	10/ 3.9	100/ 41
	HN-3440	3/4″	4 (101.6)	5/8″ /11	2-1/4 (57.2)	1-3/4 (44.5)	5/ 3.2	50/ 33
PHILLIPS FLAT HEAD*	FS-3840	3/8″	4 (101.6)	5/16″ /18	1-1/2 (38.1)	2-1/2 (63.5)	50/ 5.3	400/ 44
	FS-3850	(head dia. .722)	5 (127.0)	5/16″ /18	1-1/2 (38.1)	3-1/2 (88.9)	50/ 5.6	300/ 40
	FS-3860		6 (152.4)	5/16″ /18	1-1/2 (38.1)	4-1/2 (114.3)	50/ 8.0	300/ 48
TIE WIRE	TW-1614	5/16″	1-1/2 (38.1)	1/4″ /20	1-1/2 (38.1)	9/32 (7.1)	100/ 4.9	1000/ 50

* Phillips flat head uses a standard 80°–82° counter sink.

SELECTION CHART

Dynabolt
Type 304 Stainless Steel

Typical Applications—Cladding and Brick Ties

Environment—Slight to moderate degree of pollution

Level of Corrosion—Medium

HEAD STYLE	PART NUMBER	ANCHOR DIA. & DRILL BIT SIZE	EFFECTIVE ANCHOR LENGTH* In. (mm)	BOLT DIA./ THREADS PER INCH	MIN. EMBEDMENT In. (mm)	MAX. THICKNESS OF MATERIAL TO BE FASTENED In. (mm)	QTY/WT PER BOX lbs.	QTY/WT PER MASTER CARTON lbs.
HEX NUT	SHN-3817	3/8″	1-7/8 (47.6)	5/16″ /18	1-1/2 (38.1)	3/8 (9.5)	50/ 3.5	500/ 36
	SHN-1222	1/2″	2-1/4 (57.2)	3/8″ /16	1-7/8 (47.6)	3/8 (9.5)	25/ 3.3	250/ 34
	SHN-1240		4 (101.6)	3/8″ /16	1-7/8 (47.6)	2-1/8 (54.0)	25/ 5.3	200/ 44
PHILLIPS FLAT HEAD*	SFS-3826	3/8″	2-7/8 (73.0)	5/16″ /18	1-1/2 (38.1)	1-3/8 (34.9)	50/ 3.8	500/ 40
	SFS-3840		4 (101.6)	5/16″ /18	1-1/2 (38.1)	2-1/2 (63.5)	50/ 5.3	400/ 44

* Flat head uses a standard 80°–82° counter sink.
For continuous extreme low temperature applications, use stainless steel.

Dynabolt Sleeve Anchors — Ultimate Tension and Shear Values in Concrete (Lbs/kN)*

ANCHOR DIA. In. (mm)	INSTALLATION TORQUE Ft. Lbs. (Nm)	BOLT DIA. In. (mm)	MINIMUM EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE (STEEL)	f'c = 2000 PSI (13.8 MPa)		f'c = 3000 PSI (20.7 MPa)		f'c = 4000 PSI (27.6 MPa)	
					TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	3.5 (4.7)	3/16 (4.8)	1-1/8 (28.6)	Carbon or Stainless	1,200 (5.3)	1,215 (5.4)	1,325 (5.9)	1,215 (5.4)	1,450 (6.4)	1,215 (5.4)
5/16 (7.9)	8 (10.8)	1/4 (6.4)	1-1/4 (31.8)		1,400 (6.2)	2,040 (9.1)	1,920 (8.5)	2,220 (9.9)	2,600 (11.6)	2,400 (10.7)
3/8 (9.5)	14 (19.0)	5/16 (7.9)	1-1/2 (38.1)		1,620 (7.2)	2,560 (11.4)	2,240 (10.0)	2,800 (12.5)	3,100 (13.8)	3,040 (13.5)
1/2 (12.7)	20 (27.1)	3/8 (9.5)	1-7/8 (47.6)		2,220 (9.9)	3,250 (14.5)	3,140 (14.0)	4,000 (17.8)	4,400 (19.6)	4,500 (20.0)
5/8 (15.9)	48 (65.1)	1/2 (12.7)	2 (50.8)		3,080 (13.7)	6,440 (28.6)	4,400 (19.6)	7,240 (32.2)	6,120 (27.2)	8,080 (35.9)
3/4 (19.1)	90 (122.0)	5/8 (15.9)	2-1/4 (57.2)		4,200 (18.7)	10,200 (45.4)	6,060 (27.0)	11,600 (51.6)	8,900 (39.6)	13,100 (58.3)

* For continuous extreme low temperature applications, use stainless steel.
For AN-1405, Ultimate Pullout: 500 lbs. & Ultimate Shear: 1751 lbs. based on 4,000 psi.
* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values

Dynabolt Sleeve Anchors — Ultimate Tension and Shear Values in Lightweight Concrete (Lbs/kN)*

ANCHOR DIA. In. (mm)	INSTALLATION TORQUE Ft. Lbs. (Nm)	BOLT DIA. In. (mm)	MINIMUM EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE (STEEL)	f'c = 4000 PSI (27.6 MPa)		f'c = 6000 PSI (41.4 MPa)	
					TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	3.5 (4.7)	3/16 (4.8)	1-1/8 (28.6)	Carbon or Stainless	870 (3.9)	730 (3.2)	1,066 (4.7)	894 (4.0)
5/16 (7.9)	8 (10.8)	1/4 (6.4)	1-1/4 (31.8)		1,260 (5.6)	1,680 (7.5)	1,440 (6.4)	2,220 (9.9)
3/8 (9.5)	14 (19.0)	5/16 (7.9)	1-1/2 (38.1)		1,620 (7.2)	2,300 (10.2)	2,240 (10.0)	2,800 (12.5)
1/2 (12.7)	25 (33.9)	3/8 (9.5)	1-7/8 (47.6)		2,600 (11.6)	2,400 (10.7)	3,160 (14.1)	2,400 (10.7)
5/8 (15.9)	48 (65.1)	1/2 (12.7)	2 (50.8)		3,240 (14.4)	5,600 (24.9)	4,300 (19.1)	7,840 (34.9)
3/4 (19.1)	90 (122.0)	5/8 (15.9)	2-1/4 (57.2)		3,640 (16.2)	8,640 (38.4)	5,800 (25.8)	12,480 (55.5)

Dynabolt Sleeve Anchors — Ultimate Tension and Shear Values in Concrete Masonry Units (Lbs/kN)*

ANCHOR DIA. In. (mm)	INSTALLATION TORQUE Ft. Lbs. (Nm)	BOLT DIA. In. (mm)	MINIMUM EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE (STEEL)	LIGHTWEIGHT				MEDIUM WEIGHT			
					HOLLOW CORE		GROUT FILLED		HOLLOW CORE		GROUT FILLED	
					TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	3.5 (4.7)	3/16 (4.8)	1-1/8 (28.6)	Carbon	1,120 (5.0)	1,215 (5.4)	1,120 (5.0)	1,215 (5.4)	1,120 (5.0)	1,215 (5.4)	1,120 (5.0)	1,215 (5.4)
				Stainless	640 (2.8)	1,620 (7.2)	640 (2.8)	1,620 (7.2)	640 (2.8)	1,620 (7.2)	640 (2.8)	1,620 (7.2)
3/8 (9.5)	15 (20.3)	5/16 (7.9)	1-1/2 (38.1)	Carbon	1,360 (6.0)	2,560 (11.4)	1,360 (6.0)	2,560 (11.4)	1,360 (6.0)	2,560 (11.4)	1,360 (6.0)	2,560 (11.4)
				Stainless	1,160 (5.2)	2,560 (11.4)	1,160 (5.2)	2,560 (11.4)	1,160 (5.2)	2,560 (11.4)	1,160 (5.2)	2,560 (11.4)
1/2 (12.7)	25 (33.9)	3/8 (9.5)	1-7/8 (47.6)	Carbon	N/A	N/A	2,220 (9.9)	3,500 (15.6)	N/A	N/A	2,220 (9.9)	3,500 (15.6)
				Stainless	N/A	N/A	2,100 (9.3)	3,500 (15.6)	N/A	N/A	2,100 (9.3)	3,500 (15.6)
5/8 (15.9)	55 (74.6)	1/2 (12.7)	2 (50.8)	Carbon	N/A	N/A	3,080 (13.7)	6,440 (28.6)	N/A	N/A	3,080 (13.7)	6,440 (28.6)
				Stainless	N/A	N/A	3,080 (13.7)	6,440 (28.6)	N/A	N/A	2,820 (12.5)	6,440 (28.6)
3/4 (19.1)	90 (122.0)	5/8 (15.9)	2-1/2 (63.5)	Carbon	N/A	N/A	4,200 (18.7)	10,200 (45.4)	N/A	N/A	4,200 (18.7)	10,200 (45.4)

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values. **The tabulated values are for anchors installed in a minimum of 12 diameters on center and a minimum edge distance of 6 diameters for 100 percent anchor efficiency. Spacing and edge distance may be reduced to 6 diameter spacing and 3 diameter edge distance, provided the values are reduced 50 percent. Linear interpolation may be used for intermediate spacings and edge distances.**

Combined Tension and Shear Loading—for Dynabolt Anchors

Allowable loads for anchors subjected to combined shear and tension forces are determined by the following equation:

$$(Ps/Pt) + (Vs/Vt) \leq 1$$

Ps = Applied tension load Vs = Applied shear load Pt = Allowable tension load Vt = Allowable shear load

Tapcon® Concrete and Masonry Anchors

THE ORIGINAL Tapcon®

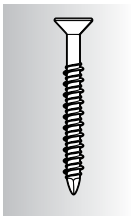
Advanced Threadform Technology™ Easier to install–less torque required!

Blue Climaseal™ 410 Stainless Steel

DESCRIPTION/SUGGESTED SPECIFICATIONS

Tapcon Anchors—

SPECIFIED FOR ANCHORAGE INTO CONCRETE, BRICK OR BLOCK

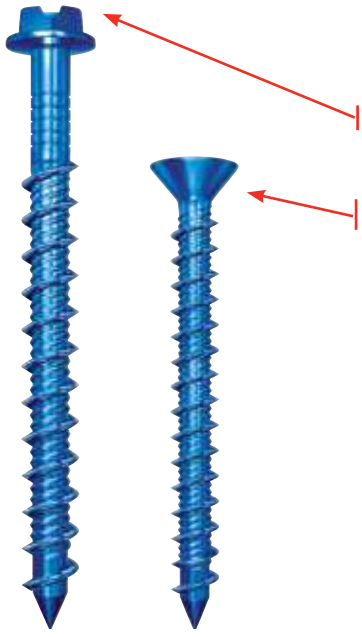


The "original masonry" anchor that cuts its own threads into concrete, brick, or block. Maximum performance is achieved because the Tapcon Anchor, the Condrive Installation Tool, and the carbide-tipped Tapcon Drill Bits are designed to work as a system. It is essential to use the Condrive tool and the correct drill bit to assure consistent anchor performance.

ADVANTAGES

- Works in all masonry base materials.
- Fast and easy—3 anchors per minute.
- No hole spotting or inserts required.
- Removable.
- Slotted hex and phillips flat head styles.
- Extended corrosion protection—Blue Climaseal™.
- Available in 410 Stainless Steel.

Tapcon Anchors



Blue Climaseal™ provides extended corrosion protection

Available in 410 Stainless Steel (see photo on left)

Hex Head style on Tapcon Anchors is available for majority of fixture anchoring needs

Phillips Flat Head style is available when flush seating is necessary in countersink applications

Advanced Threadform cuts into concrete and masonry for reduced installation torque and increased pullout performance

Lengths of Tapcon Anchors range from 1-1/4" to 4" in 3/16" and up to 6" in 1/4" diameters.

Nail-Type Point guides the anchor into the pre-drilled hole. Excellent for wood to concrete applications

CORROSION RESISTANCE

Kesternich Results (DIN 40018 2.0L)

30 Cycles - 10% or less rust

Salt Spray Results (ASTM B117)

720 Hrs - 10% or less rust

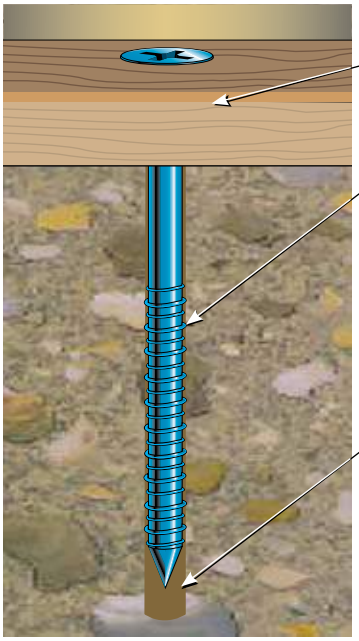
APPLICATIONS

The Tapcon Anchor is especially well suited for window and door frames because it performs well in block, is available in a flat head style, and is fast to install.

Many horizontal or "wall" applications are attached with Tapcon Anchor because it is removable and works well in block and brick.

The picture shows the Condrive 1000 Installation Kit in action. The kit makes for fast and easy change over from drill bit to driver and controls the driving torque to prevent thread stripping and head snapping in hard base materials.

FEATURES



Fixture Thickness—determine the fixture thickness to be anchored

Anchor Embedment—with a minimum recommended embedment of 1", the correct Tapcon anchor choice can be made. Hole depth must be a minimum **1/4" deeper** than the anchor embedment to allow for displaced material

Hole Diameter—proper hole diameter is very important to insure consistent performance and maximum pullout strength. **3/16" anchors require 5/32" diameter bits, and 1/4" anchors require 3/16" diameter bits**

APPROVAL/LISTINGS

Blue Climaseal™

ICC Evaluation Service, Inc. – ESR-1671
ICC Evaluation Service, Inc. – ESR-2202
Miami-Dade County – NOA #12-0816.06
Florida Building Code

410 Stainless Steel

Miami-Dade County – NOA #12-0816.06
Florida Building Code

For the most current approvals/listings visit: www.itw-redhead.com

INSTALLATION STEPS

Read installation instructions before using!

WARNING: If there are any questions concerning proper installation, applications or appropriate use of this product, please call our Technical Services Department at 1-800-848-5611. Failure to follow these instructions can result in serious personal injury.

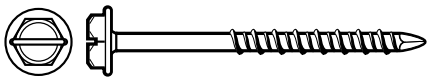
1. **Select proper fastener – diameter / head style / length.**
   a) **Use selection chart to choose proper length.**
2. **Drill Hole – use selection chart to determine drill bit length and depth of hole.**
   a) **Choose appropriate drill of Tapcon Anchor.**
   b) **Drill hole minimum ¼" deeper than Tapcon Anchor to be embedded.**
   Minimum anchor embedment: 1"
   Maximum anchor embedment: 1-3/4"
3. **Drive Anchor.**

WARNING: Failure to wear safety glasses with side shields can result in serious personal injury. Always wear ANSI compliant eye protection (ANSI Z87.1-2003).

WARNING: Using the wrong size drill bit will affect performance values and may cause failure.

Head Styles

3/16" diameter has a 1/4" slotted hex washer head (HWH)
1/4" diameter has a 5/16" slotted hex washer head (HWH)



3/16" diameter uses a #2 phillips flat head (PFH)
1/4" diameter uses a #3 phillips flat head (PFH)

SELECTION CHARTS

Tapcon® Anchors with Blue Climaseal™

Diameter.....3/16" and 1/4"
Point Type.....Nail
Thread Form.....Advanced Threadform Technology™
Finish.....Blue Climaseal™
All boxes of Tapcon anchors come packaged with matching carbide-tipped bit. Tapcon is packaged 100 pieces per box and 500 pieces per master carton except 3205407 and 3203407 (400 in master carton).

