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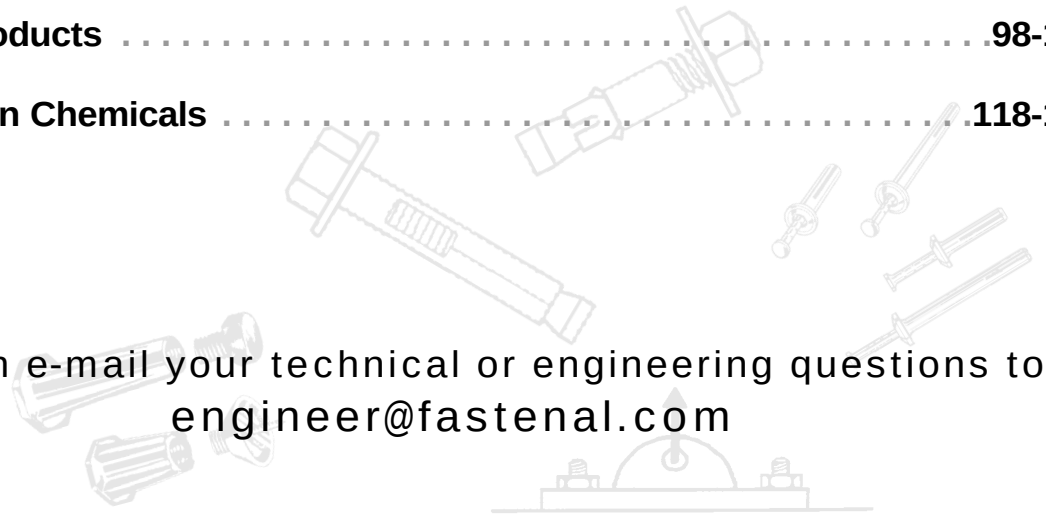

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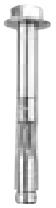
- **o May be suitable for depending on application**



Type of Anchor		Trubolt Wedge	LDT	Dynabolt Gold	Sleeve	Drop-In	C6
	Concrete	•	•	•	•	•	•
	Hard Stone	o		o	o	o	•
	Soft Stone		o	o	o		•
Use In	Solid Brick		•	•	•		•
	Hollow Brick			o	o		o
	Hollow Block		o	o	o		o
	Wallboard						
	Through Fastening	o	•	•	•		o
Application	Immediate Loading	•	•	•	•	•	
Criteria	Dynamic Loading	o	o				•
	Temp Resistant	•	•	•	•	•	o
General Description		Medium to heavy-duty metal expansion stud anchor	Medium to heavy-duty removable self-thread-ing anchor	Medium to heavy-duty expansion (sleeve style) anchor	Medium duty metal expansion anchor	Medium to heavy-duty internally threaded anchor available with standard or coil thread	Medium to heavy duty adhesive system
Pages		**6-8**	**9**	**10**	**11-12**	**12-14**	**15-22**

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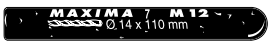



Type of Anchor		G5	Acrylic 7	Chemical Capsule (Impact & Maxima 7)	Power Sert	Tapcon®
	Concrete	•	•	•	•	•
	Hard Stone	•	•	•	•	
	Soft Stone	•	•	o	•	•
Use In	Solid Brick	•	•	o		o
	Hollow Brick		o			o
	Hollow Block		o			o
	Wallboard					
	Through Fastening	o	o	o	o	•
Application	Immediate Loading					•
Criteria	Dynamic Loading	•	•	•	•	
	Temp Resistant	o	o	o	o	•
General Description		Medium to heavy duty adhesive system	Medium to heavy duty adhesive system	Medium to heavy duty self-contained anchor system	Medium to heavy duty threaded insert system zinc	Light-Duty externally threaded self-tapping anchor
Pages		**23-27**	**28-39**	**46-48**	**49**	**50**

- **Suitable for**
- **o May be suitable for depending on application**

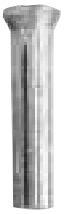





Type of Anchor		Redi Drive	Fastenal Pin Bolt Drive Nailins	Split Drive	Lag Shield	Set Bolt	Single Bolt
	Concrete	•	•	•	•	•	•
	Hard Stone		o	o	o	o	•
	Soft Stone		o	o			•
Use In	Solid Brick		o		o	o	•
	Hollow Brick	o	o		o		o
	Hollow Block	o	o		o		o
	Wallboard						
	Through Fastening	•	•	•		•	
Application	Immediate Loading	•	•	•	o	•	•
Criteria	Dynamic Loading						
	Temp Resistant	•				•	
General Description		Hammer drive anchor	Light-duty anchor available in nylon, s/s and carbon steel	Light-duty one-piece split type pre-expanded anchor	Light to medium-duty internally threaded	Medium-duty bottom bearing anchor	Non-caulking, single cone expansion anchor
Pages		**52-53**	**54**	**55**	**56**	**56**	**57**

- **Suitable for**
- **o May be suitable for depending on application**





Type of Anchor		Double Expansion	Four-Way Expansion	Lead Screw	Self-Drill	Lead Machine
	Concrete	•	•	•	•	•
	Hard Stone	•	•	•		•
	Soft Stone	•	•	o		o
Use In	Solid Brick	•	•	•		o
	Hollow Brick	o		o		
	Hollow Block	o		o		o
	Wallboard					
	Through Fastening					
Application	Immediate Loading	•	•	•	•	•
Criteria	Dynamic Loading					
	Temp Resistant					
General Description		Medium-duty, non-caulking anchor	Medium-duty mechanically expanded anchor	Light-duty screw anchor	Self-drilling expansion anchor	Light to medium-duty caulking anchor
Pages		**57**	**57**	**58**	**87-89**	**58**

• **Suitable for**

o **May be suitable for depending on application**





Type of Anchor		Plastic Conical	Plastic Straight	Fiber Plug	Hollow Wall	E-Z Anchor® Plastic, Metal and Nylon
	Concrete	•	•	•		
	Hard Stone	o	o	•		
	Soft Stone	o	o	•		
Use In	Solid Brick	o	o	•		
	Hollow Brick			o		
	Hollow Block	o	o	o		
	Wallboard			o	•	•
	Through Fastening				•	o
Application	Immediate Loading	•	•	•	•	•
Criteria	Dynamic Loading					
	Temp Resistant				o	
General Description		Light-duty expandable anchor	Light-duty anchor	Light-duty all purpose anchor	Light-duty sleeve type hollow wall anchor	Light-duty anchor available in nylon, s/s and zinc
Pages		**59**	**59**	**59**	**60**	**60**

• **Suitable for**

o **May be suitable for depending on application**





Type of Anchor		Toggle Bolt	Toggler® Alligator	Toggler® Toggle Bolt	Poly-Toggle	Bent Anchor Bolts
	Concrete					•
	Hard Stone					
	Soft Stone					
Use In	Solid Brick		•			
	Hollow Brick	•	•	•	•	
	Hollow Block	•	•	•	•	
	Wallboard	•	•	•	•	
	Through Fastening	•				•
Application	Immediate Loading	•	o	o	o	
Criteria	Dynamic Loading					
	Temp Resistant					•
		Light-duty one piece split type expansion anchor	Light-duty internally threaded	Light-duty internally threaded	Light-duty internally threaded	Medium to heavy-duty cast-in-place anchor
Pages		**61**	**61**	**62**	**62**	**63**

ANCHOR CLASSIFICATIONS AND POST-INSTALLED SYSTEMS

Anchor Classification

Numerous types of devices are available for anchoring structures or structural members to concrete. When it comes to selecting an appropriate anchoring system, the architect or engineer is often faced with making a choice from an extensive selection. While the choices may allow for a better match up of anchors to specific needs, it can complicate the selection process.

In practice, we can divide anchoring systems into two broad groups or systems: **Post-Installed Systems** and **Cast-In-Place Systems.** Advantages and disadvantages of each system are detailed in the following section.

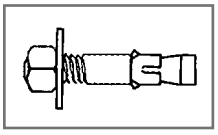
Post-Installed Systems

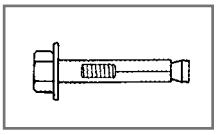
Mechanical Expansion

The mechanical expansion anchor develops its holding power by exerting mechanical force in a pre-drilled hole in the base material. Two types of expansion anchors are commonly used: **Torque-Controlled** and **Displacement Controlled.**

Torque-Controlled Anchors

A majority of anchors function by exerting force against the inner wall of the drilled hole, thus resisting the applied pressure. When inserted into a pre-drilled hole, tightening of the nut (applying torque) draws up the stud, thus exerting enough force to expand the sleeve, ring or wedge. A wide variety of fasteners are considered to be torque-controlled. Two of the more common torque-controlled fasteners are **wedge** and **sleeve anchors**.





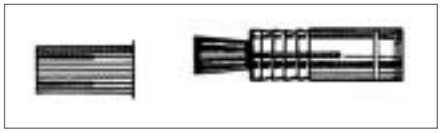
Torque-Controlled Advantages
Low in-place cost
Supports large tension and shear loads
Temperature resistant
Immediate loading
Highly versatile, works well in a wide variety of applications

Torque-Controlled Disadvantages
Hole size dependent
Works in solid hole geometry only
Can be sensitive to hole cleanliness
Edge distance and spacing sensitive
Precise drilling required

Displacement-Controlled Anchors

The drop-in anchor is a common type of displacement-controlled expansion anchor. It consists of an expansion plug placed within a section of the anchor that is tapered and slit. When the anchor is inserted into a pre-drilled hole, a setting tool is used to drive the expansion plug through the tapered end of the anchor. The slit portion of the plug expands, thus securing the anchor.

Proper fitting is essential when using displacement-controlled anchors. Always use a proper size drill bit and inspect the bits regularly. For most manufacturers, the setting tool can be used as an inspection device by inserting into the drop-in. The lip of the set tool will sit flush with the anchor upon insertion if the anchor is properly set. However, since there is no industry standard for setting tools, always use the setting tool from the manufacturer of the drop-in. Most of the self-drilling anchors are also considered displacement-controlled anchors.



Displacement-Controlled Advantages
Supports large tension and shear loads
Cost effective
Easy to install
Highly versatile, works well in a wide variety of applications

Displacement-Controlled Disadvantages
Hole cleanliness is critical
Edge distance and spacing sensitive
Hole depth dependent
Labor intensive
Shallow embedment

Adhesive Anchor

Typically, adhesive anchors rely on a chemical bond to adhere a fastening device, such as a threaded rod or deformed bar, to solid concrete or masonry base material. Two of the more commonly used systems include the **Epoxy** and **Glass Capsule**.

Epoxy Anchors

Epoxy anchoring systems usually consist of a resin and hardener housed in canisters either side-by-side or coaxially. When these two components are mixed in the proper fashion, the chemicals react to form a stable, solid adhesive. A static-mixer nozzle is used to ensure a complete and adequate chemical reaction. For field applications, a hand gun or a pneumatic dispenser is most common.

(Epoxy Anchor continued)

Epoxy Anchor Advantages
Precise mix
Not diameter sensitive
Moisture resistant
Supports large tension and shear loads
Extremely versatile

Epoxy Anchor Disadvantages
Hole cleanliness is critical
Edge distance and spacing sensitive
Non-fire resistant
No immediate loading
Wasteful
Temperature dependent

Glass Capsule Anchor

Capsule anchors consist of pre-measured amounts of resin, hardener and aggregate in a cylindrical glass capsule. The capsules are generally placed in a pre-drilled hole. A threaded rod is then inserted through the glass capsule and rotated to ensure sufficient mixing of the chemicals. When mixed, the chemicals and aggregate react to form a stable, solid adhesive.

Most capsules can be used effectively in difficult applications, such as overhead and underwater applications.

Glass Capsule Anchors Advantages
Supports large tension and shear loads
Highly versatile
Portion control

Glass Capsule Anchor Disadvantages
Sensitive to hole cleanliness
Edge distance and spacing sensitive
More expensive
Limited storage life
Fragile handling
Temperature Dependent

Grouted

Grouted anchors require the drilling of an oversized hole. The anchor is then placed in the hole and grout is poured in. After the grout has cured, fixtures can be installed.

Grouted Advantages
Inexpensive
Slow cure
Formable
Non-stressing

Grouted Disadvantages
Wasteful
Imprecise mix
Clean water required
Deep embedment

Cast-In-Place Systems

Cast-in-place anchors incorporate the use of bent anchors or J-bolts and a variety of inserts for holding purposes. These bolts must be set in place prior to pouring the concrete. After the concrete has cured, fixtures can be attached. One large drawback to using this type of anchoring system is the tendency of the anchors to shift out of place when the concrete is poured.

Cast-In-Place Systems Advantages
Low cost, no drilling
Fire resistant
Supports large tension and shear loads
Efficient large diameter anchorage in structural applications

Cast-In-Place Systems Disadvantages
Non-precise location
Corrosion effected
Long installation time
Limited anchorage alternatives
Limited dimension alternatives
Deep embedment

Anchor Behavior

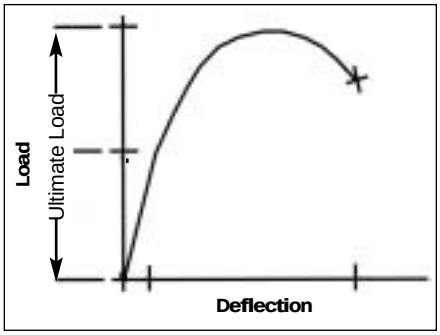
How an anchor performs under a given load defines its anchor behavior. Understanding anchor behavior is necessary when specifying the appropriate anchor for a given application. This includes an understanding of load displacement and relaxation characteristics for various types of anchors, as well as an understanding of the failure modes and strengths of anchors. Generally, anchor behavior can be qualified by the load-deflection curve. For epoxy anchors, a heat deflection curve must also be considered depending upon the particular application.

Expansion Anchors

When a mechanical expansion anchor has been properly installed and tightened in uncracked concrete, an initial pre-stressing will be applied to the anchor. This pre-stressing acts as the pre-load on the anchor which will produce the clamping load on the fixture. Pre-stressing is essential for the proper performance of the anchor. However, pre-load has a tendency to decrease up to 40% over time due to creep and relaxation, significantly altering the anchor's behavior. Generally, the design load is less than this relaxation.

The expansion anchors primarily support the applied loads by means of frictional forces exerted between the expansion wedge and the concrete. With a properly installed anchor subjected to tensile loading, three types of behavior can occur depending on the magnitude of the tensile load (F):

1. **F < Pre-load:** If the magnitude of the load is less than the pre-load, the anchor will perform as intended, with little or deflection. Generally, the design loads are well below this pre-load, limiting expected deflection.
2. **F > Pre-load < Ultimate load:** If the magnitude of the load is greater than the pre-load, but still less than the ultimate load, the anchor will begin to deflect or slip.
3. **F > Ultimate load:** If the magnitude of the applied load exceeds the ultimate load, the anchorage system will fail.



Load-Deflection Curve

Adhesive Anchors

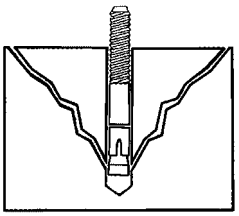
Adhesive anchors are typically pre-loaded by applying a predetermined torque. Because adhesive anchors are subject to creep effects in both the concrete and adhesive, the reduction in pre-stressing force is greater than that for other types of anchors. Documentation proves that 40% to 60% of the initial pre-stressing is lost due to relaxation. Repeated tightening of the connection can effectively prevent pre-stressing loss during relaxation.

Adhesive anchors will primarily support the applied loads by transferring the load through the bond between the concrete and the fastener. The bond is significantly altered by temperature, presence of drilling debris, presence of water and other factors. In some instances, improper hole cleaning has been shown to reduce anchor capacity by as much as 80%.

Anchor Failure Modes

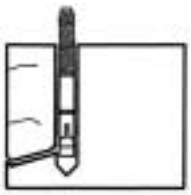
When initially designing a connection, anchor failure must be carefully defined by the engineer. In some connections failure could be characterized by a slight slippage of the anchor. In other connections, failure could be characterized by spalling. It is for this reason that anchor failures must be considered when designing a connection. The following section focuses on some of the more common modes of failure.

Concrete Cone



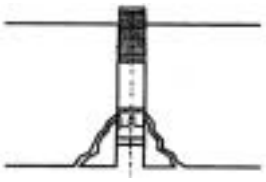
Concrete cone is characterized by a cone shaped "spall" that forms from the base of the anchor to the surface of the concrete. This failure occurs when the applied force on the concrete exceeds the tensile capacity of the concrete. The concrete will then crack along the principle tensile zones. These zones typically occur at angles of about 45 degrees of the applied load. This type of failure can occur with any type of anchor system, but can be controlled to some degree by proper anchor spacing and edge distance.

Side Blowout



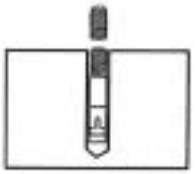
A side blowout is characterized by a concrete spall forming towards the nearest free edge of the concrete. The culprit is generally inappropriate edge distance given to the anchor. This type of failure can occur with any type of anchoring system.

Reverse Concrete Cone



The reverse concrete cone is characterized by the appearance of a cone- shaped "spall". It is similar to the regular concrete cone failure, except that it occurs on the bottom surface of the base material. During pre-drilling, a considerable amount of weight is placed on the drill by the installer. As the bit approaches the opposite surface of the concrete, a cone forms that is approximately two drill bit diameters deep. If an attempt is made to install the anchor so that the mechanical expansion sleeve is below this cone, a substantial reduction in anchor capacity will occur.

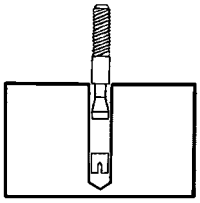
Steel Failure

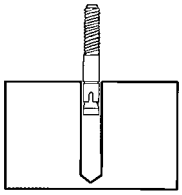


A steel or material failure is characterized by little to no slippage, followed by a sudden fracturing of the anchor. This failure usually occurs in the threaded portion of the anchor when the applied loads exceed the material strength of the anchor and could occur in either tension or shear. Any type of anchoring system is subject to steel failure.

ANCHOR FAILURE MODES AND ANCHOR CAPACITY

Anchor Failure Modes
continued

Pull-Through

A pull-through failure is characterized by withdrawal of the anchor with little or no damage to the concrete. This type of failure mode applies only to mechanical expansion anchors and occurs when the mechanical expansion clip remains in the hole. This failure results when applied forces exceeding the frictional expansion force of the anchoring system.

Pullout

A pullout is characterized by withdrawal of the anchor with little or no damage to the concrete. The anchor pulls or slips intact from the hole. For a mechanical expansion anchor, the expansion clip is pulled along with the anchor. This failure occurs when the applied forces exceed the frictional expansion force or bond force of the anchoring system. All anchoring systems are subject to pullout failure

Anchor Capacity

Anchor capacity can be defined through a number of variables. The following section briefly discusses these variables as they relate to expansion and adhesive anchoring systems.

Anchor Size and Material

As with most fasteners, a larger anchor diameter and high-performance materials provide a stronger anchor. However, these are not the only limitations when selecting an anchor. When using deeper embedments and higher strength concrete, the anchor material properties typically dictate the design. Under such conditions the tensile, and in most instances the shear capacities, can be easily calculated using standard engineering principles.

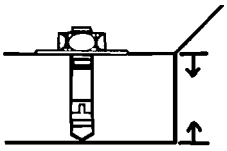
Anchor size also plays a vital role in the design process. The anchor diameter dictates anchor spacing and edge distance. Large diameter anchors require larger spacing and more edge distance. Smaller diameter anchors can be placed closer together and closer to the edge of the material, but will require more anchors for the same capacity.

Base Material Strength

When deciding which anchor to employ, one point to consider is the base material strength. Maximum anchor performance requires that the material in which the anchor is installed also be able to endure the load to which the anchor will be subjected. When an anchor is subjected to a load, it transmits that load to the base material producing a combination of tension, compression and shear. For concrete, the compressive strengths are typically measured in *pounds per square inch* or *psi*. These measurements will vary widely depending upon the concrete mix design. This value is also dependent on the cure time.

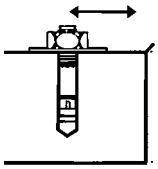
When an anchor is subjected to a tensile load, the concrete bears the primary tension. For shallow embedments, the anchor capacity is generally a function of the concrete tensile capacity. As the embedment depth increases, the anchor capacity is generally governed by the anchor material properties. When an anchor is subjected to shear, the concrete is subjected to a combination of tension and shear. When the tensile forces exceed the concrete tensile capacity, the concrete fails. ACI 349 defines this capacity as an empirical equation involving the square root of the concrete's compressive strength and the squared value of the embedment depth. Applying this equation, an increase in the concrete compressive strength would increase the concrete tensile strength, as a function of the square root of the concrete compressive strength. This, in turn, increases the anchor capacity.

Embedment Depth

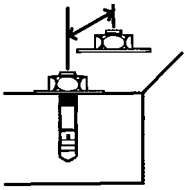

Embedment depth is defined as the distance from the surface of the concrete to the bottom of the anchor, prior to installation torque. Embedment depth greatly influences the holding power of the anchor. In most instances, the anchor capacity rises to approach a point of anchor material failure as you extend the embedment depth.

Maximum embedment is based on two factors: length of the anchor and thickness of the concrete. As a general rule the concrete base material should be 125% of the embedment to be used. For example, when installing an anchor to an embedment of 4", the base material should be at least 5" thick. If the base material is not thick enough the bottom of the slab may spall, significantly reducing the holding power of the anchor.

Edge Distance


Edge distance is defined as the distance from the center line of the anchor to the nearest free edge of concrete. A minimum edge requirement is generally recommended by most anchor manufacturers. Many anchor manufacturers specify edge distance as a multiple of the anchor diameter. However simple this method may seem, it is not entirely correct. The minimum edge distance is actually dependent upon the embedment depth. Reduced edge distances will drastically reduce the holding power of the anchor due to the reduction of the concrete cone.

Spacing


Spacing is defined as the distance from the center line of the anchor to the center line of the next nearest anchor. As with edge distances, this distance is usually dependent upon the anchor diameter. However, as seen with the edge distance requirements, the spacing is actually dependent upon the embedment depth. Reduced spacing will significantly reduce anchor capacity by also reducing the size of the concrete cone.

Minimum spacing and edge distances will be listed for each individual anchor in their respective sections.

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engineer@fastenal.com

LOAD CONDITIONS, LOAD CAPACITY TEST AND SAFETY FACTORS

Load Conditions

Anchoring systems will often perform differently under similar conditions. For this reason, load categories should be taken into consideration when designing an anchoring system. Load conditions are generally broken down and defined by **load categories** and **types**, as outlined below.

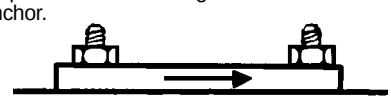
Load Categories

Tension

Tension can be defined as load force applied parallel to the longitudinal axis of the anchor. Excessive tension can cause an anchor to pull directly out of the base material.

Shear

Shear can be defined as load force applied perpendicular to the longitudinal axis of the anchor.

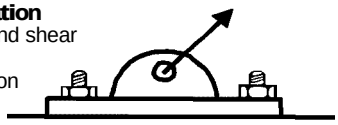


Bending

Anchor bending can occur when a shear load is applied against a raised surface existing between the anchor and the concrete surface. This type of load significantly reduces the anchor capacity as the distance between the top of the anchor and its connection with the concrete surface increases.

Combination

Tension and shear applied in combination to any degree is defined as combination force. This category of force is generally applied at some angle to the longitudinal axis of the anchor. Combination load force significantly reduces the anchor capacity.

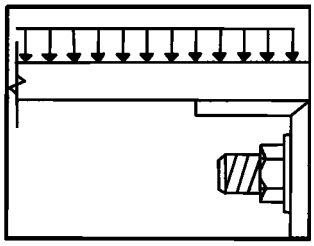


Load Type

Load type refers to the anticipated load the anchor is designed for and expected to carry. The most common of these are defined below as static, impact and dynamic load types.

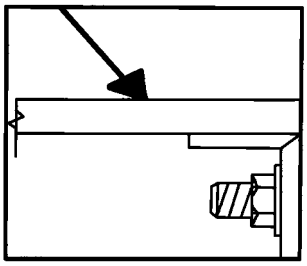
Static

Static loads, such as dead loads, are expected to remain constant throughout the design life of the application.



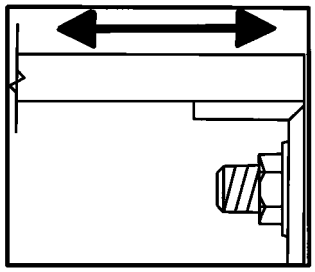
Impact

Impact loads are generally considered to be unanticipated, high-intensity, low duration loads. Proper anchor selection is critical to this type of load.



Dynamic

Dynamic or vibrational loads fluctuate rapidly over the anticipated design life. A properly designed anchoring system is very critical with this type of load.



Load Capacity Tests and Safety Factors

Most anchor manufacturers provide testing data to assist in the selection and specification of various anchors. These tests may be performed by the anchor manufacturer, but in most instances they are performed by an independent testing source. One of the most common test evaluation services for the anchor industry is the International Conference of Building Officials (ICBO).

When test data is used, you should be aware of some differences in information. Most data reported by the manufacturer is given as ultimate values, but often some data will be presented in terms of allowable working loads. The allowable working load is the highest load that an anchor can safely maintain for the life of the fastening. A minimum safety value ratio of 4:1 or 25% is often required. Tests should be performed according to ASTM E488, the only existing American standard exclusively and specifically concerned with testing to determine concrete anchoring performance. Furthermore, it is crucial that close attention be paid to embedment depth, concrete strength and anchor spacing. Changes in these values can significantly alter the anchor capacity.

Due to the varying conditions of field installations a 4:1 safety factor, or 25% of the ultimate value, is the minimum accepted industry standard to calculate allowable static loads. Critical applications, such as overhead installations, vibratory loads, etc., may require a safety factor of as much as 10:1 or more.

For anchors burdened with the simultaneous combination of tension and shear load, the combined loads should be analyzed using one of the following equations based on the Uniform Building Code.

Where

Equation 1: $\left(\frac{P}{Pallow}\right) + \left(\frac{V}{Vallow}\right) \leq 1.0$

Equation 2: $\left(\frac{P}{Pallow}\right)^{5/3} + \left(\frac{V}{Vallow}\right)^{5/3} \leq 1.0$

P = Applied tensile load calculated by an engineer

Pallow = Allowable tensile load

V = Applied shear load calculated by an engineer

Vallow = Allowable shear load

Both equations can determine anchor capacity. Equation one assumes a linear relationship between the two values. This linear approach is simple and more conservative. Equation two is considered the elliptical method. This method is more accurate but more difficult to calculate.

BASE MATERIAL AND CLEARANCE HOLES

Base Material

For purposes outlined in this reading, base material shall be defined as either concrete or masonry. Descriptions of each follow.

Concrete

Concrete is the primary base material used with anchors. Oftentimes, the terms “concrete” and “cement” are incorrectly interchanged. In a broad sense, concrete implies a composite material consisting of an aggregate of particles bound together in a solid body using some type of binding medium or cement.

One of the most common types of concrete used is portland cement concrete. The ingredients for this concrete are portland cement, a fine aggregate, sand or a coarse aggregate, gravel and water. The aggregate particles act as filler material to reduce the overall cost of the concrete product. Concrete is made by first mixing the aggregate and cement together and then adding water. When water is added, a chemical action called hydration occurs and hardens the cement. To achieve the optimum strength and workability of a concrete mixture, the ingredients must be added in the correct proportions.

Portland cement concrete is considered to be a popular construction material because it can be poured in place, and it hardens at room temperature even when submerged in water. However, as a structural material, it has limitations and disadvantages. Like most ceramics, portland cement is extremely brittle. Its tensile strength is approximately 10 to 15 times less than its compressive strength. It is not often used for large concrete structures as they often experience considerable thermal expansion and contraction with temperature fluctuations. In addition, water can penetrate the structure through external pores, which can cause severe cracking as a consequence of freeze-thaw cycles during cold weather.

Two types of concrete should be considered for use on most anchoring systems.

Poured-In-Place

Poured-in-place concrete is concrete that is poured at the job site. This type of concrete will have reinforcement added if it is to be used as a structural member. The average compressive strength of poured-in-place concrete is between 2000 to 6000 psi.

Pre-Cast

Pre-cast concrete is concrete that has been pre-manufactured as walls or panels, then delivered to the job and assembled in place. Pre-casting allows for a higher quality control and generally creates a higher strength concrete. Pre-cast concrete can be manufactured in three versions: Reinforced and Hollow, Reinforced and Solid and Pre-stressed. Descriptions of each follow.

Reinforced and Hollow

This type of pre-cast is more commonly referred to as Flexicore or Hollowcore. To help reduce weight load, these sections are produced with hollow portions.

Reinforced and Solid

This type of pre-cast concrete has reinforcement bars added to the solid concrete section for additional reinforcement.

Pre-stressed

This type of pre-cast concrete has internal stresses applied while the concrete sections are produced. The prestressing compresses the concrete mixture to obtain high compressive strengths. This method utilizes a characteristic of ceramics that makes the concrete stronger in compression rather than tension. Thus, to fracture pre-stressed concrete an applied tensile stress must exceed the magnitude of the pre-compressive stress.Depending on the type of mix, properties of aggregate and time and quality of curing, these compressive strengths can be significantly larger than normal.Prestressed concrete can further be set into two types: Pre-Tensioned and Post-Tensioned descriptions of each follow.

Pre-tensioned

Pre-tensioned concrete has had tension applied to the steel or cables in the concrete the concrete is cured.

Post-tensioned

Post-tensioned concrete has had tension applied to the steel or cables in the concrete the concrete is cured.

Concrete that is pre-stressed should be of high-quality, with a low shrinkage and a low creep rate. Pre-stressed concrete, usually pre-fabricated, is commonly used for highway and railway bridges.

It is important to be familiar with the various types of concrete when selecting a proper anchoring systems. Locations of hollow sections, thickness of the web portion of the concrete, location of the reinforcement bars and various other factors all need to be known when determining which anchor to use on a project.

There are three fundamental characteristics of concrete that influence performance: Age, strength and reinforcement or rebar. Descriptions of each follow.

Age

The strength of concrete increases over time. Due to this fact, age has a tremendous effect on performance of the anchor. However, older concrete can become brittle, resulting in spalling or chipping when the concrete is being drilled.

Strength

The design strength of concrete is based on a 28-day cure time. This is the amount of time it takes for the concrete to achieve its designed compressive strength. It is recommended that anchoring not occur until the concrete has reached or surpassed its cure time.

Compressive strength is how concrete is rated. By changing the proportions of the ingredients (water, cement and aggregate) we can alter the concrete’s compressive strength, cost and durability. This dramatically alters the performance of an anchoring system.

Reinforcement or Rebar

Concrete is a strong and applicable material for use with compressive loads, but is considered inferior for use with tensile load. For this reason steel reinforcing bar, or rebar, is added to the concrete structure to provide tensile strength. This additional reinforcement increases the concrete’s strength and integrity.

Masonry

Masonry is commonly described as concrete block, brick, stone, tile or similar materials that are joined together with mortar. Masonry and concrete are similar in the respect that they both contain similar ingredients. However, masonry is typically made of cement, an aggregate of limestone and water. Masonry blocks can be hollow or filled.

Anchoring in masonry is accomplished by placing a fastener into a mortar-filled joint of a brick or block. Due to the brittleness of brick and the improper compressive strength of block, fastening with a powder-actuated tool should not be attempted. Mortar block is not thick enough to support the force of the tool.

When drilling holes into hollow masonry with cavities, extreme care must be taken to avoid spalling on the inside of the block. To reduce this potential for spalling, holes should only be drilled using rotation. Hammering action should not be used.

It is important to be familiar with various types of masonry when selecting a proper anchoring system. You must be aware of what is behind the masonry; its weight and strength, is it hollow or filled; how is the masonry attached; and what is the precise purpose of the fastening to determining the proper anchor?

Clearance Holes

Anchors are designed to be installed in holes drilled in concrete and masonry base materials. Carbide tipped drill bits meeting ANSI Standard B212.15 requirements should be used. Drill bits standards are listed below. Keep in mind that when using the standards outlined, the actual hole diameter drilled in the base material will actually be larger than the nominal diameter.

For through-fixture installation, it may be necessary to pre-drill a minimum clearance hole in the fixture large enough to allow the carbide tipped bit to pass through. The anchor selected will also require a pre-drilled hole in the fixture large enough for the expansion mechanism to pass through. Normally, for mechanical expansion anchor sizes up to 7/8", the minimum clearance hole required is the anchor diameter plus1/16". For sizes 1" and larger, the minimum clearance hole is the anchor diameter plus 1/8". The clearance hole to be used should not be overlooked by the designer responsible for anchor installation.

Drill Bit ANSI Specifications

Nominal Drill O.D. (in.)	ANSI Spec. (in.)	Nominal Drill O.D. (in.)	ANSI Spec. (in.)
1/8	0.134 - 0.140	5/8	0.650 - 0.660
5/32	0.165 - 0.171	11/16	0.713 - 0.723
11/64	0.181 - 0.187	3/4	0.775 - 0.787
3/16	0.198 - 0.206	27/32	0.865 - 0.881
7/32	0.229 - 0.237	7/8	0.905 - 0.917
1/4	0.260 - 0.268	15/16	0.968 - 0.980
9/32	0.296 - 0.304	1	1.030 - 1.042
5/16	0.327 - 0.335	1-1/8	1.160 - 1.175
3/8	0.390 - 0.398	1-1/4	1.285 - 1.300
7/16	0.458 - 0.468	1-3/8	1.410 - 1.425
1/2	0.520 - 0.530	1-1/2	1.535 - 1.550
9/16	0.582 - 0.592		

Trubolt Wedge

Approvals/Listings:
Meets or exceeds U.S. Government G.S.A. Specification FF-S-325 Group II, Type 4, Class 1

Underwriters Laboratories

Factory Mutual

ICBO Evaluation Service, Inc. – #ER-1372 (including seismic loading conditions)

City of Los Angeles – #RR2748

SBCCI Compliance Report – #9570

California State Fire Marshall

Cal Trans
Metro-Dade #01.0504.12

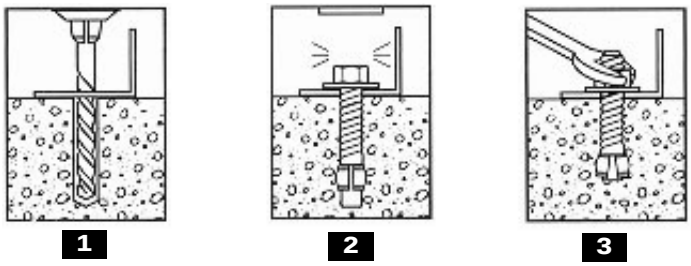
Use in: Concrete and stone
Use with: No other fastener needed

Characteristics
Wedge anchors feature a type 18-8 stainless steel split expansion ring and a threaded stud bolt body and integral cone expander, 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.

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

Installation (See diagram)

1. Using a bit whose diameter equals the anchor diameter, drill hole to any depth exceeding the minimum embedment. Clean hole.
2. Assemble anchor with nut and washer so that the top of the nut is flush with the top of the anchor. Drive anchor through material to be fastened so that nut and washer are flush with surface of material.
3. Expand anchor by tightening nut 3 to 5 turns, or to the specific torque requirement (see static load chart).

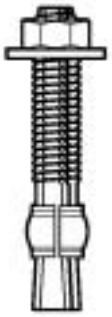


Use carbide tipped drill bits made in accordance to ANSI B212.15 to install anchors.

Anchors are tested to ASTM E488 criteria and liste by ICBO and SBCCI.

Anchors are listed by the following agencies as required by the local building code: UL, FM, City of Los Angeles, California State Fire Marshal and Cal Trans.

Now available:
Blow out bulb
Part #0136070



Trubolt Wedge Anchor Selection Set

Fastenal Part Number				Anchor Diameter (in.)	Overall Length (in.)	Thread Length
Zinc Part No.	Galvanized Part No.	18-8 Stainless Steel Part No.	316 Stainless Steel			
52001		52051		1/4	1-3/4	3/4
52002		52052	0152200		2-1/4	1-1/4
52003		52053	0152201		3-1/4	2-1/4
52004		52054	0152202	3/8	2-1/4	1-1/8
52005		52055	0152203		2-3/4	1-5/8
52006		52056	0152204		3	1-7/8
52007		52057	0152205		3-3/4	2-5/8
52008		52058	0152206		5	2-3/4
52009	52038	52059	0152207	1/2	2-3/4	1-1/4
52010		52060	0152208		3-3/4	2-1/4
52011	52039	52061	0152209		4-1/4	2-3/4
52012	52040	52062	0152210		5-1/2	3
52013	52041	52063			7	4-1/2
52014	52042	52064		5/8	3-1/2	1-3/4
52015		52048	0152211		4-1/4	2-1/2
52016		52065	0152212		5	3-1/4
52017	52043	52066			6	3-1/2
52018		52067	0152213		7	4-1/2
52019		52068			8-1/2	3-1/2
52020					10	1-3/4
52021		52078		3/4	4-1/4	1-3/4
52022	52044	52069	0152214		4-3/4	2-1/4
52023	52045	52070	0152215		5-1/2	3
52024		52079			6-1/4	3-3/4
52025		52071			7	4-1/2
52026	52046	52072			8-1/2	3-1/2
52027		52073			10	1-3/4
52028					12	1-3/4
52029				7/8	6	2-1/2
52030		52074			8	2-1/2
52031					10	2-1/2
52032		52075		1	6	2-1/2
52033	52047	52076			9	2-1/2
52034		52098			12	2-1/2
52035				1-1/4	9	3-1/2

Trubolt Static Loads

Ultimate Tension and Shear Values

Anchor Diameter	Installation Torque Ft. Lbs.	Embedment Depth	Anchor Type	2000 PSI Tension (lbs.)	2000 PSI Shear (lbs.)	4000 PSI Tension (lbs.)	4000 PSI Shear (lbs.)	6000 PSI Tension (lbs.)	6000 PSI Shear (lbs.)
1/4	8	1-1/8		1,180	1,400	1,780	1,400	1,900	1,400
		1-15/16		2,100	1,680	3,300	1,680	3,300	1,680
		2-1/8		2,260		3,300		3,300	
3/8	25	1-1/2		1,680	2,320	2,240	2,620	2,840	3,160
		3		3,480	4,000	5,940	4,140	6,120	4,500
		4		4,800		5,940		6,120	
1/2	55	2-1/4		4,660	4,760	5,100	4,760	7,040	7,040
		4-1/8	Carbon	4,660	7,240	9,640	7,240	10,820	8,160
		6	or	5,340		9,640		10,820	
5/8	90	2-3/4	Galvanized	6,580	7,120	7,180	7,120	9,720	9,616
		5-1/8		6,580	9,600	14,920	11,900	16,380	12,520
		7-1/2	Zinc	7,060		15,020		16,380	
3/4	175	3-1/4	or	7,120	10,120	10,840	13,720	13,300	15,980
		6-5/8	Stainless	10,980	20,320	17,700	23,740	20,260	23,740
		10	Steel	10,980		17,880		23,580	
7/8	250	3-3/4		9,520	13,160	14,740	16,580	17,420	19,160
		6-1/4	304 &	14,660	20,880	20,940	28,800	24,360	28,800
		8	316	14,660		20,940		24,360	
1	300	4-1/2		13,940	16,080	20,180	22,820	21,180	24,480
		7-3/8		14,600	28,680	23,980	37,940	33,260	38,080
		9-1/2		18,700		26,540		33,260	
1-1/4	500	5-1/2		18,140	23,280	26,380	29,460	33,640	33,780
		8		27,340	35,080	43,300	44,260	45,540	50,560

Ultimate Tension and Shear in Lightweight Concrete

Anchor Diameter (ft-lbs.)	Installation Torque	Embedment Depth (in.)	Anchor Type	Lightweight Concrete 2000 PSI Tension (lbs.)	Lightweight Concrete 2000 PSI Shear (lbs.)	Lower Flute of Steel Deck with Lightweight Concrete Fill of 2000 PSI	
3/8	25	1-1/2	Carbon or Galvanized	2120	3720	1900	3160
		3		2940	4240	2840	4000
1/2	55	2-1/4		3600	7040	3400	5380
		3		4720	6620	4480	6620
		4	Zinc or Stainless Steel		6920	4800	6440
5/8	90	3		6000	9240	4720	5500
		5		5960	9280	6580	9140
3/4	175	3-1/4	304 & 316	7160	12600	5840	8880
		5-1/4		8900	15920	7040	

Drill Bit ANSI Specifications

Nominal Drill O.D. (in.)	ANSI Specification (in.)
1/4	0.260 - 0.268
3/8	0.390 - 0.398
1/2	0.520 - 0.530
5/8	0.650 - 0.660
3/4	0.775 - 0.787
7/8	0.905 - 0.917
1	1.030 - 1.042
1-1/4	1.285 - 1.300

- Tested to ASTM E488 Test Standard.
- Use only ANSI B212.15 drill bit dimensions.
- Minimum edge distance and spacing requirements met.

Notes
Information provided only for use by qualified engineers. Use of technical data by persons not qualified could cause serious damage or injury. Ultimate values shown. The allowable load chart is determined using a 4:1 safety factor as shown in the lower left chart. Shear and tensile values shown are for anchors installed in stone aggregate concrete having the designated compressive strength at the time of installation.

Length Identification Code																												
Stamp on Anchor		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
Anchor Size	From:	1-1/2	2	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	8-1/2	9	9-1/2	10	11	12	13	14	15	16	17	18	
	Up to:	2	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	8-1/2	9	9-1/2	10	11	12	13	14	15	16	17	18	19	

Combined Tension and Shear Loading:

The following formula may be used for combined tension and shear loading. (Check local code requirements).

See page 4.

$$\left(\frac{P}{Pallow}\right)^{5/3} + \left(\frac{V}{Vallow}\right)^{5/3} \leq 1.0$$

FASTENAL®/REDHEAD TRUBOLT® WEDGE ANCHORS-STATIC LOADS

Allowable Tension and Shear Values with 4:1 Safety Factor

Anchor Diameter	Installation Torque Ft. Lbs.	Embedment Depth	Anchor Type	2000 PSI Tension (lbs.)	2000 PSI Shear (lbs.)	4000 PSI Tension (lbs.)	4000 PSI Shear (lbs.)	6000 PSI Tension (lbs.)	6000 PSI Shear (lbs.)
1/4	8	1-1/8		295	350	445	350	475	350
		1-15/16		525	420	825	420	825	420
		2-1/8		565		825		825	
3/8	25	1-1/2		420	580	560	655	710	790
		3		870	1,000	1,485	1,035	1,530	1,125
		4		1,200		1,485		1,530	
1/2	55	2-1/4		1,165	1,190	1,275	1,190	1,760	1,760
		4-1/8	Carbon or Galvanized Zinc or Stainless Steel 304 & 316	1,165	1,810	2,410	1,810	2,705	2,040
		6		1,335		2,410		2,705	
5/8	90	2-3/4		1,645	1,780	1,795	1,780	2,430	2,404
		5-1/8		1,645	2,400	3,730	2,975	4,095	3,130
		7-1/2		1,765		3,755		4,095	
3/4	175	3-1/4		1,780	2,530	2,710	3,430	3,325	3,995
		6-5/8		2,745	5,080	4,425	5,935	5,065	5,935
		10		2,745		4,470		5,895	
7/8	250	3-3/4		2,380	3,290	3,685	4,145	4,355	4,790
		6-1/4		3,665	5,220	5,235	7,200	6,090	7,200
		8		3,665		5,235		6,090	
1	300	4-1/2		3,485	4,020	5,045	5,705	5,295	6,120
		7-3/8		3,650	7,170	5,995	9,485	8,315	9,520
		9-1/2		4,675		6,635		8,315	
1-1/4	500	5-1/2		4,535	5,820	6,595	7,365	8,410	8,445
		8		6,835	8,770	10,825	11,065	11,385	12,640

Recommended Spacing and Edge Distance Requirements for Shear Loads

Anchor Diameter	Embedment Depth (in.)	Edge Distance to Obtain Maximum Working Load (in.)	Min. Allowable Edge Distance at which a Load Factor Applied = 0.60	Min. Allowable Edge Distance at which a Load Factor Applied = 0.20	Spacing Required to Obtain Maximum Working Load (in.)	Minimum Allowable Space between anchors at which a Load Factor Applied = 0.40
1/4	1-1/8	2	1-5/16		3-15/16	2
	1-15/16	1-15/16	1		3-7/8	1-15/16
3/8	1-1/2	2-5/8	1-3/4		5-1/4	2-5/8
	3	3-3/4	3	1-1/2	6	3
1/2	2-1/4	3-15/16	2-9/16		7-7/8	3-15/16
	4-1/8	5-3/16	3-1/8	1-9/16	6-3/16	3-1/8
5/8	2-3/4	4-13/16	3-1/8		9-5/8	4-13/16
	5-1/8	6-7/16	3-7/8	1-15/16	7-11/16	3-7/8
3/4	3-1/4	5-11/16	3-3/4		11-3/8	5-11/16
	6-5/8	6-5/16	5	2-1/2	9-15/16	5
7/8	3-3/4	6-9/16	4-5/16		13-1/8	6-9/16
	6-1/4	8-1/2	6-1/4	3-1/8	12-1/2	6-1/4
1	4-1/4	7-7/8	5-1/8		15-3/4	7-7/8
	7-3/8	10-1/16	7-3/8	3-11/16	14-3/4	7-3/8
1-1/4	5-1/2	9-5/8	6-1/4		19-1/4	9-5/8
	8	11-7/16	8	4	16	8

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.

Recommended Spacing and Edge Distance Requirements for Tension Loads

Anchor Diameter	Embedment Depth (in.)	Edge Distance Required to Obtain Max Working Load(in.)	Min. Edge Distance at which the load factor applied=0.65(in.)	Spacing Required to Obtain Max Working Load (in.)	Min. Spacing Distance at which the load factor applied=0.70(in.)
1/4	1-1/8	2	1	3-15/16	2
	1-15/16	1-15/16	1	3-7/8	1-15/16
	2-1/8	1-5/8	13/16	3-3/16	1-5/8
3/8	1-1/2	2-5/8	1-5/16	5-1/4	2-5/8
	3	3	1-1/2	6	3
	4	3	1-1/2	6	3
1/2	2-1/4	3-15/16	2	7-7/8	3-15/16
	4-1/8	3-1/8	1-9/16	6-3/16	3-1/8
	6	4-1/2	2-1/4	9	4-1/2
5/8	2-3/4	4-13/16	2-7/16	9-5/8	4-13/16
	5-1/8	3-7/8	1-15/16	7-1/16	3-7/8
	7-1/2	5-5/8	2-13/16	11-1/4	5-5/8
3/4	3-1/4	5-11/16	2-7/8	11-3/8	5-11/16
	6-5/8	5	2-1/2	9-15/16	5
	10	7-1/2	3-3/4	15	7-1/2
7/8	3-3/4	6-9/16	3-15/16	13-1/8	6-9/16
	6-1/4	6-1/4	3-1/8	12-1/2	6-1/4
	8	6	3	12	6
1	4-1/2	7-7/8	3-15/16	15-3/4	7-7/8
	7-3/8	7-3/8	3-11/16	14-3/4	7-3/8
	9-1/2	7-1/8	3-9/16	14-1/4	7-1/8
1-1/4	5-1/2	9-5/8	4-13/16	19-1/4	9-5/8
	8	8	4	16	8

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.

LDT

Use in: concrete & block
Use with: no other fastener needed
Approval/Listings: ICBO Evaluations Services Inc. Report ER5890

Characteristics
Specified for anchorage into concrete.

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

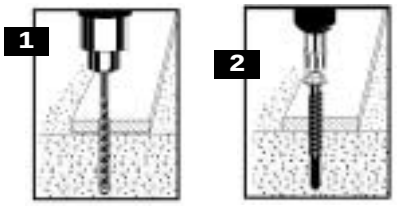
Anchor bodies are made of hardened carbon steel, mechanically plated with zinc or in accordance with ASTM B695.

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 anchor shall be installed with carbide tipped hammer drill bits made in accordance to ANSI B212.15.

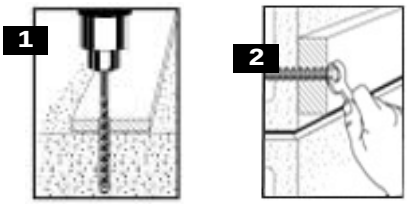
Installation Solid Concrete (See diagram)

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 1/2" (for 3/8" LDT) or 3/4" (for 1/2" LDT) impact wrench, insert anchor into LDT declutcher (or standard socket) and drive anchor until fully seated.



Installation Concrete Block (See diagram)

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 tighten. Anchor until fully seated. (9/16" socket for 3/8" and 3/4" socket for 1/2".) Anchors should be installed by hand with hollow block.



Anchoring Overhead in 3000 PSI Lightweight Concrete in Metal Deck

Anchor Diameter (in.)	Embedment Depth (in.)	3000 PSI Concrete			
		Ultimate Tension Lbs.		Allowable Tension Lbs.	
3/8	1-1/2	Upper Flute	2889	Upper Flute	722
		Lower Flute	1862	Lower Flute	465

Length Indication Code*

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	3-1/4	< 4	(88.9 < 101.6)
F	4	< 4-1/2	(101.6 < 114.3)
H	5	< 5-1/2	(127.0 < 139.7)

Recommended Edge & Space Requirements for Tension Loads

Anchor Diameter (in.)	Embedment Depth (in.)	Edge Distance Required to Obtain Max. Working Load (in.)	Load Factor applied at min. edge distance 1-3/4"	Spacing Required to Obtain Max. Working Load (in.)	Load Factor applied at min. spacing distance 3"
3/8	1-1/2	2	70%	6	44%
	2	2	70%	6	44%
	2-1/2	3	70%	6	44%
	3-1/2	4	70%	6	44%
1/2	2	2-1/4	65%	8	27%
	3-1/2	3	65%	8	27%
	4-1/2	4	65%	8	27%

LDT Selection Set

Fastenal Part No.	Coating	Anchor Dia. (in.)	Effective Length	Max. Material Thickness	Drill Bit Size (in.)
0136072	Zinc	3/8	1-3/4	1/4	5/16
0136004	Zinc	3/8	2-1/2	1	
0136005	Zinc	3/8	3	1-1/2	
0136073	Zinc	3/8	4	2-1/2	
0136059	Zinc	1/2	3	1/2	7/16
0136060	Zinc	1/2	4	1-1/2	
0136061	Zinc	1/2	5	2-1/2	

LDT Static Loads – Ultimate Shear and Tension Values

Anchor Diameter (in.)	Embedment Depth (in.)	2000 psi		3000 PSI		4000 psi		Hollow Block		Grout Filled Block	
		Tension Lbs.	Shear Lbs.	Tension Lbs.	Shear Lbs.	Tension Lbs.	Shear Lbs.	Tension Lbs.	Shear Lbs.	Tension Lbs.	Shear Lbs.
3/8	1-1/2	1,336	2,108	1,652	2,764	1,968	3,416	916	3,176	1,592	3,900
2		1,492	3,036	2,024	3,228	2,552	3,420				
2-1/2		3,732	3,312	3,748	3,364	3,760	3,424				
3-1/2		5,396	3,312	6,624	3,368	7,852	3,428				
1/2	2	3,580	5,644	3,908	6,512	4,236	7,380				
2-1/2										5924	6680
3-1/2		7,252	6,436	8,044	7,288	8,836	8,140				
4-1/2		10,176	7,384	10,332	7,968	10,488	8,552				

Ultimate loads shown.

Recommended Edge and Spacing Requirements for Shear Loads

Anchor Diameter (in.)	Edge Distance Embedment Depth (in.)	Load Factor Required to Obtain Max. Working Load (in.)	Spacing applied at min. edge distance 1-3/4"	Load Factor Required to Obtain Max. Working Load (in.)	applied at min. spacing distance 3"
3/8	1-1/2	3	25%	6	57%
2	4	25%	6	57%	
2-1/2	5	25%	6	57%	
3-1/2	5	25%	6	57%	
1/2	2	5	25%	8	60%
3-1/2	5	25%	8	60%	
4-1/2	5-1/2	25%	8	60%	

DYNABOLT GOLD

Dynabolt Gold Selection Set

Part Number		Anchor Drill Dia. (in.)	Anchor Length (in.)
Carbon Steel Zinc	316 Stainless Steel		
0140212	0140219	3/8	2
0140213	0140220		3
0140206	0140217	1/2	3 3/4
0140207	0140218		4 3/4
0140208			5 3/4
0140214		5/8	4
0140215			5
0140216			6
0140209		3/4	4 1/4
0140210			5 1/4
0140211			7 1/4

Recommended Spacing and Edge Distance Requirements for Shear Loads

Anchor Dia	Edge Distance Required to Obtain Max. Working Load (in.)	Min. Allowable Edge Distance at Which the Load Factor Applied = 0.50 (in.)	Spacing Required to Obtain Max. Working Load (in.)	Min. Allowable Spacing Between Anchors Load Factor Applied =0.50 (in.)
3/8	4 1/2	1 7/8	4 1/2	1 7/8
1/2	6	2 1/2	6	2 1/2
5/8	7 1/2	3 1/8	7 1/2	3 1/8
3/4	9	3 3/4	9	3 3/4

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

Dynabolt Gold - Ultimate Tensile and Sheer Values in Concrete

Anchor Dia. (lbs)	Installation Torque (ft-lbs.)	Embedment	3000 PSI Tension (lbs)	4000 PSI Tension (lbs)	6000 PSI Tension (lbs)	4000 PSI Shear (lbs)
3/8	35	1 1/2	1481	1814	2094	5737
		2 1/8	3510	4299	4965	6861
1/2	60	1 5/8	2452	3342	3859	
		2 3/8	5161	6321	7299	9525
		2 3/4	6719	8229	9502	9525
5/8	100	1 7/8	3098	3794	4381	
		2 3/4	6237	7639	8821	13661
		3 1/2	9664	11836	13667	13661
3/4	120	2 3/8	4721	5782	6676	
		3 3/8	8761	10730	12390	15445
		4 1/8	12744	15608	18023	15445

Ultimate loads shown. For allowable loads a minimum safety factor of 4:1 should be used.

