General Notes

These general notes are provided to ensure proper installation of Simpson Strong-Tie Company Inc. products and must be followed fully.

a. Simpson Strong-Tie Company Inc. reserves the right to change specifications, designs, and models without notice or liability for such changes.
b. Unless otherwise noted, dimensions are in millimetres (mm) and loads are in kilonewtons (kN).
c. Do not overload, which will jeopardise the anchorage. Factored loads shall not exceed design resistances calculated in accordance with published design data.
d. Some hardened fasteners may experience premature failure if exposed to moisture. These fasteners are recommended to be used in dry interior applications.
e. Do not weld products listed in this catalogue. Some steel types have poor weldability and a tendency to crack when welded.

General Instructions for the Installer

These general instructions for the installer are provided to ensure the proper selection and installation of Simpson Strong-Tie® products and must be followed carefully. They are in addition to the specific design and installation instructions and notes provided for each particular product, all of which should be consulted prior to and during the installation of Simpson Strong-Tie products.

a. Do not modify Simpson Strong-Tie products as the performance of modified products may be substantially weakened. Simpson Strong-Tie will not warrant or guarantee the performance of such modified products.
b. Do not alter installation procedures from those set forth in this catalogue.
c. Drill holes for post-installed anchors with carbide-tipped drills meeting the diameter requirements of ANSI B212.15 (shown in the table to the right). A properly sized hole is critical to the performance of post-installed anchors.
Rotary-hammered drills with light, high-frequency impact are recommended for drilling holes. When holes are to be drilled in archaic or hollow base materials, the drill should be set to "rotation only" mode.
d. Failure to apply the recommended installation torque can result in excessive displacement of the anchor under load or premature failure of the anchor. These anchors will lose pre-tension after setting due to pre-load relaxation. See page 13 for more information.
e. Do not disturb, make attachments, or apply load to adhesive anchors prior to the full cure of the adhesive.
f. Use proper safety equipment.

Finished Diameters for Carbide Tipped Bits Per ANSI B212.15

Nominal Drill Bit Diameter (mm)	Tolerance Range Minimum (mm)	Tolerance Range Maximum (mm)
5	5.15	5.40
6	6.15	6.40
7	7.20	7.45
8	8.20	8.45
10	10.20	10.45
11	11.20	11.50
12	12.20	12.50
13	13.20	13.50
14	14.20	14.50
15	15.20	15.50
16	16.20	16.50
18	18.20	18.50
19	19.21	19.55
20	20.21	20.55
22	22.21	22.55
24	24.21	24.55
25	25.21	25.55
28	28.21	28.55
30	30.21	30.55
32	32.25	32.70
34	34.25	34.70
35	35.25	35.70
37	37.25	37.70
40	40.25	40.80
44	44.25	44.80
52	52.30	52.95

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General Instructions for the Designer

These general instructions for the designer are provided to ensure the proper selection and installation of Simpson Strong-Tie products and must be followed carefully. These general instructions are in addition to the specific design and installation instructions and notes provided for each particular product, all of which should be consulted prior to and during the design process.

a. The term "Designer" used throughout this catalogue is intended to mean a licensed/certified building design professional, a licensed professional engineer, or a licensed architect.

b. All connected members and related elements shall be designed by the Designer and must have sufficient strength (bending, shear, etc.) to resist the loads imposed by the anchors.

c. When the ultimate limit state design method is used, the factored loads shall not exceed the design resistance calculated in accordance with the published design data.

d. Simpson Strong-Tie strongly recommends the following addition to construction drawings and specifications: "Simpson Strong-Tie products are specifically required to meet the structural calculations of plan. Before substituting another brand, confirm load capacity based on reliable published testing data or calculations. The Engineer/Designer of Record should evaluate and give written approval for substitution prior to installation."

e. Local and/or regional building codes may require meeting special conditions. Building codes often require special inspections of anchors installed in concrete or masonry. For compliance with these requirements, it is necessary to contact the local and/or regional building authority. Except where mandated by code, Simpson Strong-Tie® products do not require special inspection.

f. Design resistances are determined from test results, calculations, and experience. These are guide values for sound base materials with known properties. Due to variation in base materials and site conditions, site-specific testing should be conducted if exact performance in a specific base material at a specific site must be known.