FIXTURE THICKNESS INCHES	RECOMMENDED TAPCON LENGTH In. (mm)	PART NO. 3/16" HEX HEAD	PART NO. 1/4" HEX HEAD	PART NO. 3/16" FLAT HEAD	PART NO. 1/4" FLAT HEAD	BIT LENGTH In. (mm)	STRAIGHT SHANK BITS FOR 3/16" TAPCON PART NO.	STRAIGHT SHANK BITS FOR 1/4" TAPCON PART NO.
0" – 1/4"	1-1/4 (31.8)	3139407	3153407	3169407	3183407	3-1/2 (88.9)	-	3098910
1/4" – 3/4"	1-3/4 (44.5)	3141407	3155407	3171407	3185407	3-1/2 (88.9)	-	3098910
3/4" – 1-1/4"	2-1/4 (57.2)	3143407	3157407	3173407	3187407	4-1/2 (114.3)	3096910	3099910
1-1/4 " – 1-3/4"	2-3/4 (69.9)	3145407	3159407	3175407	3189407	4-1/2 (114.3)	3096910	3099910
1-3/4" – 2-1/4"	3-1/4 (82.6)	3147407	3161407	3177407	3191407	5-1/2 (139.7)	3097910	3100910
2-1/4" – 2-3/4"	3-3/4 (95.3)	3149407	3163407	3179407	3193407	5-1/2 (139.7)	3097910	3100910
2-1/2" – 3"	4 (101.6)	N/A	3165407	3181407	3195407	5-1/2 (139.7)	3097910	3100910
3-1/2" – 4"	5 (127.0)	N/A	3167407	N/A	3197407	6-1/2 (165.1)	N/A	-
4-1/2" – 5"	6 (152.4)	N/A	3205407	N/A	3203407	7-1/2 (190.5)	N/A	3206910

Additional Tapcon bits are available 10 per tube.

Tapcon® 410 SS Anchor

Diameter.....3/16" and 1/4"
Point Type.....Nail
Thread Form.....Original Notched Hi-Lo™
Finish.....410 Stainless Steel with Silver Climaseal™
All boxes of Tapcon anchors come packaged with matching carbide-tipped bit. Tapcon is packaged 100 pieces per box and 500 pieces per master carton except 3461907 (400 in master carton).

FIXTURE THICKNESS INCHES	RECOMMENDED TAPCON LENGTH In. (mm)	PART NO. 1/4" HEX HEAD	PART NO. 3/16" FLAT HEAD	PART NO. 1/4" FLAT HEAD	BIT LENGTH In. (mm)	STRAIGHT SHANK BITS FOR 3/16" TAPCON PART NO.	STRAIGHT SHANK BITS FOR 1/4" TAPCON PART NO.
0" – 1/4"	1-1/4 (31.8)	3367907	3434907	3373907	3-1/2 (88.9)	3095910	3098910
1/4" – 3/4"	1-3/4 (44.5)	3368907	3418907	3374907	3-1/2 (88.9)	3095910	3098910
3/4" – 1-1/4"	2-1/4 (57.2)	3369907	3419907	3375907	4-1/2 (114.3)	3096910	3099910
1-1/4 – 1-3/4"	2-3/4 (69.9)	3370907	3420907	3376907	4-1/2 (114.3)	3096910	3099910
1-3/4" – 2-1/4"	3-1/4 (82.6)	3371907	-	3377907	5-1/2 (139.7)	3097910	3100910
2-1/4" – 2-3/4"	3-3/4 (95.3)	3372907	3422907	3378907	5-1/2 (139.7)	3097910	3100910
2-1/2" – 3"	4 (101.6)	3459907	N/A	N/A	5-1/2 (139.7)	N/A	3100910
3-1/2" – 4"	5 (127.0)	3460907	N/A	N/A	6-1/2 (165.1)	N/A	3102910
4-1/2" – 5"	6 (152.4)	N/A	N/A	N/A	7-1/2 (190.5)	N/A	3461907

Tapcon® SDS Bits

PART NUMBER	DESCRIPTION
3311910	7" (SDS Rotohammer Bits for use with 3/16" Tapcon)
7901060	5" (SDS Rotohammer Bits for use with 1/4" Tapcon)
3101910	7" (SDS Rotohammer Bits for use with 1/4" Tapcon)

All SDS bits are sold individually.

PERFORMANCE TABLE

Tapcon® Anchors

Ultimate Tension and Shear Values (Lbs/kN) in Concrete

ANCHOR DIA. In. (mm)	MIN. DEPTH OF EMBEDMENT In. (mm)	f'c = 2000 PSI (13.8 MPa)		f'c = 3000 PSI (20.7 MPa)		f'c = 4000 PSI (27.6 MPa)		f'c = 5000 PSI (34.5 MPa)	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/16 (4.8)	1 (25.4)	600 (2.7)	720 (3.2)	625 (2.8)	720 (3.2)	650 (2.9)	720 (3.2)	800 (3.6)	860 (3.8)
	1-1/4 (31.8)	845 (3.7)	720 (3.2)	858 (3.8)	720 (3.2)	870 (3.9)	720 (3.2)	1,010 (4.5)	860 (3.8)
	1-1/2 (38.1)	1,090 (4.8)	860 (3.8)	1,090 (4.8)	860 (3.8)	1,090 (4.8)	860 (3.8)	1,220 (5.4)	860 (3.8)
	1-3/4 (44.5)	1,450 (6.5)	870 (3.9)	1,455 (6.5)	870 (3.9)	1,460 (6.5)	990 (4.4)	1,730 (7.7)	990 (4.4)
1/4 (6.4)	1 (25.4)	750 (3.3)	900 (4.0)	775 (3.4)	900 (4.0)	800 (3.6)	1,360 (6.1)	950 (4.2)	1,440 (6.4)
	1-1/4 (31.8)	1,050 (4.7)	900 (4.0)	1,160 (5.2)	900 (4.0)	1,270 (5.6)	1,360 (6.1)	1,515 (6.7)	1,440 (6.4)
	1-1/2 (38.1)	1,380 (6.1)	1,200 (5.3)	1,600 (7.2)	1,200 (5.3)	1,820 (8.1)	1,380 (6.1)	2,170 (9.7)	1,670 (7.4)
	1-3/4 (44.5)	2,020 (9.0)	1,670 (7.4)	2,200 (9.8)	1,670 (7.4)	2,380 (10.6)	1,670 (7.4)	2,770 (12.3)	1,670 (7.4)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity.

Tapcon® Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Hollow Block

ANCHOR DIA. In. (mm)	ANCHOR EMBEDMENT In. (mm)	LIGHTWEIGHT BLOCK		MEDIUM WEIGHT BLOCK	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/16 (4.8)	1 (25.4)	220 (1.0)	400 (1.8)	340 (1.5)	730 (3.2)
1/4 (6.4)	1 (25.4)	250 (1.1)	620 (2.8)	500 (2.2)	1,000 (4.4)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity.

NOTE: 3/16" Tapcon requires 5/32" bit, 1/4" Tapcon requires 3/16" bit.

Tapcon® Anchors — Allowable Edge and Spacing Distances

PARAMETER	ANCHOR DIA. In. (mm)	NORMAL WEIGHT CONCRETE			CONCRETE MASONRY UNITS (CMU)		
		FULL CAPACITY (Critical Distance Inches)	REDUCED CAPACITY (Minimal Distance Inches)	LOAD REDUCTION FACTOR	FULL CAPACITY (Critical Distance Inches)	REDUCED CAPACITY (Minimal Distance Inches)	LOAD REDUCTION FACTOR
Spacing Between Anchors - Tension	3/16	3	1-1/2	0.73	3	1-1/2	1.00
	1/4	4	2	0.66	4	2	0.84
Spacing Between Anchors - Shear	3/16	3	1-1/2	0.83	3	1-1/2	1.00
	1/4	4	2	0.82	4	2	0.81
Edge Distance - Tension	3/16	1-7/8	1	0.83	4	2	0.91
	1/4	2-1/2	1-1/4	0.82	4	2	0.88
Edge Distance -Shear	3/16	2-1/4	1-1/8	0.70	4	2	0.93
	1/4	3	1-1/2	0.59	4	2	0.80

For SI: 1 inch = 25.4 mm

Tapcon® Condrive 1000 Tool Kit

DESCRIPTION/SUGGESTED SPECIFICATIONS

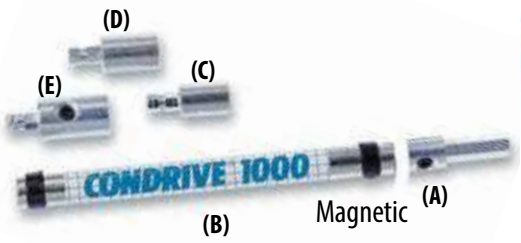
Condrive 1000 Installation Tool—

SPECIFIED FOR ANCHORAGE INTO CONCRETE, BRICK OR BLOCK

The key to Tapcon's fast and easy installation is the multi-purpose Condrive Installation Tool. The drive sleeve, along with the hex head and phillips sockets provide the installer with the flexibility necessary for the complete variety of Tapcon applications (tool does not include drill bit).

Condrive® 1000 - A multi-purpose tool designed for installation of Tapcon hex head and Phillips flat head anchors up to 3-3/4" long. If driving hex head Tapcon, driver will automatically disengage. The Condrive 1000 has a reusable plastic case.

Condrive Tools are designed to specifically install Tapcon Anchors and to fit standard hammer drills.



Part No. C1000
(Does not include drill bit)

APPLICATIONS

The picture shows the Condrive 1000 Installation Kit in action. The kit makes for fast and easy change over from drill bit to driver and controls the driving torque to prevent thread stripping and head snapping in hard base materials.

ADVANTAGES

- Fast change from drilling to driving
- Eliminates need to change out chucks and bits
- Eliminates need for two tools
- Special nut driver is recessed for torque control to reduce head breakage

Condrive 1000 Spare Parts

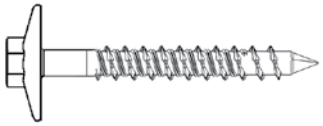
PART NO.	DESCRIPTION	QTY/WT
(A) 7901001	Drill Adapter	1/.06
(B) 7901002	Sleeve	1/.01
(C) 7901006	3/16" Socket	1/.04
(D) 7901007	1/4" Socket	1/.05
(E) 7901010	Phillips Socket	1/.44

Tapcon®
Maxi-Set Anchors

White UltraShield UltraShield

DESCRIPTION/SUGGESTED SPECIFICATIONS

FOR TAPCON APPLICATIONS THAT REQUIRE MORE ANCHOR BEARING SURFACE.



ADVANTAGES

- Same reliable performance and speed of installation as regular Tapcon.
- Large 5/8″ diameter flange provides more bearing surface and increases pullover resistance. High 5/16″ hex head adds driving stability.
- Compatible with DrivTru™ socket system. Improves installation. Protects paint finish.
- UltraShield™ and White UltraShield™ long-life finish deliver excellent corrosion resistance.

CORROSION RESISTANCE

Salt Spray Test (ASTM B117)	UltraShield	White UltraShield
	1100 Hrs 10% or less rust	1500 Hrs NO RED RUST

APPROVAL/LISTINGS

ICC Evaluation Service, Inc. – #ESR-1671

Miami-Dade County – NOA #12-0816.06

For the most current approvals/listings visit: www.itw-redhead.com

INSTALLATION STEPS

Read installation instructions before using!

WARNING: If there are any questions concerning proper installation, applications or appropriate use of this product, please call our Technical Services Department at 1-800-848-5611. Failure to follow these instructions can result in serious personal injury.

1. **Select proper fastener – diameter / head style / length.**
   a) **Use selection chart to choose proper length.**
2. **Drill Hole – use selection chart to determine drill bit length and depth of hole.**
   a) **Choose appropriate drill of Tapcon Anchor.**
   b) **Drill hole minimum ¼″ deeper than Tapcon Anchor to be embedded.**
   Minimum anchor embedment: 1″
   Maximum anchor embedment: 1-3/4″
3. **Drive anchor using 5/16″ socket.**

APPLICATIONS

Shutters - protective and decorative

Screened porch and pool enclosures.

Various sheet metal flashings.

Decorative wrought iron.

Wood nailers and plywood attachment.

WARNING: Failure to wear safety glasses with side shields can result in serious personal injury. Always wear ANSI compliant eye protection (ANSI Z87.1-2003).

WARNING: Using the wrong size drill bit will affect performance values and may cause failure.

SELECTION CHART

Tapcon® Maxi-Set Anchors

Diameter.....1/4" Thread Form..... Advanced Threadform Technology™
Point Type.....Nail Finish.....UltraShield™ or *White UltraShield™
Head Style.....5/16" across flats hex with 5/8" diameter flange.

RECOMMENDED TAPCON LENGTH In. (mm)	PART NO. 1/4" HEX HEAD	FINISH	BIT LENGTH In. (mm)	STRAIGHT SHANK BITS FOR 1/4" TAPCON PART NO.
1-3/4 (44.5)	3294000	Ultra Shield	3-1/2 (88.9)	3098910
1-3/4 (44.5)	3383100	White Ultra Shield	3-1/2 (88.9)	3098910
2-1/4 (57.2)	3384100	White Ultra Shield	4-1/2 (114.3)	3099910
3-1/4 (82.6)	3409100	White Ultra Shield	5-1/2 (139.7)	3100910

NOTE: 2-3/4" and 3-1/4" lengths are special orders. Contact customer service for lead-times.
Maxi-Sets are packed 1,000 pieces per master carton except 3409100 is packed 750 pieces.

Tapcon® SDS Bits

PART NUMBER	DESCRIPTION
3311910	7" (SDS Rotohammer Bits for use with 3/16" Tapcon)
7901060	5" (SDS Rotohammer Bits for use with 1/4" Tapcon)
3101910	7" (SDS Rotohammer Bits for use with 1/4" Tapcon)

PERFORMANCE TABLES

Tapcon® Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Concrete

ANCHOR DIA. In. (mm)	MIN. DEPTH OF EMBEDMENT In. (mm)	f'c = 2000 PSI (13.8 MPa)		f'c = 3000 PSI (20.7 MPa)		f'c = 4000 PSI (27.6 MPa)		f'c = 5000 PSI (34.5 MPa)	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	1 (25.4)	750 (3.3)	900 (4.0)	775 (3.4)	900 (4.0)	800 (3.6)	1,360 (6.1)	950 (4.2)	1,440 (6.4)
	1-1/4 (31.8)	1,050 (4.7)	900 (4.0)	1,160 (5.2)	900 (4.0)	1,270 (5.6)	1,360 (6.1)	1,515 (6.7)	1,440 (6.4)
	1-1/2 (38.1)	1,380 (6.1)	1,200 (5.3)	1,600 (7.2)	1,200 (5.3)	1,820 (8.1)	1,380 (6.1)	2,170 (9.7)	1,670 (7.4)
	1-3/4 (44.5)	2,020 (9.0)	1,670 (7.4)	2,200 (9.8)	1,670 (7.4)	2,380 (10.6)	1,670 (7.4)	2,770 (12.3)	1,670 (7.4)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity. Divide by 4

Tapcon® Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Hollow Block

ANCHOR DIA. In. (mm)	ANCHOR EMBEDMENT In. (mm)	LIGHTWEIGHT BLOCK		MEDIUM WEIGHT BLOCK	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	1 (25.4)	250 (1.1)	620 (2.8)	500 (2.2)	1,000 (4.4)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity. Divide by 4.