Dynabolt Gold - Ultimate Tension and Sheer Values in Masonry Units

Anchor Dia.	Installation Torque (ft-lbs.)	Minimum Embedment (in.)	Anchor Material	Hollow Core		Grout Filled	
				Tension (lbs)	Shear (lbs.)	Tension (lbs)	Shear (lbs.)
3/8	15	1 1/2	Carbon Steel	1360	2560	1360	2560
			316 Stainless	1160	2560	1160	2560
1/2	25	1 7/8	Carbon Steel			2220	4000
			316 Stainless			2100	4000
5/8	55	2	Carbon Steel			3080	6440
3/4	90	2 1/2	Carbon Steel			4200	10200

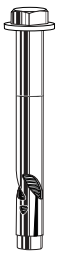
Ultimate loads shown. For allowable loads a minimum safety factor of 4:1 should be used. The values are for anchors installed in a minimum of 12 diameters on center and a minimum edge distance of 6 diameters for 100% anchor efficiency. Spacing and edge distance may be reduced to 6 diameter spacing and 3 diameter edge distance, provided the values are reduced 50%. Linear interpolation may be used for intermediate spacing and edge distances.

Recommended Spacing and Edge Distance Requirements for Tension Loads

Anchor Dia	Edge Distance Required to Obtain Max. Working Load (in.)	Min. Allowable Edge Distance at Which the Load Factor Applied = 0.75 (in.)	Spacing Required to Obtain Max. Working Load (in.)	Min. Allowable Spacing Between Anchors Load Factor Applied =0.50 (in.)
3/8	3 3/4	1 7/8	4 1/2	1 7/8
1/2	5	2 1/2	6	2 1/2
5/8	6 1/4	3 1/8	7 1/2	3 1/8
3/4	7 1/2	3 3/4	9	3 3/4

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

Dynabolt Gold Heavy-Duty Sleeve Anchor



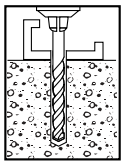
SPECIFIED FOR ANCHORAGE INTO CONCRETE,
MASONRY, GROUT-FILLED BLOCK AND HOLLOW BLOCK

The Dynabolt Gold anchor is a heavy duty sleeve anchor that can be used to anchor fixtures to concrete, concrete block, or brick. The anchor consists of a hex head bolt, a spacer sleeve, specially designed expansion sleeve, and an expansion cone. Carbon steel anchors feature a Grade 5 hex head bolt and a special organic clear coat over zinc plating for added corrosion protection (250 hours, neutral salt spray, ASTM B117). Stainless steel anchors are available in Type 316 Stainless Steel.

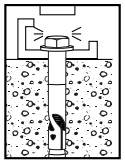
APPROVALS/LISTINGS
Meets or exceeds U.S. Government G.S.A. Specification FF-S-325 Group II, Type 3, Class 1

Other approvals pending

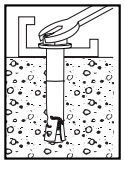
INSTALLATION STEPS



1. Use a bit with a diameter equal to the anchor. See selection chart to determine proper size bit for anchor used. Drill hole to any depth exceeding minimum embedment. Clean hole.



2. Insert assembled anchor 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.

Fastenal ® Sleeve Anchor

Specification
FF-S-325 Group II, Type 3, Class 3

Use in: Concrete, block, brick or stone
Use with: No other fastener needed
Typical materials: Carbon steel or stainless steel

Characteristics
Sleeve anchors typically consist of an anchor body and a long expansion clip. Nuts and washers are provided. The expansion sleeve fits around the reduced diameter wedge. To set the anchor, place it in a pre-drilled hole equal to the bolt size. As the anchor is tightened, the wedge produces a resistive force, thus securing the anchor in place.

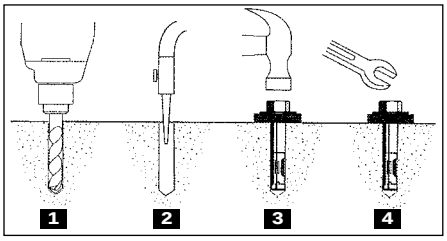
Installation (See diagram below)

1 Drill a hole perpendicular to the work surface using a bit with a diameter equal to the anchor diameter. Drill the hole to a depth exceeding minimum embedment, but not closer than two anchor diameters to the bottom or opposite concrete surface. Through drilling may be allowed when using sleeve anchors in hollow concrete block. To ensure full holding power, do not ream the hole or allow the drill to wobble.

2 Clean hole using compressed air and a wire brush.

3 Assemble anchor with nut and washer so that the top of the nut is flush with the top of the anchor. Drive the anchor into pre-drilled hole until the nut and washer are flush with the surface of the material.

4 Expand the anchor by tightening the nut 3 to 5 turns



Fastenal® Sleeve Anchor Selection Chart

Head Style	Part Number: Carbon Steel Phillips	Part Number: Carbon Steel Zinc	Part Number: Stainless Steel	Anchor Diameter & Drill Bit Size (in.)	Effective Anchor Length (in.)
Hex Nut		50301	52080	1/4	1- 3/8
		50302		1/4	2-1/4
		50303		5/16	1-1/2
		50304		5/16	2-1/2
		50305	52081	3/8	1-7/8
		50306	52082	3/8	3
		50307	52083	1/2	2-1/4
		50308		1/2	3
		50309	52084	1/2	4
		50317		1/2	6
		50310		5/8	2-1/4
		50318		5/8	3
		50311	52085	5/8	4-1/4
		50312		5/8	6
		50313		3/4	2-1/2
		50314		3/4	4-1/4
		50316		3/4	6-1/4
		50319		3/4	7-1/2
Round		50350		1/4	1-1/4
Head			52090	1/4	2
		50348		1/4	2-3/4
		50349		3/8	2-1/2
Acorn		50341		1/4	5/8
Nut		50342		1/4	1-3/8
		50343		1/4	2-1/4
Hex		50286		3/8	1-7/8
Coupling		50288		1/2	2 -1/4
Tie Wire		50346		5/16	1-1/2
Flat Head	50322	50380		1/4	1-1/2
	50323	50381	52086	1/4	2-1/4
				1/4	2-1/4
		50382		1/4	3
	50324		52087	1/4	3-1/8
	50325	50383		1/4	4
		50326		1/4	5-1/4
	50327	50385		5/16	2-1/2
	50328	50386		5/16	3-1/2
	50329	50387		3/8	2-3/4
			52088 (Phillips)	3/8	2-7/8
	50330	50388	52089 (Phillips)	3/8	4
	50331	50389		3/8	5
	50332	50390		3/8	6

Note: Part no. listing for carbon steel zinc flat head sleeve anchors are for slotted flat head.

Drill Bit ANSI Specifications

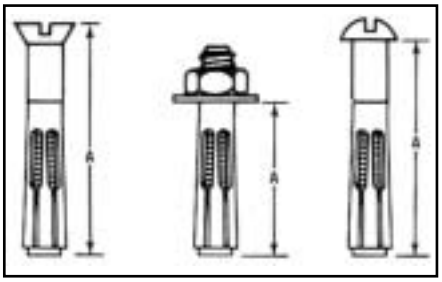
Nominal Drill O.D. (in.)	ANSI Specification (in.)
1/4	0.260 - 0.268
5/16	0.327 - 0.335
3/8	0.390 - 0.398
1/2	0.520 - 0.530
5/8	0.650 - 0.660
3/4	0.775 - .0787
7/8	0.905 - 0.917
1	1.030 - 1.042
1-1/4	1.285 - 1.300

Combined Tension and Shear Loading:

The following formula shall be used for combined tension and shear loading.
See page 4.

$$\left(\frac{P}{Pallow}\right) + \left(\frac{V}{Vallow}\right) \leq 1.0$$

Effective Anchor Length



Overall length of Hex, Round, Acorn, Hex Coupling and Tie Wire Sleeve Anchors is longer than the effective length shown on chart above.

Notes

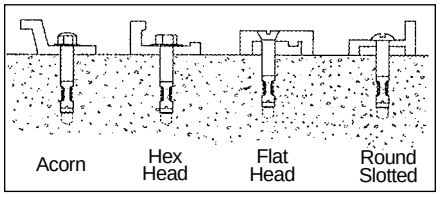
1. Information provided only for use by qualified engineers. Use of technical data by persons not qualified could cause serious damage or injury.
2. Ultimate values shown. For static loads, use 1/4 of the maximum tensile and shear capacities for the recommended 4:1 safety factor.
3. Shear and tensile values shown are for anchors installed in limestone or stone aggregate concrete having the designated compressive strength at the time of installation, or concrete block as indicated.
4. Tested to ASTM E488 Test Standard
5. Use only ANSI B212.15 drill bit dimensions
6. Minimum edge distance and spacing requirements met.
7. Capacities shown are for both the carbon steel and stainless steel bolt, except where noted.

FASTENAL® SLEEVE ANCHOR / ITW RAMSET/REDHEAD® DROP-IN ANCHOR

Fastenal® Sleeve Anchor - Maximum Tensile and Shear Capacities For Static Loads Stone Aggregate Concrete

Anchor Size	Bolt Size	3000 PSI Concrete			Hollow Concrete Block				
						Carbon Steel		Stainless Steel	
		Embedment (in.)	Tension (lbs.)	Shear (lbs.)	Embedment (in.)	Tension (lbs.)	Shear (lbs.)	Tension (lbs.)	Shear (lbs.)
1/4	10-24	5/8	800	1100	1-1/8	1100	1200	600	1200
	10-24	1-3/8	1300	1100					
5/16	1/4-20	1 1/2	1700	1290	1-1/2	1330	2000	1100	2000
3/8	5/16-18	1-7/8	2400	2600					
1/2	3/8-16	2-1/4	2500	3500					
5/8	1/2-13	2-1/4	3000	5100					
3/4	5/8-11	3-1/2	3500	8000					

Available Head Styles:



Always wear safety glasses when installing anchors. Follow safety instructions. Use only solid carbide tipped drill bits meeting ANSI B212.15 diameter standards.

ITW RAMSET/REDHEAD® Drop-In Anchor

Approvals/Listings
Meets or exceeds U.S. Government G.S.A.
Specification FF-S-325 Group VIII, Type 1
Underwriters Laboratories
Factory Mutual
ICBO Evaluation Service, Inc. Report #1372

City of Los Angeles Report #RR2748
SBCCI Compliance Report #9570
California State Fire Marshal
Metro Dade County Florida

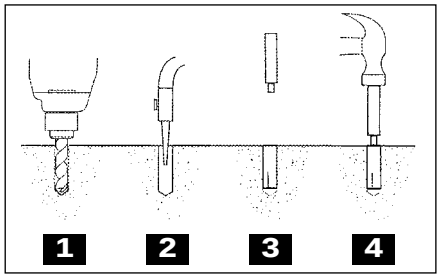
Use in: Concrete or stone
Use with: Machine screw, bolt or threaded rod
Typical materials: Carbon steel or stainless steel

Characteristics
Used in medium-duty applications in a solid base. Ideal for overhead placement. The drop-in anchor consists of an internally threaded anchor with an internal expansion plug. The expansion plug fits inside the anchor which contains an internal wedge. The anchor can be set flush or below the surface. For accurate installation, layout and hole-spotting are necessary. To set the anchor, place it threaded portion up, into a pre-drilled diameter and depth specific hole. When an appropriate setting tool is used, the internal plug forces the internal wedge to expand. The anchor is securely set when the setting tool is flush with the anchor.

The drop-in is internally threaded, allowing the mounting hardware to be removed easily while leaving the anchor in place.

Installation (See diagram to the right)

1. Using the Drill Bit ANSI Specification chart, select the recommended size bit for the anchor. Drill a hole perpendicular to the work surface at least as deep as the full length of the anchor. However, the hole should be no closer than two anchor diameters to the bottom or opposite surface of the concrete. To ensure full holding power, do not ream the hole or allow the drill to wobble.
2. Clean hole using compressed air and a wire brush.
3. Tap the anchor threaded end up into the hole. Make sure the top of the anchor is flush with or below the level of the work surface.
4. Insert the appropriate setting tool into the threaded end of the anchor and expand the anchor by striking the end of the setting tool with a hammer. **The anchor is set when the shoulder of the setting tool touches the anchor:**



Always wear safety glasses when installing anchors. Follow safety instructions. Use only solid carbide tipped drill bits meeting ANSI B212.15 diameter standards.

Note: To set anchor below surface:

Drill hole deeper than anchor length. Thread bolt into anchor. Hammer anchor into hole until bolt head is at desired depth. Remove bolt and set anchor with setting tool.

Drop-In Selection Set

Part Numbers				Anchor Dia. (in.)	Bolt Size (tpi)	Drill Bit Size (in.)	Min. Thread Depth (in.)	Min. Embedment Depth (in.)
Carbon Steel	Stainless Steel	Carbon Steel With Lip	Setting Tool					
50402	50407	50396	50412	3/8	1/4-20	3/8	3/8	1
50403	50408	50397	50413	1/2	3/8-16	1/2	1/2	1-5/8
50404	50409	50398	50414	5/8	1/2-13	5/8	3/4	2
50405	50410	50399	50415	7/8	5/8-11	7/8	1	2-1/2
50406	50411	50400	50416	1	3/4-10	1	1-1/4	3-3/16

Multi-Set II Short Drop-In

Part Numbers				Anchor Dia. (in.)	Bolt Size (tpi)	Drill Bit Size (in.)	Min. Thread Depth (in.)	Min. Embedment Depth (in.)
Carbon Steel	Stainless Steel	Carbon Steel With Lip	Setting Tool					
0131909			0152216	1/2	3/8-16	1/2	1/2	3/4

ITW RAMSET/REDHEAD® Drop-In Anchor *continued*

Maximum Tensile and Shear Strengths for Static Loads

Fastenal Part No.	Bolt Dia.	Anchor Dia.	Embedment	Anchor Type	2000 PSI		4000 PSI		6000 PSI		HOLLOW CORE	
					Tension (lbs.)	Shear (lbs.)	Tension (lbs.)	Shear (lbs.)	Tension (lbs.)	Shear (lbs.)	Tension (lbs.)	Shear (lbs.)
	1/4	3/8	1	Carbon & Stainless Steel	1,680	1,080	2,360	1,200	2,980	1,300		
	3/8	1/2	1-5/8		2,980	3,160	3,800	2,500	6,240	1,860		
	1/2	5/8	2		3,300	4,580	5,840	3,500	8,300	2,400		
	5/8	7/8	2-1/2		5,500	7,440	8,640	5,540	11,020	3,640		
	3/4	1	3-3/16		8,280	10,480	9,480	7,680	12,260	4,860		
0131909	3/8	1/2	3/4	Short Drop-in			1,987	2,903			1903	2525

Allowable Tensile and Shear Strengths for Static Loads
based on 4:1 Safety Factor

Fastenal Part No.	Bolt Dia.	Anchor Dia.	Embedment	Anchor Type	2000 PSI		4000 PSI		6000 PSI		HOLLOW CORE	
					Tension (lbs.)	Shear (lbs.)	Tension (lbs.)	Shear (lbs.)	Tension (lbs.)	Shear (lbs.)	Tension (lbs.)	Shear (lbs.)
	1/4	3/8	1	Carbon & Stainless Steel	420	270	590	300	745	325		
	3/8	1/2	1-5/8		745	790	950	625	1,560	465		
	1/2	5/8	2		825	1,145	1,460	875	2,075	600		
	5/8	7/8	2-1/2		1,375	1,860	2,160	1,385	2,755	910		
	3/4	1	3-3/16		2,070	2,620	2,370	1,920	3,065	1,215		
0131909*	3/8	1/2	3/4				497	726			477	631

* The tabulated values for 0131909 are installed at a minimum of 12-diameters on center and minimum edge of six-diameters for 100% anchor efficiency. Spacing and edge distance may be reduced to six-diameters and three-diameter edge distance provided the values are reduced 50%. Linear interpolation may be used for intermediate spacing and edge margins.

Drill Bit ANSI Specifications

Nominal Drill O.D. (in.)	ANSI Specification (in.)
3/8	0.390 - 0.398
1/2	0.520 - 0.530
5/8	0.650 - 0.660
7/8	0.905 - 0.917
1	1.030 - 1.042

Combined Tension and Shear Loading:

The following formula may be used for combined tension and shear loading. (Check local code requirements).
See page 4.

$$\left(\frac{P}{Pallow}\right)^{5/3} + \left(\frac{V}{Vallow}\right)^{5/3} \leq 1.0$$

Notes

1. Information provided only for use by qualified engineers. Use of technical data by persons not qualified could cause serious damage or injury.
2. Ultimate values shown. The allowable load chart is determined by using 1/4 of the maximum tensile and shear capacities for a 4:1 safety factor.
3. Shear and tensile values shown are for anchors installed in limestone or stone aggregate concrete having the designated compressive strength at the time of installation.
4. Tested to ASTM E488 Test Standard
5. Use only ANSI B212.15 drill bit dimensions
6. Minimum edge distance and spacing requirements met. Sources (available upon request): ICBO Report #1372
7. Load values are applicable for both carbon and stainless steel anchors.

Design Guidelines

The following charts may be used to determine reduction factors for reduced edge distance and anchor spacing.
For situations involving multiple reduction factors, use their product.

Recommended Edge Distance and Spacing Requirements

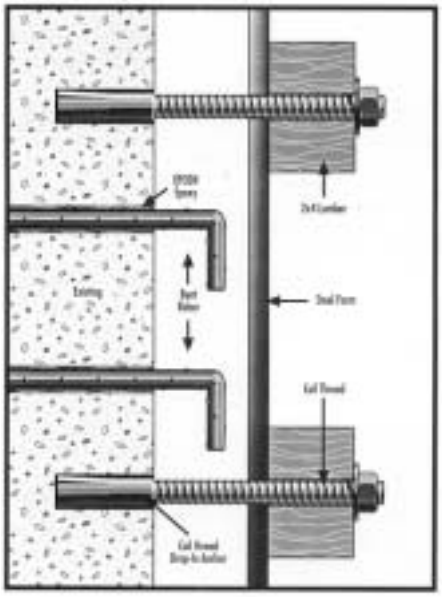
Edge Distance to Obtain Maximum Working Load (in.)	Min. Allowable Edge Distance at Which a Reduction Factor of 0.80 (tension) 0.70 (shear) is Applied	Spacing Required to Obtain Maximum Working Load (in.)	Min. Allowable Spacing Between Anchors at which a Reduction Factor of 0.80 (tension) 0.50 (shear) is Applied	Anchor Dia.	Bolt Dia.
1-3/4	7/8	3-1/2	1-3/4	3/8	1/4
2-7/8	1-7/16	5-11/16	2-7/8	1/2	3/8
3-1/2	1-3/4	7	3-1/2	5/8	1/2
4-3/8	2-3/16	8-3/4	4-3/8	7/8	5/8
5-5/8	2-13/16	11-3/16	5-5/8	1	3/4

* Edge distance may be reduced to three-diameters and spacing reduced to six-diameters provided the values are reduced 50%.

Coil Thread Drop-In Anchor

Coil thread drop-in anchors
are the perfect anchor for:

- One-sided Forming
- Seismic Upgrade/Wall Thickening
- Concrete Barrier Installation



These coil thread drop-in anchors are specifically designed with the needs of *forming* and *concrete contractors* in mind.

The internal threads are manufactured to accept coil rod and coil bolts.

Coil Thread Drop-In Anchor Advantages:

- Fast installation – easy, quick locking threads.
- Immediate loading – no set-up time required (unlike epoxies).
- Uses materials readily available on the job – no special orders or waiting for materials to be delivered.
- Coil rod can be reused – put slip compound on the rod and it can easily be removed from the coil thread anchor.

Selection Chart

Part No.	Coil Bolt Size	Drill Size	Minimum Embedment	Stone Aggregate Concrete 4,310 PSI		Setting Tool
				Ultimate* Tension	Ultimate* Shear	
0123066	1/2"	5/8"	2"	8,544	6,502	50414
0123067	3/4"	1"	3-3/16"	17,255	13,962	50416

* Safe working loads for single installations under static loading should not exceed 25% of the ultimate load capacity.
* Values shown are for ITW Ramset/Red Head anchors.

Coil Rod

Part No.	Description
0121768	1/2-6 x 6' Coil Rod Plain
0121772	1/2-6 x 12' Coil Rod Plain
0121769	3/4-4.5 x 6' Coil Rod Plain
0121773	3/4-4.5 x 12' Coil Rod Plain

Coil Nut

Part No.	Description
0121763	1/2-6 Regular Coil Nut
0121764	3/4-4.5 Regular Coil Nut

RAMSET® TRAKFAST AUTOMATIC FASTENING SYSTEM

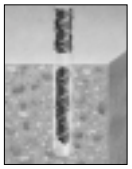
STARTING ON PAGE 65

Adhesive Anchoring Selection Guide

COLD WEATHER USE — *and lower* 0°F 20°F 50°F

HOT WEATHER USE — 80°F 90°F 100°F *and higher*

	A7	C6	NEW G5
	Fast Dispensing, Fast Curing	Fast Curing for All Conditions	Extended Working Time
	10.1 ACRYLIC	1.1 EPOXY	1.1 EPOXY
	fast 35 minute cure time at 60°F	fast 1 hour cure time at 70°F	fast 2 hour cure time PLUS extended
	7 minute working time at 60°F	7 minute working time at 70°F	15 minute working time at 70°F
	FAST DISPENSING saves time and money installing anchors	NSF STANDARD 61 Certified for drinking water applications	ODORLESS for indoor applications
	COLD WEATHER no heating of cartridges required	Suitable for extreme temperature ranges	HOT WEATHER more time to install anchors
	A7 – BEST FORMULA C6 and NEW G5	NEW G5 – BEST FORMULA C6 and A7	
	Minimum 18 month shelf life	Minimum 3 year shelf life	Minimum 2 year shelf life
	Oversized holes*	**Oversized holes**	**Oversized holes**
	Core-drilled holes*	**Core-drilled holes**	**Core-drilled holes**
	Damp holes	Damp holes	**Damp holes**
	Underwater installations	Underwater installations	Underwater installations
	For use with screens in hollow block and brick	**For use with screens in hollow block and brick**	For use with screens in hollow block and brick


Fastening to Concrete with Threaded Rod


Doweling into Concrete with Rebar

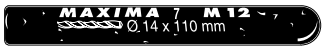
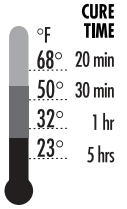
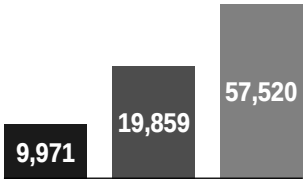
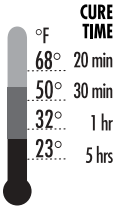
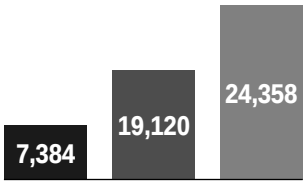
■ Best Formula ■ Suitable Formula

Solid Concrete Applications

PRODUCT SYSTEMS	KEY FEATURES	PROPERTIES	ULTIMATE TENSILE PERFORMANCE[1,2]
A7 Fast Dispensing, Fast Curing Acrylic **Install more anchors in less time** **5 fluid oz. (150 ml), 8 fluid oz. (235 ml) and 28 fluid oz. (825 ml) cartridges**	■ Solid or hollow base materials ■ Dispenses easier and faster ■ Damp holes or underwater ■ Fastest cure (35 min. at 60°F) ■ Dispenses and cures faster in cold weather (down to 0°F and below) ■ Can be used in smaller diameter holes ■ No-drip formula reduces clean-up time ■ Hand dispensable 28-oz. cartridge	WORKING TIME / °F / CURE TIME 4 min / 120° / 20 min 5 min / 100° / 25 min 5.5 min / 80° / 30 min 7 min / 60° / 35 min 15 min / 40° / 75 min 35 min / 20° / 6 hrs 4 hrs / 0° / 24 hrs	10,980 (3/8" x 3-3/8") 26,500 (5/8" x 5-5/8") 48,210 (1" x 9")
C6 Fast Curing Epoxy for All Conditions **Consistently handles all applications** **2 fluid oz. (60 ml) and 18 fluid oz. (530 ml) cartridges**	■ Solid or hollow base materials ■ Hammer drilled or diamond cored holes ■ Oversized holes ■ Cold or warm weather ■ Damp holes or underwater ■ Horizontal or overhead installations ■ Fast curing epoxy (1 hour at 70°F)	WORKING TIME / °F / CURE TIME 5 min / 90° / 1 hr 7 min / 70° / 1 hr 10 min / 60° / 2 hrs 20 min / 50° / 24 hrs 45 min / 40° / 32 hrs	8,440 (3/8" x 3-3/8") 24,520 (5/8" x 5-5/8") 47,880 (1" x 9")
NEW G5 Extended Working Time Epoxy **15 min. working time; 2-hour cure time (70°F)**	■ Nozzles last longer ■ Gives more time to install anchors ■ Easier to install anchors in hot weather ■ Odorless	WORKING TIME / °F / CURE TIME 8.5 min / 90° / 2 hrs 12 min / 80° / 2 hrs 15 min / 70° / 2 hrs 18 min / 60° / 3 hrs 21 min / 50° / 6 hrs	8,395 (3/8" x 3-3/8") 20,665 (5/8" x 5-5/8") 44,835 (1" x 9")

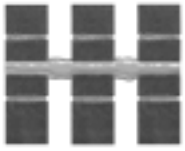
[1] Diameter x Embedment in 4000 psi concrete. [2] All loads given in pounds.

SOLID CONCRETE AND HOLLOW BASE MATERIAL APPLICATIONS

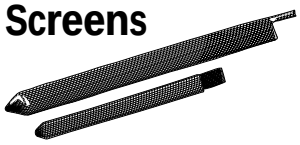
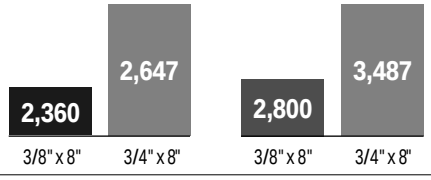
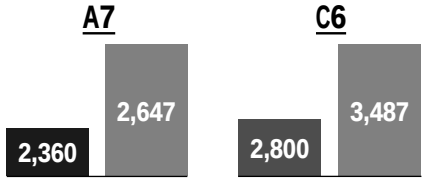
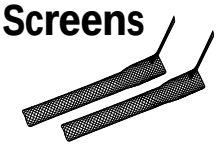
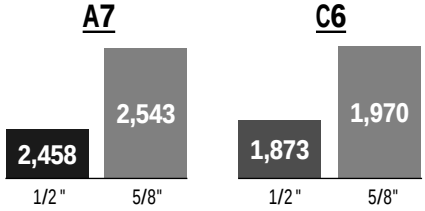
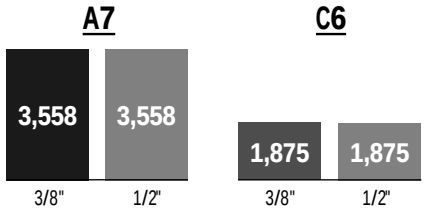
PRODUCT SYSTEMS	KEY FEATURES	PROPERTIES	ULTIMATE TENSILE PERFORMANCE[1,2]
Maxima 7 Capsules **(Spin-In Capsules)**  **For 3/8" - 1" Rods**	■ 3/8", 1/2", 5/8", 3/4", (7/8") 1" diameter sizes ■ A7 patented chemistry in a capsule ■ Can be used in damp holes ■ Extremely consistent performance		
Impact Capsules **(Hammer-In Capsules)**  **For 3/8" - 3/4" Rods**	■ 3/8", 1/2", 5/8", 3/4" diameter sizes ■ Rod or rebar can be hammered (no spinning) into hole ■ Either end can be inserted into hole ■ No special tools needed		

Hollow Base Material Applications

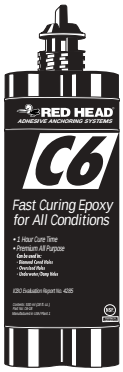
Use the following accessories with the A7 and C6 adhesive anchoring systems for all of your hollow base material applications.


Brick Pinning


Fastening to hollow concrete block

SYSTEM ACCESSORIES	KEY FEATURES	ULTIMATE TENSILE[1,2] PERFORMANCE (LBS)
Nylon Screens  **Makes it possible to use adhesive for fastening to hollow block or brick walls**	■ 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	
Stainless Steel Screens  **Makes it possible to use adhesive for fastening to hollow block or brick walls**	■ 1/4" to 3/4" diameter sizes ■ Corrosion resistant ■ Available in multiple lengths to accommodate various material thicknesses	
Stubby Screens  **Makes it possible to use adhesive for fastening to the face of hollow block or tile**	■ 1/4", 3/8", 1/2", 5/8" diameter sizes ■ Fasten to front face of block ■ Anchor remains perpendicular in wall	
Umbrella Inserts  **Makes it possible to use adhesive for fastening to the face of hollow block or tile**	■ 1/4", 3/8", or 1/2" rods ■ 3/8" internal inserts (HBU-FS) ■ Fasten to front face of blocks ■ Creates large bearing surface inside block to achieve high loads	

C6 ADHESIVE



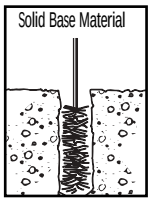
Fast Curing Epoxy for All Conditions

The hardener and resin are completely mixed as they are dispensed from the dual cartridge through a static mixing nozzle. The pre-mixed adhesive is injected directly into the anchor hole. C6 can be used with threaded rod or rebar

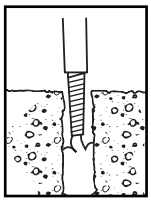
ADVANTAGES

- 1 hour cure time (see below)
- Works in damp holes and underwater applications
- Minimum shrinkage—can be used in oversized holes and diamond cored holes
- High heat deflection temperature: 140°F (ASTM D648)
- One formula for both solid and hollow base materials
- NSF standard 61 certified for drinking water systems
- Extensively tested—earthquake, underwater, creep, freeze-thaw, radiation, fire, fatigue, electrical isolation, ozone and many more test programs have been conducted on C6
- Extensive use—C6 has been used on projects all over the world for over 15 years

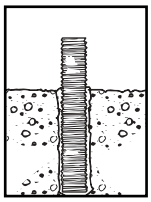
INSTALLATION STEPS



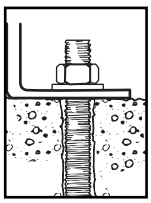
1. Drill proper sized hole. Clean out hole from bottom with forced air. Complete hole preparation with use of a brush and repeat cleaning with forced air (leave no dust or slurry).



2. When starting new cartridge or nozzle, dispense and discard enough adhesive until uniform grey color is achieved. Insert the nozzle into the bottom of the hole and fill to 1/2 the hole depth.



3. Insert the selected rod slowly by hand into the bottom of the hole with a slow twisting motion. This insures the adhesive fills voids and crevices uniformly.



4. See C6 Cure Time Charts for set-up time. After the recommended cure time is met, install and tighten fixture into place.

Curing Times

TEMPERATURE (F°/C°)	WORKING TIME	FULL CURE TIME
120°/ 49°	4 minutes	1 hour
90°/ 32°	5 minutes	1 hour
70°/ 20°	7 minutes	1 hour
60°/ 16°	10 minutes	2 hours
50°/ 10°	20 minutes	24 hours
40°/ 4°	45 minutes	32 hours

APPROVALS/LISTINGS

ICBO Evaluation Service, Inc. – #ER-4285

City of Los Angeles – RR#24975

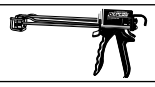
City of Los Angeles – RR#24929

NSF Standard 61 Certified for Drinking Water Components

ASTM C881-90, Type IV, Grade 3, Class A, B, and C

DOT Approvals

C6 18 oz. Ordering Information

	DESCRIPTION	BOX/BAG QTY	CARTON QTY
 C6-18	Part No. 51903 C6 Adhesive,18 Fl. Oz. Cartridge	1	12
 E24	Part No. 51904 Mixing Nozzle (1/2" outside diameter)	4	24
 E50	Part No. 51905 Mixing Nozzle (11/16" outside diameter)	5	20
 E102	Part No. 51900 Hand Dispenser for C6-18 Cartridge	1	1

ESTIMATING TABLE

C6 18 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 (mm)														
		1 (25.4)	2 (50.8)	3 (76.2)	4 (101.6)	5 (127.0)	6 (152.4)	7 (177.8)	8 (203.2)	9 (228.6)	10 (254.0)	11 (279.4)	12 (304.8)	13 (330.2)	14 (355.6)	15 (381.0)
# 3	1/2	316.7	158.4	105.6	79.2	63.3	52.8	45.2	39.6	35.2	31.7	28.8	26.4	24.4	22.6	21.1
# 4	5/8	239.3	119.6	79.8	59.8	47.9	39.9	34.2	29.9	26.6	23.9	21.8	19.9	18.4	17.1	16.0
# 5	3/4	183.5	91.8	61.2	45.9	36.7	30.6	26.2	22.9	20.4	18.4	16.7	15.3	14.1	13.1	12.2
# 6	7/8	148.2	74.1	49.4	37.0	29.6	24.7	21.2	18.5	16.5	14.8	13.5	12.3	11.4	10.6	9.9
# 7	1-1/8	71.0	35.5	23.7	17.7	14.2	11.8	10.1	8.9	7.9	7.1	6.5	5.9	5.5	5.1	4.7
# 8	1-1/4	63.2	31.6	21.1	15.8	12.6	10.5	9.0	7.9	7.0	6.3	5.7	5.3	4.9	4.5	4.2
# 9	1-3/8	65.9	33.0	22.0	16.5	13.2	11.0	9.4	8.2	7.3	6.6	6.0	5.5	5.1	4.7	4.4
# 10	1-1/2	53.9	27.0	18.0	13.5	10.8	9.0	7.7	6.7	6.0	5.4	4.9	4.5	4.1	3.9	3.6
# 11	1-3/4	33.0	16.5	11.0	8.2	6.6	5.5	4.7	4.1	3.7	3.3	3.0	2.7	2.5	2.4	2.2

ESTIMATING TABLE

C6 18 Fluid Ounce Cartridge — Number of Anchoring Installations Per Cartridge* Using Threaded Rod with C6 Adhesive in Solid Concrete

ROD In. (mm)	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES (mm)														
		1 (25.4)	2 (50.8)	3 (76.2)	4 (101.6)	5 (127.0)	6 (152.4)	7 (177.8)	8 (203.2)	9 (228.6)	10 (254.0)	11 (279.4)	12 (304.8)	13 (330.2)	14 (355.6)	15 (381.0)
1/4 (6.4)	5/16	587.3	293.7	195.8	146.8	117.5	97.9	83.9	73.4	65.3	58.7	53.4	48.9	45.2	42.0	39.2
3/8 (9.5)	7/16	340.0	170.0	113.3	85.0	68.0	56.7	48.6	42.5	37.8	34.0	30.9	28.3	26.2	24.3	22.7
1/2 (12.7)	9/16	244.7	122.4	81.6	61.2	48.9	40.8	35.0	30.6	27.2	24.5	22.2	20.4	18.8	17.5	16.3
5/8 (15.9)	3/4	125.2	62.6	41.7	31.3	25.0	20.9	17.9	15.7	13.9	12.5	11.4	10.4	9.6	8.9	8.3
3/4 (19.1)	7/8	99.1	49.5	33.0	24.8	19.8	16.5	14.2	12.4	11.0	9.9	9.0	8.3	7.6	7.1	6.6
7/8 (22.2)	1	82.0	41.0	27.4	20.5	16.4	13.7	11.7	10.3	9.1	8.2	7.5	6.8	6.3	5.9	5.5
1 (25.4)	1-1/8	67.6	33.8	22.5	16.9	13.5	11.3	9.7	8.4	7.5	6.8	6.1	5.6	5.2	4.8	4.5
1-1/4 (31.8)	1-3/8	51.2	25.6	17.0	12.8	10.2	8.5	7.3	6.4	5.7	5.1	4.6	4.3	3.9	3.7	3.4

* The number of anchoring installations is based upon calculations of hole volumes using ANSI tolerance carbide tipped drill bits, the nominal areas of the reinforcing bars and the stress areas of the threaded rods. These estimates do not account for waste.

* Oversized holes acceptable but volume of adhesive will increase.

SUGGESTED SPECIFICATIONS

EPOXY ADHESIVE:

1. Two component, 100% solid (containing no solvents), non-sag paste, insensitive to moisture, grey in color
2. Meets NSF Standard 61 for use in conjunction with drinking water systems
3. Meets ASTM C881-90, Type IV, Grade 3, Class A, B, and C with the exception of gel time
4. Shrinkage during cure per ASTM D2566: .00051 in./in. maximum
5. Compressive strength, ASTM D695: 10,300 psi minimum
6. Shelf life: 3 years minimum
7. Water solubility: None
8. Heat deflection temperature, ASTM D648: 140°F minimum

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 dating, mix ratio by volume, ANSI hazard classification, and appropriate ANSI handling precautions

PERFORMANCE TABLE

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

THREADED ROD DIA. In. (mm)	SETTING TORQUE Ft.-Lbs. (Nm)	EMBEDMENT IN CONCRETE In. (mm)	2000 PSI (13.8 MPa) CONCRETE		4000 PSI (27.6 MPa) CONCRETE		6000 PSI (41.4 MPa) CONCRETE	
			ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)
3/8 (9.5)	13 - 18 (17.6-24.4)	3-3/8 (85.7)	7,195 (32.0)	5,209 (23.2)	8,445 (37.6)	5,869 (26.1)	10,621 (47.2)	5,941 (26.4)
		4-1/2 (114.3)	8,317 (37.0)	5,209 (23.2)	10,021 (44.6)	5,869 (26.1)	10,603 (47.2)	5,941 (26.4)
1/2 (12.7)	22 - 25 (29.8-33.9)	4-1/2 (114.3)	13,271 (59.0)	11,427 (50.8)	17,684 (78.7)	12,585 (56.0)	17,684 (78.7)	12,585 (56.0)
		6 (152.4)	19,127 (85.1)	11,427 (50.8)	19,608 (87.2)	12,585 (56.0)	19,608 (87.2)	12,585 (56.0)
5/8 (15.9)	55 - 80 (74.6-108.5)	5-5/8 (142.9)	17,704 (78.8)	18,294 (81.4)	24,526 (109.1)	19,802 (88.1)	24,526 (109.1)	19,802 (88.1)
		7-1/2 (190.5)	22,642 (100.7)	18,294 (81.4)	28,766 (128.0)	19,802 (88.1)	29,456 (131.0)	19,802 (88.1)
3/4 (19.1)	106-160 (143.7-216.9)	6-3/4 (171.5)	28,779 (128.0)	25,723 (114.4)	31,521 (140.2)	25,723 (114.4)	33,759 (150.2)	25,723 (114.4)
		9 (228.6)	31,758 (141.3)	25,723 (114.4)	41,384 (184.0)	25,723 (114.4)	41,384 (184.0)	25,723 (114.4)
7/8 (22.2)	185-250 (250.8-338.9)	7-7/8 (200.0)	35,257 (156.8)	-- --	37,714 (167.8)	30,295 (134.8)	41,023 (182.5)	32,573 (144.9)
		10-1/2 (266.7)	-- --	-- --	51,211 (227.8)	30,295 (134.8)	51,211 (227.8)	32,573 (144.9)
1 (25.4)	276-330 (374.2-447.4)	9 (228.6)	40,334 (179.4)	38,519 (171.3)	47,886 (213.0)	40,341 (179.5)	47,886 (213.0)	46,416 (206.5)
		12 (304.8)	48,719 (216.7)	38,519 (171.3)	62,194 (276.7)	40,341 (179.5)	63,053 (280.5)	46,416 (206.5)
1-1/4(31.8)	370-660(501.6-894.8)	11-1/4(285.8) 55,654	(247.6) 65,085	(289.5) 56,981	(253.5) 65,085	(289.5) --	-- 65,085	(289.5)
		15 (381.0)	65,728 (289.5)	65,085 (289.5)	79,726 (354.7)	65,085 (289.5)	-- --	65,085 (289.5)

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.

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. In. (mm)	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR LOCATION	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)	-- --
1/2 (12.7)	5/8 (15.9)	3 (76.2)	GROUTED CELL	4,953 (22.0)	-- --
1/2 (12.7)	5/8 (15.9)	6 (152.4)	GROUTED CELL	8,214 (36.5)	-- --
5/8 (15.9)	3/4 (19.1)	5 (127.0)	GROUTED CELL	7,355 (32.7)	-- --
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 25% (an industry standard) capacity or the allowable load of the anchor rod. Loads based upon testing with ASTM A193, Grade B7 rods.

Combined Shear and Tension 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

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 Lbs. (kN)	6000 PSI (41.4 MPa) IN CONCRETE Lbs. (kN)	ASTM A307 (SAE 1018) Lbs. (kN)	ASTM A193 GR. B7 (SAE 4140) Lbs. (kN)	AISI 304 SS Lbs. (kN)
3/8 (9.5)	3-3/8 (85.7)	1,800 (8.0)	2,110 (9.4)	2,655 (11.8)	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)	2,655 (11.8)	2,080 (9.3)	4,340 (19.3)	3,995 (17.8)
1/2 (12.7)	4-1/2 (114.3)	3,315 (14.8)	4,420 (19.7)	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)	4,900 (21.8)	3,730 (16.6)	7,780 (34.6)	7,155 (31.8)
5/8 (15.9)	5-5/8 (142.9)	4,425 (19.7)	6,130 (27.3)	6,130 (27.3)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
	7-1/2 (190.5)	5,660 (25.2)	7,190 (32.0)	7,364 (32.8)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
3/4 (19.1)	6-3/4 (171.5)	7,195 (32.0)	7,885 (35.1)	8,440 (37.5)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
	9 (228.6)	7,940 (35.3)	10,345 (46.0)	10,345 (46.0)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
7/8 (22.2)	7-7/8 (200.0)	8,810 (39.2)	9,430 (41.9)	10,260 (45.6)	11,600 (51.6)	25,510 (113.5)	20,835 (92.7)
	10-1/2 (266.7)	-- --	12,080 (57.0)	12,805 (57.0)	11,600 (51.6)	25,510 (113.5)	20,835 (92.7)
1 (25.4)	9 (228.6)	10,085 (44.9)	11,970 (53.3)	11,970 (53.0)	15,180 (67.5)	31,620 (140.7)	26,560 (118.1)
	12 (304.8)	12,180 (54.2)	15,545 (69.2)	15,760 (70.1)	15,180 (67.5)	31,620 (140.7)	26,560 (118.1)
1-1/4 (31.8)	11-1/4 (285.8)	13,915 (61.9)	14,245 (63.4)	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)	19,930 (88.7)	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.

2 Allowable loads taken from ICBO Evaluation Report #4285.

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

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)	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)	-- --	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 ICBO Evaluation Report #4285.

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

PERFORMANCE TABLE

C6 Epoxy Adhesive — *Average Ultimate Tension Loads[1,2] 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)	--	--	45,000	(200.2)	26,400	(117.4)	39,600	(176.2)
# 7	(22.2)	7-7/8	(200.0)	--	--	45,850	(204.0)	36,000	(160.1)	54,000	(240.2)
		10-1/2	(266.7)	--	--	60,375	(268.6)	36,000	(160.1)	54,000	(240.2)
		13	(330.2)	--	--	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)	--	--	86,700	(385.7)	47,400	(210.9)	71,100	(316.3)
# 9	(28.6)	10-1/8	(257.2)	--	--	61,530	(273.7)	60,000	(266.9)	90,000	(400.4)
		13-1/2	(342.9)	--	--	81,240	(361.4)	60,000	(266.9)	90,000	(400.4)
		19	(482.6)	--	--	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)	--	--	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.

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.

C6 Adhesive Anchoring System Spacing / Edge Distance Load Factor Summary[1]

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	0.50 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

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

C6 Chemical Resistance

C6 Chemical Resistance

	HIGH Anchors installed with C6 epoxy could be submerged in these materials.	MEDIUM Intermittent exposure or temporary submersion due to splash or spill.	LOW Exposure of C6 should be limited to splash and spill exposure followed by immediate cleanup.
Xylene	✔		
Gasoline	✔		
20% Caustic (NaOH)	✔		
Fresh Water	✔		
Salt Water	✔		
10% Sulfuric Acid (H_2SO_4)		✔	
3.5% Hydrochloric Acid (HCl)		✔	
9% Phosphoric Acid (H_3PO_4)		✔	
Toluene		✔	
10% Nitric Acid		✔	
8.5% Ammonium Hydroxide		✔	
5% Bleach			✔
Acetone			✔
Glacial Acetic Acid			✔
Methanol			✔
Methylene Chloride			✔

Important Note: This chemical resistance table above applies only when C6 epoxy is used for installing anchors into concrete in a conventional manner with recommended hole sizes. Installation of the anchor must always be done in a drilled hole which is completely cleaned of all concrete dust and is dry. Exposure to solvents, chemicals and water, as listed above, should occur only after the C6 epoxy has fully cured.

NEW G5 ADHESIVE

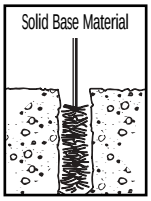
High Strength Epoxy

The 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. NEW G5 can be used with threaded rod or rebar.

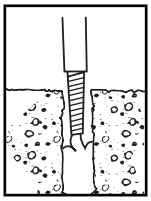
In hot weather your current epoxy sets up too quickly not giving you enough time to work and wasting nozzles. Switching to a longer cure time formula saves nozzles, but wastes time. Your crew is delayed until the next day, waiting for the epoxy to finally cure and the chance to load your anchors.

The NEW G5 is the ONLY epoxy that has the best of both worlds, an extended (15 minute) working time and a full cure in less than 2 hours. Keep your crews working not waiting.

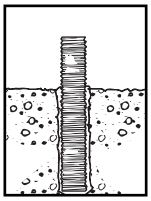
INSTALLATION STEPS



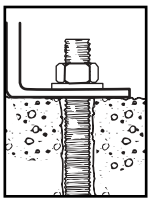
1. Drill proper sized hole. Clean out hole from bottom with forced air. Complete hole preparation with use of a brush and repeat cleaning with forced air (leave no dust or slurry).



2. When starting new cartridge or nozzle, dispense and discard enough adhesive until uniform dark grey color is achieved. Insert the nozzle into the bottom of the hole and fill to 1/2 the hole depth.



3. Insert the selected rod slowly by hand into the bottom of the hole with a slow twisting motion. This insures the adhesive fills voids and crevices uniformly.



4. See New G5 Cure Time Charts for set-up time. After the recommended cure time is met, install and tighten fixture into place.

ADVANTAGES

FORMULATED FOR HOT OR WARM WEATHER

- 15 minute nozzle life at 70° degrees F.
- 2 hours cure time at 70° degrees F.

NON-OFFENSIVE ODOR

- Virtually odorless, can be used indoors

Curing Times

TEMPERATURE (F°/C°)	WORKING TIME	CURE TIME
90°	8.5 minutes	2 hours
80°	12 minutes	2 hours
70°	15 minutes	2 hours
60°	18 minutes	3 hours
50°	21 minutes	6 hours

Designed to meet the demands of high temperature and the even higher demands of contractors

CURE TIME
70˚F

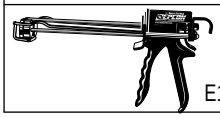
WORKING TIME
70˚F

APPROVALS/LISTINGS

DOT Approvals

Other approvals pending

New G5 22 oz. Ordering Information

	DESCRIPTION	BOX/BAG QTY	CARTON QTY
 G5-22	Part No. 0136076 New G5 Adhesive, 22 Fluid Oz. Cartridge	1	12
 E55	Part No. 0136077 Mixing Nozzle for G5-22 Cartridge	24	24
 E102	Part No. 51900 Hand Dispenser for G5-22 Cartridges	1	1

ESTIMATING TABLE

NEW G5
22 Fluid Ounce Cartridge

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

REBAR	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES (mm)														
		1 (25.4)	2 (50.8)	3 (76.2)	4 (101.6)	5 (127.0)	6 (152.4)	7 (177.8)	8 (203.2)	9 (228.6)	10 (254.0)	11 (279.4)	12 (304.8)	13 (330.2)	14 (355.6)	15 (381.0)
# 3	1/2	388.9	194.5	129.6	97.2	77.8	64.8	55.6	48.6	43.2	38.9	35.4	32.4	29.9	27.8	25.9
# 4	5/8	293.8	146.9	97.9	73.5	58.5	49.0	42.0	36.7	32.6	29.4	26.7	24.5	22.6	21.0	19.6
# 5	3/4	225.4	112.7	75.1	56.3	45.1	37.6	32.2	28.2	25.0	22.5	20.5	18.8	17.3	16.1	15.0
# 6	7/8	182.0	91.0	60.7	45.5	36.4	30.3	26.0	22.7	20.2	18.2	16.5	15.2	14.0	13.0	12.1
# 7	1-1/8	87.2	43.6	29.1	21.8	17.4	14.5	12.5	10.9	9.7	8.7	7.9	7.3	6.7	6.2	5.8
# 8	1-1/4	77.6	38.8	25.9	19.4	15.5	12.9	11.1	9.7	8.6	7.8	7.1	6.5	6.0	5.5	5.2
# 9	1-3/8	81.0	40.5	27.0	20.2	16.2	13.5	11.6	10.1	9.0	8.1	7.4	6.7	6.2	5.8	5.4
# 10	1-1/2	66.2	33.1	22.1	16.6	13.2	11.0	9.5	8.3	7.4	6.6	6.0	5.5	5.1	4.7	4.4
# 11	1-3/4	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

ESTIMATING TABLE

NEW G5
22 Fluid Ounce Cartridge

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

ROD In. (mm)	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES (mm)														
		1 (25.4)	2 (50.8)	3 (76.2)	4 (101.6)	5 (127.0)	6 (152.4)	7 (177.8)	8 (203.2)	9 (228.6)	10 (254.0)	11 (279.4)	12 (304.8)	13 (330.2)	14 (355.6)	15 (381.0)
1/4 (6.4)	5/16	721.2	360.6	240.4	180.3	144.2	120.2	103.0	90.2	80.1	72.1	65.6	60.1	55.5	51.5	48.1
3/8 (9.5)	7/16	417.6	208.8	139.2	104.4	83.5	69.6	59.7	52.2	46.4	41.8	38.0	34.8	32.1	29.8	27.8
1/2 (12.7)	9/16	300.5	150.3	100.2	75.1	60.1	50.1	42.9	37.6	33.4	30.1	27.3	25.0	23.1	21.5	20.0
5/8 (15.9)	3/4	153.8	76.9	51.3	38.4	30.8	25.6	22.0	19.2	17.1	15.4	14.0	12.8	11.8	11.0	10.3
3/4 (19.1)	7/8	121.7	60.8	40.6	30.4	24.3	20.3	17.4	15.2	13.5	12.2	11.1	10.1	9.4	8.7	8.1
7/8 (22.2)	1	100.9	50.5	33.6	25.2	20.2	16.8	14.4	12.6	11.2	10.1	9.2	8.4	7.8	7.2	6.7
1 (25.4)	1-1/8	83.0	41.5	27.7	20.7	16.6	13.8	11.9	10.4	9.2	8.3	7.5	6.9	6.4	5.9	5.5
1-1/4 (31.8)	1-3/8	62.8	31.4	20.9	15.7	12.6	10.5	9.0	7.8	7.0	6.3	5.7	5.2	4.8	4.5	4.2

* The number of anchoring installations is based upon calculations of hole volumes using ANSI tolerance carbide tipped drill bits, the nominal areas of the reinforcing bars and the stress areas of the threaded rods. These estimates do not account for waste.
* Oversized holes acceptable but volume of adhesive will increase.

SUGGESTED SPECIFICATIONS

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 dating, mix ratio by volume, ANSI hazard classification, and appropriate ANSI handling precautions

EPOXY ADHESIVE:

1. Two component, 100% solids (containing no solvents), non-sag paste, insensitive to moisture, tan in color
2. Water solubility: None

PERFORMANCE TABLE

NEW G5
Epoxy Adhesive

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

THREADED ROD DIA. In. (mm)	SETTING TORQUE 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)	13 - 18 (17.6-24.4)	1-1/2 (38.1)	-- --	-- --	3,892 (17.3)	4,686 (20.8)
		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)	22 - 25 (29.8-33.9)	2 (50.8)	-- --	-- --	6,527 (29.0)	8,873 (39.5)
		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)	-- --	12,016 (53.5)	20,572 (91.5)	12,016 (53.5)
5/8 (15.9)	55 - 80 (74.6-108.5)	2-1/2 (63.5)	-- --	-- --	10,675 (47.5)	15,941 (70.9)
		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)	-- --	17,547 (78.1)	32,249 (143.5)	17,547 (78.1)
3/4 (19.1)	106-160 (143.7-216.9)	3 (76.2)	-- --	-- --	14,909 (66.3)	22,684 (100.9)
		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)	-- --	24,918 (110.8)	47,927 (213.2)	24,918 (110.8)
1 (25.4)	276-330 (374.2-447.4)	4 (101.6)	-- --	-- --	24,144 (107.4)	38,758 (172.4)
		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)	-- --	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.

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

NEW 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)	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.

PERFORMANCE TABLE

NEW 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)	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.

