Anchoring and Fastening Systems

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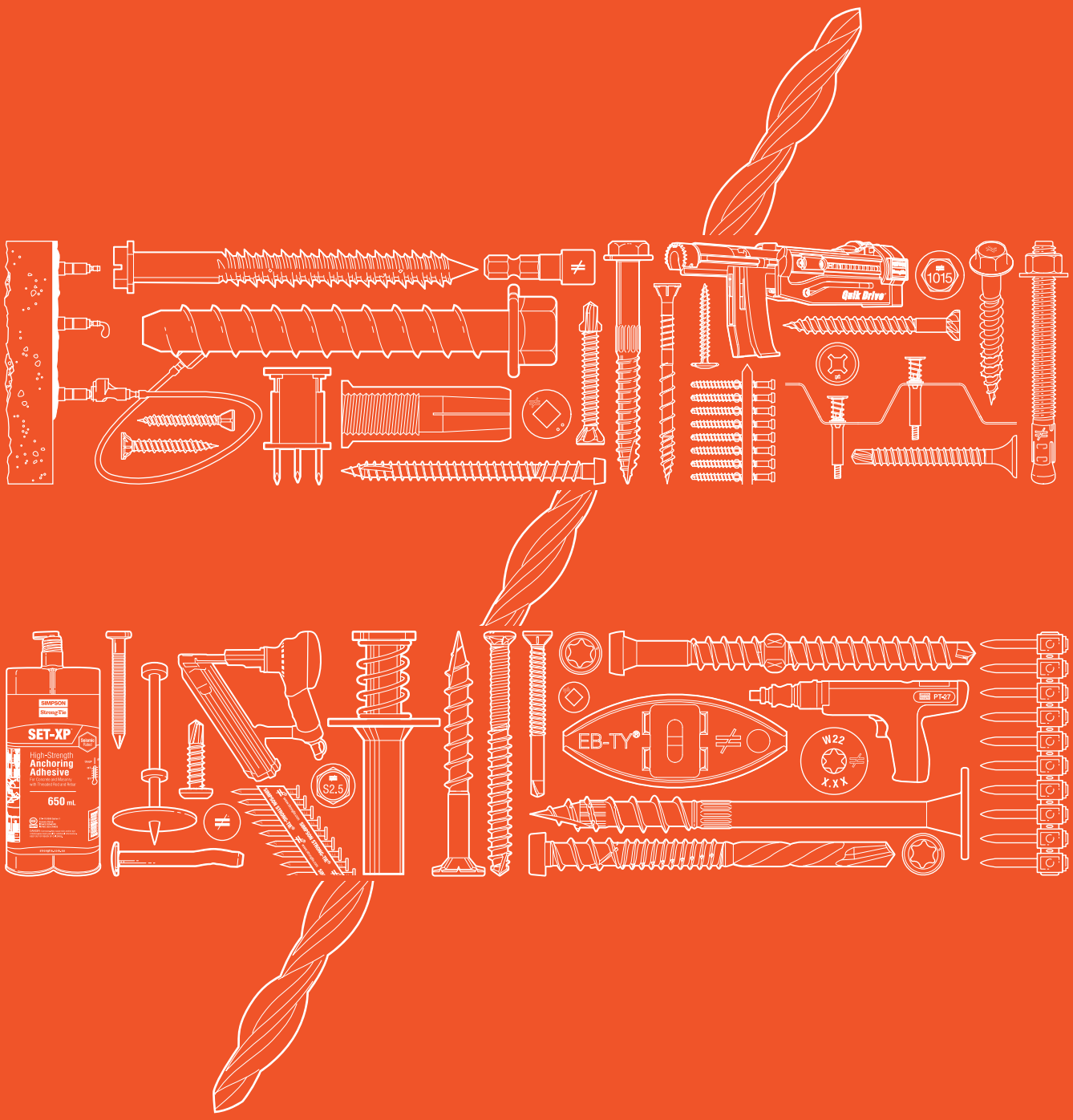
SIMPSON StrongTie



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Strong structures.
Stronger partnerships.

NO-EQUAL
pledge
of performance

Every day we work hard to earn your business,
blending the talents of our people with the quality of our products
and services to exceed your expectations. This is our pledge to you.

Why Choose Simpson Strong-Tie?

Innovation. Trust. Relationships.
These are just a few of the reasons our customers give when asked why they choose Simpson Strong-Tie products.

https://youtu.be/uEDnxl8K7jU

Member of:

AEFAC
Australian Engineered Fasteners and Anchors Council
SUPPORTING MEMBER

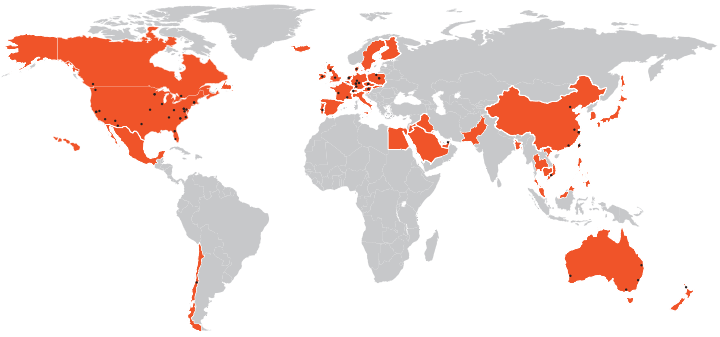
TIMBER QUEENSLAND
MEMBER

Introduction

Simpson Strong-Tie Company Inc. was founded in Oakland, California, and has been manufacturing timber-to-timber and timber-to-concrete connectors since 1956. Since then, Simpson Strong-Tie has grown to be the world's largest manufacturer of construction connectors. In recent years, the company's growth has included expanding its product offering to include prefabricated shearwalls, anchor systems for concrete and masonry, collated fastening systems and repair, protection and strengthening systems for concrete and masonry.

Simpson Strong-Tie Company Inc. Services Include

- Quality products value-engineered for the lowest installed cost at the highest-rated performance levels
- Most thoroughly tested and evaluated products in the industry
- Strategically located warehouse facilities
- Nationwide field engineering support
- National sales team
- In-house R&D and tool and die professionals
- In-house product testing and quality control engineers



● Factories, offices, and warehouses in Australia, Austria, Canada, Chile, China, Czech Republic, Denmark, France, Germany, Netherlands, New Zealand, Poland, Portugal, Switzerland, Taiwan, UK and U.S.A.

■ Distribution in Australia, Canada, Chile, Western Europe, part of Eastern Europe, Middle East, Japan, Korea, Egypt, China, Taiwan & other Asian countries, Mexico, New Zealand, UK and U.S.A.

The Simpson Strong-Tie® Quality Policy

We help people build safer structures economically. We do this by designing, engineering and manufacturing "No Equal" structural connectors and other related products that meet or exceed our customers' needs and expectations.

Everyone is responsible for product quality and is committed to ensuring the effectiveness of the Quality Management System.

Karen Colonias
Chief Executive Officer

Getting Fast Technical Support

When you call for technical support, we can help you quickly if you have the following information at hand. This will help us to serve you promptly and efficiently.

- Which Simpson Strong-Tie catalogue are you using? (See the front cover for the form number.)
- Which Simpson Strong-Tie product are you using?
- What are the design requirements (i.e., loads, anchor diameter, base material, edge/spacing distance, etc.)?

We Are ISO 9001-2008 Registered

Simpson Strong-Tie Company Inc. is an ISO 9001-2008 registered company. ISO 9001-2008 is an internationally-recognised quality assurance system which lets our domestic and international customers know that they can count on the consistent quality of Simpson Strong-Tie® products and services.

nqa. ISO 9001 Registered

Product Identification Key

Products and additional information are divided into ten general categories, identified by tabs along the page's outer edge.

Terms and Conditions of Sale

Product Availability

Products in this catalogue might not be readily available in your region. If there is a product not listed in this catalogue, check our global websites or contact your local Simpson Strong-Tie office for availability.

Product Use

Products in this catalogue are designed and manufactured for the specific purposes shown, and should not be used with other connectors not approved by a qualified Designer. Modifications to products or changes in installations should only be made by a qualified Designer. The performance of such modified products or altered installations is the sole responsibility of the Designer.

Indemnity

Customers or Designers modifying products or installations, or designing non-catalogue products for fabrication by Simpson Strong-Tie Company Inc. shall, regardless of specific instructions to the user, indemnify, defend and hold harmless Simpson Strong-Tie Company Inc. for any and all claimed loss or damage occasioned in whole or in part by non-catalogue or modified products.

Non-Catalogue and Modified Products

Consult Simpson Strong-Tie Company Inc. for applications for which there is no catalogue product, or for connectors for use in hostile environments, with excessive timber shrinkage, or with abnormal loading or erection requirements.

Non-catalogue products must be designed by the customer and will be fabricated by Simpson Strong-Tie in accordance with customer specifications.

Simpson Strong-Tie cannot and does not make any representations regarding the suitability of use or load-carrying capacities of non-catalogue products. Simpson Strong-Tie provides no warranty, express or implied, on non-catalogue products. F.O.B. Shipping Point unless otherwise specified.

Special Order Products

Some products can be ordered as special sizes or with other modifications. Contact Simpson Strong-Tie for information on special order products. Additional lead time and charges may apply. Special order products are non-cancellable, non-refundable and non-returnable.

Warning

Simpson Strong-Tie Company Inc. anchors, fasteners and connectors are designed and tested to provide specified design loads. To obtain optimal performance from Simpson Strong-Tie® products and to achieve maximum allowable design load, the products must be properly installed and used in accordance with the installation instructions and design limits provided by Simpson Strong-Tie. To ensure proper installation and use, Designers and installers must carefully read the General Notes, General Instructions to the Installer and General Instructions to the Designer contained in this catalogue, as well as consult the applicable catalogue pages for specific product installation instructions and notes. Please always consult Simpson Strong-Tie website for updates regarding all Simpson Strong-Tie products.

Proper product installation requires careful attention to all notes and instructions, including the following basic rules:

1. Be familiar with the application and correct use of the anchor, connector or fastener.
2. Follow all installation instructions provided in the catalogue, website or any other Simpson Strong-Tie publication.
3. Follow all product-related warnings provided in the catalogue, website or any other Simpson Strong-Tie publication.
4. Install anchors, connectors and fasteners in accordance with their intended use.
5. Install all anchors, connectors and fasteners per installation instructions provided by Simpson Strong-Tie.
6. When using power tools to install fasteners: (a) use proper fastener type for direct fastening tool; (b) use proper powder or gas loads; and (c) follow appropriate safety precautions as outlined in this catalogue, on the website or in the tool Operator's Manual.

In addition to following the basic rules provided above as well as all notes, warnings and instructions provided in the catalogue, installers, Designers, engineers and consumers should consult Simpson Strong-Tie website to obtain additional design and installation information, including:

- Information from workshops Simpson Strong-Tie conducts at various training workshops throughout the country;
- Product-specific installation videos;
- Specialty catalogues;
- Code reports;
- Technical fliers, bulletins and engineering letters;
- Material safety data sheets;
- Corrosion information;
- Adhesive cartridge estimator;
- Simpson Strong-Tie Anchor Designer™ software;
- Simpson Strong-Tie AutoCAD® menu;
- Answers to frequently asked questions and technical topics.

Failure to fully follow all of the notes and instructions provided by Simpson Strong-Tie may result in improper installation of products. Improperly installed products may not perform to the specifications set forth in this catalogue and may reduce a structure's ability to resist the movement, stress and loading that occur from gravity loads as well as impact events such as earthquakes and high-velocity winds.

Simpson Strong-Tie Company Inc. does not guarantee the performance or safety of products that are modified, improperly installed or not used in accordance with the design and load limits set forth in this catalogue.

Simpson Strong-Tie Limited Warranty

Effective Date: JULY 01, 2018

This Limited Warranty applies to all Simpson Strong-Tie products ("Products") purchased after the Effective Date while this Limited Warranty remains in effect, other than those Simpson Strong-Tie products that have a separate Limited Warranty applicable to such products. Please consult **strongtie.com/limited-warranties** from time to time as this Limited Warranty may be updated by Simpson Strong-Tie. All future purchases of Products are subject to the terms of the version of the Limited Warranty in effect as of the purchase date. Changes to this Limited Warranty document does not affect Products purchased before the effective date of the change.

This Limited Warranty must be read in conjunction with all applicable General Notes, General Instructions for the Installer, General Instructions for the Designer, Building Codes, Corrosion Information, and Terms & Conditions of Sale, along with any other information or specifications published by Simpson Strong-Tie Company Inc. ("Simpson") or available on the **strongtie.com** website ("Website") or on the product package, label or product manual. All of this information is referred to collectively as the "Simpson Strong-Tie Documentation." All applicable Simpson Documentation must be carefully reviewed before using any Product.

Simpson Strong-Tie warrants, to the original end user purchaser only, that each Product will be free from substantial defects in materials, manufacturing and design if properly specified, installed, and maintained, and when used in accordance with the design limits and the structural, technical, and environmental specifications in the Simpson Strong-Tie Documentation. This Limited Warranty is void and does not apply to any (a) Product purchased from an unauthorized dealer, retailer or distributor, (b) Product deterioration or damage due to environmental conditions or inadequate or improper handling, transportation, storage or maintenance, (c) cosmetic defects, including discolouration, (d) failure or damage caused by improper installation, application, mixing or preparation, (e) use of a Product in temperatures or environmental conditions outside the ranges specified for such Product in the Simpson Strong-Tie Documentation, (f) use of a Product outside of its shelf-life specifications, (g) normal wear and tear, (h) failure or damage caused by the use of a Product with any fasteners, pins, screwstrips, products or accessories other than authentic Simpson Strong-Tie products, (i) Product that was subjected to negligence or excessive or improper use, including any use not in accordance with the Simpson Strong-Tie Documentation, (j) failure or damage caused by the building site, foundation, or any third-party products, building materials or components, (k) failure or damage caused by use of a Product in a structure that has a design or other defect or that does not comply with all applicable building codes, laws, rules and regulations, (l) modified Product, or any nonstandard use or application of a Product, (m) failure or damage caused by corrosion, termites or other wood destroying organisms, animal or insect activity, wood fungal decay, rot, mold, mildew, exposure to chemicals or other hazardous substances, a corrosive environment or materials, inadequate moisture protection, or premature deterioration of building materials, (n) failure or damage caused by an act of God, including any hurricane, earthquake, tornado, lightning, ice, snow, high wind, flood or other severe weather or natural phenomena, (o) installation services or workmanship, including any failure or damage caused by installation of any Product by any person other than a Simpson Strong-Tie employee, whether or not in accordance with the Simpson Strong-Tie Documentation, or (p) failure or damage caused by the gross negligence, willful misconduct, or other acts or omissions of the builder, general contractor, installer or any third party, including the building owner. Notwithstanding the foregoing, Simpson Strong-Tie disclaims and does not provide any warranty under this Limited Warranty related to the design of any custom-order or non-catalogue Product.

Although Products are designed for a wide variety of uses, to the maximum extent permitted by applicable law, Simpson Strong-Tie assumes no liability for confirming that any Product is appropriate for an intended use, and each intended use of a Product must be reviewed and approved by qualified professionals. Each Product is designed for the load capacities and uses listed in the Simpson Strong-Tie Documentation, subject to the limitations and other information set forth in the Simpson Strong-Tie Documentation.

Due to the particular characteristics of potential impact events such as earthquakes and high velocity winds, the specific design and location of the structure, the building materials used, the quality of construction, or the condition of the soils or substrates involved, damage may nonetheless result to a structure and its contents even if the loads resulting from the impact event do not exceed Simpson Strong-Tie's specifications and the Products are properly installed in accordance with applicable building codes, laws, rules and regulations.

Product demonstrations, training, operator examinations, technical and customer support and other services provided by Simpson Strong-Tie are based on Simpson Strong-Tie's present knowledge and experience, are conducted for illustrative or instructive purposes only, do not constitute an express warranty of Product capabilities, specifications or installation and do not modify the applicable Limited Warranty for Products set forth herein. To the maximum extent permitted by law and unless otherwise agreed in writing by Simpson Strong-Tie, any services provided by Simpson Strong-Tie are provided without any representation or warranty of any kind, and Simpson Strong-Tie assumes no liability for any representations or statements made as part of such Product demonstrations, training, operator examinations or other services. In the event of any inconsistency between any information provided during any such demonstration or service, and the information in any applicable Simpson Strong-Tie Documentation, the information in the Simpson Strong-Tie Documentation shall govern. In the event of any inconsistency between any information provided on the Website, and the information in any other Simpson Strong-Tie Documentation, the information on the Website shall govern.

NOTE: IF YOU PURCHASED THE PRODUCT IN AUSTRALIA OR NEW ZEALAND, THEN THE SECTIONS BELOW IN BOLD ARE SUBJECT TO THE "AUSTRALIAN ONLY SECTION" OR THE "NEW ZEALAND ONLY SECTION" (AS APPLICABLE) AS SET OUT AT THE END OF THIS DOCUMENT.

ALL WARRANTY OBLIGATIONS OF SIMPSON STRONG-TIE UNDER THIS LIMITED WARRANTY SHALL BE LIMITED, AT SIMPSON STRONG-TIE'S ABSOLUTE DISCRETION, TO EITHER REPAIRING THE DEFECTIVE PRODUCT OR PROVIDING A REPLACEMENT FOR THE DEFECTIVE PRODUCT. THIS REMEDY CONSTITUTES SIMPSON STRONG-TIE'S SOLE OBLIGATION AND LIABILITY AND THE SOLE AND EXCLUSIVE REMEDY OF PURCHASER AND, WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, EXCLUDES ANY LABOUR OR OTHER COSTS INCURRED IN CONNECTION WITH A WARRANTY CLAIM. PURCHASER ASSUMES ALL RISK AND LIABILITY ASSOCIATED WITH ANY USE OF THE PRODUCT, INCLUDING BUT NOT LIMITED TO SUITABILITY FOR ITS INTENDED USE.

Simpson Strong-Tie Limited Warranty (cont.)

THE LIMITED WARRANTY HEREIN IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, AND, WHERE LAWFUL, SIMPSON STRONG-TIE DISCLAIMS ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO IMPLIED OR STATUTORY WARRANTIES OR GUARANTEES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND WARRANTIES ARISING FROM COURSE OF PERFORMANCE, COURSE OF DEALING OR TRADE USAGE. TO THE MAXIMUM EXTENT PERMITTED BY LAW, 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, DEATH AND PERSONAL INJURY. SIMPSON STRONG-TIE'S ENTIRE LIABILITY IS LIMITED TO THE PURCHASE PRICE OF THE DEFECTIVE PRODUCT. SOME STATES AND JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, OR THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

To obtain warranty service under this Limited Warranty, you must contact Simpson Strong-Tie in either Australia or New Zealand (depending on country or residency), in which case refer to the contact details in the applicable jurisdiction-specific sections below, regarding any potential claim, no later than sixty (60) days after you discover the potential claim. Upon request by Simpson Strong-Tie, you must provide Simpson Strong-Tie with: (a) proof of purchase and written records evidencing, in reasonable detail, the date and manner of installation, application, mixing and preparation of the Products, as applicable, (b) a reasonable opportunity to inspect the site where the Product was installed, and (c) samples of the Products from the actual installation in sufficient quantities in order for Simpson Strong-Tie to perform testing to determine whether or not the Product failed as set forth herein. Simpson Strong-Tie may, in its absolute discretion, request that you return the allegedly defective Products to Simpson Strong-Tie, in which case Simpson Strong-Tie will issue a Return Materials Authorization (RMA), which must be completed and returned to Simpson Strong-Tie with the Product. Simpson Strong-Tie is not responsible for any costs or expenses incurred in connection with any inspection (other than by Simpson Strong-Tie employees) or in connection with the return of Products to Simpson Strong-Tie, but Simpson Strong-Tie shall bear all costs and expenses incurred in connection with the shipment of replacement Products in the event that Simpson Strong-Tie determines that the Product should be replaced in accordance with this Limited Warranty. If Simpson Strong-Tie elects to repair or replace the Product, Simpson Strong-Tie shall have a reasonable time to do so.

No one other than Simpson Strong-Tie is authorized to change or add to this Limited Warranty. If at any time Simpson Strong-Tie does not enforce any of the terms, conditions or limitations stated in this Limited Warranty, Simpson Strong-Tie shall not have waived the benefit of said term, condition or limitation and can enforce it at any time. This Limited Warranty is extended only to the original end user purchaser and is not transferable. It is not intended nor shall it be construed to create rights in any third party.

AUSTRALIAN ONLY SECTION

This "Australian Only Section" applies if (and only if) you have purchased the Product in Australia . This section overrides and takes precedence over all other sections of this Limited Warranty to the extent of any inconsistencies.

For the purposes of this Limited Warranty, the Simpson Strong-Tie entity that is giving the limited warranty is Simpson Strong-Tie Australia Pty Ltd . The contact details for Simpson Strong-Tie Australia Pty Ltd are:

Unit 1/ 16 Kenoma Place, Arndell Park. NSW 2148, Australia
Phone 1300787664
info.au@strongtie.com

The Products come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and 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.

The benefits given under the Limited Warranty are additional to other rights and remedies that you may have under law in relation to the Products. In particular, nothing in this Limited Warranty (including this Australian Only Section) excludes or restricts any rights or remedies that you may have in relation to a "major failure", as that term is defined in the Competition and Consumer Act 2010 (Cth).

Subject to the above paragraphs, all statutory or implied conditions, guarantees and warranties relating to the Products and services provided by Simpson Strong-Tie are excluded to the maximum extent permitted by applicable law. To the extent permitted by law, where liability under any condition, guarantee or warranty which cannot legally be excluded but can be validly limited, Simpson Strong-Tie's liability is limited to: (1) in the case of goods (including the Products), the replacement of the goods or the supply of equivalent goods; the repair of the goods; the payment of the cost of replacing the goods or of acquiring equivalent goods; or the payment of the cost of having the goods repaired; and in the case of the services, supplying the services again; or paying the cost of having the services supplied again.