NOTE: 3/16" Tapcon requires 5/32" bit, 1/4" Tapcon requires 3/16" bit.

Tapcon® Anchors — Allowable Edge and Spacing Distances

PARAMETER	ANCHOR DIA. In. (mm)	NORMAL WEIGHT CONCRETE			CONCRETE MASONRY UNITS (CMU)		
		FULL CAPACITY (Critical Distance Inches)	REDUCED CAPACITY (Minimal Distance Inches)	LOAD REDUCTION FACTOR	FULL CAPACITY (Critical Distance Inches)	REDUCED CAPACITY (Minimal Distance Inches)	LOAD REDUCTION FACTOR
Spacing Between Anchors - Tension	1/4	4	2	0.66	4	2	0.84
Spacing Between Anchors - Shear	1/4	4	2	0.82	4	2	0.81
Edge Distance - Tension	1/4	2-1/2	1-1/4	0.82	4	2	0.88
Edge Distance -Shear	1/4	3	1-1/2	0.59	4	2	0.80

For SI: 1 inch = 25.4 mm

Tapcon®
SCOTS Anchors

DESCRIPTION/SUGGESTED SPECIFICATIONS

PREMIUM CONCRETE ANCHOR THAT COMBINES THE CORROSION PROTECTION OF STAINLESS STEEL WITH THE PERFORMANCE OF TAPCON ANCHORS.

ADVANTAGES

- **300 Series Stainless Steel head and Carbon Steel body.**
- Integral washer design provides more bearing surface.
- Rubber EPDM sealing washer "locks-out" moisture from building interior.
- Head paint available in white or bronze (extra charge).
- Delivers the same holding performance as Tapcon anchors with Blue Climaseal™.
- Reduces replacement of "weathered" fasteners.

CORROSION RESISTANCE

Kesternich Results (DIN 50018, 2.0L)

Climaseal™	30 Cycles - 10% or less red rust

APPROVAL/LISTINGS

ICC Evaluation Service, Inc. – ESR-1671

Miami-Dade County – #12-0816.06

For the most current approvals/listings visit: www.itw-redhead.com

INSTALLATION STEPS

Read installation instructions before using!

WARNING: If there are any questions concerning proper installation, applications or appropriate use of this product, please call our Technical Services Department at 1-800-848-5611. Failure to follow these instructions can result in serious personal injury.

1. **Select proper fastener – diameter / head style / length.**
   a) **Use selection chart to choose proper length.**
2. **Drill Hole – use selection chart to determine drill bit length and depth of hole.**
   a) **Choose appropriate drill of Tapcon Anchor.**
   b) **Drill hole minimum 1/4" deeper than Tapcon Anchor to be embedded.**
   Minimum anchor embedment: 1"
   Maximum anchor embedment: 1-3/4"
3. **Drive anchor using 5/16" socket.**

WARNING: Failure to wear safety glasses with side shields can result in serious personal injury. Always wear ANSI compliant eye protection (ANSI Z87.1-2003).

WARNING: Using the wrong size drill bit will affect performance values and may cause failure.

APPLICATIONS

- Shutters - protective and decorative
- Screened porch and pool enclosures
- Aluminum fixtures
- Railings
- Metal roofing
- Flexible flashings

SELECTION CHART

Tapcon® SCOTS Anchors

Diameter.....1/4" Thread Form..... Advanced Threadform Technology™
Point Type.....Nail Finish.....Silver Climaseal™
Head Style.....5/16" HWH (300 Series Stainless)

RECOMMENDED TAPCON LENGTH In. (mm)	PART NO. 1/4" HEX HEAD	BIT LENGTH In. (mm)	STRAIGHT SHANK BITS FOR 1/4" TAPCON PART NO.
1-3/4 (44.5)	3358407	3-1/2 (88.9)	3098910

NOTE: 2-3/4" and 3-1/4" lengths are special orders. Contact customer service for lead-times.
SCOTS are packed 1,000 pieces per master, 100 pieces per inner.

Tapcon® SDS Bits

PART NUMBER	DESCRIPTION
3311910	7" (SDS Rotohammer Bits for use with 3/16" Tapcon)
7901060	5" (SDS Rotohammer Bits for use with 1/4" Tapcon)
3101910	7" (SDS Rotohammer Bits for use with 1/4" Tapcon)

PERFORMANCE TABLES

Tapcon® Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Concrete

ANCHOR DIA. In. (mm)	MIN. DEPTH OF EMBEDMENT In. (mm)	f'c = 2000 PSI (13.8 MPa)		f'c = 3000 PSI (20.7 MPa)		f'c = 4000 PSI (27.6 MPa)		f'c = 5000 PSI (34.5 MPa)	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	1 (25.4)	750 (3.3)	900 (4.0)	775 (3.4)	900 (4.0)	800 (3.6)	1,360 (6.1)	950 (4.2)	1,440 (6.4)
	1-1/4 (31.8)	1,050 (4.7)	900 (4.0)	1,160 (5.2)	900 (4.0)	1,270 (5.6)	1,360 (6.1)	1,515 (6.7)	1,440 (6.4)
	1-1/2 (38.1)	1,380 (6.1)	1,200 (5.3)	1,600 (7.2)	1,200 (5.3)	1,820 (8.1)	1,380 (6.1)	2,170 (9.7)	1,670 (7.4)
	1-3/4 (44.5)	2,020 (9.0)	1,670 (7.4)	2,200 (9.8)	1,670 (7.4)	2,380 (10.6)	1,670 (7.4)	2,770 (12.3)	1,670 (7.4)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity.

Tapcon® Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Hollow Concrete Masonry Units

ANCHOR DIA. In. (mm)	ANCHOR EMBEDMENT In. (mm)	LIGHTWEIGHT BLOCK		MEDIUM WEIGHT BLOCK	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	1 (25.4)	250 (1.1)	620 (2.8)	500 (2.2)	1,000 (4.4)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity.
NOTE: 3/16" Tapcon requires 5/32" bit, 1/4" Tapcon requires 3/16" bit.

Tapcon® Anchors — Allowable Edge and Spacing Distances

PARAMETER	ANCHOR DIA. In. (mm)	NORMAL WEIGHT CONCRETE			CONCRETE MASONRY UNITS (CMU)		
		FULL CAPACITY (Critical Distance Inches)	REDUCED CAPACITY (Minimal Distance Inches)	LOAD REDUCTION FACTOR	FULL CAPACITY (Critical Distance Inches)	REDUCED CAPACITY (Minimal Distance Inches)	LOAD REDUCTION FACTOR
Spacing Between Anchors - Tension	1/4	4	2	0.66	4	2	0.84
Spacing Between Anchors - Shear	1/4	4	2	0.82	4	2	0.81
Edge Distance - Tension	1/4	2-1/2	1-1/4	0.82	4	2	0.88
Edge Distance -Shear	1/4	3	1-1/2	0.59	4	2	0.80

For SI: 1 inch = 25.4 mm

RED HEAD®
CONCRETE ANCHORING SPECIALISTS

Tapcon® XL Anchors

UltraShield White UltraShield

APPLICATIONS

Shutters - protective and decorative

Screened porch and pool enclosures.

Railings

Mounted electrical equipment

Sill plates

DESCRIPTION/SUGGESTED SPECIFICATIONS

EXTRA LARGE TAPCON FOR EXTRA LARGE CHALLENGES!

ADVANTAGES

- Internal TORX® T-40 drive assures easy installation.
- High button head resists cam-out during installation.
- Corrosion protection of UltraShield™ and White UltraShield™ to combat aggressive environments.
- Available in silver or white to complement standard fixtures.
- Delivers over 3,000 lbs. holding power in concrete.
- Alternative to sleeve anchors.
- 1/4" SDS Tapcon drill bit for added convenience.
- Condrive® XL with MegaGrip™ bit holder for rapid one-tool installation.

CORROSION RESISTANCE

Salt Spray Test (ASTM B117)	UltraShield	White UltraShield
	1100 Hrs 10% or less rust	1500 Hrs no red rust

INSTALLATION STEPS

Read installation instructions before using!

WARNING: If there are any questions concerning proper installation, applications or appropriate use of this product, please call our Technical Services Department at 1-800-848-5611. Failure to follow these instructions can result in serious personal injury.

1. **Select proper fastener – diameter / head style / length.**
   a) **Use selection chart to choose proper length.**
2. **Drill Hole – use selection chart to determine drill bit length and depth of hole.**
   a) **Choose appropriate drill of Tapcon Anchor.**
   b) **Drill hole minimum ¼" deeper than Tapcon Anchor to be embedded.**
   Minimum anchor embedment: 1"
   Maximum anchor embedment: 1-3/4"
3. **Insert the adjustable MegaGrip bit tip holder in the small opening of sleeve. Slide the open end of the Condrive XL Installation Tool sleeve over the drill bit and snap in place.**
4. **Drive anchor using MegaGrip adjustable magnetic bit holder with TORX T-40 bit tip**

MegaGrip PART#	DESCRIPTION
3400910	MegaGrip Bit Holder

WARNING: Failure to wear safety glasses with side shields can result in serious personal injury. Always wear ANSI compliant eye protection (ANSI Z87.1-2003).

WARNING: Using the wrong size drill bit will affect performance values and may cause failure.

SELECTION CHART

Tapcon® XL Anchors

Diameter.....5/16" Thread Form..... Reverse Hi-Lo®
Point Type.....Nail Finish.....UltraShield™ or *White UltraShield™
Head Style.....High button with TORX T-40 Drive

RECOMMENDED TAPCON LENGTH In. (mm)	PART NO.	FINISH	BIT LENGTH In. (mm)	1/4" DRILL BITS FOR TAPCON XL PART NO.
2-1/4 (57.2)	3395902	Ultra Shield	6-3/4" SDS drill bit with hex	3394910

XLs are packed 100 pieces per master carton.

PART NO.	DESCRIPTION	CARTON QTY
3401910	Condrive® XL Installation Tool with MegaGrip™ Bit Holder with TORX® T-40 Bit Tip	10 per master carton
3400910	MegaGrip™ Magnetized Bit Holder with TORX T-40 Bit Tip	10 per bag
3394910	1/4" x 6-3/4" SDS Tapcon Drill Bit with Hex	1 piece per tube

Tapcon XL Anchors must be installed using all Red Head system components (Tapcon XL Anchors, Condrive XL Installation Tool and Tapcon Drill Bits) in order to qualify for ITW Red Head system support.

PERFORMANCE TABLES

Tapcon® XL Anchors

Ultimate Tension and Shear Values (Lbs/kN) in Concrete

ANCHOR DIA. In. (mm)	MIN. DEPTH OF EMBEDMENT In. (mm)	EDGE DISTANCE	f'c = 3000 PSI (20.7 MPa)	
			TENSION Lbs. (kN)	SHEAR Lbs. (kN)
5/16 (7.9)	1-1/4 (31.8)	1-9/16 (39.7)	1,050 (4.7)	1,330 (5.9)
		2-3/16 (55.6)	1,205 (5.4)	1,725 (7.7)
	1-3/4 (44.5)	1-9/16 (39.7)	2,020 (9.0)	1,530 (6.8)
		2-3/16 (55.6)	2,250 (10.0)	2,505 (11.1)
	2-1/4 (57.2)	1-9/16 (39.7)	2,850 (12.7)	1,955 (8.9)
		2-3/16 (55.6)	3,120 (13.9)	3,250 (14.4)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity. Divide by 4.

1. Pilot hole diameter shall be 0.263" and drilled 1/4" longer than the necessary embedment.
2. Allowable loads are based ultimate test load divide by 4.
3. Recommended center to center distance of 3-3/4" is required for 100% efficiency and 1-7/8" for 50% efficiency.
4. Embedment is through 1-1/4" face shell of hollow block.

Tapcon® XL Anchors

Ultimate Tension & Shear Values in Concrete Masonry Units

ANCHOR DIA. In. (mm)	MINIMUM DEPTH OF EMBEDMENT In. (mm)	EDGE DISTANCE (Inches)	HOLLOW CORE[1]		GROUT-FILLED[2]	
			TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
5/16 (7.9)	1-1/4 (31.8)	4	1,045 (4.6)	2,280 (10.1)	1,045 (4.6)	2,280 (10.1)
	1-3/4 (44.5)	4	NOT RECOMMENDED	NOT RECOMMENDED	1,950 (8.7)	2,825 (12.6)
	2-1/4 (57.2)	4	NOT RECOMMENDED	NOT RECOMMENDED	3,770 (16.8)	3,140 (14.0)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity.

1 CMU = 1,600 PSI minimum compressive strength.

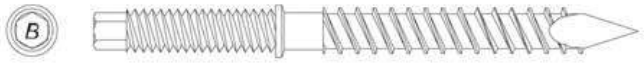
2 CMU = 1,600 PSI minimum compressive strength with 2,000 PSI grout.

RED HEAD®
CONCRETE ANCHORING SPECIALISTS

Tapcon® Storm Guard Anchors

DESCRIPTION/SUGGESTED SPECIFICATIONS

DIRECT MOUNT PERMANENT ANCHORS FOR QUICK AND EASY INSTALLATIONS OF METAL AND PLYWOOD PANELS TO CONCRETE AND BLOCK.



ADVANTAGES

- White UltraShield™ for corrosion protection in coastal environments.
- 1/4-20 x 7/8" external thread above collar.
- No caulking required.
- Threaded chamfered safety collar prevents overdriving.
- 3/16" Hex Drive.
- Use with ANSI standard 3/16" carbide-tipped drill bit. (bit not included)

CORROSION RESISTANCE

Salt Spray Test (ASTM B117)	White UltraShield
	1500 Hrs no red rust

APPROVAL/LISTINGS

Miami-Dade County – #11-0616.04

For the most current approvals/listings visit: www.itw-redhead.com

INSTALLATION STEPS

Read installation instructions before using!

CAUTION: **DO NOT BEND DRILL BIT.**
DO NOT FORCE THE DRILL BIT INTO BASE MATERIAL.

3/16" Nut Driver Installation Tool (Part # 3426910)

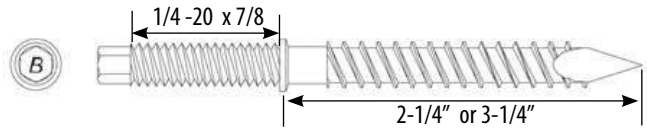
WARNING: Failure to wear safety glasses with side shields can result in serious personal injury. Always wear ANSI compliant eye protection (ANSI Z87.1-2003).

WARNING: Using the wrong size drill bit will affect performance values and may cause failure.

APPLICATIONS

Direct mount permanent anchors for quick and easy installations for metal and plywood panels to wood, hollow block and concrete.