Combined Shear and Tension Loading—for NEW 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:

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

Na = Applied Service Tension Load
Ns = Allowable Tension Load
Va = Applied Service Shear Load
Vs = Allowable Shear Load

PERFORMANCE TABLE

NEW G5 Epoxy Adhesive — *Average Ultimate Tension Loads[1,2] 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)	-- --	10,488 (46.6)	6,600 (29.4)	9,900 (44.0)
# 4 (12.7)	4-1/2 (114.3)	-- --	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)	-- --	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)	-- --	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)	-- --	43,905 (195.3)	36,000 (160.1)	54,000 (240.2)
	10-1/2 (266.7)	-- --	52,046 (231.5)	36,000 (160.1)	54,000 (240.2)
# 8 (25.4)	9 (228.6)	-- --	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)	-- --	62,443 (277.8)	60,000 (266.9)	90,000 (400.4)
	13-1/2 (342.9)	-- --	71,959 (320.1)	60,000 (266.9)	90,000 (400.4)
# 10 (31.8)	11-1/4 (285.8)	-- --	70,165 (312.1)	76,200 (339.0)	114,300 (508.5)
	15 (381.0)	-- --	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.

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.

NEW G5 Adhesive Anchoring System Spacing / Edge Distance Load Factor Summary[1]

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 →	0.50 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

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

A7 Adhesive

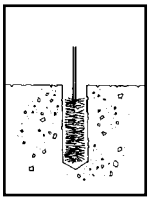
Fast Dispensing, Fast Curing Acrylic Adhesive

The acrylic resin and hardening agent are completely mixed as they are simultaneously dispensed from the dual cartridge through a static mixing nozzle, directly into the anchor hole. A7 can be used with threaded rod or rebar.

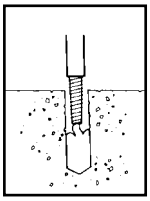
ADVANTAGES

- All weather formula, down to 0°F and below
- No drip, no sag, easy clean up
- Fast & easy dispensing, even 28-oz. cartridges can be hand dispensed
- Fast curing time, 35 minutes at 60°F
- Not mix ratio sensitive
- Rods are easier to insert into the hole with A7 compared with other adhesives
- Works in damp holes and underwater applications
- Requires less adhesive—can be used in 1/16" oversized or 1/8" oversized holes
- One formula for both hollow and solid base materials

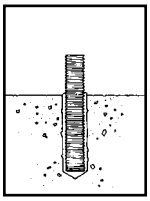
INSTALLATION STEPS



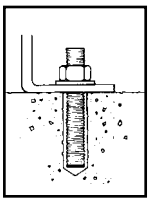
1. Drill proper sized hole. Clean out hole from bottom with forced air. Complete hole preparation with use of a brush and repeat cleaning with forced air (leave no dust or slurry).



2. When starting new cartridge or nozzle, dispense and discard enough adhesive until uniform dark grey color is achieved. Insert the nozzle into the bottom of the hole and fill to 1/2 the hole depth.



3. Insert the selected rod slowly by hand into the bottom of the hole with a slow twisting motion. This insures the adhesive fills voids and crevices uniformly.



4. See A7 Cure Time Charts for set-up time. After the recommended cure time is met, install and tighten fixture into place.

Curing Times and Dispensing Speeds

TEMPERATURE (F°/C°)	WORKING TIME	FULL CURE TIME
100°/ 38°	5 minutes	25 minutes
80°/ 27°	5.5 minutes	30 minutes
60°/ 16°	7 minutes	35 minutes
40°/ 4°	15 minutes	75 minutes
20°/ -7°	35 minutes	6 hours
0°/-18°	4 hours	24 hours

APPROVALS/LISTINGS

ASTM Type IV, Grade 3, Class A, B, C (exceptions - A7 gels faster than ASTM requirements and does not contain any epoxy)

ICBO Evaluation Service, Inc. – #ER-5560

Metro-Dade County – #01-0501.01

City of Los Angeles – RR#25379

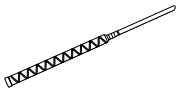
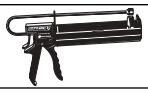
DOT Approvals

SUGGESTED SPECIFICATIONS

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 fill date, mix ratio by volume, ANSI hazard classification, and appropriate ANSI handling precautions

A7—28 oz. Ordering Information

	DESCRIPTION	BOX QTY
 A7-28	28 Fluid Ounce Cartridge A7 *Part No. 0123109*	8
 A50	*A50 nozzles fit into 3/8" holes & tip can be broken off to increase flow for larger holes* Mixing Nozzle for A7-28 Cartridge *Part No. 0123110*	24
 A102	*Largest hand dispensable cartridge—still easy to dispense* Hand Dispenser for A7-28 Cartridge *Part No. 0123111*	1

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 (mm)														
		1 (25.4)	2 (50.8)	3 (76.2)	4 (101.6)	5 (127.0)	6 (152.4)	7 (177.8)	8 (203.2)	9 (228.6)	10 (254.0)	11 (279.4)	12 (304.8)	13 (330.2)	14 (355.6)	15 (381.0)
# 3	7/16	662.5	331.3	220.8	165.6	132.5	110.4	94.6	82.8	73.6	66.3	60.2	55.2	51.0	47.3	44.2
# 4	5/8	373.0	186.5	124.3	93.2	74.6	62.2	53.3	46.6	41.4	37.3	33.9	31.1	28.7	26.6	24.9
# 5	3/4	286.1	143.0	95.4	71.5	57.2	47.7	40.9	35.8	31.8	28.6	26.0	23.8	22.0	20.4	19.1
# 6	7/8	231.0	115.5	77.0	57.7	46.2	38.5	33.3	28.8	25.7	23.1	21.0	19.2	17.8	16.5	15.4
# 7	1	213.4	106.7	71.1	53.3	42.7	35.6	30.5	26.7	23.7	21.3	19.4	17.8	16.4	15.2	14.2
# 8	1-1/8	177.3	88.6	59.1	44.3	35.5	29.5	25.3	22.2	19.7	17.7	16.1	14.8	13.6	12.7	11.8
# 9	1-1/4	102.8	51.4	34.3	25.7	20.6	17.1	14.7	12.8	11.4	10.3	9.3	8.6	7.9	7.3	6.9
# 10	1-1/2	84.1	42.0	28.0	21.0	16.8	14.0	12.0	10.5	9.3	8.4	7.6	7.0	6.5	6.0	5.6
# 11	1-3/4	51.4	25.7	17.1	12.8	10.3	8.6	7.3	6.4	5.7	5.1	4.7	4.3	4.0	3.7	3.4

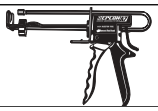
ESTIMATING TABLE

A7 *28 Fluid Ounce Cartridge* — *Number of Anchoring Installations per Cartridge* Using Threaded Rod with A7 Adhesive in Solid Concrete*

ROD In. (mm)	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES (mm)														
		1 (25.4)	2 (50.8)	3 (76.2)	4 (101.6)	5 (127.0)	6 (152.4)	7 (177.8)	8 (203.2)	9 (228.6)	10 (254.0)	11 (279.4)	12 (304.8)	13 (330.2)	14 (355.6)	15 (381.0)
1/4 (6.4)	5/16	915.5	457.7	305.2	228.9	183.1	152.8	130.8	114.4	101.7	91.5	83.2	76.3	70.4	65.4	61.0
3/8 (9.5)	7/16	530.0	265.0	176.7	132.5	106.0	88.3	75.7	66.3	58.9	53.0	48.2	44.2	40.8	37.9	35.3
1/2 (12.7)	9/16	381.4	190.7	127.1	95.4	76.3	63.6	54.5	47.7	42.4	38.1	34.7	31.8	29.3	27.2	25.4
5/8 (15.9)	11/16 3/4	273.6 195.6	136.8 97.8	91.2 65.1	68.4 48.8	54.7 39.0	45.6 32.5	39.1 27.9	34.2 24.4	30.4 21.7	27.4 19.5	24.9 17.7	22.8 16.3	21.0 15.0	19.5 13.9	18.2 13.0
3/4 (19.1)	13/16 7/8	192.9 154.4	96.5 77.2	64.3 51.5	48.2 38.6	38.6 30.9	32.2 25.7	27.6 22.1	24.1 19.3	21.4 17.2	19.3 15.4	17.5 14.0	16.1 12.9	14.8 11.9	13.8 11.0	12.9 10.3
7/8 (22.2)	15/16 1	185.1 128.0	92.6 64.0	61.7 42.8	46.3 32.0	37.0 25.6	30.9 21.4	26.8 18.3	23.1 16.0	20.6 14.2	18.5 12.8	16.8 11.6	15.4 10.7	14.2 9.9	13.2 9.2	12.3 8.5
1 (25.4)	1 - 1/16 1 - 1/8	158.3 105.2	79.2 52.6	52.8 35.2	39.6 26.3	31.7 21.1	26.4 17.6	22.6 15.0	19.8 13.2	17.6 11.7	15.8 10.5	14.4 9.6	13.2 8.8	12.2 8.1	11.3 7.6	10.6 7.0
1-1/4 (31.8)	1 - 5/16 1 - 3/8	101.3 80.0	50.7 40.0	33.8 26.6	25.3 20.0	20.3 15.9	16.9 13.3	14.5 11.4	12.7 10.0	11.3 8.9	10.1 8.0	9.2 7.2	8.4 6.6	7.8 6.1	7.2 5.7	6.8 5.3

* The number of anchoring installations is based upon calculations of hole volumes using ANSI tolerance carbide tipped drill bits, the nominal areas of the reinforcing bars and the stress areas of the threaded rods. These estimates do not account for waste.

A7—8 oz. Ordering Information

	DESCRIPTION	BOX QTY
 A7-8	*Part No. 0123106* *Fits Hilti® P2000 dispensing tools* 8 Fluid Ounce Cartridge A7	12
 A24	*Part No. 0123107* Mixing Nozzle for A7-8 Cartridge	24
 A101	*Part No. 0123108* Heavy-Duty Hand Dispenser for A7-8 Cartridge	1

Hilti® P2000 is a registered trademark of the Hilti Corp.

SUGGESTED SPECIFICATIONS

ACRYLIC ADHESIVE:

1. Two component methyl methacrylate adhesive, non-sag paste, moisture insensitive when cured, dark gray in color
2. Meets ASTM C881-90, Type IV, Grade 3, Class A, B, and C with the exception of gel time and epoxy content
3. Shrinkage during cure per ASTM D2566: .002in./in.
4. Heat deflection temperature, ASTM D648: 140°F minimum
5. Shelf life: Best if used within 18 months
6. Pumpable at 0°F without preheating

ESTIMATING TABLE

A7 — 8 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 (mm)														
		1 (25.4)	2 (50.8)	3 (76.2)	4 (101.6)	5 (127.0)	6 (152.4)	7 (177.8)	8 (203.2)	9 (228.6)	10 (254.0)	11 (279.4)	12 (304.8)	13 (330.2)	14 (355.6)	15 (381.0)
# 3	7/16	187.8	93.9	62.6	46.9	37.6	31.3	26.8	23.5	20.9	18.8	17.1	15.6	14.4	13.4	12.5
# 4	5/8	105.7	52.9	35.2	26.4	21.1	17.6	15.1	13.2	11.7	10.6	9.6	8.8	8.1	7.6	7.0
# 5	3/4	81.1	40.5	27.0	20.3	16.2	13.5	11.6	10.1	9.0	8.1	7.4	6.8	6.2	5.8	5.4
# 6	7/8	65.5	32.7	21.8	16.4	13.1	10.9	9.4	8.2	7.3	6.5	6.0	5.5	5.0	4.7	4.4
# 7	1	60.5	30.2	20.2	15.1	12.1	10.1	8.6	7.6	6.7	6.0	5.5	5.0	4.7	4.3	4.0
# 8	1-1/8	50.2	25.1	16.7	12.6	10.0	8.4	7.2	6.3	5.6	5.0	4.6	4.2	3.9	3.6	3.3
# 9	1-1/4	29.1	14.6	9.7	7.3	5.8	4.9	4.2	3.6	3.2	2.9	2.6	2.4	2.2	2.1	1.9
# 10	1-1/2	23.8	11.9	7.9	6.0	4.8	4.0	3.4	3.0	2.6	2.4	2.2	2.0	1.8	1.7	1.6
# 11	1-3/4	14.6	7.3	4.9	3.6	2.9	2.4	2.1	1.8	1.6	1.5	1.3	1.2	1.1	1.0	1.0

ESTIMATING TABLE

A7 — 8 Fluid Ounce Cartridge

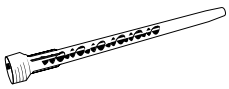
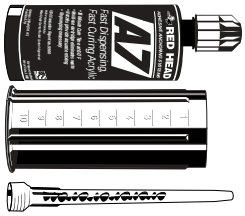
Number of Anchoring Installations per Cartridge Using Threaded Rod with A7 Adhesive in Solid Concrete*

ROD In. (mm)	HOLE DIA. INCHES	DRILL EMBEDMENT DEPTH IN INCHES (mm)														
		1 (25.4)	2 (50.8)	3 (76.2)	4 (101.6)	5 (127.0)	6 (152.4)	7 (177.8)	8 (203.2)	9 (228.6)	10 (254.0)	11 (279.4)	12 (304.8)	13 (330.2)	14 (355.6)	15 (381.0)
1/4 (6.4)	5/16	259.5	129.7	86.5	64.9	51.9	43.2	37.1	32.4	28.8	25.9	23.6	21.6	20.0	18.5	17.3
3/8 (9.5)	7/16	150.2	75.1	50.1	37.6	30.0	25.0	21.5	18.8	16.7	15.0	13.7	12.5	11.6	10.7	10.0
1/2 (12.7)	9/16	108.1	54.1	36.0	27.0	21.6	18.0	15.4	13.5	12.0	10.8	9.8	9.0	8.3	7.7	7.2
5/8 (15.9)	11/16 3/4	77.6 55.4	38.8 27.7	25.9 18.4	19.4 13.8	15.5 11.1	12.9 9.2	11.1 7.9	9.7 6.9	8.6 6.1	7.8 5.5	7.1 5.0	6.5 4.6	6.0 4.3	5.5 4.0	5.2 3.7
3/4 (19.1)	13/16 7/8	54.7 43.6	27.3 21.8	18.2 14.6	13.7 10.9	10.9 8.8	9.1 7.3	7.8 6.3	6.8 5.5	6.1 4.9	5.5 4.4	5.0 4.0	4.6 3.6	4.2 3.4	3.9 3.1	3.6 2.9
7/8 (22.2)	15/16 1	52.5 36.4	26.2 18.2	17.5 12.2	13.1 9.1	10.5 7.3	8.7 6.1	7.5 5.2	6.6 4.5	5.8 4.0	5.2 3.6	4.8 3.3	4.4 3.0	4.0 2.8	3.7 2.6	3.5 2.4
1 (25.4)	1 -1/16 1 -1/8	44.9 34.4	22.4 17.2	15.0 12.0	11.2 8.6	9.0 7.5	7.5 6.0	6.4 5.0	5.6 4.3	5.0 3.7	4.5 3.3	4.1 3.0	3.7 2.7	3.5 2.5	3.2 2.3	3.0 2.1
1-1/4 (31.8)	1 -5/16 1 -3/8	28.7 22.4	14.4 11.2	9.6 7.6	7.2 5.6	5.7 4.5	4.8 3.8	4.1 3.2	3.6 2.8	3.2 2.5	2.9 2.3	2.6 2.1	2.4 1.9	2.2 1.7	2.1 1.6	1.9 1.5

* The number of anchoring installations is based upon calculations of hole volumes using ANSI tolerance carbide tipped drill bits, the nominal areas of the reinforcing bars and the stress areas of the threaded rods. These estimates do not account for waste.

A7—5 oz. Ordering Information

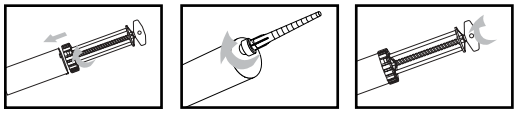
	DESCRIPTION	BOX QTY
 A7-5	*Part No. 01369672* 5 Fluid Ounce Cartridge A7	12
 A500 Kit	*Part No. 0136971* Convenient Dispensing Kit Packaged in a Solid Plastic Shell with (1) A500 Plastic Dispenser (1) A7-5 Cartridge and (1) A24 Nozzle	8

	DESCRIPTION	BOX QTY
 A24	*Part No. 0136973* Mixing Nozzle	24
 A501 Kit	*Part No. 0136074* Convenient Dispensing Kit Packaged in a Solid Plastic Shell with (1) A501 Caulking Gun Adapter (1) A7-5 Cartridge and (1) A24 Nozzle	8

A500 PLASTIC DISPENSER

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

Simple Assembly and Dispensing



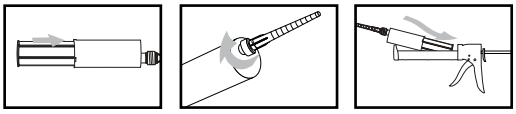
1. Twist-lock dispenser onto cartridge.
2. Thread nozzle onto cartridge.
3. Turn lever in order to dispense adhesive.

A500 Kit

A501 CAULKING GUN ADAPTER

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

Simple Assembly and Dispensing



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

A501 Kit

ESTIMATING TABLES

A7
5 Fluid Ounce Cartridge

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

REBAR	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES (mm)			
		2 (50.8)	4 (101.6)	6 (152.4)	8 (203.2)
# 3	7/16	60	30	20	15
# 4	5/8	34	17	11	8
# 5	3/4	26	13	9	6
# 6	7/8	21	10	7	5
# 7	1	19	10	6	5
# 8	1-1/8	16	8	5	4

ROD In (mm)	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES (mm)			
		2 (50.8)	4 (101.6)	6 (152.4)	8 (203.2)
3/8 (9.5)	7/16	48	24	16	12
1/2 (12.7)	9/16	35	17	12	9
5/8 (15.9)	11/16 3/4	25 18	12 9	8 6	6 4
3/4 (19.1)	13/16 7/8	18 14	9 7	6 5	4 4
7/8 (22.2)	15/16 1	17 12	8 6	6 4	4 3
1 (25.4)	1-1/16 1-1/8	14 10	7 5	5 3	4 2

* The number of anchoring installations is based upon calculations of hole volumes using ANSI tolerance carbide tipped drill bits, the nominal areas of the reinforcing bars and the stress areas of the threaded rods. These estimates do not account for waste.

PERFORMANCE TABLE

A7 Acrylic 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)	SETTING TORQUE 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)	--- ---	--- ---	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)	--- ---	--- ---	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)	11/16 (17.5) or 3/4 (19.1)	55 - 80 (74-108)	2-1/2 (63.5)	--- ---	--- ---	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)	13/16 (20.6) or 7/8 (22.2)	106 - 160 (143-216)	3 (76.2)	--- ---	--- ---	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)	15/16 (23.8) or 1 (25.4)	185 - 250 (250-338)	3-1/2 (88.9)	--- ---	--- ---	13,650 (60.7)	20,920 (92.9)
			7-7/8 (200.0)	--- ---	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)	1-1/16 (27.0) or 1-1/8 (28.6)	276 - 330 (374-447)	4 (101.6)	--- ---	--- ---	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 (143.3)	37,538 (167.0)	63,950 (284.5)	37,538 (167.0)
1-1/4 (31.8)	1-5/16 (33.3) or 1-3/8 (34.9)	370 - 660 (501-894)	5 (127.0)	--- ---	--- ---	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.

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 Acrylic 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)	AISI 304 SS Lbs. (kN)
3/8 (9.5)	7/16 (11.1)	1-1/2 (38.1)	--- ---	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)	--- ---	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)	11/16 (17.5)	2-1/2 (63.5)	--- ---	1,832 (8.2)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
	or	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)
	3/4 (19.1)	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)	13/16 (20.6)	3 (76.2)	--- ---	2,158 (9.6)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
	or	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)
	7/8 (22.2)	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)	15/16 (23.8)	3-1/2 (88.9)	--- ---	3,413 (15.2)	11,600 (51.6)	25,510 (113.5)	20,835 (92.7)
	or	7-7/8 (200.0)	-- --	11,230 (49.9)	11,600 (51.6)	25,510 (113.5)	20,835 (92.7)
	1 (25.4)	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)	1-1/16 (27.0)	4 (101.6)	--- ---	4,067 (18.1)	15,180 (67.5)	31,620 (140.7)	26,560 (118.1)
	or	9 (228.6)	8,050 (35.8)	12,050 (53.6)	15,180 (67.5)	31,620 (140.7)	26,560 (118.1)
	1-1/8 (28.6)	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)	1-5/16 (33.3)	5 (127.0)	--- ---	5,460 (24.3)	23,800 (105.9)	49,580 (220.6)	34,670 (154.2)
	or	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)
	1-3/8 (34.9)	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 Acrylic Adhesive — *Allowable Shear Loads[1,2] 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)	AISI 304 SS Lbs. (kN)
3/8 (9.5)	7/16 (11.1)	1-1/2 (38.1)	--- ---	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)	--- ---	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)	11/16 (17.5) or 3/4 (19.1)	2-1/2 (63.5)	--- ---	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)	13/16 (20.6) or 7/8 (22.2)	3 (76.2)	--- ---	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)	15/16 (23.8) or 1 (25.4)	3-1/2 (88.9)	--- ---	5,232 (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)	1-1/16 (27.0) or 1-1/8 (28.6)	4 (101.6)	--- ---	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)	1-5/1 (33.3) or 1-3/8 (34.9)	5 (127.0)	--- ---	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.

2. Allowable loads taken from ICBO Evaluation Report #5560.

PERFORMANCE TABLE

A7 Acrylic Adhesive — *Average Ultimate Tension and Shear Loads[1,2] for Threaded Rod Installed in Grout Filled Concrete Block*

THREADED ROD DIA. In. (mm)	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR LOCATION	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)
1/2 (12.7)	5/8 (15.9)	4-1/4 (108.0)	GROUTED CELL	5,170 (23.0)	8,500 (37.8)
5/8 (15.9)	3/4 (19.1)	5 (127.0)	GROUTED CELL	6,320 (28.1)	10,850 (48.3)
3/4 (19.1)	7/8 (22.2)	6-5/8 (168.3)	GROUTED CELL	10,910 (48.5)	17,075 (76.0)

1 Allowable working loads for the single installations should not exceed 25% (an industry standard) capacity or the allowable load of the anchor rod. Loads based upon testing with ASTM A193, Grade B7 rods.

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

PERFORMANCE TABLE

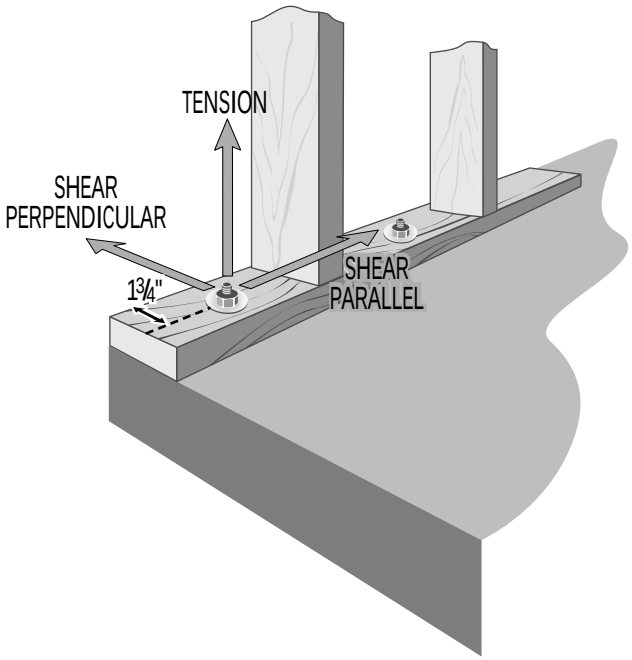
A7 Acrylic Adhesive — *Average Ultimate Tension and Shear Loads[1] for Threaded Rod Installed in Grouted[2] Brick Masonry Constructed of Solid Red Brick Units*

THREADED ROD DIA. In. (mm)	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR LOCATION	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)
1/4 (6.4)	3/8 (9.5)	3-1/2 (88.9)	CENTER OF	2,130 (9.5)	1,165 (5.2)
		6 (152.4)	BRICK FACE	3,575 (15.9)	1,550 (6.9)
3/8 (9.5)	1/2 (12.7)	3-1/2 (88.9)	CENTER OF	2,130 (9.5)	4,150 (18.5)
		6 (152.4)	BRICK FACE	8,875 (39.5)	6,950 (30.9)
1/2 (12.7)	5/8 (15.9)	3-1/2 (88.9)	CENTER OF	2,130 (9.5)	3,090 (13.7)
		6 (152.4)	BRICK FACE	12,155 (54.1)	7,910 (35.2)

1 Allowable working loads for the single installations should not exceed 25% (an industry standard) capacity or the allowable load of the anchor rod. Loads based upon testing with ASTM A193, Grade B7 rods.

2 Void between brick wythes was grouted solid; therefore the use of screens was not necessary.

A7 Adhesive for Still Plate Attachments



PERFORMANCE TABLE

A7
Acrylic Adhesive

Average Ultimate Tension and Shear[1,2,3] for Threaded Rods in Solid Concrete Floors and Stemwalls at 1-3/4" Edge Distance

ANCHOR DIAMETER	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT In. (mm)	2000PSI (13.8 MPa) CONCRETE		
			SHEAR LOAD DIRECTION	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)
1/2 (12.7)	9/16 (14.3)	4-1/2 (114.3)	Perpendicular	9,180 (40.8)	1,760 (7.8)
			Parallel	9,180 (40.8)	7,240 (32.2)
5/8 (15.9)	11/16 (17.5) or 3/4 (19.1)	5-5/8 (142.9)	Perpendicular	13,620 (60.6)	2,540 (11.3)
			Parallel	13,620 (60.6)	8,778 (39.0)
		10 (254.0)	Perpendicular	20,700 (92.1)	2,540 (11.3)
			Parallel	20,700 (92.1)	8,799 (39.1)
3/4 (19.1)	13/16 (20.6) or 7/8 (22.2)	6-3/4 (171.4)	Perpendicular	15,080 (67.1)	2,080 (9.2)
7/8 (22.2)	15/16 (23.8) or 1 (25.4)	15 (381.0)	Perpendicular	29,940 (133.2)	2,080 (9.2)
			Parallel	29,940 (133.2)	7,101 (31.6)

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 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 Acrylic Adhesive — *Allowable Tension Loads[1] at 1-3/4" Edge Distance for Threaded Rods in Solid Concrete Floors and Stemwalls*

DIAMETER In. (mm)	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	2000 PSI (13.8 MPa) CONCRETE Lbs. (kN)	ALLOWABLE TENSION LOAD BASED ON STEEL STRENGTH		
				ASTM A307 (SAE 1018) Lbs. (kN)	ASTM A193 GR. B7 (SAE 4140) Lbs. (kN)	AISI 304 SS Lbs. (kN)
1/2 (12.7)	9/16 (14.3)	4-1/2 (114.3)	2,295 (10.2)	3,730 (16.6)	7,780 (34.6)	7,155 (31.8)
5/8 (15.9)	11/16 (17.5)	5-5/8 (142.9)	3,405 (10.7)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
	or 3/4 (19.1)	10 (254.0)	5,175 (23.0)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
3/4 (19.1)	13/16 (20.6) or 7/8 (22.2)	6-3/4 (171.4)	3,770 (16.8)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
7/8 (22.2)	15/16 (23.8) or 1 (25.4)	15 (381.0)	7,485 (33.3)	11,600 (51.6)	25,510 (113.5)	20,835 (92.7)

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

PERFORMANCE TABLE

A7 Acrylic Adhesive — *Allowable Shear Loads[1] at 1-3/4" Edge Distance for Threaded Rods in Solid Concrete Floors and Stemwalls*

DIAMETER In. (mm)	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	SHEAR LOAD DIRECTION	2000 PSI (13.8 MPa) CONCRETE Lbs. (kN)	ALLOWABLE SHEAR LOAD BASED ON STEEL STRENGTH		
					ASTM A307 (SAE 1018) Lbs. (kN)	ASTM A193 GR. B7 (SAE 4140) Lbs. (kN)	AISI 304 SS Lbs. (kN)
1/2 (12.7)	9/16 (14.3)	4-1/2 (114.3)	Perpendicular	440 (1.9)	1,870 (8.3)	3,895 (17.3)	3,585 (15.9)
			Parallel	1,810 (8.0)	1,870 (8.3)	3,895 (17.3)	3,585 (15.9)
5/8 (15.9)		5-5/8 (142.9)	Perpendicular	635 (2.8)	2,940 (13.1)	6,125 (27.2)	5,635 (25.1)
	11/16 (17.5)		Parallel	2,195 (9.8)	2,940 (13.1)	6,125 (27.2)	5,635 (25.1)
	or 3/4 (19.1)	10 (254.0)	Perpendicular	635 (2.8)	2,940 (13.1)	6,125 (27.2)	5,635 (25.1)
			Parallel	2,200 (9.8)	2,940 (13.1)	6,125 (27.2)	5,635 (25.1)
3/4 (19.1)	13/16 (20.6)	6-3/4 (171.4)	Perpendicular	600 (2.7)	4,250 (18.9)	8,855 (39.4)	7,440 (33.1)
	or 7/8 (22.2)						
7/8 (22.2)	15/16 (23.8)	15 (381.0)	Perpendicular	520 (2.3)	5,800 (25.8)	12,760 (56.8)	10,730 (47.7)
	or 1 (25.4)		Parallel	1,775 (7.9)	5,800 (25.8)	12,760 (56.8)	10,730 (47.7)

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

PERFORMANCE TABLE

A7 Acrylic Adhesive — Average Ultimate Tension Loads[1,2] 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)	-- --	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)	-- --	57,221 (254.5)	60,000 (266.9)	90,000 (400.4)
	13-1/2 (342.9)	-- --	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.

PERFORMANCE TABLE

A7 Acrylic Adhesive — Recommended Edge Distance Requirements for Shear Loads

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)

Combined Shear and Tension 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

PERFORMANCE TABLE

A7 Acrylic Adhesive — Recommended Edge Distance Requirements for Tension Loads

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)	2-1/2 (63.5)	1-15/16 (49.2)	1-3/8 (34.9)	13/16 (26.2)
	4-1/2 (114.3)	3-3/8 (85.7)	2-5/8 (66.7)	1-7/8 (47.6)	1-1/8 (28.6)
1/2 (12.7)	4-1/2 (114.3)	3-3/8 (85.7)	2-5/8 (66.7)	1-7/8 (47.6)	1-1/8 (28.6)
	6 (152.4)	4-1/2 (114.3)	3-1/2 (88.9)	2-1/2 (63.5)	1-1/2 (38.1)
5/8 (15.9)	5-5/8 (142.9)	4-3/16 (106.4)	3-1/4 (82.6)	2-5/16 (58.7)	1-3/8 (34.9)
	7-1/2 (190.5)	5-5/8 (142.9)	4-3/8 (111.1)	3-1/8 (79.4)	1-7/8 (47.6)
3/4 (19.1)	6-3/4 (171.5)	5-1/16 (128.6)	3-15/16 (100.0)	2-13/16 (71.4)	1-5/8 (15.9)
	9 (228.6)	6-3/4 (171.5)	5-1/4 (133.4)	3-3/4 (95.3)	2-1/4 (57.2)
1 (25.4)	9 (228.6)	6-3/4 (171.5)	5-1/4 (133.4)	3-3/4 (95.3)	2-1/4 (57.2)
	12 (304.8)	9 (228.6)	7 (177.8)	5 (127.0)	3 (76.2)
1-1/4 (31.8)	11-1/4 (285.8)	8-7/16 (214.3)	6-9/16 (166.7)	4-3/4 (120.7)	2-7/8 (73.0)
	15 (381.0)	11-1/4 (285.8)	8-3/4 (222.2)	6-1/4 158.8)	3-3/4 (95.3)

PERFORMANCE TABLE

A7 Acrylic Adhesive — Recommended Spacing Requirements for Tension Loads

ANCHOR DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	CRITICAL SPACING In. (mm) (100% LOAD CAPACITY)	INTERPOLATED SPACING In. (mm) (90% LOAD CAPACITY)	MINIMUM SPACING In. (mm) (80% LOAD CAPACITY)
3/8 (9.5)	3-3/8 (85.7)	4-3/16 (106.4)	2-1/2 (63.5)	13/16 (20.6)
	4-1/2 (114.3)	5-5/8 (142.9)	3-3/8 (85.7)	1-1/8 (28.6)
1/2 (12.7)	4-1/2 (114.3)	5-5/8 (142.9)	3-3/8 (85.7)	1-1/8 (28.6)
	6 (152.4)	7-1/2 (190.5)	4-1/2 (114.3)	1-1/2 (38.1)
5/8 (15.9)	5-5/8 (142.9)	7 (177.8)	4-3/16 (106.4)	1-3/8 (34.9)
	7-1/2 (190.5)	9-3/8 (238.1)	5-5/8 (142.9)	1-7/8 (47.6)
3/4 (19.1)	6-3/4 (171.5)	8-7/16 (214.3)	5 (127.0)	1-5/8 (41.3)
	9 (228.6)	11-1/4 (285.8)	6-3/4 (171.5)	2-1/4 (57.2)
1 (25.4)	9 (228.6)	11-1/4 (285.8)	6-3/4 (171.5)	2-1/4 (57.2)
	12 (304.8)	15 (381.0)	9 (228.6)	3 (76.2)
1-1/4 (31.8)	11-1/4 (285.8)	14-1/16 (357.2)	8-1/2 (215.9)	2-7/8 (73.0)
	15 (381.0)	18-3/4 (476.3)	11-1/4 (285.8)	3-3/4 (95.5)

A7 Adhesive Anchoring System Spacing / Edge Distance Load Factor Summary[1]

LOAD FACTOR	DISTANCE FROM EDGE OF CONCRETE
Critical Edge Distance—Tension	
100% Tension Load →	0.75 x Anchor Embedment (or greater)
Minimum Edge Distance—Tension	
70% Tension Load →	0.25 x Anchor Embedment
Critical Edge Distance—Shear	
100% Shear Load →	1.25 x Anchor Embedment (or greater)
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 (or greater)
Minimum Spacing—Tension	
80% Tension Load →	0.25 x Anchor Embedment

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

A7 Chemical Resistance

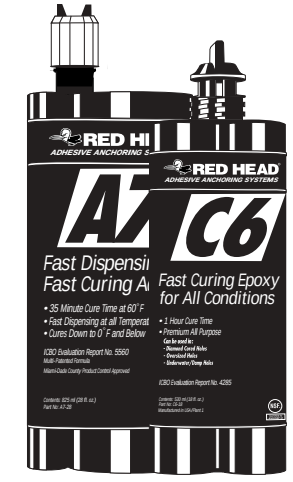
A7
Chemical Resistance

	HIGH Anchors installed with A7 could be submerged in these materials.	MEDIUM Intermittent exposure or temporary submersion due to splash or spill.	LOW Exposure of A7 should be limited to splash and spill exposure followed by immediate cleanup.
Fresh Water	✔		
Salt Water	✔		
Brine	✔		
Urine	✔		
Humus	✔		
20% Caustic (NaOH)		✔	
Gasoline		✔	
10% Sulfuric Acid (H_2SO_4)		✔	
3.5% Hydrochloric Acid (HCl)		✔	
9% Phosphoric Acid (H_3PO_4)		✔	
10% Nitric Acid		✔	
8.5% Ammonium Hydroxide		✔	
Bleach		✔	
Ammonia		✔	
Xylene			✔
Toluene			✔
Acetone			✔
Glacial Acetic Acid			✔
Methanol			✔
Methylene Chloride			✔

Important Note: This chemical resistance table above applies only when A7 adhesive is used for installing anchors into concrete in a conventional manner with recommended hole sizes. Installation of the anchor must always be done in a drilled hole which is completely cleaned of all concrete dust. Exposure to solvents and chemicals, as listed above should occur only after the A7 adhesive has fully cured.

Umbrella Inserts and Stubby Screens

High Performance Adhesive Systems for Fastening to the Front Face of Hollow Base Materials



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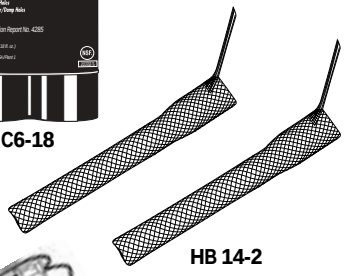

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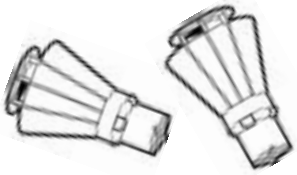

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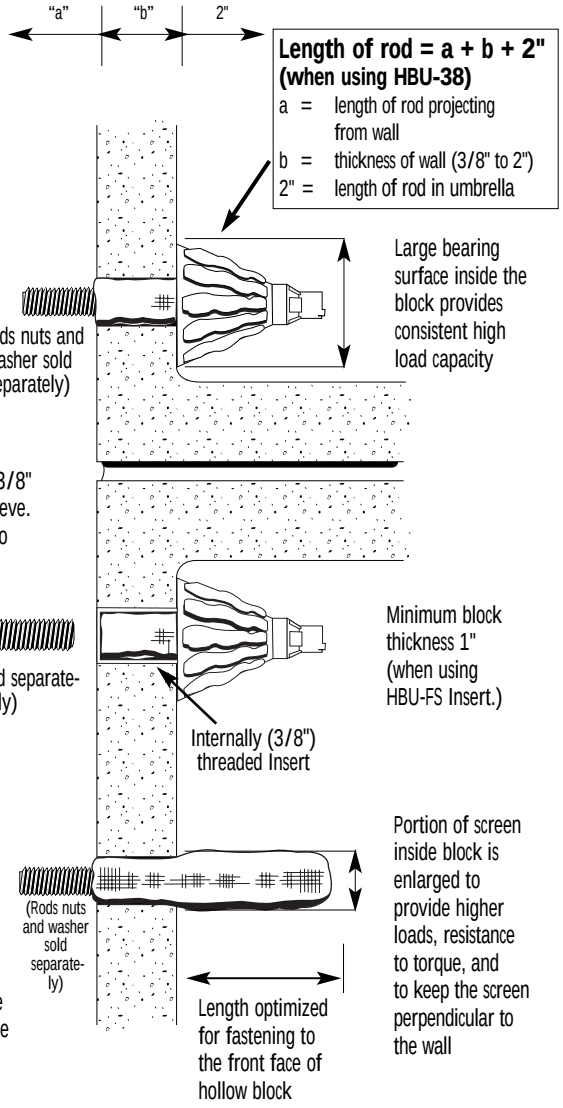
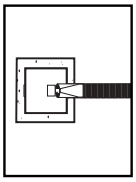
Hollow Block Fastening with A7 and C6 Adhesive



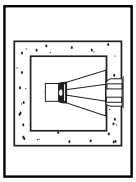
Section View—Face Concrete Block

INSTALLATION STEPS

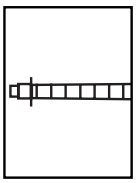
1. Drill 3/4" diameter hole, 3-3/4" deep using rotation only drilling mode and carbide tipped drill bit. Clean out hole with forced air. Complete hole preparation with use of a brush and repeat cleaning with compressed air (leave no dust or slurry).



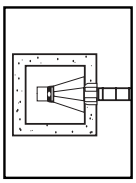
2. Place umbrella on piece of threaded rod, expanding umbrella over the rod. Push umbrella into hole.



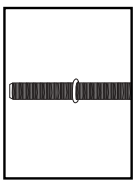
3. Push umbrella body through the hole and completely into void. Remove threaded rod. (Do not use in solid base materials. For anchoring into block web, ends and mortar joints, use screens.) View and verify umbrella wings expanded behind wall.



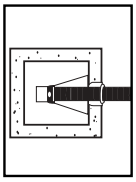
4. Place hole plug (E038) 1/8" from end of self-mixing adhesive nozzle.



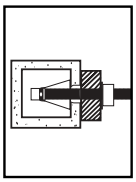
5. Dispense and discard a sufficient amount of adhesive from new cartridge until a uniform adhesive mix is achieved. Inject approximately 1-1/2 fl. oz. of adhesive into umbrella (7 to 8 pumps using manual dispenser) to completely fill umbrella.



6. 3/8" rod uses a centering ring (supplied with inserts) to keep rod perpendicular to the wall.



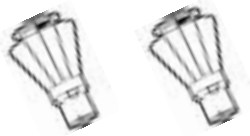
7. Insert rod into the filled umbrella using a slow, soft twisting motion until it contacts the back of umbrella.

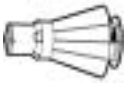


8. Wait for appropriate temperature/cure time before tightening fixture to the recommended torque of10 ft./lbs.

SELECTION CHART

Umbrella Inserts



DESCRIPTION	PART NO.	BOX CONTENTS
Umbrella Anchor 	0123112	20 Umbrella 20 Centering Rings
3/8" Internally Threaded Insert 	HBU-FS	10 Umbrella 10 Flush Sleeve Inserts

SELECTION CHART

Stubby Screens

PART NO.	DESCRIPTION	
51910	1/4" x 2"	Stainless Screen
51911	3/8" x 3-1/2"	Stainless Screen
51915	1/2" x 3-1/2"	Stainless Screen
51919	5/8" x 4-1/2"	Stainless Screen

ESTIMATING TABLE

Umbrella Inserts

Number of Anchoring Installations Per Cartridge Using Threaded Rod and Umbrella Inserts with A7 and C6 Adhesives in Hollow Base Material*

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	8 fluid oz.	5
		A7	28 fluid oz.	17
		C6	18 fluid oz.	11

*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 and C6 Adhesives in Hollow Base Material*

ROD In (mm)	DRILL HOLE DIA. INCHES	VOLUME OF CARTRIDGE	SCREEN LENGTH (INCHES) 2	3-1/2	4-1/2
1/4 (6.4)	3/8	A7 8 fluid oz.	39		
		A7 28 fluid oz.	135		
		C6 18 fluid oz.	87		
3/8 (9.5)	1/2	A7 8 fluid oz.		17	
		A7 28 fluid oz.		62	
		C6 18 fluid oz.		40	
1/2 (12.7)	5/8	A7 8 fluid oz.		12	
		A7 28 fluid oz.		43	
		C6 18 fluid oz.		28	
5/8 (15.9)	3/4	A7 8 fluid oz.			7
		A7 28 fluid oz.			24
		C6 18 fluid oz.			16

* These estimates do not account for waste.

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

	ROD DIA. In. (mm)	MAX INSTALLATION TORQUE Ft.-Lbs. (Nm)	DRILL HOLE DIA. In. (mm)	EMBEDMENT 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 (50.8)	1,550 (6.9)	1,900 (8.5)
	3/8 (9.5)	7 (9)	1/2 (12.7)	3-1/2 (88.9)	1,661 (7.4)	2,071 (9.2)
	1/2 (12.7)	10 (13)	5/8 (15.9)	3-1/2 (88.9)	2,458 (10.9)	4,467 (19.9)
	5/8 (15.9)	13 (17)	3/4 (19.1)	4-1/2 (114.3)	2,543 (10.9)	5,047 (22.4)

1 Allowable working loads should not exceed 25% ultimate capacity. Based upon testing using ASTM A193, Grade B7 rod.

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

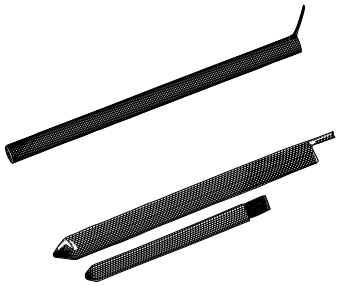
Load Values[1, 2] Using C6 in Hollow Concrete Block

	ROD DIA. In. (mm)	MAX INSTALLATION TORQUE Ft.-Lbs. (Nm)	DRILL HOLE DIA. In. (mm)	EMBEDMENT 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)	1,875 (8.3)	2,200 (9.8)
Stubby Screens	1/4 (6.4)	4 (5)	3/8 (9.5)	2 (50.8)	1,550 (6.9)	1,900 (8.5)
	3/8 (9.5)	7 (9)	1/2 (12.7)	3-1/2 (88.9)	1,661 (7.4)	2,071 (9.2)
	1/2 (12.7)	10 (13)	5/8 (15.9)	3-1/2 (88.9)	1,873 (8.3)	2,242 (10.0)
	5/8 (15.9)	13 (17)	3/4 (19.1)	4-1/2 (114.3)	1,970 (8.8)	3,554 (15.8)

1 Allowable working loads should not exceed 25% ultimate capacity. Based upon testing using ASTM A193, Grade B7 rod.

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

Screen Tubes



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

ADVANTAGES

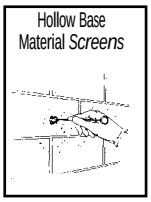
HBP SERIES—NYLON SCREENS

- 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

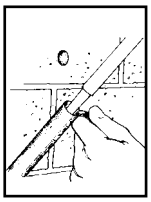
HB SERIES—STAINLESS SCREENS

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

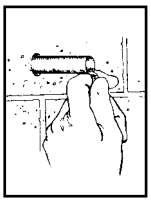
INSTALLATION STEPS



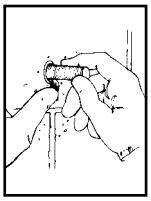
1. Drill proper sized hole, using rotation-only drilling mode. Clean out hole with forced air. Complete hole preparation with use of a brush and repeat cleaning with forced air (leave no dust or slurry).



2. When starting new cartridge or new nozzle, dispense and discard enough adhesive until uniform gray color 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.

Screens Used with A7 and C6

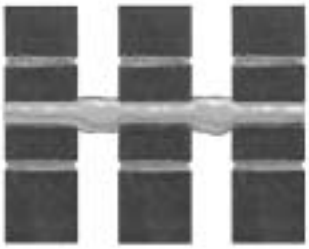
HOLLOW CONCRETE BLOCK

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.

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.

ESTIMATING TABLE

Screen Tubes

Number of Anchoring Installations Per Cartridge Using Threaded Rod and Screen Tubes with A7 and C6 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 8 fluid oz.	13	10	8	
		A7 28 fluid oz.	45	35	28	
		C6 18 fluid oz.	29	22	18	
3/8 (9.5)	1/2	A7 8 fluid oz.	10	8	6	
		A7 28 fluid oz.	37	29	23	
		C6 18 fluid oz.	24	19	15	
1/2 (12.7)	5/8	A7 8 fluid oz.	7	5	4	
		A7 28 fluid oz.	26	18	14	
		C6 18 fluid oz.	17	12	9	
5/8 (15.9)	3/4	A7 8 fluid oz.	5	4	3	
		A7 28 fluid oz.	18	14	10	
		C6 18 fluid oz.	12	9	7	
3/4 (19.1)	7/8	A7 8 fluid oz.			2	1
		A7 28 fluid oz.			6	5
		C6 18 fluid oz.			4	3

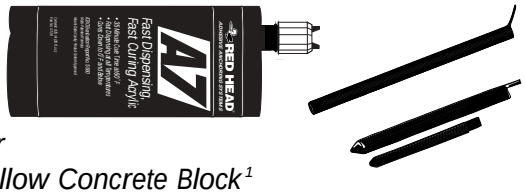
* These estimates do not account for waste.

Epoxy Anchor Screens

Description	Part No.	Pkg. Qty.	Bulk Qty.
1/4 x 2 Stubby	51910	100	200
3/8 x 3-1/2 Stubby	51911	100	200
3/8 x 6	51912	50	100
3/8 x 8	51913	25	50
3/8 x 10	51914	25	50
1/2 x 3-1/2 Stubby	51915	50	100
1/2 x 6	51916	50	100
1/2 x 8	51917	25	50
1/2 x 10	51918	25	50
5/8 x 4-1/2 Stubby	51919	50	100
5/8 x 6	51920	25	50
5/8 x 8	51921	20	40
5/8 x 10	51922	20	40
3/4 x 10	51923	10	20
3/4 x 13	51924	10	10

* For use in Hollow Block Applications

UMBRELLA INSERTS AND STUBBY SCREENS



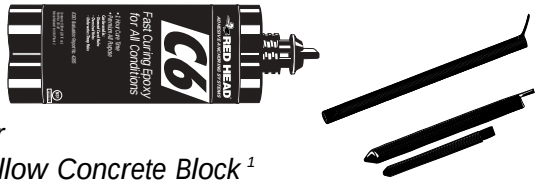
PERFORMANCE TABLE

Load Values

Average Ultimate Loads for HBP (nylon) or HB (stainless) Screens Used with A7 in Hollow Concrete Block[1]

ROD DIA. In. (mm)	DRILL HOLE DIA. In. (mm)	MAX INSTALLATION TORQUE Ft.-Lbs. (Nm)	EMBEDMENT In. (mm)	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)
1/4 (6.4)	3/8 (9.5)	5 (6)	8 (203.2)	2,072 (9.2)	2,264 (10.1)
3/8 (9.5)	1/2 (12.7)	12 (16)	8 (203.2)	2,360 (10.5)	2,668 (11.9)
1/2 (12.7)	5/8 (15.9)	19 (25)	8 (203.2)	2,647 (11.8)	2,668 (11.9)
5/8 (15.9)	3/4 (19.1)	26 (35)	8 (203.2)	2,647 (11.8)	3,578 (15.9)
3/4 (19.1)	7/8 (22.2)	28 (37)	8 (203.2)	2,647 (11.8)	4,573 (20.3)

1 Allowable working loads should not exceed 25% of ultimate capacity. Loads based upon testing with ASTM A193, Grade B7 rods.



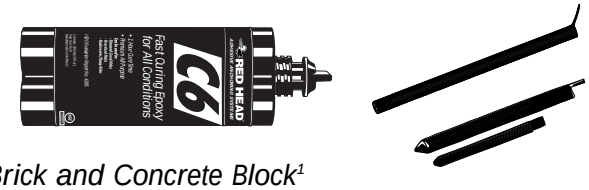
PERFORMANCE TABLE

Load Values

Average Ultimate Loads for HBP (nylon) or HB (stainless) Screens Used with C6 in Hollow Concrete Block [1]

ROD DIA. In. (mm)	DRILL HOLE DIA. In. (mm)	MAX INSTALLATION TORQUE Ft.-Lbs. (Nm)	EMBEDMENT In. (mm)	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)
1/4 (6.4)	3/8 (9.5)	5 (6)	8 (203.2)	2,072 (9.2)	2,264 (10.1)
3/8 (9.5)	1/2 (12.7)	12 (16)	8 (203.2)	2,800 (12.5)	2,466 (10.9)
1/2 (12.7)	5/8 (15.9)	19 (25)	8 (203.2)	3,487 (15.5)	2,668 (11.9)
5/8 (15.9)	3/4 (19.1)	26 (35)	8 (203.2)	3,487 (15.5)	3,578 (15.9)
3/4 (19.1)	7/8 (22.2)	28 (37)	8 (203.2)	3,487 (15.5)	4,573 (20.3)

1 Allowable working loads should not exceed 25% of ultimate capacity. Loads based upon testing with ASTM A193, Grade B7 rods.



PERFORMANCE TABLE

Load Values

Average Ultimate Loads for HBP (nylon) Screens Used with C6 in Brick and Concrete Block[1]

NYLON SCREEN PART NO.	DRILL HOLE DIA. In. (mm)	SINGLE BRICK		DOUBLE BRICK		BRICK AND HOLLOW BLOCK
		ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)	ULTIMATE TENSION Lbs. (kN)
HBP 38-6	1/2 (12.7)	2,150 (9.6)	-- --	4,675 (20.8)	1,917 (8.5)	3,659 (16.3)
HBP 38-8	1/2 (12.7)	2,200 (9.8)	1,143 (5.1)	6,175 (27.5)	1,743 (7.8)	3,659 (16.3)
HBP 38-10	1/2 (12.7)	2,000 (8.9)	950 (4.2)	3,272 (14.6)	2,498 (11.1)	2,498 (11.1)
HBP 12-6	5/8 (15.9)	3,800 (16.9)	-- --	6,369 (28.3)	2,498 (11.1)	5,595 (24.9)
HBP 12-8	5/8 (15.9)	1,750 (7.8)	-- --	7,530 (33.5)	2,305 (10.3)	3,500 (15.6)
HBP 12-10	5/8 (15.9)	2,618 (11.6)	-- --	2,885 (12.8)	2,305 (10.3)	2,498 (11.1)

1 Allowable working loads should not exceed 25% of ultimate capacity. Loads based upon testing with ASTM A193, Grade B7 rods.

Impact and Maxima 7 Capsules

Impact
Hammer-In Capsule

Impact Capsule

Two-part Vinylester capsules—hardener and resin are mixed in the hole as a rebar (rod) is hammered (no spinning needed) through the capsule to the bottom of the hole, crushing the capsule and mixing its contents.

Maxima 7
Spin-In Capsule

Maxima 7 Capsule

Patented Acrylic 7™ chemistry now available in a glass capsule—hardener and resin are mixed in the hole as a chisel-pointed rod is spun (hammer-drilled) through the capsule to the bottom of the hole, pulverizing the capsules and completely mixing the contents.

ADVANTAGES

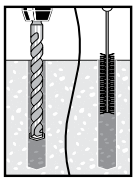
IMPACT CAPSULE

- Either end can be inserted into the hole
- Hole Plugs can be used to contain the mixture within the hole for a cleaner installation
- On smaller projects, more convenient than using a cartridge system
- Two year shelf life

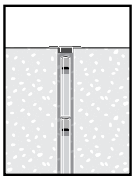
MAXIMA 7 CAPSULE

- Higher loads are obtained because mixing action scrapes and cleans the sides of the hole during installation
- Maxima 7 capsules can be used in temperatures as low as 0°F (full cure time 24 hours)
- Can be used in damp holes
- ICBO Evaluation Report No. 5560
- Two year shelf life

INSTALLATION STEPS

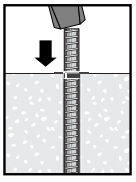


1. Drill & clean hole.



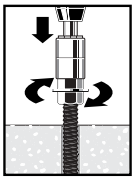
2. Insert capsule(s).

