

Warranty Against Defects on Quik Drive® Tool

This Two-Year Warranty applies to all Quik Drive tools purchased in Australia and New Zealand ("Products") and must be read in conjunction with the General Notes, Terms and Conditions of Sale, and Corrosion Resistance information on strongtie.com.au. The benefits given under this Warranty are additional to any other rights and remedies that you may have under a law in relation to the Products. The relevant Simpson Strong-Tie entity listed at the bottom of this Warranty warrants the Products to the original purchaser to be free from substantial defects in material, manufacturing, and design for a 2 year term from date of purchase, if properly stored, maintained and used. This Warranty does not provide a remedy for normal wear and tear or any Product that was: (1) purchased other than from an authorised Simpson Strong-Tie Australia/Simpson Strong-Tie New Zealand dealer, retailer or distributor; (2) modified or altered; (3) used with any fasteners other than authentic Quik Drive fasteners; (4) improperly serviced; or (5) subject to negligence or excessive use, or any use not in accordance with the printed materials provided with the Product as determined by Simpson.

This Warranty does not cover:

Any screwdriver supplied with the Product that are manufactured by another company.

Fasteners or other consumables purchased with the Product.

The following statement is provided where this Product is supplied to a buyer who is a "consumer" under the Australian Consumer Law:

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or a refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Procedure in claiming under this warranty:

Identifying a warranty claim

1. Less than 2 years have elapsed from the original date of purchase and you have original receipt/tax invoice as proof of purchase.
2. The Product:
 - a. does not visually fit the description (i.e. does not resemble the packaging look or website images);
 - b. when opened for the first time has loose items (i.e. washers, springs, pins, etc.) within the case; or
 - c. no longer functions for its intended purposes (taking into account normal wear and tear).

Making a claim

1. If you believe the Product is damaged or defective, ensure the Product is no longer used for any purposes and safely store in original case and secure until repaired or replaced.
2. Please make immediate contact with your closest Simpson Strong-Tie region office to arrange shipment of the Product back to the address below.
3. A Simpson Strong-Tie ticket number will be issued to you.

Remedy

If Simpson Strong-Tie agrees that you have a valid claim under this warranty, depending on the circumstances, either a replacement tool will be sent to you or a Simpson Strong-Tie representative will ensure the Product is promptly repaired and returned to you.

In Australia:

Simpson Strong-Tie Australia Pty Limited
1/16 Kenoma Place,
Arndell Park, NSW 2148
Australia
Phone: 1300 STRONGTIE (1300 787664)
Fax: (61) 02 9831 2726
Email: sales.au@strongtie.com

In New Zealand:

Simpson Strong-Tie New Zealand Limited
52A Arrenway Drive,
Albany Auckland
New Zealand
Phone: (64) 09 477 4440
Fax: (64) 09 475 9724
Email: sales.nz@strongtie.com

IF YOU ARE NOT A "CONSUMER" UNDER THE AUSTRALIAN CONSUMER LAW, SIMPSON STRONG-TIE DISCLAIMS ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT WILL SIMPSON STRONG-TIE BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR SPECIAL DAMAGES OR DIRECT OR INDIRECT LOSS OF ANY KIND, INCLUDING BUT NOT LIMITED TO PROPERTY DAMAGE AND PERSONAL INJURY. OTHERWISE, TO THE EXTENT THAT THE PRODUCT IS NOT OF A KIND ORDINARILY ACQUIRED FOR PERSONAL, DOMESTIC OR HOUSEHOLD USE OR CONSUMPTION, SIMPSON'S ENTIRE LIABILITY IS LIMITED TO THE REPLACEMENT OF THE PRODUCT OR THE SUPPLY OF EQUIVALENT PRODUCT, THE REPAIR OF THE PRODUCT OR THE COST OF DOING SO.

Additional Quik Drive® Safety Warnings

- a. Keep work area clean and well lit.
- b. Do not operate Simpson Strong-Tie® Quik Drive® tools in dangerous environments. Do not expose tools to rain, or use them in damp or wet locations. Do not use Quik Drive tools in the presence of flammable liquids, dust or gases, as they can create sparks.
- c. Keep bystanders, children and visitors away while operating a Quik Drive Tool. Distractions can cause accidents and serious bodily injury.

Reduce Risk of Electrical-Related Accidents

- a. Guard against electrical shock. Prevent body contact with grounded surfaces.
- b. Never modify the Quik Drive tool power plug in any way. Always use a plug with a matching outlet. Use of proper, unmodified plugs and outlets reduces the risk of electric shock.
- c. Do not abuse the power cord. Never carry a Quik Drive tool by its cord or pull the cord to disconnect from an outlet or other receptacle. Keep cord away from heat, oil, sharp edges or moving parts. Replace damaged cord immediately. Damaged cords increase the risk of electrical shock.

- d. When operating a Quik Drive tool outside, use extension cords suitable for outdoor use.

Personal Safety

- a. Stay alert. Do not use a Quik Drive tool while tired or under the influence of drugs, alcohol or medication. Use common sense when operating the tool. Inattention while operating Quik Drive tools may result in serious bodily injury.
- b. Dress properly when using a Quik Drive tool. Do not wear loose clothing or jewellery. Keep your hair, clothing and gloves away from moving parts. Loose clothes, long hair or jewellery can be caught in moving parts and result in serious bodily injury.
- c. Be sure the power switch on a Quik Drive tool is in the off position before plugging in the tool. Do not carry tools with your finger on the switch.
- d. Keep proper footing and balance at all times.
- e. Always use safety equipment such as wearing protective glasses, dust masks, non-skid safety shoes, safety harnesses hard hats and/or earplugs.

Additional Quik Drive® Safety Warnings (cont.)

Quik Drive Tool Use and Care

- a. Do not force the Quik Drive tool. Use the correct tool for the application.
- b. When not in use, Quik Drive tools should be stored in a dry place and out of the reach of children and other untrained persons.
- c. Disconnect the plug from power source before making adjustments, changing accessories, or storing tool.
- d. Maintain Quik Drive tools with care. Follow instructions for lubricating and changing accessories.
- e. Regularly check for misalignment or binding of moving parts, and other conditions that may affect operation.
- f. Use only accessories recommended by Simpson Strong-Tie Company Inc.
- g. Any repairs to electric tools should be performed by qualified personnel. Use only authorised parts.