The application of the United Nations Convention on Contracts for the International Sale of Goods (known as the Vienna Sales Convention 1980) is excluded.

NEW ZEALAND ONLY SECTION

This "New Zealand Only Section" applies if (and only if) you have purchased the Product in New Zealand. This section overrides and takes precedence over all other sections of this Limited Warranty to the extent of any inconsistencies.

For the purposes of this Limited Warranty, the Simpson Strong-Tie entity that is giving the limited warranty is Simpson Strong-Tie (New Zealand) Limited (trading as Simpson Strong-Tie New Zealand Limited). The contact details for Simpson Strong-Tie New Zealand Limited are:

52 Arrenway Drive, Rosedale, Auckland, 0632 New Zealand
Phone +64 9 4774440
info.nz@strongtie.com

This Limited Warranty is provided in addition to any statutory guarantees that apply under the Consumer Guarantees Act 1993 and does not limit or exclude any rights that you may have under that Act or any other applicable law that cannot be excluded.

Your sole remedy for a breach of this Limited Warranty shall be, at Simpson Strong-Tie's discretion, Simpson Strong-Tie either repairing the defective Product or providing a replacement for the defective Product. For the avoidance of doubt, this Limited Warranty does not cover any costs and expenses incurred with any inspection process or return of the Product

Simpson Strong-Tie Limited Warranty (cont.)

Simpson Strong-Tie will not have any other liability for breach of this Limited Warranty (regardless of whether liability would arise in contract, tort including negligence, or otherwise), and Simpson Strong-Tie will not be liable under this Limited Warranty for any economic loss, loss of profits, income business or revenue, or any indirect or consequential loss.

Subject to the above paragraphs, all statutory or implied conditions, guarantees and warranties relating to the Products and services provided by Simpson Strong-Tie are excluded to the maximum extent permitted by applicable law.

The application of the United Nations Convention on Contracts for the International Sale of Goods (known as the Vienna Sales Convention 1980) is excluded.

Trademark Attribution

AutoCAD®, Autodesk®, Bosch®, DeWalt®, E-Coat®, E-Z-Click™, Heli-Tie™, Hilti®, Hitachi®, Makita®, Metabo®, Milwaukee®, N2000®, Opti-Mesh®, Ramset®, Revit®, Surf Mist® are registered trademarks of their respective companies.

Keep this catalogue – it is valid for two years

Simpson Strong-Tie publishes the *Anchoring and Fastening Systems* catalogue every two years. Please be sure to visit our website in your region regularly for updates that occur throughout the year.

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

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

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

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.

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

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
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.

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 my 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 ⅜ 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 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 blead 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 (⅜ 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 though 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)
Hasteloy 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.

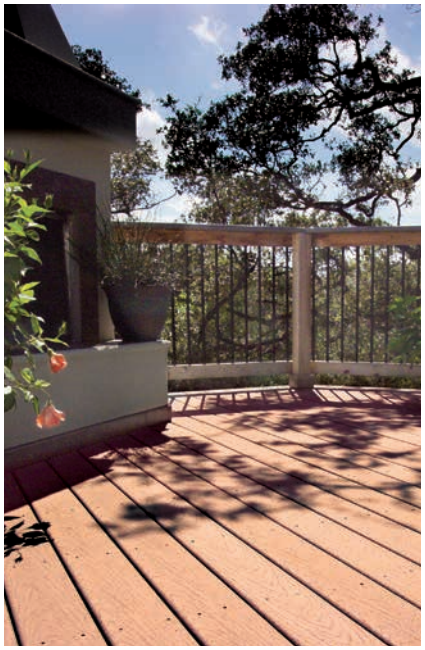
Treatment Chemicals: See AS 1604 and Timber Preservers Association of Australia and other related organisations for treatment practices and chemicals. The preservative-treated timber supplier should provide all of the pertinent information about the treated timber being used. The information should include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

1. These are general guidelines that may not consider all application criteria. Refer to product specific information for additional guidance.
2. Treatments typical of Hazard Classes H1 and H2 are based on inorganic boron or are preservatives in light organic solvents (LOSP).
3. 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)
4. Treatments for sawn products typical of Hazard Classes H4, H5, and H6 are CCA, ACZA, ACQ (retention > 6.4 kg/m3), and creosote.
5. Fire-retardant treated timber may have specific corrosion resistance requirements. See chemical manufacturer guidelines.
6. Type 316/305/304 stainless steels are recommended where preservative treated timber is used in ground contact.
7. Testing by Simpson Strong-Tie following ICC-ES AC257 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.
8. 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).
9. If uncertain about Hazard Class, treatment chemical, or environment, use Type 316/305/304 stainless steels, silicon bronze, or copper.
10. 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 utilises 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.

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/ft^2 [305 g/m^2] 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%.

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/ft^2 [381 g/m^2] 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.

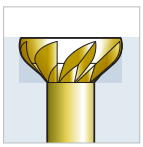
Passivation of Stainless-Steel Fasteners

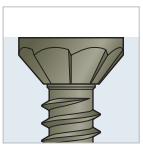
Stainless steels are designed to naturally self-passivate by forming a chromium oxide layer. Corrosion resistance of some stainless-steel fasteners is enhanced by a post-fabrication passivation process. The passivation process uses an acid bath to strip free iron from the surface and an oxidiser to force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

Head Styles


Flat Head

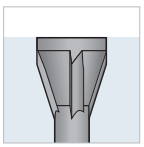

Flat Head with Nibs

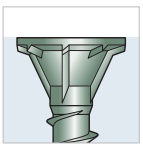

Flat Head with Aggressive Nibs


Ribbed Flat Head

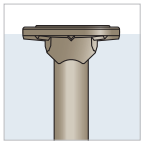

Bugle Head

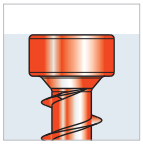

Trim Head

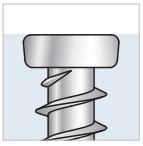

Trim Head with Nibs

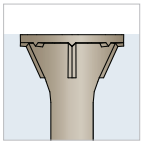

Ribbed Wafer Head


Washer Head

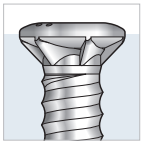

Underhead Box Nib


Cap-Style Head


Trim-Pan Head


Rimmed Flat Head with Nibs


Compact Head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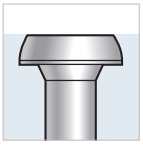
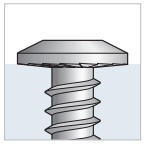

Cap Head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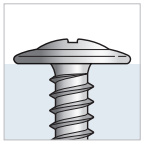
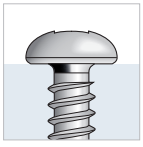
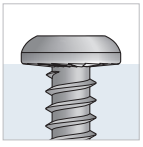
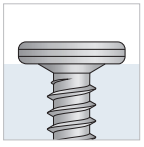
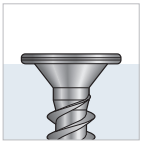
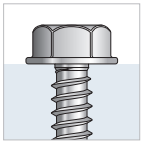

Modified Truss Head


Pan Head

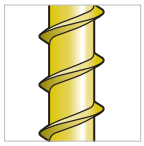

Flat-Pan Head

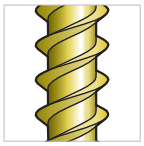

Pancake Head

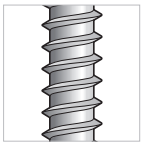

Ultra-Low Profile Pancake Head

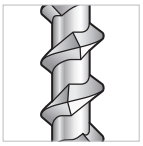

Hex-Washer Head

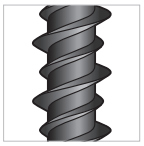
Thread Styles

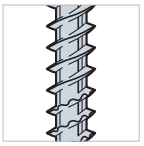

Coarse Threads

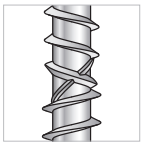

Twin Threads

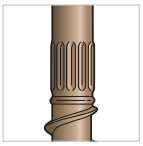

Steel Tapping Threads


Box Threads


High-Low Threads


Serrated Threads

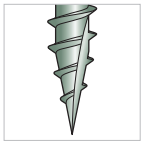

Reverse Threads


Knurls

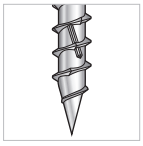
Point Styles


Sharp Point

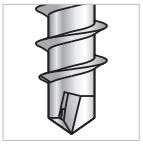
Application: Timber and thin steel


Type-17 Point

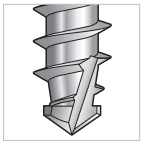
Application: Timber, composite and thin steel


Sharp Point with Nib

Application: Timber, composite


Hardwood Drill Point

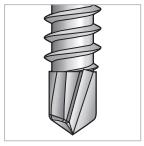
Application: Hardwood-to-Softwood


Hardwood Drill Point

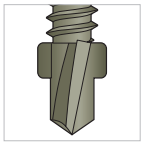
Application: Hardwood-to-Hardwood


SawTooth™ Point

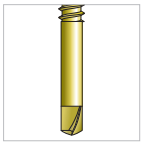
Application: Timber-to-timber


Drill Point

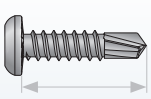
Application: Steel

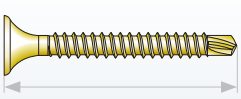

Drill Point with Wings

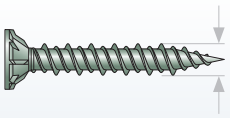
Application: Timber-to-steel


Pilot Point

Application: Timber-to-steel


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

FASTENERS

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.

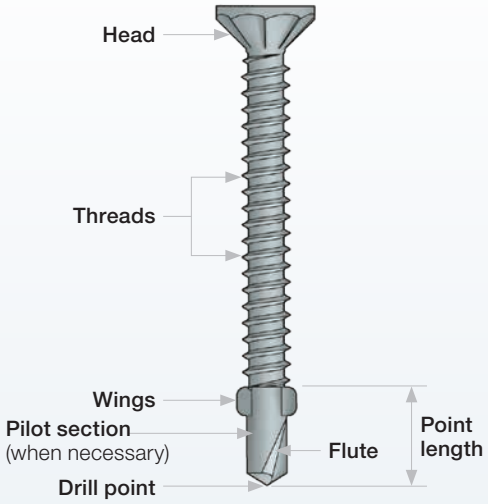
Design Features

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.

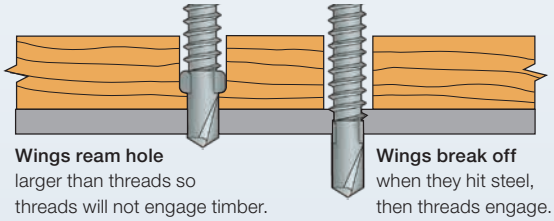
Point Length determines the material thickness which the screw can reliably penetrate. The unthreaded portion of the point, (pilot section) must be able to completely drill through the material before the threads engage. If the threads engage before drilling is complete, the fastener can bind and break.

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



Wings ream hole larger than threads so threads will not engage timber.

Wings break off when they hit steel, then threads engage.

FASTENERS

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		• Work material too hard • Insufficient chip clearance • Excessive force (feed) applied while drilling	• Confirm work material specifications • Choose screw with longer pilot section • Reduce application force
Screw spins without drilling a hole		• Drill motor set on reverse • Work material too hard • Drill point blunted by handling	• Check motor direction • Confirm work material specifications • Inspect unused drill points for possible damage (from handling)

Anchors — The Power to Build

Scan this QR code to watch a video of Simpson Strong-Tie Anchor Systems Testing Lab.

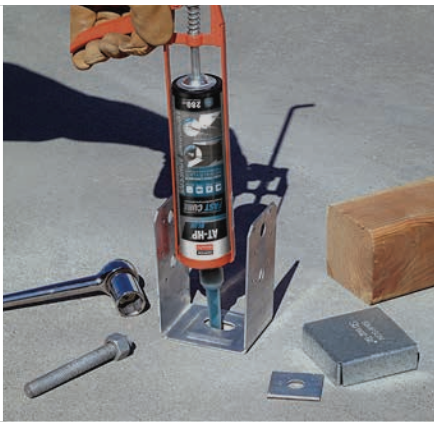
https://youtu.be/2A9kwSuS-nU

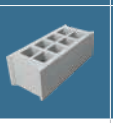
For more than 60 years, Simpson Strong-Tie has focused on providing powerful solutions to meet our customers' needs.

We offer a full array of anchoring systems for residential, commercial, infrastructure and industrial uses — from anchoring adhesives and mechanical anchors for anchoring applications in concrete and masonry to direct fastening solutions for attachments to concrete, steel, CMU, or steel deck.

The innovative products featured in this catalogue are the result of more than 40 years of research and development, and have passed the rigorous quality-assurance testing you have come to expect from Simpson Strong-Tie. With our expanding lines of high-performance anchoring products, engineering and field support, product testing and training, we are committed to giving you the power to build.

Adhesive Anchors



Product		Page No.	BASE MATERIAL						Approvals
			Concrete		Concrete Block		Brick		
			Uncracked	Cracked	Solid CMU	Grout filled CMU	Solid	Hollow	
									
SET-XP®		38	✓	✓	✓	✓	—	—	European Technical Approval ICC ES *(ACI 355.4)*
ET-HP®		42	✓	✓	✓	✓	✓	✓*	ICC ES *(ACI 355.4)* BRANZ Appraised Appraisal No.983 [2018]
AT-HP® Blue		50	✓	—	✓	✓*	✓	✓*	European Technical Approval CSTB FIRE TEST N°26045738 BRANZ Appraised Appraisal No.983 [2018]

*Used in conjunction with screen tubes.
1. Please refer to individual product page for further information to determine product suitability.

Mechanical Anchors

Product		Page No.	BASE MATERIAL						Approvals
			Concrete		Concrete Block		Brick		
			Uncracked	Cracked	Solid CMU	Grout filled CMU	Solid	Hollow	
									
Wedge Anchor		64	✓	—	—	—	—	—	—
Titen HD®		68	✓	✓	✓	✓	✓*	—	European Technical Approval BRANZ Appraised Appraisal No.983 [2018]

*See page 116 for Titen HD® used for red-brick seismic strengthening
1. Please refer to individual product page for further information to determine product suitability.

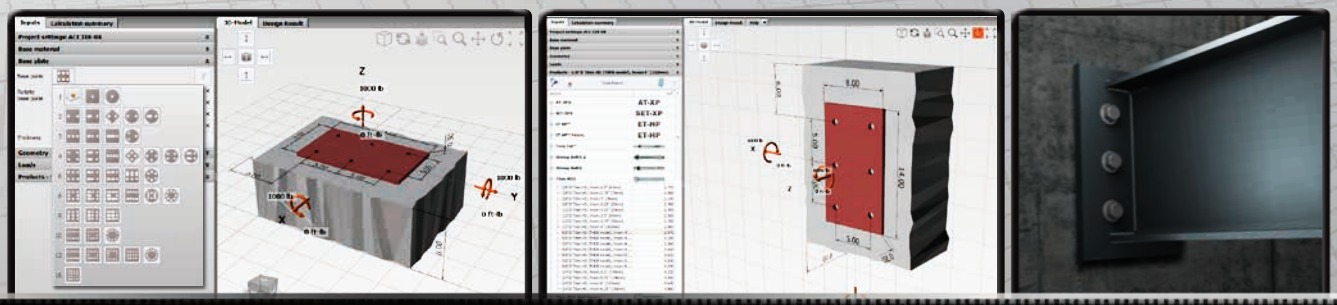
Mechanical Anchors (cont.)

Product		Page No.	BASE MATERIAL						Approvals
			Concrete		Concrete Block		Brick		
			Uncracked	Cracked (Seismic Rated)	Solid CMU	Grout filled CMU	Solid	Hollow	
Titen HD® Rod Hanger		72	✓	✓	—	—	—	—	ICC ES (ACI 355.2)
Blue Banger Hanger®		76	✓	✓	—	—	—	—	
Drop-In		82	✓	—	—	—	—	—	—
Titen®		85	✓	—	✓	—	—	✓	—
Crimp Drive®		88	✓	—	—	—	—	—	—

1. Please refer to individual product page for further information to determine product suitability.

Powerful calculations,

Concrete solutions



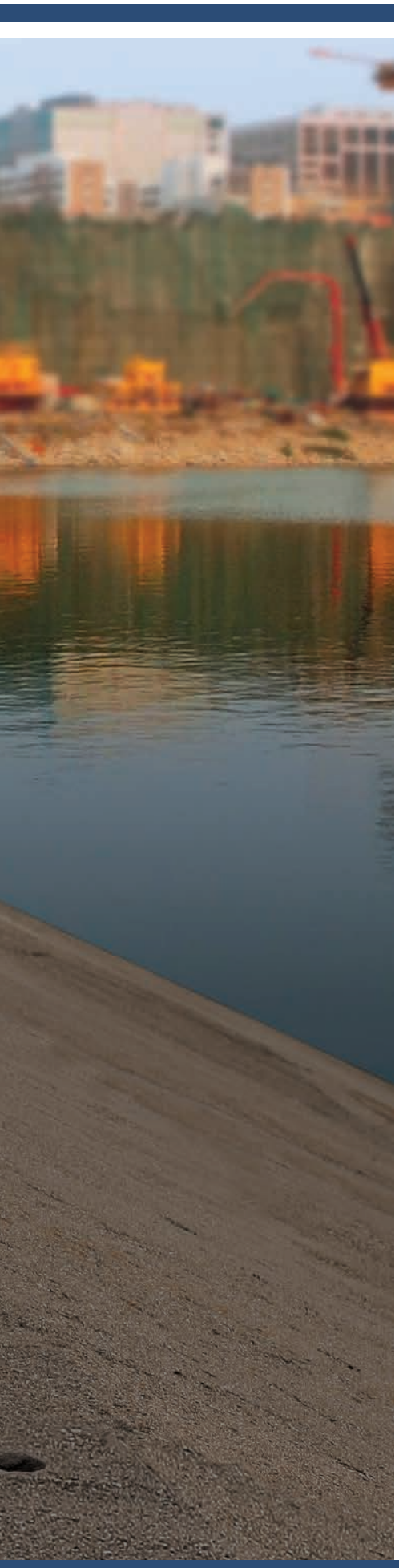
Performing challenging calculations required by current design methodologies can be completed quickly and accurately with the Simpson Strong-Tie® Anchor Designer™ software. A fully interactive 3D graphical-user interface with 42 pre-loaded anchor configurations simplify input, and calculation results are output for verification and submission of your design. Anchor Designer complies with current ACI 318, ETAG and CSA code requirements.

To learn more and download the free software visit **strongtie.com/anchordesigner**

SIMPSON Strong-Tie®

Adhesive Anchors

Product Index



From rebar dowelling on a high-traffic infrastructure retrofit project, to do-it-yourself projects, Simpson Strong-Tie offers a wide variety of adhesive anchoring products to meet virtually any need.

Our strong, versatile epoxy-based adhesives are ideal for anchoring threaded rod and rebar in an assortment of base materials. And our fast cure acrylic formulation delivers consistent performance for high-strength anchor grouting in a wide range of weather conditions.

SET-XP® Extra-Performance Epoxy Adhesive

SET-XP is an epoxy-based seismic anchoring adhesive for uses in cracked and uncracked concrete.

Features
- Seismic Rated as per ACI 355.4
- High Strength
- Non-shrink, high solids
- Long-term loading (creep) applications
- Non-sag formulation: good for vertical applications
- Suitable for over sized and core-drilled holes

Applications
- Rebar Dowelling
- Tension Zones
- Dry And Wet Concrete
- Threaded Rod Anchoring
- General Purpose Anchoring
- Overhead Anchoring (Tension Zones)
- Structural Steel

Base Material
- Cracked and Uncracked Concrete
- Grout-filled Concrete Block

Approvals
- Complies with AS5216
- Seismic testing per ACI 355.4
- ETA-11/0360 (OPTION 1)
- ICC-ES ESR-2508 (Concrete)
- IAPMO UES ER-265 (Masonry)
- NSF/ANSI Standard 61 (313 cm^2/1000 L)
- Transport and Main Roads (QLD) product approval (Threaded rod and Reinforcing bar)

Installation
Refer to page 46 for installation procedures.

Refer to page 49 for cartridge usage estimation guide.

Shelf Life
24 months from date of manufacture in unopened cartridge.

Storage Conditions
For best results, store between 7–32°C. To store partially used cartridges, leave hardened nozzle in place. To re-use, attach new nozzle.

Colour
Resin — white, hardener — black-green. When properly mixed, SET-XP adhesive will be a uniform teal colour.

Chemical Resistance
Refer to page 14 for chemical resistance of adhesive anchors.

SET-XP650-AU (650 ml)
(Includes 2 mixing nozzle EMN22i)

European Technical Approval

ICC ES (ACI 355.4)

ETA approved SET-XP® Extra-Performance Epoxy Adhesive ideal for use in either cracked or uncracked concrete applications, and is seismic rated.

SET-XP® Extra-Performance Epoxy Adhesive

Working and Curing Time Schedule

Internal Concrete Temperature	Working Time	Curing Time (Dry Concrete)	Curing Time (Wet Concrete)
$T_{anchorage\ base}$	t_{gel}	$t_{cure,dry}$	$t_{cure,wet}$
≥ +10°C	60 min	72 h	144 h
≥ +21°C	45 min	24 h	48 h
≥ +32°C	20 min	24 h	48 h
≥ +43°C	12 min	24 h	48 h

*Let anchor fully cure without disturbing.