g. Tests are conducted with anchors installed perpendicular (±6°) to the surface of the base material. Deviations can result in anchor bending stresses and reduce the load carrying capacity of the anchor.

h. Design resistances in our load tables do not consider bending stresses due to shear loads applied with eccentricities (shear with lever arm). Refer to EOTA ETAG 001, Annex C, Section 5.2.3.2b for bending analysis.

i. Steel anchors and fasteners will corrode and may lose load-carrying capacity when installed in corrosive environments or exposed to corrosive materials. See "III. Corrosion Resistance" on page 13.

j. Mechanical anchors should not be installed into concrete that is less than 7 days old. The allowable loads and design strengths of mechanical anchors that are installed into concrete less than 28 days old should be based on the actual compressive strength of the concrete at the time of installation.

k. Nominal embedment depth (embedment depth) is the distance from the surface of the base material to the installed end of the anchor and is measured prior to application of an installation torque (if applicable). Effective embedment depth is the distance from the surface of the base material to the deepest point at which the load is transferred to the base material.

l. Drill bits shall meet the diameter requirements of ANSI B212.15. For adhesive anchor installations in oversized holes, and adhesive anchor installations into core-drilled holes, see "V. Adhesive Anchors" on page 13.

m. Threaded-rod inserts for adhesive anchors shall be fully threaded steel.

n. Design resistances for chemical anchors shown in the load tables are based on dry or wet hole conditions. Chemical anchors may not be installed into water-flooded holes. See "V. Adhesive Anchors" on page 13.

o. Adhesive anchors should not be installed into concrete that is less than 7 days old. The allowable loads and design strengths of adhesive anchors that are installed into concrete less than 28 days old should be based on the actual compressive strength of the concrete at the time load is applied.

p. Adhesive anchors can be affected by elevated base material temperature. See "V. Adhesive Anchors" on page 13.

q. Anchors are permitted to support fire-resistive construction provided at least one of the following conditions is fulfilled: a) Anchors are used to resist wind or seismic forces only. b) Anchors that support gravity load-bearing structural elements are within a fire-resistance-rated envelope or a fire-resistance-rated membrane, are protected by approved fire-resistance rated materials, or have been evaluated for resistance to fire exposure in accordance with recognised standards. c) Anchors are used to support nonstructural elements.

r. Some adhesives are not qualified for resisting long-term sustained loads. These adhesives are for resisting short-term loads such as wind or seismic loads only. See "V. Adhesive Anchors" on page 13.

s. Exposure to some chemicals may degrade the bond strength of adhesive anchors. Refer to the product description for chemical resistance information. See "VI. Chemical Resistance of Adhesive Anchors" on page 14

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Supplemental Topics

I. Base Materials

"Base material" is a generic industry term that refers to the element or substrate to be anchored to. Base materials include concrete, brick, concrete block (CMU) and structural tile, to name a few. The base material will determine the type of fastener for the application. The most common type of base material where adhesive and mechanical anchors are used is concrete.

Concrete: Concrete can be cast in place or precast concrete. Concrete has excellent compressive strength, but relatively low tensile strength. Cast-in-place (or sometimes called "poured in place") concrete is placed in forms erected on the building site. Cast-in-place concrete can be either normal-weight or lightweight concrete. Lightweight concrete is specified when it is desirable to reduce the weight of the building structure.

Lightweight concrete differs from normal-weight concrete by the weight of aggregate used in the mixture. Normal-weight concrete has a unit weight of approximately 2400 kg per cubic meter compared to approximately 1837 kg per cubic meter for lightweight concrete.

The type of aggregate used in concrete can affect the tension capacity of an adhesive anchor. Presently, the relationship between aggregate properties and anchor performance is not well understood. A recent study based on a limited test program has shown that in relative terms, concrete with harder and more dense aggregates tend to yield greater anchor tension capacities. Conversely, use of softer, less dense aggregates tends to result in lower anchor tension capacities. Research in this area is ongoing. Test results should not be assumed to be representative of expected performance in all types of concrete aggregate.

Prefabricated concrete is also referred to as "precast concrete". Precast concrete can be made at a prefabricating plant or site-cast in forms constructed on the job. Precast concrete members may be solid or may contain hollow cores. Many precast components have thinner cross sections than cast in place concrete. Precast concrete may be either normal or lightweight concrete. Reinforced concrete contains steel bars, cable, wire mesh or random glass fibres. The addition of reinforcing material enables concrete to resist tensile stresses which lead to cracking.