Additional CCN64 Safety Warnings

- a. Before operating the tool, all operators should study the Operators Manual to understand and follow the safety warnings and instructions. Keep the manual with the tool for future reference. If you have any questions, contact your Simpson Strong-Tie representative or distributor.
- b. The CCN64 is a nailer tool that is powered by pressurised air. It is activated by pressing the nose to the work piece. It is intended to be used to drive collated nails into pre-punched holes in metal hardware used in timber construction and to drive nails in timber-to-timber framing connections. Only collated nails shall be used with this tool and the nail size, collation angle and material must meet the specifications of this manual.
- c. Please note that additional safety measures may be required because of your particular application.
- d. This tool uses 3/8 inch N.P.T. male fitting. The fitting must relieve air pressure when disconnected from the air supply.

Personal Safety

- e. Eye protection that conforms to AS/NZ specifications and provides protection against flying debris from front and sides shall always be worn by the operator and others in the work area.
- f. The employer and/or operator are responsible to ensure proper eye protection is worn. Non-side-shielded eye protection and face shields do not provide adequate protection.
- g. Hearing protection that conforms to AS/NZ specifications may be required in some environments that include exposure to noise that could affect hearing damage.
- h. Head and foot protection that conforms to AS/NZ specifications may be required in some work environments with head and foot hazards. Dress appropriately.

WARNING

- i. Know and understand the trigger system.
- j. Operate the tool only on the workpiece and at 90 degrees to the workpiece.
- k. Never assume the tool is empty.
- l. Never engage in horseplay with the tool.
- m. Carry the tool by the handle. Do not lift by hose.
- n. Never leave the tool unattended with the air supply connected.
- o. Do not use the tool as a hammer.
- p. Do not continue to use the tool if it leaks air or fails to function properly.
- q. Use clean, dry, regulated compressed air.
- r. Do not use the tool while tired, after having consumed drugs or alcohol, or while under the influence of medication.
- s. Do not over reach. Keep proper footing and balance at all times.

Loading and Unloading the Tool

- t. Use only nails recommended by Simpson Strong-Tie for use in the CCN64 tool.
- u. Disconnect air supply before loading and unloading.
- v. Always handle the tool with care.
- w. Never point the tool at yourself or another person.
- x. Do not depress the nose/magazine of the tool or it will activate driving.

Tool Operation

- y. Keep hands and body away from discharge area of the tool.
- z. Never point the tool at yourself or others.
- aa. Use at 90-degree angle on clean dry surfaces.
- ab. The tool is activated by compressing the nose/magazine on any surface or material.
- ac. The tool drives continuously while the nose/magazine is compressed.
- ad. The tool has no depth of drive adjustment and will overdrive unless stopped by lifting the nose from the workpiece surface.
- ae. Be careful when fastening into dense woods and wood products.
- af. Be careful to not drive a nail onto another nail.
- ag. When installing metal hardware, be careful that the nail point is in the pre-punched hole.
- ah. If the tool becomes jammed and all nails cannot be removed from the tool, the tool shall be removed from service.

Maintaining the Tool

- ai. Use care when evaluating tools.
- aj. Always disconnect the tool from air pressure before performing maintenance.
- ak. Use only Simpson Strong-Tie recommended fasteners and parts.
- al. Clean the tool after each day of use or after driving 1,000 fasteners.
- am. Lubricate with 3 drops of acid-free lubricant at the start of each work day or after driving 1,000 fasteners.
- an. Clean by wiping: magazine, nail feeder, blade guide and piston.
- ao. Check wear parts when cleaning: magazine and bleed guide.
- ap. The tool shall be stored in a warm dry location that is out of the reach of children.

Air Supply and Connections

- aq. For air powered tools to operate at their best, the air supply system must be properly installed and maintained. See your air supply equipment manual for operating, maintenance, and safety instructions.
- ar. DO NOT OPERATE at air pressures in excess of 6.2 bar (90 psi)
- as. Air pressure at the tool shall never exceed 8.3 bar (120 psi). EXPLOSION HAZARD!
- at. Do not use oxygen, combustible gases, or bottled gases as power source for this tool. EXPLOSION HAZARD!
- au. Air connector on the tool must not hold pressure when air supply is disconnected.
- av. Use an air hose with diameter 10 mm (3/8 inch).
- aw. Do not depress nose/magazine while connected to air supply or tool will activate.
- ax. Always disconnect air supply before:
 - Making adjustments;
 - When tool is not in use;
 - When performing maintenance
 - When moving to new work area.