In-Service Temperature*

Temperature Range I		Temperature Range II	
Maximum **Long** Term Temperature	Maximum **Short** Term Temperature	Maximum **Long** Term Temperature	Maximum **Short** Term Temperature
+24°C	+43°C	+43°C	+65°C

*See "Elevated In-Service Temperature" on page 13 for more information

Cartridge Size and Accessories

Cartridge	Size	Box Qty	Model No.
	650 ml	10	**SET-XP650-AU**
Dispensing Tools	**Description**		**Model No.**
	Manual dispensing tool		**EDT22S**
Mixing Nozzles			
	Mixing nozzle Pack of 5		**EMN22i-RP5** (NZ)
	Mixing nozzle Pack of 10		**EMN22i-RP10** (AU)

Please see pages 58–60 for complementing items

SET-XP® Extra Performance Anchoring Adhesive — Gr 8.8 Threaded Rod

Installation Data

Description	Symbol	Units	Threaded Rod Size (mm)				
			M12	M16	M20	M24	M27
Nominal Insert Diameter	d	mm	12	16	20	24	27
Drill Hole Diameter	d_o		14	18	24	28	30
Minimum Embedment Depth	$h_{ef,min}$		70	80	90	100	110
Maximum Embedment Depth	$h_{ef,max}$		240	320	400	480	540
Clearance Hole Diameter in Fixture	d_f		14	18	22	26	30
Installation Torque	$T_{inst,\ max}$	Nm	40	60	80	100	120

Concrete Thickness, Edge Distance and Spacing

Description	Symbol	Units	M12	M16	M20	M24	M27
Minimum Concrete Thickness	h_{min}	mm	h_{ef} + 30mm	$h_{ef} + 2d_o$			
Minimum Edge Distance	c_{min}		80	100	115	135	155
Minimum Spacing	s_{min}		45	60	70	80	90
Critical Edge Distance	$c_{cr,N}$		$1.5 \times h_{ef}$				
Critical Spacing	$s_{cr,N}$		$3 \times h_{ef}$				

Design Resistance — Single Anchor, No Concrete Edge or Spacing Influence

Description	Symbol	Units	M12	M16	M20	M24	M27
Embedment Depth	h_{ef}	mm	110	140	180	220	240
Minimum Concrete Thickness			140	176	228	276	300
Uncracked Concrete							
TENSION	N_{Rd}	kN	**33.6**	**33.5**	**53.9**	**71.1**	**67.9**
SHEAR	V_{Rd}		**27.2**	**50.4**	**78.4**	**113**	**147**
Cracked Concrete							
TENSION	N_{Rd}	kN	**11.9**	**15.1**	**16.2**	**23.7**	**29.1**
SHEAR	V_{Rd}		**27.2**	**42.2**	**45.2**	**66.4**	**81.4**

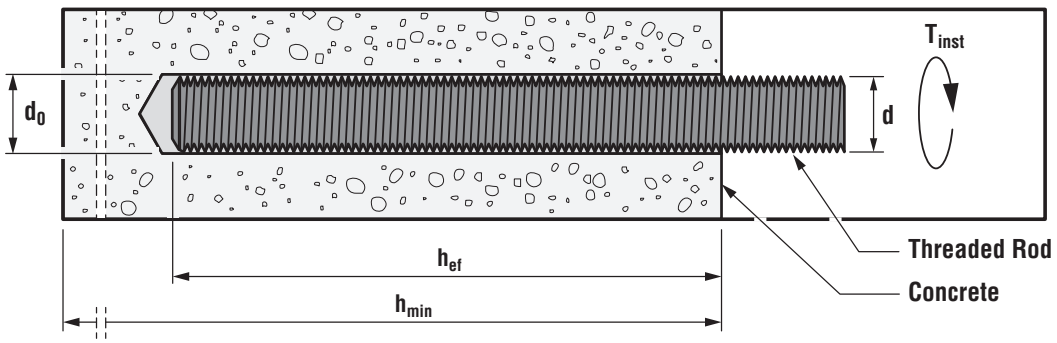
1. Concrete strength is 30 MPa (cylinder) unreinforced, hole condition is "dry, damp or wet", and temperature range 24°C long-term/43°C short-term.
2. Tabulated loads are valid at critical spacing and critical edge distance only.
   For spacing and edge distance influence, use Simpson's Anchor Designer™ Software for analysis.
3. N_{Rd} and V_{Rd} is based on use of a Grade 8.8 threaded insert. Verify capacity if using a different steel grade.
4. All design resistances are derived from the product's ETA (European Technical Assessment).

Steel Design Resistance (Tension)

Description	Symbol	Units	M12	M16	M20	M24	M27
Steel Grade 5.8	$N_{Rd,s}$	kN	28.0	52.7	82.0	118	153
Steel Grade 8.8			44.7	84.0	131	188	245
Stainless Steel A4			31.6	58.8	92.0	132	80.4

Steel Design Resistance (Shear)

Description	Symbol	Units	M12	M16	M20	M24	M27
Steel Grade 5.8	$V_{Rd,s}$	kN	16.8	31.2	48.8	70.4	92.0
Steel Grade 8.8			27.2	50.4	78.4	113	147
Stainless Steel A4			19.2	35.3	55.1	79.5	48.3



SET-XP® Extra Performance Anchoring Adhesive — Rebar Grade B500 (DIN 488-2)

Installation Data

Description	Symbol	Units	Rebar Size (mm)				
			12	14	16	20	25
Drill Hole Diameter	d_o	mm	16	18	20	25	32
Minimum Embedment Depth	$h_{ef,min}$		70	75	80	90	100
Maximum Embedment Depth	$h_{ef,max}$		240	280	320	400	500

Concrete Thickness, Edge Distance and Spacing

Description	Symbol	Units	12	14	16	20	25
Minimum Concrete Thickness	h_{min}	mm	h_{ef} + 30mm	$h_{ef} + 2d_o$			
Minimum Edge Distance	c_{min}		80	90	100	115	135
Minimum Spacing	s_{min}		45	50	60	70	80
Critical Edge Distance	$c_{cr,N}$		1.5 x h_{ef}				
Critical Spacing	$s_{cr,N}$		3 x h_{ef}				

Design Resistance — Single Rebar, No Concrete Edge or Spacing Influence

Description	Symbol	Units	12	14	16	20	25
Embedment Depth	h_{ef}	mm	110	130	140	180	220
Minimum Concrete Thickness			140	166	180	230	284
Uncracked Concrete							
TENSION	N_{Rd}	kN	**31.1**	**25.4**	**31.3**	**44.0**	**52.8**
SHEAR	V_{Rd}		**20.7**	**28.0**	**36.7**	**57.3**	**90.0**
Cracked Concrete							
TENSION	N_{Rd}	kN	**11.5**	**11.1**	**9.8**	**15.7**	**24.0**
SHEAR	V_{Rd}		**20.7**	**26.7**	**23.5**	**37.7**	**57.6**

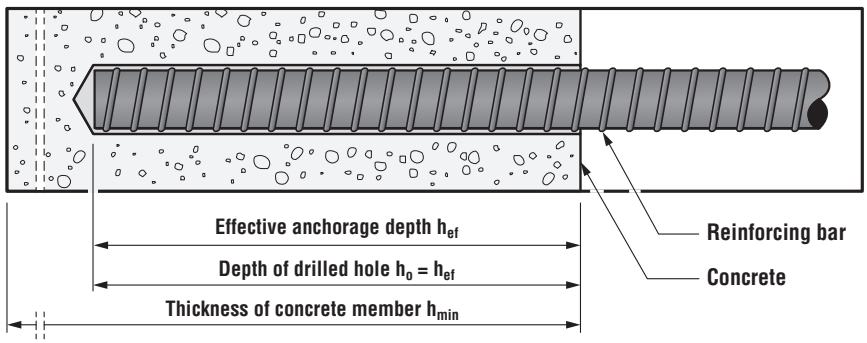
Rebar Strength Tension

Description	Symbol	Units	12	14	16	20	25
Design Resistance	$N_{Rd,s}$	kN	44.3	60.7	79.3	124	193
Nominal Yield Strength	f_{yk}		56.5	77.0	101	157	243
Nominal Tensile Strength	f_{uk}		62.2	84.7	111	173	270

Rebar Strength Shear

Description	Symbol	Units	12	14	16	20	25
Design Resistance	$V_{Rd,s}$	kN	20.7	28.0	36.7	57	90.0

1. Concrete strength is 30 MPa (cylinder) unreinforced, hole condition is "dry, damp or wet", and temperature range 24°C long-term/43°C short-term.
2. Tabulated loads are valid at critical spacing and critical edge distance only.
   For spacing and edge distance influence, use Simpson's Anchor Designer™ Software for analysis.
3. All design resistances are derived from the product's ETA (European Technical Assessment).
4. Nominal yield strength (f_{yk}) for Gr 500B Rebar is determined by the equation: f_{yk} = 500 MPa x A_{nom}
   Nominal tensile strength (f_{uk}) for Gr 500B Rebar is determined by the equation: f_{uk} = 550 MPa x A_{nom}



ET-HP® High-Performance Epoxy Adhesive

ET-HP is a high performance epoxy based anchoring adhesive for use as a non-shrink anchor grouting material.

Features
- Economical
- High performance
- Non-shrink
- Suitable for cracked and uncracked concrete
- Seismically rated per ACI 355.4
- Long-term loading (creep) applications

Applications
- Rebar Dowelling
- Tension Zones
- Dry And Wet Concrete
- Threaded Rod Anchoring
- General Purpose Anchoring
- Structural Steel

Base Material
- Cracked and Uncracked Concrete
- Grout-filled and Hollow* Concrete Block
- Solid and Hollow* Brick

*When used in conjunction with screen tubes

Approvals
- Seismic testing per ACI 355.4
- ICC-ES ESR-3372 (Concrete)
- ICC-ES ESR-3638 (URM)
- IAPMO UES ER-241 (Masonry)
- BRANZ Appraisal 983 (2018) for applications related to bottom plate fixings and holdown applications per NZS 3604 using ET-HP.

Installation
Refer to page 46 for installation procedures.

Refer to page 49 for cartridge usage estimation guide.

Shelf Life
24 months from date of manufacture in unopened cartridge.

Storage Conditions
For best results, store between 7–32°C. To store partially used cartridges, leave hardened nozzle in place. To re-use, attach new nozzle.

Colour
Resin — white, hardener — black. When properly mixed, ET-HP adhesive will be a uniform medium grey colour.

Chemical Resistance
Refer to page 14 for chemical resistance of adhesive anchors.

ET-HP650-AU
(Includes 2 mixing nozzle EMN22i)

ICC ES (ACI 355.4)

BRANZ Appraised
Appraisal No.983 [2018]

Scan this QR code to download the BRANZ Appraisal
http://www.strongtie.co.nz/pdf/codes/BRANZ-APPROVAL-983.pdf

ET-HP® is an economical high-performance general purpose anchoring adhesive.

ET-HP® High-Performance Epoxy Adhesive

Working and Curing Time Schedule

Internal Concrete Temperature	Working Time	Curing Time (Dry Concrete)	Curing Time (Wet Concrete)
$T_{anchorage\ base}$	t_{gel}	$t_{cure,dry}$	$t_{cure,wet}$
≥ +10°C	45 min	72 h	144 h
≥ +16°C	30 min	24 h	48 h
≥ +27°C	20 min	24 h	48 h
≥ +38°C	15 min	24 h	48 h

*Let anchor fully cure without disturbing.

In-Service Temperature*

Temperature Range	
Maximum **Long** Term Temperature	Maximum **Short** Term Temperature
+43°C	+65°C

*See "Elevated In-Service Temperature" on page 13 for more information

Cartridge Size and Accessories

Cartridge	Size	Box Qty	Model No.
	650 ml	10	**ET-HP650-AU**
Dispensing Tools	**Description**		**Model No.**
	Manual dispensing tool		**EDT22S**
Mixing Nozzles			
	Mixing nozzle Pack of 5		**EMN22i-RP5** (NZ)
	Mixing nozzle Pack of 10		**EMN22i-RP10** (AU)

Please see pages 58–60 for complementing items

ET-HP® High-Performance Epoxy Adhesive — Gr 8.8 Threaded Rod

Installation Data

Description	Symbol	Units	Threaded Rod Size (mm)						
			M10	M12	M16	M20	M24	M27	M30
Nominal Insert Diameter	d	mm	10	12	16	20	24	27	30
Drill Hole Diameter	d_o		12	14	18	24	28	30	35
Minimum Embedment Depth	$h_{ef,min}$		60	70	80	90	100	110	120
Maximum Embedment Depth	$h_{ef,max}$		120	144	192	240	288	324	360
Clearance Hole Diameter in Fixture	d_f		12	14	18	22	26	30	32
Installation Torque	$T_{inst, max}$	Nm	25	35	50	75	100	120	200

Concrete Thickness, Edge Distance and Spacing

Description	Symbol	Units	M10	M12	M16	M20	M24	M27	M30
Minimum Concrete Thickness	h_{min}	mm	$h_{ef} + 5d_o$						
Minimum Edge Distance	c_{min}		45						70
Minimum Spacing	s_{min}		76						152
Critical Edge Distance	$c_{cr,N}$		$1.5 \times h_{ef}$						
Critical Spacing	$s_{cr,N}$		$3 \times h_{ef}$						

Design Resistance — Single Anchor, No Concrete Edge or Spacing Influence

Description	Symbol	Units	M10	M12	M16	M20	M24	M27	M30
Embedment Depth	h_{ef}	mm	80	110	140	180	220	240	260
Minimum Concrete Thickness			130	170	220	280	340	375	410
Uncracked Concrete									
TENSION	N_{Rd}	kN	**12.4**	**20.5**	**34.8**	**55.9**	**81.9**	**101**	**121**
SHEAR	V_{Rd}		**13.8**	**24.3**	**45.3**	**70.5**	**102**	**132**	**162**
Cracked Concrete									
TENSION	N_{Rd}	kN	**3.1**	**7.6**	**12.8**	**33.8**	**51.8**	**54.3**	**55.7**
SHEAR	V_{Rd}		**6.7**	**16.3**	**27.6**	**70.5**	**102**	**117**	**120**

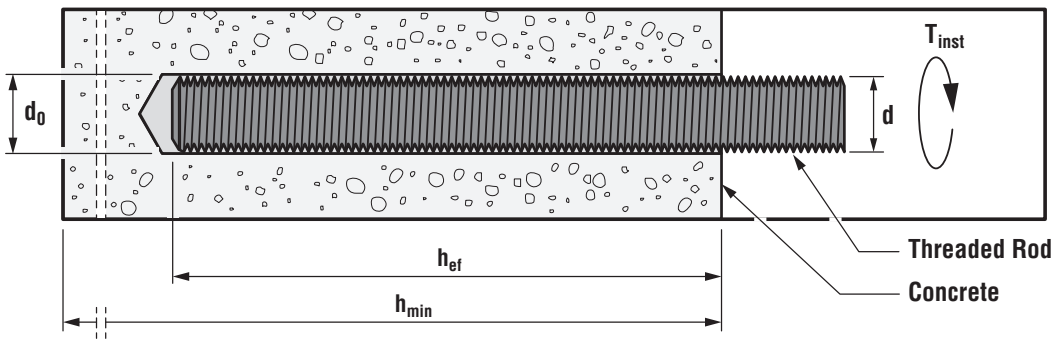
1. Concrete strength is 31 MPa (cylinder) unreinforced, hole condition is "dry", and temperature range 24°C long-term/43°C short-term.
2. Tabulated loads are valid at critical spacing and critical edge distance only.
   For spacing and edge distance influence, use Simpson's Anchor Designer™ Software for analysis.
3. N_{Rd} and V_{Rd} is based on use of a Grade 8.8 threaded insert. Verify capacity if using a different steel grade.
4. All design resistances are derived from the product's ICC ESR (ACI 355.4 testing, ACI 318 Design).

Steel Design Resistance (Tension)

Description	Symbol	Units	M10	M12	M16	M20	M24	M27	M30
Steel Grade 5.8	$N_{Rd,s}$	kN	18.9	27.3	51.0	79.6	115	149	183
Steel Grade 8.8			30.2	43.9	81.6	127	184	239	292
Stainless Steel A4			26.4	38.4	71.4	111	160	119	145

Steel Design Resistance (Shear)

Description	Symbol	Units	M10	M12	M16	M20	M24	M27	M30
Steel Grade 5.8	$V_{Rd,s}$	kN	8.7	15.3	28.2	44.1	63.6	82.5	101
Steel Grade 8.8			13.8	24.3	45.3	70.5	102	132	162
Stainless Steel A4			12.2	21.2	39.5	61.7	89.0	65.9	80.6



ET-HP® High-Performance Epoxy Adhesive — Rebar Grade B500 (DIN 488-2)

Installation Data

Description	Symbol	Units	Rebar Size (mm)						
			10	12	16	20	25	28	32
Drill Hole Diameter	d_o	mm	14	16	20	25	32	35	40
Minimum Embedment Depth	$h_{ef,min}$		60	70	80	90	100	115	130
Maximum Embedment Depth	$h_{ef,max}$		200	240	320	400	500	560	640

Concrete Thickness, Edge Distance and Spacing

Description	Symbol	Units	10	12	16	20	25	28	32
Minimum Concrete Thickness	h_{min}	mm	$h_{ef} + 5d_o$						
Minimum Edge Distance	c_{min}		45						70
Minimum Spacing	s_{min}		76						152
Critical Edge Distance	$c_{cr,N}$		$1.5 \times h_{ef}$						
Critical Spacing	$s_{cr,N}$		$3 \times h_{ef}$						

Design Resistance — Single Rebar, No Concrete Edge or Spacing Influence

Description	Symbol	Units	10	12	16	20	25	28	32
Embedment Depth	h_{ef}	mm	80	110	140	180	220	240	260
Minimum Concrete Thickness			130	170	220	280	345	380	420
Uncracked Concrete									
TENSION	N_{Rd}	kN	**10.6**	**17.6**	**29.8**	**47.9**	**73.2**	**89.4**	**111**
SHEAR	V_{Rd}		**15.6**	**22.5**	**39.9**	**61.8**	**97.2**	**122**	**159**

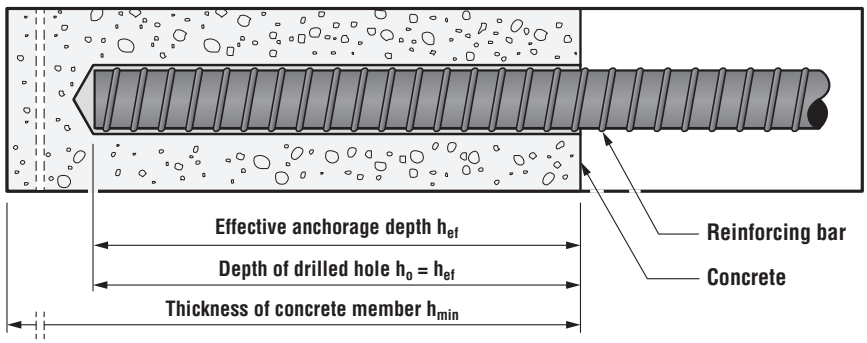
Rebar Strength Tension

Description	Symbol	Units	10	12	16	20	25	28	32
Design Resistance	$N_{Rd,s}$	kN	28.0	40.3	71.8	112	176	220	288
Nominal Yield Strength	f_{yk}		38.8	55.8	99.5	156	243	305	398
Nominal Tensile Strength	f_{uk}		43.0	62.0	110	173	270	339	443

Rebar Strength Shear

Description	Symbol	Units	10	12	16	20	25	28	32
Design Resistance	$V_{Rd,s}$	kN	15.6	22.5	39.9	61.8	97.2	122	159

1. Concrete strength is 31 MPa (cylinder) unreinforced, hole condition is "dry", and temperature range 24°C long-term/43°C short-term.
2. Tabulated loads are valid at critical spacing and critical edge distance only.
   For spacing and edge distance influence, use Simpson's Anchor Designer™ Software for analysis.
3. All design resistances are derived from the product's ICC ESR (ACI 355.4 testing, ACI 318 Design).
4. Nominal yield strength (f_{yk}) for Gr 500B Rebar is determined by the equation: $f_{yk} = 500$ MPa x A_{nom}
   Nominal tensile strength (f_{uk}) for Gr 500B Rebar is determined by the equation: $f_{uk} = 550$ MPa x A_{nom}



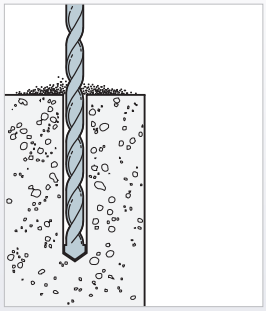
Epoxy Adhesive Installation Instructions

Consist of Part A, B and C

NOTE: Always check expiration date on product label. Do not use expired product.

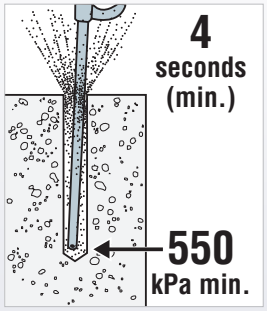
WARNING: When drilling and cleaning hole, use eye and lung protection. When installing adhesive, use eye and skin protection.

A. Hole Preparation — Horizontal, Vertical and Overhead Applications



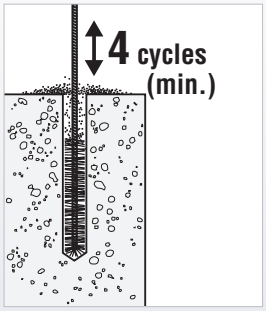
1. Drill

Drill hole to specified diameter and depth.



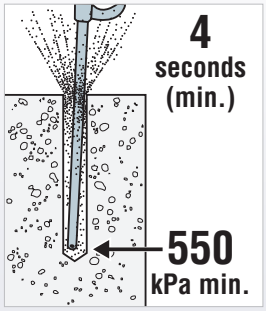
2. Blow

Remove dust from hole with oil-free compressed air for a minimum of 4 seconds.



3. Brush

Clean with a nylon brush for a minimum of 4 cycles.



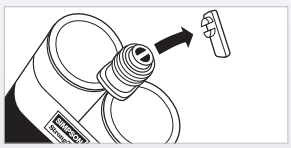
4. Blow

Remove dust from hole with oil-free compressed air for a minimum of 4 seconds.

B. Cartridge Preparation

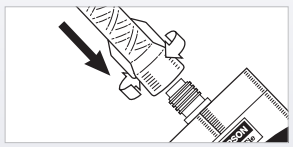
1. Check

Check expiration date on product label. **Do not use expired product.** Product is usable until end of printed expiration month.