SELECTION CHART



Tapcon® Storm Guard Anchors

Diameter.....1/4" Thread Form..... Original Notched Hi-Lo™
Point Type.....Nail Finish.....UltraShield™

PART NO.	DESCRIPTION	COATING	BOX QTY
3424100	1/4" dia. x 2-1/4"	White UltraShield	1,000
3426910	3/16" Nut Driver	---	1

PERFORMANCE TABLES

Tapcon® Storm Guard Anchors

Ultimate Tension and Shear Values (Lbs/kN) in Concrete

ANCHOR DIA. In. (mm)	MIN. DEPTH OF EMBEDMENT In. (mm)	EDGE DISTANCE	f'c = 3000 PSI (20.7 MPa)	
			TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	1 (25.4)	1-1/4 (31.8)	1,230 (5.5)	1,339 (6.0)
	1 (25.4)	2-1/2 (63.5)	1,701 (7.6)	2,333 (10.4)
	1-3/4 (44.5)	1-1/4 (31.8)	2,704 (12.0)	1,375 (6.1)
	1-3/4 (44.5)	2-1/2 (63.5)	2,844 (12.6)	2,618 (11.6)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity. Divide by 4.

Tapcon® Storm Guard Anchors

Ultimate Tension and Shear Values (Lbs/kN) in Hollow Concrete Masonry Units

ANCHOR DIA. In. (mm)	MIN. DEPTH OF EMBEDMENT In. (mm)	EDGE DISTANCE	f'c = 1500 PSI (10.4 MPa)	
			TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	1-1/4 (31.8)	1-1/4 (31.8)	1,955 (8.7)	536 (2.4)
	1-1/4 (31.8)	2-1/2 (63.5)	1,940 (8.6)	1,088 (4.8)

Tapcon® Storm Guard Anchors

Ultimate Tension and Shear Values (Lbs/kN) in Grout-Filled (CMU)

ANCHOR DIA. In. (mm)	MIN. DEPTH OF EMBEDMENT In. (mm)	EDGE DISTANCE	GROUT-FILLED (CMU) f'c = 2000 PSI (13.8 MPa)	
			TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	1-3/4 (44.5)	1-1/4 (31.8)	3,335 (14.8)	1,207 (5.4)
	1-3/4 (44.5)	2-1/2 (63.5)	3,779 (16.8)	2,061 (9.2)

RED HEAD®
CONCRETE ANCHORING SPECIALISTS

Hammer-Set™ Anchors

Nail-Drive Anchors

APPLICATIONS

*For overhead applications refer to page 79 for Redi-Drive information and performance data

NOT FOR USE IN OVERHEAD APPLICATIONS*

- Electrical boxes
- Conduit clips
- Drywall track
- Roof flashing

*For spacing and edge distance data please refer to the Tapcon data tables

DESCRIPTION/SUGGESTED SPECIFICATIONS

Hammer-Set Nail Drive Anchors—

SPECIFIED FOR ANCHORAGE INTO CONCRETE

Hammer-Set Nail-Drive Anchor

The Hammer-Set one-piece zinc plated steel anchor consists of an expansion body and expander drive pin. Anchors meet or exceed GSA specification A-A-1925A Type 1. (Formerly GSA: FF-S-325 Group V, Type 2, Class 3)

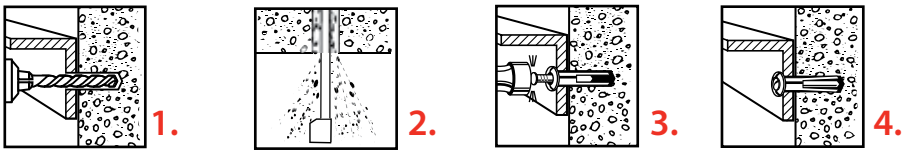
ADVANTAGES

- Fast, easy installation
- Works in concrete, block and brick
- Install through material to be fastened
- Low profile mushroom head style

APPROVALS/LISTINGS

Meets or exceeds GSA specification A-A-1925A Type 1 (Formerly GSA: FF-S-325 Group V, Type 2, Class 3)

INSTALLATION STEPS



1. Drill proper size hole through material to be fastened into base material. (See Chart for bit size).
2. Clean hole.
3. Insert Hammer-Set into hole until head of anchor body is flush with material to be fastened. Tap the nail until flush with head of anchor. Ensure minimum embedment is 1/4" deeper than anchor embedment. Be sure head is firmly against fixture
4. Anchor is now set. ** NOT RECOMMENDED FOR OVERHEAD **

SELECTION CHART

Hammer-Set

PART NUMBER	DESCRIPTION In. (mm)	DRILL SIZE In. (mm)	MAX. FIXTURE THICKNESS In. (mm)	MIN. EMBEDMENT In. (mm)	MIN. HOLE DEPTH In. (mm)	QTY/WT PER BOX lbs.	QTY/WT PER MASTER CTN - lbs.
HS-1607	3/16 x 7/8 (4.8 x 22.2)	3/16 (4.8)	1/4 (6.4)	5/8 (15.9)	1-1/8 (28.6)	100/ 2.0	1000/ 20
HS-1406	1/4 x 3/4 (6.4 x 19.1)	1/4 (6.4)	1/8 (3.2)	5/8 (15.9)	1 (25.4)	100/ 2.2	1000/ 22
HS-1410	1/4 x 1 (6.4 x 25.4)	1/4 (6.4)	1/4 (6.4)	3/4 (19.1)	1-1/4 (31.8)	100/ 2.4	1000/ 24
HS-1412	1/4 x 1-1/4 (6.4 x 31.8)	1/4 (6.4)	1/2 (12.7)	3/4 (19.1)	1-1/2 (38.1)	100/ 2.6	1000/ 26
HS-1414	1/4 x 1-1/2 (6.4 x 38.1)	1/4 (6.4)	3/4 (19.1)	3/4 (19.1)	1-3/4 (44.5)	100/ 2.8	1000/ 28
HS-1420	1/4 x 2 (6.4 x 50.8)	1/4 (6.4)	1-1/4 (31.8)	3/4 (19.1)	2-1/4 (57.2)	100/ 3.5	1000/ 35

PERFORMANCE TABLE

Hammer-Set

Ultimate Tension and Shear Values in Concrete (Lbs/kN)

ANCHOR DIA. In. (mm)	MIN. DEPTH OF EMBEDMENT In. (mm)	4000 PSI (27.6 MPa)	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/16" (4.8)	5/8" (15.9)	500 (2.2)	450 (2.0)
1/4" (6.4)	5/8" (15.9)	700 (3.1)	700 (3.1)
1/4" (6.4)	3/4" (19.1)	800 (3.5)	800 (3.5)
1/4" (6.4)	1" (25.4)	950 (4.2)	800 (3.5)
1/4" (6.4)	1-1/4" (31.8)	1,100 (4.9)	1,100 (4.9)

Safe working loads for single installations under static loading conditions should not exceed 25% of the ultimate capacity. Divide ultimate values by 4.

ITW Red Head

Call our toll free number **800-848-5611** or visit our web site for the most current product and technical information at **www.itwredhead.com**

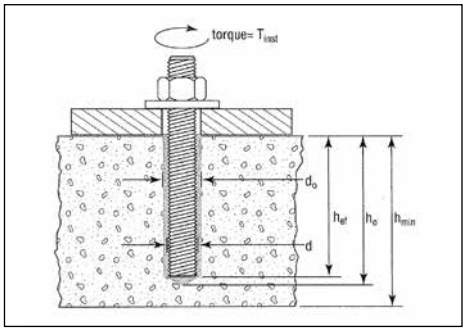
APPENDIX A: Strength Design Performance Values

SPECIFICATIONS AND DETAILS FOR INSTALLATION OF ANCHORS IN CONCRETE WITH EPCON G5 ADHESIVE

Characteristic	Symbol	Units	Threaded Rod Diameter (d)						
			3/8″	1/2″	5/8″	3/4″	7/8″	1″	1-1/4″
Nominal carbide bit diameter	d_o	in.	7/16	9/16	3/4	7/8	1	1-1/8	1-3/8
Anchor embedment depth – minimum	$h_{ef,\,min}$	in.	1-5/8	2	2-1/2	3-1/2	3-1/2	4	5
Anchor embedment depth – maximum	$h_{ef,\,max}$	in.	3-3/8	4-1/2	5-5/8	6-3/4	7-7/8	9	11-1/4
Minimum spacing	s_{min}	in.	15/16	1	2-1/2	6	3-1/2	4	5
Minimum edge distance	c_{min}	in.	15/16	1	2-1/2	6	3-1/2	4	5
Minimum concrete thickness	h_{min}	in.	$h_{ef} + 1\text{-}1/4$		$h_{ef} + 2d_o$				
Maximum tightening torque for pretension clamping	T_{inst}	ft lb	9	16	47	90	145	170	370

For SI: 1 inch= 25.4mm, 1 lbf = 4.45N, 1ft-lbf = 1.356N-m, 1psi = .006895MPa

ANCHOR INSTALLATION



BRUSH SPECIFICATIONS

Brush color	Part #	(d) Anchor diameter (in.)	Minimum brush diameter (in.)
Grey	SB038	3/8	0.563
Brown	SB012	1/2	0.675
Green	SB058	5/8	0.900
Yellow	SB034	3/4	1.125
Red	SB078	7/8	1.350
Purple	SB010	1	1.463
Blue	SB125	1-1/4	1.575

For SI: 1 inch= 25.4mm ◆ Available with lead time.

WORKING TIMES AND CURE TIME FOR EPCON G5 ADHESIVE

Concrete Temp. (°F) [1,2]	Working Time (minutes) [3]	Cure Time (hours) [4]
70	15	24
90	9	24
110	9	24

For SI: t°(°F-32) X .555 = °C.

1 Adhesives must be installed in base material temperatures of 70°F to 110°F or artificially maintained.
2 Cartridge temperature should not differ significantly from the temperature of the base material.
3 Working time is the maximum time from the end of mixing to when the insertion of the anchor into the adhesive shall be completed.
4 Cure time is the minimum time from the end of working time to when the anchor may be torqued or loaded. Anchors are to be undisturbed during the cure time.

APPENDIX A: Strength Design Performance Values

TABLE 1: EPCON G5 ADHESIVE STEEL DESIGN INFORMATION FOR THREADED ROD

Characteristic		Symbol	Units	Anchor nominal diameter (d)						
				3/8″	1/2″	5/8″	3/4″	7/8″	1″	1-1/4″
Threaded rod effective cross-sectional area		A_{se}	inch^2	0.078	0.142	0.226	0.335	0.462	0.606	0.969
Carbon Steel A36	Nominal steel strength in tension	N_{sa}	lb	4,500	8,230	13,110	19,400	26,780	35,130	56,210
	Nominal steel strength in shear	V_{sa}	lb	2,250	4,940	7,870	11,640	16,070	21,080	33,730
	Strength reduction factor for tension, steel failure mode[1]	Φ	–	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Strength reduction factor for shear, steel failure mode[1]	Φ	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Reduction factor for seismic shear	$\alpha_{v,seis}$	–	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Carbon Steel A193 B7	Nominal steel strength in tension	N_{sa}	lb	9,690	17,740	28,250	41,810	57,710	75,710	121,140
	Nominal steel strength in shear	V_{sa}	lb	4,845	10,640	16,950	25,090	34,630	45,430	72,680
	Strength reduction factor for tension, steel failure mode[1]	Φ	–	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Strength reduction factor for shear, steel failure mode[1]	Φ	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Reduction factor for seismic shear	$\alpha_{v,seis}$	–	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Stainless Steel F593	Nominal steel strength in tension	N_{sa}	lb	5,810	10,640	16,950	25,090	34,630	45,430	72,680
	Nominal steel strength in shear	V_{sa}	lb	2,905	6,390	10,170	15,050	20,780	27,260	43,610
	Strength reduction factor for tension, steel failure mode[1]	Φ	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Strength reduction factor for shear, steel failure mode[1]	Φ	–	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Reduction factor for seismic shear	$\alpha_{v,seis}$	–	0.70	0.70	0.70	0.70	0.70	0.70	0.70

For SI: 1 inch = 25.4mm, 1 lbf = 4.45N

1 The tabulated value of Φ applies when the load combinations of Section 1605.2.1 of the IBC, Section 1612.2.1 of the UBC, or ACI 318 Section 9.2 are used as set forth in ACI 318 D.4.4. If the load combinations of Section 1909.2 of the UBC or ACI 318 Appendix C are used, the appropriate value of Φ must be determined in accordance with ACI 318 D.4.5.

TABLE 2: EPCON G5 ADHESIVE CONCRETE BREAKOUT DESIGN INFORMATION

Characteristic	Symbol	Units	Nominal rod diameter, d (inch)						
			3/8″	1/2″	5/8″	3/4″	7/8″	1″	1-1/4″
Effectiveness factor for uncracked concrete	$k_{c,uncr}$	–	24	24	24	24	24	24	24
Effectiveness factor for cracked concrete	$k_{c,cr}$	–	17	17	17	17	17	17	17
Minimum concrete thickness[2]	h_{min}	in.	h_{ef} + 1-1/4		$h_{ef} + 2d_o$				
Anchor embedment depth - minimum	$h_{ef,min}$	in.	1-5/8	2	2-1/2	3-1/2	3-1/2	4	5
Anchor embedment depth - maximum	$h_{ef,max}$	in.	3-3/8	4-1/2	5-5/8	6-3/4	7-7/8	9	11-1/4
Minimum spacing	s_{min}	in.	15/16	1	2-1/2	6	3-1/2	4	5
Minimum edge distance	c_{min}	in.	15/16	1	2-1/2	6	3-1/2	4	5
Critical edge distance	c_{ac}	in.	See Section 4.1.10 of the ESR-1137 Report						
Strength reduction factor for tension, concrete failure mode[1]	Φ	Cond B	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Strength reduction factor for shear, concrete failure mode[1]	Φ	Cond B.	0.70	0.70	0.70	0.70	0.70	0.70	0.70

For SI: 1 inch = 25.4mm, 1 lbf = 4.45N

1 The tabulated value of Φ applies when the load combinations of Section 1605.2.1 of the IBC, Section 1612.2.1 of the UBC, or ACI 318 Section 9.2 are used and the requirements of ACI 318 D.4.4(c) for Condition B are met. If the load combinations of Section 1909.2 of the UBC or ACI 318 Appendix C are used, the appropriate value of Φ must be determined in accordance with ACI 318 D.4.5 for Condition B.

2 d_o represents the nominal drill hole diameter.

TABLE 3: EPCON G5 ADHESIVE ANCHOR BOND STRENGTH DESIGN INFORMATION[1]

Characteristic		Symbol	Units	Nominal rod diameter (inch)						
				3/8″	1/2″	5/8″	3/4″	7/8″	1″	1-1/4″
Anchor embedment depth - minimum		$h_{ef,min}$	in.	1-5/8	2	2-1/2	3-1/2	3-1/2	4	5
Anchor embedment depth - maximum		$h_{ef,max}$	in.	3-3/8	4-1/2	5-5/8	6-3/4	7-7/8	9	11-1/4
Temperature Range A[2,3,4]	Characteristic Bond Strength for Uncracked Concrete	$\tau_{K,uncr}$	psi	1,155	1,155	1,155	1,155	1,155	1,155	1,155
	Characteristic Bond Strength for Cracked Concrete[6]	$\tau_{K,cr}$	psi	475	560	560	560	560	560	560
Continuous Inspection	Strength Reduction Factor - Dry Concrete	$\Phi_{dry, ci}$	–	0.65	0.65	0.65	0.65	0.55	0.55	0.55
	Strength Reduction Factor - Saturated Concrete	$\Phi_{sat, ci}$	–	0.65	0.65	0.65	0.65	0.55	0.55	0.55
	Strength Reduction Factor - Water-Filled Holes	$\Phi_{wf, ci}$	–	0.65	0.65	0.65	0.65	0.55	0.55	0.55
	Strength Reduction Factor - Submerged Concrete	$\Phi_{sub, ci}$	–	0.65	0.65	0.65	0.65	0.55	0.55	0.55
Periodic Inspection	Strength Reduction Factor - Dry Concrete	$\Phi_{dry, ci}$	–	0.55	0.55	0.55	0.55	0.45	0.45	0.45
	Strength Reduction Factor - Saturated Concrete	$\Phi_{sat, ci}$	–	0.55	0.55	0.55	0.55	0.45	0.45	0.45
	Strength Reduction Factor - Water-Filled Holes	$\Phi_{wf, ci}$	–	0.55	0.55	0.55	0.55	0.45	0.45	0.45
	Strength Reduction Factor - Submerged Concrete	$\Phi_{sub, ci}$	–	0.55	0.55	0.55	0.55	0.45	0.45	0.45
Reduction factor for seismic tension		$\Phi_{N, seis}$	–	0.80						

For SI: 1 inch = 25.4mm, 1 lbf = 4.45N, 1ft-lbf= 1.356 N-m, 1 psi=0.006895 MPa.