General Notes

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

- a. Simpson Strong-Tie Company Inc. reserves the right to change specifications, designs and models without notice or liability for such changes.
- b. Do not exceed published loads, doing so could jeopardise the connection.
- c. A fastener that splits the timber will not take the design load. Evaluate splits to determine if the connection will perform as required. Dry timber may split easily and should be evaluated as required. If timber tends to split consider pre-boring holes with diameters specified in the 2015 Edition National Design Specification (NDS) sections 12.1.5 for screws and 12.1.6 for nails.
- d. Fasteners may break if driven into hard materials or if countersunk below the surface of the substrate fastened.
- e. Do not overdrive fasteners. Overdriven fasteners may have a reduction in shear and pull-through capacity.
- f. Use products only in accordance with all instructions.
- g. All specified fasteners must be installed according to the instructions in this catalogue.
- h. There are many choices of fasteners, tools and other products. It is often difficult to determine which type of product is best suited for your application. In some cases, there may be more than one type of product that will work well. The information in this catalogue is intended to guide the Designer toward the product best suited for the specific application, use and environment. The choice of which product to use should be made by a qualified Designer.
- i. All connected members and related elements shall be designed by the Designer.
- j. Select fasteners of a type, size, length, thread, head, coating, material, point and other characteristics suitable for your application, use and environment. Incorrect fastener selection may cause the connection to fail.
- k. If using a fastener from this catalogue with any other Simpson Strong-Tie product, consult the appropriate Simpson Strong-Tie catalogue or Simpson Strong-Tie website for detailed information concerning the other product.
- l. Only use fasteners for their intended purpose as described in this publication. Connection failures can result from inappropriate substitution.
- m. Test drive fasteners to assure fasteners install correctly.
- n. The term "Designer" used throughout this catalogue is intended to mean a licensed/certified building design professional, a licensed professional engineer or licensed architect.
- o. Follow material manufacturer's installation instructions and fastener recommendations.
- p. Unless otherwise noted, dimensions are in inches, loads are in pounds and shear loads are applied perpendicular to edge.
- q. Unless otherwise noted, nail "penny size" does not imply specific diameters or load capacities. Design standards must be used in conjunction with fastener material, diameter and length to determine acceptable uses.
- r. Use Quik Drive® tools only with authentic Quik Drive fasteners. Other fasteners will void the warranty and may cause the tool to malfunction and become damaged.
- s. If a Quik Drive product is compatible with a specified tool, do not use the product with any other tool.
- t. Pneumatically driven fasteners may deflect and injure the operator or others. Follow the tool manufacturer's operating instructions and use appropriate safety equipment.
- u. Choose the proper tool to suit the fastener and applications.
- v. Use proper safety equipment and follow all safety instructions.
- w. Always wear protective eyewear.
- x. With the use of any power or pneumatic tools, follow manufacturer's safety instructions.
- y. Dissimilar metal combinations should be carefully assessed and avoided if possible.
- z. All carbon steel based fasteners have the potential to corrode and rust.
- aa. Some hardened fasteners may have premature failure if exposed to moisture. These fasteners are recommended to be used in interior dry conditions.
- ab. Select a fastener only after reading the corrosion information on pages 20–26 of this catalogue.
- ac. Be aware of special conditions that may increase corrosion risk and select product accordingly.
- ad. Screws made from austenitic stainless steel are generally softer and have less torsional strength than screws made from carbon steel. Simpson Strong-Tie does not assume liability for breakage or damage due to screw breakage during or after installation. Predrilling may be necessary in some case. For best results, drive at 2,500 rpm or less.
- ae. This catalogue includes all information available as of the effective date of publication. Please consult Simpson Strong-Tie website for current information.

Fastening Timber Decks to Timber and Steel Framing



Fastening timber and composite decking to either timber or steel joists can be a challenge. There are a number of potential issues with timber and composite decking materials that need consideration when selecting an appropriate fastener.

Moisture effect on timber

Timber shrinks and swells as it loses and gains moisture, respectively. In timber decking, virtually all of the moisture-related dimensional change occurs in the cross section of the board (thickness and width), while at the same time there is a negligible change on length. Timber shrinkage and swelling occurs in the moisture range between "fibre saturation point" and zero moisture content. Above the fibre saturation point, there is no change in dimension regardless of moisture gain or loss. The "fibre saturation point" is the moisture condition where the timber cell walls are fully saturated with water, and there is no free water in the cell lumen. This condition is between 25% and 30% moisture for most timber species. In addition to shrinkage and swelling in the cross section, timber can warp, twist, and bow as it gains and loses moisture between fibre saturation point and zero moisture. However, it does not change dimension or shape as the moisture content fluctuates above the fibre saturation point.

The moisture content of a timber deck in service depends on the season of the year, local environment and exposure, and the deck board manufacturing. A timber deck could be as low as 6% moisture content in the summer in some Australian locations, and it might exceed 20% at other times of the year. Timber that is sheltered from rain will only shrink and swell with relative humidity because it is not exposed to liquid water. This means that along the coast in northern Australia, the moisture content in timber decking is likely relatively high and has a narrower moisture content range than timber located inland in Queensland because the range of relative humidity and rain falls are quite different. The moisture content of timber decking in central Australia, for example, Alice Springs, is probably low all of the time.

Some timber decking and timber framing products are treated with preservative chemicals. The types of chemicals used for exterior timber decking and framing are carried in water, and the result is that chemically treated timber probably has an elevated moisture content when it goes to the timber yard or it might be kiln dried to remove the excess moisture after treatment. Preservative chemicals minimally affect the shrinkage and swelling characteristics of the timber.

Fastener selection

Fastening timber and composite deck boards to steel or timber framing involves several significant challenges. When fastening timber decking to steel framing the fastener has to drive through the timber and steel. Also, for the fastener to perform in service, the screw needs to have corrosion resistance and ductility. This means that the fastener needs to have an appropriate metallurgy and protection so that it can resist corrosion, stress corrosion, hydrogen-assisted stress corrosion, and fatigue. These requirements conflict with the properties that make the screw drive through timber and steel.

The best result in fastening timber decking to timber joists, is achieved with decking screws or stainless steel fasteners. This is recommended firstly to deal with corrosion issues that may occur due to the treated timber. Secondly, the moisture content in the timber will fluctuate and cause the fasteners to be loaded by dimensional changes due to shrinkage and swelling. We recommend that the best long-term solution for timber-to-timber deck fastening is 300-series stainless steel screws which have the ductility to allow for shrinkage and expansion of the timber and provide good corrosion resistance. Use 304 or 305 stainless steel screws away from marine environments, and use 316 stainless steel screws near the ocean.

The best fasteners for fixing timber and composite deck materials to steel framing are bi-metal screws or specially designed composite decking screws. The bi-metal screws have a hardened drill point and leading threads that are fused to stainless steel shanks and heads. This type of screw can drill through soft and hard materials, form threads in steel, and provide corrosion resistance and ductility, which contribute to long lasting deck surfaces. The screws must be long enough that the drill point and the first three threads protrude through the steel framing.

If you require further information on the appropriate fastener for your decking project please contact your local Simpson Strong-Tie representative.

Understanding the Corrosion Issue

Many environments and materials can cause corrosion including ocean salt air, fire-retardants, fumes, fertilisers, preservative-treated timber, de-icing salts, dissimilar metals and more. Steel fasteners could corrode and lose load-carrying capacity when installed in corrosive environments or when installed in contact with corrosive materials.

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

It is common to see some corrosion in outdoor applications. Even stainless steel can corrode. The presence of some corrosion does not mean that load capacity has been affected or that failure is imminent. If significant corrosion is apparent or suspected, then the timber, fasteners and connectors should be inspected by a qualified engineer or qualified inspector. Replacement of affected components may be appropriate.