3. Double nut threaded rod.

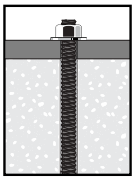


4. **Impact Capsule**
Hammer rebar (rod) to hole bottom.

OR



4. **Maxima 7 Capsule**
Spin chisel pointed threaded rod to hole bottom.



5. Allow to cure Install fixture. Apply torque.

Curing Times for Impact and Maxima 7 Capsules

TEMPERATURE (F°/C°)	FULL CURE TIME
68°/20°	20 minutes
50°/10°	30 minutes
32°/ 0°	1 hour
23°/-5°	5 hours

Impact Ordering Information

Impact
Hammer-In Capsules

ROD DIA. REBAR SIZE In. (mm)	IMPACT CAPSULE PART NO.	DRILL HOLE DIAMETER* (DRILL DIA. X MIN. DEPTH) In. (mm)	QTY PER BOX
3/8 (9.5)	0140191	7/16 x 3-5/8 (11.1 x 92.1)	10
1/2 (12.7)	0140192	9/16 x 4-3/8 (14.3 x 111.1)	10
5/8 (15.9)	0140193	11/16 x 5 (17.5 x 127.0)	10
3/4 (19.1)	0140194	7/8 x 6-3/4 (22.2 x 171.5)	10
# 3	0140191	1/2 x 3-1/2 (12.7 x 88.9)	10
# 4	0140192	5/8 x 4 (15.9 x 101.6)	10
# 5	0140193	3/4 x 5 (19.1 x 127.0)	10
# 6	0140194	7/8 x 6-5/8 (22.2 x 168.3)	10

* Capsules can be stacked for deeper embedments and higher strengths.

Maxima 7 Ordering Information

Maxima 7
Spin-In Capsules

ROD DIA. In. (mm)	MAXIMA 7 CAPSULE PART NO.	DRILL HOLE DIAMETER* (DRILL DIA. X MIN. DEPTH) In. (mm)	QTY PER BOX	SETTING TOOL PART NO.**	DRIVE SOCKET ***
3/8 (9.5)	0140197	7/16 x 3-5/8 (11.1 x 92.1)	10	0140204 (SDS)	9/16 x 3/8 (14.3 x 9.5)
1/2 (12.7)	0140198	9/16 x 4-3/8 (14.3 x 111.1)	10	0140204 (SDS)	3/4 x 3/8 (19.1 x 9.5)
				0140205 (SDS Max)	3/4 x 3/8 (19.1 x 9.5)
5/8 (15.9)	0140199	11/16 x 5 (17.5 x 127.0)	10	0140204 (SDS)	15/16 x 3/8 (23.8 x 9.5)
				0140205 (SDS Max)	15/16 x 3/4 (23.8 x 19.1)
3/4 (19.1)	0140200	1 x 6-3/4 (25.4 x 171.5)	10	0140205 (SDS Max)	1- 1/8 x 3/4 (28.6 x 19.1)
1 (25.4)	0140202	1-1/8 x 8-1/4 (28.6 x 209.6)	10	0140205 (SDS Max)	1- 1/2 x 3/4 (38.1 x 19.1)

*Capsules can be stacked for deeper embedments and higher strengths.

** A7C-DD setting tools can be used in SDS-drive rotary hammer drills. A7C-DSM setting tools can be used in SDS Max rotary hammer drills.

*** Provided by contractor.

Maxima 7 Capsule — Installation Components

Adapter | Socket | Double Nut | Chisel Pointed Rod | Capsules

PERFORMANCE TABLES

Impact Hammer-In Capsules

Tension Loads for Reinforcing Bar Installed in 4000 PSI Solid Concrete

REBAR SIZE	DRILL HOLE DIAMETER In. (mm)	YIELD STRENGTH GRADE 60 REBAR Lbs. (kN)	EMBED TO EXCEED YIELD In. (mm)	NUMBER OF IMPACT CAPSULES (PART NO.)	ULTIMATE STRENGTH GRADE 60 REBAR Lbs. (kN)	EMBED TO EXCEED ULTIMATE In. (mm)	NUMBER OF IMPACT CAPSULES (PART NO.)
#3	1/2 (12.7)	6,600 (29.4)	3-1/2 (88.9)	1 (EIC-38)	9,900 (44.0)	7 (177.8)	2 (EIC-38)
#4	5/8 (15.9)	12,000 (53.4)	4 (101.6)	1 (EIC-12)	18,000 (80.1)	8 (203.2)	2 (EIC-12)
#5	3/4 (19.1)	18,600 (82.7)	5 (127.0)	1 (EIC-58)	27,900 (124.1)	10 (254.0)	2 (EIC-58)
#6	7/8 (22.2)	26,400 (117.4)	6-5/8 (168.3)	1 (EIC-34)	39,600 (176.2)	13-1/4 (336.6)	2 (EIC-34)

Impact Hammer-In Capsules

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

THREADED ROD DIA. In. (mm)	DRILL HOLE DIA. In. (mm)	HOLE DEPTH In. (mm)	MAX TORQUE (FT-LB)	ALLOWABLE WORKING LOADS Lbs. (kN)							
				BASED ON BOND STRENGTH		BASED ON STEEL STRENGTH					
				4000 PSI 27.6 (MPa) CONCRETE	≥2000 PSI 13.8 (MPa) CONCRETE	ASTM A307		ASTM A193 GR. B7		AISI 304SS	
				TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR
3/8 (9.5)	7/16 (11.1)	3-5/8 (92.1)	27	1,846 (8.2)	1,390 (6.2)	2,080 (9.3)	1,040 (4.6)	4,340 (19.3)	2,170 (9.7)	3,995 (17.8)	1,995 (8.9)
1/2 (12.7)	9/16 (14.3)	4-3/8 (111.1)	40	3,270 (14.5)	2,415 (10.7)	3,730 (16.6)	1,870 (8.3)	7,780 (34.6)	3,895 (17.3)	7,155 (31.8)	3,585 (15.9)
5/8 (15.9)	11/16 (17.5)	5 (127.0)	80	4,780 (21.3)	4,045 (18.0)	5,870 (26.1)	2,940 (13.1)	12,230 (54.4)	6,125 (27.2)	11,250 (50.0)	5,635 (25.1)
3/4 (19.1)	7/8 (22.2)	6-3/4 (171.5)	160	6,090 (27.1)	4,690 (20.1)	8,490 (37.8)	4,250 (18.9)	17,690 (78.7)	8,855 (39.4)	14,860 (66.1)	7,440 (33.1)

Maxima 7 Spin-In Capsules

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

THREADED ROD DIA. In. (mm)	DRILL HOLE DIA. In. (mm)	HOLE DEPTH In. (mm)	MAX TORQUE (FT-LB)	ALLOWABLE WORKING LOADS Lbs. (kN)							
				BASED ON BOND STRENGTH		BASED ON STEEL STRENGTH					
				4000 PSI 27.6 (MPa) CONCRETE	≥2000 PSI 13.8 (MPa) CONCRETE	ASTM A307		ASTM A193 GR. B7		AISI 304SS	
				TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR
3/8 (9.5)	7/16 (11.1)	3-5/8 (92.1)	27	2,740 (12.2)	1,305 (5.8)	2,080 (9.3)	1,040 (4.6)	4,340 (19.3)	2,170 (9.7)	3,995 (17.8)	1,995 (8.9)
1/2 (12.7)	9/16 (14.3)	4-3/8 (111.1)	40	4,290 (19.1)	2,005 (8.9)	3,730 (16.6)	1,870 (8.3)	7,780 (34.6)	3,895 (17.3)	7,155 (31.8)	3,585 (15.9)
5/8 (15.9)	11/16 (17.5)	5 (127.0)	80	6,625 (29.5)	3,990 (17.7)	5,870 (26.1)	2,940 (13.1)	12,230 (54.4)	6,125 (27.2)	11,250 (50.0)	5,635 (25.1)
3/4 (19.1)	1 (25.4)	6-3/4 (171.5)	160	7,430 (33.0)	5,030 (22.4)	8,490 (37.8)	4,250 (18.9)	17,690 (78.7)	8,855 (39.4)	14,860 (66.1)	7,440 (33.1)
1 (25.4)	1-1/8 (28.6)	8-1/4 (209.6)	270	12,050 (53.6)	9,385 (41.7)	15,180 (67.5)	7,590 (33.7)	31,620 (140.7)	15,810 (70.3)	26,560 (118.1)	13,285 (59.1)

1 Use lower value of either bond or steel strengths for allowable tensile and shear loads.

High-Performance Drop-in Anchor

Power-Sert®

Description

The Power-Sert® is an internally threaded epoxy system anchor. The anchor offers vibrational resistance, close spacing and edge distance benefits like an epoxy anchor along with the advantage of removing and reinserting the bolt if needed, like a drop-in.

Features and Benefits

- High Holding Values
- Instant Holding Power
- Thru-Hole Installation
- Easy to Install
- Shallow Embedment
- Close Edge Distance and Spacing
- Vibration Resistant

How to Install

Always wear safety glasses. Follow the drill manufacturer's safety instructions. Use only solid carbide tipped drill bits meeting ANSI B212.15 diameter standards.

1 Drill a hole perpendicular to the work surface. To assure full holding power, do not ream the hole or allow the drill to wobble.

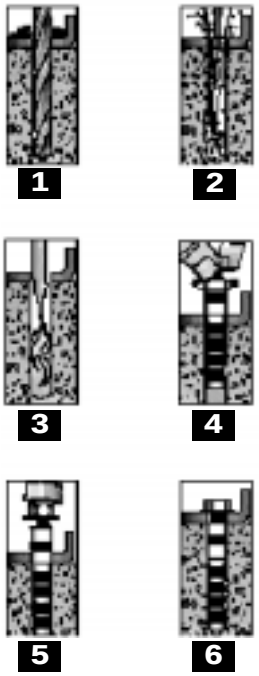
2 Clean the hole using compressed air and a nylon brush. Dust and debris left in the hole will significantly reduce the holding capacity of the anchor.

3 **Inject Unitex® Pro-Poxy 300 Fast Two-Part Structural Epoxy into hole to approximately half full.**

4 Choose a bolt equal in length to the thread depth plus the material depth. Thread bolt into POWER-Sert® anchor so that the offset is equal to the thickness of material to be fastened. Insert POWER-Sert® anchor into hole to shoulder with slight twisting motion.

5 Drive home anchor with several sharp hammer blows to the head of the unit.

6 Allow epoxy to cure prior to applying maximum load.



High Performance Drop-In Power-Sert Anchor

Part No.	Bolt Size	Thread Depth (in)	Drill Size (in.)	Hole Depth (in.)	Anchors per 22 oz. Cartridge
0123098	1/4	1/2	5/16	1-3/4	900
0123099	5/16	3/4	7/16	2-3/4	230
0123100	3/8	1	1/2	3-1/4	180
0123101	1/2	1-1/8	5/8	4-1/8	60
0123102	5/8	1-1/2	7/8	6-1/4	38
0123103	3/4	1-1/2	1	7-1/2	20
0123104*	7/8	1-1/2	2	5-1/2	4
0123105	1	2-3/4	1-1/2	9-1/2	4

Number of anchors per cartridge is for estimates only and does not supersede engineer specifications.

* Di-electric Power-Sert anchor (with non-conductive sleeve).

Maximum Tensile and Shear Capacities for Static Loads

Bolt Size	Concrete Strength (PSI)	Tension (lbs.)	Source	Shear (lbs.)	Source
1/4	4000	2540	1		
5/16	4000	6250	1		
3/8	3000	10000	3	7600	2
1/2	3000	19000	3	9245	2
5/8	3000	28000	3		
3/4	3000	46000	3		
7/8	6130	43333	2		
1	3000	64000	3		

Allowable Tensile and Shear Capacities for Static Loads

Based on 4:1 Safety Factor

Bolt Size	Concrete Strength (PSI)	Tension (lbs.)	Source	Shear (lbs.)	Source
1/4	4000	635	1		
5/16	4000	1562.5	1		
3/8	3000	2500	3	1900	2
1/2	3000	4750	3	2311	2
5/8	3000	4750	3		
3/4	3000	11500	3		
7/8	6130	10833	2		
1	3000	16000	3		

Sources

1. United Industries Corp. Internal Laboratory
2. SGS U.S. Testing Co., Inc. Tulsa, OK
3. Interpolated from independent tests verified by Maximum Technologies, Inc., Kansas City, KS

Notes

1. Information provided only for use by qualified engineer. Use of technical data by persons not qualified could cause serious damage or injury.
2. Ultimate loads shown. The allowable load chart is determined using a 4:1 safety factor as shown in chart above.
3. Use only ANSI B212.15 drill bit dimensions.
4. Minimum edge distance and spacing requirements met.
5. Use lower value of Power-Sert allowable capacity and fastener capacity.

Tapcons®

Use in: Concrete, block and brick
Use with: No other fastener needed.

Characteristics
The Tapcon® anchor is a heat-treated carbon steel anchor with an alternating high-low thread form. With a properly drilled hole, this thread form provides the cutting and penetration while providing stability. Anchors are available in diameters of 3/16" and 1/4" and are available in various lengths. Two head styles are also available: slotted hex head or Phillips flat head.

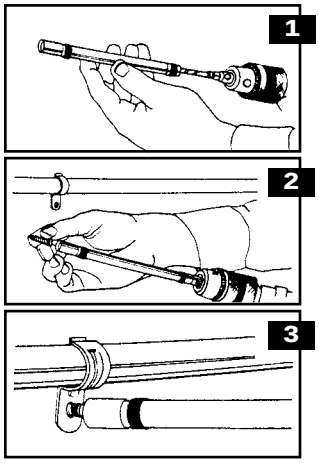
Installation Steps

Note: The Tapcon® is designed to be embedded in concrete or block a minimum of 1" and a maximum of 1-3/4". (Refer to selection guide)

1 With sleeve off and appropriate drill bit exposed, drill pilot hole 1/4" deeper than the recommended anchor embedment. Snap in proper anchor socket onto end of sleeve over drill bit.

2 Insert head of anchor into hex or Phillips socket.

3 Put point of anchor into pre-drilled hole and drive until anchor is fully seated.



Selection Guide

Part Number			Dia. (in.)	Length (in.)	Fixture Thickness (in. - in.)
Hex Head	Phillips Flat Head	Drill Bit			
51530	51550	51570	3/16	1-1/4	0 – 1/4
51531	51551			1-3/4	1/4 – 3/4
51532	51552	51571		2-1/4	3/4 – 1-1/4
51533	51553			2-3/4	1-1/4 – 1 3/4
51534	51554	51572		3-1/4	1-3/4 – 2-1/4
51535	51555			3-3/4	2-1/4 – 2-3/4
51536	51556			4	2-1/2 – 3
51540	51560	51573	1/4	1-1/4	0 – 1/4
51541	51561			1-3/4	1/4 – 3/4
51542	51562	51574		2-1/4	3/4 – 1-1/4
51543	51563			2-3/4	1-1/4 – 1-3/4
51544	51564	51575		3-1/4	1-3/4 – 2-1/4
51545	51565			3-3/4	2-1/4 – 2-3/4
51546	51566			4	2-1/2 – 3
51547	51567	51576		5	3-1/4 – 4
51548	51568	51577		6	4-1/4 – 5

Notes
5/32" diameter bit is used for 3/16" anchors and 3/16" diameter drill bit for the 1/4" anchor.

Installation Tools	Part Number
Condrive 1000	51580
Condrive 2000	51581
Condrive 500	0133000

- The Condrive 1000 is a multi-purpose tool designed for the installation of Tapcon® hex-head and Phillips flathead anchors.
- The Condrive 2000 is a one-step tool designed specifically for the repetitive installation of hex-head Tapcon® anchors.

Ultimate Tensile and Shear Capacities

Anchor Dia. (in.)	Embedment (in.)	Stone Aggregate (1) 2000 PSI Tension (lbs.)	2000 PSI Shear (lbs.)	3000 PSI Tension (lbs.)	3000 PSI Shear (lbs.)	4000 PSI Tension (lbs.)	4000 PSI Shear (lbs.)	5000 PSI Tension (lbs.)	5000 PSI Shear (lbs.)	Hollow Block (2) Tension (lbs.)	Hollow Block (2) Shear (lbs.)
3/16	1	240	740	320	840	400	840	440	860	209	
	1-1/4	440	780	560	840	600	840	640	860	357	731
	1-1/2	640	820	840	860	880	880	920	900	468	
	1-3/4	760	920	1040	1020	1120	1020	1240	1020	547	
1/4	1	520	1120	720	1460	800	1560	920	1660	406	
	1-1/4	840	1280	1120	1600	1240	1660	1400	1740	615	1058
	1-1/2	1120	1280	1520	1620	1600	1680	1680	1760	851	
	1-3/4	1320	1500	1840	2140	2040	2160	2240	2200	984	

Allowable Tensile and Shear Capacities Based on 4:1 Safety Factor

Anchor Dia. (in.)	Embedment (in.)	Stone Aggregate (1) 2000 PSI Tension (lbs.)	2000 PSI Shear (lbs.)	3000 PSI Tension (lbs.)	3000 PSI Shear (lbs.)	4000 PSI Tension (lbs.)	4000 PSI Shear (lbs.)	5000 PSI Tension (lbs.)	5000 PSI Shear (lbs.)	Hollow Block (2) Tension (lbs.)	Hollow Block (2) Shear (lbs.)
3/16	1	60	185	80	210	100	210	110	215	52	
	1-1/4	110	195	140	210	150	210	160	215	89	182
	1-1/2	160	205	210	215	220	220	230	225	117	
	1-3/4	190	230	260	255	280	255	310	255	137	
1/4	1	130	280	180	365	200	390	230	415	102	
	1-1/4	210	320	280	400	310	415	350	435	154	264
	1-1/2	280	320	380	405	400	420	420	440	213	
	1-3/4	330	375	460	535	510	540	560	550	246	

Notes
1. Information provided only for use by qualified engineers. Use of technical data by persons not qualified could cause serious damage or injury.
2. Ultimate values shown. The allowable load chart is determined using 1/4 of the maximum tensile and shear capacities for a 4:1 safety factor.
3. Shear and tensile values shown are for anchors installed in limestone or stone aggregate concrete having the designated compressive strength at the time of installation.
4. Tested to ASTM E488 Test Standard
5. Use only ANSI B212.15 drill bit dimensions.
6. The anchors are installed a minimum of 12 diameters on center with a minimum edge distance of 10 diameters for full anchor capacity. Spacing and edge distance may be reduced to 6 diameter spacing and 5 diameter edge distance provided values are reduced 50%. Linear interpolation may be used for intermediate spacing and edge margins.

Sources (available upon request):

(1) ICBO Report #3370

(2) Pittsburgh Testing Laboratory Test #CH 3748

Crete-Flex™ Stainless Steel Masonry Fastening System

Use in: Concrete, block or brick
Use with: No other fastener needed

Characteristics

The Crete-Flex anchor is a heat-treated 410 stainless steel anchor with a corrosion resistant finish. With a properly drilled hole, the #14-10 thread form provides the cutting and penetration while providing stability. Two head styles are available: 5/16" hex washer head or #3 Phillips.

Installation Steps

Note: The Crete-Flex is designed to be embedded in concrete or block a minimum of 1" and a maximum of 1-3/4".

1. Drill hole with appropriate drill bit (#62276 or #62277 SDS) 1/4" deeper than the recommended anchor embedment.
2. Put anchor into pre-drilled hole and turn until anchor is fully seated.

Part Number				
Hex Head	Phillips Flat Head	Dia.	Length (in.)	Fixture Thickness (in.-in.)
51370	51380	#14	1-1/4	0 – 1/4
51371	51381		1-3/4	1/4 – 3/4
51372	51382		2-1/4	3/4 – 1-1/4
51373	51383		2-3/4	1-1/4 – 1-3/4
0150132	0150139		3-1/4	1-3/4 – 2-1/4
0150133	0150140		3-3/4	2-1/4 – 2-3/4
0150134	0150141		4	2-1/2 – 3
0150135	0150142		5	3-1/4 – 4
0150136	0150143		6	4-1/4 – 5

0.234 Drill Bit Part Number
62276 Carbide Tipped Tang Drill Bit, 4-1/2" length
62277 Hex Collared SDS Bit, 3" length
0150149 Crete-Flex Drive Tool

Note: Tapcon drill bits can not be substituted because their diameter is only 0.204"

0150144	5-1/2
0150145	7-1/2
0150146	7-1/2 SDS
0150147	8-1/4

Ultimate Tensile and Shear Capacities

Embedment (in.)	Tension (lbs.)	Shear (lbs.)
1	813	1302
1-3/4	1488	2260

Allowable Tensile and Shear Capacities Based on 4:1 Safety Factor

Embedment (in.)	Tension (lbs.)	Shear (lbs.)
1	203	326
1-3/4	372	565

Notes

1. Information provided only for use by qualified engineers. Use of technical data by persons not qualified could cause serious damage or injury.
2. Ultimate values shown. The allowable load chart is determined using a 4:1 safety factor as shown in the chart.
3. Shear and tensile values shown are for anchors installed in limestone or stone aggregate concrete having the designated compressive strength at the time of installation.
4. Tested to ASTM E488 Test Standard
5. Use only ANSI B212.15 drill bit dimensions
6. Minimum edge distance and spacing requirements met.

Redi-Drive® Anchors

Approvals/Listings:
Meets or exceeds U.S. Government G.S.A. Specification FF-S-325 Group VI

Factory Mutual (3/8" pipe-drive)

Use in: concrete, block and brick
Use with:

Characteristics

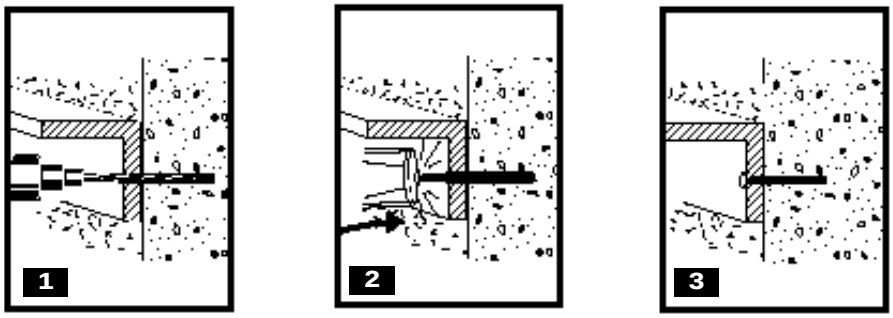
Specified for anchorage into concrete, block and brick.

The Redi-Drive is a high performance small diameter one-piece hammer-drive anchor. The anchor holds based on a friction principle—the shank diameter is larger than the drill hole size. Anchors shall be installed with carbide-tipped hammer drill bits made in accordance to ANSI B212.15.

The Redi-Drive is available in four types: mushroom head, pipe-hanging (1/4" & 3/8" FM approved on 3/8"), Tie-Wire, and double-head forming versions.

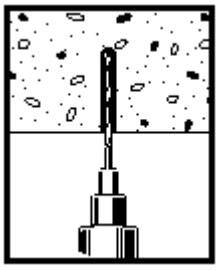
Installation (See diagram)

1. Drill a 3/16" diameter hole (1/4" for 3/8" pipe drive) at a minimum depth (see chart). Clean hole.
2. Insert anchor through material to be fastened (insert tie-wire or pipe version Redi-Drive Anchors into drilled holes) and drive anchor with a 3-lb. hammer until the head is flush with surface or desired embedment.
3. Anchor is now set.

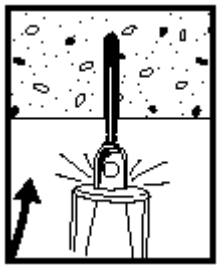


Installation Steps for Redi-Tie-Drive

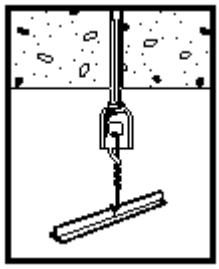
1. Drill 3/16" diameter hole in concrete.



2. Hammer in flat side of Redi-Drive 1-1/4".

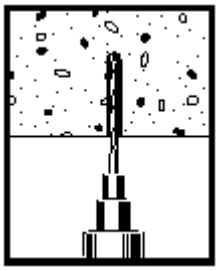


3. The Redi-Drive is set. Tie acoustical or electrical drop wire to open hole.

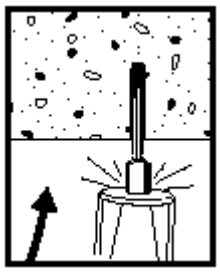


Installation Steps for Redi-Pipe-Drive

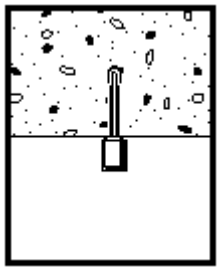
1. Drill 3/16" diameter hole for 1/4" anchor (1/4" diameter hole for 3/8" anchor).



2. Hammer in coupler end of anchor 1-1/4" for 1/4" anchor (1-3/4" for 3/8" anchor).



3. The Redi-Drive is set. Run 1/4" or 3/8" threaded rod or bolt into anchor.



Redi-Drive Anchors Selection Set

Fastenal Part No.	Clearance Hole Size (in.)	Total Length (in.)	Drill Size (in.)	Minimum Embedment (in.)	Head Diameter (in.)	Minimum Fixture Thickness
0131900	1/4	3/4	3/16	11/16	7/16	1/16
0131901	1/4	1-1/8	3/16	3/4	7/16	3/8
0131902	1/4	1-5/8	3/16	3/4	7/16	7/8
0131903	1/4	2	3/16	3/4	7/16	1-1/4
0131904	1/4	2-1/2	3/16	3/4	7/16	1-3/4
0131905	1/4	3	3/16	3/4	7/16	2-1/4

Redi-Drive Pipe/Tie Anchors

Fastenal Part No.	Clearance Hole Size (in.)	Total Length (in.)	Drill Size (in.)	Minimum Embedment (in.)	Head Diameter (in.)	Head Height (in.)	Head I.D. (in.)	
0131906	1/4	2-1/8	3/16	1-1/4	13/32	5/8	1/4/20	
0131907	1/4	2-1/2	3/16	1-3/4	9/16	3/4	3/8-16	← Pipe
0131917	3/8	2-1/8	1/4	1-1/4	3/16	5/8	9/32 Hole	← Tie Wire

Redi-Drive Static Loads – Ultimate Shear and Tension Values

Anchor Type	Embedment (in.)	4500 PSI		CMU (hollow block) PSI		CMU (gout filled) PSI	
		Tension (lbs)	Shear (lbs)	Tension (lbs)	Shear (lbs)	Tension (lbs)	Shear (lbs)
Redi-Drive/	3/4	1,215	1,857	382	683	731	1,614
Redi-Form	1	1,667	3,112	392	987	870	1,766
Drive	1-1/4	2,373	3,355	398	1,381	1,543	2,778
Tie-Drive or 1/4 Pipe-Drive	1-1/4	2,372					
3/8 Pipe-Drive	1-1/2	2,090					

Safe working loads for single installations under static loading conditions should not exceed 25% of ultimate capacity.

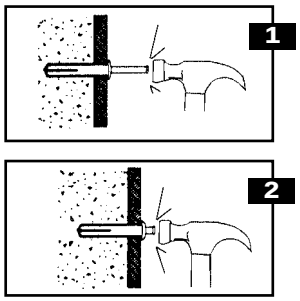
Pin Bolt Drive Anchor

Use in: Concrete, block, brick or stone
Use with: No other fastener needed
Made of: Carbon steel or stainless steel

Characteristics
Pin Bolt Drive anchor are light-duty anchors and not recommended for dynamic loads, sub-zero temperatures or overhead applications.

GSA Specification FF-S-325 Group V, Type 2, Class 3

Installation Steps
1. Position fixture and drill hole.
2. Using a hammer, gently drive pin flush into recessed hole of expansion plug.



Selection Guide

Part Number		Anchor Size (in x in)	Drill Dia (in.)	Max. Fixture Thickness (in.)	Embed-ment (in.)	Tension (lbs.)
Zinc Plated	S/S					
50502	50794	3/16 x 7/8	3/16	1/4	5/8	400
50503	50795	1/4 x 3/4	1/4	1/8	5/8	500
50504	50798	1/4 x 1		1/4	3/4	800
50505	50799	1/4 x 1-1/4		1/2	3/4	800
50506	50800	1/4 x 1-1/2		3/4	3/4	800
50507	50801	1/4 x 2		1-1/4	3/4	800

Minimum Hole Depth =
Anchor Length + 1/4" - Fixture Thickness

Notes
Test data represents average ultimate load sustained in concrete having minimum compressive strength of 3000 psi. Should be assigned a minimum of a 4:1 safety factor to determine allowable load.

Nylon Nailin Anchor

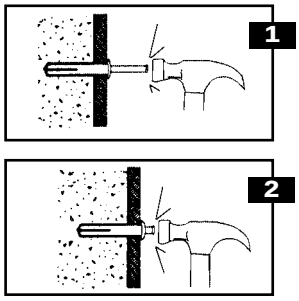
Use in: Concrete, block, brick or wall board
Use with: No other fastener needed
Made of: Polymer body with either a polymer or metal pin

Characteristics
The pin drive with polymer pin works well in softer substrates, such as plaster or cement block. Excellent when fastening to a thin gauge frame or into void spaces where the legs can spread apart. Will also hold in hard substrates but hole size is critical. The metal pin is widely used where the extra strength is needed and has found uses in the truck-trailer and construction industry.

Installation Steps

1 Position fixture and drill hole.

2 Using hammer, gently drive pin flush into recessed hole of expansion plug.



Anchor Dia (in.)	Anchor Length (in.)	Part Numbers Mushroom Head Steel Pin	Mushroom Head All Nylon	Flat Head Steel Pin	Round Head Steel Pin
3/16	3/4	50802	50840	50822	
	1	50803	50841	50823	50833
	1-1/2	50812	50842	50824	50834
1/4	3/4	50804		50825	
	1	50805		50826	50836
	1-1/2	50806		50827	50837
	2	50807		50828	50838
	3	50808			
	4	50809			
	6	50810			

Split Drive Anchor

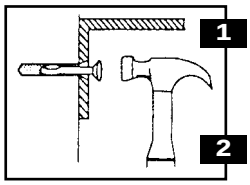
Use in: Concrete or stone
Use with: No other fastener needed

Characteristics
Split drive anchors are one-piece, pre-expanded anchors designed for use in concrete and stone. As the anchor is driven into the base material, the two sheared halves of the expansion mechanism are compressed to match the diameter of the drilled hole. Once seated at the required embedment, the sheared halves of the expansion mechanism exert a continuous compressive force against the wall of the hole. The split drive anchor is available in three head styles: The countersunk style is particularly suited for wood-to-concrete anchoring. The tie wire anchor is used for suspended ceiling applications. The round head style could be used for other applications requiring fast, permanent installations.

Installation Steps

1 Position fixture and drill hole to diameter of anchor.

2 Insert split drive anchor and hammer flush with fixture.



Selection Guide and Ultimate Tension Capacity in 3,500 PSI Concrete

Part Number		Dia.	Length	Min. Depth	Tension
Countersunk	Round Head	(in.)	(in.)	(in.)	(lbs.)
50602	50622	3/16	1	7/8	1050
50603	50623		1-1/2		
50604			2		
50605			2-1/2		
	50624	1/4	1-1/4	1-1/8	1595
50606	50625		1-1/2		
50607	50626		2		
50608	50627		2-1/2		
50609			3		
50610			3-1/2		
50611			4		
	50628	3/8	2	1-7/8	
	50632		2-1/2		
	50629		3-1/2		
	50630	1/2	3	2-5/8	

	Part No.	Size
Tie Wire	50652	1/4" x 1 3/4"
Setting Tool	50653	

Notes
On-site testing should be conducted if actual data is desired. Shield lengths and tension values may vary depending upon the manufacturer.

1. Information provided only for use by qualified engineers. Use of technical data by persons not qualified could cause serious damage or injury.
2. Ultimate values shown. For static loads, use 1/4 of the maximum tensile and shear capacities for the recommended 4:1 safety factor.
3. Shear and tensile values listed are for anchors installed in stone aggregate concrete having the designated ultimate compressive strength at the time of installation.
4. Tested to ASTM E488 Test Standard.
5. Minimum edge distance and spacing requirements met.

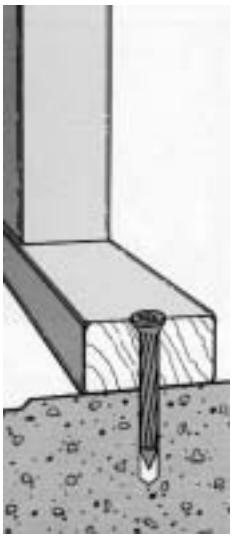
Perma-Grip™ Masonry Fasteners

Use in: Concrete, block or brick
Use with: No other fastener needed

Features:
- No Special driving tools required
- Hot Dip Galvanized
- Control of Embedment
- Compatible with steel and plastic stress plates

Installation Steps:
1. With appropriate drill bit, drill hole 1/4" deeper than the engagement of the fastener
2. Tap the Perma-Grip until securely seated.

Part Number	Length (in.)
51620	1-1/8
51621	1-1/2
51622	2
51623	2-1/2
51624	3
51625	3-1/2
51626	4
51627	4-1/2
51628	5
51629	5-1/2
51630	6
51631	6-1/2
51632	7
51633	8
51634	10



In selecting the fastener length, for most substrates add 1" (25mm) to the fixture thickness.

Average Ultimate Tensile and Shear Capacities

Embed-ment	3750 PSI Concrete		Hollow Block	
(in.)	Tension (lbs.)	Shear (lbs.)	Tension (lbs.)	Shear (lbs.)
3/4	420		240	
1	1016	2294	380	1580
1-1/2		2994		1614

Allowable Ultimate Tensile and Shear Capacities Based on 4:1 Safety Factor

Embed-ment	3750 PSI Concrete		Hollow Block	
(in.)	Tension (lbs.)	Shear (lbs.)	Tension (lbs.)	Shear (lbs.)
3/4	105		60	
1	254	574	95	395
1-1/2		749		404

Notes

1. Information provided only for use by qualified engineers. Use of technical data by persons not qualified could cause serious damage or injury.
2. Performance of the Perma-Grip Masonry Fastener is subject to quality of the masonry material, embedment depth and proper hole size.
3. Ultimate values shown. The allowable load chart is determined using a 4:1 safety factor as shown in the chart. Reference should always be made to any applicable codes for any other specific safe working load requirement.
4. Use 3/16" drill bit meeting ANSI B212.15 dimensions (0.198" - 0.206").

Lag-Shield Anchor (Short and Long)

Use in: Mortar joint and concrete
Use with: Lag bolt

Characteristics
Lag-shield anchors are designed for medium, to heavy loads of static, dynamic or vibrational loading conditions depending on the base material. The anchors can be used in all atmospheric conditions. Select an appropriate bolt length to assure full thread engagement in anchor. Bolt length should equal the shield length plus the thickness of the fixture.

Installation
In mortar joints, install anchor to expand against the brick or block.

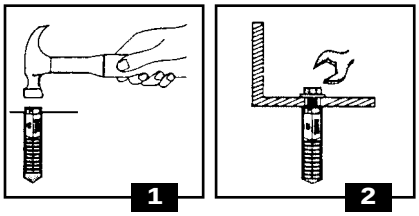
1. Drill hole and insert anchor until flush with surface.
2. Position fixture, insert lag bolt and tighten.

GSA Specification FF-S-325 Group II, Type 1, Classes 1 & 2

Selection Guide

Short Lag Shield Part Number	Anchor Size (in.)	Drill Dia. (in.)	Shield Length (in.)
51202	1/4	1/2	1
51203	5/16	1/2	1-1/4
51204	3/8	5/8	1-3/4
51205	1/2	3/4	2
51206	5/8	7/8	2
51207	3/4	1	2

Long Lag Shield Part Number	Anchor Size (in.)	Drill Dia. (in.)	Shield Length (in.)
51212	1/4	1/2	1-1/2
51213	5/16	1/2	1-3/4
51214	3/8	5/8	2-1/2
51215	1/2	3/4	3
51216	5/8	7/8	3-1/2
51217	3/4	1	3-1/2



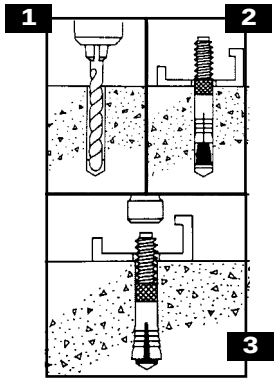
Notes
On-site testing should be conducted if actual data is desired. Shield lengths and tension values may vary with manufacturer.

Set-Bolt Anchor

Use in: Concrete
Use with: No other fastener needed

Installation

1. Drill same diameter hole as anchor to embedment specifications and clean hole.
2. Insert the plug into the bottom of the drilled hole then insert the anchor, threaded end up.
3. To secure the anchor, use a hammer to drive the anchor over the plug.



GSA Specification FF-S-325 Group VIII, Type 2

Selection Guide

Part Number	Size Drill/Anchor (in.)	Total Length (in.)	Stud Length (in.)	Thread Length (in.)	Min. Embed. (in.)	Maximum Capacities Tension (lbs.)	Maximum Capacities Shear (lbs.)
50702	1/4	1-3/4	3/4	5/8	1-3/8	1500	1640
50703		2-1/4	1-1/8	7/8			
50704		3-1/4	2-1/8	7/8			
50705	3/8	2-1/4	1	3/4	1-5/8	3160	3360
50706		3	1-5/8	1-1/4			
50707		3-3/4	2-1/4	1-1/4			
50709	1/2	2-3/4	1-1/8	7/8	1-7/8	4020	5100
50710		4-1/4	2-1/2	2			
50711		5-1/4	3-5/8	2			
50712	5/8	3-3/8	1-3/8	1	2-3/8	5520	6820
50713		5	3	2-1/4			
50714		7	5	2-1/4			
50715	3/4	4-1/4	1-3/4	1-3/8	2-7/8	7520	8560
50716		6-1/4	3-3/4	2-1/2			
50717		8-1/2	6	2-1/2			

Notes

1. Information provided only for use by qualified engineers. Use of technical data by persons not qualified could cause serious damage or injury.
2. All values shown are for ITW Ramset/Red Head Anchors.
3. Ultimate values shown. For static loads, use 1/4 of the maximum tensile and shear capacities for the recommended 4:1 safety factor.
4. Shear and tensile values listed are for anchors installed in 4000 psi crushed limestone aggregate concrete.
5. Tested to ASTM E488 Test Standard.
6. Minimum edge distance and spacing requirements met.

   Sources (available upon request): ICBO Report #1372

You can e-mail your technical or engineering questions to:
engineer@fastenal.com

SINGLE BOLT, DOUBLE EXPANSION SHIELD, & FOUR-WAY EXPANSION SHIELD ANCHORS

Single Bolt Anchor

Use in: Concrete, brick or stone
Use with: Machine bolt

Characteristics
Single bolt anchors are general-purpose expansion shield anchors made of a rustproof alloy. The anchor shield locks in the masonry as the bolt is tightened and will remain secure even if the bolt is removed. Bolt length should equal the shield length plus the thickness of the fixture.

Installation

1. Drill hole to size as required
2. Insert anchor, threaded end first.
3. Insert bolt and tighten.

GSA Specification FF-S-325 Group II, Type 2, Class 2, Style 1

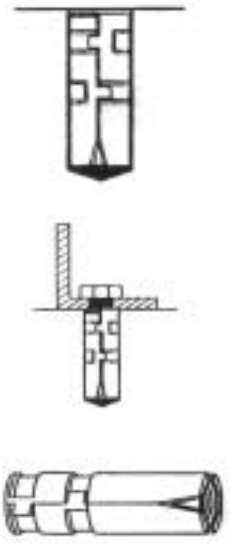
Selection Guide

Ultimate Tension Capacity in 4000 psi Concrete

Part Number	Anchor Size (in.)	Drill Dia. (in.)	Shield Length (in.)	Tension (lbs.)
51131	1/4	1/2	1-5/16	1590
51132	5/16	5/8	1-1/2	1800
51133	3/8	5/8	1-1/2	1900
51134	1/2	7/8	2	2800
51135	5/8	1	2-5/8	4500
51136	3/4	1-1/4	2-3/4	7150

Notes
On-site testing should be conducted if actual data is desired. Shield lengths and tension values may vary depending upon the manufacturer.

1. Information provided only for use by qualified engineers. Use of technical data by persons not qualified could cause serious damage or injury.
2. Ultimate values shown. For static loads, use 1/4 of the maximum tensile and shear capacities for the recommended 4:1 safety factor.
3. Shear and tensile values listed are for anchors installed in stone aggregate concrete having the designated ultimate compressive strength at the time of installation.
4. Tested to ASTM E488 Test Standard.
5. Minimum edge distance and spacing requirements met.



Double Expansion Shield Anchor

Use in: Concrete, brick or stone
Use with: Machine screw or bolt

Characteristics
Double expansion shield anchors are mechanically expanded machine bolt expansion shields. This type of anchor is suitable for use in all types of solid masonry where medium to heavy holding power is required. They can be used under static, variable and vibratory loading conditions.

Installation

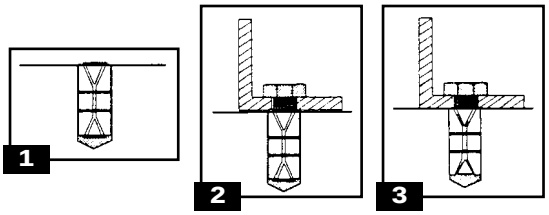
1. Drill hole to specified diameter at least the length of the shield.
2. Insert anchor, threaded cone first.
3. Position fixture and insert screw or bolt and tighten.

GSA Specification FF-S-325 Group II, Type 2, Class 2, Style 2

Selection Guide and Ultimate Tension Capacity in 3,500 PSI Concrete

Part Number	Size (in.)	Drill Dia. (in.)	Tension (lbs.)
51141	1/4	1/2	1500
51142	5/16	5/8	1790
51143	3/8	3/4	2210
51144	1/2	7/8	3100
51145	5/8	1	4700
51146	3/4	1-1/4	7000

Notes
On-site testing should be conducted if actual data is desired. The length of the anchor may vary depending on manufacturer.



For maximum expansion, the anchor should protrude slightly above surface of masonry prior to setting.

Four-Way Expansion Shield Anchor

Use in: Concrete, brick, block or stone
Use with: Machine screw or bolt

Characteristics
Four-Way anchors are mechanically expanded machine bolt expansion shields designed for medium loads under static conditions.

Installation

1. Drill hole to specified diameter at least the length of the shield.
2. Insert anchor and position fixture.
3. Insert machine screw and tight

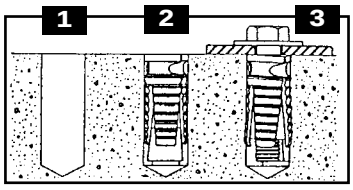
Ensure machine screw is proper length prior to installing.

GSA Specification FF-S-325 Group II, Type 2, Class 1

Selection Guide

Part Number	Size (in.)	Drill Dia. (in.)	Shield Length (in.)
51151	1/4	1/2	1-1/4
51152	5/16	9/16	1-1/2
51153	3/8	11/16	1-3/4
51154	1/2	7/8	2-1/4
51155	5/8	1-1/8	2-5/8
51156	3/4	1-1/4	3-3/4

Notes
On-site testing should be conducted if actual data is desired.



LEAD SCREW & LEAD MACHINE SCREW (CAULK-IN) ANCHOR

Lead Screw Anchor

Use in: Concrete, brick or stone
Use with: Sheet metal or wood screw
Material: Lead alloy

Characteristics
Lead Screw anchors are light-duty anchors to be used with sheet metal or wood screws. This product is recommended only for light-duty static loads where holding power is not a critical factor.

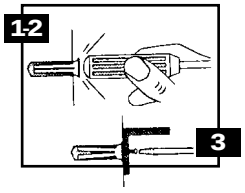
Installation
1. Drill hole to specified diameter at least the length of the anchor.
2. Insert anchor and tap flush with base material surface.
3. Position fixture, insert screw and tighten.

Screw length should be determined by the length of the anchor plus 1/8" plus the thickness of the fixture.

GSA Specification FF-S-325 Group IV, Type 1

Selection Guide

Part Number	Anchor Size	Drill Dia. (in.)	Length (in.)
50992	6–8 x 3/4"	1/4	3/4
50993	6–8 x 1"	1/4	1
50994	6–8 x 1-1/2"	1/4	1-1/2
50995	10–14 x 1"	5/16	1
50996	10–14 x 1-1/2"	5/16	1-1/2
50997	16–18 x 1-1/2"	3/8	1-1/2



Notes
On-site testing should be conducted if actual data is desired.

Lead Machine Screw (Caulk-In) Anchor

Use in: Concrete, brick or stone
Use with: Machine screw or bolt

Characteristics
Machine screw anchors are designed for shallow hole applications in all types of solid masonry. When properly installed, the anchor can hold light to medium loads under static conditions in most atmospheric conditions.

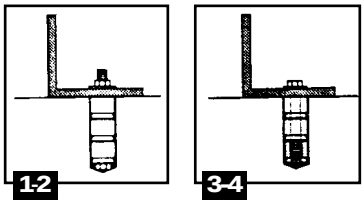
GSA Specification FF-S-325 Group I, Type 1, Class 1

Selection Guide

Part Number		Anchor Size	Drill Dia.
Anchor	Setting Tool	(dia. x length)	(in.)
51002		6–32 x 1/2"	5/16
51003	51013	8–32 x 1/2"	5/16
51004	51014	10–24 x 5/8"	3/8
51005	51015	12–24 x 7/8"	1/2
51006	51016	1/4"–20 x 7/8"	1/2
51007	51017	5/16"–18 x 1"	5/8
51008	51018	3/8"–16 x 1-1/4"	3/4
51009	51019	1/2"–13 x 1-1/2"	7/8
51010	51020	5/8"–11 x 2"	1-1/8
51011	51021	3/4"–10 x 2-1/4"	1-1/4

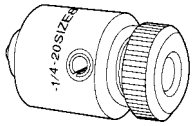
Notes
On-site testing should be conducted if actual data is desired.

Installation
1. Drill appropriate diameter hole to anchor length.
2. Insert anchor, threaded end first, into hole until anchor is flush with the surface.
3. With appropriate setting (caulking) tool, caulk lead outer sleeve with sharp hammer blows until anchor is tight.
4. Position fixture, insert fastener and tighten.



Anchor Set Tool
Screw Expander for Calk-in Anchors

Ideal for setting anchors in cinder block and for setting anchors all at the same depth. Just drill a hole and screw anchor onto the expander. Insert expander into hole and strike head with hammer.



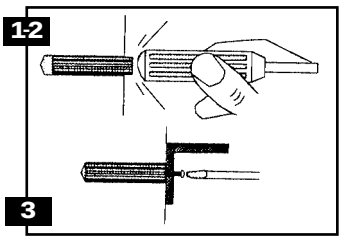
PLASTIC CONICAL, PLASTIC TUBULAR (STRAIGHT) & RAWL™ FIBER PLUG ANCHORS

Plastic Conical Anchor and Plastic Tubular (Straight) Anchor

Use in: Concrete, block or brick
Use with: Sheet metal or wood screw
Made of: Plastic

Characteristics
Plastic conical anchors and plastic tubular anchors are general purpose, expansive fasteners suitable for light loads under static conditions. These anchors can be used in all types of solid material and in all atmospheric conditions.

Installation
1. Drill hole as specified.
2. Insert anchor until the flange is flush with the surface of the base material.
3. Position fixture and install screw.



Conical Anchor Selection Guide

Part Number	Anchor Size	Drill Dia. (in.)	Min. Depth (in.)
50975	4–6 x 3/4"	3/16	3/4
50976	6–8 x 3/4"	3/16	3/4
50977	8–10 x 7/8"	3/16	7/8
50978	10–12 x 1"	1/4	1
50980	14–16 x 1 1/2"	5/16	1-1/2

Straight Anchor Selection Guide

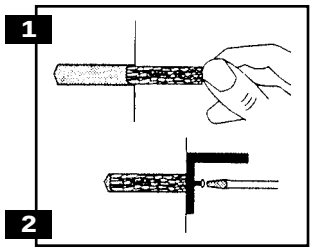
Part Number	Anchor Size	Drill Dia. (in.)	Min. Depth (in.)	Fastener Size
50981	4-6 x 1"	3/16	1	#6
50982	4-6 x 1-1/2"	3/16	1-1/2	#6
50983	7-9 x 1"	15/64	1	#8
50984	10-12 x 1"	1/4	1	#10
50985	10-12 x 1-1/4"	1/4	1-1/4	#10
50986	10-12 x 1-1/2"	1/4	1/12	#10
50987	14 x 1"	5/16	1	#14
50988	14 x 1 1/2"	5/16	1-1/2	#14
50989	3/8 x 2"	3/8	2	5/16
50990	3/8 x 2-1/2"	3/8	2-1/2	5/16

Rawl™ Fiber Plug Anchor

Use in: Concrete, block, brick or stone
Use with: Sheet metal, wood or lag screw
Made of: Braided jute with lead liner

Characteristics
Rawl™ Plug anchors are universal masonry fasteners with a unique feature which allows for "elastic compression." This feature allows the plug to absorb shock and vibration and prevents cracking of fragile or brittle masonry.

Installation
1. Position fixture and drill hole to full length of anchor.
2. Insert anchor flush with surface and install screw of same diameter as plug and tighten.



GSA Specification FF-S-325 Group I, Type 1, Class 1

Selection Guide

Part Number	Anchor Size	Drill Dia. (in.)
50961	6 x 3/4	5/32
50962	8 x 3/4	11/64
50963	8 x 1	11/64
50964	8 x 1-1/4	11/64
50966	10 x 1	3/16

Part Number	Anchor Size	Drill Dia. (in.)
50967	10 x 1-1/4	3/16
50968	10 x 1-1/2	3/16
50969	12 x 1	1/4
50970	14 x 1-1/2	9/32
50972	16 x 1-1/2	5/16
50971	20 x 2	3/8

Notes
Test data represents industry standards for average ultimate load sustained in concrete having minimum compressive strength of 3000 psi. A minimum of a 4:1 safety factor should be used when determining allowable load. On-site testing should be conducted if actual data is desired.

Ultimate Load Capacities in 3000 psi Concrete

	Sheet Metal and Wood Screws				Lag Screws
Anchor Size	#8 x 1"	#10 x 1"	#12 x 1"	#14 x 1"	3/8" x 2 1/2"
Tension (lbs.)	1190	1300	2000	2980	3225
Shear (lbs.)	240	280	350	420	1500

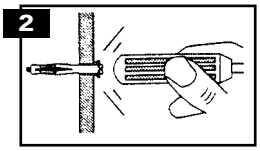
Hollow Wall Anchor

Use in: Wall board, paneling and plaster
Use with: No other fastener needed
Made of: Steel, zinc plated

GSA Specification FF-B-588C Type III

Installation

1. Drill hole completely through wall and insert anchor.
2. Tap head until the holding prongs are embedded in wall.
3. Maintain pressure with screwdriver while turning in screw until resistance is felt.



Characteristics

Hollow Wall Anchors can be used to fasten mirrors, pictures, cabinets, curtains, shelving brackets, etc., to hollow walls or ceilings made of wall board or plaster over wood or metal lath, gypsum board, etc. When fastener is expanded, the legs of the shell drawn up snugly against the back side of the wall. The expanded shell reinforces the material around the hole, providing a secure anchorage. Once expanded, the shell is permanently installed and fixtures can be exchanged simply by removing and replacing the screw. Prongs on the head of the shell prevent the fastener from rotating during expansion.

Selection Guide

Part Number	Size	Drill Dia (in.)	Wall Thickness (in.)
50902	1/8 XS	5/16	1/8 – 1/4
50903	1/8 S		1/8 – 5/8
50904	1/8 L		5/8 – 1-1/4
50905	1/8 XL		1-1/4 – 1-3/4
50906	3/16 S	3/8	1/8 – 5/8
50907	3/16 L		5/8 – 1-1/4
50908	3/16 XL		1-1/4 – 1-3/4
50909	1/4 S	7/16	1/8 – 5/8
50910	1/4 L		5/8 – 1-1/4
50911	1/4 XL		1-1/4 – 1-3/4
50921	HH 1/8 S	5/16	3/8 – 1/2

Notes

Wall thickness may vary with manufacturer.

E-Z Anchor®

Use in: Wallboard
Use with: #8 type A or AB sheet metal screw
Made of: Zinc, engineered plastic or nylon

Characteristics

E-Z Anchors® allow the fastener to make a small hole that does not disrupt the consistency of the drywall. No pre-drilling is necessary. Deep-cutting threads on the anchor provide strong engagement and resist stripping out of the wall. The tapered, oversized head seals the hole with a flush mount. The E-Z Anchor® can be used to hang pictures, mirrors, shelving and support brackets, bathroom fixtures, curtain rods, etc.

Selection Guide

Part Number	Type
50929	Plastic
50930	Metal
50931	Nylon

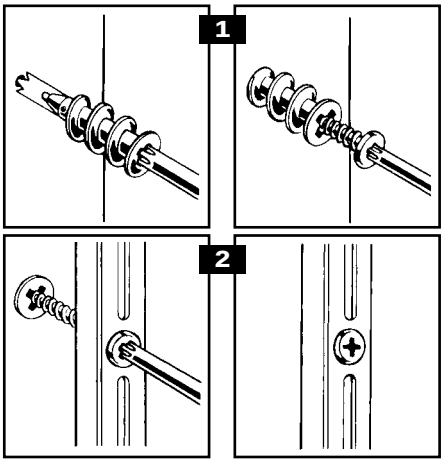
Drywall Anchor Ultimate Loads Number Gypsum Wall Board			
	3/8"	1/2"	5/8"
Tension (lbs.)	50	60	80
Shear (lbs.)	65	70	100

Notes

The load values are industry representative ultimate values and should be reduced by a minimum safety factor of four or greater when determining allowable working loads. These values are approximate industry standards for wallboard. Actual on-site testing should be conducted to determine actual values.