1 Bond strength values correspond to concrete compressive strength range 2,500 psi to 8,500 psi.

2 Temperature range A: Maximum short term temperature of 130 degrees F and maximum long term temperature of 110 degrees F.

3 Short term elevated concrete temperatures are those that occur over brief interval, e.g., as a result of diurnal cycling. Long term concrete temperatures are roughly constant over significant periods of time.

4 For load combinations consisting of only short-term loads, such as wind or seismic loads, bond strengths may be increased by 36% for Temperature Range A

5 For structures assigned to IBC or IRC Seismic Design Category C, D, E, or F, or UBC Seismic Zone 2b, 3, or 4, bond strength values must be multiplied by $\alpha_{N,seis}$.

SEE TABLE ON ALLOWABLE STRESS DESIGN, ASD, USING LOW STRENGTH CARBON STEEL (A36) THREADED ROD ON NEXT PAGE.

TABLE 1: STEEL DESIGN INFORMATION FOR U.S. CUSTOMARY UNIT THREADED ROD [(1)]

Characteristic		Symbol	Units	Anchor nominal diameter (d)						
				3/8″	1/2″	5/8″	3/4″	7/8″	1″	1-1/4″
Threaded rod effective cross-sectional area		A_{se}	inch^2	0.078	0.142	0.226	0.335	0.462	0.606	0.969
Carbon Steel A36	Nominal steel strength in tension	N_{sa}	lb	4,500	8,230	13,110	19,400	26,780	35,130	56,210
	Nominal steel strength in shear	V_{sa}	lb	2,250	4,940	7,870	11,640	16,070	21,080	33,730
	Strength reduction factor for tension, steel failure mode[1]	Φ	–	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Strength reduction factor for shear, steel failure mode[1]	Φ	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Reduction factor for seismic shear	$\alpha_{v,seis}$	–	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Carbon Steel A193 B7	Nominal steel strength in tension	N_{sa}	lb	9,690	17,740	28,250	41,810	57,710	75,710	121,140
	Nominal steel strength in shear	V_{sa}	lb	5,810	10,640	16,950	25,090	34,630	45,430	72,680
	Strength reduction factor for tension, steel failure mode[1]	Φ	–	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Strength reduction factor for shear, steel failure mode[1]	Φ	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Reduction factor for seismic shear	$\alpha_{v,seis}$	–	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Stainless Steel F593	F593 CW1 Nominal steel strength in tension	N_{sa}	lb	7.365	13,480	21,470	-	-	-	-
	F593 CW1 Nominal steel strength in shear	V_{sa}	lb	3,680	6,740	10,735	-	-	-	-
	F593 CW2 Nominal steel strength in tension	N_{sa}	lb	-	-	-	25,385	35,110	46,055	73,645
	F593 CW2 Nominal steel strength in shear	V_{sa}	lb	-	-	-	12,690	17,555	23,030	36,820
	Strength reduction factor for tension, steel failure mode[1]	Φ	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Strength reduction factor for shear, steel failure mode[1]	Φ	–	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Reduction factor for seismic shear	$\alpha_{v,seis}$	–	0.70	0.70	0.70	0.70	0.70	0.70	0.70

For SI: 1 inch = 25.4mm, 1 lbf = 4.45N, 1ft-lbf = 1.356 N-M, 1 pso = 0.006895 MPa.

1 The tabulated value of Φ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI-11 9.2 are used. If load combinations of ACI 318-11 Appendix C are used, the appropriate value of Φ must be determined in accordance with ACI 318-11 D.4.

TABLE 2: CONCRETE BREAKOUT DESIGN INFORMATION FOR U.S. CUSTOMARY UNIT THREADED ROD [(1)]

Characteristic	Symbol	Units	Nominal rod diameter, d (inch)						
			3/8″	1/2″	5/8″	3/4″	7/8″	1″	1-1/4″
Effectiveness factor for uncracked concrete	$k_{c,uncr}$	–	24	24	24	24	24	24	24
Effectiveness factor for cracked concrete	$k_{c,cr}$	–	17	17	17	17	17	17	17
Minimum concrete thickness	h_{min}	in.	h_{ef} + 1-1/4		$h_{ef} + 2d_o$				
Anchor embedment depth - minimum	$h_{ef,min}$	in.	2-3/8	2-3/4	3-1/8	3-1/2	3-1/2	4	5
Minimum spacing	s_{min}	in.	15/16	1-1/2	2-1/2	3	3-1/2	4	5
Minimum edge distance	c_{min}	in.	15/16	1-1/2	2-1/2	3	3-1/2	4	5
Critical edge distance	c_{ac}	in.	See Section 4.1.10 of this report						
Strength reduction factor for tension, concrete failure mode[1]	Φ	Cond B	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Strength reduction factor for shear, concrete failure mode[1]	Φ	Cond B.	0.70	0.70	0.70	0.70	0.70	0.70	0.70

For SI: 1 inch = 25.4mm, 1 lbf = 4.45N, 1ft-lbf = 1.356 N-M, 1 pso = 0.006895 MPa.

1 The tabulated value of Φ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2 are used and the requirements of ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of Φ must be determined in accordance with ACI 318-11 D.4.4 for Condition B.

TABLE 3: RED HEAD A7+ ADHESIVE ANCHOR BOND STRENGTH DESIGN INFORMATION FOR U.S. CUSTOMARY UNIT THREADED ROD[1,5]

Characteristic		Symbol	Units	Nominal rod diameter (inch)						
				3/8″	1/2″	5/8″	3/4″	7/8″	1″	1-1/4″
Anchor embedment depth - minimum		$h_{ef,min}$	in.	2-3/8	2-3/4	3-1/8	3-1/2	3-1/2	4	5
Anchor embedment depth - maximum		$h_{ef,max}$	in.	7-1/2	10	12-1/2	15	17-1/2	20	25
Temperature Range A[2]	Characteristic Bond Strength for Uncracked Concrete	$\tau_{K,uncr}$	psi	1,770	1,770	1,770	1,770	1,490	1,490	1,490
	Characteristic Bond Strength for Cracked Concrete	$\tau_{K,cr}$	psi	1,060	790	860	890	695	655	585
Temperature Range B[3,4]	Characteristic Bond Strength for UNCracked Concrete	$\tau_{K,uncr}$	psi	1,275	1,275	1,275	1,275	1,080	1,080	1,080
	Characteristic Bond Strength for Cracked Concrete	$\tau_{K,cr}$	psi	765	570	620	640	500	475	420
Continuous Inspection	Strength Reduction Factor - Dry Concrete	$\Phi_{dry, ci}$	–	0.65	0.65	0.65	0.65	0.55	0.55	0.55
	Strength Reduction Factor - Saturated Concrete	$\Phi_{sat, ci}$	–	0.65	0.65	0.65	0.65	0.55	0.55	0.55
	Strength Reduction Factor - Water-Filled Holes	$\Phi_{wf, ci}$	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Strength Reduction Factor - Submerged Concrete	$\Phi_{sub, ci}$	–	0.65	0.55	0.55	0.65	0.65	0.55	0.65
Periodic Inspection	Strength Reduction Factor - Dry Concrete	$\Phi_{dry, ci}$	–	0.55	0.55	0.55	0.55	0.55	0.55	0.55
	Strength Reduction Factor - Saturated Concrete	$\Phi_{sat, ci}$	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Strength Reduction Factor - Water-Filled Holes	$\Phi_{wf, ci}$	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Strength Reduction Factor - Submerged Concrete	$\Phi_{sub, ci}$	–	0.65	0.45	0.45	0.65	0.55	0.45	0.65
Reduction factor for seismic tension		$\Phi_{N, seis}$	–	0.89	0.75	0.76	0.66	0.77	0.80	0.80

For SI: 1 inch = 25.4mm, 1 lbf = 4.45N, 1ft-lbf= 1.356 N-m, 1 psi=0.006895 MPa.

1Bond strength values correspond to concrete compressive strengths ranging from 2,500 psi to 8,000 psi [minimum of 24 MPa is required under ADIBC Appendix L, Section 5.1.1].

2Temperature range A: Maximum short term temperature of 130°F and maximum long term temperature of 110°F.

3Temperature range B: Maximum short term temperature of 176°F and maximum long term temperature of 110°F.

4For load combinations consisting of only short-term loads, such as wind or seismic loads, bond strengths may be increased by 4% for Temperature Range B.

5For structures assigned to IBC or IRC Seismic Design Category C, D, E, or F, bond strength values must be multiplied by αN,seis.

TABLE 4: STEEL DESIGN INFORMATION FOR U.S. CUSTOMARY UNIT REINFORCING BARS[1]

Characteristic		Symbol	Units	Nominal rod diameter (inch)							
				No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10
Nominal bar diameter		d	in.	3/8	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4
Reinforcing bar effective cross-sectional area		Ase	in.[2]	0.11	0.2	0.31	0.44	0.6	0.79	1.00	1.27
ASTM 615 Grade 60	Nominal steel strength in tension	N_{sa}	lb	9,900	18,000	27,900	39,600	54,000	71,100	90,000	114,300
	Nominal steel strength in shear	V_{sa}	il	5,940	10,800	16,740	23,760	32,400	42,660	54,000	68,580
	Strength reduction factor for tension, steel failure mode	Φ	-	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Strength reduction factor for shear, steel failure mode[1]	Φ	-	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Reduction factor for seismic shear	$\alpha_{v,seis}$	–	0.91	0.91	0.91	0.90	0.90	0.75	0.75	0.75

For SI: 1 inch = 25.4mm, 1 lbf = 4.45N, 1ft-lbf= 1.356 N-m, 1 psi=0.006895 MPa.

1 The tabulated value of φ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2 are used. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of φ must be determined in accordance with ACI 318-11 D.4.4.

TABLE 5: CONCRETE BREAKOUT DESIGN INFORMATION FOR U.S. CUSTOMARY UNIT REINFORCING BARS (1,2)

Characteristic	Symbol	Units	Nominal rod diameter (inch)							
			No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10
Effectiveness factor for uncracked concrete	k_{uncr}	-	24	24	24	24	24	24	24	24
Effectiveness factor for cracked concrete	k_{cr}	-	17	17	17	17	17	17	17	17
Minimum concrete thickness Nominal steel strength in tension	h_{min}	in.	hef + 1-1/4		-	hef + 2do				
Anchor embedment depth - minimum	$h_{ef,min}$	in.	2-3/8	2-3/4	3-1/8	3-1/2	3-1/2	4	4-1/2	5
Minimum Spacing	s_{min}	in.	15/16	1-1/2	2-1/2	3	3-1/2	4	4-1/2	5
Minimum edge distance	c_{min}	in.	15/16	1-1/2	2-1/2	3	3-1/2	4	4-1/2	5
Critical edge distance	c_{ac}	in.		See section 4.1.10 of this report						
Strength reduction factor for tension, concrete failure mode[1]	Φ	Cond. B	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Strength reduction factor for shear, concrete failure mode [1]	Φ	Cond. B	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70

For SI: 1 inch = 25.4mm, 1 lbf = 4.45N, 1ft-lbf= 1.356 N-m, 1 psi=0.006895 MPa.

1 The tabulated value of φ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2 are used and the requirements of ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, for Condition B are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of φ must be determined in accordance with ACI 318-11 D.4.4 for Condition B.

2 The value of f'c used for calculation must be limited to maximum 8,000 psi (55 MPa) in accordance with ACI 318-14 17.2.7 or ACI 318-11 D.3.7, as applicable

TABLE 6: RED HEAD A7+ ADHESIVE ANCHOR BOND STRENGTH DESIGN INFORMATION FOR U.S. CUSTOMARY UNIT REINFORCING STEEL (1,5)

Characteristic		Symbol	Units	Nominal rod diameter (inch)							
				No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10
Anchor embedment depth - minimum		h_{ef}	in.	2-3/8	2-3/4	3-1/8	3-1/2	3-1/2	4	4-1/2	5
Anchor embedment depth - maximum		h_{ef}	in.	7-1/2	10	12-1/2	15	17-1/2	20	22-1/2	25
Temperature Range A[2]	Characteristic Bond Strength for Uncracked Concrete	$\tau_{\kappa,uncr}$	psi	1,675	1,935	1,900	1,700	1,635	1,615	1,585	1,550
	Characteristic Bond Strength for Cracked Concrete[6]	$\tau_{\kappa,cr}$	psi	755	755	755	585	585	585	585	585
Temperature Range B[3,4]	Characteristic Bond Strength for Uncracked Concrete	$\tau_{\kappa,uncr}$	psi	1,210	1,400	1,370	1,230	1,180	1,165	1,145	1,120
	Characteristic Bond Strength for Cracked Concrete[6]	$\tau_{\kappa,cr}$	psi	545	545	545	420	420	420	420	435
Continuous Inspection	Strength Reduction Factor - Dry Concrete	$\Phi_{dry, ci}$	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Strength Reduction Factor - Saturated Concrete	$\Phi_{sat, ci}$	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Strength Reduction Factor - Water-Filled Holes	$\Phi_{wf, ci}$	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Strength Reduction Factor - Submerged Concrete	$\Phi_{sub, ci}$	–	0.65	0.55	0.55	0.65	0.65	0.55	0.55	0.55
Periodic Inspection	Strength Reduction Factor - Dry Concrete	$\Phi_{dry, ci}$	–	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.65
	Strength Reduction Factor - Saturated Concrete	$\Phi_{sat, ci}$	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Strength Reduction Factor - Water-Filled Holes	$\Phi_{wf, ci}$	–	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
	Strength Reduction Factor - Submerged Concrete	$\Phi_{sub, ci}$	–	0.65	0.45	0.45	0.65	0.55	0.45	0.45	0.65
Reduction factor for seismic tension		$\Phi_{N, seis}$	–	0.92	0.92	0.92	0.82	0.82	0.82	0.82	0.82

For SI: 1 inch = 25.4mm, 1 lbf = 4.45N, 1ft-lbf = 1.356 N-M, 1 psi = 0.006895 MPa.

1Bond strength values correspond to concrete compressive strengths ranging from 2,500 psi to 8,000 psi [minimum of 24 MPa is required under ADIBC Appendix L, Section 5.1.1].

2Temperature range A: Maximum short term temperature of 130°F and maximum long term temperature of 110°F.

3Temperature range B: Maximum short term temperature of 176°F and maximum long term temperature of 110°F.

4For load combinations consisting of only short-term loads, such as wind or seismic loads, bond strengths may be increased by 4% for Temperature Range B.