Some timber-preservative chemicals and fire retardant chemicals and retentions pose increased corrosion potential and are more corrosive to steel connectors and fasteners than others. Testing by Simpson Strong-Tie has shown that Alkaline Copper Quaternary-Type D (ACQ-Type D) is more corrosive than Copper Azole Type C, Micronised Copper Azole, and Chromated Copper Arsenate-Type C (CCA-C). At the same time, others have shown that the inorganic boron treatment chemicals, specifically SBX-DOT, is less corrosive than CCA-C.

Due to the many different chemical treatment formulations, chemical retention levels, moisture conditions and regional formulation variants, selection of fasteners has become a complex task. We have attempted to provide basic knowledge on the subject here, but it is important to fully educate yourself by reviewing our technical bulletins on the topic (strongtie.com/info) and also by reviewing information, literature and evaluation reports published by others.

Galvanic Corrosion — Galvanic corrosion occurs when two electrochemically dissimilar metals contact each other in the presence of an electrolyte (such as water) that acts as a conductive path for metal ions to move from the more anodic to the more cathodic metal. In the galvanic couple, the more anodic metal will corrode preferentially. The Galvanic Series of Metals table provides a qualitative guide to the potential for two metals to interact galvanically. Metals in the same group (see table) have similar electrochemical potentials. The farther the metals are apart on the table, the greater the difference in electrochemical potential, and the more rapidly galvanic corrosion will occur. Corrosion also increases with increasing conductivity of the electrolyte.

Good detailing practice, including the following, can help reduce the possibility of galvanic corrosion of fasteners:

- Use fasteners and metals with similar electrochemical properties
- Separate dissimilar metals with insulating materials
- Ensure that the fastener is the cathode when dissimilar metals are present
- Prevent exposure to and pooling of electrolytes

Galvanic Series of Metals

Corroded End (Anode)
Magnesium Magnesium alloys Zinc
Aluminum 1100 Cadmium Aluminum 2024-T4 Iron and Steel
Lead Tin Nickel (active) Inconel Ni-Cr alloy (active) Hastelloy alloy C (active)
Brasses Copper Cu-Ni alloys Monel
Nickel (passive)
304 stainless steel (passive) 316 stainless steel (passive) Hastelloy alloy C (passive)
Silver Titanium Graphite Gold Platinum
Protected End (Cathode)

Hydrogen-Assisted Stress-Corrosion Cracking

Some hardened fasteners may experience premature failure if exposed to moisture as a result of hydrogen-assisted stress-corrosion cracking. These fasteners are recommended specifically for use in dry, interior locations.

Integration of Treatment Hazard Categories and Atmospheric Exposure Conditions

The corrosion guidelines in standards, such as ISO 9223, AS 4791, AS 4534 describe corrosion hazard as a function of atmospheric conditions and proximity to ocean salinity. Hazard classification for timber durability based on moisture and ground contact is described in AS 1684.2. In building construction, chemical treatment is used to prevent timber deterioration and many timber treatment chemicals have a pronounced corrosion effect that also has to be considered in the selection of metal hardware and fasteners. The standard AS 1684.4-2010 instructs that the level of corrosion protection should include consideration of weather exposure, timber treatment, and moisture and presence of salt. However, the standard provides no further guidance to assist the designer with this task. Simpson Strong-Tie has attempted to integrate the information

related to atmospheric corrosion hazard, hazard classification for durability of timber with the known corrosion effects of timber treatment chemicals and the AS and NZ building codes. See tables on page 23 for recommendations based on the integration of timber treatment chemicals and atmospheric corrosion zones.

A word about timber and its corrosion effects is important. Some timbers are not corrosive to metals. For example, Radiata Pine and Douglas-fir are known to have no significant corrosion effects on metals. However, some tropical and semi-tropical hardwoods are acidic or have naturally occurring compounds that are corrosive to metals. The selection of fasteners and metal hardware should be influenced by this condition. If uncertain about the corrosion effect of the timber being used, select HDG or stainless steel.

Simpson Strong-Tie General Recommendations

Simpson Strong-Tie has evaluated the AU/NZ Hazard Categories and atmospheric corrosion zones and developed from that evaluation an integrated set of corrosion resistance recommendations (see Integrated Corrosion Resistance Recommendations table on page 23). The recommendations address the coating systems and materials used by Simpson Strong-Tie for connector and fastener products.

Dry service (or damp service) environments lead to timber moisture contents less than or equal to 19%. The corrosion potential, even in chemically treated timber, is reduced in these conditions. At the same time, outdoor environments are generally more corrosive to steel, either because the moisture exposure is elevated (greater than 19%), the treatment chemical retention level is higher than for interior service, or the metal is directly exposed to the weather and airborne agents.

Types 316/305/304 stainless steel, copper, silicon bronze and hot-dip galvanised are the most effective protection against corrosion risk. Type 316 is the best choice for salt marine and chloride containing environments, regardless of treatment chemicals or timber species. If you choose to use hot-dip galvanised, mechanically galvanised, double-barrier coated or Quik Guard coated fasteners on outdoor projects (e.g. a deck), you should periodically inspect the fasteners or have a professional inspection performed and regular maintenance is

a good practice. See the Corrosion Resistance Classifications Table for the Simpson Strong-Tie assessment of the corrosion resistance associated with materials and coatings and an appropriate level of corrosion resistance for various environments.

Simpson Strong-Tie does not recommend painting stainless steel fasteners or hardware. The reason behind this recommendation is that sometimes painting can facilitate corrosion. Stainless steel is "stainless" because it forms a protective chromium oxide film on the surface by passive oxidation with air. The paint film on the stainless steel surface may be imperfect or it can be injured during service, and in either case the metal may be exposed. Microscopic sized film imperfections and scratches facilitate collection of dirt and water that can be stagnant and degrade or block the passive formation of the protective chromium oxide film. When this happens crevice corrosion can initiate. Crevice corrosion eventually becomes visible as a brown stain or red rust. This is the reason that painting usually does not improve corrosion resistance of stainless steel.