Installations

1. Place #2 Phillips screwdriver or cordless screwdriver with #2 Phillips bit into recess of E-Z Anchor®.
2. Press into wallboard while turning the anchor clockwise until seated flush. Place fixture in position over installed anchor and insert screw. Tighten fixture into place. A minimum of 1" thread engagement is recommended. Do not over tighten.



TOGGLE BOLTS & TOGGLER® ALLIGATOR SOLID WALL ANCHOR

Toggle Bolts

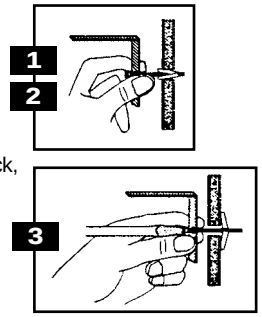
Use in: Block, plaster, wallboard or hollow tile
Use with: Machine screw
Made of: Steel, zinc plated (ASTM B-633)

Characteristics

Toggle wings are spring loaded expansion wings that are used in conjunction with a machine screw. Fastenal offers both the assembled toggle bolt with wing and the toggle wing. Because the expansion wings must fully expand, through drilling is required. The toggle bolt is placed into a pre-drilled diameter specified hole. The expansion wing folds inward to fit through the hole and inserted through the wall. This anchor can be used for hanging signs, supporting plywood, etc.

Installation

1. Drill the hole completely through the wall. Hole diameter listed are for lightweight material such as wallboard. In denser material it may be necessary to drill the hole 1/16" larger.
2. Insert the bolt through the fixture, fold wings completely back, then push through the hole until the wings are against the inside wall.
3. Tighten with screwdriver.



Notes
Actual on-site testing should be done to determine actual values.

Selection Guide

Part Number		Size (in.)	Drill Dia. (in.)
Toggle Wing Only	Toggle Bolt Assy.		
51302		1/8(6-32)	3/8
	51657	1/8 x 3	
	51658	1/8 x 4	
51303		3/16(10-24)	1/2
	51659	3/16 x 2	
	51660	3/16 x 3	
	51661	3/16 x 4	
51304		1/4-20	5/8
	51670	1/4-20 x 3	
	51671	1/4-20 x 4	
	51672	1/4-20 x 5	
	51673	1/4-20 x 6	
51305		5/16-18	7/8
	51674	5/16-18 x 3	
	51675	5/16-18 x 4	
	51676	5/16-18 x 5	
	51677	5/16-18 x 6	
51306		3/8-16	7/8
	51678	3/8-16 x 3	
	51679	3/8-16 x 4	
	51680	3/8-16 x 5	
	51681	3/8-16 x 6	
51307		1/2-13	1-1/4

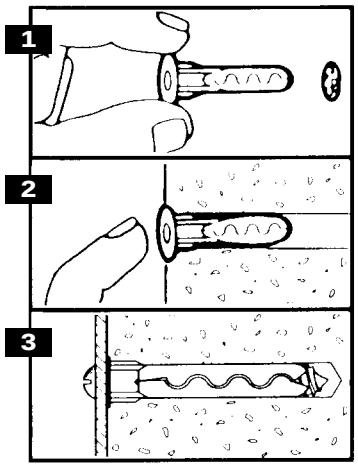
In denser materials, such as concrete, the hole may have to be drilled 1/16" larger.

Toggler® Alligator Solid Wall Anchor

Use in: Concrete, block, brick, wood or drywall
Use with: Lag, sheet metal, drywall or wood screw

Installation

1. Drill appropriate size hole.
2. Insert anchor in hole, flush with wall.
3. Put fixture in place, insert screw and tighten until secure.



Selection Guide

Part Number	Type		Anchor and Drill Diameter	Screw Diameter	Grip Range Minimum	Hole Depth Minimum	Minimum Wall Thickness
50944	Flanged	No. AF5	3/16" (5mm)	#4-#10 (3-5mm)	1/4" (6mm)	1-3/8"	0.25"
50945	Flanged	No. AF6	1/4" (6mm)	#6-#14 (3.5-6mm)	5/16" (8mm)	1-9/16"	0.32"
50946	Flanged	No. AF8	5/16" (8mm)	#8-5/16" (4-8mm)	1/2" (12mm)	2"	0.48"
50947	Flush Mount	No. A5	3/16" (5mm)	#4-#10 (3-5mm)	1/4" (6mm)	1-5/16"	0.25"
50948	Flush Mount	No. A6	1/4" (6mm)	#6-#14 (3.5-6mm)	5/16" (8mm)	1-1/2"	0.32"
50949	Flush Mount	No. A8	5/16" (8mm)	#8-5/16" (4-8mm)	1/2" (12mm)	1-15/16"	0.48"

The screw diameter can be as large as the anchor diameter. In dense concrete, use the same diameter screw as the anchor. Fragile walls require smaller screw diameters than the anchor. In brick, use one size smaller screw. In drywall, use a screw two sizes smaller than the anchor and drill diameter.

Ultimate Load Capacities

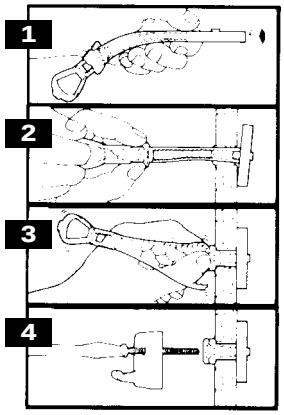
Anchor and Drill Diameter	Screw Size	1/2" Drywall Tension (lbs.)	Shear (lbs.)	4000 psi Concrete Tension (lbs)
3/16"	#8	57	125	
	#10			1716
1/4"	#10	69	153	
	1/4"			2366
5/16"	#12	85	276	
	5/16"			3083

Notes
These values are ultimate load capacities which should be reduced by a minimum safety factor of four to determine allowable working load. Holding strength for a given size anchor varies directly with the strength of wall material, screw size and extent of screw engagement. Actual on-site testing should be done to determine actual load values.

TOGGLER® TOGGLE BOLT & POLY-TOGGLE® SCREW ANCHOR

Toggler® Toggle Bolt

Use in: Block, plaster, wallboard or hollow tile
Use with: Machine screw or bolt



Note
Minimum clearance behind wall: 1-7/8"

Installation

1. Drill appropriate size hole. Hold metal channel flat alongside plastic straps and slide channel through hole.
2. Pull ring straight out (do not pull at angle) so metal channel rests flush behind wall. Then slide plastic cap along straps with other hand until flange of cap is flush with wall.
3. Place thumb between plastic straps. Push side to side snapping off straps flush with wall.
4. Insert bolt through fixture and tighten until flush.

Characteristics
The Toggler toggle bolt features a one piece, zinc plated steel anchoring channel which pivots on polystyrene legs. The legs incorporate one-way ratcheting teeth which permit movement of the cap. The cap squarely secures the anchor to the wall. The plastic legs are easily snapped off at the required length. The unique design enables the removal of bolt/fixture without the anchor falling behind the wall.

Selection Guide

Part No. Carbon Steel	Part No. Stainless Steel	Bolt Size	Drill Diameter	Ultimate Tensile (lbs.)			
				1/2" Drywall	5/8" Drywall	Concrete Block	1/2" Steel Plate
50955	50845	#10-24	1/2"	238	356	714	918
50956	50846	1/4-20	1/2"	265	306	925	1283
50957	50847	3/8-16	3/4"		576	1167	1425
50958	50848	1/2-13	3/4"			2038	2392

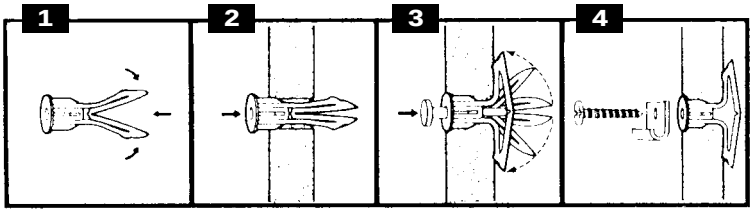
Notes
These values are ultimate load capacities which should be reduced by a minimum safety factor of four to determine allowable working load. Age and condition of wall material will cause values to vary. Actual on-site testing should be done to determine actual load values.

Poly-Toggle® Screw Anchor

Use in: Wallboard, paneling, wood, concrete or hollow tile
Use with: Sheet metal screw

Installation

1. Fold anchor.
2. Insert anchor in 5/16" (8mm) hole and tap flush with wall.
3. Insert setting key and pop anchor open (except in thick or solid walls). Do not force or hammer key. Remove key.
4. Place item over anchor, insert screw and tighten until flush with item, then stop. (TOGGLER hollow wall anchors wedge solidly in thick and solid wall when key is not used.)



Characteristics
The Poly-Toggle anchor is a fast and extremely easy to use wall anchor. The load capacities for this anchor depend extremely on the integrity of the base material. This anchor should only be used where holding power is not a critical factor. For shear load applications, locate folding arms of anchor to open in direction of shear load.

Selection Guide

Part Number	Grip Range	1/4" Plywood		1/2" Drywall		5/8" Drywall	
		Tensile (lbs.)	Shear (lbs.)	Tensile (lbs.)	Shear (lbs.)	Tensile (lbs.)	Shear (lbs.)
50951	1/8"-1/4"	124	265				
50952	3/8"-1/2"			143	167		
50953	5/8"-3/4"					159	237
50950	1"						

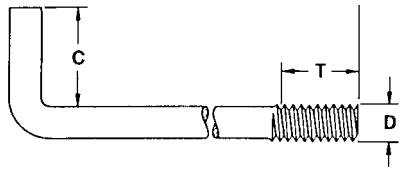
Notes
These values are ultimate load capacities which should be reduced by a minimum safety factor of four to determine allowable working load. Age and condition of wall material will cause values to vary. Actual on-site testing should be done to determine actual load values.

FASTENAL® BENT ANCHOR BOLT & FASTENAL® ANCHOR BOLT SLEEVES

Fastenal® Bent Anchor Bolt

Use in: Concrete
Use with: No other fastener needed
Made of: ASTM A36 Steel (or mechanical equivalent)

Characteristics
The bent anchor bolt is primarily a heavy-duty structural, cast-in-place anchor. The bolts are set in place prior to pouring the concrete. After the concrete has cured, fixtures can be attached.



Specifications
Anchor Material
ASTM A36 or Mechanical Equivalent
Galvanizing
ASTM A153

Specials
Non-standard sizes and/or material also available in 2A thread fit through the Fastenal Manufacturing Division. See next page for list of materials available.

Standard Part Number		D	C	T	Thread
Plain	Galvanized	Dia. (in)	Length (in)	Length (in)	
50001	50720	3/8	1	1-1/2	
50002	50721				
50003	50722				
50004	50723				
50005	50724				
50011	50728	1/2	1	2	
50012	50729				
50014	50731				
50015	50732				
50016	50733				
50018	50735				
50019	50736				
50022	50737	5/8	2	4	
50024	50739				
50025	50740				
50026					
50027	50742				
50028	50743				
50029	50744				
50032	50745	3/4	3	4	
50034	50747				
50035	50748				
50036	50749				
50037	50750				
50038	50751				
50039	50752				
50051	50753				
50040		7/8	3	6	
50041					
50042	50756	1	3	6	
50043	50757				
50044	50758				
50045	50759				
50046	50760				
50047	50761				
50049	50763				

Fastenal® Anchor Bolt Sleeves

Characteristics
The anchor bolt sleeve is used as an in-place form to provide a grout pocket around an anchor bolt to allow for positioning of the bolt. It is manufactured of high impact, non-rusting, non-conductive and lightweight plastic.

Part Number	Bolt Dia. (in)	Shell Size	Template Dia. (in)
50060	1/2	2 x 5	3/4
50061	3/4	2 x 5	7/8
50062	5/8	2 x 7	1-1/8
50063	3/4	2 x 7	7/8
50064	7/8	2 x 7	1-1/4
50065	1	3 x 10	1-3/8
50066	1-1/4	3 x 10	1-5/8
50067	1-1/2	4 x 15	1-7/8

Use with: Bent Anchor Bolt

Installation

1 The bottom of the sleeve is passed over the top of the bolt until the threaded portion engages the top of the sleeve. The sleeve is turned until the proper thread projection is obtained. The entire assembly is cast into concrete, with the top of the sleeve at the foundation level.

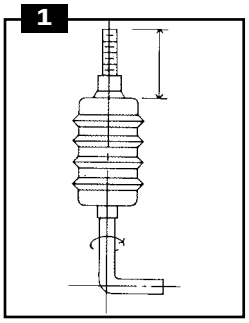
2 Once the concrete has set, the top of the sleeve is cut off and the top is discarded. The bolt can now be adjusted.

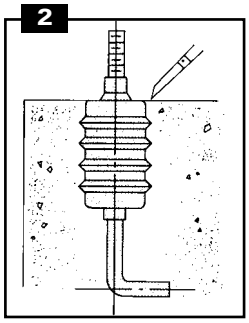
3 Expansion or non-shrinking grout is cast into the sleeve around the bolt once the fixtures are set.

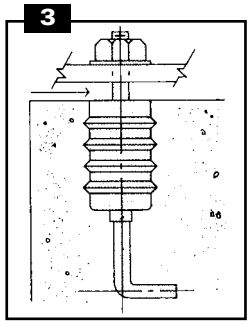
Limitations
The anchor bolt sleeve is not recommended where high heat is used.

Tensile Stress Areas

Bolt Dia (in)	Threads per inch	Tensile Stress Area sq. in.
3/8	16	0.0775
1/2	13	0.1419
5/8	11	0.2260
3/4	10	0.3340
7/8	9	0.4620
1	8	0.6060
1-1/4	7	0.9690







The tensile stress area was calculated as follows:

$$As = 0.7854[D - (0.9743/n)]^2$$

Where:

As = stress area (in sq.)

D = nominal bolt diameter (in)

n = threads per inch

Need A Non-Standard Part or a Standard Part Modified?

Fastenal's Manufacturing Division has the capabilities to manufacture non-standard parts.

Available Materials

Alloy Steel	Misc. Steel	Carbon Steel	Stainless Steel
4140	Aluminum	1018	303
4142	Brass	1045	304
ETD150	Tool Steels	1141	309
B16	Monel	1215	310
41L42	Hastalloy	12L14	316
A449	Inconel	Stress Proof	316L
B7	Nylon	1035	321
	Silicon Bronze	A36	Alloy 20
	Copper		17-4
			317L
			A193 B8 – A-286

Materials certified to ASTM specifications. Other materials available upon request.

Ramset POWDER FASTENING SYSTEMS

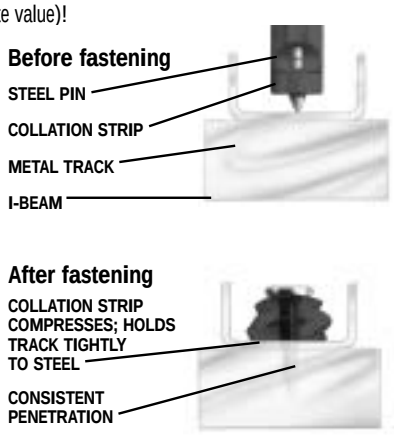
TRAKFAST

CONCRETE PINS
STEEL PINS

TrakFast Steel Pins—

The Pins That Don't Penetrate Completely—By Design!

Upon firing, the TrakFast Steel Pin is designed to stop midway at a precise point. On its way into the steel, it compresses the collation strip making it "balloon out" to increase the bearing surface against the track. This results in excellent holding power—more than 1,000 pounds (ultimate value)!



DESCRIPTION

Standard Black Collation Strip

TrakFast's patented black collation strip is designed to stay with the fastener. Track or channels are held down tightly to the work surface. Pins work in both concrete and block without making any adjustments to the power of the tool. Available in 1/2", 3/4" and 1" pin lengths.

Breakaway Collation Strip

Designed for applications that require the head of the fastener to be flush or slightly recessed with the surface of the material being attached. Collation strip breaks away upon impact, allowing the head to recess into the material. Pins work in both concrete and block without making adjustments to the power of the tool. Available in 3/4", 1", 1-1/4" and 1-1/2" plated pin lengths.

ADVANTAGES

TrakFast's Patented Technology Assures You of Superior Fastening Performance in Concrete, Block or Steel

- **Fewer Jams—** superior guidance technology makes pin center in nose for true 90° alignment at impact
- **More Consistent Fastening—** each pin breaks away cleanly during fastening to reduce jams
- **Easy to Use—** ten pins per strip. Strips fit easily into operator's pouch, eliminating dropped pins

FEATURES / SPECIFICATIONS

Longer nose piece / narrower magazine— allows the contractor to fasten into deeper channels (fits inside 1-1/8" wide by 2" high track)

Lighter and more balanced tool— design increases operator comfort, decreases fatigue

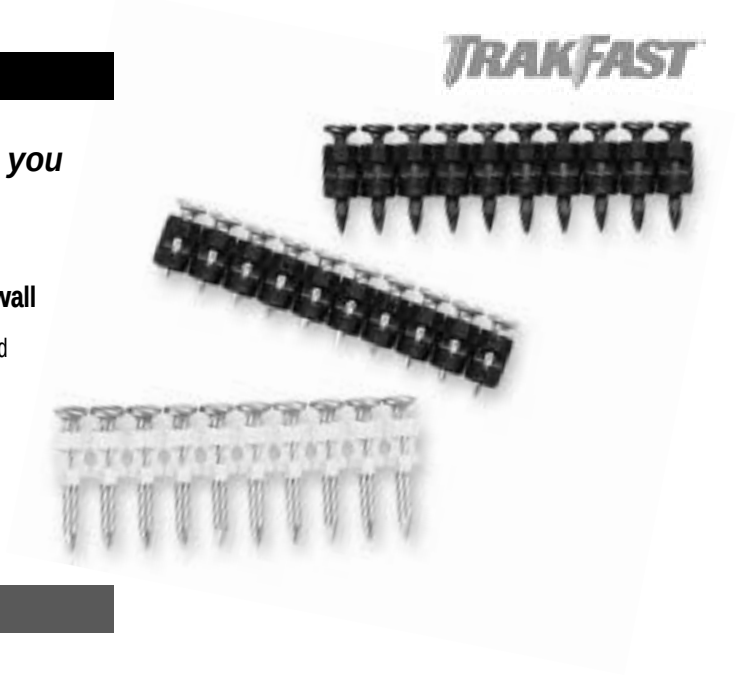
Four-strip magazine capacity— holds four strips instead of three; allows contractor to work faster because there's less reloading

Upper and lower rail design— extruded aluminum rails allow fasteners to slide into tool easier. Also makes fastener change-overs easier—just tilt tool back, release the follower, and the pins fall out!

Tool Specifications

Part Number	0205238
Model No	TF1100
Length	17"
Height	15-1/2"
Weight	9.25 lbs.
Maximum Capacity	42 pins
Maximum Cycles/Second	2

APPROVALS / LISTINGS



ICBO ER-5001 Approval/Listing now gives you these great advantages:

- **TrakFast ICBO ER-5001 is the only ICBO that allows the contractor to fasten into any location on a hollow block wall**
- Provides data for fasteners installed into lightweight concrete and installed into lower flute of a composite deck
- Fasten into thicknesses as thin as 3/16" for A36 steel
- Fasten into thicknesses as thin as 1/8" for A572 steel

PERFORMANCE TABLES

TrakFast Pins in Concrete

MINIMUM EMBEDMENT In. (mm)	2000 PSI / 13.8 MPa		3000 PSI / 20.7 MPa		4000 PSI / 27.6 MPa	
	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
5/8" (15.9)	60 (.27)	55 (.24)	55 (.24)	75 (.33)	55 (.24)	95 (.42)
3/4" (19.1)	60 (.27)	80 (.36)	55 (.24)	95 (.42)	55 (.24)	115 (.51)

* All Values Published are Allowable Working Loads
Shank diameter = .102

TrakFast Pins in 3000 psi Lightweight Concrete and Hollow CMU

MINIMUM EMBEDMENT In. (mm)	INSTALLED IN CONCRETE		INSTALLED THROUGH METAL DECK (LOWER FLUTE)		HOLLOW CMU (ANY LOCATION)	
	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
5/8" (15.9)	35 (.16)	55 (.24)	30 (.13)	205 (.91)	35 (.16)	50 (.22)
3/4" (19.1)	80 (.36)	100 (.45)	40 (.18)	235 (1.05)		

* All Values Published are Allowable Working Loads
Shank diameter = .102

TrakFast 1/2" Pins in ASTM A36 Steel

FASTENER TYPE In. (mm)	STEEL THICKNESS In. (mm)							
	3/16" (4.8)		1/4" (6.4)		3/8" (9.5)		1/2" (12.7)	
	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
9/16" (14.3) step shank	115 (.51)	300 (1.33)	195 (.87)	340 (1.51)	215 (.96)	335 (1.49)	215 (.96)	355 (1.58)

* All Values Published are Allowable Working Loads
Shank diameter = .092/.107

TrakFast 1/2" Pins in ASTM A572 Grade 50 Steel

FASTENER TYPE In. (mm)	STEEL THICKNESS In. (mm)							
	1/8" (3.2)		1/4" (6.4)		3/8" (9.5)		1/2" (12.7)	
	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
9/16" (14.3) step shank	135 (.60)	300 (1.33)	200 (.89)	290 (1.29)	210 (.93)	345 (1.53)	180 (.80)	330 (1.47)

* All Values Published are Allowable Working Loads
Shank diameter = .092/.107

TRAKFAST

TRAKFAST TOOL & FUEL/PIN PACKS

Part Number	Description	Qty
TrakFast Tool		
0205238	TrakFast Tool	1
Standard Black Strip Fuel/Pin Packs*		
0205239	1/2" Plated Steel Pin	1 Carton
0205240	3/4" Black Pin	1 Carton
0205241	1" Black Pin	1 Carton
0205242	1-1/4" Plated Pin	1 Carton
* 1 Carton = 1000 pins		
Breakaway Strip Fuel/Pin Packs*		
0205243	3/4" Plated Pin	1 Carton
0205244	1" Plated Pin	1 Carton
0205245	1-1/4" Plated Pin	1 Carton
0205246	1-1/2" Plated Pin	1 Carton
* 1 Carton = 1000 pins		
TrakFast Accessories		
0205221	Plated Lathing Disc (1" diameter)	1 Carton
0205222	Disc Holding Probe (for TF1100)	1
0205247	Delta Plug Holder/Cosella	1
0204262	Platen Plug Holder/Big O	1
* 1 Carton = 1000 pins		

* Each fuel/pin pack includes 1 fuel cell & 1,000 pins.

The Five Important "Operator" Reasons to Buy TrakFast

1. No Licensing Required

Because TrakFast doesn't use gunpowder, no special training or licensing is required. Less-experienced employees can operate TrakFast, and more seasoned employees can be assigned to other productive areas.

2. No Recoil or Kick

There's little recoil while firing and there's no need to reset the piston after each fastening. Over a long day, operators are less tired and more productive.

3. Easier and Safer to Use

Because of its unique design and self-contained power source, TrakFast is easier and safer to use. It's more lightweight and compact than pneumatics, so it's far easier to operate overhead or near an edge.

4. Less Maintenance and Downtime

vs. Powder Actuated Tool — With TrakFast's clean-burning engine, there's no gunpowder build-up. That means less cleaning, less downtime and less maintenance.

vs. Pneumatic — TrakFast is ready to operate at the job site. No set-up time, no hoses and no compressors as with air systems.

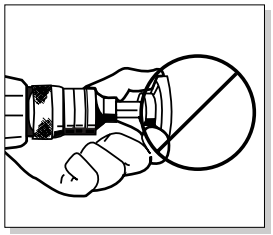
5. Low Operating Noise

TrakFast is quieter than other fastening tools—less noise and less distraction means more productivity for operator and others near him. This is especially important for renovation projects in occupied buildings.

POWER ACTUATED TOOLS SAFETY PRINCIPLES

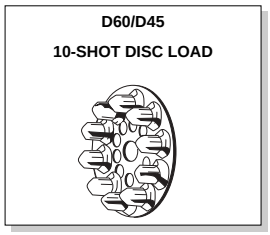
SAFETY PRINCIPLES

Ramset has designed and engineered the right powder actuated tool for your applications. To ensure you use a powder actuated tool correctly, please take the time to review the following **safety procedures.** Also, be sure to call your Ramset Representative (your local distributor) to schedule a safety training session to train and license your employees. This **free one hour seminar** is invaluable and provides important safety and product information to help you improve productivity, reduce downtime and reduce the number of job site accidents. **NOTE: It is required by Federal OSHA that all PAT users are trained and licensed.**



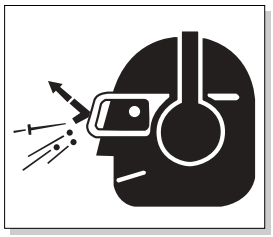
Hand Placement

Never place your hand or fingers over the front muzzle end of the tool. The fastener or piston can seriously injure your hand in the event of an accidental discharge.



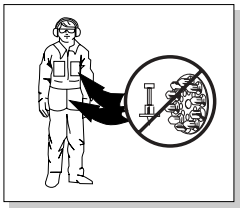
Load Level Number

The power level of ITW Ramset/Red Head loads is designated by the load level number marked on each box of loads. As the number increases, the power level also increases. Power level is also indicated by the color of the box or the color on each powder load.



Safety Gear

Operators and bystanders must wear personal safety gear at all times. Serious eye injury and hearing loss can result if proper gear is not worn.

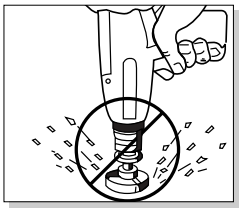


Powder Load Transport

Never carry fasteners or other hard objects in the same pocket or container with powder loads. The loads could be set off, causing serious injury or death.

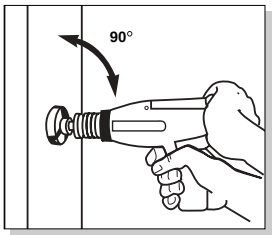
Warning Signs

Always post warning signs when powder actuated tools are in use. Signs should state "Powder Actuated Tool in Use" and should be located within 50 feet of the area where tool is being used.



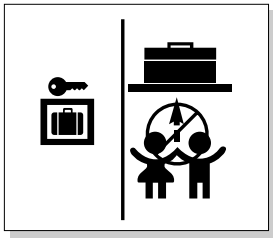
Hard and Soft Material

Never fire into very hard or brittle materials such as cast iron, tile, glass or rock. These materials can shatter, causing sharp fragments and/or the fastener to fly freely. Never fasten into soft materials such as drywall.



Spall Guard

Always hold the tool perpendicular to the work surface to avoid serious injury or death from ricocheting fasteners. Use the spall guard whenever possible.



Tool Storage

Always store the loads and tool, UNLOADED, under lock and key. Keep tool box and key out of the reach of children.

AUTOMATIC PISTON RETURN TOOL

FEATURES / SPECIFICATIONS

1. Automatic piston return
Simple spring mechanism provides automatic piston return—requires no cocking or slinging to reset piston… **33% faster than semi-automatic tools**

2. Up to 37% less recoil
Unique combustion chamber minimizes recoil—up to 37% less recoil means less operator fatigue

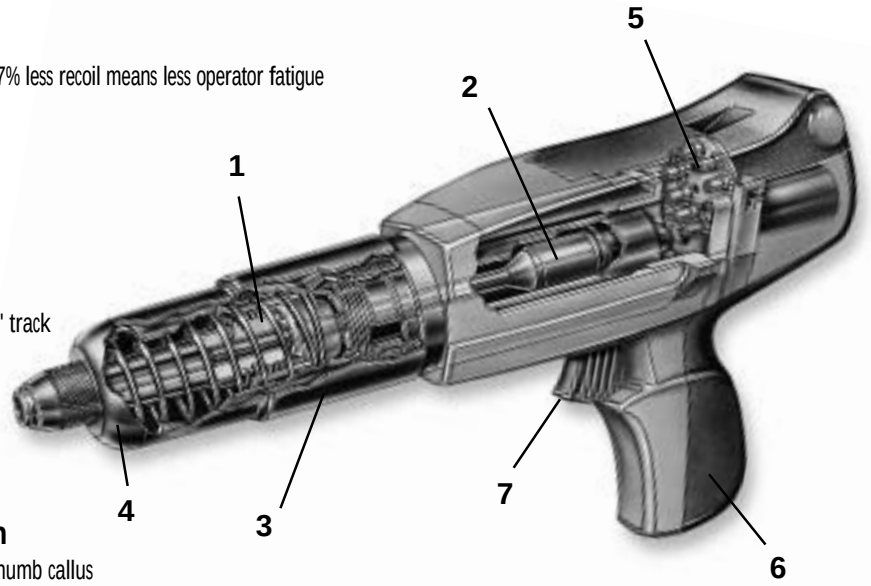
3. Low, low noise level
Patented noise reduction chamber system—makes this one of the quietest tools available

4. Fits in 1-1/2" track
Tapered spring cover—allows easy access into 1-1/2" track

5. No wasted loads
10-shot disc load advances only after firing—eliminates wasted loads

6. Operator-friendly handle design
Ergonomic tapered handle design—reduces painful thumb callus

7. Large trigger
Easy to use even with a gloved hand



Clean operation
Unique combustion chamber also provides cleaner operation—less maintenance required

APPLICATIONS

Use AutoFast for these high-production applications!

Speed, comfort, ease of handling. With its Automatic Piston Return, lighter weight and reduced recoil, the AutoFast Powder Fastening System is the ideal tool for the following high production applications:

Attachment of dry wall track—*AutoFast fits into deep channels without the need of a special adapter or piston.*

Overhead track attachment—*Hold AutoFast in one hand and line up your track with the other. AutoFast is two pounds lighter and won't produce the recoil of other automatic piston return tools.*

Roofing—*Because of the lack of recoil, AutoFast is ideal for those awkward bent positions when you fasten termination bar.*

Flooring—*With the heavy-duty buffer system, there's less wear and tear on the tool when you countersink sub-flooring.*

DISC LOADS/FASTENERS

Disc Loads

PART NUMBER	MODEL NUMBER	POWER LEVEL	COLOR	CALIBER
51617	2D60/D45	2	Brown	.25
51618	3D60/45	3	Green	.25
51619	4D60/45	4	Yellow	.25
0205237	5D45	5	Red	.25

Most Common Fasteners

PART NUMBER	PIN NUMBER	SHANK LENGTH In. (mm)	MOST COMMON APPLICATION
51715	1524SDB (washered)	3 (76.2)	2' x 4' to concrete
51714	1516SD (washered)	2-1/2 (63.5)	2' x 4' to concrete
0205207	SP178	1-7/8 (47.6)	2' x 4' to steel
51705	1508	1 (25.4)	Sheet metal to concrete
51702	1503K (knurled)	1/2 (12.7)	Sheet metal to steel
0205201	SP12	1/2 (12.7)	Sheet metal to harder steel

Pins are stamped with the Ramset® logo and 3" on a square washer for ease of inspection

Each 1524SDB carton contains two convenient bags of 500 per bag

TOOL SPECIFICATIONS

Caliber ..... .25
Disc Loads..... 10-shot
Weight ..... 5 lbs.
Height ..... 7-1/2"
Length..... 17-1/2"
Compressed Length ..... 13-1/2"
Muzzle Bushing O.D. ..... .750
Muzzle Bushing I.D. ..... .340-.345
Max. Fastener Length..... 2-1/2" or 3" washered

KIT INCLUDES:

- Heavy-duty lockable box
- Operators instruction manual
- Spall guard
- Safety glasses
- Maintenance kit

POWDER ACTUATED TOOLS AND APPLICATIONS

Ramset
POWDER FASTENING SYSTEMS

SELECTION GUIDE

Powder Actuated Tools and Loads for Fastening Applications

0205173	0205180	0205177	0205179	0205174	0205182	0205175
721	**AUTOFAST**	**SA270**	**MD380**	**D45**	**COBRA**	**VIPER**
Single-shot	Automatic Piston Return	Semi-Automatic	Single-shot	Semi-Automatic	Semi-Automatic	Overhead

LOADS							
 **Drywall**						
 **Electrical**						
 **General**						
 **Framer**						
 **Plumbing / Fire Sprinkler**						
 **Acoustical / Overhead**						
 **Remodeling**						
Carpentry			SA270				
Flooring			SA270		D45		
Glazing	721		SA270		D45		
HVAC				MD380			
Maintenance			SA270		D45		
Roofing			SA270		D45		
Sheet Metal	721				D45		
Steel Erection					D45		
Telecommunications							VIPER
Basement Wrap							

ADVANTAGES

SPECIFICATIONS

Ramset's Patented Red Disc Gives You the Power You Need
Fasten into the hardest of concrete and steel with a red disc load and the D45. The patented 10-shot disc load advances only after firing which eliminates wasted loads.

D45

Part Number: 0205174
Semi-Automatic
2" Pin Capacity
(2-1/2" w/washer)
5-Year Warranty

- Most durable, powerful powder tool—designed for high-production use in steel and concrete
- Heavy-duty buffer system—prevents front-end tool damage for longer tool life
- Weekly cleaning, *not* daily cleaning—saves time and reduces labor costs
- Quieter than standard powder tool—allows you to work in occupied buildings
- Disc System—eliminates wasted loads…and dollars
- Long, narrow muzzle bushing—allows fastening in hard-to-reach areas

- .25 caliber, 10-shot disc loads 2 (Brown), 3 (Green), 4 (Yellow), 5 (Red)
- Weight: 4-1/2 pounds
- Height: 7-1/2 inches
- Length: 11 inches
- Muzzle Bushing O.D.: 5/8"
- Pin Capacity: 2 or 2-1/2" washered
- Factory Mutual System approved

D45 Eliminates these problems and avoids these costs
Competitors' tools, pistons, piston rings, nosepieces and base plates break. This costs time and money. Ramset developed a unique buffer system that prevents the piston from overdriving, so the muzzle bushing won't break. **Guaranteed for 10 years!** If it breaks, we will replace it free of charge.

CEILING CLIPS

Acoustical Ceiling Contractors

APPLICATIONS

MOST COMMON FASTENERS*

Use the D45 to fasten track to hard concrete or steel—especially productive in tight areas.

TOOL	PART NUMBER	SHANK LENGTH In. (mm)	MOST COMMON APPLICATION
D45	51702	1/2 (12.7)	Track to steel
D45	0205201	1/2 (12.7)	Track to hard steel
D45	0205211	3/4 (19.1)	Track to concrete
D45	0205212	1 (25.4)	Track to concrete

The D45's heavy-duty buffer system prevents front-end damage caused by piston overdrive.

WHEN OTHER PINS DON'T WORK!

Use PowerPoint™ Pins for Easier Penetration of Hard Steel or Concrete

PowerPoint reduces pin failures and saves you money. Increased holding values assure reliability. Combined with the D45, you're assured of optimum fastening performance into the hardest base materials. PowerPoint is a part of the SP series.

BLACK PINS

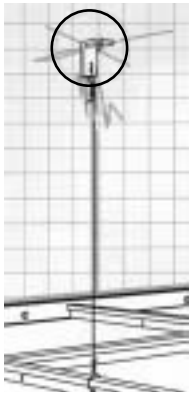
Black Pins

Special black coating improves pin penetration into concrete. Use for the attachment of drywall track and channel to concrete and steel.

Pre-Tie Wire Hanger

The new pre-mounted Pre-Tie wire hanger with clip and pin is ideal for many high production applications completely assembled ready to install.

Applications:
- No drilling.
- Ease of fastening with powder actuated tool for shooting into concrete or steel.



Part No.	Description	Pkg Qty.
0202782	4' Pre-tie, w/pin & clip	100
0202783	6' Pre-tie, w/pin & clip	100
0202784	8' Pre-tie, w/pin & clip	100

Ramset's Patented Red Disc Gives You the Power You Need Fasten into the hardest of concrete and steel with a red disc load and the D45. The patented 10-shot disc load advances only after firing which eliminates wasted loads.

D45

Part Number: 0205174

Semi-Automatic

2" Pin Capacity
(2-1/2" w/washer)

5-Year Warranty

ADVANTAGES

- Most durable, powerful powder tool—designed for high-production use in steel and concrete
- Heavy-duty buffer system—prevents front-end tool damage for longer tool life
- Weekly cleaning, *not* daily cleaning—saves time and reduces costs
- Quieter than standard powder tool—allows you to work in occupied buildings
- Disk System—eliminates wasted loads… and dollars
- Narrow 5/8" muzzle bushing—for easy access in tight fastening areas

SPECIFICATIONS

- .25 caliber, 10-shot disc loads 2 (Brown) 3 (Green), 4 (Yellow), 5 (Red)
- Weight: 4-1/2 pounds
- Height: 7-1/2 inches
- Length: 11 inches
- Muzzle Bushing O.D.: 5/8"
- Pin Capacity: 2" (2-1/2" with washer)
- Factory Mutual System approved

APPLICATIONS

The D45's unique design prevents overdrive problems. Unique venting system keeps tool clean.

WHEN OTHER PINS DON'T WORK!
Use the PowerPoint™ pin with the D45 to increase productivity—even in hard steel.

In 1" and 1-1/4" Clip Assembly for hanger wire.

MOST COMMON FASTENERS*

TOOL	PART NUMBER	SHANK LENGTH In. (mm)	MOST COMMON APPLICATION
D45	51854	1 (25.4)	Clip and pin for hanger wire
D45	0205208	1 (25.4)	Hard concrete clip/pin assembly
D45	0205178	1-1/4 (31.8)	Hard concrete clip/pin assembly

TOOL	PART NUMBER	SHANK LENGTH In. (mm)	THREAD LENGTH In. (mm)	MOST COMMON APPLICATION
D45	51891	1 (25.4)	3/4 (19.1)	Box to concrete
D45	51889	1/2 (12.7)	3/4 (19.1)	Box to steel

ADVANTAGES

SPECIFICATIONS

SA270

Part Number: 0205177

Semi-Automatic

2-1/2" Pin Capacity
(3" w/washer)

5-Year Warranty

Uses Loadsaver™ 10-shot strip load

- Excellent balance—easy to use all day long
- Rubber grip on front barrel—eliminates pinched fingers and hands
- Twist lock front end—easy to clean
- Rugged polyamide housing—reduces heat transfer and maximizes operator comfort
- Soft, recoil-absorbing handle—for increased operator comfort
- Narrow nosepiece for hat track available—Part #27996

- .27 caliber 10-shot strip loads 3 (Green), 4 (Yellow), 5 (Red)
- Weight: 5-3/4 pounds
- Length: 15 inches
- Muzzle Bushing O.D.: 5/8"
- Pin Capacity: 2-1/2" (3" w/washer)
- Factory Mutual System approved

APPLICATIONS

SA270 is a well-balanced strip tool that allows you to get between tightly placed studs.

Pins are stamped with the Ramset® logo and 3" on a square washer for ease of inspection
1524SDB

MOST COMMON FASTENERS*

TOOL	PART NUMBER	SHANK LENGTH In. (mm)	MOST COMMON APPLICATION
SA270	51714	2-1/2 (63.5)	2' x 4' to concrete
SA270	51715	3 (76.2)	2' x 4' to concrete
SA270	51705	1 (25.4)	Sheet metal to concrete

1524SDB

FIND OUR SELECTION OF STUD SENSORS

PAGE 560 OF OUR 2003 FASTENAL BIG BLUE CATALOG

ITW Ramset / Red Head®

recommends the following tools—based on their design and versatility—for framing, general construction and maintenance applications. Detailed engineering and durable performance makes these tools ideal for fastening in medium-duty, general purpose concrete or steel applications.

ADVANTAGES

Patented 10-shot disc loads advance automatically, eliminating wasted loads

AutoFast

Part Number: 0205180
Automatic Piston Return

- 33% faster than semi-automatic tools—higher production rates
- No cocking necessary—less wasted motion
- Dramatically less recoil—easier on your hand
- Exceptionally quiet—great for tenant occupied buildings
- 2.4 lbs. lighter than Hilti® DXA41—easier to use overhead

Hilti® is a registered trademark of Hilti, Corp.

SPECIFICATIONS

- .25 caliber, 10-shot disc loads 2 (Brown), 3 (Green), 4 (Yellow), 5 (Red)
- Weight: 5 pounds
- Length: 17-1/2 inches
- Height: 7-1/2 inches
- Muzzle Bushing O.D.: 3/4"
- Pin Capacity: 2-1/2" (3" w/washer)

APPROVALS / LISTINGS

Complies with OSHA and ANSI standards

ICBO Evaluation Service, Inc. – #ER-1147 (for sillplate applications)

APPLICATIONS

The AutoFast automatic piston return tool speeds your applications up to 33% faster.

MOST COMMON FASTENERS*

TOOL	PART NUMBER	SHANK LENGTH In. (mm)		MOST COMMON APPLICATION
AutoFast	51715	3	(76.2)	2" x 4" to concrete
AutoFast	51714	2-1/2	(63.5)	2" x 4" to concrete
AutoFast	0205207	1-7/8	(47.6)	2" x 4" to steel
AutoFast	51705	1	(25.4)	Sheet metal to concrete
AutoFast	51702	1/2	(12.7)	Sheet metal to steel
AutoFast	0205201	1/2	(12.7)	Sheet metal to harder steel

ADVANTAGES

SPECIFICATIONS

721

Part Number: 0205173
Single Shot
1-1/2" Pin Capacity
5-Year Warranty

.22 caliber "A" crimped powder loads in four power levels (gray, brown, green, yellow)

- Rugged metal housing—holds up for years
- Low recoil—reduces operator fatigue on large scale jobs
- Rubber cushion grip—for maximum operator comfort
- Only two moving parts to clean—easy maintenance; saves time
- Narrow 5⁄8" muzzle bushing—for easy access in tight fastening areas
- Automatic cartridge ejection system—increases operator speed and productivity
- Simple to clean—saves on labor costs

- .22 caliber, single-shot loads 1 (Gray), 2 (Brown), 3 (Green), 4 (Yellow)
- Weight: 4.3 pounds
- Length: 13-1/2 inches
- Muzzle Bushing O.D.: 5⁄8"
- Pin Capacity: 1-1/2"
- Factory Mutual System approved

For the most current product and technical information, visit our website at www.ramset-redhead.com

APPLICATIONS

The 721 has been the industry standard tool for attachment of drywall to concrete for more than 30 years.

MOST COMMON FASTENERS*

TOOL	PART NUMBER	PIN #	SHANK LENGTH DIA. In. (mm)	MOST COMMON APPLICATION
721	0205211	1506B	3/4 (19.1)	Track to concrete
721	0205212	1508B	1 (25.4)	Track to concrete
721	0205210	1503K (knurled)	1⁄2 (12.7)	Track to steel

CRIMPED LOADS

.22 caliber "A" crimped powder loads in four power levels (gray, brown, green, yellow).

PLUMBING/FIRE SPRINKLER

ADVANTAGES

SPECIFICATIONS

MD380

Part Number: 0205179

Single Shot

3" Pin Capacity

5-Year Warranty

.27 caliber long "A" crimped powder loads in three power levels (yellow, red, purple)

- Most powerful, lightest 3/8" tool available—reduces operator fatigue
- Uses .27 caliber long crimped loads—for hard concrete and long pin applications
- Narrow muzzle bushing—for easy access in tight areas
- Buffered muzzle bushing—reduces impact and damage from metal parts pounding into each other
- All accessories screw on easily—no tools are required to attach spall reducer or open for cleaning
- Full ring ejector—speeds removal of spent loads
- Heat-resistant Delrin™ sleeve—allows grip area of the tool to remain cool
- Work from the floor with a 6' or 8' extension pole

- .27 caliber long single-shot loads 4 (Yellow), 5 (Red), 6 (Purple)
- Weight: 6-3/4 pounds
- Length: 15 inches
- Muzzle Bushing O.D.: 3/4"
- Pin Capacity: 3"
- Factory Mutual System approval

APPLICATIONS

Use the MD380 and our 6' or 8' extension pole. Work faster from the floor.

Using the heavy-duty spall reducer gives installed fasteners the appearance of being "drilled in place" by greatly reducing surface spalling.

MOST COMMON FASTENERS*

TOOL	THREAD STUD #	SHANK LENGTH In. (mm)	THREAD LENGTH In. (mm)	MOST COMMON APPLICATION
MD380	51992	1-1/16 (27.0)	1 (25.4)	Hanging pipe to concrete
MD380	51995	1 - 1/4 (31.8)	1 (25.4)	Hanging pipe to concrete
MD380	51994	5/8 (15.9)	1 (25.4)	Hanging pipe to steel

TOOL	PIN #	SHANK LGTH In. (mm)	THREAD LENGTH	MOST COMMON APPLICATION
MD380	0205216	1-1/4 (31.8)	N/A	Attaching drywall track to concrete
MD380	0205215	3/4 (19.1)	N/A	Attaching drywall track to steel
MD380	0205220	3 (76.2)	N/A	Attaching 2" x 4"s to concrete

Ramset
POWDER FASTENING SYSTEMS

Pins for Hard Concrete and Steel Fastening

DESCRIPTION / SUGGESTED SPECIFICATIONS

Use Ramset's exclusive PowerPoint pins for your advanced steel fastening applications. They provide easier penetration into hard steel. That means reduced pin failures and increased holding values to make your jobs more productive.

ADVANTAGES

Consistent Performance, Even in Hard Steel

Standard powder actuated pins fasten inconsistently in steel. Frequently the steel is just too hard for conventional pins. Steel is also inconsistent because hardness varies. According to the steel industry's accepted Rockwell Hardness Scale (Rb), steel strength can vary from a relatively soft 54 Rb to an extremely hard 88 Rb or higher. Standard pins typically begin to fail in the upper 70s Rb. Tests, however, have proven that PowerPoint consistently performs, even as steel approaches 90 Rb!

Average in place fastener costs

POWER POINT

Notice in the photographs below how typical manufacturing processes can cause inconsistency in a pin's finish, increasing its likelihood of failure. And see the difference with Ramset's process! Which pin would you want to use?

Typical cut-point finish resulting from manufacturing process will increase pin failure

Typical swage-ballistic point finish results in potential failure of pin

Ramset's unique manufacturing process results in uniform shape and finish for more consistent performance.

SELECTION CHARTS

BASE STEEL THICKNESS

MATERIAL	3/16"	1/4"	3/8"	1/2"	3/4"
1/4" Plywood	0205202*	0205203*	0205204**	0205204**	0205204**
3/8" Plywood	0205202*	0205203*	0205204**	0205204**	0205204**
1/2" Plywood	0205205**	0205205**	0205205**	0205205**	0205205**
3/4" Plywood	0205206**	0205206**	0205206**	0205206**	0205206**
2' x 4' Plate	0205207**	0205207**	0205207**	0205207**	0205207**
10 Ga. to 12 Ga.	0205202*	0205203*	0205203*	0205204**	0205202**
13 Ga. to 17 Ga.	0205201*	0205202*	0205203*	0205203**	0205202**
18 Ga. to 25 Ga.	0205201*	0205202*	0205203*	0205203**	0205202**

* For use with all Ramset Powder Tools

** For use with all Ramset Powder Tools except the Model 721

PRODUCT SELECTION CHART

PART NUMBER	NOM. SHANK DIAMETER	SHANK LENGTH IN. (MM)	BOX QTY	PRICE EACH
0205201	.150	1/2 (12.7)	100	$0.15
0205202	.150	5/8 (15.9)	100	$0.15
0205203	.150	3/4 (19.1)	100	$0.16
0205204	.150	7/8 (22.2)	100	$0.16
0205205	.150/.180	1 (25.4)	100	$0.19
0205206	.150/.180	1-1/4 (31.8)	100	$0.23
0205207	.150/.180	1-7/8 (47.6)	100	$0.27

For optimum results in hard steel, use the D45 powder actuated tool.

DESCRIPTION

We maintain only the highest standards in the materials, production techniques and quality control measures used to manufacture our fasteners, assuring consistent, optimum quality in every fastener.

ADVANTAGES

Black Pins

The special black coating improves pin penetration into difficult base material (i.e. hard concrete). We offer this black coating on all of our fasteners manufactured for the attachment of drywall track and channel to concrete and steel.

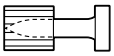
Pins

ITW Ramset/Red Head powder actuated fasteners are specifically fabricated to meet the exacting requirements of toughness and durability that enable them to penetrate dense concrete and structural quality steel.

SELECTION CHARTS

Black Track Pins

.300 Head Diameter Drive Pins



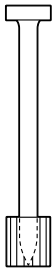
Designed for use in concrete and structural steel applications. Available in 100-Pin Pack

PART NUMBER	MODEL NUMBER	SHANK LENGTH In. (mm)	721	AUTO FAST	D60	D60L	SA270	D45	COBRA	M70
0205210	1503KBC	1/2 Knurled (12.7)	▲	▲	▲	▲	▲	▲	▲	▲
0205211	1506BC	3/4 (19.1)	▲	▲	▲	▲	▲	▲	▲	▲
0205212	1508BC	1 (25.4)	▲	▲	▲	▲	▲	▲	▲	▲

Shank diameter = .145

Drive Pins

.300 Head Diameter Drive Pins



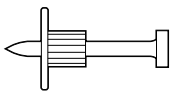
Designed for use in concrete and structural steel applications. 100 Pin Pack

PART NUMBER	MODEL NUMBER	SHANK LENGTH In. (mm)	721	AUTO FAST	D60	D60L	SA270	D45	COBRA	M70
51702	1503K	1/2 Knurled (12.7)	▲	▲	▲	▲	▲	▲	▲	▲
51704	1506	3/4 (19.1)	▲	▲	▲	▲	▲	▲	▲	▲
51705	1508	1 (25.4)	▲	▲	▲	▲	▲	▲	▲	▲
51706	1510	1-1/4 (31.8)	▲	▲	▲	▲	▲	▲	▲	▲
51707	1512	1-1/2 (38.1)	▲	▲	▲	▲	▲	▲	▲	▲
0205213	1513	1-3/4 (44.5)		▲	▲	▲	▲	▲	▲	▲
51708	1514	2 (50.8)		▲	▲	▲	▲	▲	▲	▲
0205214	1515	2-3/8 (60.3)		▲	▲	▲	▲		▲	▲
51709	1516	2-1/2 (63.5)		▲		▲	▲		▲	▲
51710	1524	3 (76.2)							▲	▲

Shank diameter = .145

Drive Pins

.300 Head Diameter Drive Pins with 7/8" Washer



Washer increases bearing surface against the material to be fastened. 100 Pin Pack

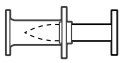
PART NUMBER	MODEL NUMBER	SHANK LENGTH In. (mm)	721	AUTO FAST	D60	D60L	SA270	D45	COBRA	M70
51848	1506SD	3/4 (19.1)	▲	▲	▲	▲	▲	▲	▲	▲
51849	1508SD	1 (25.4)	▲	▲	▲	▲	▲	▲	▲	▲
51711	1510SD	1-1/4 (31.8)	▲	▲	▲	▲	▲	▲	▲	▲
51712	1512SD	1-1/2 (38.1)	▲	▲	▲	▲	▲	▲	▲	▲
51713	1514SD	2 (50.8)	▲	▲	▲	▲	▲	▲	▲	▲
51714	1516SD	2-1/2 (63.5)		▲	▲	▲	▲	▲	▲	▲
51715	1524SDB*	3 (76.2)		▲		▲	▲		▲	▲

* Square washer indicates 3" pin has been installed
Shank diameter = .145

SELECTION CHARTS

Top Hat Drive Pins

.300 Head Diameter Top-Hat



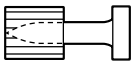
Increases the bearing surface against the material to be fastened for improved attachment to inconsistent base materials. 100 Pin Pack

PART NUMBER	MODEL NUMBER	SHANK LENGTH In. (mm)	721	AUTO FAST	D60	D60L	SA270	D45	COBRA	M70
51864	1903K	1/2 Knurled (12.7)	▲	▲	▲	▲	▲	▲	▲	▲
51867	1906	3/4 (19.1)	▲	▲	▲	▲	▲	▲	▲	▲
51868	1908	1 (25.4)	▲	▲	▲	▲	▲	▲	▲	▲

Shank diameter = .145

PowerPoint Pins

Premium Steel Pin



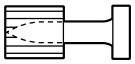
Pin for fastening into harder steel and concrete. 100 Pin Pack

PART NUMBER	MODEL NUMBER	SHANK LENGTH In. (mm)	721	AUTO FAST	D60	D60L	SA270	D45	COBRA	M70
0205201	SP12	1/2 (12.7)	▲	▲	▲	▲	▲	▲	▲	▲
0205202	SP58	5/8 (15.9)		▲	▲	▲	▲	▲	▲	▲
0205203	SP34	3/4 (19.1)		▲	▲	▲	▲	▲	▲	▲
0205204	SP78	7/8 (22.2)		▲	▲	▲	▲	▲	▲	▲

Shank diameter = .150

PowerPoint Step Shank Pins

Premium Steel Pin



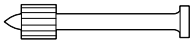
Pin for fastening into harder steel and concrete. 100 Pin Pack

PART NUMBER	MODEL NUMBER	SHANK LENGTH In. (mm)	721	AUTO FAST	D60	D60L	SA270	D45	COBRA	M70
0205205	SP100	1 (25.4)	▲	▲	▲	▲	▲	▲	▲	▲
0205206	SP114	1-1/4 (31.8)		▲	▲	▲	▲	▲	▲	▲
0205207	SP178	1-7/8 (47.6)		▲	▲	▲	▲	▲	▲	▲

Shank diameter = .150/.180

Drive Pins

3/8" (.375) Head Diameter Drive Pins



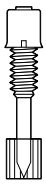
Designed for heavy duty applications. 100 Pin Pack

PART NUMBER	MODEL NUMBER	SHANK LENGTH In. (mm)	MD380
0205215	3306K	3/4 Knurled (19.1)	▲
0205216	3310	1-1/4 (31.8)	▲
0205217	3335	1-1/2 (38.1)	▲
0205218	3329	2 (50.8)	▲
0205219	3337	2-1/2 (63.5)	▲
0205220	3330	3 (76.2)	▲

Shank diameter = .180

Threaded Studs

1/4"-20 Threaded Stud

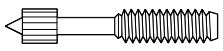


For applications that require removability, where shimming is required. 100 Stud Pack

PART NUMBER	MODEL NUMBER	THREAD LENGTH In. (mm)	SHANK LENGTH In. (mm)	721	AUTO FAST	D60	D60L	SA270	*D45	COBRA	M70	VIPER	VIPER NOSEPIECE REQUIRED
51885	1622WK	1/2 (12.7)	1/2 Knurled (12.7)	▲	▲	▲	▲	▲	▲	▲	▲	▲	2VP4100
51889	1623WK	3/4 (19.1)	1/2 Knurled (12.7)	▲	▲	▲	▲	▲	▲	▲	▲	▲	2VP4125
51887	1642W	1/2 (12.7)	1 (25.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲	2VP4200
51891	1643W	3/4 (19.1)	1 (25.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲	2VP4200
51895	1644W	1 (25.4)	1 (25.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲	2VP4200
51892	1653W	3/4 (19.1)	1-1/4 (31.8)	▲	▲	▲	▲	▲	▲	▲	▲		

Shank diameter = .145

3/8"-16 Threaded Stud



100 Stud Pack

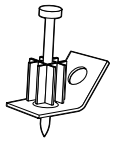
PART NUMBER	MODEL NUMBER	THREAD LENGTH In. (mm)	SHANK LENGTH In. (mm)	MD380
51994	9140K	1 (25.4)	5/8 Knurled (15.9)	▲
51992	9150	1 (25.4)	1-1/16 (27.0)	▲
51995	9190	1 (25.4)	1 - 1/4 (31.8)	▲

Shank diameter = .205

SELECTION CHARTS

Ceiling Clip Assemblies

.300 Head Diameter Pin



Fastener is preassembled to angle clip for applications such as the hanging of ceiling wire to support ceiling grid.
Available in 1000-Pack only

PART NUMBER	MODEL NUMBER	DESCRIPTION	721	AUTO FAST	D60	D60L	SA270	D45	VIPER*
0205224	2202	Ceiling Clip w/1-1/4"	▲	▲	▲	▲	▲	▲	▲

* Viper tool comes assembled with the 2VP4125 nosepiece
Shank diameter = .145

PART NUMBER	MODEL NUMBER	PIN LENGTH In. (mm)	721	AUTO FAST	D60	D60L	SA270	D45	COBRA	VIPER**	VIPER NOSEPIECE REQUIRED
51854	SDC100	1 (25.4)	▲	▲	▲	▲	▲	▲	▲	▲	2VP4100
0205223	SDC125*	1-1/4 (31.8)	▲	▲	▲	▲	▲	▲	▲	▲	2VP4125

** Viper tool comes assembled with the 2VP4125 nosepiece
Shank diameter = .145

Step Shank Pins with Ceiling Clip

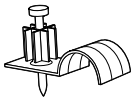
.300 Head Diameter Pin For Hard Concrete

PART NUMBER	MODEL NUMBER	PIN LENGTH In. (mm)	AUTO FAST	D60	D60L	SA270	D45	COBRA	VIPER*	VIPER NOSEPIECE REQUIRED
0205208	SPC100	1 (25.4)	▲	▲	▲	▲	▲	▲	▲	2VP4100
0205178	SPC114	1-1/4 (31.8)		▲	▲	▲	▲	▲	▲	2VP4125

* Viper tool comes assembled with the 2VP4125 nosepiece
Shank diameter = .150/.180

Conduit Clip Assemblies

.300 Head Diameter Pin

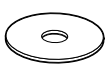


Fastener is preassembled to conduit clip to attach electrical conduit to concrete or steel.