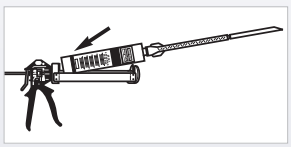
2. Open

Open cartridge per package instructions.



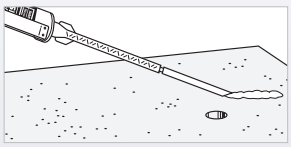
3. Attach

Attach supplied Simpson Strong-Tie® nozzle to cartridge. (Do not modify or use alternate nozzle)



4. Insert

Insert cartridge into appropriate Simpson Strong-Tie® dispensing tool.



5. Dispense

Dispense and discard to the side first part of resin until it is properly mixed (minimum 3 complete trigger pulls).

Epoxy Adhesive Installation Instructions

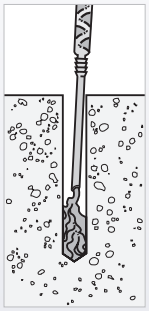
SOLID BASE MATERIALS

NOTE: Nozzle extensions may be needed for deep holes.

C. Filling the Hole — Vertical Anchorage for Threaded Rod or Rebar

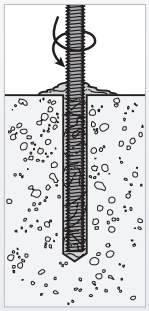
DRY AND DAMP HOLES:

NOTE: If standing water is present, it must be removed with compressed air



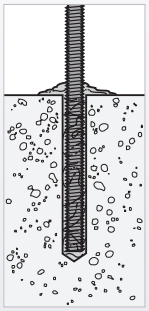
1. Fill

Fill hole ½–⅔ full, starting from bottom of hole to prevent air pockets. Withdraw nozzle as hole fills up.



2. Insert

Insert clean, oil free anchor, turning slowly until the anchor contacts the bottom of the hole. Adhesive must be present above concrete surface.



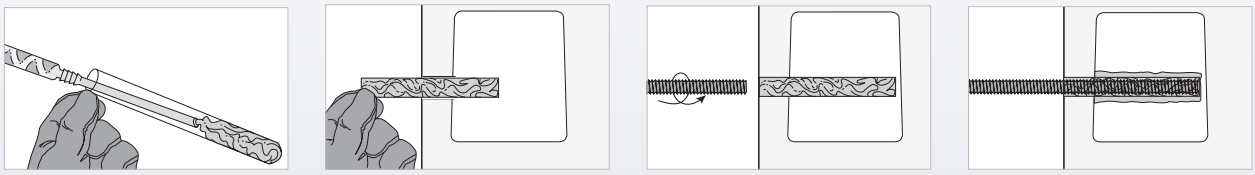
3. Do Not Disturb

Do not disturb anchor until fully cured. (See cure schedule for specific adhesive.)

Epoxy Adhesive Installation Instructions

HOLLOW BASE MATERIALS AND UNREINFORCED BRICK MASONRY

C. Filling the Hole — When Anchoring with Screens



1. Fill
Fill screen completely. Fill from the bottom of the screen and withdraw the nozzle as the screen fills to prevent air pockets. (Optimesh® screens: Close integral cap after filling.)

2. Insert
Insert adhesive filled screen into hole.

3. Insert
Insert clean, oil-free anchor, turning slowly until the anchor contacts the bottom of the hole.

4. Do Not Disturb
Do not disturb anchor until fully cured. (See cure schedule for specific adhesive.)

Adhesive Anchors

Estimating Guides for SET-XP® and ET-HP® Adhesives

Calculation Assumptions

25% waste used in calculations

Contact Simpson Strong-Tie
for estimation not covered in these tables.

Threaded Rod — Number of holes per 650 ml Cartridge

Rod Dia. (mm)	Drill Bit Dia. (mm)	Threaded Rod in Solid Base Material Hole Depth (mm)																		
		50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
10	12	158	106	79	63	53	45	40	35	32	29	26	24	23	21	20	19	18	17	16
12	14	124	82	62	49	41	35	31	27	25	22	21	19	18	16	15	15	14	13	12
16	18	82	55	41	33	27	23	20	18	16	15	14	13	12	11	10	10	9	9	8
20	24	40	26	20	16	13	11	10	9	8	7	7	6	6	5	5	5	4.4	4.2	4.0
22	25	41	28	21	17	14	12	10	9	8	8	7	6	6	6	5	5	4.6	4.4	4.1
24	28	31	21	15	12	10	9	8	7	6	6	5	5	4.4	4.1	3.9	3.6	3.4	3.3	3.1
27	30	31	20	15	12	10	9	8	7	6	6	5	5	4.4	4.1	3.8	3.6	3.4	3.2	3.1
30	35	20	13	10	8	7	6	5	4.4	4.0	3.6	3.3	3.0	2.8	2.6	2.5	2.3	2.2	2.1	2.0

Estimate only. Actual usage may vary from these values depending on waste

Rebar Dowels — Number of holes per 650 ml Cartridge

Rebar Size	Drill Bit Dia. (mm)	Threaded Rod in Solid Base Material Hole Depth (mm)																		
		50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
10	14	107	72	54	43	36	31	27	24	21	20	18	17	15	14	13	13	12	11	11
12	16	90	60	45	36	30	26	23	20	18	16	15	14	13	12	11	11	10	9	9
16	20	67	45	34	27	22	19	17	15	13	12	11	10	10	9	8	8	7	7	7
20	25	43	29	22	17	14	12	11	10	9	8	7	7	6	6	5	5	5	5	4.3
25	30	34	23	17	14	11	10	9	8	7	6	6	5	5	5	4.3	4.0	3.8	3.6	3.4
28	35	22	15	11	9	7	6	6	5	4.4	4.0	3.7	3.4	3.1	2.9	2.8	2.6	2.4	2.3	2.2
32	40	17	11	8	7	6	5	4.2	3.7	3.4	3.1	2.8	2.6	2.4	2.2	2.1	2.0	1.9	1.8	1.7

Estimate only. Actual usage may vary from these values depending on waste

AT-HP® Blue High-Performance Methacrylate Anchoring Adhesive

AT-HP® Blue is a styrene free methacrylate resin for high performance fixing applications of threaded rod and rebar into concrete.

Features

- Fast cure Colour change technology — changes from blue to grey when cured
- All-weather
- Fire exposure rated
- Low odour
- Heavy Loads
- Each cartridge is supplied with 2 mixing nozzles

Applications

- Timber Bottom Plate and Holdown Fixing
- Threaded Rod Anchoring
- Rebar Dowelling
- Balconies
- Facade
- Structural Steel
- Dry and Wet Concrete

Base Material

- Normal and Lightweight Concrete
- Grout-filled and Hollow* Concrete Block
- Solid and Hollow* Brick

*When used in conjunction with screen tubes

Approvals

- Complies with AS5216
- ETA 14/0383 (Concrete);
- ETA 13/0416 (Masonry)
- CSTB Fire Test N° 26045738
- BRANZ Appraisal 983 (2018) for applications related to bottom plate fixings and holdown applications per NZS 3604 using AT-HP® Blue.
- Transport and Main Roads (QLD) product approval (Threaded rod)

Installation

Refer to page 53 for installation procedures.

Refer to page 56 for cartridge usage estimation guide.

Shelf Life

18 months from date of manufacture in unopened cartridge.

Storage Conditions

Store between 5–25°C. To store partially used cartridges, leave hardened nozzle in place. To re-use, attach new nozzle.

Colour

Resin — white, hardener — bright blue. When properly mixed, AT-HP® Blue adhesive will be a uniform teal-blue colour. Changes from teal-blue to grey when cured.

Note: Concerning the version of the mortar with changing colour proof, after the minimum curing time the blue coloured injection mortar changed into grey. The curing colour proof is available for standard version of the mortar only, and the curing colour proof is working above 5°C.

See colour indicator on page 55 for further information.

AT-HP280BLUE-AU
(Includes 2 mixing nozzles MN1)

European Technical Approval

CSTB FIRE TEST N°26045738

BRANZ Appraised
Appraisal No.983 [2018]

Scan this QR code to download the BRANZ Appraisal
http://www.strongtie.co.nz/pdf/codes/BRANZ-APPROVAL-983.pdf

AT-HP® Blue high performance, all-weather methacrylate anchoring adhesive for concrete and masonry with threaded rod and rebar, changes from teal-blue to grey when cured to give a visual representation when the chemical anchor is ready to load.

AT-HP® Blue High-Performance Methacrylate Anchoring Adhesive

Working and Curing Time Schedule

Mortar Temperature	Base Material Temperature	Gel Time (Working Time) in Dry/Wet* Concrete	Curing Time in Dry/Wet* Concrete
T_{mortar}	$T_{base\ material}$	t_{gel}	t_{cure}
+5°C	-5°C to -1°C	15 min	9 h
+5°C	0°C to 4°C	12 min	4 h
+5°C	5°C to 9°C	9 min	1.5 h
+10°C	10°C to 19°C	4 min	60 min
+20°C	20°C to 29°C	1 min	30 min
+30°C	30°C and above	< 1 min	20 min

Note: Concerning the version of the mortar with changing colour proof, after the minimum curing time the blue coloured injection mortar changed into grey. The curing colour proof is available for standard version of the mortar only, and the curing colour proof is working above 5°C.
*Installation in water-filled holes is not allowed.

In-Service Temperature*

Temperature Range I		Temperature Range II	
Maximum **Long** Term Temperature	Maximum **Short** Term Temperature	Maximum **Long** Term Temperature	Maximum **Short** Term Temperature
+24°C	+40°C	+50°C	+80°C

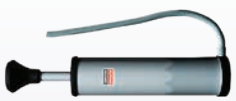
*See "Elevated In-Service Temperature" on page 13 for more information

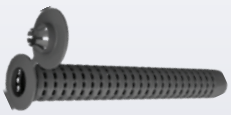
Cartridge Size and Accessories

Cartridge	Size	Box Qty	Model No.
	280 ml	12	**AT-HP280BLUE-AU**
	380 ml	12	**AT-HP380BLUE-AU**

Dispensing Tools	Description	Model No.
	Manual dispenser for **280 ml** cartridges	**DT300**
	Manual dispenser for **380 ml** cartridges	**DT380**

Mixing Nozzles		
	Mixing nozzle Pack of 10	**MN1-RP10**





Please see pages 58–60 for complementing items

AT-HP® Blue High-Performance Epoxy Adhesive — Gr 8.8 Threaded Rod

Installation Data

Description	Symbol	Units	Threaded Rod Size (mm)							
			M8	M10	M12	M16	M20	M24	M27	M30
Nominal Insert Diameter	d	mm	8	10	12	16	20	24	27	30
Drill Hole Diameter	d_o		10	12	14	18	22	28	30	35
Minimum Embedment Depth	$h_{ef,min}$		60	60	70	80	90	96	108	120
Maximum Embedment Depth	$h_{ef,max}$		160	200	240	320	400	480	540	600
Clearance Hole Diameter in Fixture	d_f		9	12	14	18	22	26	30	33
Installation Torque	$T_{inst, max}$	Nm	10	20	40	80	150	200	270	300

Concrete Thickness, Edge Distance and Spacing

Description	Symbol	Units	M8	M10	M12	M16	M20	M24	M27	M30
Minimum Concrete Thickness	h_{min}	mm	h_{ef} + 30mm (≥100mm)		$h_{ef} + 2_{do}$					
Minimum Edge Distance	c_{min}		40	50	60	80	100	120	135	150
Minimum Spacing	s_{min}		40	50	60	80	100	120	135	150
Critical Edge Distance	$c_{cr,N}$		$1.5 \times h_{ef}$							
Critical Spacing	$s_{cr,N}$		$3 \times h_{ef}$							

Design Resistance — Single Anchor, No Concrete Edge or Spacing Influence

Description	Symbol	Units	M8	M10	M12	M16	M20	M24	M27	M30
Embedment Depth	h_{ef}	mm	70	80	110	140	180	220	240	260
Minimum Concrete Thickness			100	110	140	176	228	276	300	330
Uncracked Concrete										
TENSION	N_{Rd}	kN	**5.6**	**7.8**	**14.4**	**22.5**	**33.1**	**51.6**	**63.3**	**68.6**
SHEAR	V_{Rd}		**11.2**	**15.7**	**27.0**	**45.0**	**66.4**	**103**	**127**	**137**

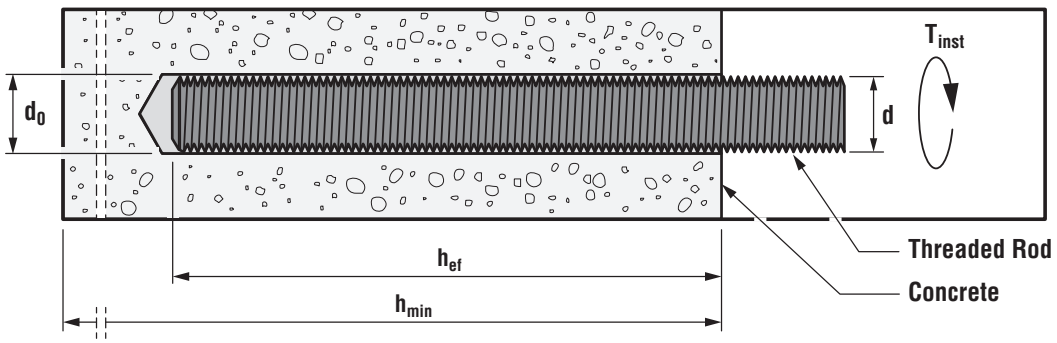
1. Concrete strength is 30 MPa (cylinder) unreinforced, hole condition is "dry", and temperature range 24°C long-term/43°C short-term.
2. Tabulated loads are valid at critical spacing and critical edge distance only.
   For spacing and edge distance influence, use Simpson's Anchor Designer™ Software for analysis.
3. N_{Rd} and V_{Rd} is based on use of a Grade 8.8 threaded insert. Verify capacity if using a different steel grade.
4. All design resistances are derived from the product's ETA (European Technical Assessment).

Steel Design Resistance (Tension)

Description	Symbol	Units	M8	M10	M12	M16	M20	M24	M27	M30
Steel Grade 5.8	$N_{Rd,s}$	kN	12.2	19.3	28.0	52.7	82.0	118	153	187.0
Steel Grade 8.8			19.5	30.9	44.7	84.0	131	188	245	299.0
Stainless Steel A4			13.7	21.7	31.6	58.8	92.0	132	80.2	98.1

Steel Design Resistance (Shear)

Description	Symbol	Units	M8	M10	M12	M16	M20	M24	M27	M30
Steel Grade 5.8	$V_{Rd,s}$	kN	7.4	11.6	16.8	31.2	48.8	70.4	92.0	112
Steel Grade 8.8			11.8	18.6	27.0	50.4	78.4	113	147	150
Stainless Steel A4			8.2	13.0	19.2	35.3	55.1	79.5	48.3	58.9



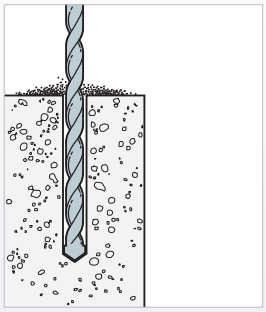
AT-HP® Blue Installation Instructions

Consist of Part A, B and C

NOTE: Always check expiration date on product label. Do not use expired product.

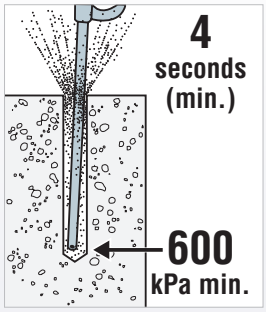
WARNING: When drilling and cleaning hole, use eye and lung protection. When installing adhesive, use eye and skin protection.

A. Hole Preparation — Horizontal, Vertical and Overhead Applications



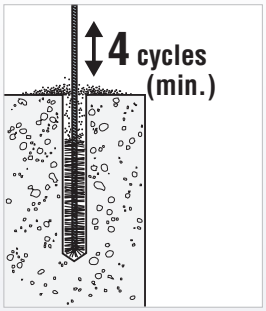
1. Drill

Drill hole to specified diameter and depth.



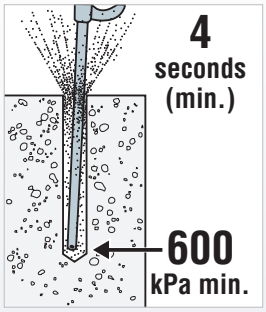
2. Blow

Remove dust from hole with oil-free compressed air for a minimum of 4 seconds.



3. Brush

Clean with a nylon brush for a minimum of 4 cycles.



4. Blow

Remove dust from hole with oil-free compressed air for a minimum of 4 seconds.

Concrete Option 7

2x BLOW (hand pump/600kPa), **4x BRUSH**, **2x BLOW** (hand pump/600kPa). *Compressed air (600kPa) for drilled holes h_{ef} 10d or > Ø22 mm.*

Rebar

2x BLOW (600kPa), **2x BRUSH**, **2x BLOW** (600kPa).

Masonry, Solid

2x BLOW (hand pump), **2x BRUSH**, **2x BLOW** (hand pump).

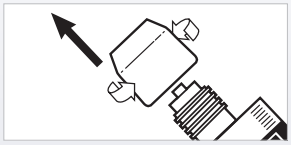
Masonry, Perforated and Hollow Bricks

2x BRUSH.

B. Cartridge Preparation

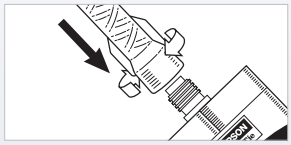
1. Check

Check expiration date on product label. **Do not use expired product.** Product is usable until end of printed expiration month.



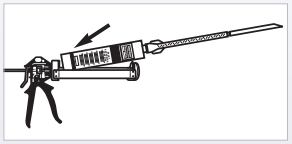
2. Open

Open cartridge per package instructions.



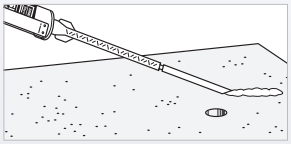
3. Attach

Attach supplied Simpson Strong-Tie® nozzle to cartridge. (Do not modify or use alternate nozzle)



4. Insert

Insert cartridge into appropriate Simpson Strong-Tie® dispensing tool.



5. Dispense

Dispense and discard to the side first part of resin until it is properly mixed (minimum 3 complete trigger pulls). See colour indicator on page 55.

AT-HP® Blue Installation Instructions

CONCRETE

C. Filling the Hole — Vertical Anchorage for Threaded Rod or Rebar

1. Fill

Inject resin using a Simpson Strong-Tie® dispensing tool. Fill hole approximately two-thirds full, starting from bottom of hole, withdraw the nozzle after each trigger to prevent air pockets.

2. Insert

Insert clean, oil-free threaded rod/rebar, turning slowly until anchor/threaded rod reaches bottom of hole. Excess adhesive must be present above surface of hole.

3. Set

Rebar/threaded rod can be adjusted and/or more resin added before working time elapses. Refer to working times on page 51.

4. Do Not Disturb

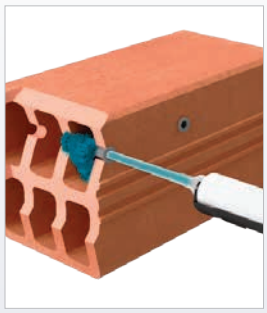
***Do not disturb the threaded rod/rebar until fully cured.** Check the colour of your adhesive, it must turn grey. See colour indicator guide on page 55, and cure schedule.

MASONRY

C. Filling the Hole — Vertical Anchorage for Threaded Rod or Rebar

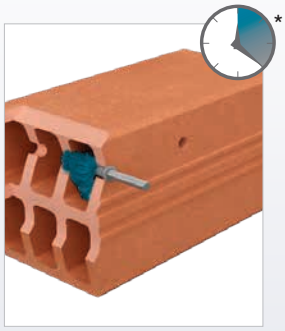
1. Insert

Insert Simpson Strong-Tie® sieve.



2. Fill

Fill sieve by withdrawing nozzle one graduation after each trigger pull of Simpson Strong-Tie® dispensing tool.

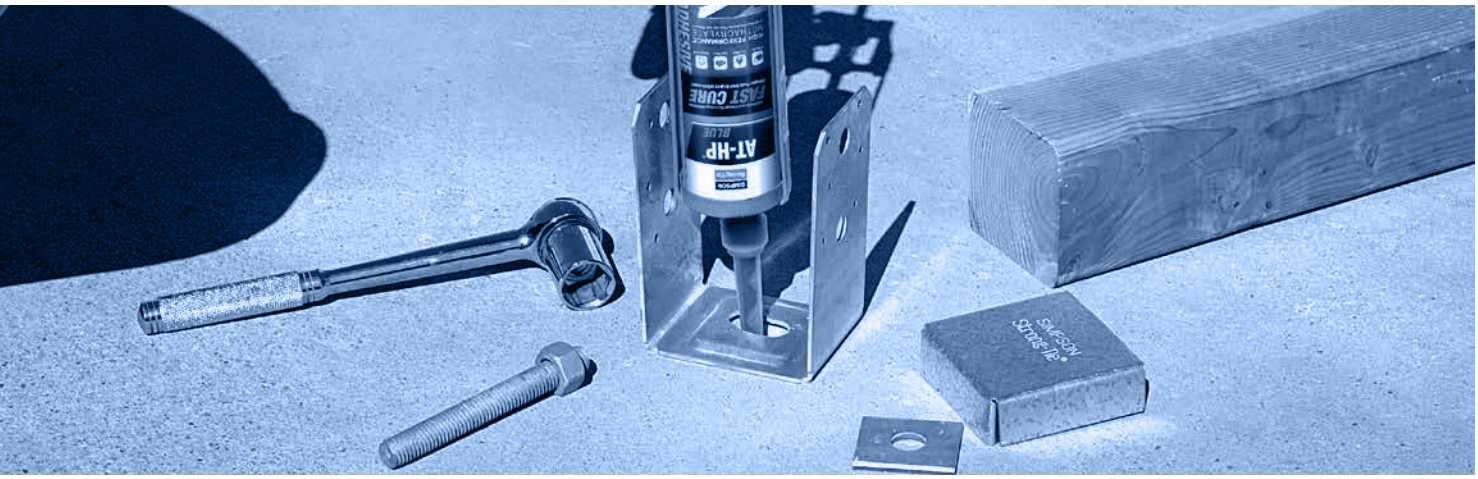


3. Insert

Insert clean, oil-free anchor, turning slowly until the anchor contacts the bottom of the sieve.