Due to the many variables involved, Simpson Strong-Tie cannot provide estimates of service life of connectors and fasteners. We suggest that all users and specifiers obtain recommendations of corrosion from the treated timber supplier for the type of timber used. As long as Simpson Strong-Tie recommendations are followed, Simpson Strong-Tie stands behind its product performance, and our standard warranty applies.

Guidelines for Selecting Corrosion-Resistant Fasteners

Evaluate the Application

Consider the importance of the connection.

Evaluate the Integrated Environment

Consider these moisture and treatment integrated environments.

Dry service: Generally INTERNAL applications include roof and wall cavities, raised floor applications in enclosed buildings that have been designed to prevent condensation and exposure to sources of moisture.

Wet Service: Generally EXTERNAL construction in conditions other than elevated service. These include applications that are external sheltered and exposed and general-use ground contact.

Elevated Service: Includes air pollutants, fertilisers, soil, some preservative treated timber, industrial fumes, acid rain, and other corrosive elements in dry and wet service environments.

Marine/Coastal/Tropical: Marine environments that include direct exposure and exterior sheltered exposure to ocean salinity, salt water splash, and elevated moisture due to air or ground moisture.

Uncertain: Unknown exposure, materials, treatment chemicals, or corrosion effects of timber.

Treatment Chemicals: See AS 1604 and Timber Preservers Association of Australia and other related organisations for treatment practices and chemicals. The preservative-treated timber supplier should provide all of the pertinent information about the treated timber being used. The information should include timber treatment chemical and chemical retention. See related chemical product literature for corrosion effects of treatment chemicals and fastener corrosion resistance recommendations.

Use the Simpson Strong-Tie® Corrosion Classification Table

If the treatment chemical information is incomplete, Simpson Strong-Tie recommends the use of a 300 series stainless steel product. Also if the treatment chemical is not shown in the Corrosion Classification Table, then Simpson Strong-Tie has not evaluated it and cannot make any recommendations other than the use of coatings and materials in the Severe category. Manufacturers may independently provide test results of other product information; Simpson Strong-Tie expresses no opinion regarding such information.

Interior Dry



Wet Service



Ocean/Water Front



Integrated Corrosion Resistance Recommendations

Integration of treatment hazard and atmospheric corrosion hazard for the purposes of corrosion protection determination for fasteners and metal hardware in timber-frame buildings. References are AS 1604, ISO 9223, AS 1684.2 (appendix B), AS 1684.4, AS 4534 (appendix F), and NZ3604.

Integrated Environment	Corrosion Classification			
	AS Treatments	AS Atmospheric	NZ Zones	ISO 9223
Dry	H1, H2	A, B	B, C	C1
Wet	H3, H4	F	B, C, D	C2, C3
Elevated	—	C, E-I	B, C, D	C4
Marine/Coastal/Tropical	H5, H6	D, F, E-M	D	C4, C5
Uncertain	All	All	All	All

Corrosion Resistance Classifications Table

Integrated Environment	Material To Be Fastened					
	Untreated timber or other material	Preservative-Treated Timber				
		Hazard Class H1, H2	Hazard Class H3	Hazard Class H4, H5, H6	Other Treatments or Uncertain	FRT Timber
Dry Service	Low	Low	N/A	N/A	High	Medium
Wet Service	Medium	N/A	Medium	High	High	High
Elevated Service	High	N/A	High	Severe	Severe	High
Uncertain	High	High	Severe	Severe	Severe	High
Ocean/Water Front	Severe	N/A	Severe	Severe	Severe	Severe

- These are general guidelines that may not consider all application criteria. Refer to product specific information for additional guidance.
- Treatments typical of Hazard Classes H1 and H2 are based on inorganic boron or are preservatives in light organic solvents (LOSP).
- Treatments typical of Hazard Class H3 is ACQ-D (retention 6.4 kg/m³), Copper Azole-B (retention 3.3 kg/m³), Copper Azole-C (retention 2.4 kg/m³).
- Treatments for sawn products typical of Hazard Classes H4, H5, and H6 are CCA, ACZA, ACQ (retention > 6.4 kg/m³), and creosote.
- Fire-retardant treated timber may have specific corrosion resistance requirements. See chemical manufacturer guidelines.
- Type 316/305/304 stainless steels are recommended where preservative treated timber is used in ground contact.
- Testing by Simpson Strong-Tie following ICC-ES AC208 has shown that mechanical galvanisation, Quik Guard coating, and Double Barrier coating will provide corrosion resistance equivalent to hot-dip galvanisation in contact with chemically treated timber in dry service and wet service exposures (Hazard Classes H1-H3) and will perform adequately subject to regular maintenance and periodic inspection.
- Mechanical galvanisations C3 and N2000 should not be used in conditions that would be more corrosive than Hazard Class H3 (external, above ground rapid water run off).
- If uncertain about Hazard Class, treatment chemical, or environment, use Type 316/305/304 stainless steels, silicon bronze, or copper.
- Type 316 stainless steel, silicon bronze, and copper fasteners are the best recommendation for ocean front and chloride-containing environments. Hot-dipped galvanised fasteners, Class C protection can also be used as an alternate for some applications in environments with ocean air and/or elevated moisture content.

Simpson Strong-Tie® fasteners feature a wide range of materials and coatings designed to meet specific performance criteria. It is important to select a material and/or coating that is suitable for the intended application and environment based upon factors such as corrosion resistance and mechanical properties of the material.

Simpson Strong-Tie Company Inc. welcomes the opportunity to provide assistance in fastener selection. Please call your Simpson Strong-Tie Representative in the event that technical support is needed.



Clear Zinc

Electroplated Clear Zinc is applied in accordance with ASTM F1941. In the ASTM B117 salt spray test, Clear Zinc provides 12 to 24 hours of corrosion protection before the first appearance of red rust depending on coating thickness.

Electrocoating (E-Coat®)

Electrocoat utilizes electrical current to deposit the coating material onto the fastener. After application, the coating is oven cured. Electrocoat is intended for dry, low corrosion applications.

Grey Phosphate

Grey phosphate provides a minimum level of corrosion resistance and is intended for dry, low corrosion applications.

Black Phosphate

Black phosphate provides a minimum level of corrosion resistance and is intended for dry, low corrosion applications.

Yellow Zinc

Electroplated zinc applied in accordance with ASTM F1941. In the ASTM B117 salt spray test, Yellow Zinc provides at least 24 hours of corrosion protection before the first appearance of red rust.