PART NUMBER	MODEL NUMBER	DESCRIPTION	721	AUTO FAST	D60	D60L	SA270	D45	COBRA	M70	VIPER
0205225	38BX08C	3/8" Bx clip w/1" pin	▲	▲	▲	▲	▲	▲	▲	▲	▲
51856	12EMT08C	1/2" Conduit clip w/1" pin	▲	▲	▲	▲	▲	▲	▲	▲	▲
51857	34EMT08C	3/4" Conduit clip w/1" pin	▲	▲	▲	▲	▲	▲	▲	▲	▲
51858	10EMT08C	1" Conduit clip w/1" pin	▲	▲	▲	▲	▲	▲	▲	▲	▲

Shank diameter = .145

Fastener Accessories



PART NUMBER	MODEL NUMBER	DESCRIPTION
0205227	1202CF	Angle clip (no pin)
0205228	1183A	7/8 Metal washer

Ladd Assembly for L1600

PART NUMBER	MODEL NUMBER	PIN LENGTH In. (mm)	DESCRIPTION
0205229	L652	1-1/4 (31.8)	Preassembled pin & clip

Ramset
POWDER FASTENING SYSTEMS

High Quality and Dependability

DESCRIPTION/SUGGESTED SPECIFICATIONS

Powder Loads

ITW Ramset/Red Head powder loads and tools match tolerances to provide optimum power within recognized national velocity standards. Available in color-coded 10-load discs, 10-load strips, and 100-load boxes.

Caution

Always test-fasten with the lowest power level for your tool. If more power is necessary, use the next highest power level until proper level and fastening is achieved. Refer to operator's manual for more specific details. Observe all safety reminders. Tool operators must be trained and qualified as required by federal law. Failure to use properly can result in serious injury or death to users or bystanders.

ADVANTAGES

Loadsaver™ Strip Loads

No more wasted loads! No more wasted time! When mark on strip appears, you know you're about to use the 10th load. Top mark is for tool with high cowling; second mark is for all Ramset and similarly designed tools.

Powder Guide

Power level is designated by the load level number marked on each box; also by the color of the box and each powder load. As the number increases, the power level increases.

(RS 27 caliber series)

SELECTION CHARTS

RAMSET LOADS FOR LOW VELOCITY TOOLS

TOOL MODEL	PART NUMBER	POWER LEVEL	COLOR	CASE COLOR	CALIBER	PACKAGING
D60, D60L D45 AutoFast	51617 51618 51619	2 3 4	Brown Green Yellow	Brass Brass Brass	.25 .25 .25	All 10 Disc 10 Discs/Box
D45 and AutoFast	0205237	5	Red	Brass	.25	10 Discs/Box
721	51716	1	Gray	Brass	.22	
S38 4170 M70	51717 51718 51719	2 3 4	Brown Green Yellow	Brass Brass Brass	.22 .22 .22	All 100/Box
SA270 Cobra Viper	51742 51743 51744	3 4 5	Green Yellow Red	Brass Brass Brass	.27 .27 .27	All 10 Strip, 10 Strips/Box
MD380	51758 51759 51760	4 5 6	Yellow Red Purple	Brass Brass Brass	.27 .27 .27	All 100/Box
L1600	0205230 0205231	4 5	Yellow Red	Brass Brass	.22 .22	All 100/Box

RAMSET LOADS FOR HILTI TOOLS

DX-35	51746 51747 51748	3 4 5	Green Yellow Red	Brass Brass Brass	.25 .25 .25	All 10 Strip, 10 Strips/Box
DX-350	51742 51743	3 4	Green Yellow	Brass Brass	.27 .27	All 10 Strip, 10 Strips/Box
DX-350, DX-36M DX-451	51744	5	Red	Brass	.27	All 10 Strip, 10 Strips/Box
DX-451	51745	6	Purple	Brass	.27	All 10 Strip, 10 Strips/Box
DX-600N	51758 51759 51760	4 5 6	Yellow Red Purple	Brass Brass Brass	.27 .27 .27	All 100/Box
DXE37 DXE72	51716 51717 51718 51719	1 2 3 4	Gray Brown Green Yellow	Brass Brass Brass Brass	.22 .22 .22 .22	All 100/Box

*1000-Pak/100 Strips/Box

Hilti® is a registered trademark of Hilti, Corp.

Catalog No.	Description	Qty/Wt Per Box	Qty/Wt Per Master Carton
.22 Caliber Low Velocity Loads for 721, 4170			
51716	grey, .22 caliber crimp load	100/.2	10,000/19.0
51717	brown, .22 caliber crimp load	100/.2	10,000/20.0
51718	green, .22 caliber crimp load	100/.2	10,000/20.0
51719	yellow, .22 caliber crimp load	100/.2	10,000/21.0
Disc loads for AUTOFAST, D45, D60, D60L			
51617	brown, .25 caliber disc load	100/.1	2000/7.0
51618	green, .25 caliber disc load	100/.1	2000/7.0
51619	yellow, .25 caliber disc load	100/.1	2000/8.0
Disc Load for D45 Only			
0205237	red, .25 caliber D45 disc load	100/.1	2000/9.0
.25 Caliber Strip Loads for DX35			
51746	green, .25 caliber strip load	100/.28	10,000/28.0
51747	yellow, .25 caliber strip load	100/.29	10,000/29.0
51748	red, .25 caliber strip load	1000/2.8 100/.29	10,000/28.0 10,000/29.0
.27 Caliber Strip Loads for SA270, COBRA, VIPER, DX350, DX451, DX36M, DX351			
51742	green, .27 caliber strip load	100/.33	10,000/33.0
51743	yellow, .27 caliber strip load	100/.34	10,000/34.0
51744	red, .27 caliber strip load	100/.34	10,000/34.0
51878	brown, .27 caliber strip load		
.27 Caliber Strip Loads for DX451			
51745	purple, .27 caliber strip load	100/.36	10,000/36.0
.27 Caliber Long Loads for MD380, DX600, HG100			
51758	yellow, .27 caliber long load	100/.36	10,000/36.0
51759	red, .27 caliber long load	100/.37	10,000/37.0
51760	purple, .27 caliber long load	100/.39	10,000/39.0

SPECIFICATIONS

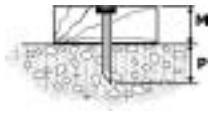
How to Select a Powder Actuated Fastener

Drive pins are used to directly fasten an object (permanent installation).
Threaded studs are used where the object fastened is to be removed or where shimming is required. The following shows how to determine shank and thread length. Required penetration is determined by load requirement (illustrated in the following examples).

Ramset/Red Head fasteners may be specified by their type or catalog number to satisfy fastening requirements.

Permanent Installation

To Concrete



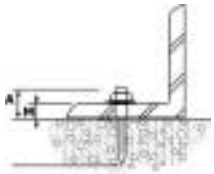
Minimum Shank Length = Thickness of Material (M) + Required Penetration (P)

To Steel

Minimum Shank Length = Thickness of Material (M) + Thickness of Steel (T) + 1/4 Min. Point Allowance

Removable Installation

To Concrete

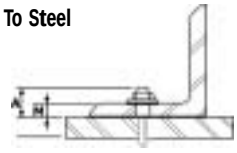


Thread Length (A) = Thickness of Material (M) + Allowance* For Nut & Washer

Shank Length = 1"

*Allowance for thickness of nut & washer = thread size (i.e. allow 1/4" for 1/4-20 thread, etc.)

To Steel



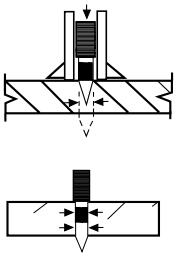
Thread Length (A) = Thickness of Material (M) + Allowance* For Nut & Washer

Shank Length = 1/2"

DESCRIPTION

Fastening to Concrete—

As the fastener enters the concrete, extreme pressures and heat are created. This creates a bond that provides high loading strength in concrete.



Fastening to Steel—

The resilience of steel provides a clamping effect to the fastener. This combined with the tremendous heat that is created, provides a welding and clamping effect to give maximum holding power.

FASTENING PLACEMENT & PENETRATION

The following represents the minimum edge and spacing requirements, plus base material thickness requirements:

Concrete

1. Edge distance
Do not fasten closer than 3 inches from the edge of concrete. If the concrete cracks, the fastener may not hold and may allow the fastener to ricochet, causing serious injury or death to the operator or bystanders.

2. Recommended minimum fastener spacing
Setting fasteners too close together can cause the concrete to crack. The recommended MINIMUM DISTANCE between fastening is three (3) inches. Never attempt a fastener application too close to another previously inserted fastener to prevent the second fastener from ricocheting off the previously installed fastener. A ricochet can result in serious injury or death to the operator or bystanders.

3. Concrete thickness
It is important that the concrete be at least three (3) times as thick as the fastener penetration. If the concrete is too thin, the compressive forces forming at the fastener's point can cause the free face of the concrete to break away. This creates a dangerous condition from flying concrete and/or the fastener and also results in a reduction of fastener holding power.

Steel

1. Edge distance
The recommended edge distance for a fastener to the edge of steel is 1/2 inch. Never fire the tool within 1/2 inch of the edge of a steel base material because the steel may bend or break off, allowing the fastener to ricochet, causing serious injury or death to the operator or bystanders.

2. Recommended minimum fastener spacing
The recommended minimum distance between fastening is 1-1/2 inches. Never attempt a fastening application too close to another previously inserted fastener to prevent the second fastener from ricocheting off the previously installed fastener. A ricochet can result in serious injury or death to the operator or bystanders.

3. Steel thickness
Do not fasten into steel base material thinner than the fastener shank diameter. Holding power will be reduced and the fastener may be over-driven, creating a dangerous situation to the operator or bystanders due to a free-flying fastener.

Fastener penetration is highly dependent on the application. Generally, the deeper the embedment up to 1-1/2", the greater the holding value in concrete. For specific values by fastener type, please refer to the Performance Tables on pages the next two pages.

PERFORMANCE TABLE

ITW Ramset/Red Head Low Velocity Fasteners — *Allowable Working Values (Lbs) in Concrete*

MODEL NUMBER	SHANK DIAMETER SERIES	MIN. PENETRATION (INCH)	*INSTALLED IN STONE AGGREGATE CONCRETE* CONCRETE COMPRESSIVE STRENGTH (PSI) (INCH)						*INSTALLED IN LIGHTWEIGHT AGGREGATE CONCRETE* CONCRETE COMPRESSIVE STRENGTH (PSI)	
			2000PSI		3000PSI		4000PSI		3000PSI	
			TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR
1500, 1600 & 1900 Series Straight Shank Fasteners	0.145	3/4	**45**	**80**	**70**	**115**	**90**	**145**	**80**	**85**
		1	110	165	175	185	235	205	143	152
		1 - 1/4	130	190	180	215	230	240	168	187
		1 - 1/2	187	200	227	233	268	247	175	210
SDC100	0.145	3/4	80	--	120	--	130	--	--	--
SDC125	0.145	1	80	--	120	--	130	--	95	--
2202 Ceiling Clip	0.145	1 - 1/8	--	--	96	180	98	193	--	--
3300 Series	0.180	1 - 1/4	165	225	185	225	210	280	--	--
		1 - 1/2	220	330	225	315	225	300	--	--
9100 Series	0.205	13/16	80	125	90	145	105	170	--	--
		1 - 1/16	115	265	150	250	190	230	--	--
		1 - 1/4	165	315	230	330	295	350	--	--
		1 - 1/2	300	375	310	420	320	460	--	--
		1 - 7/8	385	470	370	440	350	415	--	--
LADD Ceiling System	0.152	1 - 1/8	--	--	211	--	193	--	--	--

Note 1: Except as noted, values shown reflect an 8 to 1 safety factor.

Note 2: Bold values shown reflect 10 to 1 safety factor due to shallow embedment.

Note 3: Values shown are for concrete at the designed strength and are for the fastener or clip system only. Wood, steel, etc. Connected members must be investigated separately.

Note 4: Cyclic, fatigue or shock loads and other design criteria may require a different safety factor.

Note 5: Job-site testing may be required to determine actual job-site values.

Note 6: Tension value for a 3/4" min. embedment in Precast Hollow 5000 psi is 95 lbs. (Ref SDC100).

Note 7: Edge distance is 3" unless otherwise approved.

PERFORMANCE TABLE

ITW Ramset/Red Head Low Velocity Fasteners — *Allowable Working Values (Lbs) in Steel*

MODEL NUMBER SERIES	SHANK DIAMETER (INCH)	TYPE OF SHANK	*INSTALLED IN STEEL* STEEL THICKNESS (INCHES)									
			3/16		1/4		3/8		1/2		3/4	
			TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR
1500, 1600 & 1900 Series Straight Shank Fasteners	0.145	Smooth	130	665	270	700	370	840	--	--	--	--
SD Series	0.145	Smooth										
1/2" Plywood			75	200	110	250	218	276	--	--	--	--
2X Doug Fir			90	235	160	255	--	--	--	--	--	--
3300 Series	0.180	Smooth	85	820	180	895	330	900	--	--	--	--
9100 Series	0.205	Knurled	--	--	480	1,565	550	1,950	--	--	--	--
LADD Ceiling System	0.152	Smooth	137	--	--	--	--	--	--	--	--	--
SP Series	0.150	Smooth	170	645	220	610	295	710	340	754	294	659

Note 1: Values shown reflect a 10 to 1 safety factor for tension and 5 to 1 for shear.

Note 2: Values shown are for fastenings that have the entire pointed end of the fastener driven through the steel plate.

Note 3: Job-site testing may be required to determine actual job-site values.

Note 4: Cyclic, fatigue or shock loads and other design criteria may require a different safety factor.

Note 5: Fastener penetration is 9/16" minimum (Reference 1/2" steel, SP series Shear Data (754 lbs).

Note 6: Fastener penetration is 19/32" minimum (Reference 3/4" steel, SP series Tension data (294 lbs).

Note 7: Fastener penetration is 1/2" minimum (Reference 3/4" steel, SP series Shear data (659 lbs).

PERFORMANCE TABLE

ITW Ramset/Red Head Low Velocity Fasteners — Allowable Working Values (kN) in Concrete

MODEL NUMBER SERIES	SHANK DIAMETER (mm)	MIN. PENETRATION (mm)	*INSTALLED IN STONE AGGREGATE CONCRETE* CONCRETE COMPRESSIVE STRENGTH (MPa)						*INSTALLED IN LIGHTWEIGHT AGGREGATE CONCRETE* CONCRETE COMPRESSIVE STRENGTH (MPa)	
			13.8 MPa		20.7 MPa		27.6 MPa		20.7 MPa	
			TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR
1500, 1600 & 1900 Series Straight Shank Fasteners	3.7	19.1	**0.20**	**0.35**	**0.31**	**0.51**	**0.40**	**0.64**	**0.34**	**0.37**
		25.4	0.48	0.73	0.77	0.81	1.03	0.90	0.63	0.67
		31.8	0.57	0.84	0.79	0.95	1.01	1.06	0.74	0.82
		38.1	0.82	0.88	1.00	0.98	1.18	1.09	0.77	0.92
SDC100*	3.7	19.1	0.35	0.44	0.53	0.55	0.57	0.59	--	0.42
SDC125	3.7	25.4	0.35	0.44	0.53	.055	0.57	0.59	0.42	--
2202 Ceiling Clip	3.7	28.6	--	--	0.42	0.79	0.43	0.85	--	--
3300 Series	4.6	31.8	0.73	0.99	0.81	0.99	0.92	1.23	--	--
		38.1	0.97	1.45	0.99	1.39	0.99	1.32	--	--
9100 Series	5.2	20.7	0.35	0.55	0.40	0.64	0.46	0.75	--	--
		27.0	0.51	1.17	0.66	1.10	0.84	1.01	--	--
		31.8	0.73	1.39	1.01	1.45	1.30	1.54	--	--
		38.1	1.32	1.65	1.36	1.85	1.41	2.02	--	--
		47.6	1.69	2.07	1.63	1.94	1.54	1.83	--	--
LADD Ceiling System	3.9	28.6	--	--	0.93	--	0.85	--	0.75	--

Note 1: Except as noted, values shown reflect an 8 to 1 safety factor.

Note 2: Bold values shown reflect 10 to 1 safety factor due to shallow embedment.

Note 3: Values shown are for concrete at the designed strength and are for the fastener or clip system only. Wood, steel, etc. Connected members must be investigated separately.

Note 4: Cyclic, fatigue or shock loads and other design criteria may require a different safety factor.

Note 5: Job-site testing may be required to determine actual job-site values.

Note 6: Tension value for a 19.1mm min. embedment in Precast Hollow 34.5 MPa is 0.42 kN (Ref SDC100).

Note 7: Edge distance is 76mm unless otherwise approved.

PERFORMANCE TABLE

ITW Ramset/Red Head Low Velocity Fasteners — Allowable Working Values (kN) in Steel

PART NUMBER SERIES	SHANK DIAMETER (mm)	TYPE OF SHANK	*INSTALLED IN STEEL* STEEL THICKNESS (mm)									
			4.76		6.35		9.53		12.7		19.1	
			TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR	TENSION	SHEAR
1500, 1600 & 1900 Series Straight Shank Fasteners	3.7	Smooth	10.57	2.93	1.19	3.08	1.65	3.74	--	--	--	--
SD Series	3.7	Smooth	0.33	0.88	0.48	1.10	0.97	1.23	--	--	--	--
1/2" Plywood			0.40	1.03	0.70	1.12	--	--	--	--	--	--
2X Doug Fir												
3300 Series	4.6	Smooth	0.37	3.61	0.79	3.94	1.45	3.96	--	--	--	--
9100 Series	5.2	Knurled	--	--	2.11	6.89	2.42	8.58	--	--	--	--
LADD Ceiling System	3.9	Smooth	0.60	--	0.59	--	0.58	--	--	--	--	--
SP Series	3.8	Smooth	0.76	2.87	0.98	2.71	1.31	3.16	1.51	2.96	1.31	2.93

Note 1: Values shown reflect a 10 to 1 safety factor for tension and 5 to 1 for shear.

Note 2: Values shown are for fastenings that have the entire pointed end of the fastener driven through the steel plate.

Note 3: Job-site testing may be required to determine actual job-site values.

Note 4: Cyclic, fatigue or shock loads and other design criteria may require a different safety factor.

Note 5: Fastener penetration is 14.3mm minimum (Reference 12.7mm steel, SP series Shear Data (2.96Kn).

Note 6: Fastener penetration is 15.1mm minimum (Reference 19.1mm steel, SP series Tension data (1.31Kn).

Note 7: Fastener penetration is 12.7mm minimum (Reference 19.1mm steel, SP series Shear data (2.93Kn).

Decimal Equivalents for Standard Sheet Gauges

Gauge No.	Steel Sheet	Galvanized Sheets	Stainless Steel Sheets	Aluminum Sheets	Steel Tubing
	Manufacturers Standard	Galvanized Sheet Gauge	United States Standard	American or Brown & Sharpe	Birmingham Wire Gauge
0000				0.4600	0.454
000				0.4096	0.425
00				0.3648	0.380
0				0.3249	0.340
1				0.2893	0.300
2				0.2576	0.284
3	0.2391			0.2294	0.259
4	0.2242			0.2043	0.238
5	0.2092			0.1819	0.220
6	0.1943			0.1620	0.203
7	0.1793			0.1443	0.180
8	0.1644	0.1681	0.172	0.1285	0.165
9	0.1495	0.1532	0.156	0.1144	0.148
10	0.1345	0.1382	0.141	0.1019	0.134
11	0.1196	0.1233	0.125	0.0907	0.120
12	0.1046	0.1084	0.109	0.0808	0.109
13	0.0897	0.0934	0.094	0.0720	0.095
14	0.0747	0.0785	0.078	0.0641	0.083
15	0.0673	0.0710	0.070	0.0571	0.072
16	0.0598	0.0635	0.063	0.0508	0.065
17	0.0538	0.0575	0.056	0.0453	0.058
18	0.0478	0.0516	0.050	0.0403	0.049
19	0.0418	0.0456	0.044	0.0359	0.042
20	0.0359	0.0396	0.038	0.0320	0.035
21	0.0329	0.0366	0.034	0.0285	0.032
22	0.0299	0.0336	0.031	0.0253	0.028
23	0.0269	0.0306	0.028	0.0226	0.025
24	0.0239	0.0276	0.025	0.0201	0.022
25	0.0209	0.0247	0.022	0.0179	0.020
26	0.0179	0.0217	0.019	0.0159	0.018
27	0.0149	0.0202	0.017	0.0142	0.016

Notes

Climaseal™ and Climacoat™ are trademarks of ITW Buildex and Illinois Tool Works Inc.

Nominal Screw Sizes

Nominal Screw Size	Basic Diameter (in.)
6	0.138
8	0.164
10	0.190
12	0.216
1/4	0.250

Installation Guidelines

- Use a standard screwgun with a depth sensitive nosepiece to install fasteners. For optimal fastener performance, the screwgun should be a minimum of 4 amps and have a range of 0-2000 RPM.
- Adjust the screwgun nosepiece to properly seat fastener.
- New magnetic sockets must be correctly set before use.
- Worn or damaged bit tip should be replaced
- Remove chip build-up as needed.
- For non-bonded or integral washer fasteners, the fastener is fully seated when the head is flush with the work surface.
- The following illustrates a properly seated bonded or integral washer fastener.
- Overdriving may result in torsional failure of the fastener or stripout of the base material.
- The fastener must penetrate beyond the metal structure a minimum of 3 pitches of thread.
- All “winged” fasteners must be driven into 16 gauge minimum steel thickness to consistently break wings.

#8 Diameter - Light Gauge - Zinc Finish

Part Number					
Pan Head Phillips	Hex Washer Head	Description	Drill Point	Drill & Tap Capacity (in.)	Max. Material Attachments (in.)
32004	32028	8-18 x 1/2	#2	0.036 - 0.100	0.205
32005	23029	8-18 x 5/8	#2	0.036 - 0.100	0.330
32006	32030	8-18 x 3/4	#2	0.036 - 0.100	0.455
32007	32031	8-18 x 1	#2	0.036 - 0.100	0.705

Uses

HVAC, electrical trim accessories to steel framing, stitch roof deck and wall panel sidelaps, residential steel frame construction, brick ties to steel framing, track to stud, stud splicing and hat channel to stud.

#10 Diameter - Light to Medium Gauge - Climaseal™ Finish

Part Number					
Pan Head Phillips	Hex Washer Head	Description	Drill Point	Drill & Tap Capacity (in.)	Max. Material Attachments (in.)
32010	32035	10-16 x 1/2	#3	0.036 - 0.175	0.150
32011	32036	10-16 x 5/8	#3	0.036 - 0.175	0.200
32012	32037	10-16 x 3/4	#3	0.036 - 0.175	0.325
32013	32038	10-16 x 1	#3	0.036 - 0.175	0.575
	32039	10-16 x 1-1/4	#3	0.036 - 0.175	0.825
	32040	10-16 x 1-1/2	#3	0.036 - 0.175	1.075

Uses

HVAC, electrical trim accessories to steel framing, stitch roof deck and wall panel sidelaps, residential steel frame construction, brick ties to steel framing, track to stud, stud splicing and hat channel to stud.

#12 Diameter - Medium Gauge - Climaseal™ Finish

Hex Washer Head Part No.	Description	Drill Point	Drill & Tap Capacity (in.)	Max. Material Attachments (in.)
32041	12-14 x 3/4	#3	0.036 - 0.210	0.290
32042	12-14 x 1	#3	0.036 - 0.210	0.525
32055	12-14 x 1-1/4	#2	0.036 - 0.210	0.580
32043	12-14 x 1-1/2	#2	0.036 - 0.210	0.980
32044	12-14 x 2	#3	0.036 - 0.210	1.525
32053	12-14 x 3	#3	0.036 - 0.210	2.525
32054	12-14 x 4	#3	0.036 - 0.210	3.425

Uses

Duct work, roof deck, clips or accessories to steel framing, wall panel to girt and retrofit framing.

SELF-DRILLING SCREWS

1/4" Diameter - Medium Gauge - Climaseal™ Finish

Hex Washer Head Part No.	Description	Drill Point	Drill & Tap Capacity (in.)	Max. Material Attachments (in.)
32046	1/4-14 x 1	#3	0.036 - 0.210	0.460
32047	1/4-14 x 1-1/4	#3	0.036 - 0.210	0.710
32048	1/4-14 x 1-1/2	#3	0.036 - 0.210	0.960
32049	1/4-14 x 2	#3	0.036 - 0.210	1.460
32051	1/4-14 x 3	#3	0.036 - 0.210	2.460

Uses
Duct work, roof deck, clips or accessories to steel framing, wall panel to girt and retrofit framing.

#12 Diameter - Heavy Gauge - Climaseal™ Finish

Hex Washer Head Part No.	Description	Drill Point	Drill & Tap Capacity (in.)	Max. Material Attachments (in.)
32106	12-24 x 7/8	#4	0.125 - 0.250	0.325
32108	12-24 x 1-1/4	#4.5	0.125 - 0.375	0.575
32109	12-24 x 1-1/4	#5	0.250 - 0.500	0.375
32112	12-24 x 1-1/2	#5	0.250 - 0.500	0.625
32116	12-24 x 2	#5	0.250 - 0.500	1.125
32117	1/4-28 x 3	#5	0.250 - 0.500	2.125
32119	1/4-28 x 4	#5	0.250 - 0.500	3.100

Uses
Metal deck, clips, liner panels or accessories to structural steel or bar joist.

Hex Washer Head with 9/16" Bonded Washer - Climaseal™ Finish

Part Number	Description	Drill Point	Drill & Tap Capacity (in.)	Max. Material Attachments (in.)
32070	12-14 x 2	#3	0.036 - 0.210	1.400
32073	1/4-14 x 1-1/4	#3	0.036 - 0.210	0.590
32075	1/4-14 x 2	#3	0.036 - 0.210	1.340
32077	1/4-14 x 3	#3	0.036 - 0.210	2.340
32080	12-24 x 1-1/4	#4.5	0.125 - 0.375	0.450

Uses
Dual sealing bonded washer provides weather tight sealing of roof and wall applications.

Hex Washer Head with Integral Washer System - Climaseal™ Finish

Part Number	Description	Drill Point	Drill & Tap Capacity (in.)	Max. Material Attachments (in.)
32065	10-16 x 3/4	#3	0.036 - 0.210	0.150
32067	12-14 x 3/4	#3	0.036 - 0.210	0.260
32068	12-14 x 1	#2	0.036 - 0.210	0.310
32078	12-14 x 1-1/4	#2	0.036 - 0.210	0.560
32069	12-14 x 1-1/2	#2	0.036 - 0.210	0.810
32071	1/4-14 x 3/4	#3	0.036 - 0.210	0.150
32072	1/4-14 x 1	#3	0.036 - 0.210	0.400
32074	1/4-14 x 1-1/2	#3	0.036 - 0.210	0.810

Uses
Provides superior weather tight sealing of roof and wall applications with optimal pullover resistance.

Wafer Head - Wood to Metal - Climacoat™ Finish

Part Number	Description	Drill Point	Drill & Tap Capacity (in.)	Wood Attachment Range (in.)
32090	10-24 x 3/4	#3	0.036 - 0.175	1/4 - 3/8
32601	10-24 x 1	#3	0.036 - 0.175	1/4 - 1/2

Uses
Plywood, facia, mansard, roofing, flooring to steel framing.

Phillips Flat Head (with wings) - Wood to Metal - Climacoat™ Finish

Part Number	Description	Drill Point	Drill & Tap Capacity (in.)	Wood Attachment Range (in.)
32086	12-24 x 2-1/4	#4	0.125 - 0.375	3/4 - 1-3/8
32087	12-24 x 2-3/4	#4	0.125 - 0.375	3/4 - 1-5/8
32088	1/4-20 x 3	#4	0.125 - 0.375	3/4 - 2

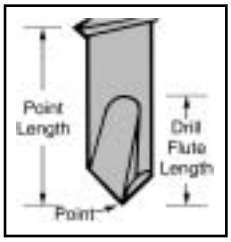
Uses
Plywood or 2x4's to steel framing.

You can e-mail your technical or engineering questions to:
engineer@fastenal.com

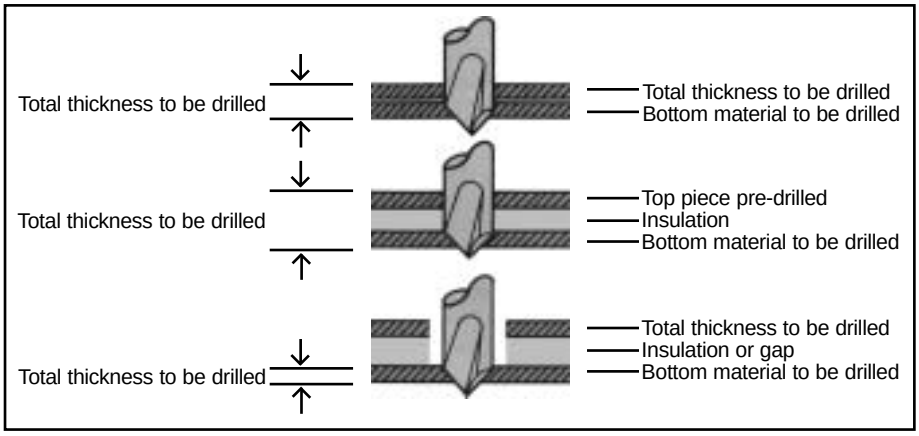
SELF-DRILLING SCREW SELECTION GUIDE & PERFORMANCE ANALYSIS

Self-Drilling Screw Selection Guide

The point is designed to efficiently remove material and precisely size the hole for the thread. The length of the drill flute determines the metal thickness that can be drilled. The flute provides a channel for chip removal during the drilling process. The point length, which is the unthreaded portion from the point to the first thread, should be long enough to assure the drilling action is complete before the first thread begins tapping into the drilled metal. Screw threads advance at a rate of up to ten times faster than the drill flute can remove metal. All drilling should be complete prior to forming the threads.

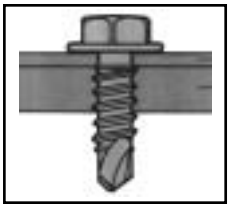


The following illustrates how to determine the thickness of the material to be drilled:



Thread Length

Choose a fastener with sufficient threads to fully engage in the base material. The head of the fastener provides the holding power for the material being fastened. It may be helpful, but not critical, that the threads also engage in the material being fastened. The threads provide the holding power in the base material.



Thread Pitch

The type of thread pitch to be used is determined by the thickness of the material to be fastened and the diameter of the screw. In general, the thinner the fastened material, the more threads needed, while the thicker the material, the fewer the number of threads needed. This is due to the fact that in thin metal, the upper and lower threads provide the clamp force. Most thicker materials will require a coarser thread. However, in thick metal (3/8" to 1/2" thick), a fine thread may be required to tap into the base material and provide the greatest holding power.

Self-Drilling Screw Performance Analysis

Average Ultimate Pullout Values (lbs.)

Fastener		Steel Gauge									
Diameter	Point	26	24	22	20	18	16	14	12	3/16	1/4
#8	2	119	193	265	298	491	703	959			
#10	3	124	208	266	299	499	708	967	1474		
#12	2	156	243	283	375	605	848	1181	1856	3520	
#12	3	142	211	289	341	551	757	1063	1631	2998	
#12	4					495	697	986	1532	3485	4013
#12	4.5					468	683	923	1508	3865	4101
#12	5					487	699	913	1527	3701	3999
1/4"	3	141	231	293	346	613	880	1145	1858	4550	
1/4"	4					554	788	1116	1803	4297	

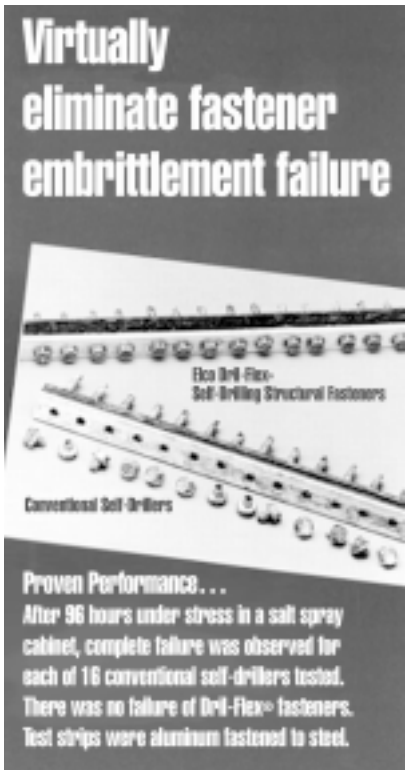
Average Ultimate Shear Values (lbs.)

Fastener		Steel Gauge (lapped)									
Diameter	Point	26	24	22	20	18	16	14	12	1/8	1/4
#8	2	294	496	560	740	1060					
#10	3				728	1266	1540	1552			
#12	2	365	600	623	898	1370	1758	2138	2202		
#12	3				769	1358	1620	1970	1986		
#12	4								2048	2030	
#12	4.5								2641	2887	2897
#12	5								2650	2700	2762
1/4"	3				930	1442	2100	2584	2650		
1/4"	4								2650	2820	

Fastener Values

Fastener dia-tpi	Tensile (lbs.)	Shear (lbs.)
8-18	1545	750
10-16	1936	1400
12-14	2778	2000
12-24	3165	2200
1/4-14	4060	2600
1/4-20	3860	2700

Load values listed are ultimate averages achieved under laboratory conditions and apply to ITW Buildex fasteners only. Due to differences in specifications, applications and interpretation of results, appropriate safety factors should be applied to these values for actual design purposes.



Dril-Flex®

Dril-Flex® self-drilling fasteners incorporate two separate hardness zones. The higher hardness zone consists of the self-drilling point and the leading threads. This area provides dependable self-drilling and tapping. The lower hardness zone consists of the fastener shank and head. This area is of high strength, yet, possesses higher ductility and is, therefore, virtually immune to embrittlement failures.

The Dril-Flex® fastener is coated with a three step silver Stalgard® finishing system. This system consists of a heavy zinc base plate, a chromate conversion coating and two coats of thermosetting aluminum-filled polymer.

Performance Analysis

Average Ultimate Pullout Values (lbs.)

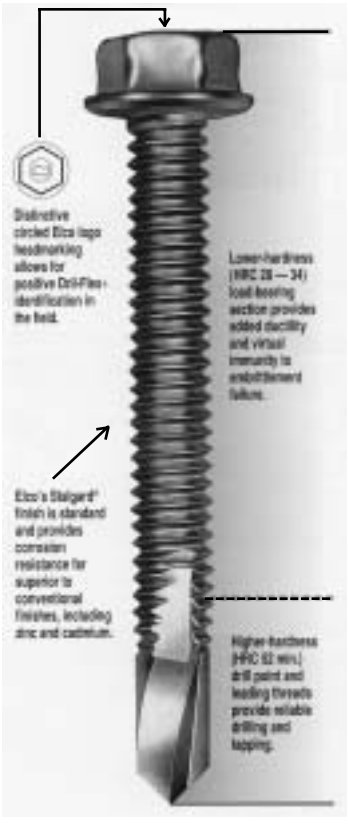
Fastener		ASTM A36 Steel							6063-T5 Aluminum	
Size	Point	18 Gage	16 Gage	14 Gage	1/8"	3/16"	1/4"	5/16"	1/8"	1/4"
10-16 HWH	3	396	501	634	1420				726	
12-14 HWH	3	396	527	710	2246	2944			1066	
1/4-14 HWH	3	398	530	686	2677	3832			1231	
1/4-20 HWH	4		516	649	2783	3948	4304	4412	1167	2322

Load values listed are ultimate average values achieved under laboratory conditions. Due to differences in specifications, applications and interpretation of results, appropriate safety factors should be applied to these values for actual design purposes.

Average Ultimate Shear Values (lbs.)

Test Material Description						
Fastener Size	18 Gage Steel to 18 Gage Steel	18 Gage Steel to 18 Gage Steel	1/8" Steel to 3/16" Steel	3/16" Steel to 1/4" Steel	1/8" Aluminum to 1/8" Aluminum	1/8" Aluminum to 1/4" Aluminum
10–16	888	1464				
12–14	924	1606			1704	2423
1/4–14	900	1648	2633		2045	2978
1/4–20	996	1580	2781	2711	2002	2905

Load values listed are ultimate average values achieved under laboratory conditions. Due to differences in specifications, applications and interpretation of results, appropriate safety factors should be applied to these values for actual design purposes.



Dril-Flex Fastener Tensile Strength (lbs.)

Fastener	10–16	12–14	1/4–14	1/4–20
Tensile (lbs.)	2295	2968	4208	4516

Load values listed are ultimate average values achieved under laboratory conditions. Due to differences in specifications, applications and interpretation of results, appropriate safety factors should be applied to these values for actual design purposes.

Dril-Flex® Screws

Elco Dril-Flex® fasteners are specially designed and processed to help alleviate hydrogen induced brittle failures. Cold formed from a special steel alloy, their point and lead tapping threads are selectively hardened to a minimum of HRC 52 for reliable drilling and tapping, while the hardness of the load-bearing portion is held at or below the critical HRC 34 level.

Part Number	Description	Drive Point Style	Drilling Capacity	Application
0120595	10–16 x 3/4	Hex Washer #3	0.150	Steel & Aluminum
0120596	12–14 x 7/8	Hex Washer #3	0.187	Aluminum Only
0120597	12–14 x 1	Hex Washer #3	0.187	Steel & Aluminum
0120598	12–14 x 1-1/2	Hex Washer #3	0.187	Steel & Aluminum
0120599	12–14 x 2	Hex Washer #3	0.187	Steel & Aluminum
0120600	1/4–14 x 1	Hex Washer #3	0.210	Steel & Aluminum
0120601	1/4–14 x 1-1/2	Hex Washer #3	0.210	Steel & Aluminum
0120602	1/4–20 x 1-1/8	Hex Washer #4	.210-.312	Steel & Aluminum
0120603	1/4–20 x 1-1/2	Hex Washer #4	.210-0.375	Steel & Aluminum
0120604	1/4–20 x 2	Hex Washer #4	.210-0.375	Steel & Aluminum
0120605	1/4–20 x 2 1/2	Hex Washer #4	.210-0.375	Steel & Aluminum
0120606	12–14 x 1	UndrCut Flat #3	0.187	Steel & Aluminum

HANGERMATE™ THREADED ROD ANCHORING SYSTEMS

Threaded Rod to Steel

A solid, one piece, 4037 carbon alloy steel, self-drilling HangerMate anchor for use in steel up to 1/4" thick. Ideal for overhead vertical support applications in steel. Place the anchor in appropriate recessed socket and drive directly into the steel.

Part No.	Rod Size	Installation Tool	Ultimate Average Pull-Out Values (lbs.) Steel Thickness (in.)												
			0.062	0.078	0.105	0.112	0.121	0.125	0.155	0.172	0.187	0.193	0.235	0.25	0.256
62270	1/4-20	0128881	516	649	1433			2783			3948			4304	
62271	3/8-16	62274	735	1044	1655	1889	2093		2806	3255		3968	4545		5090
*62281	3/8-16	62274	2801	4065	4925										

* with nut

An appropriate safety factor must be applied to these values

Approvals, Listings & Specifications
Plating per ASTM B633, Type II, Class 12"
3/8-16 Rod Anchors:
Meets NFPA 13 Requirements/ 16 ga - 1/4"
UL Listings for 0.155" steel and above up to 4" pipe
FM Approved in 0.138" steel and above up to 4" pipe

Hangermate™ Threaded Rod Anchoring Systems

Self-Drilling Anchors

Attach threaded rod to steel up to .250".

Rod Size	Part Number	Package Quantity	Wt. Per 100
1/4–20	62270	50	150
3/8–16	62271	50	150
3/8-16*	62281	50	150

*= with nut

Threaded Rod to Concrete or Wood

A solid, one piece, 4037 carbon alloy steel, self-drilling HangerMate anchor ideal for use in both concrete or wood. For wood, place the anchor in appropriate recessed socket and drive directly in the wood surface. Avoid overdrilling. In concrete applications, use appropriate carbide bit to pre-drill hole. Then place the drive sleeve over the bit and place the anchor into the end of the sleeve. Drive the anchor into the hole.

Part Number	Rod Size	Ultimate Average Pull-Out Values (lbs.)		Wood Installation Tool	
		Wood	Concrete		
62272	1/4-20	1694	2181	0128881	1
62273	3/8-16	1694	2181	62274	2

An appropriate safety factor must be applied to these values

Approvals, Listings & Specifications
Plating per ASTM B633, TypeII, Class 12"
3/8-16 Rod Anchors:
Meets NFPA 13 2-6.1 requirements in wood materials
FM Approved for Concrete when installed in countersunk position

Masonry/Wood Anchors

Attach threaded rod to concrete or wood.

Rod Size	Part Number	Package Quantity	Bulk Quantity
1/4–20	62272	50	150
3/8–16	62273	50	150

Meets NFPA 13 Support Requirements.
For wood materials.

For Masonry Applications:

1. Use masonry installation sleeve #0128882. Use with drill bit part #62276 and drill adapter part #62278 and 0128881, or SDS hex shank part #62277 and 0128881.
2. Use masonry installation sleeve part #62275. Use with bit #62276 and drill adapter part #62278 or SDS hex shank #62277.

Threaded Rod to Wood

A solid, one piece, 10B21 carbon alloy steel, self-drilling HangerMate anchor ideal for overhead vertical use in wood beams or joists. Place the anchor in appropriate recessed socket and drive directly in the wood surface. Avoid overdrilling.
Installation Tool: 62274

Part Number	Rod Size	Ultimate Average Pull-Out Values (lbs.) in Douglas Fir
62285	3/8-16	2353

An appropriate safety factor must be applied to these values

Approvals, Listings & Specifications
Plating Per ASTM B633, Type II, Class 12
FM Approved for pipe up to 4
Meets NFPA 13 requirements

Heavy-Duty Wood Only Anchor

Attach threaded rod or components to wood. FM approved for pipe up to 4".

Rod Size	Part Number	Package Quantity	Bulk Quantity
3/8–16	62285	50	150

Mini-Point

A solid, one piece 10B21 carbon alloy steel, self-drilling HangerMate anchor ideal for vertical support applications in 14 and 16 ga Z-Purlins, C-Purlins or other secondary structural framing members. Place the anchor directly in the appropriate recessed socket and drive directly into the steel.
Installation Tool: 62274

Part Number	Rod Size	Ultimate Average Pull-Out (lbs.)	
		16 ga Purlin	14 ga Purlin
62288	3/8-16	735	1044

An appropriate safety factor must be applied to these values

Approvals, Listings & Specifications
Plating Per ASTM B633, Type II, Class 12

Self-Drilling Mini-Point Anchors

For attachment to bottom of 16 or 14 gauge steel purlins/Structural Framing. Packed with retainer nuts.

Rod Size	Part Number	Package Quantity	Bulk Quantity
3/8–16	62288	50	150

Brute™ Self-Drilling Sidewall Anchors

A solid, one piece 10B21 carbon alloy steel, self-drilling HangerMate anchor ideal for horizontal support applications in 14 and 16 ga Z-Purlins, C-Purlins or other secondary structural framing members. Place the anchor directly in the appropriate recessed socket and drive directly into the steel.
Installation Tool: 62289

Part No.	Rod Size	Ultimate Average Pull-Out (lbs.)	
		16 ga Purlin	14 ga Purlin
62290	3/8-16	735	1044
		*2801	*4065

* with nut

An appropriate safety factor must be applied to these values

Approvals, Listings & Specifications
Plating Per ASTM B633, Type II, Class 12

A solid, one piece 10B21 carbon alloy steel, self-drilling HangerMate anchor ideal for horizontal support applications in steel applications from 12 ga up to 1/4". Place the anchor directly in the appropriate recessed socket and drive directly into the steel.
Installation Tool: 62289

Part Number	Rod Size	Steel Thickness (in.)	Ultimate Average Pull-Out Values (lbs.)						
			0.105	0.112	0.155	0.172	0.193	0.235	0.256
62286	3/8-16		1655	1889	2093	3255	3968	4545	5090

An appropriate safety factor must be applied to these values

Approvals, Listings & Specifications
Plating Per ASTM B633, Type II, Class 12

Brute™ Self-Drilling Sidewall Anchors

For sidewall attachment: For 16 or 14 gauge steel purlin, use #62290-this fastener is packed with retainer nuts. For 12 gauge steel purlin or steel joist up to 1/4" thick, use #62286. UL listing for #62290 only.

Rod Size	Part Number	Package Quantity	Bulk Quantity
3/8–16	62286	50	75
3/8–16 w/nut	62290	50	75

Brute™ Self-Drilling Sidewall Anchors for Wood

A solid, one piece, 10B21 carbon alloy steel, self-drilling HangerMate anchor ideal for horizontal support applications in wood beams or joists. Place the anchor in appropriate recessed socket and drive directly in the wood surface. Avoid overdrilling.
Installation Tool Required: 62289

Part Number	Rod Size	Ultimate Average Pull-Out Values (lbs.)
62287	3/8-16	1889

Wood Type: Southern Yellow Pine SPIB No. 2 GRN/Specific Gravity 0.678

An appropriate safety factor must be applied to these values

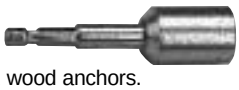
Approvals, Listings & Specifications
Plating Per ASTM B633, Type II, Class 12
Meets NFPA 13 2-6.1 Support Requirements

Self-Drilling Brute™ Anchor For Wood

Use with Gold-Colored drive tool part number 62289.

Rod Size	Part Number	Package Quantity	Bulk Quantity
3/8–16	62287	50	75

Installation Tool



Use part number 62274 drive tool for end-tapped self-drilling steel and wood anchors.
Use Gold-Colored part number 62289 drive tool for BRUTE™ sidewall anchors.

Part Number	Package Quantity	Bulk Quantity
62274	1	3
62289	1	3

Masonry Anchor Installation Tool

Part Number 62275

Available in single or bulk (3). Use with SDS hex shank part number 62275 or with standard carbide bit part number 62276 and adapter part number 62278 in hammer drills.

Carbide Bits

.234" Diameter

Part Number 62276

Available in single or bulk (3). Use with 62278 drill adapter and 62275 masonry installation tool.

SDS Carbide-Tipped Drill Bits

Hex Shank

Part Number 62277

Available in single or bulk (3). Use with 62275 masonry installation tool.

Carbide-Tipped Drill Bit Adapter

Part Number 62278

Available in single or bulk (3). Use with 62275 masonry installation tool.

Starter Kit

Part Number 62279

Description	Part No.	Pkg. Qty.
1/4–20 Self-Drilling Anchors	62270	10
3/8–16 Self-Drilling Anchors	62271	10
1/4–20 Masonry/Wood Anchors	62272	10
3/8–16 Masonry/Wood Anchors	62273	10
Recessed Drive Sleeve	62275	1
Recessed Drive Socket	62274	1
SDS Carbide-Tipped Drill Bit	62277	1
Tanged Carbide-Tipped Drill Bit	62276	1
Tanged Drill Bit Adapter	62278	1
1/8" Short Arm Hex Key	26516	1

Steel - Vertical Mount

DSTR
Self-drilling and self-tapping in steel. Includes retainer nut.

Item No.	Model No.	Rod Size	Description	FM-UL Pullout	Pipe Size	Gauge/Actual Pullout	Max. Thick	Part No.
30	DSTR 1	3/8-16	1/4-20 x 1	1475#	3/4-4"	.036"-20 ga./1510#	.188"	61900

For maximum pull out in steel, add retainer nut and torque to 20 ft-lbs.

DSTR 516
Self-drilling and self-tapping in steel. Includes retainer nut.

Item No.	Model No.	Rod Size	Description	FM-UL Pullout	Pipe Size	Gauge/Actual Pullout	Max. Thick	Part No.
31	DSTR 516	3/8-16	5/16-18 x 1-1/4	1500#	4"	.036"-20 ga./2200#	.188"	61912

For maximum pull out in steel, add retainer nut and torque to 20 ft-lbs.

TEK
Self-drilling and self-tapping in steel.

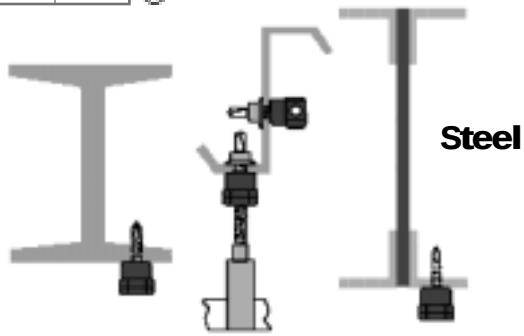
Item No.	Model No.	Rod Size	Description	FM-UL Pullout	Pipe Size	Gauge/Actual Pullout	Max. Thick	Part No.
38	TEK 50	3/8-16	12-24 x 1-1/2	1475#	3/4-4"	.25"-1/4"/3125#	.50"	61901

DST 516
Self-drilling and self-tapping in steel.

Item No.	Model No.	Rod Size	Description	FM-UL Pullout	Pipe Size	Gauge/Actual Pullout	Max. Thick	Part No.
37	DST 516	3/8-16	5/16-18 x 1-1/4	1500#	4"	.188"-3/16"/1500+#	.210"	61913

DST
Self-drilling and self-tapping in steel.

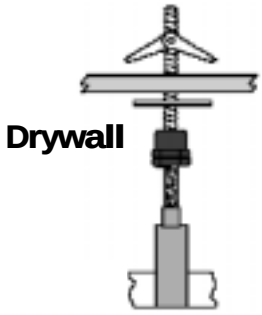
Item No.	Model No.	Rod Size	Description	Gauge/Actual Pullout	Max. Thick	Part No.
32	DST 10	3/8-16	1/4-14 x 1	.036"-20 ga./446#	.188"	61902
33	DST 15	3/8-16	1/4-14 x 1-1/2	.066"-16 ga./970#	.188"	61903
34	DST 20	3/8-16	1/4-14 x 2		.188"	61904
35	DST 25	3/8-16	1/4-14 x 2-1/2		.188"	61905
36	DST 30	3/8-16	1/4-14 x 3		.188"	61906



Wood - Vertical Mount

GST
Self-drilling and self-tapping in wood.