4. Do Not Disturb

Do not disturb anchor until fully cured. (See cure schedule for specific adhesive.)



AT-HP® Blue Colour Indicator Guide

The curing colour proof works from +5°C

NOTE: Adhesive colours pictured may vary, use as a guide only. Refer to curing times on page 51.

NOT MIXED
Bright blue,
continue to purge

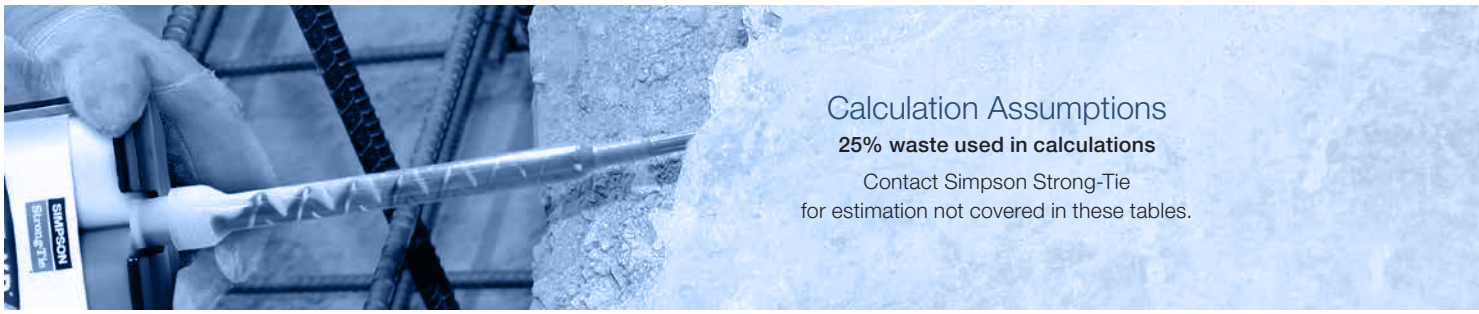
MIXED
Uniform teal blue,
ready to inject

CURED
Solid grey,
ready to load

AT-HP Blue changes from blue to grey when cured.
The colour change process gives a visual indication that the chemical anchor has cured and is ready to load.

Adhesive Anchors

Estimating Guides for AT-HP® Blue Adhesives



Calculation Assumptions

25% waste used in calculations

Contact Simpson Strong-Tie
for estimation not covered in these tables.

Threaded Rod — Number of holes per **280 ml** Cartridge

Rod Dia. (mm)	Drill Bit Dia. (mm)	Threaded Rod in Solid Base Material Hole Depth (mm)																		
		50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
8	10	91	61	45	36	30	26	23	20	18	17	15	14	13	12	11	11	10	10	9
10	12	68	45	34	27	23	19	17	15	14	12	11	10	10	9	9	8	8	7	7
12	14	53	36	27	21	18	15	13	12	11	10	9	8	8	7	7	6	6	6	5
16	18	35	24	18	14	12	10	9	8	7	6	6	5	5	5	4.4	4.1	3.9	3.7	3.5
20	22	25	17	13	10	8	7	6	6	5	5	4.2	3.9	3.6	3.4	3.1	3.0	2.8	2.7	2.5
24	28	13	9	7	5	4.4	3.8	3.3	3.0	2.7	2.4	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3
27	30	13	9	7	5	4.4	3.8	3.3	2.9	2.6	2.4	2.2	2.0	1.9	1.8	1.6	1.5	1.5	1.4	1.3
30	35	9	6	4.3	3.4	2.8	2.4	2.1	1.9	1.7	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.9

Estimate only. Actual usage may vary from these values depending on waste

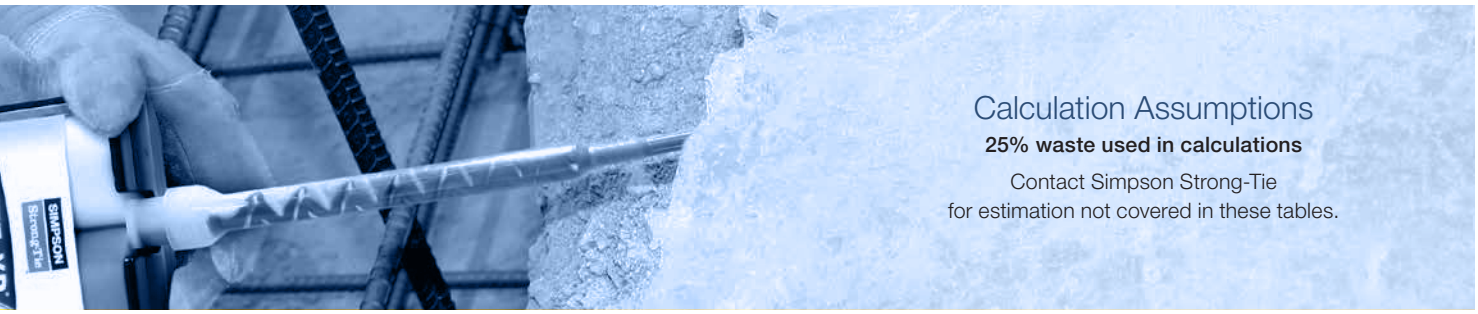
Threaded Rod — Number of holes per **380 ml** Cartridge

Rod Dia. (mm)	Drill Bit Dia. (mm)	Threaded Rod in Solid Base Material Hole Depth (mm)																		
		50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
8	10	123	82	62	49	41	35	31	27	25	22	21	19	18	16	15	15	14	13	12
10	12	93	62	46	37	31	26	23	21	19	17	15	14	13	12	12	11	10	10	9
12	14	72	48	36	29	24	21	18	16	14	13	12	11	10	10	9	9	8	8	7
16	18	48	32	24	19	16	14	12	11	10	9	8	7	7	6	6	6	5	5	5
20	22	34	23	17	14	11	10	9	8	7	6	6	5	5	5	4.3	4.0	3.8	3.6	3.4
24	28	18	12	9	7	6	5	5	4.0	3.6	3.3	3.0	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8
27	30	18	12	9	7	6	5	4.5	4.0	3.6	3.2	3.0	2.7	2.5	2.4	2.2	2.1	2.0	1.9	1.8
30	35	12	8	6	5	3.9	3.3	2.9	2.6	2.3	2.1	1.9	1.8	1.7	1.5	1.4	1.4	1.3	1.2	1.2

Estimate only. Actual usage may vary from these values depending on waste

Adhesive Anchors

Estimating Guides for AT-HP® Blue Adhesives



Calculation Assumptions

25% waste used in calculations

Contact Simpson Strong-Tie
for estimation not covered in these tables.

Rebar Dowels — Number of holes per **280 ml** Cartridge

Rebar Size	Drill Bit Dia. (mm)	Threaded Rod in Solid Base Material Hole Depth (mm)																		
		50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
8	12	57	38	28	23	19	16	14	13	11	10	9	9	8	8	7	7	6	6	6
10	14	46	31	23	19	15	13	12	10	9	8	8	7	7	6	6	5	5	5	5
12	16	39	26	19	16	13	11	10	9	8	7	6	6	6	5	5	5	4.3	4.1	3.9
14	18	33	22	17	13	11	10	8	7	7	6	6	5	5	4.4	4.2	3.9	3.7	3.5	3.3
16	20	29	19	15	12	10	8	7	6	6	5	5	4.5	4.2	3.9	3.6	3.4	3.2	3.1	2.9
20	25	19	12	9	7	6	5	5	4.1	3.7	3.4	3.1	2.9	2.7	2.5	2.3	2.2	2.1	2.0	1.9
25	30	15	10	7	6	5	4.2	3.7	3.3	2.9	2.7	2.4	2.3	2.1	2.0	1.8	1.7	1.6	1.5	1.5

Estimate only. Actual usage may vary from these values depending on waste

Rebar Dowels — Number of holes per **380 ml** Cartridge

Rebar Size	Drill Bit Dia. (mm)	Threaded Rod in Solid Base Material Hole Depth (mm)																		
		50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
8	12	77	51	38	31	26	22	19	17	15	14	13	12	11	10	10	9	9	8	8
10	14	63	42	31	25	21	18	16	14	13	11	10	10	9	8	8	7	7	7	6
12	16	53	35	26	21	18	15	13	12	11	10	9	8	8	7	7	6	6	6	5
14	18	45	30	23	18	15	13	11	10	9	8	8	7	6	6	6	5	5	5	5
16	20	39	26	20	16	13	11	10	9	8	7	7	6	6	5	5	5	4.4	4.2	3.9
20	25	25	17	13	10	8	7	6	6	5	5	4.2	3.9	3.6	3.4	3.2	3.0	2.8	2.7	2.5
25	30	20	13	10	8	7	6	5	4.4	4.0	3.6	3.3	3.1	2.8	2.7	2.5	2.3	2.2	2.1	2.0

Estimate only. Actual usage may vary from these values depending on waste

Adhesive Dispensing Tools

Our heavy-duty tools are designed to work with our cartridges for trouble-free dispensing.

Epoxy Adhesive Dispensing Tool

EDT22S Manual Dispensing Tool for 650 ml Cartridges

The EDT22S epoxy adhesive tool features a steel carriage and is engineered for high-volume, continuous use. The tool can be easily convert from dispensing a 650 ml 1:1 ratio cartridge to a 488 ml 2:1 ratio cartridge.[1]

1. Refer to operating instructions supplied with tool.

Model No.	Pack Qty	Ctn Qty
EDT22S	1	5

Acrylic Adhesive Dispensing Tools

DT380 Manual Dispensing Tool for 380 ml Cartridges

The DT380 features a steel carriage for ultimate durability and is engineered for continuous, high-volume use. The DT380 also features double-gripping plates that help extend tool life.

Model No.	Pack Qty	Ctn Qty
DT380	1	6

DT300 Manual Dispensing Tool for Single Cartridge Adhesives

The DT300 is a high-quality, standard size caulking tool for single cartridge adhesives. The DT300 features a steel carriage for ultimate durability and is engineered for continuous, high-volume use. The DT300 also features double-gripping plates that help extend tool life.

Model No.	Pack Qty	Ctn Qty
DT300	1	12

Hole Cleaning

Blow-Out Pump For Hole Cleaning

Manual blow pump ideal for cleaning dust from drilled holes prior to applying anchoring adhesive or installing mechanical anchors.

Model No.	Pack Qty	Ctn Qty
PUMP	1	4

Hole Cleaning Brushes

Brushes are used for cleaning drilled holes prior to adhesive anchor installation. Brushes have a twisted wire handle with nylon bristles.

Model No.	Description	For Hole Diameter (mm)	Pack Qty	Ctn Qty
ETB6	19mm x 101mm brush 406mm total length	12–20	1	24
ETB8	25.4mm x 101.6mm brush 406mm total length	20–24	1	24
ETB10	31.8mm x 101.6mm brush 737mm total length	24–30	1	24
ETB12	41.3mm x 152.4mm brush 864mm total length	30–35	1	24

Mixing Nozzles

Mixing nozzles are designed for the proper proportioning and mixing of the different adhesive formulations. Use only appropriate Simpson Strong-Tie mixing nozzle in accordance with Simpson Strong-Tie instructions. Modification or improper use of the mixing nozzle may impair epoxy or acrylic performance.

EMN22i

18-element mixing nozzle for use with 650 ml epoxy adhesives cartridges. This is a one-piece nozzle with integrated nut (separate retaining nut not required).

MN1

18-element, graduated mixing nozzle for use with all AT-HP® Blue cartridges. This is a one-piece nozzle with integrated nut (separate retaining nut not required).

Model No.	Description	Pack Qty	Packs per Ctn
EMN22i-RP5	Nozzle to suit 650 ml Epoxy Adhesive (NZ)	5	6
EMN22i-RP10	Nozzle to suit 650 ml Epoxy Adhesive (AU)	10	3
MN1-RP10	Nozzle to suit AT-HP® Blue Adhesive	10	6

Adhesive Screen Tubes

Screen tubes are vital to the performance of adhesive anchors in base materials that are hollow or contain voids, such as hollow block and brick.

Acrylic Adhesive Screen Tube

Features

- Integral Cap: Secures the rod in tube. Displays rod diameter, drill bit diameter and the Simpson Strong-Tie® "≠" sign for easy inspection. Prevents adhesive from running out of the front of the screen tube.
- Flange: Prevents the screen tube from slipping into over-drilled holes.
- Colour-Coded, Formula-Specific Mesh: The screen tube mesh is sized to allow only the right amount of adhesive to flow through the screen tube to bond with the base material while the balance remains in the screen to bond the rod. The acrylic screen tube mesh is grey.

Model No.	Description	For Hole Dia. (mm)	Pack Qty	Ctn Qty
SH12050-RP10	Suits M8 diameter rod	12 x 50mm	10	16
SH16085-RP6	Suits M8–M10 diameter rod	16 x 85mm	6	16
SH16130-RP6	Suits M8–M10 diameter rod	16 x 130mm	6	16
SH20085-RP4	Suits M12–M16 diameter rod	16 x 130mm	6	16

Acrylic Screen Tube (mesh is grey)

Adhesive Troubleshooting Guide

Problem	Cause	Solution
Material not flowing through nozzle.	Gelled or hardened adhesive in nozzle. Adhesive can harden in the nozzle at 21°C in about 5–7 minutes. As the air temperature increases, gel time is shorter.	Replace mixing nozzle.
	Too cold for adhesive to flow.	Keep Material in storage area: Store epoxy at 7–32°C; Store acrylic at 5–25°C.
	Surface is crusting.	Remove nozzle, dispense small amount of material, then replace nozzle.
	Obstruction in nozzle or on outlet of cartridge.	Change to new nozzle or remove obstruction from cartridge outlet.
	Product has expired	Acquire new product
Leakage from front of threaded section of cartridge.	Nozzle coupling nut is cross-threaded.	Remove coupling nut and reattach, taking care not to cross-thread.
	Cracked or punctured cartridge.	Do not attempt to dispense damaged cartridge.
Material leaking from back of cartridge during dispensing.	Excessive pressure resulting in swelling of cartridge or misalignment of retaining wiper.	Regulate air pressure on pneumatic tool.
		Do not overdrive manual tool.
		See problem 1 to find out why material is not flowing.
	Misalignment of tool push rods and cartridge.	Adjust/repair dispensing tool.
	Misalignment of cartridge.	Make sure cartridge is inserted correctly.
Resin (white) getting into hardener (black) chamber or vice versa.	Excessive pressure.	Do not overdrive manual tool.
		Check to see mixing nozzle is not filled with gelled or hardened epoxy.
		Make sure one of the cartridges is not leaking out of the bottom (refer to problem 3).
Hardener (black) only being dispensed or mixture is too dark.	Adhesive too cold to flow and mix properly.	Keep material in storage area: Store epoxy at 7–32°C; Store acrylic at 5–25°C.
Adhesive won't harden in hole.	Adhesive not mixed thoroughly.	Abandon hole and drill new hole. If not possible, call Simpson Strong-Tie.
		Make sure wipers on cartridge are equalised prior to dispensing and adhesive being dispensed is a uniform colour before filling holes. Attach nozzle and dispense adhesive to the side until properly mixed (uniform colour).
	Base material too cold for epoxy being used.	Allow more time for epoxy to cure.
		Wait for base material to reach minimum installation temperature to begin the curing process

Mechanical Anchors

Product Index

From complex infrastructure projects to do-it-yourself ventures, Simpson Strong-Tie offers a wide variety of anchoring products to meet virtually any need.

Our mechanical anchors are designed to install easily and securely into a variety of base materials — from concrete and brick to hollow and grout filled concrete block. They offer optimal performance even in the most demanding structural applications. For applications where there is a risk of concrete cracking, specific anchors have been designed and tested to offer reliability under these conditions.

Wedge Anchor — Throughbolt

A non-bottom-bearing, wedge-style expansion anchor for use in solid concrete or grout-filled masonry. Threaded studs are set by tightening the nut to the specified torque.

Features

Application of the installation torque draws the cone end of the stud into the expansion clip. The expansion clip expands and develops a frictional grip with the sidewalls of the hole. This gives the anchor its resistance to tension loads.

- Economical anchor for medium-duty loads

Applications

- Steel Fixtures
- Brackets
- Facades
- Ladders
- Railing
- Ladders

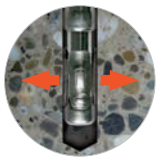
Base Material

- Uncracked Concrete

Finish

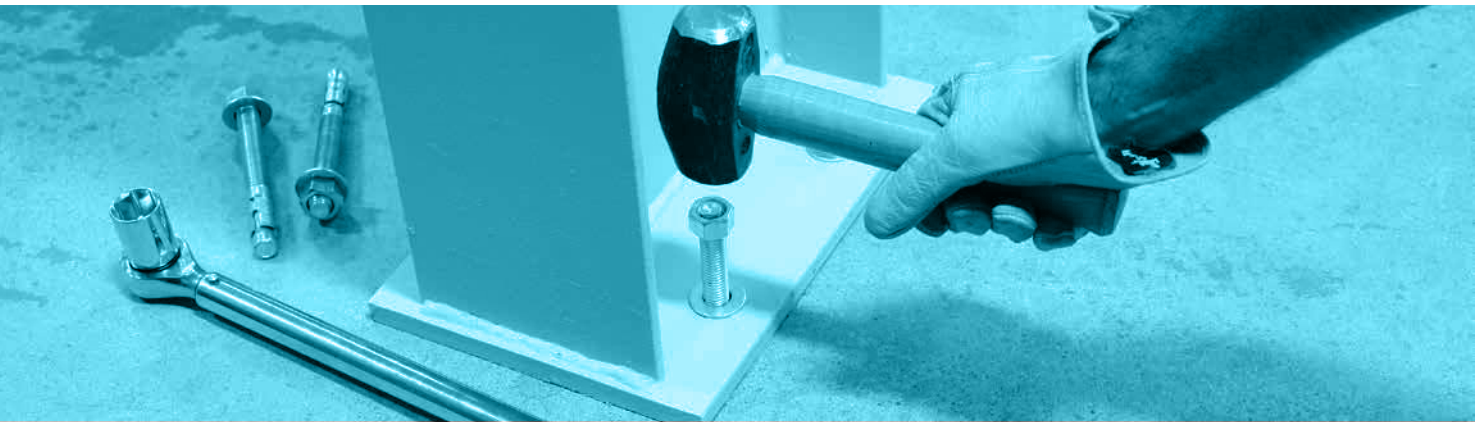
- Carbon Steel, Mechanically Galvanised

Application of the installation torque draws the cone end of the stud into the expansion clip.



The expansion clip expands and develops a frictional grip with the sidewalls of the hole. This gives the anchor its resistance to tension loads.

Wedge Anchor Installation

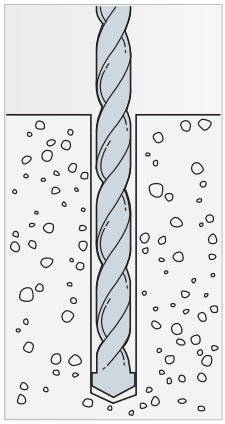


Holes in steel fixtures to be mounted should match the diameter range specified in the table on page 66.

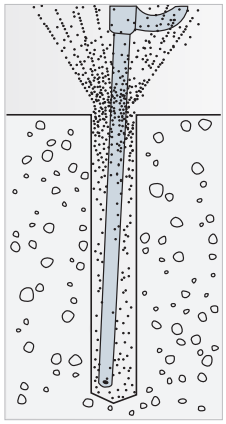
Do not use an impact wrench to set or tighten anchors.

CAUTION: Oversized holes in the base material will make it difficult to set the anchor and will reduce the anchor's load capacity.

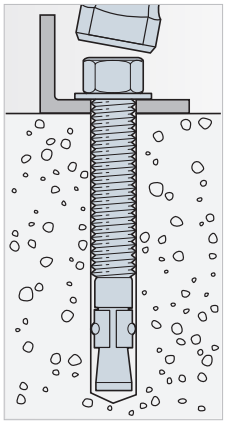
Installation Sequence



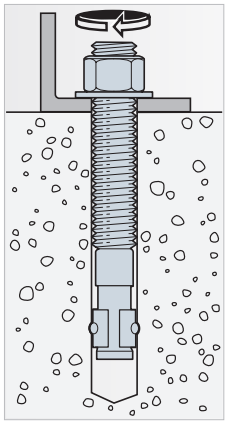
1. **Drill**
Drill a hole in base material using a carbide drill bit the same diameter as the nominal diameter of the anchor to be installed. Drill the hole to the specified embedment depth.



2. **Blow**
Blow it clean using compressed air. (Overhead installations need not be blown clean.) Alternatively, drill the hole deep enough to accommodate the embedment depth and the dust from drilling.



3. **Assemble**
Assemble the anchor with nut and washer so the top of the nut is flush with the top of the anchor. Place the anchor in the fixture, and drive it into the hole until the washer and nut are tight against the fixture.



4. **Tighten**
Tighten to the required installation torque.