5For structures assigned to IBC or IRC Seismic Design Category C, D, E, or F, bond strength values must be multiplied by αN,seis.

TABLE 7: EXAMPLE RED HEAD A7+ ADHESIVE ALLOWABLE STRESS DESIGN VALUES (ASD) FOR ILLUSTRATIVE PURPOSES

Anchor Diameter (d)	Embedment Depth, h_{ef} (in) (min./max)	* Characteristic Bond Strength τ_K, uncr (psi)	Allowable Tension Load LBS	Controlling Failure Mode
			2,500 PSI- 8000 PSI	
3/8	2-3/8	1,770	1,929	Concrete
	7-1/2		2,280	Steel
1/2	2-3/4	1,770	2,403	Concrete
	10		4,171	Steel
5/8	3-1/8	1,770	2,911	Concrete
	12-1/2		6,644	Steel
3/4	3-1/2	1,770	3,451	Concrete
	15		9,831	Steel
7/8	3-1/2	1,490	3,451	Concrete
	17-1/2		13,571	Steel
1	4	1,490	4,216	Concrete
	20		17,802	Steel
1-1/4	5	1,490	5,892	Concrete
	25		28,485	Steel

For SI: 1 inch = 25.4mm, 1 lbf = 4.45N, 1ft-lbf = 1.356 N-M, 1 psi = 0.006895 MPa.

This table was developed based on the following conditions:

1Single anchor with static tension only, A36 threaded rod

2Vertical downward installation direction

3Inspection regimen = Periodic

4Installation temperature = 30°F to 90°F

5Long term temperature = 110°F

6Short term temperature = 130°F

7Dry hole condition (carbide drilled hole)

8Embedment = hef (min/max for each diameter)

9Concrete determined to remain uncracked for the life of the anchorage

10Load combinations from ACI 318-11 Section 9.2 (no seismic loading)

1130% dead load and 70% live load, controlling load combination 1.2D + 1.6L

12Calculation of weighted average for α = 0.3*1.2 + 0.7*1.6 = 1.48

13f' c = 2,500 psi (normal weight concrete)

14ca1 = ca2 ≥ cac

15h ≥ hmin

APPENDIX A: Strength Design Performance Values

TABLE 4: STRENGTH DESIGN USING LOW STRENGTH CARBON STEEL (A36) THREADED ROD ◆ INSTALLED IN f′c = 2,500 PSI – 8,000 PSI UNCRACKED CONCRETE WITH EPCON G5 ADHESIVE

Anchor Diameter (d)	Embedment Depth, hef (in) (min./max)	* Characteristic Bond Strength τ_K, uncr (psi)	Allowable Tension Load LBS				
			2,500 PSI (Controlling Mode)	3,000 PSI (Controlling Mode)	4,000 PSI (Controlling Mode)	6,000 PSI (Controlling Mode)	8,000 PSI (Controlling Mode)
3/8	2-3/8	1,155	1,777 (BOND)	1,777 (BOND)	1,777 (BOND)	1,777 (BOND)	1,777 (BOND)
	3-3/8	1,155	2,525 (BOND)	2,525 (BOND)	2,525 (BOND)	2,525 (BOND)	2,525 (BOND)
1/2	2-3/4	1,155	2,743 (BOND)	2,743 (BOND)	2,743 (BOND)	2,743 (BOND)	2,743 (BOND)
	4-1/2	1,155	4,488 (BOND)	4,488 (BOND)	4,488 (BOND)	4,488 (BOND)	4,488 (BOND)
5/8	3-1/8	1,155	3,896 (BOND)	3,896 (BOND)	3,896 (BOND)	3,896 (BOND)	3,896 (BOND)
	5-5/8	1,155	7,013 (BOND)	7,013 (BOND)	7,013 (BOND)	7,013 (BOND)	7,013 (BOND)
3/4	3-1/2	1,155	5,107 (CONCRETE)	5,236 (BOND)	5,236 (BOND)	5,236 (BOND)	5,236 (BOND)
	6-3/4	1,155	10,098 (BOND)	10,098 (BOND)	10,098 (BOND)	10,098 (BOND)	10,098 (BOND)
7/8	3-1/2	1,155	4,998 (BOND)	4,998 (BOND)	4,998 (BOND)	4,998 (BOND)	4,998 (BOND)
	7-7/8	1,155	11,246 (BOND)	11,246 (BOND)	11,246 (BOND)	11,246 (BOND)	11,246 (BOND)
1	4	1,155	6,240 (CONCRETE)	6,528 (BOND)	6,528 (BOND)	6,528 (BOND)	6,528 (BOND)
	9	1,155	14,668 (BOND)	14,668 (BOND)	14,668 (BOND)	14,668 (BOND)	14,668 (BOND)
1-1/4	5	1,155	8,721 (CONCRETE)	9,553 (CONCRETE)	10,200 (BOND)	10,200 (BOND)	10,200 (BOND)
	11-1/4	1,155	22,950 (BOND)	22,950 (BOND)	22,950 (BOND)	22,950 (BOND)	22,950 (BOND)

For SI: 1 inch= 25.4mm, 1 lbf = 4.45N, 1ft-lbf= 1.356 N-M, 1 psi=0.006895 MPa

1. Refer to Tables 1, 2 and 3 for steel, concrete and bond strength design information.
2. Bond strength reduction factors based on periodic inspection and dry, saturated, water-filled or submerged concrete conditions.

◆ Call 800-848-5611 for controlling modes and loads using stainless steel or higher strength threaded rod.

Procedure to calculate tension load for strength design – SD

Example: 1/2" diameter anchor with embedment depth of 4-1/2" installed in 4,000 psi concrete

1. Calculate steel strength – tension (per ACI 318 D.5.1.2)
   $\Phi N_{sa} = 0.75 * 8,230 =$ 6,173 lbs
2. Calculate concrete breakout strength – tension
   $\Phi k_{uncr}\sqrt{2,500\ psi}\ h_{ef}^{1.5} = 0.65 * 24 * \sqrt{2,500} * 4\text{-}1/2^{1.5}$
   = 7,446 lbs per ACI 318 D.5.2
   Normalize load for 4,000 psi concrete $= 7,446\sqrt{\frac{4,000}{2,500}} =$ 9,418 lbs
3. Calculate bond strength – tension
   $\Phi * d * \pi * h_{ef} * \tau_{k,uncr} = 0.55 * 1/2 * \pi * 4\text{-}1/2 * 1,155 =$ 4,488 lbs (per equations D-16a, and D-16f of ESR-1137)
4. Controlling strength is 4,488 lbs (bond) – lowest load value amongst bond, concrete and steel controlling modes

Strength Design Load = 4,488 lbs

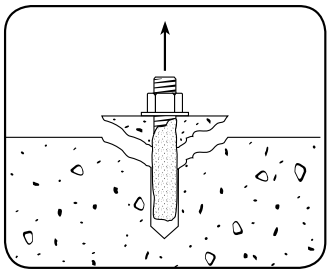
Procedure to calculate tension load for allowable stress design – ASD

1. Determine load combination and conversion factor.
   – Assume 30% dead load and 70% live load using load combination = 1.2D + 1.6L = 1.2 (0.3) + 1.6 (0.7) = 1.48 (per ACI318 Sect. 9.2)
2. Divide controlling strength (see strength design procedure - step 4) 4,488 lbs by the conversion factor of 1.48 = 4,488/1.48 =3,032 lbs (steel)

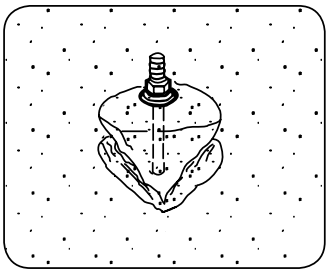
Allowable Strength Design Load = 3,032 lbs

Controlling Modes

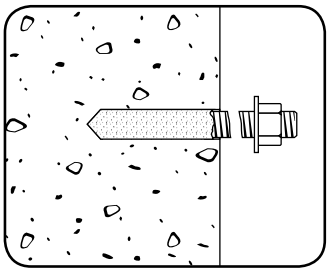
Bond



Concrete



Steel



APPENDIX B: Strength Design Performance values in accordance to 2015 IBC

ITW RED HEAD TRUBOLT WEDGE ANCHOR

DESIGN INFORMATION TESTED TO ICC-ES AC193 AND ACI 355.2, IN ACCORDANCE WITH 2015 IBC

Trubolt® Wedge Anchors

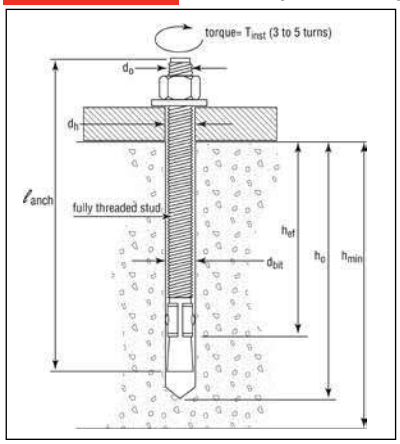
TRUBOLT WEDGE ANCHOR DESIGN INFORMATION[1,2,3]

DESIGN INFORMATION	Symbol	Units	Nominal Anchor Diameter									
			1/4		3/8		1/2		5/8		3/4	
Anchor O.D.	d_o	in	0.250		0.375		0.500		0.625		0.750	
Effective embedment	h_{ef}	in	1-1/2	2	1-3/4	2-5/8	1-7/8	3-3/8	2-1/2	4	3-1/2	4-3/4
Minimum member thickness	h_{min}	in	4	4	4	5	5	6	5	8	6	8
Critical edge distance	c_{ac}	in	2-5/8	3	2-5/8	5-1/4	3-3/4	6-3/4	5	8	7	9
Minimum edge distance	c_{min}	in	1-3/4	1-1/2	2-1/4	2	3-3/4	3-3/4	4-1/4	3-1/4	3-3/4	3-1/2
Minimum anchor spacing	s_{min}	in	1-3/4	1-1/2	2-1/4	2	3-3/4	3-3/4	4-1/4	3-1/4	3-3/4	3-1/2
Min. Specified Yield Strength	f_y	lb/in^2	55,000									
Min. Specified Ultimate Strength	f_{uta}	lb/in^2	75,000									
Effective tensile stress area	A_{se}	in^2	0.032		0.078		0.142		0.226		0.334	
Steel strength in tension	N_s	lb	2,385		5,815		10,645		16,950		25,050	
Steel strength in shear	V_s	lb	1,430		2,975	3,490	4,450	6,385	6,045	10,170	10,990	15,030
Pullout strength, uncracked concrete	$N_{p,uncr}$	lb	1,392	1,706	2,198	3,469	2,400	4,168	4,155	6,638	8,031	10,561
Anchor Category (All anchors are ductile)			1									
Effectiveness factor k_{uncr} uncracked concrete			24									
Axial stiffness in service load range	β	lb/in	14,651	9,385	17,515	26,424	32,483	26,136	42,899	21,749	43,576	28,697
Coefficient for variation for axial stiffness in service load range			34	47	28	45	17	33	55	22	63	28
Strength reduction factor ϕ for tension, steel failure modes			0.75									
Strength reduction factor ϕ for shear, steel failure modes			0.65									
Strength reduction factor ϕ for tension, concrete failure modes, Condition B			0.65									
Strength reduction factor ϕ for shear, concrete failure modes, Condition B			0.70									

[1] Trubolt+ Anchor Design Strengths must be determined in accordance with ACI 318-05 Appendix D and this table
[2] The Trubolt+ Wedge Anchor is a ductile steel element as defined by ACI 318 D.1
[3] 1/4", 3/8", & 1/2" diameter data is listed in ICC-ES ESR-2251.

Trubolt® Wedge Anchors

TRUBOLT WEDGE ANCHOR (INSTALLED)



TRUBOLT WEDGE INSTALLATION INFORMATION

	Symbol	Units	Nominal Anchor Diameter (in.)									
			1/4		3/8		1/2		5/8		3/4	
Anchor outer diameter	d_o	in	0.25		0.375		0.5		0.625		0.750	
Nominal carbide bit diameter	d_{bit}	in	1/4		3/8		1/2		5/8		3/4	
Effective embedment depth	h_{ef}	in	1-1/2	2	1-3/4	2-5/8	1-7/8	3-3/8	2-1/2	4	3-1/2	4-3/4
Min hole depth	h_o	in	2	2-1/2	2-1/2	3-3/8	2-3/4	4-1/4	3-3/4	5-1/4	4-3/4	6
Min slab thickness	h_{min}	in	4		4	5	5	6	5	8	6	8
Installation torque	T_{inst}	ft-lb	4		25		55		90		110	
Min hole diameter in fixture	d_h	in	5/16		7/16		9/16		11/16		13/16	

APPENDIX B: Strength Design Performance values in accordance to 2015 IBC

Trubolt®
Wedge Anchors

TRUBOLT WEDGE PULLOUT STRENGTH ($N_{p, unc}$) (POUNDS) [1]

Nominal Anchor Diameter (in.)	Effective Embedment Depth (in.)	Concrete Compressive Strength			
		f'c = 2,500 psi	f'c = 3,000 psi	f'c = 4,000 psi	f'c = 6,500 psi
1/4	1-1/2	1,392	1,525	1,610	1,822
	2	1,706	1,869	1,947	2,151
3/8	1-3/4	2,198	2,408	2,621	3,153
	2-5/8	3,469	3,800	3,936	4,275
1/2	1-7/8	2,400	2,629	3,172	4,520
	3-3/8	4,168	4,520	4,520	4,520
5/8	2-1/2	4,155	4,155	4,376	5,578
	4	6,638	6,900	7,968	10,157
3/4	3-1/2	8,031	8,322	9,610	12,251
	4-3/4	10,561	10,561	10,561	12,251

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 Mpa
1 Values are for single anchors with no edge distance or spacing reduction.

TRUBOLT WEDGE ANCHOR ALLOWABLE STATIC TENSION (ASD), NORMAL-WEIGHT UNCRACKED CONCRETE [1-6]

Nominal Anchor Diameter (in.)	Effective Embedment Depth (in.)	Concrete Compressive Strength			
		f'c = 2,500 psi	f'c = 3,000 psi	f'c = 4,000 psi	f'c = 6,500 psi
1/4	1-1/2	611	670	707	800
	2	749	821	855	945
3/8	1-3/4	965	1,058	1,151	1,385
	2-5/8	1,524	1,669	1,729	1,878
1/2	1-7/8	1,054	1,155	1,393	1,985
	3-3/8	1,831	1,985	1,985	1,985
5/8	2-1/2	1,825	1,825	1,922	2,450
	4	2,915	3,030	3,499	4,461
3/4	3-1/2	3,527	3,655	4,221	5,381
	4-3/4	4,638	4,638	4,638	5,381

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 Mpa
Design Assumptions:
1 Single anchor with static tension load only.
2 Concrete determined to remain uncracked for the life of the anchorage.
3 Load combinations from 2006 IBC, Sections 1605.2.1 and 1605.3.1 (no seismic loading).
4 Thirty percent dead load and 70 percent live load, controlling load combination 1.2D + 1.6L
5 Calculation of weighted average: 1.2D + 1.6L = 1.2 (0.3) + 1.6 (0.7) = 1.48
6 Values do not include edge distance or spacing reductions.