Item No.	Model No.	Rod Size	Shk. Dia.	Shk. Lgth.	FM-UL Pullout	Pipe Size	Actual Pullout	Part No.
11	GST 10	3/8-16	1/4	1			210# / 7/16 OSB 670# / 3/4" Ply	61914
12	GST 20	3/8-16	1/4	2	940#	3/4-2 1/2"	1760# - Fir	61909
13	GST 30	3/8-16	1/4	3	1475#	3/4-4"	2060# - Fir	61910
27	GST 25-380	3/8-16	3/8	2-1/2			2113# - Fir	0128517
15	GST 3	1/2-13	1/4	3			2275# - Fir	61916



Concrete - Vertical Mount

CST 20
For use in concrete. Pre-drilling required with .25" bit.

Item No.	Model No.	Rod Size	Shk. Dia.	Shk. Lgth.	Actual Pullout	Part No.
61	CST 20	3/8-16	5/16	1-1/2	2810#	61907

Concrete - Horizontal Mount

SWC 20
Self-threading into concrete. *Pre-drilling required with .25" bit.*

Item No.	Model No.	Rod Size	Shk. Dia.	Shk. Lgth.	Actual Pullout	Part No.
65	SWC 20	3/8-16	5/16	1-1/2	2050#	61932

Drywall - Vertical Mount

SST 30
Toggle for sheetrock or plywood.

Item No.	Model No.	Rod Size	Shk. Dia.	Shk. Lgth.	Actual Pullout	Part No.
70	SST 30	3/8-16	14-20	3	450#/Lath & Plaster 404#/2 Layers 5/8 Rock	61911

Ceiling Wire Screws/Tools

Wood–self-tapping / Steel–self-drilling

Item No.	Model No.	Shk. Dia.	Shk. Lgth.	Pull-out	Part No.
96	CWSD 1 (steel)	1/4	1	170# - 20ga.	0128519
98	CWSD 2 (steel)	1/4	2	170# - 20ga.	0128520
97	CWSW 2 (wood)	1/4	2	270# - fir	0128521
99	CWIT (installation tool)				0128522

Steel - Horizontal Mount

SWDR 1

Self-drilling and self-tapping in steel. Includes retainer nut.

Item No.	Model No.	Rod Size	Description	FM-UL Pullout	Pipe Size	Gauge/Actual Pullout	Max. Thick	Part No.
43	SWDR 1	3/8-16	1/4-20 x 1	1500#	4"	.036"-20 ga./1900#	.188"	61924
44	SWDR 516	3/8-16	5/16-18 x 1-1/4	1500#	4"	.036"-20 ga./2480#	.188"	61933
46	SWDR 1-1/2	3/8-16	1/4-20 x 1-1/2	1500#	4"	.036"-20 ga./2375#	.188"	61925

For maximum pull out in steel, add retainer nut and torque to 20 ft-lbs.

SWT 15

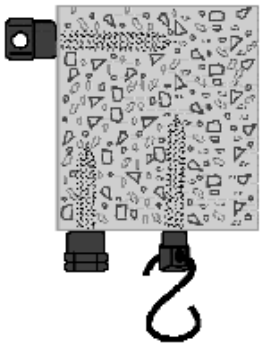
Self-drilling and self-tapping in steel.

Item No.	Model No.	Rod Size	Description	FM-UL Pullout	Pipe Size	Minimum Thickness	Maximum Thick	Part No.
45	SWT 15	3/8-16	12-24 x 1-1/2			.25" - 1/4"	.50"	61929

SWD

Self-drilling and self-tapping in steel.

Item No.	Model No.	Rod Size	Description	Gauge/Actual Pullout	Max. Thick	Part No.
39	SWD 10	3/8-16	1/4-14 x 1	.066"-16 ga./1477#	.188"	61926
40	SWD 15	3/8-16	1/4-14 x 1-1/2	.066"-16 ga./1477#	.188"	61927
41	SWD 20	3/8-16	1/4-14 x 2	.066"-16 ga./1477#	.188"	61928



Concrete

SWD 516

Self-drilling and self-tapping in steel.

Item No.	Model No.	Rod Size	Description	Gauge/Actual Pullout	Max. Thick	Part No.
42	SWD 516	3/8-16	5/16-18 x 1-1/4			61934

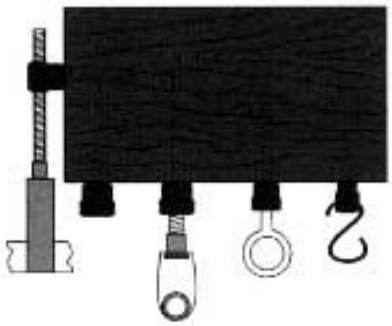
Wood - Horizontal Mount

SWG

Self-drilling and threaded into wood.

Item No.	Model No.	Rod Size	Shk. Dia.	Shk. Lgth.	FM-UL Pullout	Pipe Size	Actual Pullout	Part No.
18	SWG 10	3/8-16	1/4	1				61930
19	SWG 20	3/8-16	1/4	2			1725# - Fir	61931
26	SWG 25-380	3/8-16	3/8	2-1/2	750#	2"	2249# - Fir	0128523

Wood



Nut Drivers

Item No.	Model No.	Part No.
100	#14 Nut Driver for Vertical Mount	61955
101	#14SW Nut Driver for Horizontal Mount	61956

Extension Poles

Telescope in 1' increments.

Item No.	Model No.	Part No.
130	2306 Extension Pole 6' (3'-6')	61957
131	3412 Extension Pole 12' (4'-12')	61958
132	3618 Extension Pole 18' (6'-18')	61959
133	3824 Extension Pole 24' (8'-24')	61960

SAMMY JUNIOR™ SCREWS

Steel - Vertical Mount

JRS
Self-drilling and self-tapping in steel.

Item No.	Model No.	Rod Size	Shk. Dia.	Shk. Lgth.	Tested Pull (lbs.)	Part No.	UL Max. Load Rating
75	JRS 1	1/4-20	#10	1	630	61964	210
76	JRS 1-1/2	1/4-20	#10	1-1/2	630	61965	

Steel - Eyelet

JES
Self-drilling and self-tapping in steel.

Item No.	Model No.	Hole Size	Shk. Dia.	Shk. Lgth.	Tested Pull (lbs.)	Part No.	UL Max. Load Rating
80	JES 1	5/32	#10	1	630	61969	50
86	JES 1-1/2	5/32	#10	1-1/2	630	0128524	

Wood - Vertical Mount

JRW
Self-drilling and self-tapping in wood.

Item No.	Model No.	Rod Size	Shk. Dia.	Shk. Lgth.	Tested Pull (lbs.)	Part No.	UL Max. Load Rating
72	JRW 1	1/4-20	#10	1	900	61961	
73	JRW 2	1/4-20	#10	2	900	61962	300

JRN
Nail point for driving into wood.

Item No.	Model No.	Rod Size	Shk. Dia.	Shk. Lgth.	Tested Pull (lbs.)	Part No.	UL Max. Load Rating
74	JRN 2-1/2	1/4-20	#10	2-1/2	210	61963	70

Wood - Eyelet

JEW
Self-drilling and self-tapping in wood.

Item No.	Model No.	Hole Size	Shk. Dia.	Shk. Lgth.	Tested Pull (lbs.)	Part No.	UL Max. Load Rating
87	JEW 1	5/32	#10	1	900	0128525	
79	JEW 2	5/32	#10	2	900	61968	50

JEN
Nail point for driving into wood.

Item No.	Model No.	Hole Size	Shk. Dia.	Shk. Lgth.	Tested Pull (lbs.)	Part No.	UL Max. Load Rating
81	JEN 2-1/2	1/4-20	#10	2-1/2	210	61970	50

Concrete - Vertical Mount

JRC
Self-tapping into concrete. Pre-drill 3/16 hole.

Item No.	Model No.	Rod Size	Shk. Dia.	Shk. Lgth.	Tested Pull (lbs.)	Part No.	UL Max Load Rating
77	JRC 1-1/2	1/4-20	1/4"	1-1/2	1023	61966	

Concrete - Eyelet

JEC
Self-tapping into concrete. Pre-drill 3/16 hole.

Item No.	Model No.	Hole Size	Shk. Dia.	Shk. Lgth.	Tested Pull (lbs.)	Part No.
83	JEC 1-1/2	5/32	1/4	1-1/2	1023	61971

Toggle - Vertical Mount

JRT
Self-tapping into concrete. Pre-drill 3/16 hole.

Item No.	Model No.	Rod Size	Description	Tested Pull (lbs.)	Part No.	UL Max Load Rating
78	JRT 3	1/4-20	#10-24 x 2-5/8	150	61967	50

Toggle - Eyelet

JET

Item No.	Model No.	Hole Size	Description	Tested Pull (lbs.)	Part No.	UL Max. Load Rating
83	JET 3	5/32	10-24 x 2-5/8	150	61972	50

Junior Nut Driver/Hooks

Item No.	Model No.	Part No.
102	#12 Junior Nut Driver	61948
84	"S" Hook - 5/32" in Hole	61973
85	"J" Hook - 1/4" x 3" (1/4-20)	0128526

Miscellaneous Installation Tools

Item No.	Model No.	Part No.
104	Hex 316 Receiver (3/16)	51582
105	Hex 250 Receiver (1/4)	51950
106	#316 Carbide Tip Bit (3/16)	51574
107	#250 Carbide Tip Bit (.263)	61952
108	SDS 316 Bit (3/16)	54365
109	SDS 250 BIt (.263)	61953
110	SL 250 Sleeve	61954

SAMMY SUPER SCREWS™ INTRODUCTION

The Sammy X-Press System is designed to provide direct attachment of threaded rod in metal deck (22-16 gauge) and thin gauge purlin (18-16 gauge), while providing reduced installation costs in terms of time and materials. The X-Press Anchors eliminate the need for costly “armovers” in pipe hanging installations. Current methods offered for thin gauge purlin require use of a time-consuming retaining nut on the threaded portion of the fastener to prevent pullout and are not designed for use in metal deck. In many instances, access to the backside of the installed fastener is prohibited by panel liner or roofing insulation. Sammy X-Press Anchors deliver the performance installers require without the use of a retaining nut!

The patent-pending X-Press Anchors consist of a threaded fastener and expandable sleeve. The X-Press System features an easy-to-install anchor with expanding anchoring strips that collapse to prevent pullout after installation. The Sammy X-Press It Installation Tool assures a perfect installation every time offering the added convenience of one-tool efficiency – just drill and drive in seconds! SECONDS!

• The XP 20 provides 750 pounds of pullout in 22-20 gauge metal deck and will support a 2” pipe.

• The XP 35 delivers 1250 pounds of pullout in 18-16 gauge purlin and supports a 3-1/2” pipe.

Fastenal Part #	Vendor Part #	Model	Description	Box/Ctn	Max Pipe Quantity
0159049	8150922	XP 20	Sammy X-Press 20 Anchor	25/125	2”
0159050	8153922	XP 35	Sammy X-Press 35 Anchor	25/125	3-1/2
0159051	8151910	XPIT	Sammy X-Press It Installation Tool*	1/1	
0159052	8152910	XPDB	25/64” Drill Bit	1/1	

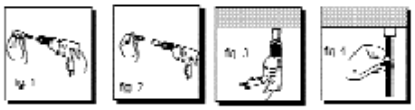
*Kit includes:Sleeve, Bit Receiver, 25/64” Drill Bit and 1/8” Hex Wrench

The X-Press System has earned the 9R21 UL Listing and meets the NFPA standards.

SAMMY SUPER SCREWS™ & SAMMY JUNIOR™ SCREWS

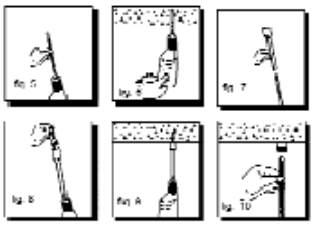
INSTALLING SAMMYS & SAMMY JUNIORS-MODEL DST, DSTR, TEK50, GST, JRS, JRW, JEW, JES

DST-Self drilling and tapping into steel up to 3/16" thickness; DSTR-Self-drilling & self-tapping into steel up to 1/8" thickness with retainer nut; Tek50-Self-drilling & tapping into steel up to 1/2" thickness; GST-self-drilling & tapping into wooden structural members for vertical installation only. **VERTICAL INSTALLATION ONLY:** Install Sammy #14 or #12 nut driver into a 3/8" or 1/2" portable drill. Insert DST, Tek 50, GST or JR. into appropriate nut driver. Position drill at right angle to structural member to be penetrated and begin installation. Push the face of the nut driver tight to the member. When the nut driver spins freely on the cap of the screw, stop drill and remove. DST, Tek 50, GST or JR is now ready to receive 1/4", 3/8", 1/2" or metric all tread rod or bolt stock, or 5/32" wire (See figures 1, 2, 3 & 4). When installing MODEL DSTR use the same method as above instructions, then add retaining nut and torque to 20 ft-lbs for maximum pullout in purlin steel.



INSTALLING SAMMYS & SAMMY JUNIORS — MODEL CST, JCR

(Self-tapping into concrete) **VERTICAL INSTALLATION ONLY:** (Note: Use a 1200 maximum RPM drill for installation) Using a SDS 250 or SDS 316 (Jr.) carbide tip bit; or HEX RECEIVER with a #250 or #316 (Jr.) carbide tip bit, pre-drill the concrete member to a depth of 2", with an electric hammer drill set on hammer mode. After pre-drilling has been completed, install SLEEVE TOOL over the bit (the bit should remain in the drill), and insert the appropriate nut driver into the opposite end. Install the CST screw into the nut driver. Now you are ready to insert the screw. Place tip of screw into the pre-drilled hole, turn hammer drill unit to drill mode and begin insertion. When the nut driver spins free on the cap of the CST screw, installation is complete. Stop and remove drill. The CST screw is ready to receive 1/4", 3/8" or metric all thread rod or bolt stock (See Figures 5, 6, 7, 8, 9 & 10). ***Note: Do not install the CST while the drill is in hammer mode-doing so will destroy the pullout factor of the CST.***



INSTALLING THE SAMMY TOGGLE-MODEL SST, JRT, JET

For use in sheet rock ceiling, metal lath & plaster, metal liners, thin wood, ceiling panels etc. **VERTICAL INSTALLATION ONLY:** Pre-drill a 5/8" hole with a regular drill bit or hole saw. Install Model #14 nut driver into light duty drill or screw gun. Insert SST screw into #14 nut driver or use #12 nut driver for the SST Junior. With wing nut and washer on bolt, insert wing nut through surface, and begin installation. When bolt is secure, and nut driver spins free, stop drill motor and remove. SST screw is now ready to receive 1/4", 3/8" or metric all thread rod or bolt stock. *Note: SST is a light duty fastener and should be used with consideration.*

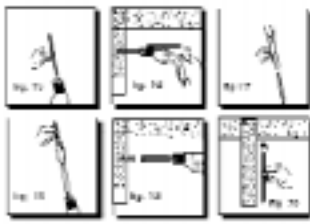
NOTE: Warranty requires the use of SAMMY NUT DRIVER Model #14 for installing SAMMY SUPER SCREW & MODEL #12 for installing the SAMMY JUNIOR Screw. Use appropriate nut driver for proper installation. Model #12 — 1/2" (Blue); Model #14 — 5/8" (Black). Caution-Do not over torque. Eye protection should be worn at all times when installing this product.

INSTALLING SIDEWINDERS — MODEL SWD, SWDR, SWT, SWG

SWD — Drills & taps thru 3/16" metal; SWDR — Drills and taps thru 1/8" metal with retaining nut; SWT — Drills & taps thru 1/2" metal; SWG — Drills & taps into wooden structures. **HORIZONTAL INSTALLATION ONLY:** Install the SIDEWINDER #14 SW nut driver in the drill unit, insert the SWD, SWDR, SWT or SWG into the nut driver. With drill unit in a horizontal position, at a right angle to the structural member begin installation. When the #14 SW nut driver spins free, stop the drill and remove. The unit is now ready to receive 1/4", 3/8" or metric all thread rod or bolt stock. (See Figures 11, 12, 13 & 14). *NOTE: be sure rod is threaded completely through unit head.* When installing MODEL SWDR use the same method as above instructions, then add retainer nut and torque to 20 ft-lbs for maximum pull-out in purlin steel.

INSTALLING SIDEWINDERS — MODEL SWC

Self-tapping into concrete. **HORIZONTAL INSTALLATION ONLY:** (Note: use a 1200 maximum RPM drill for installation) Using the SDS 250 carbide tip bit or a HEX RECEIVER with #250 carbide tip bit, pre-drill the concrete to a depth of 2" with an electric hammer drill set on hammer mode. After pre-drilling has been completed, install SLEEVE TOOL over the bit (the bit should remain in the drill), and insert the #14 SW nut driver into the opposite end. Now you are ready to install the screw into the concrete member. Place tip of screw into the pre-drilled hole, turn hammer drill unit to drill mode and begin insertion. When the nut driver spins free on the cap of the SWC screw, installation is complete. Stop and remove drill. The SWC screw is ready to receive 1/4", 3/8" or metric all thread rod or bolt stock (See Figures 15, 16, 17, 18, 19 & 20). NOTE, be sure rod is threaded completely through unit head. ***CAUTION: Do not install the SWC while the drill unit is in hammer mode-doing so will destroy the pull-out factor of the SWC.***



NOTE: Warranty requires the use of SIDEWINDER NUT DRIVER Model #14 SW for installing the SIDEWINDER. Use appropriate nut driver for proper installation. Model #14SW (Red) with 3/16" hole. Caution-Do not over torque. Eye protection should be worn at all times when installing this product.

INSTALLING SAMMY JUNIOR NAIL-MODEL JRN, JEN

Install the Junior nail-type fastener with hammer unit completely embedded into wood. Fastener is now ready to receive 1/4" rod, bolt stock (JRN); or wire (JEN).

IMPORTANT INSTALLATION PROCEDURES

SAMMY SUPER SCREWS have been tested for straight pull-out. The SIDEWINDERS have been tested for shear. Installing any of the units and then deflecting the receiver head more than 15 degrees could result in weakening of the unit or separation. Any deflection beyond 15 degrees nullifies the warranty. All units are to be installed with the use of #14, #14SW or #12 nut driver, which have a built-in automatic release mechanism to prevent over-tightening. If other tools are used for installation, the warranty is void.

NOTE: SAMMY nut drivers have a unique spin off feature that provides a fast and safe installation each time. When the face of the driver comes in contact with the material you are installing into, continue drilling until nut driver spins free. Installation is then complete. CAUTION-DO NOT OVER TORQUE. ***Eye protection should be worn at all times when installing this product.***

WARRANTY/DISCLAIMER OF WARRANTIES

SPEEDY PRODUCTS, INC. ("Seller") states that there is no warranty, representation or condition of any kind, express or implied, (including no warranty of merchantability or fitness for a particular purpose), except as specified herein, and no such warranty shall be implied by law. Seller warrants that its product shall be in accordance with the specifications set forth in seller's testing data and as stated on the usage and installation instructions. A final determination of the suitability of the material for the use contemplated by buyer is the sole responsibility of buyer. It is understood and agreed that seller's liability, whether on contact, in tort, under any warranty, in negligence or otherwise, shall not exceed the return of the amount of the purchase price paid by the buyer. Under no circumstances shall seller be liable for special, indirect or consideration in limiting seller's liability.

3M FIRESTOP PRODUCTS

3M Fire Protection Products is the industry leader in providing qualified, comprehensive coverage for through-penetration, construction joint, grease and air duct, fire door/window, and electrical outlet box protection systems. Utilizing revised product formulations and updated configurations has optimized many of the systems detailed in this guide, thus providing improved value to you. The scope of products available provides you the most complete passive fire protection solutions available.

This section of the guide includes updated product information, code jurisdiction approvals of 3M firestopping products and systems, and helpful charts for the estimating and application of 3M Fire Protection systems. Please refer to the 3M AutoFax: **1-800-498-9563** for fast, easy reference to any of the available documents; also, our CD-Rom and **website www.3m.com/firestop** provides an electronic means to access all of the latest 3M Fire Protection Products technology.

The referenced systems from the UL Fire Resistance Directory and Omega Point Laboratories, shows detailed firestop configurations, system parameters and step-by-step installation instructions, all part of the **Fastenal product catalog for 3M Fire Protection Products**. While not included here, the drawings represent ASTM tested systems and provide the basis for engineering judgements for alternative configurations. The systems are presented in a logical progression within each section to minimize the time and effort required to locate your specific system. The UL and Omega Point Laboratories systems detailed are primarily used in the United States but are applicable wherever U.S. standards are in place. Thank you for choosing 3M Fire Protection Products to meet your firestopping needs.

3M Fire Protection Products
3M Center, Building 223-2N-21
St. Paul, MN 55144-1000
AutoFax: 1-800-498-9563 (U.S. or Canada)
Website: www.3m.com/firestop

Warren Langstraat	Brandon Cordts	Chuck Stobbie
Technical Director	**Laboratory Manager**	**Marketing Manager**

3M
Fire Protection Products

GENERAL CERTIFICATE OF CONFORMANCE

DESCRIPTION: 3M™ FIRE BARRIER PRODUCTS

FireDam™ Spray 100
FireDam™ 150 Caulk
Fire Barrier CP 25WB+ Caulk
Fire Barrier 2000 Silicone Sealant
Fire Barrier 2000+ Silicone Sealant
Fire Barrier 2001 Silicone RTV Foam
FireDam™ 150+ Caulk
Expantrol™ Flexible Intumescent Seal (E-FIS)
Fire Barrier Spray 100
Fire Barrier Mortar
Fire Barrier Pillow - FB249, FB269, FB369
Fire Barrier Cast-In Devices
Fire Barrier CS-195+ Composite Sheet
Fire Barrier FS-195+ Sheet
Fire Barrier FS-195+ Wrap Strip
Fire Barrier Moldable Putty + (MP+)
Fire Barrier Ultra Plastic Pipe Device (PPD)
Interam™ Ultra GS Wrap
Fire Barrier 1000 Silicone Sealant
Fire Barrier 1003 Silicone Sealant
Fire Barrier Marine Wrap
Fire Barrier Ultra RC Pack
Fire Barrier Sealant IC 15WB

THESE PRODUCTS ARE TESTED TO ONE OR MORE OF THE FOLLOWING STANDARDS:

- ASTM E-119 Fire Tests of Building Construction and Materials Time-Temperature Curve
- ASTM E-814 Fire Tests of Through-Penetration Fire Stops (under positive furnace pressure of minimum .01 inches of water column)
- ASTM E-84 Surface Burning Characteristics of Building Materials
- UL 2079 Test for Fire Resistance of Building Joint Systems
- NFPA 252 Standard Methods of Fire Test and Door Assemblies
- UBC Standard 7-2(97)
- IMO Res. A.754(18)

No asbestos, PCB's, or lead are used or contained in these products.

SM Hackney
Quality Manager or Designee

12-12-02
Date

Fire Protection Laboratory Manager or Designee

12-13-02
Date

3M Consumer Safety and Light Management Department
3M Center, Building 223-2N-21
St. Paul, MN 55144-1000

98-0400-5030-8
MCS 211723

3M
Fire Protection Products

GENERAL CERTIFICATE OF CONFORMANCE

DESCRIPTION: 3M™ FIRE BARRIER PRODUCTS

3M Fire Barrier Duct Wrap 15A
3M Fire Barrier Duct Wrap 20A
3M Fire Barrier Plenum Wrap 5A

THESE PRODUCTS ARE TESTED TO ONE OR MORE OF THE FOLLOWING STANDARDS:

- UL 1978 Grease Duct 1 or 2 hour Shaft Enclosure (Sections 12 and 13)
- ICBO ES AC101 Grease Ducts, Flexible Enclosure Systems
- ASTM E-119 Fire Tests of Building Construction and Materials Time-Temperature Curve
- ASTM E-814 Fire Tests of Through-Penetration Fire Stops
- ASTM E-84 Surface Burning Characteristics of Building Materials
- ASTM E136 Test Method for Behavior of Materials in a Vertical Tube Furnace @ 750°
- ASTM C411 Hot Surface Performance of High Temperature Thermal Insulation
- ASTM C518 Product Aging Tests
- UL 910 Test Method for Fire and Smoke Characteristics of Cables

No asbestos, PCB's, or lead are used or contained in these products.

JM Hackney
Quality Manager or Designee

12-12-02
Date

12-12-02

Fire Protection Laboratory Manager
or Designee

12-13-02
Date

3M Consumer Safety and Light Management Department
3M Center, Building 223-2N-21
St. Paul, MN 55144-1000

98-0400-5030-8
MCS 211723

The following are code excerpts from select major building codes citing firestop code requirements. In summary:

When penetrating a fire-resistive wall or floor, it must be sealed back to its original fire integrity with a material or product tested under a nationally recognized test standard and at an independent test agency.

Plans and specifications for all buildings must show or indicate how penetrations will be firestopped in order to obtain design approval by the authority having jurisdiction.

This Applications Manual has the specifications and typical drawings meeting these code requirements.

Firestopping Code Requirements

ICBO UNIFORM BUILDING CODE (1997 EDITION)	**SBCCI STANDARD BUILDING CODE (1997 EDITION)**	**BOCA NATIONAL BUILDING CODE (1996 EDITION)**	**BOCA NATIONAL BUILDING CODE (1996 EDITION) Continued…**
702 DEFINITIONS 706 CONSTRUCTION JOINTS 708 WOOD FRAME CONSTRUCTION FIREBLOCKING 709 WALL & PARTITION PENETRATION PROTECTION 709.3.2.2 CURTAIN WALL GAP 710 FLOOR/CEILING OR ROOF/CEILING PENETRATION PROTECTION 711.3 SHAFT ALTERNATIVE 714 THROUGH-PENETRATION FIRESTOPS F&T REQUIREMENTS UBC STANDARD 7-1 EQUIVALENT TO ASTM E 119 UBC STANDARD 7-5 EQUIVALENT TO ASTM E 814	104.2.4 PLANS MUST SHOW HOW INTEGRITY IS MAINTAINED FOR ASSEMBLIES PENETRATED 202 DEFINITIONS 705.3 WOOD FRAME CONSTRUCTION FIREBLOCKING 705.3.1.5 CURTAIN WALL GAP 705.4 (GENERAL) PENETRATIONS OF FIRE RATED ASSEMBLIES 705.5 (WALLS) 705.6 (FLOORS) 705.7 FIRE RESISTANT JOINT SYSTEMS	702.0 REVISED AND EXPANDED DEFINITIONS FOR PENETRATIONS AND JOINTS 703.1 CONSTRUCTION DOCUMENTS SHALL INDICATE DETAILS AND MATERIALS FOR PROVIDING RATINGS AT JOINTS AND PENETRATIONS 703.1.1 PENETRATIONS AND JOINTS SHALL NOT BE CONCEALED FROM VIEW BEFORE INSPECTION 703.2 BUILDINGS FOR MORE THAN TWO STORIES SHALL INDICATE ALL PENETRATIONS 704.1.1 SUFFICIENT DATA SHALL BE AVAILABLE TO JUSTIFY UNTESTED MATERIALS USED FOR RESTORATION OF FIRE RATINGS 707.0 FIRE WALLS AND PARTY WALLS 707.10 PENETRATIONS - REFERS TO 714 707.8 JOINTS - REFERS TO 709.7 709.0 FIRE SEPARATION ASSEMBLIES 709.6 PENETRATIONS - REFERS TO 714	709.7 JOINTS 711.0 FIRE PARTITIONS 711.6 PENETRATIONS - REFERS TO 714 711.7 JOINTS - REFER TO 709.7 713.0 FLOOR/CEILING AND ROOF/CEILING ASSEMBLIES 713.2 CURTAIN WALL GAP 713.4 PENETRATIONS - REFERS TO 714 713.5 JOINTS - REFERS TO 709.7 714.0 PENETRATIONS - ALL REQUIREMENTS (GENERAL) 714.1 THROUGH 714.1.6.2 WALL ASSEMBLIES 714.2 THROUGH 714.2.6.5 FLOOR/CEILING AND ROOF/CEILING ASSEMBLIES 714.3 THROUGH 714.3.2 NONRATED ASSEMBLIES 721.0 FIREBLOCKING AND DRAFTSTOPPING

NFPA
LIFE SAFETY CODE 101
(1997 EDITION)

6-2.3.2.4
PENETRATIONS AND MISC. OPENINGS &FIRE BARRIERS

6.2.4.2, EXCEPTION
5 OPENINGS (EXPANSION OR SEISMIC JOINTS) IN FLOORS

APPENDIX
A-6-2.4.2

6-3.6.1
PENETRATIONS AND MISC. OPENINGS IN FLOORS AND SMOKE BARRIERS

NFPA #221

FIRE WALLS AND BARRIERS

NFPA
LIFE SAFETY CODE 101
(2000 EDITION)

8.2.3.2.4.2
PENETRATIONS AND MISC. OPENINGS IN FIRE BARRIERS

8.2.4.4.1
PENETRATIONS AND MISC. OPENINGS IN SMOKE PARTITIONS

8.2.5.1 EXCEPTION 3
JOINTS

8.3.6
PENETRATIONS AND MISC. OPENINGS IN SMOKE BARRIERS

Member
IFC International FireStop Council

3M™ Fire Protection Products are classified by Underwriters Laboratories, Inc.®, Omega Point Lab, Inc., UL Canada, Warnock Hersey and BCJ (Japan). Code Approved ICBO, BOCA and SSBCCI (N.E.R. 243). Tested worldwide to ASTM E-814, ASTM E-119, UL 910, UL 1479, NFPA, 101 Life Safety Code, AS 1530.4, BS 476, DIN 4102, ISO 834 and JIS A 1304. 3M™ Fire Protection Products are asbestos-free and contain no PCBs.

NFPA
CODE 70 NEC NATIONAL ELECTRIC CODE

300-21 FIRESTOPPING

NFPA
5000 BUILDING CODE
(2002 EDITION)

8.8
PENETRATIONS

8.9
JOINTS

8.9.3
CURTAIN WALL

ANNEX
A.8.8.2.1(1)
PENETRATIONS

UNIFORM MECHANICAL CODE
(2000 EDITION)

508.4
GREASE DUCT ENCLOSURE

UNIFORM PLUMBING CODE
(2000 EDITION)

CHAPTER 15
FIRESTOPPING

CABO
ONE AND TWO FAMILY DWELLING CODE (1995 EDITION)

602.7
FIRESTOPPING
(FIREBLOCKING IN OTHER MODEL CODES)

INTERNATIONAL BUILDING CODE (2000 EDITION)

702
DEFINITIONS

711
PENETRATIONS

712
FIRE-RESISTANT JOINT SYSTEMS

712.4
CURTAIN WALL

716
CONCEALED SPACES (FIREBLOCKING)

INTERNATIONAL MECHANICAL CODE
(2000 EDITION)

506.3.11
GREASE DUCT ENCLOSURES

City Approvals

City of New York, NY Report MEA 152-83-M Vol. V., MEA 377-87-M, MEA 20-02-E, MEA 147-01-M

To get to an adoption map for the USA, see website at: www.intlcode.org and pick the USA code adoption map on the right hand side of the first page of the web site. The map breaks down the different codes by state and states' counties.

The following pages contain helpful product estimating information in the form of charts.

Having previously selected the appropriate drawing(s) which meet the firestopping condition(s) being addressed, you may use the estimating charts to determine the amount(s) of product(s) needed.

You should understand that these charts are provided as a convenience only. No claim is made as to their complete accuracy. The user assumes all responsibility for the use of these charts and for determining the amount of product needed for an application.

3M™ Fire Barrier Products

Pipe Chart
Schedule 40 Pipe Sizes to 12 Inches

Nominal Pipe Size	Actual Pipe Size In Decimal Inches		Nominal Pipe Size	Actual Pipe Size In Decimal Inches	
	O.D.	Wall		O.D.	Wall
1/8	0.405	0.068	3-1/2	4.000	0.237
1/4	0.540	0.088	4	4.500	0.247
3/8	0.675	0.091	5	5.563	0.258
1/2	0.840	0.109	6	6.625	0.280
3/4	1.050	0.113	7	7.625	0.280
1	1.315	0.133	8	8.625	0.332
1-1/4	1.660	0.140	9	9.625	0.342
1-1/2	1.900	0.145	10	10.750	0.365
2	2.375	0.154	11	11.750	0.375
2-1/2	2.875	0.203	12	12.750	0.37
3	3.5	0.216			

NOTE: Pipe sizes greater than 12 inches are measured according to O.D.
Example – A nominal 14 inch pipe is 14 inch O.D.

Guidelines for Hourly Ratings of Concrete Versus Thickness

Fire Resistance (Hours)	Lightweight Concrete (Inches)	Normal Weight Concrete (Inches)
1.0	3.0	3.5
1.5	3.5	4.25
2.0	3.75	5.0
3.0	4.5	6.25
*4.0	5.25 - 5.5	8.0

*4-hour fire resistance ratings are approximate.

NOTE: Some assemblies have a different thickness of top coat depending on the fire resistance of the assembly designs. Make firestop system selection based on hourly rating of design if thickness is not known.

Ultra GS Wrap/Strip

Schedule 40 PVC – Nominal Pipe Size
Length of 2" Ultra GS Needed (Inches)

Nominal Pipe Size	Actual Pipe Size in Decimal Inches	1 Wrap	2 Wraps	3 Wraps	4 Wraps	Length of RC-1 Needed (Inches)
1-1/2"	1.900	5.97				7.75
2"	2.375	7.46	15.71			10.00
3"	3.500		22.78	35.34		14.50
4"	4.500			44.77	61.26	18.25
5"	5.563				149.24 (double stacked to 4" width)	20.75 (2 lengths required)
6"	6.625				175.92 (double stacked to 4" width)	25.00 (2 lengths required)

3M™ FIRE BARRIER CAULK OR SEALANT LINEAL FEET PER GALLON METHOD

1/4" depth		1/2" depth		1" depth	
Joint Width (Inches)	**Lineal Feet / Gallon**	**Joint Width (Inches)**	**Lineal Feet / Gallon**	**Joint Width (Inches)**	**Lineal Feet / Gallon**
1/8	614	1/8	307	1/8	153
1/4	307	1/4	153	1/4	76
3/8	204	3/8	102	3/8	51
1/2	153	1/2	76	1/2	38
5/8	123	5/8	61	5/8	30
3/4	102	3/4	51	3/4	25
7/8	87	7/8	44	7/8	22
1	76	1	38	1	19
1-1/4	61	1-1/4	30	1-1/4	15
1-1/2	51	1-1/2	25	1-1/2	12
1-3/4	44	1-3/4	22	1-3/4	11
2	38	2	19	2	9
2-1/4	34	2-1/4	17	2-1/4	8
2-1/2	30	2-1/2	15	2-1/2	7
2-3/4	28	2-3/4	14	2-3/4	7
3	25	3	12	3	6
3-1/4	23	3-1/4	11	3-1/4	6
3-1/2	22	3-1/2	11	3-1/2	5
3-3/4	20	3-3/4	10	3-3/4	5
4	19	4	9	4	4
4-1/4	18	4-1/4	9	4-1/4	4
4-1/2	17	4-1/2	8	4-1/2	4
4-3/4	16	4-3/4	8	4-3/4	4
5	15	5	7	5	3
5-1/4	14	5-1/4	7	5-1/4	3
5-1/2	14	5-1/2	7	5-1/2	3
5-3/4	13	5-3/4	6	5-3/4	3
6	12	6	6	6	3
6-1/4	12	6-1/4	6	6-1/4	3
6-1/2	11	6-1/2	6	6-1/2	3
6-3/4	11	6-3/4	5	6-3/4	2
7	11	7	5	7	2
7-1/4	10	7-1/4	5	7-1/4	2
7-1/2	10	7-1/2	5	7-1/2	2
7-3/4	10	7-3/4	5	7-3/4	2
8	9	8	4	8	2

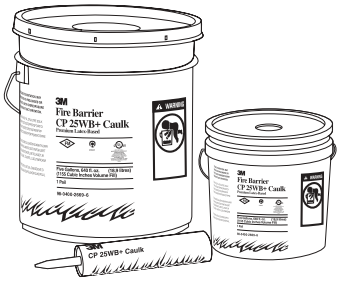
3M™ FIREDAM™ SPRAY 100
LINEAL FEET PER GALLON METHOD

1/8" Coating with 1/2" Overlap		1/8" Coating with 1" Overlap	
Joint Width (Inches)	**Lineal Feet/Gallon**	**Joint Width (Inches)**	**Lineal Feet/Gallon**
1/8	136	1/8	72
1/4	123	1/4	68
3/8	111	3/8	64
1/2	102	1/2	61
5/8	94	5/8	58
3/4	87	3/4	55
7/8	82	7/8	53
1	76	1	51
1-1/4	68	1-1/4	47
1-1/2	61	1-1/2	44
1-3/4	55	1-3/4	41
2	51	2	38
2-1/4	47	2-1/4	36
2-1/2	44	2-1/2	34
2-3/4	41	2-3/4	32
3	38	3	30
3-1/4	36	3-1/4	29
3-1/2	34	3-1/2	28
3-3/4	32	3-3/4	26
4	30	4	25
4-1/4	29	4-1/4	24
4-1/2	28	4-1/2	23
4-3/4	26	4-3/4	22
5	25	5	22
5-1/4	24	5-1/4	21
5-1/2	23	5-1/2	20
5-3/4	22	5-3/4	19
6	22	6	19
6-1/4	21	6-1/4	18
6-1/2	20	6-1/2	18
6-3/4	19	6-3/4	17
7	19	7	17
7-1/4	18	7-1/4	16
7-1/2	18	7-1/2	16
7-3/4	17	7-3/4	15
8	17	8	15

3M™ Fire Barrier CP 25WB+

3M CP 25WB+ Caulk is our premium, intumescent latex-based caulk offering outstanding fire performance plus a non-halogen formula.

- Water based – easy cleanup, no special handling, routine disposal
- Intumescent – expands when heated to choke and seal around items consumed by fire
- Endothermic – releases chemically bound water to cool exposed surfaces
- Non-halogen formula
- No-sag formulation
- Fast-dry – tack-free in approximately 10-15 minutes
- Paintable (best results obtained after 72 hour cure)
- Red/Brown color
- Water seal – seals against inadvertent water spills in the unexpanded state
- High caulk rate: 1000 g/min. with 1/4 in. nozzle opening
- Point contact allowed
- Continuous operating temperature not to exceed 120°F (48°C)



Product	Package Size	Fastenal Part #	3M Part #	Case Qty
CP 25WB+ Caulk	10.1 oz. Tube	0211480	0 00 51115 11638 4	12 Tubes
CP 25WB+ Caulk	20 oz. Sausage	0211481	0 00 51115 11642 1	10 Sausages
CP 25WB+ Caulk	27 oz. Cartridge	0211482	0 00 51115 11641 4	6 Cartridges
CP 25WB+ Caulk	2 gallon Pail	0211483	0 00 51115 11639 1	1 Pail
CP 25WB+ Caulk	5 gallon Pail	0211484	0 00 51115 11640 7	1 Pail

Most common systems for this product included in this book:

CAJ-0009	p17	CAJ-1338	p22	CAJ-7016	p70	WJ-7030	p70	FC-2134	p49	WL-1001	p25	WL-2088	p42	WL-5011	p64	WL-7051	p73
CAJ-1044	p19	CAJ-3030	p50	CAJ-8072	p77	WJ-7036	p71	FC-3017	p55	WL-1003	p26	WL-2265	p45	WL-5039	p64	WL-7052	p73
CAJ-1091	p20	CAJ-5001	p61	CAJ-8073	p77	FC-1002	p29	FC-7001	p74	WL-1146	p27	WL-3032	p52	WL-7008	p71	WL-7063	p74
CAJ-1092	p21	CAJ-5156	p63	CAJ-8088	p82	FC-1006	p30	FC-8012	p84	WL-1228	p28	WL-3110	p53	WL-7013	p72	WL-8010	p84
CAJ-1175	p21	CAJ-7003	p69	WJ-1010	p24	FC-1015	p31	FC-8020	p86	WL-2087	p41	WL-4004	p58	WL-7045	p72		

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ FireDam™ 150+ Acrylic Latex Caulk

3M FireDam 150+ is the economical alternative to costly firestopping applications. It is used to firestop metal pipes or cables through concrete or gypsum, and for use in dynamic head-of-wall systems.

A single-part, non-sag, water-based acrylic latex sealant, 3M FireDam 150+ has excellent adhesion characteristics to most common construction materials. And since it dries to the touch in 30-60 minutes, 3M FireDam 150+ can be painted for a more professional-looking job.

3M FireDam 150+ is a solvent-free sealant that, when fully cured, provides a continuous seal with a movement capability of ±16%. It can be applied with a bulk-loading caulk gun, standard caulk gun, trowel or putty knife. And clean-up is easy. All you need is water.

3M FireDam 150+ is available in three convenient sizes: 10.1-oz. tube, 28.0-oz. tube and 5-gallon pail.

- Remains pliable allowing for normal pipe movement
- Water-based for easy installation, cleanup and disposal
- Endothermic fillers absorb heat and release water
- High-solids formula means no shrinkage
- Safe ... no solvents
- Blue color for easy identification and inspection
- Multi-viscosity grade offers excellent caulking properties

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
FireDam™ 150+ Caulk	10.1 oz. Tube	0211485	0 00 51115 11574 5	12 Tubes
FireDam™ 150+ Caulk	20 oz. Sausage	0211486	0 00 51115 11634 6	12 Sausages
FireDam™ 150+ Caulk	28 oz. Cartridge	0211487	0 00 51115 11602 5	6 Cartridges
FireDam™ 150+ Caulk	4.5 gallon Pail	0211488	5 00 51115 11575 7	1 Pail

Most common systems for this product included in this book:

CAJ-1366	p23	CAJ-5172	p63	FC-2134	p49	WL-1001	p25	WL-2264	p44	HWD-0111	p93
CAJ-2299	p36	FB-3008	p52	FC-3048	p55	WL-1167	p28	WL-3148	p54	HWD-0169	p95
CAJ-3164	p51	FC-1060	p31	FC-7017	p75	WL-1228	p28	WL-5147	p66	HWD-0205	p98

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ Fire Barrier IC 1WB SEALANT

3M Fire Barrier IC 15WB Sealant is a latex sealant designed for use as a one-part fire, smoke, noxious gas and water sealant, plus a halogen-free formula.

- Water based – easy cleanup, no special handling, routine disposal
- Intumescent – expands when heated to choke and seal around items consumed by fire
- Endothermic – absorbs heat energy, releases chemically bound water
- Thixotropic – will not sag or run in overhead or vertical applications
- Halogen-free
- Fast dry – tack-free in approximately 8 to 12 minutes @ 73°F (23°C)
- Paintable – best results obtained after 72 hour cure
- Minimal shrinkage
- Yellow color
- Water seal – seals against inadvertent water spills in the unexpanded state
- High sealant rate – 2000 g/min. with 1/4 in. (6 mm) nozzle
- Point contact allowed
- Continuous operating temperature not to exceed 120°F (48°C)
- Continuous operating temperature not to exceed 120°F (48°C)

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
IC 15WB	10.1 oz. Tube	0211545	0 00 51115 16557 3	12 Tubes
IC 15WB	20 oz. Sausage	0211546	0 00 51115 16560 3	10 Sausages
IC 15WB	27 oz. Cartridge	0211547	0 00 51115 16559 7	6 Cartridges
IC 15WB	4.5 gallon Pail	0211548	0 00 51115 16558 0	1 Pail

Most common systems for this product included in this book:

CAJ-1427	CAJ-5209	WJ-1127	WJ-5078	FC-2241	WL-1296	WL-5169	FE-2013
CAJ-1428	CAJ-5210	WJ-2109	WJ-7050	FC-3070	WL-2299	WL-7091	FE-3008
CAJ-1429	CAJ-5211	WJ-2110	WJ-8019	WJ-5058	WL-2300	WL-8039	FE-5005
CAJ-2377	CAJ-7076	WJ-3081	FC-1094	FC-7022	WL-3194	FE-1009	FE-7005
CAJ-2378	CAJ-8123	WJ-3082	FC-1095	FC-8024	WL-3195	FE-1010	FE-8005
CAJ-3200	WJ-1122	WJ-5077	FC-2240	WL-1287	WL-5168	FE-2012	

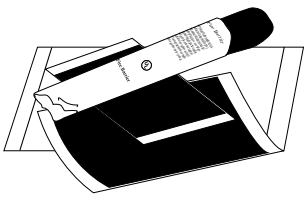
These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the Go-To Index in the 3M Applicators and Specifiers Guide for a complete listing of systems/designs; or visit www.3M.com/firestop for more information.

Moldable Putty+ Pads and/or Stixs

3M™ Fire Barrier Moldable Putty+

3M Fire Barrier Moldable Putty+ is designed for use as a one-part, 100% solids intumescent firestop that restores the integrity of fire-rated building construction.

- Ideal for construction gaps, cable, insulated pipe, electrical conduit and metal pipe
- Provides up to a 4-hour fire rating
- UL-classified for tele-communications applications (innerduct, fiber optic and cables)
- Remains pliable and flexible
- Won't dry out or crumble
- Convenient pad and stix form
- Non-halogen formula/ Re-enterable
- Adheres to all common building surfaces including metal and plastic electrical boxes
- Available in both 4S and 5S electrical box sizes
- Provides draft and cold smoke seal even before temperature increases
- Intumescent and expands to form a hard char which prevents the transmission of hot gases and fire
- Great for building maintenance applications



Product	Package Size	Fastenal Part #	3M Part #	Case Qty
MPP-1+	4 in. x 8 in.	0211515	0 00 51115 16508 5	100 Pads
MPP-4S+	7 in. x 7 in.	0211516	0 00 51115 16509 2	20 Pads
MPP-5S+	9.5 in. x 9.5 in.	0211517	0 00 51115 16510 8	20 Pads
MPS-2+	1.5 in. x 12 in.	0211518	0 00 51115 16526 9	10 Sticks

Most common systems for this product included in this book:

CAJ-5156 p63 CAJ-8088 p82 FC-3017 p55 FC-8012 p84 FC-8020 p86 WL-2088 p42 WL-4004 p58 WL-4018 p59 WL-6002 p68 CLIV p120

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ Fire Barrier 1000 N/S and 1003 S/L

3M Fire Barrier 1000 N/S silicone sealant (non-slump) and 3M Fire Barrier 1003 S/L silicone sealant (self-leveling) are ready to use, one-component silicone elastomers. Both cure upon exposure to atmospheric humidity to form a flexible seal.

Both sealants remain elastomeric and are weather resistant. They bond to most common construction materials.

- Excellent adhesion
- 15% Compression/extension
- Re-enterable/repairable
- Cures upon exposure to atmospheric humidity
- Applied with conventional caulking equipment.

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
1000 N/S Silicone Sealant	10.1 oz. Tube	0211489	0 00 51115 11535 6	12 Tubes
1000 N/S Silicone Sealant	4.5 gallon Pail	0211490	5 00 51115 11537 5	1 Pail
1003 S/L Silicone Sealant	10.1 oz. Tube	0211491	0 00 51115 11538 7	12 Tubes
1003 S/L Silicone Sealant	4.5 gallon Pail	0211492	5 00 51115 11540 5	1 Pail

Most common systems for this product included in this book:

CAJ-0060 p17 CAJ-3150 p51 CAJ-8075 p80 WL-1157 p27 WL-5124 p65 HWD-0168 p94 HWD-0173 p96 WWD-1023 p101
CAJ-1364 p23 CAJ-5125 p62 FC-1073 p32 WL-3129 p54 FFD-1020 p87 HWD-0170 p95 HWD-1015 p100

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ Fire Barrier 2000+

3M Fire Barrier 2000+ silicone sealant is a ready-to-use, gun-grade, one-component silicone elastomer that cures upon exposure to atmospheric humidity to form a flexible seal. Sealant remains elastomeric and is weather resistant. It will bond to most common construction materials.

- Superior adhesion
- Compression/extension recovery of ±12.5 percent of original joint width
- Re-enterable/repairable
- Excellent weatherability
- Provides up to a 4-hour fire rating
- Maximum pipe size of 24 in. (609,6 mm)
- Cures upon exposure to atmospheric humidity

3M™ Fire Barrier 2000 N/S

3M Fire Barrier 2000 (non-slump) is one-part, ready-to-use silicone penetration seal for a variety of fire-rated penetrations. This flexible sealant has excellent adhesion and extension/compression capabilities, making it ideal for sealing dynamic construction joints and pipe penetrations.

- Great for top-of-wall/head-of-wall joints
- Superior adhesion
- Sealant compression/extension recovery of ±40 percent (per ASTM C719-86)
- Re-enterable/repairable
- Excellent weatherability
- Provides up to a 4-hour fire rating
- Excellent sound barrier properties
- Maximum pipe size of 24 in. (609,6 mm)
- Cures upon exposure to atmospheric humidity
- Applied with conventional caulking gun
- Tested to ASTM 1399 (500 cycles, 25% compressing ext.)

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
2000+ Silicone Sealant	10.3 oz. Tube	0211493	0 00 51115 11558 5	12 Tubes
2000+ Silicone Sealant	4.5 gallon Pail	0211494	5 00 51115 11559 7	1 Pail
2000 N/S Silicone Sealant	10.3 oz. Tube	0211495	0 00 51115 11556 1	12 Tubes
2000 N/S Silicone Sealant	4.5 gallon Pail	0211496	5 00 51115 11537 5	1 Pail

Most common systems for this product included in this book:

CAJ-0008 p16 CAJ-1060 p20 CAJ-6002 p68 FFD-1004 p87 FWD-1009 p88 HWD-1007 p99 WWD-1010 p101

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ Fire Barrier 2001 RTV Foam

3M Fire Barrier 2001 silicone foam is a two-part, liquid-silicone elastomer that foams in place when mixed. It firestops and seals large and complex penetrations.

- Foams in place to seal complex penetrations
- Cures in 1-5 minutes to form a compression seal
- Elastomeric compression seal
- Re-enterable/repairable
- Excellent sound barrier properties
- No ampacity derating of cables when used properly
- Provides up to 3-hour fire rating
- Easily mixed by hand (small amounts) or automated mixing and dispensing equipment (large amounts)

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
2001 RTV Foam	7 oz. A & B Cartridge	0211497	0 00 51115 07502 5	12 Cartridges
2001 RTV Foam	2 lb. A & B Kit	0211498	0 00 51115 07503 2	12 Units
2001 RTV Foam	8 lb. Part A	0211499	0 00 51115 08370 9	1 Unit
2001 RTV Foam	8 lb. Part B	0211500	0 00 51115 08371 6	1 Unit
2001 RTV Foam	40 lb. Part A	0211501	0 00 51115 07505 6	1 Unit
2001 RTV Foam	40 lb. Part B	0211502	0 00 51115 07551 3	1 Unit

Most common systems for this product included in this book:

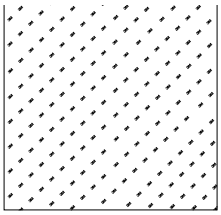
CBJ-8008 p83 WJ-0003 p18 WJ-1023 p24 WJ-4008 p58 FFS-0001 p88

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

Composite Sheet

3M™ Fire Barrier CS-195+

Intumescent sheet used to firestop large openings. Seals penetrations against flame spread, smoke and toxic fumes. This composite sheet has multiple applications, including blank openings, through penetrations of multiple cable, pipe ducts, buss ducts and cable trays.



(Bottom side Shown)

- Intumescent (expands with heat) to form a hard char that tightly penetrations against flame spread, smoke and toxic fumes
- Multiple applications: through-penetration firestop, heat shield and firebreak protection
- Lightweight – easy to handle, just cut and form to desired shape
- Easy to fasten – bolt punch or drill through and use self-tapping screws or anchor bolts
- Thermally conductive – allows unwanted heat buildup to escape
- Non-flame supporting seals
- UL-classified
- Cost-effective
- 100% solids
- Re-enterable
- No mixing or damming – clean to install
- Versatile – can be cut to fit irregular shapes
- Easy to install using common trade tools

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
CS-195+ Composite Sheet	Boxed 3 ft. x 2 ft.	0211503	0 00 51115 07220 8	1 Sheet
CS-195+ Composite Sheet	Boxed 3 ft. x 3 ft.	0211504	0 00 51115 07222 2	1 Sheet
CS-195+ Composite Sheet	Boxed 3 ft. x 41 in.	0211505	0 00 51115 07224 6	1 Sheet
CS-195+ Composite Sheet	Boxed 16 in. x 28 in.	0211506	0 00 51115 07437 0	1 Sheet
CS-195+ Composite Sheet	Bulk 28 in. x 52 in.	0211507	0 00 51115 08260 3	Min of 10 Sheets
CS-195+ Composite Sheet	Bulk 3 ft. x 2 ft.	0211508	0 00 51115 07219 2	50 Sheets
CS-195+ Composite Sheet	Bulk 3 ft. x 3 ft.	0211509	0 00 51115 07221 5	50 Sheets
CS-195+ Composite Sheet	Bulk 3 ft. x 41 in.	0211510	0 00 51115 07223 9	50 Sheets
CS-195+ Composite Sheet	Bulk 16 in. x 28 in.	0211511	0 00 51115 07454 7	50 Sheets

Most common systems for this product included in this book:

CAJ-0004 p16 CAJ-4003 p56 CAJ-6001 p66 CAJ-8001 p75 WL-4004 p58 WL-4018 p59 WL-6002 p68

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ Fire Barrier Pillows

3M™ Fire Barrier Pillow is a self contained, highly intumescent firestop product for use in through-penetration firestops.