Class 1 Zinc Electroplate

Electroplated coating that is zinc with a minimum of 98% zinc and a minimum thickness of 4µm in accordance with Australian Standard AS3566.2.

Type 410 Stainless Steel

Type 410 stainless steel is a low-carbon martensitic grade of stainless steel that can be hardened and is inherently magnetic. This material provides corrosion resistance in mild atmospheres and many mild chemical environments.

Coated Zinc

This coating system consists of an electroplated zinc base layer with an E-Coat® top coat. It provides corrosion resistance that is adequate for low corrosion environments. In ASTM B117 salt spray testing at 500 hours of exposure, fasteners with this coating have an average red rust of less than 5%.

General Note about Salt Spray Testing

Salt spray testing in accordance with ASTM B117 is not intended to represent real-world corrosion performance of fastener coatings. It should only be used for comparative evaluation between like products. Many variables may affect the outcome of the salt spray test such as base material, fastener features, coating and the material where it is installed.



Medium Level of Corrosion Resistance

Corrosion Resistance Level
MEDIUM

Quik Guard® Coating

Quik Guard is a proprietary coating that consists of an electroplated zinc base layer and a system of organic top coats. It provides corrosion resistance equivalent to hot-dip galvanisation (ASTM A153, Class D) in some exposures. In ASTM B117 salt spray testing at 1000 hours of exposure, fasteners with the Quik Guard coating have average red rust less than 2%.

Double-Barrier Coating

The Simpson Strong-Tie® Double Barrier coating is a proprietary coating that provides a level of corrosion resistance that is equivalent to hot-dip galvanisation (ASTM A153, Class D) in most non-marine environments.

Class D Hot-Dip Galvanised, ASTM A153

The Class D hot-dip galvanisation is a coating that meets the requirements of ASTM A153, Class D, which is a minimum average of 1.0 oz/ft² [305 g/m²] of zinc applied by a hot-dip process. Hot-dip galvanised fasteners are compliant with the 2012 and 2015 IBC and IRC.

Class 55 Mechanically Galvanised, ASTM B695

This is a mechanically-applied zinc coating that meets the requirements of ASTM B695, Class 55, which is a minimum average thickness of 55 microns with a supplementary overcoat. Screws with a Class 55 coating meet the requirements for use in preservative-treated and fire-retardant-treated timber as stated in the 2012 and 2015 IRC.

N2000® Mechanically Galvanised

This is a mechanically-applied proprietary zinc coating with a supplementary overcoat. In the ASTM B117 salt spray test at 1000 hours of exposure, fasteners with the N2000 coating exhibit average red rust less than 15%.

C-3 Mechanically Galvanised

A mechanically-applied coating that is zinc with a minimum of 20% tin in accordance with Australian Standard AS3566.2. In the ASTM B117 salt spray test at 1,000 hours of exposure, fasteners with the C3 coating exhibit average red rust of less than 2%.



High Level of Corrosion Resistance

Corrosion Resistance Level
HIGH

Types 304 and 305 Stainless Steel

Types 304 and 305 stainless steels are nickel-chromium austenitic grades of stainless steel. Types 304 and 305 stainless steels are not hardened by heat treatment and are inherently non-magnetic.

They provide very good corrosion resistance and are suitable for use in many corrosive environments. Fasteners made from Types 304 and 305 stainless steels are compliant with the 2012 and 2015 IBC and IRC.

Passivation of Stainless-Steel Fasteners

Stainless steels are designed to naturally self-passivate by forming a chromium oxide layer. Corrosion resistance of some stainless-steel fasteners is enhanced by a post-fabrication passivation process. The passivation process uses an acid bath to strip free iron from the surface and an oxidiser to force conversion of the surface chromium to the oxide form.



Type 316 Stainless Steel

Type 316 stainless steel is a nickel-chromium austenitic grade of stainless steel with 2–3% Molybdenum. Type 316 stainless steel is not hardened by heat treatment and is inherently non-magnetic. It provides a level of corrosion protection suitable for severe environments, especially environments with chlorides. Type 316 stainless steel fasteners are compliant with the 2012 and 2015 IBC and IRC.

Class C, Hot-Dip Galvanised, ASTM A153

Class C hot-dip galvanisation is a coating that meets the requirements of ASTM A153, Class C, which is a minimum average of 1.25 oz/ft² [381 g/m²] of zinc applied by a hot-dip process. Hot-dip galvanised fasteners are compliant with the 2012 and 2015 IBC and IRC.

Copper

Copper wire used for the manufacture of fasteners is in compliance with the material specifications of ASTM F1667. Copper fasteners meet the requirements for use in preservative-treated and fire-retardant-treated timber as stated in the 2012 and 2015 IBC and IRC. Compatibility with proprietary timber treatment chemicals should be verified against applicable evaluation reports.