Wedge Anchor Product Availability

Mechanically Galvanised Model No.	Ø x Depth of Drilled Hole (mm) d_o x h_1	Total Length (mm) L	Max. Fixture Thickness (mm) $t_{fix,max}$	Min. Fixture Hole Ø (mm) d_f	Wrench Size (mm)	Box Qty	Carton Qty
WA06060MG	6 x 55	60	5	7	10	500	100
WA06085MG		85	30			500	100
WA08068MG	8 x 65	68	5	9	13	250	50
WA08083MG		83	20			250	50
WA08093MG		93	30			200	50
WA08113MG		113	50			200	50
WA10083MG	10 x 70	83	10	12	17	200	50
WA10093MG		93	20			200	50
WA10103MG		103	30			200	50
WA10123MG		123	50			200	50
WA10143MG		143	70			100	50
WA10213MG		213	140			100	50
WA12085MG	12 x 90	85	5	14	19	125	25
WA12104MG [1]		104	5			100	25
WA12109MG		109	10			100	25
WA12119MG [1]		119	20			100	25
WA12129MG		129	30			100	25
WA12139MG [1]		139	40			100	25
WA12149MG		149	50			100	25
WA12179MG [1]		179	80			100	25
WA12199MG		199	100			50	25
WA16110MG	16 x 110	110	10	18	24	80	20
WA16151MG		151	30			40	20
WA16171MG		171	50			40	20
WA16201MG		201	80			20	10
WA20120MG	20 x 130	120	5	22	30	40	10
WA20173MG		173	30			40	10
WA20193MG		193	50			40	10
WA20263MG		263	120			20	10

1. Only available in New Zealand.

Wedge Anchor Master Technical Data Sheet

Installation Data

Description	Symbol	Units	Anchor Size				
			M6	M8	M10	M12	M16
Drill Hole Diameter	d_o	mm	6	8	10	12	16
Maximum Diameter of Drill Bit	$d_{cut,\ max}$		6.45	8.45	10.45	12.5	16.5
Drill Depth	h_1		55	65	70	90	110
Nominal Embedment Depth	h_{nom}		40	45	50	65	80
Anchor Length Range	L		60–85	68–163	78–233	104–259	151–261
Clearance Hole Diameter in Fixture	d_f		7	9	12	14	18
Maximum Thickness of Fixture	$t_{fix,max}$		45	100	160	160	160
Recommended impact screw driver with max. power output specified according to manufacturer's instructions.							
Installation Torque	$T_{inst,\ max}$	Nm	8	15	30	50	100

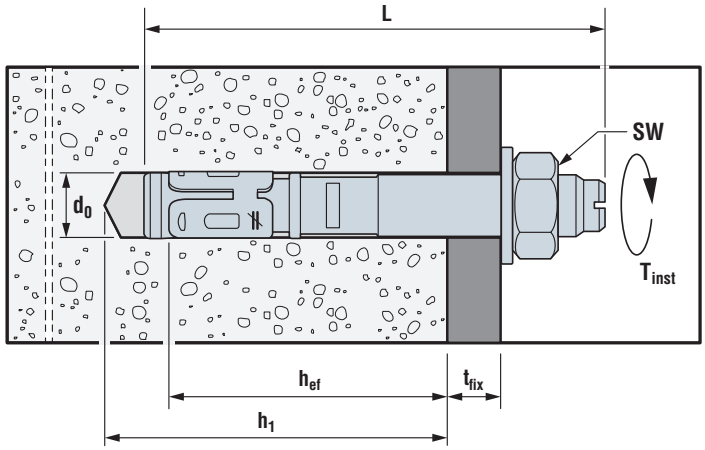
Concrete Thickness, Edge Distance and Spacing

Description	Symbol	Units	M6	M8	M10	M12	M16
Minimum Concrete Thickness	h_{min}	mm	100	100	100	130	160
Minimum Edge Distance	c_{min}		40	40	50	70	90
Minimum Spacing	s_{min}		30	40	50	70	90
Critical Edge Distance (cone)	$c_{cr,N}$		1. 5 x h_{ef}				
Critical Spacing (cone)	$s_{cr,N}$		3 x h_{ef}				
Critical Edge Distance (splitting)	$c_{cr,sp}$		80	115	125	180	200
Critical Spacing (splitting)	$s_{cr,sp}$		2 x $c_{cr,sp}$				

Design Resistance — Single Anchor, No Concrete Edge or Spacing Influence

Description	Symbol	Units	M6	M8	M10	M12	M16
Embedment Depth	h_{ef}	mm	40	45	50	65	80
Minimum Concrete Thickness	h_{min}		100	100	100	130	160
Uncracked Concrete							
TENSION	N_{Rd}	kN	**6.5**	**9.7**	**13.0**	**21.4**	**29.3**
SHEAR	V_{Rd}		**4.8**	**7.6**	**13.6**	**20.0**	**37.6**

1. Concrete strength is 30 MPa (cylinder) unreinforced.
2. Tabulated loads are based on no edge distance, no anchor spacing and installed at min. allowable concrete thickness and embedment depth
   For spacing and edge distance influence, use Simpson's Anchor Designer™ Software for analysis.
3. N_{Rd} and V_{Rd} is based on use of a Carbon Steel, Zinc plated bolt.
4. All design resistances are derived from the product's ETA (European Technical Assessment).



Titen HD® Heavy Duty Screw Anchor for Concrete and Masonry

The original high-strength screw anchor for use in cracked and uncracked concrete, as well as uncracked masonry. The Titen HD® offers low installation torque and outstanding performance. The Titen HD® demonstrates industry-leading performance.

Features

- Reduced Installation Time
- Low Installation Torque
- No Special Drill Bits
- Removable
- Built in Hex Head
- Easy Post-Installation Inspection
- Vibration and Shock Resistance
- Excellent Minimum Edge Distance Performance
- Ductile Anchor Through Proprietary Heat-Treatment Process

Applications

- Timber Bottom Plate and Holdown Fixings
- Structural Steel
- Subway/Railway Fixings
- Machinery and Equipment
- Concrete Formwork and Bracing
- Access Equipment: Ladders, Staircases
- Ledgers
- Overhead Anchoring (Tension Zones)
- Strut and Pipe Hangers
- Junction Boxes and Control Panels
- Racking, Mezzanines, Conveyors
- Furniture and Storage
- Guardrails, Railings, Fencing

Base Material

- Cracked and Uncracked Concrete
- Grout-filled and Hollow Concrete Block

Approvals

- Complies with AS5216
- ETA-12/0060 (Option 1)
- BRANZ Appraisal 983 (2018) for applications related to bottom plate fixings and holdown applications per NZS 3604 using Titen HD.

Finish

- Carbon Steel, Mechanically Galvanised

Serrated teeth facilitate cutting and reduce installation torque

Easy post-installation inspection: The head is stamped with the Simpson Strong-Tie "≠" sign and the anchor size in mm

Highly ductile: Can be bent to a right angle (90 degrees) and remain intact without snapping or breakage

European Technical Approval

BRANZ Appraised
Appraisal No.983 [2018]

Scan this QR code to download the BRANZ Appraisal
http://www.strongtie.co.nz/pdf/codes/BRANZ-APPROVAL-983.pdf

Proprietary heat treating process: Creates superior surface hardness for cutting into the hardest of base materials.

Scan this QR code to watch video of the Titen HD® Heavy Duty Screw Anchor for Concrete and Masonry.

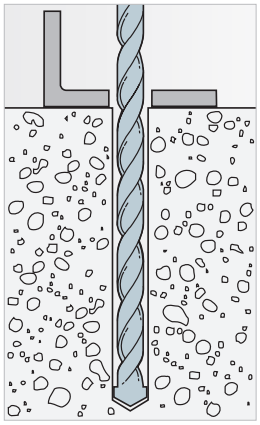
https://youtu.be/7KuXGsPfnQI

Titen HD® Installation

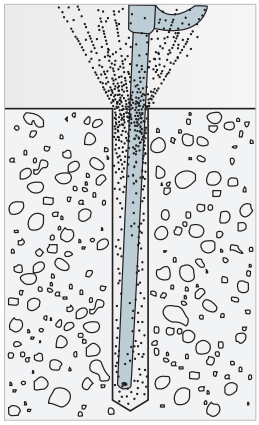
Holes in steel fixtures to be mounted should match the diameter range specified in the table on page 70.

CAUTION: Oversized holes in the base material will reduce or eliminate the mechanical interlock of the threads with the base material and will reduce the anchor's load capacity. Use a Titen HD screw anchor one time only. Installing the anchor multiple times may result in excessive thread wear and reduce load capacity.

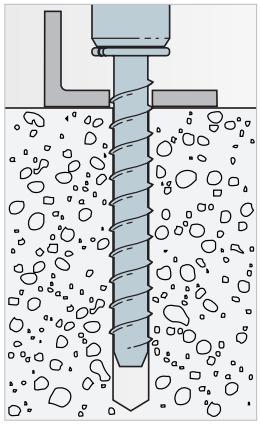
Installation Sequence



1. **Drill**
Drill a hole in the base material using a carbide drill bit the same diameter as the nominal diameter of the anchor to be installed. Drill the hole to the specified embedment depth plus 13 mm minimum to allow the thread tapping dust to settle

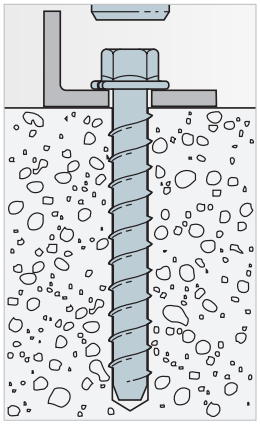


2. **Blow**
Blow it clean using compressed air. Overhead installations need not be blown clean. Alternatively, drill the hole deep enough to accommodate embedment depth and dust from drilling and tapping.



3. **Tighten**
Insert the anchor through the fixture and into the hole.

Tighten the anchor into the base material until the hex washer head contacts the fixture.



4. If the anchor will not install completely, remove the anchor and assure that all dust has been evacuated or drill the hole deeper. Begin re-installation of the anchor by hand to prevent cross-threading.

Do not use impact wrenches to install into hollow CMU.

Titen HD® Product Availability

Mechanically Galvanised[1,2,3] Model No.	Anchor and Drill Bit Size	Total[4] Length (mm) L	Max. Fixture Thickness (mm) $t_{fix,max}$	Fixture Hole Range[5] (mm)	Wrench Size (mm)	Box Qty	Carton Qty
THD08080MG	M8	80	15	10–12	13	50	200
THD08100MG		100	35			50	200
THD08120MG		120	55			50	100
THD08140MG		140	75			50	100
THD10060MG	M10	60	5	12–14	15	50	200
THD10080MG		80	5			50	200
THD10090MG		90	15			50	200
THD10100MG		100	25			50	200
THD10120MG		120	45			50	200
THD10140MG		140	65			50	100
THD10160MG		160	85			50	100
THD12075MG	M12	75	5	14–16	18	20	80
THD12110MG		110	15			20	80
THD12130MG		130	35			20	80
THD12150MG		150	55			20	80
THD12190MG [6]		190	95			20	80
THD12230MG [6,7]		230	—			25	50
THD16130MG	M16	130	15	19–22	24	10	40
THD16150MG		150	35			10	40
THD20150MG	M20	150	15	23–28	30	5	20
THD20170MG		170	35			5	10

1. Mechanically galvanised finish is ≥ 12 microns in accordance with EN ISO 12683, Type 1. Not for use in highly corrosive or outdoor environments.
2. Other sizes available in MG finish by special order, contact Simpson Strong-Tie for details.
3. MG finish ETA approval pending.
4. Length is measured from the underside of the head to the tip of the anchor.
5. The max. fixture holes are limited to the outside diameter of the anchor based on ETAG 001, Annex C.
6. Only available in New Zealand.
7. Titen HD® 12 x 230 mm Masonry Screw for retrofitting URM cavity walls for out-of-plane composite behaviour. See page 116 for further information.

Titen HD® Master Technical Data Sheet

Installation Data

Description	Symbol	Units	Anchor Size				
			M8	M10	M12	M16	M20
Drill Hole Diameter	d_o	mm	8	10	12	16	20
Maximum Diameter of Drill Bit	$d_{cut,\ max}$		8.45	10.45	12.5	16.5	20.55
Drill Depth	h_1		75	85	105	130	150
Nominal Embedment Depth	h_{nom}		65	75	95	115	135
Anchor Length Range	L		70–140	60–160	75–150	130–150	150–170
Clearance Hole Diameter in Fixture	d_f		12	14	16	22	26
Maximum Thickness of Fixture	$t_{fix,max}$		85	85	85	85	85
Recommended impact screw driver with max. power output specified according to manufacturer's instructions.							
Installation Torque	$T_{inst,\ max}$	Nm	200		515		

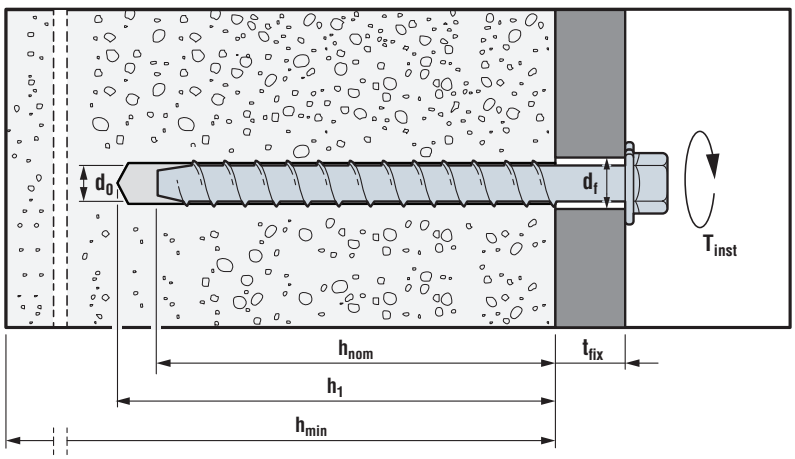
Concrete Thickness, Edge Distance and Spacing

Description	Symbol	Units	M8	M10	M12	M16	M20
Minimum Concrete Thickness	h_{min}	mm	105	125	150	180	220
Minimum Edge Distance	c_{min}		50	60	80	100	120
Minimum Spacing	s_{min}		50	60	80	100	120
Critical Edge Distance (cone)	$c_{cr,N}$		1. 5 x h_{ef}				
Critical Spacing (cone)	$s_{cr,N}$		3 x h_{ef}				
Critical Edge Distance (splitting)	$c_{cr,sp}$		1. 5 x h_{ef}				
Critical Spacing (splitting)	$s_{cr,sp}$		3 x h_{ef}				

Design Resistance — Single Anchor, No Concrete Edge or Spacing Influence

Description	Symbol	Units	M8	M10	M12	M16	M20
Embedment Depth	h_{ef}	mm	47	55	70	86	102
Minimum Concrete Thickness	h_{min}		105	125	150	180	220
Uncracked Concrete							
TENSION	N_{Rd}	kN	**5.1**	**7.1**	**16.9**	**20.3**	**33.8**
SHEAR	V_{Rd}		**11.7**	**18.3**	**25.2**	**46.7**	**73.6**
Cracked Concrete							
TENSION	N_{Rd}	kN	**4.1**	**5.1**	**8.1**	**16.9**	**23.7**
SHEAR	V_{Rd}		**11.7**	**18.3**	**25.2**	**46.7**	**60.2**

1. Concrete strength is 30 MPa (cylinder) unreinforced.
2. Tabulated loads are based on no edge distance, no anchor spacing and installed at min. allowable concrete thickness and embedment depth
   For spacing and edge distance influence, use Simpson's Anchor Designer™ Software for analysis.
3. N_{Rd} and V_{Rd} is based on use of a Carbon Steel, Zinc plated bolt, or mechanically galvanised.
4. All design resistances are derived from the product's ETA (European Technical Assessment).



Titen HD® Threaded Rod Hanger

The Titen HD® threaded rod hanger is a high-strength screw anchor designed to suspend threaded rod from concrete slabs and beams or concrete over steel in order to hang services such as pipes, cable trays and HVAC equipment. The anchor offers low installation torque with no secondary setting, and has been tested to offer industry-leading performance in cracked and uncracked concrete — even in seismic loading conditions.

Features

- Seismic rated — Meets NZS 4219 Section 3.10.5 for Seismic use (tested per ACI 355.2)
- Suitable for Cracked and Uncracked Concrete
- Drill Bit supplied with each box
- Thread design undercuts to efficiently transfer the load to the base material
- Serrated cutting teeth and patented thread design enable quick and easy installation
- Specialised heat-treating process creates tip hardness to facilitate cutting while the anchor body remains ductile

Applications

- Pipes
- Cable trays
- Electrical
- HVAC
- Suspended ceilings and equipment

Base Material

- Cracked and Uncracked Concrete
- Composite floor slabs (concrete over metal deck)
- Normal or lightweight concrete floor slabs

Approvals

- ICC ESR-2713

Finish

- Carbon Steel, Zinc Plated

THD10212RH

Seismic Rated

Serrated teeth facilitate cutting and reduce installation torque.

Hex head with **10 mm internal threaded rod coupler**

Highly ductile: Can be bent to a right angle (90 degrees) and remain intact without snapping or breakage.

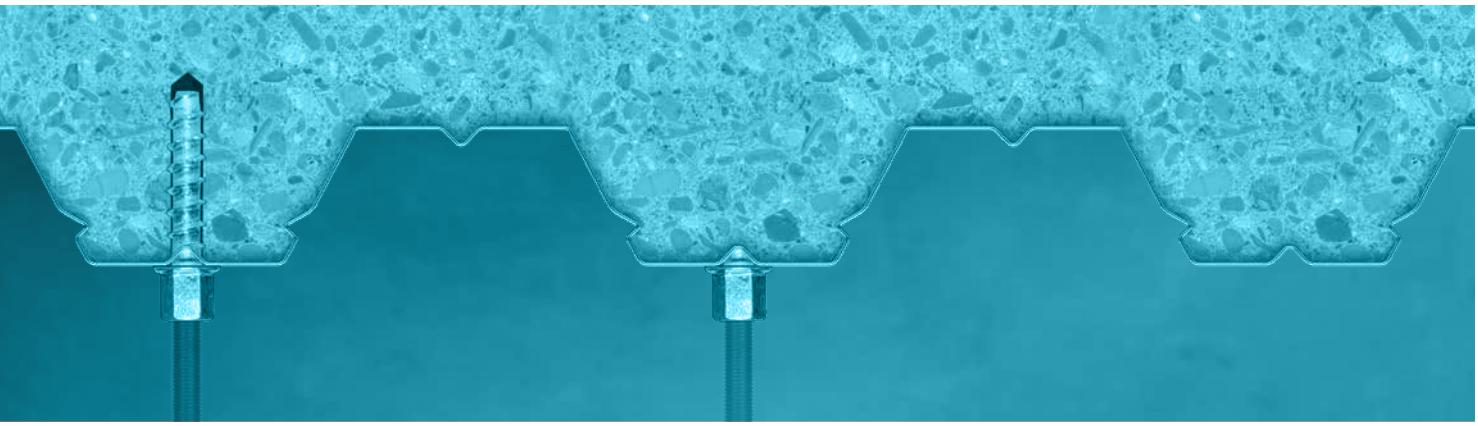
ICC ES (ACI 355.2)

Proprietary heat treating process: Creates superior surface hardness for cutting into the hardest of base materials.

Scan this QR code to watch video of the Titen HD® Threaded Rod Hanger.

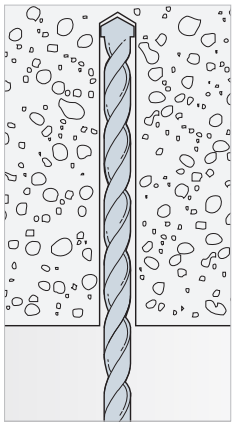
https://youtu.be/hjzDT0M41uo

Titen HD® Threaded Rod Hanger Installation

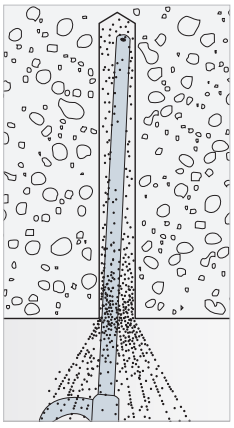


CAUTION: Oversized holes in the base material will reduce or eliminate the mechanical interlock of the threads with base material and will reduce the anchor's load capacity. Use a Titen HD rod hanger one time only. Installing the anchor multiple times may result in excessive thread wear and reduce load capacity.

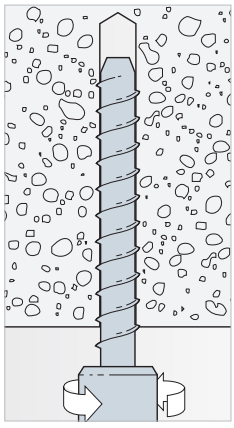
Installation Sequence



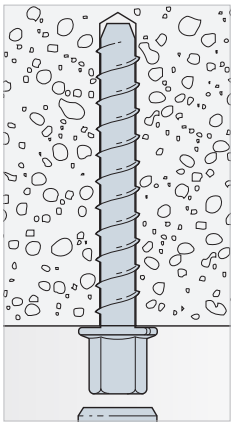
1. Drill a hole in the base material using a carbide drill bit the same diameter as the nominal diameter of the anchor to be installed. Drill the hole to the specified embedment depth plus 6 mm minimum to allow the thread tapping dust to settle



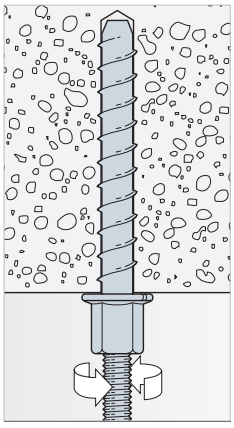
2. Blow
Blow the hole clean of dust and debris using compressed air.



3. Install
Install with a torque wrench, driver drill, hammer drill or cordless wrench with an applied torque of 20 Nm, up to a maximum of 65 Nm.



If the anchor will not install completely, remove the anchor and assure that all dust has been evacuated or drill the hole deeper. Begin re-installation of the anchor by hand to prevent cross-threading.



4. Insert
Fully insert threaded rod.

Titen HD® Threaded Rod Hanger Product Availability

Zinc Plated Model No.	Accepts Rod Dia. (mm)	Anchor and Drill Bit Size[1]	Total Length (mm) L	Min. Embedment Depth (mm)	Min. Hole Depth Overdrill (mm)	Wrench Size (mm)	Box Qty	Carton Qty
THD10212RH	M10	⅜"	64mm (2.5")	64	6	½"	100	200

1. ⅜" SDS drill bit supplied in each box.