The 3M Fire Barrier Pillows achieve up to 3 hour fire ratings when tested by Underwriters Laboratory, Inc. in accordance with ASTM E 814 (UL1479).

- Tested to UL 910 flammability test.
- Graphite free composition.
- Multiple sizes available.
- Red Color- Easy to inspect.
- Easy retrofit - remove and replace pillows, as needed.

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
Pillow - FB249	2 in. x 4 in. x 9 in.	0211535	0 00 51115 16530 6	24 Pillows
Pillow - FB269	2 in. x 6 in. x 9 in.	0211536	0 00 51115 16531 3	16 Pillows
Pillow - FB369	3 in. x 6 in. x 9 in.	0211537	0 00 51115 16532 0	20 Pillows

Most common systems for this product included in this book:

CAJ-0084 p18 CAJ-4056 p57 WJ-1111 p25 WL-0011 p18 WL-1255 p29 WL-4037 p60

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

Wrap Strips and Restricting Collars

3M™ Fire Barrier FS-195+ Wrap Strip

This patented intumescent wrap/strip has the same 3M state-of-the-art through-penetration fire protection plus improved characteristics.

Firestops difficult through penetrations such as plastic pipe, insulated pipe and cables. When exposed to heat, this flexible, rubber-like strip expands up to ten times its original volume, forming a very hard char to prevent the migration of fire and smoke.

- 100% solids
- One-part, organic/inorganic, fire-resistive elastomeric sheet with foil on one side
- Intumescent for complete, rapid sealing during a fire
- Standard 2 in. width or optimized 1 in. width applications
- Superior, documented aging properties. Proven stability and performance for expected life of building
- Improved flexibility for easy, cost-effective installation
- Versatile – can be cut to fit irregular shapes
- Re-enterable – no special tools required
- Non-flame supporting
- Red-brown color
- Applications include: telephone cable, metal pipe, plastic pipe, conduit, insulated metal pipe and cable trays
- Used to firestop up to 10 in. (254,0 mm) diameter PVC pipe
- UL-classified for use on PVC, CPVC, ABS, CCPVC, CCABS, PVDF, FRPP, PP and PB plastic pipe

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
FS-195+	Boxed 2 in. x 24 in.	0211512	0 00 51115 07115 7	10 Strips

Most common systems for this product included in this book:

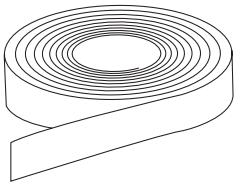
CAJ-5024 p61 CAJ-8001 p75 CAJ- 8073 p77 FC-8012 p84 WL-2087 p41 WL-4004 p58 WL-6002 p68 WL-8010 p84

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ Fire Barrier Ultra GS Wrap Strip

3M Interam Ultra GS is a graphite based, largely inorganic, flexible, fire resistive, intumescent mat. Ultra GS is designed to firestop plastic pipe penetrations in fire-rated walls, floors and floor/ceiling assemblies.

The unique, intumescent property of this material means that as penetrating items such as plastic pipe are consumed by fire, Ultra GS expands to maintain a tight seal, preventing the spread of fire, deadly smoke, and other by-products of combustion.



- Intumescent: Expands when heated to seal around items consumed by fire.
- Thermal insulator
- Smoke seal
- Normal disposal procedures
- Excellent flexibility, weatherability and versatility

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
Ultra GS-40 Wrap Strip	2 in. x 40 ft.	0211513	0 00 51115 16507 8	5 Rolls

Most common systems for this product included in this book:

CAJ-2312 p37 CAJ-2313 p37 CAJ- 8088 p82 FA-2033 p39 FA-2055 p40 FC-8020 p86 WL-2265 p45 WL-7051 p73

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ Fire Barrier RC-1 Restricting Collar

This collar works in conjunction with 3M FS-195+ wrap/strip and 3M Interam™ Ultra GS wrap/strip to close an opening left by a burned away pipe.

- UL-classified for use on PVC, CPVC, ABS, CCPVC, CCABS, PVDF, PP and PB plastic pipe
- Required for firestopping plastic pipes larger than 4 in. (101,6 mm) in diameter
- 28 gauge steel
- Convenient 25 ft. (7,62 m) roll

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
RC-1 Restricting Collar	Boxed 2 in. x 25 ft.	0211514	0 00 51115 08324 5	1 Collar

Most common systems for this product included in this book:

Used in conjunction with FS-195+ Wrap/Strips or Ultra GS Wrap/Strips in Systems where field fabricated collars are required.

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

FIND OUR SELECTION SPECSEAL FIRESTOP PRODUCTS

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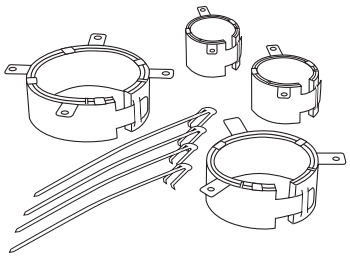
3M™ Fire Barrier Ultra Plastic Pipe Device

The 3M Plastic Pipe Device is a one piece metal collar assembly encasing 3M's heat expanding 3M Interam™ Ultra GS (intumescent) material.

The 3M Plastic Pipe Device is used for new and retrofit installations and will accommodate 1 1/2 inch (38 mm), 2 inch (5 cm), 3 inch (7 cm), and 4 inch (10 cm) schedule 40 drain, waste and vent pipe systems.

The 3M Plastic Pipe Device achieved up to 3 hour fire ratings when tested by Underwriters Laboratories, Inc. in accordance with ASTM E814 (UL1479).



- Ultra fast anchoring system
- One piece quick and easy installation
- Factory-made quality consistency
- UL Classified – meets code requirements – universally recognized
- Easily identified red color (fire rated device)

3M™ Fire Barrier Ultra RC Pack

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
Ultra RC Pack	2 in.	0211519	0 00 51115 16504 7	10 Devices
Ultra RC Pack	3 in.	0211520	0 00 51115 16505 4	10 Devices
Ultra RC Pack	4 in.	0211521	0 00 51115 16506 1	10 Devices

Most common systems for this product included in this book:

CAJ-2242 p35 FA-2033 p39 FC-2115 p46 WL-2147 p43

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ Fire Barrier Ultra PPD

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
Ultra PPD	1.5 in.	0211522	0 00 51115 08378 5	10 Devices
Ultra PPD	2 in.	0211523	0 00 51115 08379 2	10 Devices
Ultra PPD	3 in.	0211524	0 00 51115 08380 8	10 Devices
Ultra PPD	4 in.	0211525	0 00 51115 08381 5	10 Devices

Most common systems for this product included in this book:

CAJ-2227 p34 CAJ-2312 p37 CAJ-2313 p37 CBJ-2002 p38 FC-2129 p48 WL-2162 p44 WL-2266 p46

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ Fire Barrier PPD

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
PPD	6 in.	0211526	0 00 51115 08253 5	5 Devices

Most common systems for this product included in this book: CAJ-2001 p32

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ Fire Barrier Ultra Fast Anchors

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
Ultra Fast Anchors	10 in.	0211527	0 00 51115 08377 8	400 Anchors
Ultra Fast Anchors	16 in.	0211528	0 00 51115 11530 1	400 Anchors

Most common systems for this product included in this book: See Specifier's Guide

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ FireDam™ Spray 100

3M FireDam Spray 100 is a flexible, sprayable, water-based coating. 3M FireDam Spray 100 dries in ambient conditions to form a flexible seal.

3M FireDam Spray 100 firestops head-of-wall joints, floors joints, penetration seals, and perimeter joints (curtain wall joints). 3M FireDam Spray 100, when installed properly, will control the transmission of fire, heat and smoke before, during and after exposure to fire.

- Green Color
- Good adhesion to most common construction materials
- Compression/Extension recovery of up to ±25% of original joint width
- Re-enterable/repairable
- Water-based: dries when exposed to the atmosphere
- Applied with conventional airless spray equipment
- Tack free 12 hours
- Fully cured 48 hours, (70°F [21°C], 70% RH)
- Paintable

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
FireDam™ Spray 100	5 gallon Pail	0211529	0 00 51115 16534 4	1 Pail

Most common systems for this product included in this book:

CEJ 113 P p102 CEJ 115 P p103 CEJ 119 P p105 CEJ 238 P p112 FWD 1040 p89 HWD 0021 p90 HWD 0040 p92 HWD 0192 p97 HWD 1010 p100
CEJ 114 P p102 CEJ 116 P p104 CEJ 234 P p111 FFD 1042 p87 HWD 0020 p89 HWD 0029 p91 HWD 0123 p93 HWD 0248 p98

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ Fire Barrier Spray 100 For Perimeter Safing Slots

3M Fire Barrier Spray 100 is a flexible, sprayable, water-based coating. It dries in ambient conditions to form a flexible seal. 3M Fire Barrier Spray 100 is installed in perimeter joints between a non-rated exterior curtain wall and a concrete floor. When installed in the proper system, it will control the transmission of fire, heat and smoke before, during and after exposure to fire.

- Blue Color
- Good adhesion to most common construction materials
- Compression/Extension recovery of up to ±16.7% of original joint width
- Re-enterable/repairable
- Water resistant
- Used in up to 2-hour fire rated systems
- Water-based: dries when exposed to the atmosphere
- Applied with conventional airless spray equipment or brush applied
- Tack free 12 hours
- Fully cured 48 hours, (70°F [21°C], 70% RH)
- Paintable

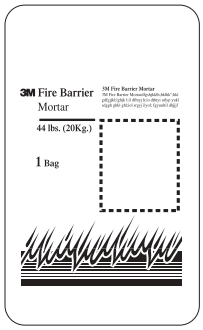
Product	Package Size	Fastenal Part #	3M Part #	Case Qty
Fire Barrier Spray 100	5 gallon Pail	0211530	0 00 51115 16535 1	1 Pail

Most common systems for this product included in this book:

CEJ 130 P p106 CEJ 132 P p108 CEJ 134 P p110 FWD 1040 p89 HWD 0021 p90 HWD 0040 p92 HWD 0192 p97 HWD 1010 p100
CEJ 131 P p107 CEJ 133 P p109 FFD 1042 p87 HWD 0020 p89 HWD 0029 p91 HWD 0123 p94 HWD 0248 p98

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ Fire Barrier Mortar



3M Fire Barrier mortar is a lightweight cementitious firestop product.

- Variable mix ratio – permits self-leveling as well as no-sag (no forming) application consistencies, resulting in labor savings
- Excellent adhesion – will bond to concrete, metals, wood, plastic and cable jacketing
- Re-enterable without use of power tools – results in lower maintenance costs due to ease of making cable changes
- Bonds to itself – proven prior and during fire testing, resulting in proven and tested repair procedures
- Pumpability
- Mortar is available in 44 lb. bags

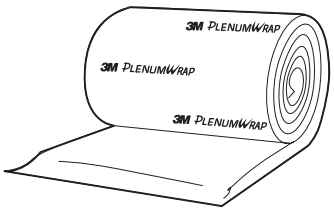
Product	Package Size	Fastenal Part #	3M Part #	Case Qty
Mortar	44 lb. Bag	0211534	0 00 51115 07559 9	30 Bags

Most common systems for this product included in this book: CAJ-8073 p77

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

Wrap Products

3M™ Fire Barrier Plenum Wrap



3M™ Fire Barrier Plenum Wrap 5A is a fire resistant wrap consisting of a patented inorganic blanket encapsulated with a scrim-reinforced foil. It provides a flexible, non-combustible enclosure for cables and pipe in return air plenums as tested to UL 910. Use with single and multiple 1 in. (25,4 mm) and larger plastic pipe and cables. This non-asbestos wrap contains a safer fiber construction and installs easily because of its high flexibility and strength.

- Tested to UL 910 flammability test
- Lightweight and with high flexibility for easy installation
- Foil encapsulated with unique center overlap seam for blanket strength, protection and less dust
- Safer fiber construction*

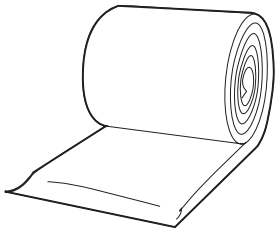
Product	Package Size	Fastenal Part #	3M Part #	Case Qty
Plenum Wrap 5A	.5 in. x 24 in. x 50 ft. Roll	0211543	0 00 51115 16513 9	1 Roll
Plenum Wrap 5A	.5 in. x 48 in. x 25 ft. Roll	0211544	0 00 51115 16514 6	2 Rolls

Most common systems for this product included in this book: PP 100 p119 PP 101 p119

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

*Has been demonstrated to be soluble in the lungs according to EU guidelines 67/548/EWG, Note Q for bio persistence.

3M™ Fire Barrier Duct Wrap 15A



3M™ Fire Barrier Duct Wrap 15A is a fire resistant wrap consisting of a patented inorganic blanket encapsulated with a scrim-reinforced foil. It is used to fire rate commercial kitchen grease ducts and is a proven alternative to 1 or 2 hour fire resistant rated shaft enclosures. This non-asbestos wrap contains a safer fiber construction* and installs easily because of its high flexibility and strength. 3M Fire Barrier Duct Wrap 15A is the thinnest standard, single layer fire resistant wrap that has passed the UL1978 test which simulates a grease duct fire. With its excellent insulating capabilities, it is an ideal choice for tight spaces because it protects combustible constructions at zero clearance to the overlap or collar. 3M Fire Barrier 1000 N/S, 1003 S/L and 2000+ Silicone Sealants used in combination 3M Fire Barrier Duct Wrap 15A provide an effective firestop when the duct penetrates fire rated walls and floors.

- Thinnest, standard one layer wrap for grease ducts rated as a shaft alternative per UL 1978
- Zero clearance to the overlap or collar for congested spaces
- High flexibility for installation ease
- Foil encapsulated with unique center overlap seam for blanket protection, less dust, and high wrap strength
- Safer fiber construction*

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
Duct Wrap 15A	1.5 in. x 24 in. x 20 ft. Roll	0211538	0 00 51115 16553 5	1 Roll
Duct Wrap 15A	1.5 in. x 48 in. x 20 ft. Roll	0211539	0 00 51115 16554 2	1 Roll

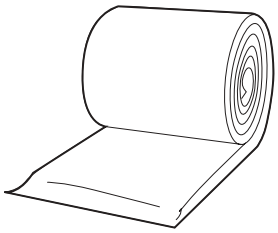
Most common systems for this product included in this book:

GD 532 F p114 GD 538 F p115 VAD 529 F p116 VAD 534 F p116 VAD 535 F p117 VAD 536 F p118

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

*Has been demonstrated to be soluble in the lungs according to EU guidelines 67/548/EWG, Note Q for bio persistence.

3M™ Fire Barrier Duct Wrap 20A



3M™ Fire Barrier Duct Wrap 20A is a fire resistant wrap consisting of a patented inorganic blanket encapsulated with a scrim-reinforced foil. It is used to fire rate commercial kitchen grease ducts and is a proven alternative to 1 or 2 hour fire resistant rated shaft enclosures. This non-asbestos wrap contains a safer fiber construction* and installs easily because of its high flexibility and strength. 3M Fire Barrier Duct Wrap 20A is a two-layer fire resistant wrap system that has passed the ICBO AC101 internal test which simulates a grease duct fire. With its excellent insulating capabilities, it is an ideal choice for tight spaces because it protects combustible constructions at zero clearance. 3M Fire Barrier 1000 N/S, 1003 S/L or 2000+ Silicone Sealants used in combination 3M Fire Barrier Duct Wrap 20A provide an effective firestop when the duct penetrates fire rated walls and floors.

- Listed to pass the internal grease duct fire test, ICBO AC101
- Zero clearance to combustibles for congested spaces
- High flexibility for installation ease
- Foil encapsulated with unique center overlap seam for blanket strength, protection and less dust
- Safer fiber construction*

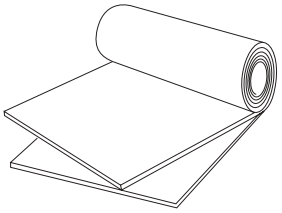
Product	Package Size	Fastenal Part #	3M Part #	Case Qty
Duct Wrap 20A	2 in. x 24 in. x 20 ft. Roll	0211540	0 00 51115 16555 9	1 Roll
Duct Wrap 20A	2 in. x 48 in. x 20 ft. Roll	0211541	0 00 51115 16556 6	1 Roll
Duct Wrap 20A	2 in. x 6 in. x 20 ft. Collar	0211542	5 00 51115 16520 2	4 Rolls

Most common systems for this product included in this book: GD 531 F p113

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

*Has been demonstrated to be soluble in the lungs according to EU guidelines 67/548/EWG, Note Q for bio persistence.

3M™ Interam™ Endothermic Mat Products



This endothermic wrap blocks heat penetration by chemically absorbing heat energy. When exposed to high temperatures, it keeps heat out by releasing chemically bound water to cool the outer surface.

- Outstanding performance in high-intensity fires
- Protects structural steel, cable trays and circuits in conduits
- Easy to install
- Can be installed directly over existing fire protection

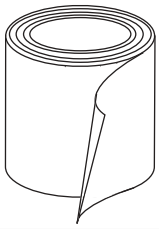
Product	Package Size	Fastenal Part #	3M Part #	Case Qty
E-5A-3	24.5 in. x 25 ft.	0211531	0 00 51115 11622 3	1 Roll
E-5A-4	24.5 in. x 20 ft.	0211532	0 00 51115 11623 0	1 Roll

Most common systems for this product included in this book: See Specifier's Guide

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

Aluminum Tape

3M™ Interam™ Aluminum T-49 Tape



Interam tape is an adhesive-backed aluminum foil tape which is designed to seal the cut edges of 3M Duct Wrap and interam mats to complete the total encapsulation.

- 3-mil. aluminum foil
- Acrylic adhesive
- Tensile Strength: 30 lbs./in. width (525N/100 mm)

Product	Package Size	Fastenal Part #	3M Part #	Case Qty
T-49 Tape	4 in. x 180 ft.	0211533	0 00 51115 02240 1	2 Rolls

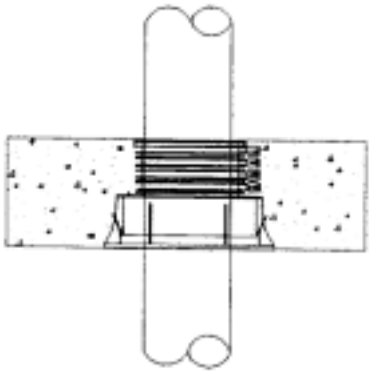
For use with any application that requires aluminum tape.

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the 3M Application and Specifiers Guide or visit www.3M.com/firestop for more information.

3M™ FIRE BARRIER CAST-IN DEVICE FOR PLASTIC OR METAL PIPES

3M Fire Barrier Cast-In Device (3M CID) is a one piece plastic body assembly with many unique features. The 3M CID is available plastic and metal pipes. 3M Plastic CID assembly contains 3M Interam™ Ultra GS intumescent wrap, a flexible smoke and water resistant seal and a unique retaining system. 3M Metal CID assembly contains a patented firestop design with 3M Interam Ultra GS intumescent wrap incorporating plastic wrap and a flexible smoke and water resistant seal. Both assemblies feature easily adjustable bodies that can be adopted to concrete height, before or after pour, with only a pliers. 3M CID is used primarily in new installations and is designed to accommodate concrete thickness as small as 2-1⁄2 in. and pipe sizes from 1-1⁄2 in. to 4 in. at this time. 3M CID achieves up to 3 hr. F and T Ratings when tested by Underwriters Laboratories, Inc. in accordance with ASTM E 814 (UL 1479).

- Easy installation, annular space allows for easier pipe installation
- Pipes may be installed from top or bottom of floor
- Easily adjusted body height, from 2-1⁄2 in. to 8 in.
- Red color – easily identified as a fire-rated device
- Color coded caps and retainers allow quick identification of device type: White for plastic / Black for metal
- Proven patented technology
- Factory made, assures consistent quality
- UL Classified, universally recognized



Product	Case Weight	Fastenal Part #	3M Part #	Case Qty
PLASTIC PIPES				
2" 2PCID	11.44 lbs.		0 00 51115 16536 8	12 units
3" 3PCID	17.00 lbs.		0 00 51115 16537 5	12 units
4" 4PCID	12.43 lbs.		0 00 51115 16538 2	6 units
METAL PIPES				
2" 2MCID	11.56 lbs.		0 00 51115 16540 5	12 units
3" 3MCID	15.34 lbs.		0 00 51115 16541 2	12 units
4" 4MCID	19.82 lbs.		0 00 51115 16542 9	6 units

The systems used for Plastic Pipe included in this book:

FA 2097 FA 2098

The systems used for Plastic Pipe included in this book:

FA 1041 FA 1042

These UL and/or OPL systems pertain to the most common applications for this product. If these systems do not meet the specifics of your application, please refer to the Go-To Index in the 3M Applicators and Specifiers Guide for a complete listing of systems/designs; or visit www.3M.com/firestop for more information.

UNITEX® SLOW SET BONDING AGENT

ULTRA-LONG GEL TIME BONDING ADHESIVE

BENEFITS:

- Ultra Long Gel Time
- Low Exotherm
- Corrosion Inhibiting
- High Modulus
- Medium Viscosity
- Low Odor

Description	Part No.
1 Gallon	0215330
3 Gallon	0215330

Need a longer open time for concrete placement? Is a warmer climate a factor?

SLOW SET BONDING AGENT

SLOW SET BONDING AGENT

ULTRA-LONG GEL TIME BONDING AGENT

DESCRIPTION

A solvent-free, moisture insensitive, 100 % solids, medium viscosity, high modulus, two component, tropical grade bonding agent and corrosion inhibitor for steel. It meets ASTM-C-881 Types I, II, & V, Grade 2, Classes B & C. It also meets USDA specifications for use in food processing areas. Ideally suited for use in hot weather.

USAGE

- Structural bonding of fresh to hardened and old to old concrete.
- Corrosion inhibitor for steel.

Appearance: component A - gray
component B - amber
Shelf Life:1 year in original unopened container
Storage Conditions: Store at 40°- 95°F (5°- 35°C). Condition material to 65°- 85°F (18°- 29°C) before using
Working Time (60 g mass): Up to 8 hrs at 73° ± 2°F (23°C)

APPLICATION

SURFACE PREPARATION: Surface must be clean and sound. It may be dry or damp, but free of standing water. Remove surface contaminants *i.e.* dust, grease, curing compounds, impregnations, waxes, foreign particles and disintergrated materials.

Concrete: Abrasive blast or use other approved mechanical means.

Steel: Abrasive blast or power tool clean to a white metal finish, either SSPC-SP-11 or SP-5.

MIXING: Pre-mix each component thoroughly. Place 2 parts by volume of component A and 1 part by volume of component B into a clean pail. Mix thoroughly for 3 min. with low-speed drill and Jiffy type mixer (400–600 rpm) until uniformly blended. Mix only the quantity that can be used within its gel time.

TO BOND FRESH CONCRETE TO HARDENED CONCRETE: Apply by brush, roller, broom, or spray to cured concrete substrate. Place fresh concrete while SLOW SET BONDING AGENT is still tacky. If coat of SLOW SET BONDING AGENT loses tackiness, before pouring concrete, roughen epoxy surface to create a bonding profile. Recoat with additional SLOW SET BONDING AGENT and proceed.

TO BOND OLD TO OLD CONCRETE: Apply the neat SLOW SET BONDING AGENT with brush, roller, broom, or spray to the substrate working in for positive adhesion. While coating is tacky, join the coated substrates and secure firmly into place. Glue-line should not exceed 1/8 in / 3.2 mm.

TO PROVIDE CORROSION RESISTANCE TO STEEL: Clean steel with abrasive blast or power tool to a white metal finish, either SSPC-SP-11 or SP-5. Spray or brush a coat of SLOW SET BONDING AGENT on steel to point of rejection, leaving no voids, pinholes, or uncoated areas. Coating should be approx. 20 mls. thick. Allow to cure to tacky stage and immediately pour concrete.

PACKAGING

1 gal / 3.8 L units (2/3 gal A; 1/3 gal B)
3 gal / 11.4 L units (2 gal A; 1 gal B)
15 gal / 56.8 L units (2-5 gal A; 1-5 gal B)
165 gal / 624.6 L units (2 drums A; 1 drum B)

COVERAGE

1 gal / 3.8 L of mixed epoxy covers approx. 80 sq ft (7.4 sq m)

COMPLIANCES

ASTM-C-881: Types I, II, & V
Grade 2
Classes B & C

LIMITATIONS

- Minimum substrate temperature is 50° F (10° C)
- Do no thin. Solvents will prevent proper cure.
- SLOW SET BONDING AGENT is a vapor barrier when cured.
- Minimum age of hardened concrete for bonding should be 5-7 days

CAUTION

- Component A – Irritant
- Component B – Corrosive
- Product is a strong sensitizer. Use of safety goggles and chemical resistant gloves are recommended.
- Use of a NIOSH/MSHA organic vapor respirator is recommended if ventilation is inadequate.
- Avoid breathing vapors.
- Avoid skin contact.

FIRST AID

EYE CONTACT: Flush immediately with water for at least 15 minutes. Contact physician immediately.

RESPIRATORY CONTACT: Remove person to fresh air.

SKIN CONTACT: Remove any contaminated clothing. Remove epoxy immediately with a dry cloth or paper towel. Solvents should not be used as they carry the irritant into the skin. Wash skin thoroughly with soap and water.

CURED EPOXY RESINS ARE INNOCUOUS.

CLEANUP

EQUIPMENT: Uncured material can be removed with Unitex CITRI-CLEAN or other approved solvent. Cured material can only be removed mechanically.

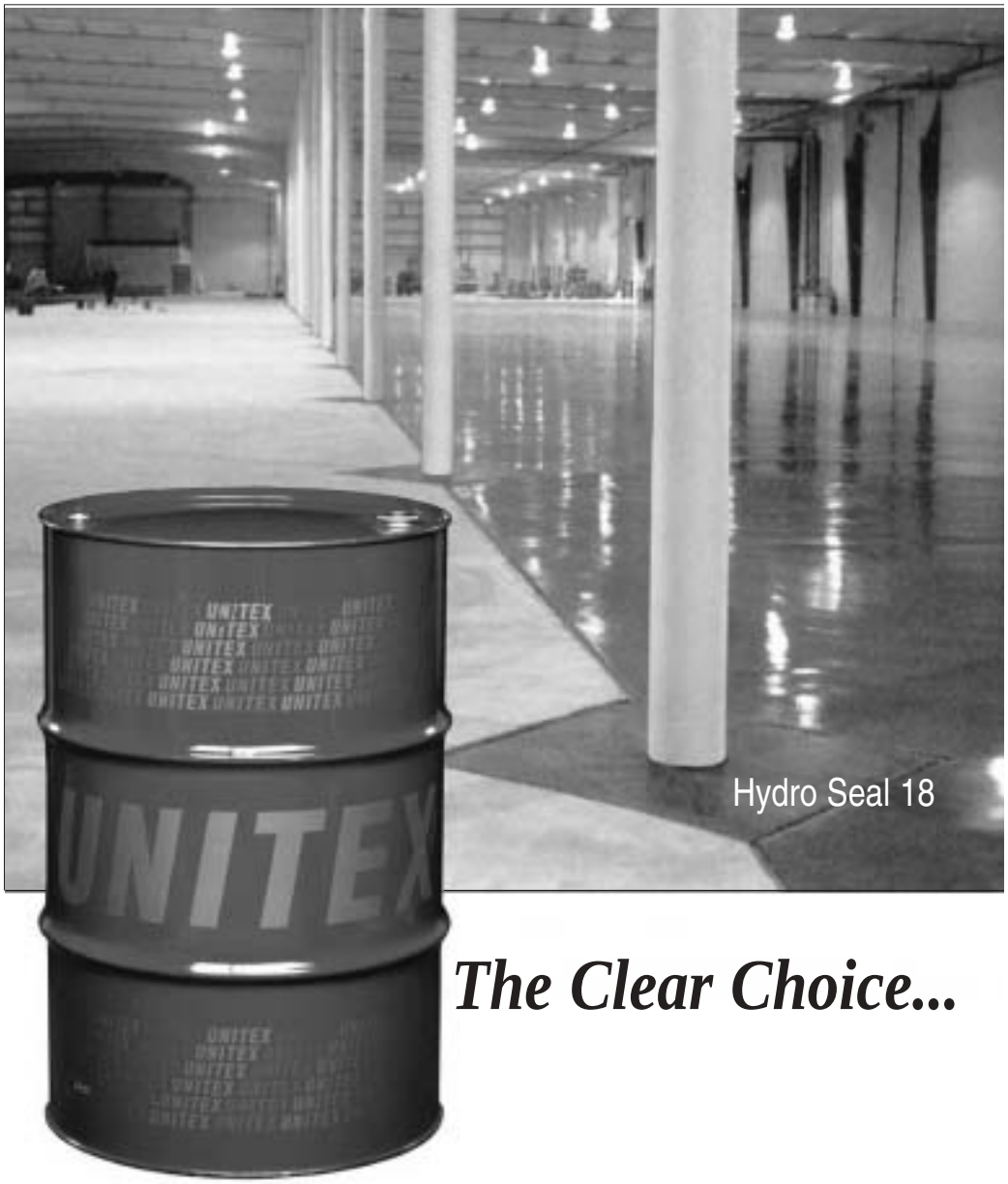
MATERIAL: Collect with absorbent material. Flush area with water. Dispose of in accordance with local, state, and federal disposal regulations.

UNITEX® HYDRO SEAL 18

WATER BORNE ACRYLIC CONCRETE CURE AND SEAL

BENEFITS:

- Non-yellowing
- Dries & Stays Clear
- High Gloss
- Does Not Blush
- Water Cleanup
- UV Resistant
- Economical
- VOC Compliant
- Meets:
  ASTM-C-309/TT-C-800A



Description	Part No.
5 Gallon	0207292
55 Gallon	0207291

The Clear Choice...

HYDRO SEAL 18

WATER BORNE ACRYLIC CONCRETE CURE AND SEAL

DESCRIPTION
State of the art, VOC compliant, acrylic emulsion. Applied after finishing to form a membrane, which retains mix water, allowing normal hydration. Proper curing is the best insurance to help eliminate scaling concrete and reduce callbacks. An excellent anti-spalling compound. Contains no fillers, extenders, waxes or flammable solvents.

USAGE
- Cures, seals, hardens and dustproofs concrete substrates.
- Protects against many oils, acids, salt, alkalis, fungus, grease, spalling, and damage from sudden rainfalls. Retards the moisture exchange, giving additional protection for tile, paint, carpet, etc. Helps to prevent efflorescence. Efflorescence requires a moisture exchange to bring soluble salts to the surface. Without this flow of moisture, efflorescence cannot exist.
- Protects aluminum, copper and steel from concrete stains.

APPLICATION
METHOD: Apply with spray, brush, long-nap roller, or lambswool applicator. Ordinary garden-type sprayers with neoprene hoses are recommended for best results. Spray uniformly to form a continuous film.

CURING NEW CONCRETE: Application should be made immediately after finishing as soon as bleed water has disappeared and slab can support the weight of an applicator.

SEALING NEW CONCRETE: For an excellent sealer and added protection to concrete cured with product, apply a second coat after 28 days of curing. If not previously applied when curing concrete, apply two coats, second coat four hours after first coat. Area to be sealed must be cleaned and free of all foreign matter such as dirt, rubber marks, paint, etc. Apply at 300 - 400 sq ft / gal or 7.4 - 9.8 sq m / L, to dry surface.

DUSTPROOFING / SEALING AGED CONCRETE: Defective mortar, open joints, and spalling should be repaired. Surface must be structurally sound and free of foreign matter such as grease, oil, dirt, and incompatible sealers and coatings. Unitex CITRI-CLEAN should be used as a degreaser and to remove rubber tire marks followed by a thorough rinse with clean water. Apply to dry surface at 300 to 400 sq ft / gal or 7.4 to 9.8 sq m / L, depending upon the porosity. Second coat is necessary for maximum protection. Apply after 4 hours drying time at 300 to 600 sq ft / gal or 7.4 – 14.7 sq m / L.

DRYING TIME: (80° F or 27°C)
Dry to touch . . . . . .30 minutes
Light foot traffic . . . . . .4 hours
Normal traffic . . . . . .Overnight
Maximum hardness . . . . . .7 days

CARE OF SPRAYER: To release air pressure from spray can at night, turn can upside down and open valve. When not in use, keep hose and nozzle elevated to drain away from tip. Prior to drying, equipment can be cleaned with soap and water.

PACKAGING
55 gal / 208 L drums
5 gal / 18.9 L pails

COVERAGE
Steel Troweled Concrete:
ASTM-C-309
200 sq ft/gal
4.9 sq m/L
Federal Specification TT-C-800A
200 sq ft/gal
4.9 sq m/L

Broom Finished Concrete:
ASTM-C-309
100 sq ft/gal
2.5 sq m/L
Federal Specification TT-C-800A
100 sq ft/gal
2.5 sq m/L

COMPLIANCES
Federal EPA V.O.C.
California V.O.C.
ASTM-C-309 Type 1, Clear
Federal Specification TT-C-800A

LIMITATIONS
Test panel should be made prior to application on exposed aggregate, concrete block, stone, precast, colored concrete, etc. Test application should be left for the time specified by the manufacturer. This procedure is recommended due to the thousands of different native stones.

- Protect from freezing.
- Do not apply if concrete is below 40°F/4°C.
- Colored Concrete: Best results are obtained by waiting a minimum of 72 hrs prior to application. Do no over apply. Test samples are recommended.
- Not for continual immersion in water or around pools, fountains.
- May not provide bond for cementitious or other adhesives.Tests should be conducted to determine bondability with new products.
- Do not dilute or alter the product in any way.
- Use in well ventilated areas.
- For industrial use only.

UNITEX® GRAY SOLVENT SEAL

SOLVENT BASED ACRYLIC SEAL & CURE

BENEFITS:

- Provides uniform appearance to blotchy concrete floors resulting from uneven finishing or curing.
- Can be recoated at any time.
- Cures, seals, & dustproofs in one easy application.
- Retards moisture exchange, giving additional protection for tile, paint, carpeting, etc.
- Compatible with floors cured & sealed with Unitex acrylics
- Helps prevent efflorescence.
- Reduces expensive jobsite clean-up.
- Passes 500-hour salt-spray test.
- Solids remain stable under attack of most oils, salts, alkalis, fungi, and many mineral acids.
- An excellent anti-spalling compound.

DESCRIPTION

A gray pigmented, VOC compliant, acrylic curing, sealing, dustproofing compound. When applied to blotchy interior concrete floors, GRAY SOLVENT SEAL makes them uniformly gray in color.

APPLICATION

CURING NEW CONCRETE: Application should be made immediately after finishing as soon as bleed water has disappeared and slab can support the weight of an applicator.

SEALING NEW CONCRETE: For slabs cured with GRAY SOLVENT SEAL or Unitex SOLVENT SEAL 1315, apply as sealing coat after 28 days of curing. If not previously applied when curing concrete, apply two coats, second coat four hours after first coat. Area to be sealed must be cleaned and free of all foreign matter such as dirt, rubber marks, paint, etc.

SEALING / DUST PROOFING AGED CONCRETE: Surface must be structurally sound and free of foreign matter such as grease, oil, dirt, and incompatible sealers and coatings. Unitex CITRI-CLEAN should be used as a degreaser and to remove rubber tire marks followed by a thorough rinse with clean water. Surface must dry prior to application.

SURFACE PREPARATION: Test panels should be made on specific jobs to ensure use of proper sealer and to determine the number of coats required. Surface must be clean, dry, structurally sound and free of foreign matter such as grease, oil, and dirt. Unitex CITRI-CLEAN may be used as a degreaser, followed by a thorough rinse with clean water. Surface should be dry prior to application. Cracks, expansion joints, and spalling should be repaired before sealing,

METHOD: Apply with Chapin sprayer, roller, or lambswool applicator to form a light continuos film.

APPLICATION: Stir before spraying. Spray in a cross-hatched, continuous light film to the point of rejection, avoiding puddling. Two light coats are preferable to one heavy coat. Second coat may be applied in 4 hrs if additional gloss is desired. Avoid over application and high gloss which may become slick and discolor.

PACKAGING

55 gallon / 208 liter drums
5 gallon / 18.9 liter pails

COVERAGE

Curing and sealing new concrete:
300 sq ft / gal (7.4 sq m / L)
Second application:
400-600 sq ft / gal (9.8-14.7 sq m / L)
Sealing aged concrete:
200–300 sq ft / gal (4.9-7.4 sq m / L)

DRYING TIME

At 80° F (27° C)
Dry to touch . . . . . 25 min.
Light foot traffic . . . . . 4 hrs.
Normal traffic . . . . . over night
Maximum hardness . . . . . 7 days

COMPLIANCES

Federal EPA VOC
ASTM-C-309
ASTM-C-156 (Method of Testing)
AASHO-M-148

LIMITATIONS

- Will not provide bond to cementitious adhesives.
- Tests should be conducted to determine bondability with new products. Test panel should be made prior to application to determine suitability of product.
- Check with tile or flooring adhesive manufacturer to ensure compatibility.
- Provide adequate ventilation during application. Use of a NIOSH/MSHA organic vapor respirator is recommended if ventilation is inadequate. Do not apply in inhabited buildings where application odor may be objectionable. Once cured, product is odor free.
- Do not apply where food is stored as it may absorb solvent odor. Once dry, product is innocuous and odor free.

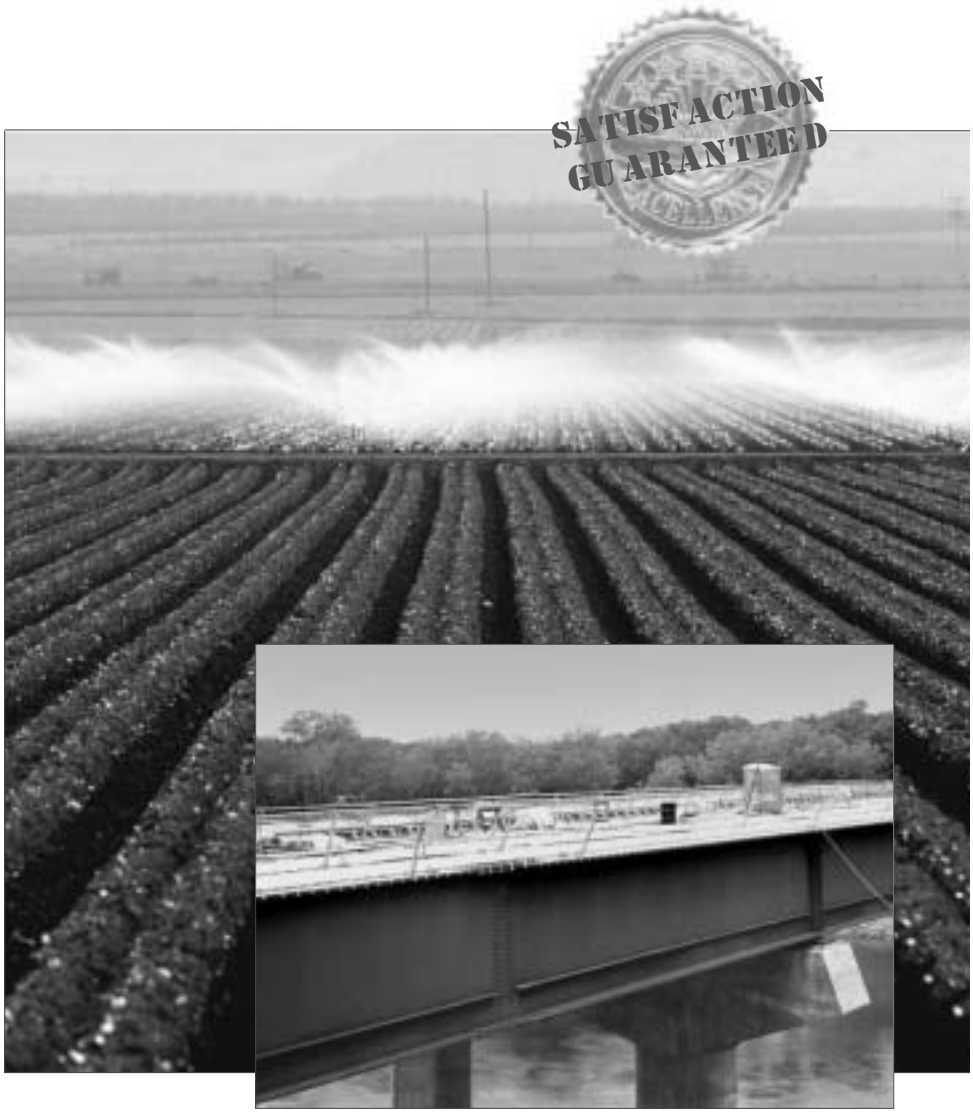
PRECAUTIONS

- Contains petroleum distillate.
- Keep away from heat and open flame.
- Avoid prolonged breathing of vapor or repeated skin contact.
- Use in well-ventilated area.
- For Industrial Use Only.
- Do not dilute product or alter in any way.
- Not recommended for use around pools, fountains, or areas of continuous moisture.
- Product may be slippery when wet.

Description	Part No.
5 Gallon	0215326
55 Gallon	0215327

UNITEX® FARM FRESH

VEGETABLE OIL FORM RELEASE



BENEFITS:

- Organic
- Biodegradable
- No Petroleum
- Environmentally Friendly
- VOC Compliant
- Ready to Use
- Odorless
- Non-staining

Innovative • Reliable • Guaranteed

FARM FRESH – the best form release on the market!

FARM FRESH

VEGETABLE OIL FORM RELEASE

DESCRIPTION
Using the latest micro-emulsion technology, FARM FRESH is an innovative, 100% natural, organic chemical release agent. Ideal for sensitive environmental situations such as bridge formwork over rivers and streams or potable water reservoirs. FARM FRESH provides quick, easy release and leaves an architectural bondable concrete surface. 100% GUARANTEED SATISFACTION*.

USAGE
- Chemically releases concrete from plywood, steel, aluminum, polystyrene, and fiberglass forms and formliners.
- Prevents concrete build-up on all equipment.
- Cleans and reconditions forms.
- Helps eliminate build-up, bugholes, and fines.

APPLICATION
Stir before use. Apply in thin film for maximum protection and economy. Spread uniformly with cross spray to avoid pin holes and uncoated areas. Puddles should be wiped up with squeegee or rag prior to use of forms. Prior to coating plywood forms, apply one or two heavy brush coats to edges for waterproofing protection.

Surface Preparation:
Forms and equipment should be free from dirt, hardened concrete and foreign matter.

Method:
For best results, lightly fog FARM FRESH using Unitex Scotchman atomizing spray tip.

PACKAGING
5 gallon / 18.9 liter pails
55 gallon / 208 liter drums
275 gallon / 1,045 liter totes

COVERAGE
Steel, Aluminum, Plastic and
High Density Plywood:
1000 - 1500 sq ft / gal
24.5 - 36.7 sq m / L

Medium Density Plywood, Paper Column Forms:
1000 - 1250 sq ft / gal
24.5 - 30.6 sq m / L

BB Grade Plywood:
1000 sq ft / gal
24.5 sq m / L

Rough Sawn Lumber, Straited Plywood:
First use, 2 coats: 500 sq ft/ gal /coat
12 sq m / L / coat
Subsequent uses: 1000 sq ft / gal
24.5 sq m / L

CLEANUP
Sprayers and other application equipment can be cleaned with water.

COMPLIANCES
Corps of Engineers CEGS-03300, Section 10.8 Form Coating.
Navy Dock and Piers 56359
V.O.C. Compliant

LIMITATIONS
- For subsequent coatings over concrete, follow recommended application procedures by paint and coating manufacturers.
- When any material is to be applied on top of the concrete, follow the application instructions of the manufacturer.
- Protect from freezing.

** We are so confident that you will think FARM FRESH is the best release agent you've ever used, we will fully refund your purchase price if you are not completely satisfied.*

UNITEX® PRO-POXY 204

MEDIUM VISCOSITY, MULTI-PURPOSE BONDING ADHESIVE

BENEFITS:

- Meets ASTM-C-881 Types I, II, IV, & V for Structural Repairs
- Super Strength
- Moisture Insensitive
- Excellent Adhesion
- Easy to Mix 1:1 Ratio
- Easy to Use
- Fast Set
- Corrosion Inhibiting

Description	Part No.
1 Gallon	0215328
2 Gallon	0215329

Specifically formulated for load bearing applications where higher tensile strength is required.

PRO-POXY 204

MEDIUM VISCOSITY, MULTI-PURPOSE BONDING ADHESIVE

DESCRIPTION

A solvent-free, moisture insensitive, 100% solids, medium viscosity, two component epoxy bonding agent and injection resin. Recommended for structural crack repair for larger cracks; .007–.030 in / .18–.76 mm. PRO-POXY 204 meets ASTM-C-881, Types I, II, IV & V, Grade 2, Classes B & C. It also meets USDA specifications for use in food processing areas. An excellent epoxy adhesive for use in crack grouting by pressure injection or gravity-feed and for making epoxy mortars and grouts. PRO-POXY 204 is slightly thinner than PRO-POXY 200.

USAGE

- Structural bonding of fresh to hardened & old to old concrete
- Structural crack repair for larger cracks, i.e. .007–.030 in / .18-.76 mm cracks
- Structural adhesive for concrete, masonry, metal, wood, etc.
- Vertical anchoring of rebar, dowels, and threaded rod

Appearance: component A– gray
component B– dark amber
Shelf Life: 1 yr in original unopened container
Storage Conditions: Store at 40 - 95°F (5 - 35°C). Condition material to 65 - 85°F (18°- 29°C) before using
Gel Time (60 g mass): 30 min. at 73 ± 2°F(23°C)

APPLICATION

SURFACE PREPARATION: Surface must be clean and sound. It may be dry or damp, but free of standing water. Remove surface contaminants i.e. dust, grease, curing compounds, impregnations, waxes, foreign particles and disintegrated materials.

Concrete: Sandblast or use other approved mechanical means.

Steel: Sandblast to white metal finish.

MIXING: Pre-mix each component thoroughly. Place 1 part by volume of component A and 1 part by volume of component B into a clean pail. Mix thoroughly for 3 min. with low-speed drill and Jiffy type mixer (400–600 rpm) until uniformly blended. Mix only the quantity that can be used within its gel time.

TO BOND FRESH CONCRETE TO HARDENED CONCRETE: Apply by brush, roller, broom or spray to cured concrete substrate. Place fresh concrete while PRO-POXY 204 is still tacky. If coat of PRO-POXY 204 loses tackiness before pouring concrete, roughen epoxy surface to create bonding profile. Recoat with additional PRO-POXY 204 and proceed.

TO BOND OLD TO OLD CONCRETE: Apply the mixed PRO-POXY 204 by brush, roller, broom or spray to the substrate working in for positive adhesion. While coating is tacky, join the coated substrates and secure firmly into place. Glue-line should not exceed 1/8 in / 3.2 mm.

TO STRUCTURALLY REPAIR CRACKS BY GRAVITY FEED: If cracks reflect through slab, seal underside of cracks by buttering crack with PRO-POXY 300, PRO-POXY 300 FAST, or PRO-POXY 300 PASTE. Otherwise, pour neat PRO-POXY 204 into vee-notched crack. Continue placement until crack is completely filled.

TO VERTICALLY ANCHOR REBAR, DOWELS, AND THREADED ROD: For efficient transfer of stress, the annular space around bolt should not exceed 1/8 in / 3.2 mm. The depth of embedment is typically 9 times the bolt diameter. Grout with neat PRO-POXY 204.

TO PREPARE EPOXY MORTAR: Slowly add 1 1/2 parts by loose volume of an oven-dried aggregate to 1 part of the mixed PRO-POXY 204. Mix until uniform in consistency and color.

PACKAGING

22 oz / 600 ml cartridges
1gal / 3.8 liter units (2 - .5 gal cans)
2 gal / 7.6 liter units (2 - 1 gal cans)
10 gal / 37.9 liter units (2 - 5 gal pails)
110 gal / 416.4 liter units (2 - 55 gal drums)

COVERAGE

1 gal / 3.8 L of epoxy covers approx. 80 sq ft / 7.43 sq m

COMPLIANCES

ASTM-C-881: Types I, II, IV, & V
Grade 2
Classes B & C

LIMITATIONS

- Minimum substrate temperature is 40° F (5° C).
- Do not thin. Solvents will prevent proper cure.
- Use oven-dried aggregate only.
- Minimum age of concrete must be 5–7 days, depending on curing and drying conditions, for mortar.
- Do not seal exterior slabs on grade with product. PRO-POXY 204 is a vapor barrier.
- Maximum epoxy mortar thickness is 1.5 in / 3.8 cm per lift.

CAUTION

- Component A – Irritant
- Component B – Corrosive
- Product is a strong sensitizer. Use of safety goggles and chemical resistant gloves are recommended.
- Use of a NIOSH/MSHA organic vapor respirator is recommended if ventilation is inadequate.
- Avoid breathing vapors.
- Avoid skin contact.

FIRST AID

EYE CONTACT: Flush immediately with water for at least 15 minutes. Contact physician immediately.

RESPIRATORY CONTACT: Remove person to fresh air.

SKIN CONTACT: Remove any contaminated clothing. Remove epoxy immediately with a dry cloth or paper towel. Solvents should not be used as they carry the irritant into the skin. Wash skin thoroughly with soap and water.

CURED EPOXY RESINS ARE INNOCUOUS.

CLEANUP

EQUIPMENT: Uncured material can be removed with Unitex CITRI-CLEAN or other approved solvent. Cured material can only be removed mechanically.

MATERIAL: Collect with absorbent material. Flush area with water. Dispose of in accordance with local, state, and federal disposal regulations.

UNITEX® FREEDOM FORM RELEASE

FOR HIGH VISUAL IMPACT CONCRETE – V.O.C. COMPLIANT

EXCELLENT FOR:

- Treated Plywood
- Plywood
- Prestress, precast, and pipe plants
- Steel
- Aluminum Forms
- Fiberglass
- Formliners
- Masonite
- Pans
- Paper
- Plastic
- Rough-sawn Lumber
- Wood

Description	Part No.
5 Gallon	0207288
55 Gallon	0207287

Which would you choose?

UNITEX® FREEDOM FORM RELEASE

DESCRIPTION and PHYSICAL PROPERTIES

FREEDOM FORM RELEASE is a chemical release for concrete forms which effectively prevents bonding of concrete to steel, aluminum, plywood, and composite forms. FREEDOM FORM RELEASE is composed of organic chemicals which react with the concrete to prevent adhesion and provide a quick and easy release.

Pleasantly scented and free of kerosene, FREEDOM FORM RELEASE is a thin amber liquid that remains fluid at subfreezing temperatures and can be stored indefinitely.

BENEFITS

- **Increases form life. Waterproofs mill oiled plywood forms to prevent the wicking of alkali water from the concrete into the form. This prevents the form from rotting out and raising the grain, thus doubling or tripling form life.**
- **Protects metal forms. FREEDOM FORM RELEASE is chemically reactive and forms a rust-proof film. Makes pre-manufactured forms self-cleaning and reduces maintenance costs as much as 50%.**
- **Leaves concrete surfaces unstained.**
- **Does not impair the natural bonding of paints and other surface coatings, when used in accordance with the manufacturer's instructions.**
- **Cuts clean-up time to a minimum. Besides making forms virtually self-cleaning, if sprayed daily, equipment can be cleaned in a minimal amount of time.**
- **Saves on material. As a well-balanced, chemically reactive form release, it does not need, and should not be, over applied.**

EFFECTS on CONCRETE

- **Produces architectural concrete by eliminating bug holes caused by thick form oils.**
- **FREEDOM FORM RELEASE provides a quick, easy release without staining, discoloration, or pitting.**
- **FREEDOM FORM RELEASE leaves no residue or cement dust on the concrete surface.**
- **Concrete is left with an architectural surface or ready for application of curing compound, sealer, or bonder for plaster, mastics, or paints.**
- **When any material is to be applied on top of the concrete, follow the application instructions of the material manufacturer.**

Release with diesel

FREEDOM FORM RELEASE

...The Clear Choice

COVERAGE

APPLICATION	SQ. FT./GALLON
Steel, Aluminum, Plastic, and High Density Plywood	2000-3000
Medium Density Plywood	1000-1500
BB Grade Plywood	1000
Rough Sawn Lumber, Straited Plywood	
1st use, two coats	700
Subsequent uses	1000

PACKAGING

- 55 gallon drums
- 5 gallon pails

APPLICATION

- **Forms should be free from dirt, hardened concrete and foreign matter.**
- **Release agent is ready to use direct from container.**
- **Apply sparingly with Scotchman fog tip to produce high visual impact concrete.**
- **Apply a thin film for maximum protection and economy.**
- **Spray uniformly with cross spray to avoid pin holes and uncoated areas. Avoid over-application.**
- **Prior to coating plywood forms, apply one or two heavy brush coats to edges for water-proofing protection.**

CAUTION

- For Industrial Use Only.
- Keep Out of Reach of Children.
- Keep away from heat or open flame.
- Use in well ventilated area.
- Avoid prolonged breathing of vapors.
- Avoid prolonged or repeated skin contact.

ORDERING INFORMATION

Call 816-231-7700 or toll free 800-821-5846

Disclaimer of Warranties: Neither manufacturer nor seller have any knowledge or control concerning the purchaser's use of the product. No expressed warranty is made by manufacturer or seller with respect to the results of any use of the product or container that the product comes in. No implied warranties including, but not limited to, an implied warranty of merchantability or an implied warranty of fitness for a particular purpose are made with respect to the product. Neither manufacturer nor seller assume any liability for personal injury, loss or damage resulting from the use of the product. In the event that the product shall prove defective, buyer's exclusive remedy shall be as follows: Seller or manufacturer shall, upon request of buyer, replace any quantity of the product which is proven to be defective or shall, at its option, refund the purchase price of the product upon return of the product. Manufacturer shall not be responsible for use of this product in a manner to infringe on any patent held by others.