The compressive strength of concrete varies according to the proportions of the components in the mixture. The desired compressive strength of the concrete will be specified according to the application. Water and cement content of the mix is the main determinant of the compressive strength.

The compressive strength of concrete can range from 13.8 MPa to over 138 MPa, depending on the mixture and how it is cured. Most concrete mixes are designed to obtain the desired properties within 28 days after being cast.

Concrete Masonry Units (CMU): Block is typically formed with large hollow cores. Block with a minimum 75% solid cross section is called solid block even though it contains hollow cores. In many parts of the world building codes require steel reinforcing bars to be placed in the hollow cores, and the cores to be filled solid with grout.

In some areas of the world, past practice was to mix concrete with coal cinders to make cinder blocks. Although cinder blocks are no longer made, there are many existing buildings where they can be found. Cinder blocks require special attention as they soften with age.

Brick: Clay brick is formed solid or with hollow cores. The use of either type will vary in different parts of the world. Brick can be difficult to drill and anchor into. Most brick is hard and brittle. Old, red clay brick is often very soft and is easily over-drilled. Either of these situations can cause problems in drilling and anchoring. The most common use of brick today is for building facades (curtain wall or brick veneer) and not for structural applications. Brick facade is attached to the structure by the use of brick ties spaced at intervals throughout the wall. In older buildings, multiple widths, or "wythes" of solid brick were used to form the structural walls. Three and four wythe walls were common wall thicknesses.

Clay Tile: Clay tile block is formed with hollow cores and narrow cavity wall cross sections. Clay tile is very brittle, making drilling difficult without breaking the block. Caution must be used in attempting to drill and fasten into clay tile.

II. Anchor Failure Modes

Anchor Failure Modes: The failure modes for both mechanical and adhesive anchors depends on a number of factors including the anchor type and geometry, anchor material mechanical properties, base material mechanical properties, loading type and direction, edge distance, spacing and embedment depth.

Six different failure modes are generally observed for mechanical and adhesive anchors installed in concrete under tension loading: concrete cone breakout, concrete edge breakout, concrete splitting, anchor slip, adhesive bond, and steel fracture. Three failure modes are generally observed for mechanical and adhesive anchors installed in concrete under shear loading: concrete edge breakout, pryout and steel failure.

Concrete Cone Breakout Failure: This failure mode is observed for both mechanical and adhesive anchors installed at shallow embedment depths under tension loading. This failure mode is also observed for groups of mechanical and adhesive anchors installed at less than critical spacing.

Concrete Edge Breakout Failure: This failure mode is observed for both mechanical and adhesive anchors installed at less than critical edge distance under either tension or shear loading. For this failure mode neither the adhesive nor mechanical anchor fail, but rather the concrete fails. According to Simpson Strong-Tie testing, the tension load at which failure occurs is correlated to the concrete aggregate performance. Other factors may also influence tension capacity.

Concrete Splitting Failure: This failure mode is observed for both mechanical and adhesive anchors installed in a "thin" concrete member under tension loading.

Anchor Slipping Failure: This failure mode is observed for mechanical anchors under tension loading in which the anchor either pulls out of the member (e.g.- a Drop-In Anchor installed through steel deck and into a concrete fill) or the anchor body pulls through the expansion clip (e.g.- a Throughbolt WA expansion anchor installed at a deep embedment depth in concrete).

Adhesive Bond Failure: This failure mode is observed for adhesive anchors under tension loading in which a shallow concrete cone breakout is observed along with an adhesive bond failure at the adhesive/base material interface. The concrete-cone breakout is not the primary failure mechanism, unless the embedment depth is very shallow

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Steel Fracture: This failure mode is observed for both mechanical and adhesive anchors under tension or shear loading where the concrete member thickness and mechanical properties along with the anchor embedment depth, edge distance, spacing, and adhesive bond strength (as applicable), preclude base material failure.

Pryout Failure: This failure mode is observed for both mechanical and adhesive anchors installed at shallow embedment under shear loading.

III. Corrosion Resistance

Some products are available with additional coating options or in stainless steel to provide additional corrosion resistance.

Highly-hardened fasteners can experience premature failure due to hydrogen-assisted stress corrosion cracking when loaded in environments producing hydrogen. Simpson Strong-Tie recommends that such fasteners be used in dry, interior and non-corrosive environments only.