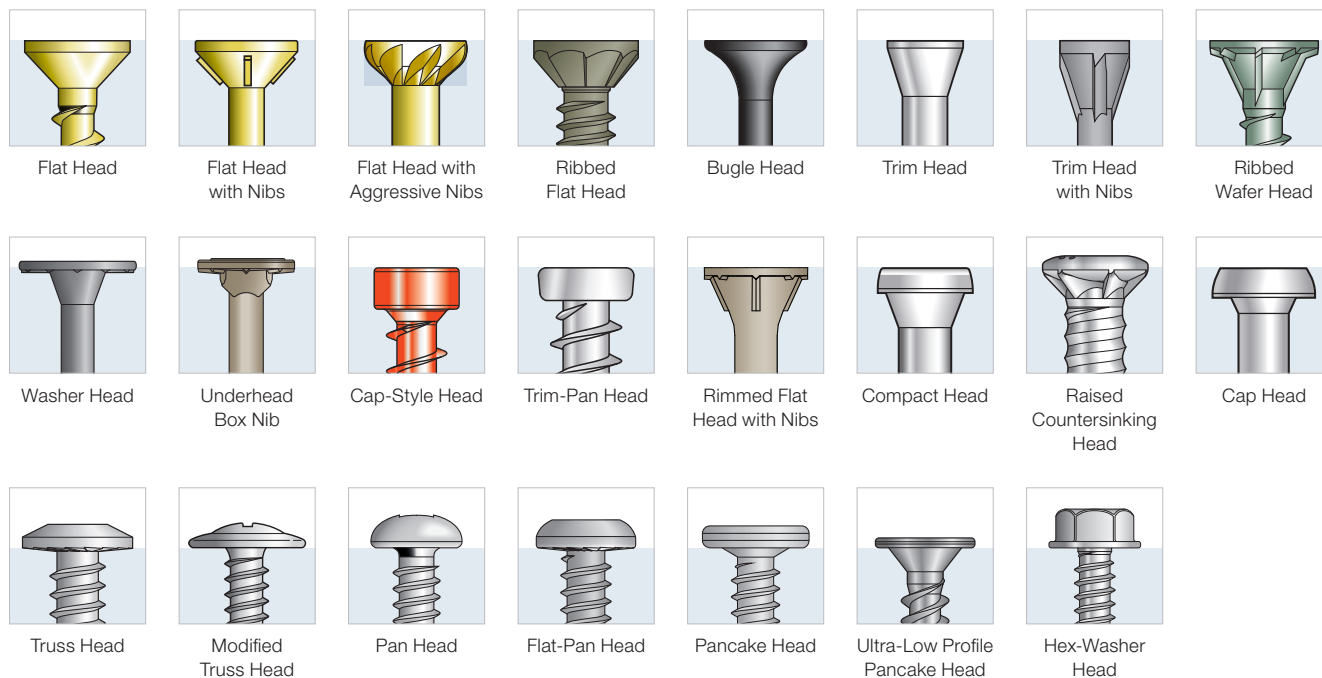
Silicon Bronze

Silicon bronze is a copper alloy with silicon as the alloying element. Silicon bronze fasteners meet the requirements for use in preservative-treated and fire-retardant treated timber as stated in the 2012 and 2015 IBC and IRC. Compatibility with proprietary timber treatment chemicals should be verified against applicable evaluation reports.

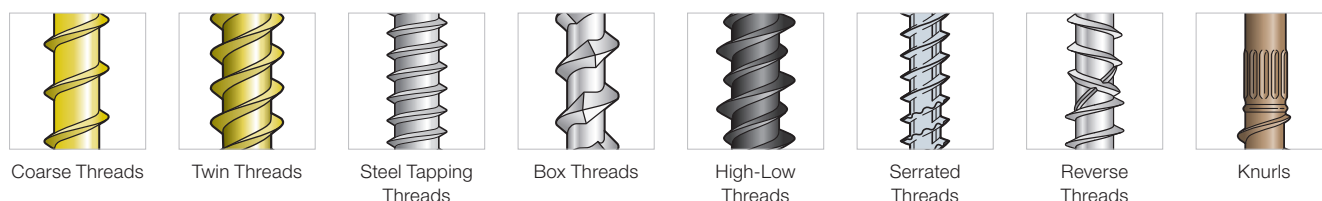
Passivation of Stainless-Steel Fasteners

Stainless steels are designed to naturally self-passivate by forming a chromium oxide layer. Corrosion resistance of some stainless-steel fasteners is enhanced by a post-fabrication passivation process. The passivation process uses an acid bath to strip free iron from the surface and an oxidiser to force conversion of the surface chromium to the oxide form.

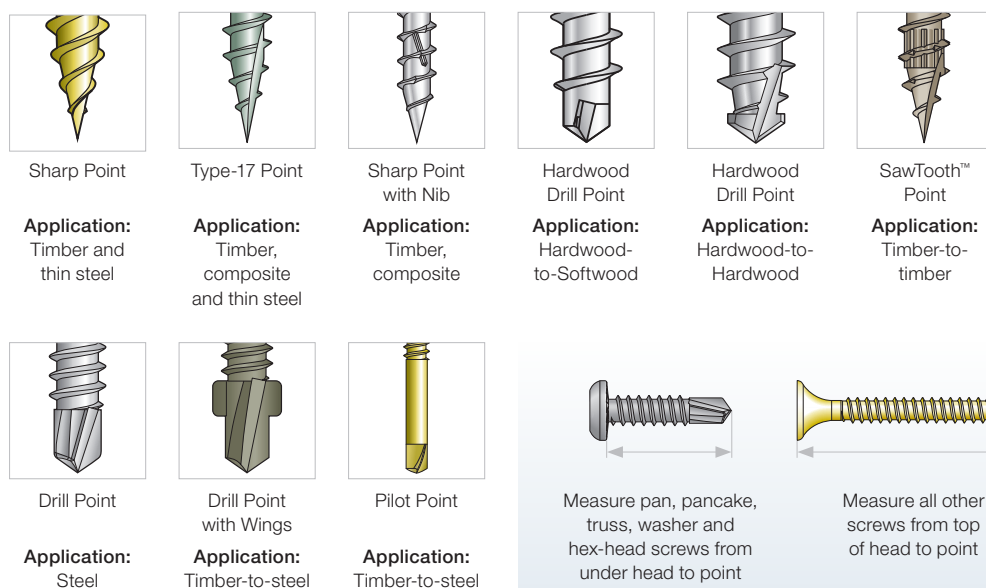
Head Styles



Thread Styles



Point Styles



Measure pan, pancake, truss, washer and hex-head screws from under head to point

Measure all other screws from top of head to point

The screw size or diameter is measured from the outmost height of the thread

How Self-Drilling Works

Application

As their name implies, self-drilling screws operate on the same principles as drill bits and other cutting tools. For any cutting tool, performance is governed by cutting speed, feed rate, depth of cut and the work material itself. Then, installation performance of self-drilling screws can be linked to the basic cutting tool parameters where suggested optimal parameter values are listed by nominal screw size in the table.

Optimal Cutting Conditions by Screw Size

Screw Size	Major Diameter (mm)	RPM*	Applied Force* (N)	Work Material Hardness*
#6	3.5	2,200	355	20 Rockwell "C"-scale
#8	4.2	1,900	414	
#10	4.9	1,600	463	
#12	5.5	1,400	516	
#14	6	1,200	583	

* Suggested combined maximum values. Individual values may be increased if other, associated variables are decreased proportionally. Stated speeds may require a variable-speed screwdriver motor and a partial trigger-pull.