Titen HD® Threaded Rod Hanger Design Information — CONCRETE

Titen HD® Threaded Rod Hanger Installation Information and Additional Data[1]

Characteristic	Symbol	Units	THD10212RH
Installation Information			
Rod Hanger Shank Diameter	d_o	in.	⅜
Drill Bit Diameter[2]	d_{bit}		
Maximum Installation Torque[3]	$T_{inst,max}$	Nm	65
Maximum Impact Wrench Torque Rating[4]	$T_{impact,max}$		200
Minimum Hole Depth	h_{hole}	mm	75
Embedment Depth	h_{nom}		64
Effective Embedment Depth	h_{ef}		45
Critical Edge Distance	c_{ac}		70
Minimum Edge Distance	c_{min}		45
Minimum Spacing	s_{min}		75
Minimum Concrete Thickness	h_{min}		100
Anchor Data			
Yield Strength	f_{ya}	MPa	669
Tensile Strength	f_{uta}		758
Minimum Tensile and Shear Stress Area	A_{se}	mm^2	64
Axial Stiffness in Service Load Range — Uncracked Concrete	β_{uncr}	N/mm	125,200
Axial Stiffness in Service Load Range — Cracked Concrete	β_{cr}		60,400

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D, which meets NZS 4219 Section 3.10.5
2. ⅜" SDS drill bit supplied in each box.
3. $T_{inst,max}$ is the maximum permitted installation torque for installations using a torque wrench.
4. $T_{impact,max}$ is the maximum permitted torque rating for impact wrenches.

Titen HD® Threaded Rod Hanger Design Information — CONCRETE SLAB

Titen HD® Threaded Rod Hanger Tension Strength Design Data for Installations in Concrete

Characteristic	Symbol	Units	THD10212RH
Anchor Category	1, 2 or 3	—	1
Embedment Depth	h_{nom}	mm	64
Steel Strength in Tension (ACI 318 Section D.5.1)			
Tension Resistance of Steel	N_{sa}	kN	48.4
Strength Reduction Factor — Steel Failure	ϕ_{sa}	—	0.65
Concrete Breakout Strength in Tension (ACI 318 Section D.5.2)			
Effective Embedment Depth	h_{ef}	mm	45
Critical Edge Distance	c_{ac}		70
Effectiveness Factor — Uncracked Concrete	k_{uncr}	—	10.1
Effectiveness Factor — Cracked Concrete	k_{cr}		7.2
Modification Factor	$\psi_{c,N}$		1.0
Strength Reduction Factor — Concrete Breakout Failure	ϕ_{cb}		0.65
Pullout Design Strength in Tension (ACI 318 Section D.5.3)			
Pullout Design Strength[1,2,3] — Uncracked Concrete (f'_c = 31 MPa)	$\phi N_{p,uncr}$	kN	**7.9**
Pullout Design Strength[1,2,3] — Cracked Concrete (f'_c = 31 MPa)	$\phi N_{p,cr}$		**4.8**
Tension Design Strength for Seismic Applications (ACI 318 Section D.3.3)			
Pullout Design Strength for Seismic Loads[4] (f'_c = 31 MPa)	$\phi N_{p,eq}$	kN	**3.6**

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D which meets NZS 4219 Section 3.10.5, except as modified below.
2. Design Values based on 31 MPa concrete compressive strength, Condition "B". For different compressive strengths or conditions, use Simpson's Anchor Designer™ Software for analysis.
3. For guidance on the appropriate strength reduction factors to be used for various load combinations, refer Simpson's Anchor Designer™ Software and ACI 318-08 Appendix D.
4. When the strength level earthquake force applied to the anchor exceeds 20% of the total factored anchor force, use the Seismic Pullout Design Strength value. Seismic Pullout Design Strength assumes concrete is cracked and applies ϕ_{eq} = 0.75.

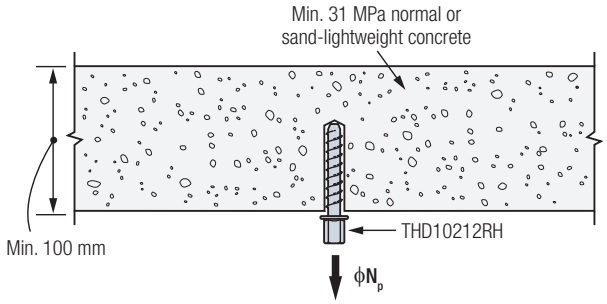


Figure 1. Installation in Concrete

Titen HD® Threaded Rod Hanger Design Information — COMPOSITE SLAB

Titen HD® Threaded Rod Hanger Tension Strength Design Data for Installations in the Lower and Upper Flute of Normal-Weight or Sand-Lightweight Concrete Through Metal Deck

Characteristic	Symbol	Units	THD10212RH
Minimum Hole Depth	h_{hole}	mm	75
Embedment Depth	h_{nom}		64
Effective Embedment Depth	h_{ef}		45
Pullout Design Strength — Uncracked Concrete[2,3,4]	$\phi N_{p,deck,uncr}$	kN	**5.0**
Pullout Design Strength — Cracked Concrete[2,3,4]	$\phi N_{p,deck,cr}$		**3.1**
Seismic Pullout Design Strength[7]	$\phi N_{p,deck,eq}$		**2.3**

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318 Appendix D which meets NZS 4219 Section 3.10.5, except as modified below.
2. Design Values based on 31 MPa concrete compressive strength, Condition "B". For different compressive strengths or conditions, use Simpson's Anchor Designer™ Software for analysis.
3. For anchors installed in the soffit of sand-lightweight or normal-weight concrete over metal deck floor and roof assemblies, as shown in Figure 2, calculation of the concrete breakout strength may be omitted.
4. In accordance with ACI 318 Section D.5.3.2, the nominal pullout strength in cracked concrete for anchors installed in the soffit of sand-lightweight or normal-weight-concrete-over-metal-deck floor and roof assemblies $N_{p,deck,cr}$ shall be substituted for $N_{p,cr}$. Where analysis indicates no cracking at service loads, the normal pullout strength in uncracked concrete $N_{p,deck,uncr}$ shall be substituted for $N_{p,uncr}$.
5. Minimum distance to edge of panel is $2h_{ef}$.
6. The minimum anchor spacing along the flute must be the greater of $3h_{ef}$ or 1.5 times the flute width.
7. When the strength level earthquake force applied to the anchor exceeds 20% of the total factored anchor force, use the Seismic Pullout Design Strength value. Seismic Pullout Design Strength assumes concrete is cracked and applies $\phi_{eq} = 0.75$.

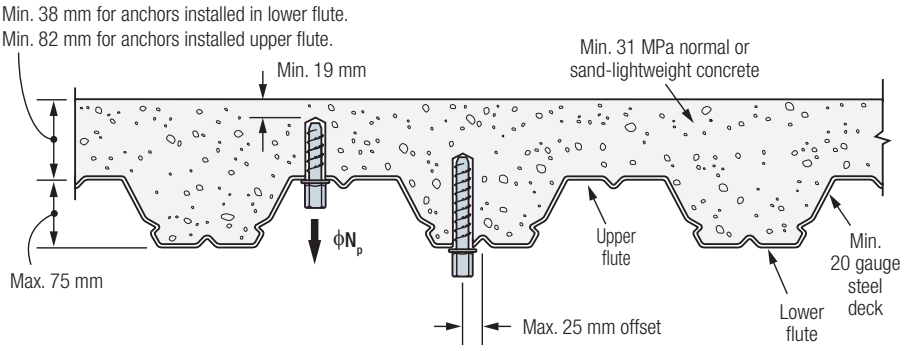
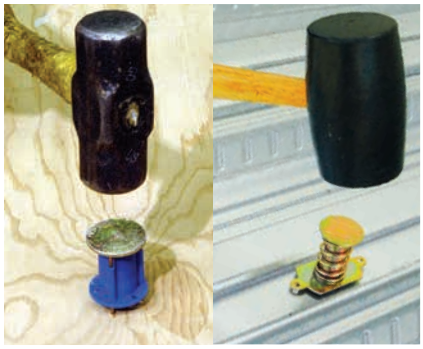


Figure 2. Installation in Concrete Over Metal Deck


Speed
Performance
Versatility
Blue Banger Hanger®
Cast-in-place, Internally-Threaded Rod Hanger

Eliminate Costly Overhead Installations

Speed



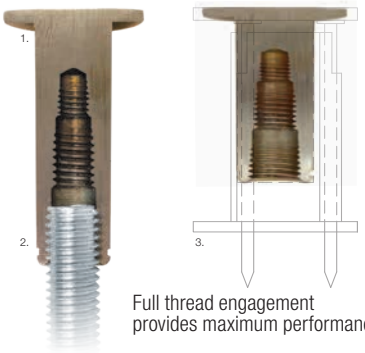
- Before the concrete pour, Blue Banger Hangers mount on forms or decking quickly and easily, speeding up installation.

- The 75 mm blue sleeve on the Metal-Deck insert makes it easy to locate the insert after the pour, even after fireproofing has been applied to the underside of the deck. It also protects the threads, so the rod installs easily every time.

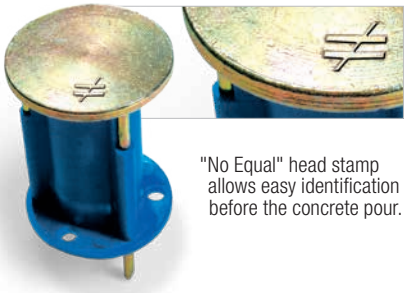
- On the Wood-Form insert, the blue ring acts as a locator after the pour and creates a countersunk recess to protect the threads.

Performance

1. Large flanged head provides high tension loads for overhead attachments.
2. Full thread engagement prevents the rod from stripping out of the insert.
3. Positive connection to the form or deck keeps the insert vertical and in the correct position before and during the pour ensuring that the insert stays where you put it.

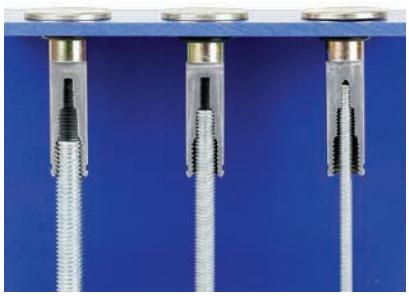


Full thread engagement provides maximum performance.



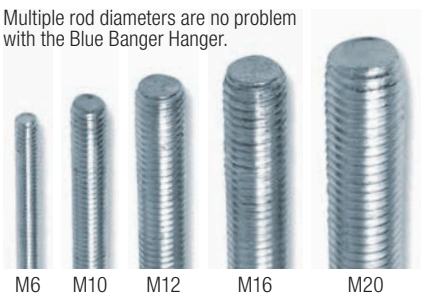
"No Equal" head stamp allows easy identification before the concrete pour.

Versatility



- Patented multi-thread design allows each insert to accept multiple diameters of threaded rod. Three sizes of Blue Banger Hanger can handle most applications, reducing contractor and distributor inventories.
- Multi-thread design allows threaded rod size to be changed after the anchor is in the concrete.

Multiple rod diameters are no problem with the Blue Banger Hanger.



Blue Banger Hanger® Cast-in-place, Internally-Threaded Rod Hanger

Multi-thread, cast-in-place wood-form inserts for cracked and uncracked concrete maximise jobsite efficiency and reduce inventory commitment. Also available in metal-roof-deck insert version, offering a low-profile design that does not interfere with roofing material.

Features

- Code listed under the IBC/IRC in accordance with AC446 for cracked and uncracked concrete applications, per ICC-ES ESR-3707
- Multi-thread design: Each insert accepts multiple rod diameters.

Wood-Form Insert Additional Features

- Blue plastic ring acts as an insert locator when forms are removed.
- Plastic ring creates a countersunk recess to keep internal threads clean from concrete residue.
- Nails snap off with the swipe of a hammer after the forms are removed.

Metal-Deck Insert Additional Features

- 75 mm Plastic sleeve keeps internal threads clean.
- Extended length of the sleeve allows easy location of the insert even with fireproofing on the underside of the deck. Also provides guidance to align threaded rod with the internal threads.
- Installed height of 50 mm allows the insert to be used on top of, or between, deck flutes.
- Compression spring keeps the insert perpendicular to the deck, even if it is bumped or stepped on after installation.

Applications

- Pipes
- Cable trays
- Electrical
- HVAC
- Suspended ceilings and equipment

Base Material

- Cracked and Uncracked Concrete

Approvals

- ICC-ES ESR-3707 (ACI 355.2)
- City of Los Angeles RR26030
- Factory Mutual 3024378
- Underwriters Laboratories File EX3605. Maximise pipe size information is listed within UL/FM reports.

Finish

- Carbon steel, Yellow-zinc-dichromate coating

Autodesk® Revit® drawings are available from our website — Resources/Drawings.

Seismic Rated

[M6, M10, M12]
[M10, M12, M16]
[M16, M20]

BBWF Wood-Form Insert
U.S. Patent 6,240,697B1
(Available in 3 stepped models)

[M6, M10, M12]
[M10, M12, M16]
[M16, M20]

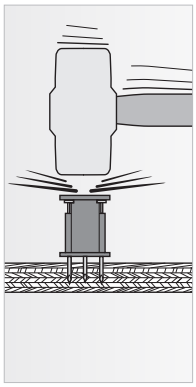
BBMD Metal-Deck Insert
U.S. Patent 6,240,697B1
(Available in 3 stepped models)

ICC ES (ACI 355.2)

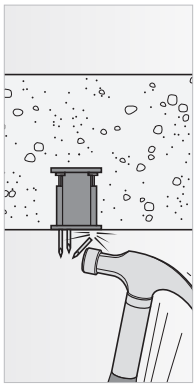
Multi-thread design for versatile threaded rod size options

Blue Banger Hanger® Installation

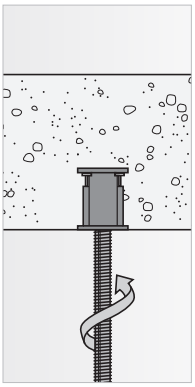
Wood-Form Insert Installation Sequence



1. Bang
Strike the top of the hanger and drive the 3 mounting nails into the forming material until the bottom of the hanger is flush with the bottom of the plywood. The hanger should be sitting 90° from the forming material.

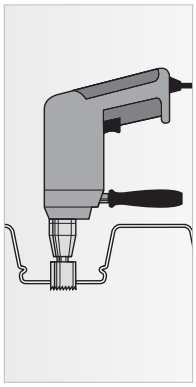


2. Snap
Once concrete is hardened, and forms are stripped, strike the mounting nails to break them off.

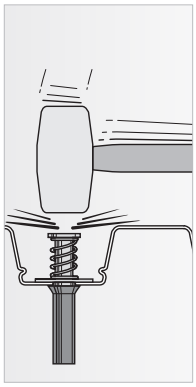


3. Thread
Insert the rod into the sleeve and thread it into the hanger.

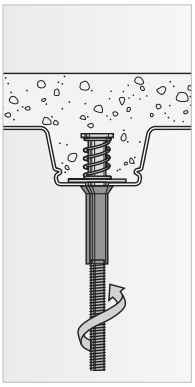
Metal-Deck Insert Installation Sequence



1. Drill
Drill a hole in the metal deck using the appropriate diameter bit as referenced in the table.



2. Bang
Insert the hanger in to the hole & strike the top so that the plastic sleeve is forced through the hole and expands against the bottom side of the deck. The anchor can also be installed by stepping on it.



3. Thread
Insert the rod into the sleeve and thread it into the hanger.

Blue Banger Hanger® Product Availability

Wood-Form Insert

For Rod Diameter (mm)	Model No.	Carton Qty.
M6, M10, M12	**BBWF0612**	200
M10, M12, M16	**BBWF1016**	150
M16, M20	**BBWF1620**	150

Metal-Deck Insert

For Rod Diameter (mm)	Deck Hole Diameter (mm)	Model No.	Carton Qty.
M6, M10, M12	21–22	**BBMD0612**	100
M10, M12, M16	29–30	**BBMD1016**	50
M16, M20	30–32	**BBMD1620**	50

Blue Banger Hanger® Wood-Form Insert Technical Information

Tension Loads in Normal-Weight Concrete

Model No.	Threaded Rod Dia. (mm)	Embed. Depth (mm)	Min. Edge Dist. (mm)	Min. Spacing (mm)	Tension Capacity Based on Concrete Strength		Tension Capacity Based on Rod Strength
					20 Mpa		Grade 5.8
					Characteristic	Design	Design
BBWF0612	M6	51	178	203	34.2	22.3	6.5
	M10						18.9
	M12						27.4
BBWF1016	M10	51	178	203	36.5	23.7	18.9
	M12						27.4
	M16						51.0
BBWF1620	M16	51	178	203	34.2	22.3	51.0
	M20						79.6

Shear Loads in Normal-Weight Concrete

Model No.	Threaded Rod Dia. (mm)	Embed. Depth (mm)	Min. Edge Dist. (mm)	Min. Spacing (mm)	Shear Capacity Based on Concrete Strength		Shear Capacity Based on Rod Strength
					20 Mpa		Grade 5.8
					Characteristic	Design	Design
BBWF0612	M12	51	178	203	30.3	22.7	15.8
BBWF1016	M16	51	178	203	36.5	27.4	29.4
BBWF1620	M20	51	178	203	39.0	29.2	45.9

1. Characteristic and design values in the tables are based on testing per ICC Evaluation Services, AC446.
   For tension design capacities, a 0.65 strength reduction factor is applied to the characteristic strength for concrete and the steel rod; For shear design capacities, a 0.75 strength reduction factor is applied to the characteristic strength for concrete and the steel rod.
2. The design value used shall be the lower of the concrete strength, steel rod strength, or governing local code requirements.
3. Design values may be used to resist seismic forces.
4. Shear loads shall be applied flush to the concrete surface.
5. Minimum concrete thickness shall be at least 2 x insert embedment depth.

Blue Banger Hanger® Metal-Deck Insert Technical Information

Tension Loads in Normal-Weight or Sand-Lightweight Concrete over Metal Deck

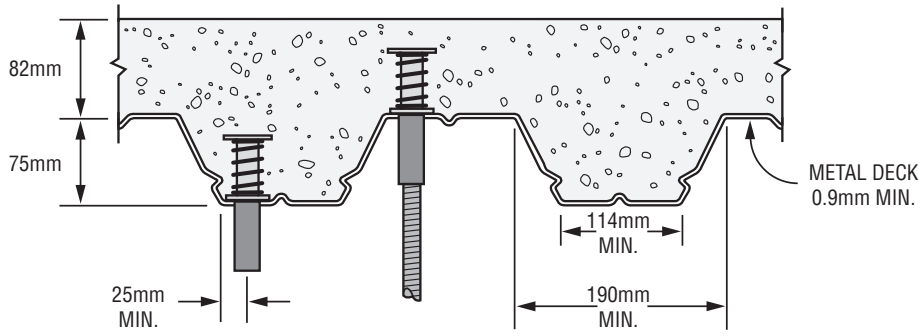
Model No.	Drill Bit Dia (mm)	Threaded Rod Dia. (mm)	Embed. Depth (mm)	Min. Edge Dist. (mm)	Min. Spacing (mm)	Tension Capacity Based on Concrete Strength				Tension Capacity Based on Rod Strength
						(Install in High Flute) 20.7 Mpa		(Install in Low Flute) 20.7 Mpa		Grade 5.8
						Characteristic	Design	Characteristic	Design	Design
BBMD0612	21–22	M6	51	178	203	35.2	22.9	35.2	22.9	6.5
		M10								18.9
		M12								27.4
BBMD1016	29–30	M10	51	178	203	35.2	22.9	35.2	22.9	18.9
		M12								27.4
		M16								51.0
BBMD1620	30–32	M16	51	178	203	35.2	22.9	35.2	22.9	51.0
		M20								79.6

Shear Loads in Normal-Weight or Sand-Lightweight Concrete over Metal Deck

Model No.	Drill Bit Dia (mm)	Threaded Rod Dia. (mm)	Embed. Depth (mm)	Min. Edge Dist. (mm)	Min. Spacing (mm)	Shear Capacity Based on Concrete Strength				Shear Capacity Based on Rod Strength
						(Install in High Flute) 20.7 Mpa		(Install in Low Flute) 20.7 Mpa		Grade 5.8
						Characteristic	Design	Characteristic	Design	Design
BBMD0612	21–22	M12	51	191	203	15.6	11.7	13.8	10.4	15.8
BBMD1016	29–30	M16	51	191	203	7.6	5.7	11.6	8.7	29.4
BBMD1620	30–32	M20	51	191	203	24.8	18.6	14.9	11.2	45.9

1. Characteristic and design values in the tables are based on testing per ICC Evaluation Services, AC446.
   For tension design capacities, a 0.65 strength reduction factor is applied to the characteristic strength for concrete and the steel rod; For shear design capacities, a 0.75 strength reduction factor is applied to the characteristic strength for concrete and the steel rod.
2. The design value used shall be the lower of the concrete strength, steel rod strength, or governing local code requirements.
3. Design values may be used to resist seismic forces.
4. Anchors may be installed off-centre in the flute provided that a minimum flute edge distance of 25 mm is maintained (centre of insert).
5. Shear loads shall be applied flush to the metal deck surface.
6. The metal deck thickness shall be 0.9 mm thick, minimum.

Blue Banger Hanger® Typical Metal Deck Installation



Save Time and Reduce Worker Fatigue!

Working on top of the forms or metal deck before concrete is poured is easier and faster than installing drop-in anchors from underneath after the concrete is in place. Consider the realities of working overhead:

- Drilling overhead is hard work, contributing to worker fatigue.
- Moving ladders or manoeuvring scissor-lifts slows down work.
- Working overhead poses inherent safety risks.
- Installing anchors after the pour means you may have to deal with fixtures installed by other trades.

Installation Time Comparison

Blue Banger Hanger for Wood Forms

VS.

Drop-In Anchors

Type of Anchor	M10 Drop-In	M12 Drop-In	**BBWF0612** (for M6, M10 & M12 rod)
Time Required Per Anchor	2 min 8 s	2 min 19 s	**10 Seconds**
Time Required Per 100 Anchors	3 h 28 min	3 h 39 min	**16 min 40 s**

Blue Banger Hanger for Metal Deck

VS.