UNDERSTANDING THE ISSUES

Metal anchors and fasteners will corrode and may lose load-carrying capacity when installed in corrosive environments or exposed to corrosive materials. There are many environments and materials which may cause corrosion including ocean salt air, fire-retardants, fumes, fertilisers, preservative-treated timber, dissimilar metals, and other corrosive elements.

The many variables present in a single building environment make it impossible to accurately predict if, or when, significant corrosion will begin or reach a critical level. This relative uncertainty makes it crucial that specifiers and users be knowledgeable of the potential risks and select a product coating or metal suitable for the intended use. It is also important that regular maintenance and periodic inspections are performed, especially for outdoor applications.

It is common to see some corrosion on anchors and fasteners especially in outdoor applications. Even stainless steel can corrode. The presence of some corrosion does not mean that load capacity has necessarily been affected or that a failure will occur. If significant corrosion is apparent or suspected, then the anchors should be inspected by a professional engineer or general contractor and may need to be replaced.

Stainless steel is always the most effective solution to corrosion risk. However, it is also more expensive and sometimes more difficult to obtain. To best serve our customers, Simpson Strong-Tie is evaluating the options to identify the safest and most cost-effective solutions. Based on our testing and experience there are some specific applications that are appropriate for hot-dip galvanised (HDG), mechanically galvanised (MG) or electroplated anchors.

See Simpson Strong-Tie website for additional information related to corrosion.

IV. Mechanical Anchors

Pre-Load Relaxation: Expansion anchors that have been set to the required installation torque in concrete will experience a reduction in pre-tension (due to torque) within several hours. This is known as pre-load relaxation. The high compression stresses placed on the concrete cause it to deform which results in a relaxation of the pre-tension force in the anchor. Tension in this context refers to the internal stresses induced in the anchor as a result of applied torque and does not refer to anchor capacity. Historical data shows it is normal for the initial tension values to decrease by as much as 40–60% within the first few hours after installation. Re-torquing the anchor to the initial installation torque is not recommended, or necessary.

V. Adhesive Anchors

Oversized Holes: The design loads in this manual are based on anchor tests in which holes were drilled with carbide-tipped drill bits of the same diameter that are listed in the product installation data. Drilled holes outside the range shown are not recommended. In the case that a different drill bit diameter is used than what is published, it is recommended that on-site proof load testing of the adhesive anchor shall be performed to confirm that the load capacity is acceptable to the Designer.

Core-Drilled Holes: The design loads in this manual are based upon anchor tests in which holes were drilled with carbide-tipped drill bits. In the case that a diamond-core bit is used, it is recommended to contact Simpson Strong-Tie for recommendations, or that on-site proof load testing of the adhesive anchor shall be performed to confirm that the load capacity is acceptable to the Designer.

Installation in Damp, Wet or Flooded Holes: Adhesive anchors are permitted to be installed in damp or wet holes; however, they are not permitted to be installed in flooded holes. Standing water (flooded hole) must be completely removed, and the hole must be thoroughly cleaned of debris prior to the installation of the adhesive.

Elevated In-Service Temperature: Base material temperature represents the average internal temperature of the concrete. This temperature is not always the same as ambient temperature; therefore the actual base material temperature should be checked to achieve accurate measurements. It is assumed that the measured base material temperature occurs over the entire bonded length of the anchor.

The performance of all adhesive anchors is affected by elevated base material temperature. The design tables provided in this manual consider adhesive performance at "Temperature Range 1" (24°C maximum long-term temperature, 43°C maximum short-term temperature). Maximum long-term temperature is the base material temperature that occurs over a long period of time at a fairly constant rate. Maximum short-term temperature is the base material temperature that occurs over short intervals, such as during a diurnal cycle. For performance in temperatures that are higher than "Temperature Range 1", refer to the product's specific code/technical approval, or use Simpson Strong-Tie® "Anchor Designer™" software.

Creep Under Long-Term Loads: Creep is the slow continuous deformation of a material under constant stress. Creep occurs in many construction materials, including concrete and steel when the stress is great enough. The creep characteristics of adhesives are product dependent. Adhesive anchors that are not creep resistant can pull out slowly over time when sustained tensile loads are applied.