TRUBOLT WEDGE ANCHOR ALLOWABLE STATIC SHEAR (ASD), STEEL (POUNDS)[1-5]

Nominal Anchor Diameter (in.)	Effective Embedment Depth (in.)	Allowable Steel Capacity, Static Shear
1/4	1-1/2	628
	2	
3/8	1-3/4	1,307
	2-5/8	1,533
1/2	1-7/8	1,954
	3-3/8	2,804
5/8	2-1/2	2,655
	4	4,467
3/4	3-1/2	4,827
	4-3/4	6,601

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 Mpa
Design Assumptions:
1 Single anchor with static shear load only.
3 Load combinations from 2006 IBC, Sections 1605.2.1 and 1605.3.1 (no seismic loading).
3 Thirty percent dead load and 70 percent live load, controlling load combination 1.2D + 1.6L
4 Calculation of weighted average: 1.2D + 1.6L = 1.2 (0.3) + 1.6 (0.7) = 1.48
5 Values do not include edge distance or spacing reductions.

APPENDIX C: Strength Design Performance values in accordance with 2015 IBC

ITW RED HEAD TRUBOLT+ and OVERHEAD TRUBOLT+ EDGE ANCHOR DESIGN INFORMATION TESTED TO ICC-ES AC 193 AND ACI 355.2, IN ACCORDANCE WITH 2015 IBC

TRUBOLT+ AND OVERHEAD TRUBOLT+ WEDGE ANCHOR DESIGN INFORMATION[1]

Trubolt+ Seismic Wedge Anchors

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)[4]									
			3/8"		1/2"				5/8"		3/4"	
Anchor category	1, 2 or 3	—	1		1				1		1	
Minimum effective embedment depth	h_{ef}	in	1-5/8		2		3-1/4		2-3/4	4-1/4	3-3/4	
Minimum concrete member thickness	h_{min}	in	4	5	4	6	6	8	6	6-1/4	7	8
Critical edge distance	c_{ac}	in	5	3	6	6	7-1/2	6	7-1/2	6-1/2	12	10
Data for Steel Strengths – Tension and Shear												
Minimum specified yield strength	f_y	psi	60,000		55,000				55,000		55,000	
Minimum specified ultimate strength	f_{uta}	psi	75,000		75,000				75,000		75,000	
Effective tensile stress area (neck)	A_{se}	in^2	0.056		0.119				0.183		0.266	
Effective tensile stress area (thread)	A_{se}	in^2	0.075		0.142				0.217		0.332	
Steel strength in tension	N_{sa}	lbf	4,200		8,925				13,725		19,950	
Steel strength in shear, uncracked or cracked concrete [6]	V_{sa}	lbf	1,830		5,175				8,955		14,970	
Steel strength in shear – seismic loads	V_{eq}	lbf	1,545		5,175				8,955		11,775	
Strength reduction factor f for tension, steel failure modes [2]			0.75		0.75				0.75		0.75	
Strength reduction factor f for shear, steel failure modes [2]			0.60		0.65				0.65		0.65	
Data for Concrete Breakout Concrete Pryout Strengths in Tension and Shear												
Effectiveness factor – uncracked concrete	k_{uncr}	—	24		24				24		24	
Effectiveness factor – cracked concrete	k_{cr}	—	17		17				17		17	
Modification factor for cracked and uncracked concrete [3]	$\Psi_{c,N}$	—	1.0		1.0				1.0		1.0	
Coefficient for pryout strength	k_{cp}	—	1.0		1.0		2.0		2.0		2.0	
Load-bearing length of anchor	l_e	in	1.625		2.0		3.25		2.75	4.25	3.75	
Strength reduction factor ϕ for tension, concrete failure modes, Condition B [2]			0.65		0.65				0.65		0.65	
Strength reduction factor ϕ for shear, concrete failure modes, Condition B [2]			0.70		0.70				0.70		0.70	
Data for Pullout Strengths												
Pullout strength, uncracked concrete	$N_{p,uncr}$	lbf	See Footnote [5]		See Footnote [5]		6,540		5,430	8,900	See Footnote [5]	
Pullout strength, cracked concrete	$N_{p,cr}$	lbf	See Footnote [5]		See Footnote [5]				See Footnote [5]		See Footnote [5]	
Pullout strength for seismic loads	N_{eq}	lbf	See Footnote [5]		See Footnote [5]				See Footnote [5]	6,715	See Footnote [5]	
Strength reduction factor f for tension, pullout failure modes, Condition B [2]			See Footnote [5]		0.65				0.65		See Footnote [5]	
Additional Anchor Data												
Axial stiffness in service load range in uncracked concrete	b_{uncr}	lbf/in	100,000		250,000				250,000		250,000	
Axial stiffness in service load range in cracked concrete	b_{cr}	lbf/in	40,000		20,000				20,000		20,000	

For SI: 1 inch = 25.4 mm, 1 in2 = 645.16mm2, 1 lbf = 4.45 N, 1 psi = 0.006895 MPa, 1 lbf • 102/in - 17,500 N/m.

[1] The 1/2", 5/8" and 3/4" diameter Trubolt+ Wedge Anchors are ductile steel elements as defined by ACI 318 D.1. The 3/8" diameter Trubolt+ is considered ductile under tension loading and brittle under shear loading.

[2] All values of ϕ apply to the load combinations of IBC Section 1605.2, ACI 318 Section 9.2 or UBC Section 1612.2. If the load combinations of Appendix C or UBC Section 1909.2 are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.5. For installations where reinforcement that complies with ACI 318 Appendix D requirements for Condition A is present, the appropriate ϕ factor must be determined in accordance with ACI 318 D.4.4.

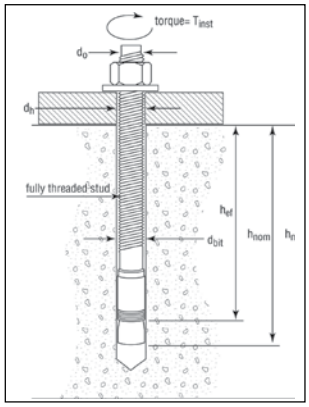
[3] For all design cases $\Psi_{c,N} = 1.0$. The appropriate effectiveness factor for cracked concrete (k_{cr}) or uncracked concrete (k_{uncr}) must be used.

[4] The actual diameter for the 3/8" diameter anchor is 0.361" for the 5/8" diameter anchor is 0.615" and the 3/4" diameter anchor is 0.7482".

[5] Anchor pullout strength does not control anchor design. Determine steel and concrete capacity only.

[6] Steel strength in shear values are based on test results per ACI 355.2, Section 9.4 and must be used for design.

TRUBOLT+ WEDGE ANCHOR (INSTALLED)



TRUBOLT+ AND OVERHEAD TRUBOLT+ WEDGE INSTALLATION INFORMATION

Parameter	Notation	Units	Nominal Achor Diameter (inch)									
			3/8		1/2				5/8		3/4	
Anchor outer diameter	d_o	inches	0.361		0.5				0.615		0.7482	
Nominal carbide bit diameter	d_{bit}	inches	3/8		1/2				5/8		3/4	
Effective embedment depth	h_{ef}	inches	1-5/8		2		3-1/4		2-3/4	4-1/4	3-3/4	
Minimum anchor embedment depth	h_{nom}	inches	2		2-1/2		3-3/4		3-1/4	4-3/4	4-3/8	
Minimum hole depth[1]	h_o	inches	2-1/4		2-3/4		4		3-1/2	5	4-5/8	
Minimum concrete member thickness[1]	h_{min}	inches	4	5	4	6	6	8	6	6-1/4	7	8
Critical edge distance[1]	c_{ac}	In.	5	3	6	6	7-1/2	6	7-1/2	6-1/2	12	10
Minimum anchor spacing[1]	s_{min}	In.	3-1/2	2-1/2	6	5-3/4	4	5-3/4	8	6	6	6
Minimum edge distance[1]	c_{min}	In.	3		6				7-1/2	5	7-1/2	7-1/2
Minimum overall anchor length	l	inches	2-1/2		3-3/4		4-1/2		4-1/4	6	5-1/2	
Installation torque	T_{inst}	ft-lb	30		45				90		110	
Minimum diameter of hole in fastened part	d_h	inches	1/2		5/8				3/4		7/8	

For SI: 1 inch = 25.4 mm, 1 ft-lb = 1.356 N-m.

APPENDIX C: Strength Design Performance values in accordance with 2015 IBC

TRUBOLT+ AND *OVERHEAD* TRUBOLT+ WEDGE ANCHOR ALLOWABLE STRESS DESIGN (ASD) VALUES FOR ILLUSTRATIVE PURPOSES

Anchor Notation	Anchor Embedment Depth	Effective Embedment Depth	Allowable Tension Load
	(inches), h_{nom}	(inches), h_{ef}	(lbs)
3/8	2	1-5/8	1,090
1/2	2-1/2	2	1,490
	3-3/4	3-1/4	2,870
5/8	3-1/4	2-3/4	2,385
	4-3/4	4-1/4	3,910
3/4	4-3/8	3-3/4	3,825

For SI: 1 inch = 25.4 mm, 1 ft-lb = 4.45N.
Design Assumptions:
1 Single anchor with static shear load only.
[2] Load combinations from 2006 IBC, Sections 1605.2.1 and 1605.3.1 (no seismic loading).
[3] Thirty percent dead load and 70 percent live load, controlling load combination 1.2D + 1.6L
[4] Calculation of weighted average: 1.2D + 1.6L = 1.2 (0.3) + 1.6 (0.7) = 1.48
[5] Values do not include edge distance or spacing reductions.

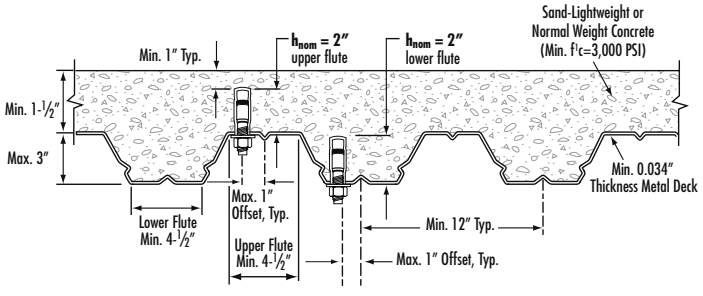
ITW RED HEAD TRUBOLT+ and *OVERHEAD* TRUBOLT+ WEDGE ANCHOR DESIGN INFORMATION FOR INSTALLATION IN THE SOFFIT OF CONCRETE FILL ON METAL DECK FLOOR AND ROOF ASSEMBLIES

TRUBOLT+ AND *OVERHEAD* TRUBOLT+ WEDGE ANCHOR DESIGN INFORMATION

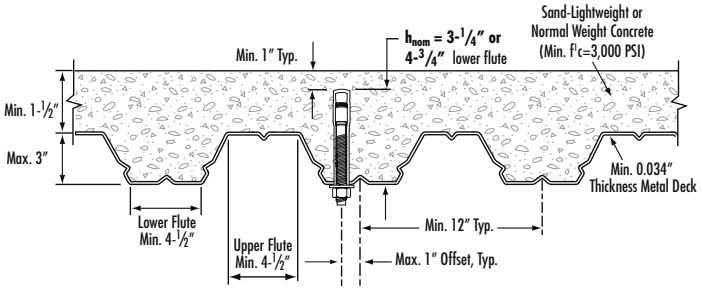
Characteristic	Symbol	Units	Nominal Anchor Diameter				
			3/8"	1/2"		5/8"	
			Upper /Lower	Upper /Lower	Lower Only	Lower Only	Lower Only
			h_{ef} = 1-5/8"	h_{ef} = 2"	h_{ef} = 3-1/4"	h_{ef} = 2-3/4"	h_{ef} = 4-1/4"
Pullout strength, uncracked concrete over metal deck	$N_{p, deck, uncr}$	lbf	2,170	2,515	5,285	3,365	6,005
Pullout strength, cracked concrete over metal deck	$N_{p, deck, cr}$	lbf	1,650	1,780	4,025	2,405	5,025
Reduction factor for pullout strength in tension, Condition B	ϕ	––	0.65				
Shear strength, uncracked concrete over metal deck	$V_{p, deck, uncr}$	lbf	1,640	2,200	3,790	2,890	6,560
Reduction factor for steel strength in shear	ϕ	––	0.60	0.65			
Anchor embedment depth	h_{nom}	in	2.0	2.5	3.75	3.25	4.75

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N

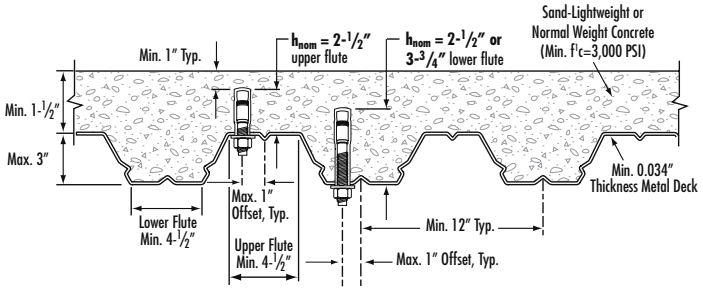
Nominal Anchor Diameter = 3/8″



Nominal Anchor Diameter = 5/8″



Nominal Anchor Diameter = 1/2″



APPENDIX C: Strength Design Performance values in accordance with 2015 IBC

ITW RED HEAD TRUBOLT+ WEDGE ANCHOR DESIGN INFORMATION TESTED TO ICC-ES AC 193 AND ACI 355.2, IN ACCORDANCE WITH 2015 IBC

TRUBOLT+ STAINLESS STEEL WEDGE ANCHOR DESIGN INFORMATION[1]

Characteristic	Symbol	Units	1/2"				5/8"	
Anchor category	1, 2 or 3	—	1				1	
Minimum effective embedment depth	h_{ef}	in	2		3-1/4		2-3/4	4-1/4
Minimum concrete member thickness	h_{min}	in	4	6	6	8	6	6-1/4
Critical edge distance	c_{ac}	in	6	6	7-1/2	6	7-1/2	6-1/2
Data for Steel Strengths – Tension and Shear								
Minimum specified yield strength	f_y	psi	65,000				65,000	
Minimum specified ultimate strength	f_{uta}	psi	100,000				100,000	
Effective tensile stress area (neck)	A_{se}	in^2	0.119				0.183	
Effective tensile stress area (thread)	A_{se}	in^2	0.142				0.217	
Steel strength in tension	N_{sa}	lbf	11,900				18,300	
Steel strength in shear, uncracked or cracked concrete [6]	V_{sa}	lbf	7,265				10,215	
Steel strength in shear – seismic loads	V_{eq}	lbf	5,805				8,105	
Strength reduction factor *f* for tension, steel failure modes [2]			0.75				0.75	
Strength reduction factor *f* for shear, steel failure modes [2]			0.65				0.65	
Data for Concrete Breakout Concrete Pryout Strengths in Tension and Shear								
Effectiveness factor – uncracked concrete	k_{uncr}	—	24				24	
Effectiveness factor – cracked concrete	k_{cr}	—	17				17	
Modification factor for cracked and uncracked concrete [3]	$y_{c,N}$	—	1.0				1.0	
Coefficient for pryout strength	k_{cp}	—	1.0		2.0		2.0	
Load-bearing length of anchor	l_e	in	2.0		3.25		2.75	4.25
Strength reduction factor f for tension, concrete failure modes, Condition B [2]			0.65				0.65	
Strength reduction factor f for shear, concrete failure modes, Condition B [2]			0.70				0.70	
Data for Pullout Strengths								
Pullout strength, uncracked concrete	$N_{p,uncr}$	lbf	See Footnote [4]		6,540		5,430	8,900
Pullout strength, cracked concrete	$N_{p,cr}$	lbf	See Footnote [4]				See Footnote [4]	
Pullout strength for seismic loads	N_{eq}	lbf	2,345		See Footnote [4]		See Footnote [4]	
Strength reduction factor *f* for tension, pullout failure modes, Condition B [2]			0.65				0.65	
Additional Anchor Data								
Axial stiffness in service load range in uncracked concrete	b_{uncr}	lbf/in	250,000				250,000	
Axial stiffness in service load range in cracked concrete	b_{cr}	lbf/in	20,000				20,000	

For SI: 1 inch = 25.4 mm, 1 in2 = 645.16mm2, 1 lbf = 4.45 N, 1 psi = 0.006895 MPa, 1 lbf • 102/in - 17,500 N/m.