Point Geometry is the designed shape of the screw's drill point and not directly adjustable by the user.

RPM is the speed at which the driver motor runs while the screw is installed. This is often adjustable using a variable pull trigger or different driver motor.

Applied Force is a measure of the user applied force as the screw is installed. More force is not necessarily better.

Work Material Hardness can be viewed as a material's resistance to drilling or cutting. In most instances, the harder the work material, the more difficult it is to cut. Depending on the application, this may be outside the user's control.

Special Considerations

Drill-Point Material is generally plain carbon steel which is less stable at high temperatures than equivalent high-speed steel (HSS) drill-bits. To reduce wear on the drill point, fasten using a drill motor rather than an impact driver or hammer drill.

High Temperature Stability affects how quickly the drill point fails due to the heat generated by the drilling operation. Refer to the troubleshooting guide at the end of this section for some visual examples.

Drilling Temperature is directly proportional to motor RPM, applied force, and work material hardness. As each value increases, so does the heat generated by the drilling operation.

Reducing Applied Force can increase durability and allow the drill point to penetrate thicker materials (i.e., remove more material before failing due to heat buildup).

Reducing Motor RPM can improve performance in harder materials by allowing the user to push harder during the drilling process and extending the life of the drill point.

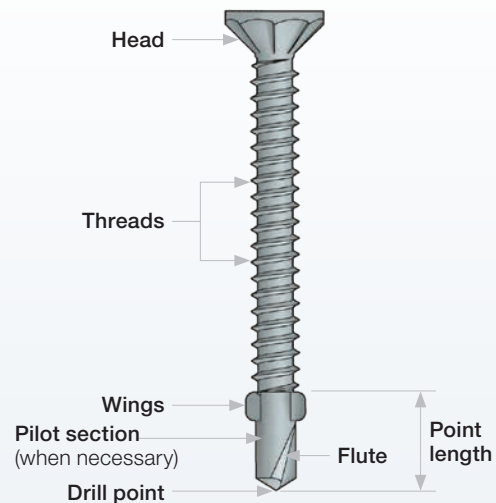
Design Features

When selecting a self-drilling screw, consider the material thicknesses and types of materials to be joined. Following are some key design features to look for when selecting suitable fasteners.

Drill Flutes allow drilled material to exit the hole. Completely embedded flutes can no longer remove these chips, which contain approximately 80% of the heat created by the drilling process. A buildup of this material can cause the point to over-heat and fail.

Point Length determines the material thickness which the screw can reliably penetrate. The unthreaded portion of the point, (pilot section) must be able to completely drill through the material before the threads engage. If the threads engage before drilling is complete, the fastener can bind and break.

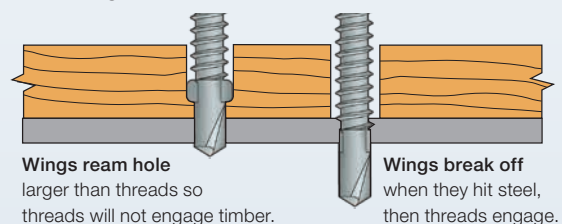
Point Wings are used on some screws that fasten thicker materials, such as timber, to steel. The wings enlarge the hole in the fastened material, allowing the threads to pass through without contacting the fastened material. This added clearance prevents separation of the fastened material from the base steel (known as "jacking"). The wings will break away on contact with the steel before the threads engage in the steel.



Remember:

Drill point must be harder than material being drilled.

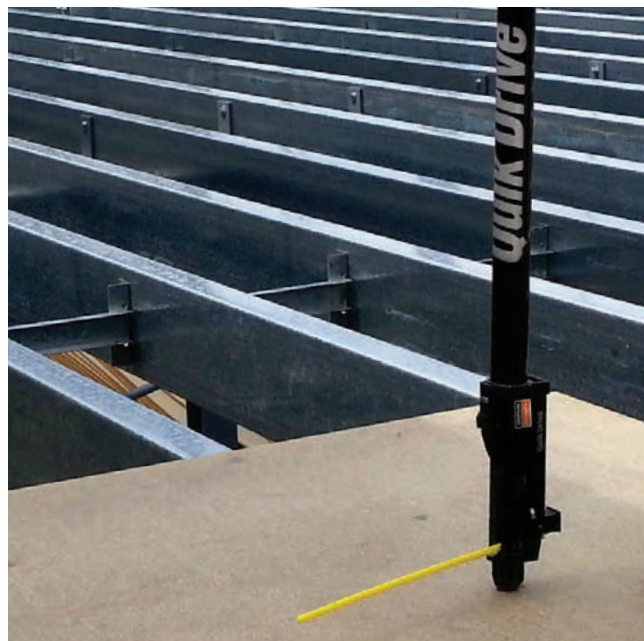
Drill point with wings








Work Material Thickness by Screw

Drill Point Size	Screw Size	Maximum Material Thickness ¹ (mm)
#2	#6	2.5
	#8	2.5
	#10	2.8
#3	#7	3.2
	#8	3.6
	#10	4.5
	#12	5.4
	#14	5.6
#4	#12	6.5
	#14	6.5
#5	#12	12.5

1. Total thickness of all steel, including any spacing between layers.
2. Drill and tap capacities may vary.



Self-Drilling Screw Troubleshooting Guide

Failure Mode	Likely Cause(s)	Suggested Action
Split at point (web)	 Excessive force (feed) applied while drilling	Reduce application force
Outer corners worn or melted	 Drill RPM (cutting speed) too high	Use slower motor or partial trigger pull
Cutting edges chipping or breaking	 Excessive force (feed) applied while drilling	Reduce application force
Point melted or diameter significantly reduced	 <ul style="list-style-type: none"> Work material too hard Insufficient chip clearance Excessive force (feed) applied while drilling 	<ul style="list-style-type: none"> Confirm work material specifications Choose screw with longer pilot section Reduce application force
Screw spins without drilling a hole	 <ul style="list-style-type: none"> Drill motor set on reverse Work material too hard Drill point blunted by handling 	<ul style="list-style-type: none"> Check motor direction Confirm work material specifications Inspect unused drill points for possible damage (from handling)