Because of the creep phenomenon, it is important for Designers to consider the nature of the applied tension loads and to determine if the tension loads will be continuously applied to the anchor over the long-term. If this is the case, a product that is suitable for resisting sustained loads over the long-term must be selected.

All Simpson Strong-Tie anchoring adhesives (SET-XP®, ET-HP and AT-HP) have been qualified for resisting long-term loads through ETAG or ICC-ES AC308 "creep tests" in which an anchor is loaded and monitored for movement over time. According to ETAG and ICC, anchors that pass the creep test are determined to be suitable for resisting long-term tensile loads.

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VI. Chemical Resistance of Adhesive Anchors

Samples of Simpson Strong-Tie® anchoring adhesives were immersed in the chemicals shown below until they exhibited minimal weight change (indicating saturation) or for a maximum of three months. The samples were then tested according to ASTM D543 Standard Practices for Evaluating the Resistance of Plastics to Chemical Changes, Procedures I & II, and either ASTM D790 Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials or ASTM D695 Standard Test Method for Compressive Properties of Rigid Plastics. In cases where mild chemicals were evaluated, the exposure was accelerated per ASTM D3045 Standard Practice for Heat Aging of Plastics Without Load.

Samples showing no visible damage and demonstrating statistically equivalent strength and elastic modulus as compared to control samples were classified as "Resistant" (R). These adhesives are considered suitable for continuous exposure to the identified chemical when used as a part of an adhesive anchor assembly.

Samples exhibiting slight damage, such as swelling or crazing, or not demonstrating both statistically equivalent strength and elastic modulus as compared to control samples were classified as "Non-Resistant" (NR). These adhesives are considered suitable for periodic exposure to the identified chemical if the chemical will be diluted and washed away from the adhesive anchor assembly after exposure, or if only emergency contact with the chemical is expected and subsequent replacement of the anchor would be undertaken. Some manufacturers refer to this as "limited resistance" or "partial resistance" in their literature.

Samples that were completely destroyed by the chemical, or that demonstrated a significant loss in strength after exposure were classified as "Failed" (F). These adhesives are considered unsuitable for exposure to the identified chemical.

NOTE: In most actual service conditions, the majority of the anchoring adhesive is not exposed to the chemical and thus some period of time is required for the chemical to saturate the entire adhesive. An adhesive anchor would be expected to maintain bond strength and creep resistance until a significant portion of the adhesive is saturated.

Chemical	Concentration	SET-XP	ET-HP
Acetic Acid	Glacial	F	F
	5%	F	F
Acetone	100%	F	F
Aluminum Ammonium Sulfate (Ammonium Alum)	10%	R	R
Aluminum Chloride	10%	R	R
Aluminum Potassium Sulfate (Potassium Alum)	10%	R	R
Aluminum Sulfate (Alum)	15%	R	R
Ammonium Hydroxide (Ammonia)	28%	R	NR
	10%	R	R
	pH=10	R	R
Ammonium Nitrate	15%	R	R
Ammonium Sulfate	15%	R	R
Automotive Antifreeze	50%	R	R
Aviation Fuel (JP5)	100%	R	R
Brake Fluid (DOT3)	100%	NR	F
Calcium Hydroxide	10%	R	R
Calcium Hypochlorite (Chlorinated Lime)	15%	R	R
Calcium Oxide (Lime)	5%	R	R
Carbolic Acid	10%	F	F
	5%	F	F
Carbon Tetrachloride	100%	R	R
Chromic Acid	40%	NR	NR
Citric Acid	10%	R	R
Copper Sulfate	10%	R	R
Detergent (ASTM D543)	100%	R	R
Diesel Oil	100%	R	NR
Ethanol, Aqueous	95%	F	F
	50%	NR	NR
Ethanol, Denatured	100%	F	F
Ethylene Glycol	100%	R	R
Fluorosilicic Acid	25%	R	R
Formic Acid	Concentrated	F	F
	10%	F	F
Gasoline	100%	R	R
Hydrochloric Acid	Concentrated	F	F
	10%	NR	F
	pH=3	R	R
Hydrogen Peroxide	30%	F	F
	3%	R	R
Iron (II) Chloride (Ferrous Chloride)	15%	R	R
Iron (III) Chloride (Ferric Chloride)	15%	R	R
Iron (III) Sulfate (Ferric Sulfate)	10%	R	F
Isopropanol	100%	F	F
Lactic Acid	85%	F	F
	10%	F	F
Machine Oil	100%	R	R
Methanol	100%	F	F
Methyl Ethyl Ketone	100%	F	F
Methyl Isobutyl Ketone	100%	NR	NR
Mineral Oil	100%	R	R
Mineral Spirits	100%	R	R
Mixture of Amines[1]	100%	F	F
Mixture of Aromatics[2]	100%	NR	R
Motor Oil (5W30)	100%	R	R
N,N-Diethyaniline	100%	R	R
Nitric Acid	Concentrated	F	F
	40%	F	F
	10%	R	F
	pH=3	R	R
Phosphoric Acid	85%	F	F
	40%	F	F
	10%	F	F
	pH=3	R	R
Potassium Hydroxide	40%	R	NR
	10%	R	R
	pH=13.2	R	R