[1] The 1/2" and 5/8" diameter Trubolt+ Wedge Anchors are ductile steel elements as defined by ACI 318 D.1.

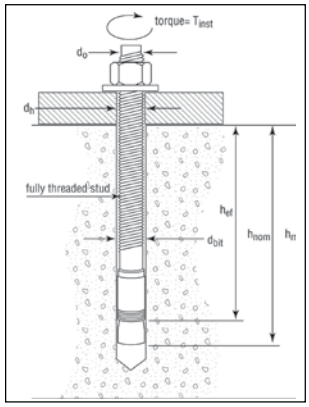
[2] All values of f apply to the load combinations of IBC Section 1605.2, ACI 318 Section 9.2 or UBC Section 1612.2. If the load combinations of Appendix C or UBC Section 1909.2 are used, the appropriate value of f must be determined in accordance with ACI 318 D.4.5. For installations where reinforcement that complies with ACI 318 Appendix D requirements for Condition A is present, the appropriate f factor must be determined in accordance with ACI 318 D.4.4.

[3] For all design cases $\Psi_{c,N} = 1.0$. The appropriate effectiveness factor for cracked concrete (k_{cr}) or uncracked concrete (k_{uncr}) must be used.

[4] Anchor pullout strength does not control anchor design. Determine steel and concrete capacity only.

[5] Steel strength in shear values are based on test results per ACI 355.2, Section 9.4 and must be used for design.

TRUBOLT+ WEDGE ANCHOR (INSTALLED)



TRUBOLT+ STAINLESS STEEL WEDGE INSTALLATION INFORMATION

Parameter	Notation	Units	1/2				5/8	
Anchor outer diameter	d_o	inches	0.5				0.615	
Nominal carbide bit diameter	d_{bit}	inches	1/2				5/8	
Effective embedment depth	h_{ef}	inches	2		3-1/4		2-3/4	4-1/4
Minimum anchor embedment depth	h_{nom}	inches	2-1/2		3-3/4		3-1/4	4-3/4
Minimum hole depth[1]	h_o	inches	2-3/4		4		3-1/2	5
Minimum concrete member thickness[1]	h_{min}	inches	4	6	6	8	6	6-1/4
Critical edge distance[1]	c_{ac}	In.	6	6	7-1/2	6	7-1/2	6-1/2
Minimum anchor spacing[1]	s_{min}	In.	6	5-3/4	4	5-3/4	8	6
Minimum edge distance[1]	c_{min}	In.	6				7-1/2	5
Minimum overall anchor length	l	inches	3-3/4		4-1/2		4-1/4	6
Installation torque	T_{inst}	ft-lb	45				90	
Minimum diameter of hole in fastened part	d_h	inches	5/8				3/4	

For SI: 1 inch = 25.4 mm, 1 ft-lb = 1.356 N-m.

APPENDIX D: Installation information for Tapcon+ Screw Anchors[1]

Characteristics	Symbols	Units	Nominal Anchor Diameter (inch)				
			1/4		3/8	1/2	
Head Style	-	-	Hex Head		Hex Head	Hex Head	
Nominal Outside diameter (Shank)	d_{a3}	in.	0.25		0.38	0.50	
Nominal Outside diameter (threads)	-	in.	0.33		0.46	0.59	
Drill Bit Specification	d_{bit}	in.	¼ Tapcon+ Bit	¼ Tapcon+ Bit	3/8 ANSI Bit	1/2 ANSI Bit	
Minimum base plate clearance hole diameter	d_h	in.	3/8		1/2	5/8	
Maximum installation torque[3]	Tinst, max	ft-lbf	20		50	70	
Maximum Impact Wrench Torque Rating	Timpact, max	ft-lbf	115		200	345	
Effective embedment depth	h_{ef}	in.	1.45		1.78	1.32	2.17	3.02
Minimum nominal embedment depth[4]	h_{nom}	in.	2		2 1/2	2	3	4
Minimum hole depth	h_{hole}	in.	2 1/4		2 3/4	2 1/4	3 1/4	4 1/4
Minimum concrete member thickness	h_{min}	in.	4		4	4	6	
Critical edge distance	c_{ac}	in.	2 1/2		4 1/2	3	4	5
Minimum edge distance	c_{min}	in.	1 1/2		1 1/2	2 1/2	1 3/4	2 1/2
Minimum Spacing	s_{min}	in.	3		3	3	3 1/2	3

APPENDIX D: Tension Strength Design Information for Tapcon+ Screw Anchors[1]

Table 2

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)					
			1/4		3/8	1/2		
Head Style	-	-	Hex Head		Hex Head	Hex Head		
Drill bit specification	-	in.	1/4 Tapcon+ Bit	1/4 ANSI Bit	3/8 ANSI Bit	1/2 ANSI Bit		
Anchor Category	1, 2, or 3	-	1	2	1	1		
Effective embedment depth	h_{ef}	in.	1.45		1.78	1.32	2.17	3.02
Minimum concrete member thickness	h_{min}	in.	4		4	4	6	
Critical edge distance	c_{ac}	in.	2 1/2		4 1/2	3	4	5
Data for Steel Strength in Tension								
Minimum specified yield strength	f_y	psi	100,000		100,000	100,000		
Minimum specified ultimate strength	$f_{uta}(f_{ut})$[5]	psi	125,000		125,000	125,000		
Effective tensile stress area	A_{se}	in^2	0.0470		0.098	0.1850		
Steel strength in tension	V_{sa}	lbf	5,900		12,250	23,125		
Strength reduction factor Φ for tension, steel failure modes[2]	Φ_{sa}	-	0.65		0.65	0.65		
Data for Concrete Breakout Strength in Tension								
Effectiveness factor - uncracked concrete	k_{uncr}	-	24		27	30		
Effectiveness factor - cracked concrete	k_{cr}	-	17		17	17		
Modification factor for cracked and uncracked concrete[3]	$\Psi_{c,N}$ (Ψ_3)[5]	-	1.0		1.0	1.0		
Strength reduction factor Φ for tension, concrete failure modes, Condition B[3]	Φ_{cb}	-	0.65	0.55	0.65	0.65		
Data for Pullout Strength in Tension								
Pullout strength, uncracked concrete	$N_{p,uncr}$	lbf	2,107		See footbote 4	See footnote 4		
Pullout strength, cracked concrete	$N_{p,cr}$	lbf	857		1,837	See footnote 4		
Pullout strength for seismic loads	$N_{p,eq}$	lbf	857		1,677	See footnote 4		
Strength reduction factor Φ for tension, pullout failure modes, Condition B[3]	Φ_p	-	0.65	0.55	0.65	See footnote 4		
Additional Anchor Data								
Axial stiffness in service load range in uncracked concrete	β_{uncr}	lbf/in	385,000		800,000	800,000		
Axial stiffness in service load range in cracked concrete	β_{cr}	lbf/in	225,000		365,000	365,000		

For SI: 1 inch = 25.4 mm, 1 ft-lbf = 1.356 N-m

[1] The data presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D

[2] The tabulated value of Φ_{sa} applies when the load combinations of Section 1605.2.1 of the IBC or ACI 318 section 9.2 are used. If load combinations of ACI 318 Appendix C are used, the appropriate value of Φ must be determined in accordance with ACI 318-11 D.4.4(b).

[3] The tabulated value of Φ_{cb} and Φ_{cp} applies when the load coombinations of Section o1605.2.1 of the IBC or ACI 318 Section 9.2 are used and the requirements of ACI 318-11 D.4.3(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, the appropriate value of Φ must be determined in accordance with ACI 318-11 D.4.4(c) for Condition B

[4] Pullout resistance does not govern design and does not need to be considered

[5] The notation in parenteses is for the 2006 IBC

[6] For calculation only. For actual h_{ef} see Table 1

[7] For the strength between the threaded cap and anchor head

APPENDIX D: Shear Strength Design Information for Tapcon+ Screw Anchors[1]

Table 3

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)						
			1/4		3/8	1/2			
Head Style	-	-	Hex Head		Hex Head	Hex Head			
Drill bit specification	-	in.	1/4 Tapcon+ Bit	1/4 ANSI Bit	3/8 ANSI Bit	1/2 ANSI Bit			
Anchor Category	1, 2, or 3	-	1	2	1	1			
Minimum effective embedment depth	h_{ef}	in.	1.45		1.78	1.32	2.17	3.02	
Minimum concrete member thickness	h_{min}	in.	4		4	4	6		
Critical edge distance	c_{ac}	in.	2 1/2		4 1/2	3	4	5	
Data for Steel Strengths in Shear									
Minimum specified yield strength	f_y	psi	100,000		100,000	100,000			
Minimum specified ultimate strength	$f_{uta}(f_{ut})^5$	psi	125,000		125,000	125,000			
Effective shear stress area	A_{se}	in^2	0.0470		0.098	0.1850			
Steel strength in shear - static	V_{sa}	lbf	2,045		3,621	12,610			
Steel strength in shear - seismic	$V_{sa, eq}$	-	1,350		2,920	9,300			
Strength reduction factor Φ for shear, steel failure modes[2]	Φ_{sa}	-	0.60		0.60	0.60			
Data for Concrete Breakout and Concrete Pryout Strengths in Shear									
Nominal Outside Diameter (shank)	$d_a(d_o)^4$	in.	0.25		0.38	0.50			
Load bearing length of anchor	ℓ_e	-	1.45		1.78	1.32	2.17	3.02	
Coefficient for pryout strength	κ_{cp}	-	1.0		1.0	1.0		2.0	
Strength reduction factor for shear, concrete breakout[3]	Φ_{cb}	-	0.70		0.70	0.70			
Strength reduction factor for shear, pryout[3]	Φ_{cp}	-	0.70		0.70	0.70			

For SI: 1 inch = 25.4 mm, 1 ft-lbf = 1.356 N-m

[1]The data presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D

[2] The tabulated value of Φ_{sa} applies when the load combinations of Section 1605.2.1 of the IBC or ACI 318 section 9.2 are used. If load combinations of ACI 318 Appendix C are used, the appropriate value of Φ must be determined in accordance with ACI 318-11 D.4.4(b).

[3] The tabulated value of Φ_{cb} and Φ_{cp} applies when the load coombinations of Section o1605.2.1 of the IBC or ACI 318 Section 9.2 are used and the requirements of ACI 318-11 D.4.3(c) for Condition B are met. If the load combinations of ACI 318 Appendix C are used, the appropriate value of Φ must be determined in accordance with ACI 318-11 D.4.4(c) for Condition B

[4] Pullout resistance does not govern design and does not need to be considered

[5] The notation in parenteses is for the 2006 IBC

[6] For calculation only. For actual h_{ef} see Table 1

[7] For the strength between the threaded cap and anchor head

APPENDIX D: Tapcon+ Screw Anchors Design Information for Anchors Located in the Soffit of Concrete Over Steel Deck Floor and Roof Assemblies[1,2,3,4,5]

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)		
			1/2		
Location of installation	-	-	Lower Flute		Upper Flute
Minimum hole depth	h_{hole}	in.	2 1/2	4 1/2	2 1/2
Nominal embedment depth	h_{nom}	in.	2	4	2
Minimum effective embedment depth	h_{ef}	in.	1.32	3.02	1.32
Characteristic pullout strength, uncracked concrete over metal deck	$N_{p,\,deck,uncr}$	lbf	1,720	4,950	2,405
Characteristic pullout strength, cracked concrete over metal deck	$N_{p,\,deck,cr}$	lbf	975	2,805	1,360
Characteristic shear strength, concrete over metal deck	$V_{sa,\,deck}$	lbf	3,825	6,130	3,825
Characteristic shear strength - seismic, concrete over metal deck	$V_{sa,\,deck,\,eq}$	lbf	2,820	4,520	2,820
Reduction factor for pullout strength in tension, Condition B	Φ	-	0.65		
Reduction factor for pullout strength in shear, Condition B	Φ	-	0.65		

For SI: 1 inch = 25.4 mm, 1 ft-lbf = 1.356 N-m

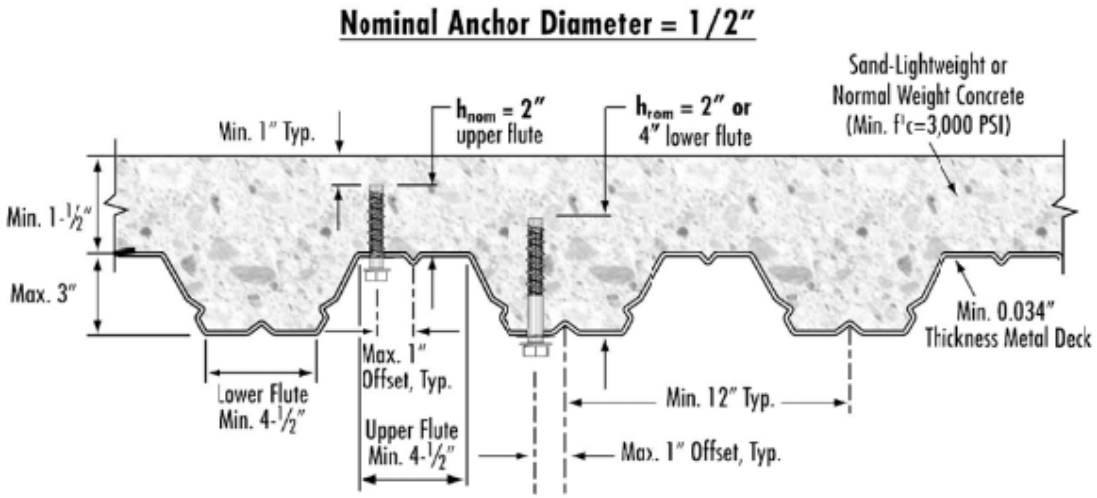
[1]Values for $N_{p,\,deck,uncr}$, $N_{p,\,deck,cr}$, $V_{sa,\,deck}$, $V_{sa,\,deck,\,eq}$ apply to sand-lightweight concrete having a inimum concrete compressive strength, f'_c of 3,000 psi.

[2] The characteristic pull-out strength for greater concrete compressive strengths shall be increased by multiplying the tabular value by $(f'_c / 3000psi)^{0.5}$

[3] All values of Φ apply to the load combinations of IBC Section 1605.2.1, or ACI 318 Section 9.2. If the load combinations of Appendix C are used, then appropriate value of Φ must be determined in accordance with ACI 318-11 D.4.4. For installations where reinforement that complies with ACI 318 Appendix D requirements for Condition A is present, the appropriate Φ factor must be determined in accordance with ACI 318-11 D.4.3.

[4] The minimum anchor spacing along the flute must be greater of 3 h_{ef} or 1.5 times the flute width in accordance with Section 4.1.11 of this report

[5] Installation must comply with Figure 6 of this report



Notes