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Chemical	Concentration	SET-XP	ET-HP
Potassium Permanganate	10%	R	R
Propylene Glycol	100%	R	NR
Seawater (ASTM D1141)	100%	R	R
Soap (ASTM D543)	100%	R	R
Sodium Bicarbonate	10%	R	R
Sodium Bisulfite	15%	R	R
Sodium Carbonate	15%	R	R
Sodium Chloride	15%	R	R
Sodium Fluoride	10%	R	R
Sodium Hexafluorosilicate (Sodium Silicon Fluoride)	5%	R	R
Sodium Hydrosulfide	10%	R	R
Sodium Hydroxide	60%	R	R
	40%	R	R
	10%	R	R
	pH=10	R	R
Sodium Hypochlorite (Bleach)	25%	R	R
	10%	R	R

Chemical	Concentration	SET-XP	ET-HP
Sodium Nitrate	15%	R	R
Sodium Phosphate (Trisodium Phosphate)	10%	R	R
Sodium Silicate	50%	R	R
Sulfuric Acid	Concentrated	F	F
	30%	NR	F
	3%	NR	F
	pH=3	R	R
Toluene	100%	F	NR
Triethanol Amine	100%	NR	R
Turpentine	100%	R	R
Water	100%	R	R
Xylene	100%	NR	R

"R" — Resistant, "NR" — Non-Resistant, "F" — Failed, "—" — Not tested
1. triethanol amine, n-butylamine, N,N-dimethylamine
2. toluene, methyl naphthalene, xylene

Additional Instructions for the Installer for Powder-Actuated Fastening

Before operating any Simpson Strong-Tie gas- or powder-actuated tool, you must read and understand the Operator's Manual and be trained by an authorised instructor in the operation of the tool. Simpson Strong-Tie recommends you read and fully understand the safety guidelines of the tool you use. To become a Certified Operator of Simpson Strong-Tie gas- and powder-actuated tools, you must pass a test and receive a certified operator card. Test and Operator's Manual are included with each tool kit. Electronic copies may be obtained by downloading from the Simpson Strong-Tie website in your region.

To avoid serious injury or death:

a. Always make sure that the operators and bystanders wear safety glasses. Hearing and head protection is also recommended.
b. Always post warning signs within the area when gas- or powder-actuated tools are in use. Signs should state "Tool in Use."
c. Always store gas- and powder-actuated tools unloaded. Store tools and powder loads in a locked container out of reach of children.
d. Never place any part of your body over the front muzzle of the tool, even if no fastener is present. The fastener, pin or tool piston can cause serious injury or death in the event of accidental discharge.
e. Never attempt to bypass or circumvent any of the safety features on a gas- or powder-actuated tool.
f. Always keep the tool pointed in a safe direction.
g. Always keep your finger off the trigger.
h. Always keep the tool unloaded until ready to use.
i. Always hold the tool perpendicular (90°) to the fastening surface to prevent ricocheting fasteners. Use the spall guard whenever possible.
j. Never attempt to fasten into thin, brittle or very hard materials such as drywall, glass, tile or cast iron as these materials are inappropriate. Conduct a pre-punch test to determine base material adequacy.
k. Never attempt to fasten into soft material such as drywall or timber. Fastening through soft materials into appropriate base material may be allowed if the application is appropriate.
l. Never attempt to fasten to a spalled, cracked or uneven surface.
m. Re-driving of pins is not recommended.

ANCHORS

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