Drop-In Anchors

Type of Anchor	M10 Drop-In	M12 Drop-In	**BBMD0612** (for M6, M10 & M12 rod)
Time Required Per Anchor	2 min 19 s	2 min 30 s	**18 Seconds**
Time Required Per 100 Anchors	3 h 39 min	4 h 10 min	**30 Minutes**

*Times may vary depending on accessibility and working heights

Drop-In Internally Threaded Anchor

Drop-in anchors are internally threaded, deformation controlled expansion anchors with a pre-assembled expander plug, suitable for flush mount applications in solid base materials. The anchor is set by driving the expansion plug towards the bottom of the anchor using the setting tool.

The Lipped Drop-In (DIAL) features a lip at the top of the anchor body that keeps the top of the anchor flush with the concrete. This eliminates the need for precisely drilled hole depths and allows for easier flush installation, consistent embedment and uniform rod lengths.

Applications

- Flush-mount applications in solid base materials.

Base Material

- Concrete
- Masonry

Approvals

- The Drop-In anchor has been tested in accordance with *ASTM E488 Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.*

Finish

- Carbon Steel, Zinc Plated

Contact Simpson Strong-Tie for load values

M6 | M8 | M10 | M12 | M16

M10

DIA
Drop-In — Does not include setting tool

DIAL
Lipped Drop-In — Includes setting tool

DIAST
Drop-In Setting Tool

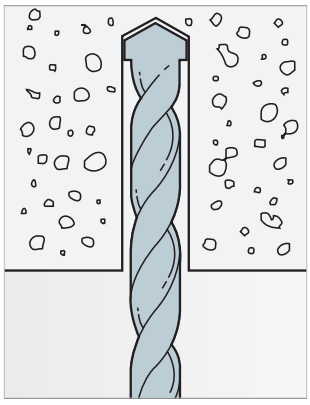
Drop-In Installation

Holes in steel fixtures to be mounted should match the diameter range specified in the table on page 84.

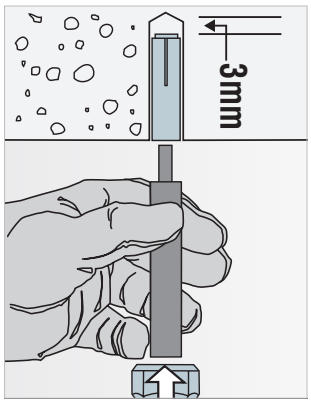
CAUTION: Oversized holes will make it difficult to set the anchor and will reduce the anchor's load capacity.

The load tables list values based upon results from the most recent testing and may not reflect those in current code reports. Where code jurisdictions apply, consult the current reports for applicable load values.

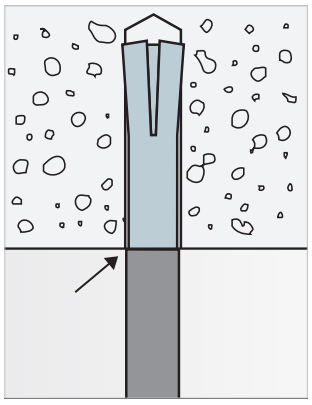
Installation Sequence



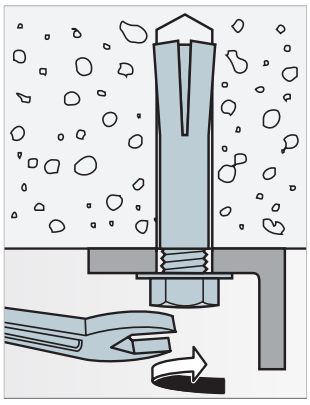
1. **Drill**
   Drill a hole in the base material using the appropriate diameter carbide drill bit as specified in the table.
   Drill the hole to the specified embedment depth plus 3–5 mm for flush mounting.
   Blow the hole clean using compressed air. Overhead installations need not be blown clean.



2. **Insert**
   Insert designated anchor into hole. Tap with hammer until flush against surface.



3. **Expand**
   Using the designated drop-in setting tool (DIAST), drive expander plug toward the bottom of the anchor until shoulder of setting tool makes contact with the top of the anchor.



4. Minimum thread engagement should be equal to the nominal diameter of the threaded insert.

Drop-In Product Availability

Model No.	Setting Tool Model No.	Rod Size	Drill Bit Dia. (mm)	Anchor Length (mm)	Thread Length	Box Qty	Carton Qty
DIA06	DIAST06	M6	8	25	10	100	500
DIA08	DIAST08	M8	10	30	13	100	500
DIA10	DIAST10	M10	12	40	16	100	500
DIAL1030	(Included)	M10	12	30	11	100	500
DIA12	DIAST12	M12	16	50	21	50	200
DIA16	DIAST16	M16	20	65	30	25	100

Drop-In Setting Tool Product Availability

Model No.	Use With	Box Qty	Carton Qty
DIAST06	DIA06	10	40
DIAST08	DIA08	10	40
DIAST10	DIA10	10	40
DIAST12	DIA12	10	20
DIAST16	DIA16	5	20

Titen® Concrete and Masonry Screw

Titen® screws are hardened screws for attaching all types of components to concrete and masonry. These fasteners are commonly used in applications such as attaching electrical boxes, light fixtures or window frames into concrete or masonry base materials.

Features

- Available in 5 mm and 6.5 mm diameter sizes
- Available in hex and Phillips flat-head designs
- Suitable for concrete, brick, grout-filled CMU and hollow-block applications
- Drill bit included with each box

Applications

- Electrical boxes
- Light fixtures
- Window frames
- Timber strapping

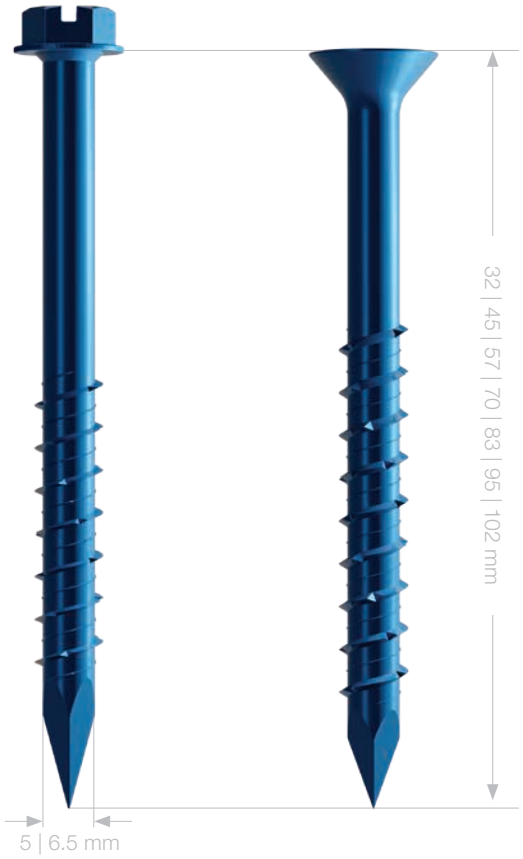
Base Material

- Cracked and Uncracked Concrete
- Grout-filled and Hollow Concrete Block
- Solid and Hollow Brick

Finish

- Carbon Steel, Zinc-plated with a baked-on ceramic coating

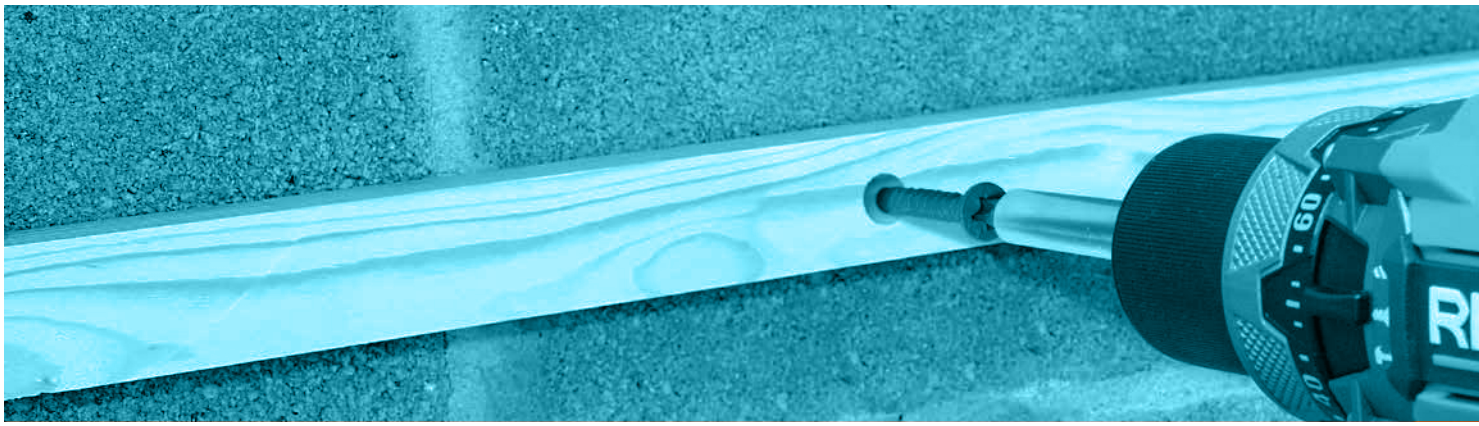
Contact Simpson Strong-Tie for load values



Titen® — Phillips Hex head **Titen® — Phillips Flat-head**

Available in either a hex head or countersink head.

Titen® Installation

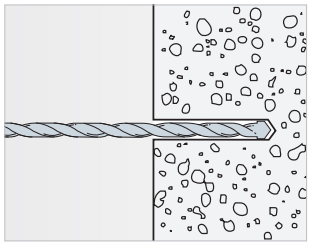


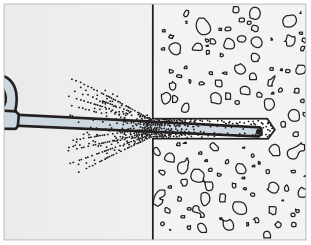
Holes in steel fixtures to be mounted should match the diameter range specified in the table on page 87.

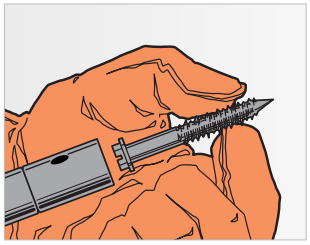
CAUTION: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Steps must be taken to prevent inadvertent sustained loads above the listed allowable loads. Overtightening and bending moments can initiate cracks detrimental to the hardened screw's performance. Use recommended driver bit size & be careful not to overtighten.

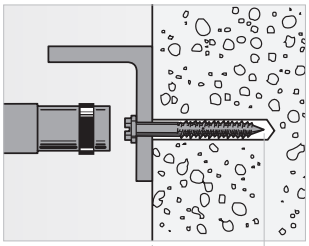
Oversized holes in the base material will reduce or eliminate the mechanical interlock of the threads with the base material and will reduce the anchor's load capacity.

Installation Sequence









1. **Drill**
Drill a hole in the base material using the appropriate diameter carbide drill bit as specified in the table. Drill the hole to the specified embedment depth plus 12 mm to allow the thread tapping dust to settle.

2. **Blow**
Blow it clean using compressed air. Overhead installations need not be blown clean. Alternatively, drill the hole deep enough to accommodate embedment depth and dust from drilling and tapping.

3. Use recommended driver bit size & be careful not to overtighten the screw.

4. **Install**
Position fixture, insert screw and tighten using drill and installation tool fitted with a hex socket or Phillips bit.

Preservative-treated timber applications: suitable for use in non-ammonia formulations of CCA, ACQ-C, ACQ-D, CA-B, BX/DOT and zinc borate. Use in dry, interior environments only.

Use caution not to damage coating during installation. The 410 stainless-steel Titen with top coat provides "medium" corrosion protection. Recommendations are based on testing and experience at time of publication and may change. Simpson Strong-Tie cannot provide estimates on service life of screws.

Titen® Product Availability

Model No.		Size (mm) Diameter (in.)	Bit Diameter[3] (in.)	Total Length (mm) L	Min. Embedment Depth (mm)	Box Qty	Carton Qty
Phillips Hex head[1]	Phillips Flat-head						
TTN18114H	TTN18114PF	5 3/16	5/32	32	25	100	1600
TTN18134H	TTN18134PF			45		100	500
TTN18214H	TTN18214PF			57		100	500
TTN18234H	TTN18234PF			70		100	500
TTN18314H	TTN18314PF			83		100	400
TTN18334H	TTN18334PF			95		100	400
TTN18400H	TTN18400PF			102		100	400
TTN25114H [2]	TTN25114PF	6.5 1/4	3/16	32		100	1600
TTN25134H	TTN25134PF			45		100	500
TTN25214H [2]	TTN25214PF			57		100	500
TTN25234H	TTN25234PF			70		100	500
TTN25314H	TTN25314PF			83		100	400
TTN25334H [2]	TTN25334PF			95		100	400
TTN25400H [2]	TTN25400PF			102		100	400

1. Drive size ¼" Hex head
2. Available in Type 410 Stainless Steel, add suffix "SS"
3. One drill bit is included in each box

Crimp Drive® Anchor

The Crimp anchor is an easy-to-install expansion anchor for use in concrete and grout-filled block. The pre-formed curvature along the shaft creates an expansion mechanism that secures the anchor in place and eliminates the need for a secondary tightening procedure. This speeds up anchor installation and reduces the overall cost.

Features

- Curved design helps speed up anchor installation and reduce the overall cost

Applications

- Fastening timber or light-gauge steel
- Attaching concrete formwork
- Hanging overhead support for sprinkler pipes or suspended ceiling panels

Base Material

- Cracked and Uncracked Concrete
- Grout-filled Concrete Block

Finish

- Carbon Steel, Zinc Plated

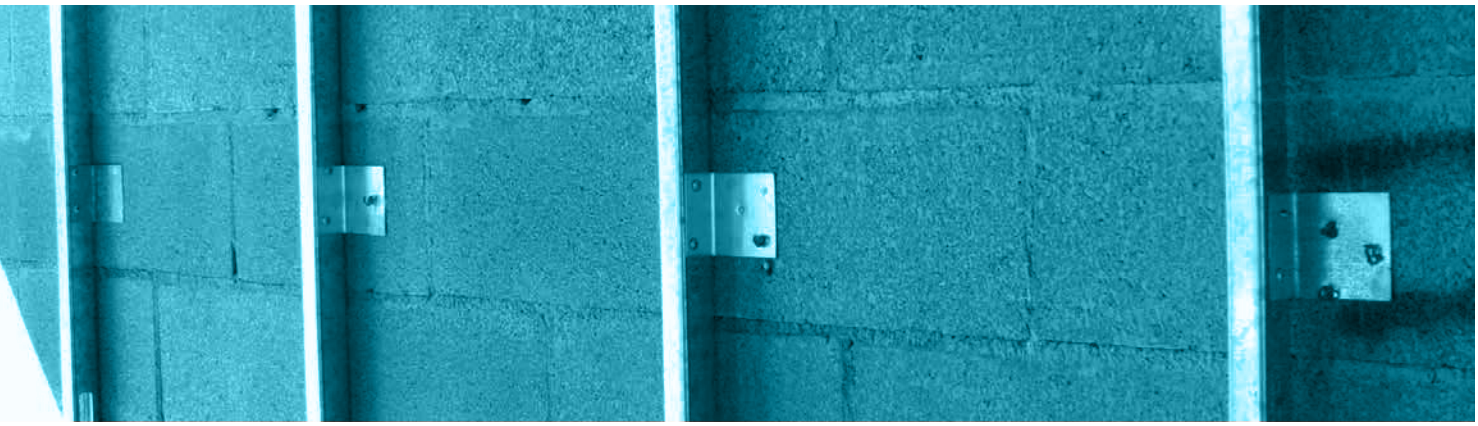
Contact Simpson Strong-Tie for load values

Crimp Drive®
Mushroom head

Crimp Drive® Product Availability

Model No.	Size (mm)	Drill Bit Dia. (in.)	Anchor Length (mm)	Min. Fixture Hole Size (in.)	Min. Embed (mm)	Box Qty	Carton Qty
CD18114M	5	3/16	32	1/4	22	100	1600
CD18200M	5		50		32	100	500
CD25100M	6.5	1/4	25	5/16	22	100	1600
CD25114M	6.5		32			100	1600
CD25112M	6.5		38		32	100	1600
CD25200M	6.5		50			100	500
CD25212M	6.5		63			100	500
CD25300M	6.5		75			100	500
CD37200M	10	3/8	50	7/16	45	25	125
CD37300M	10		75			25	125

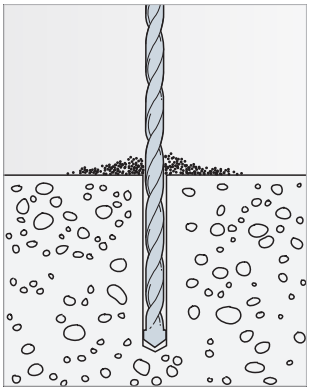
Crimp Drive® Installation



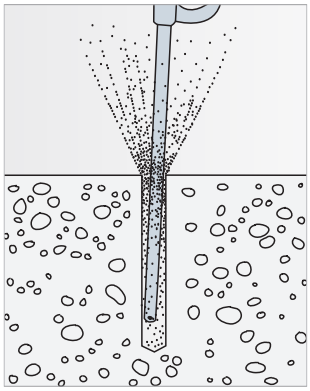
Holes in steel fixtures to be mounted should match the diameter range specified in the table on page 88.

WARNING: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, with the exception of the duplex anchor, use these products in dry, interior and non-corrosive environments only.

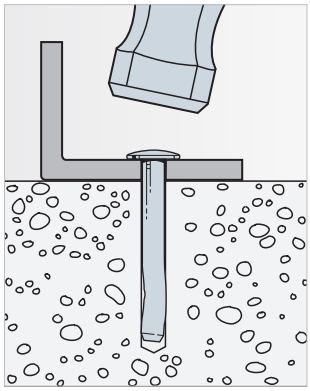
Installation Sequence



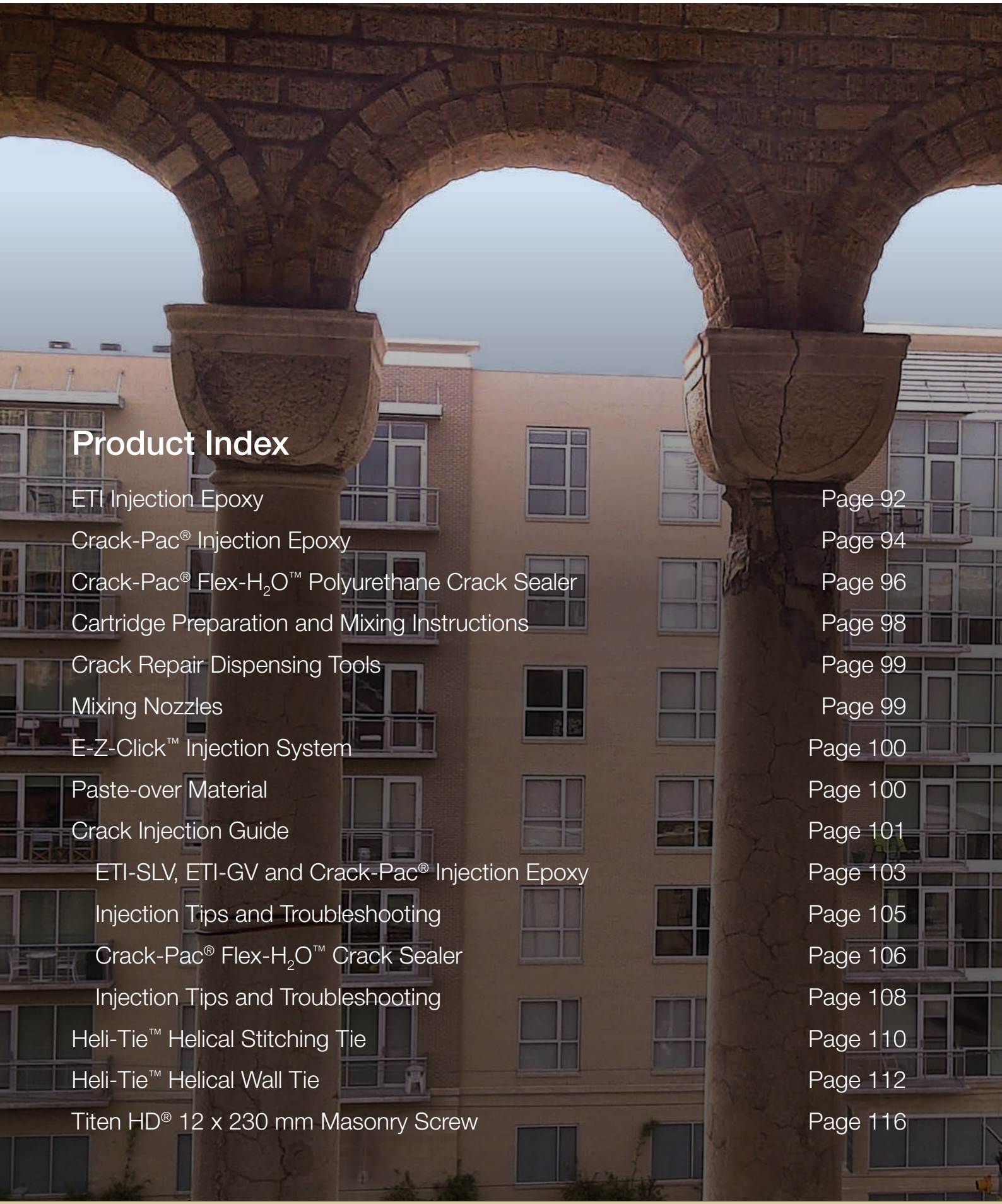
1. **Drill**
Drill a hole using the specified diameter carbide bit into the base material to a depth of at least 13 mm deeper than the required embedment.



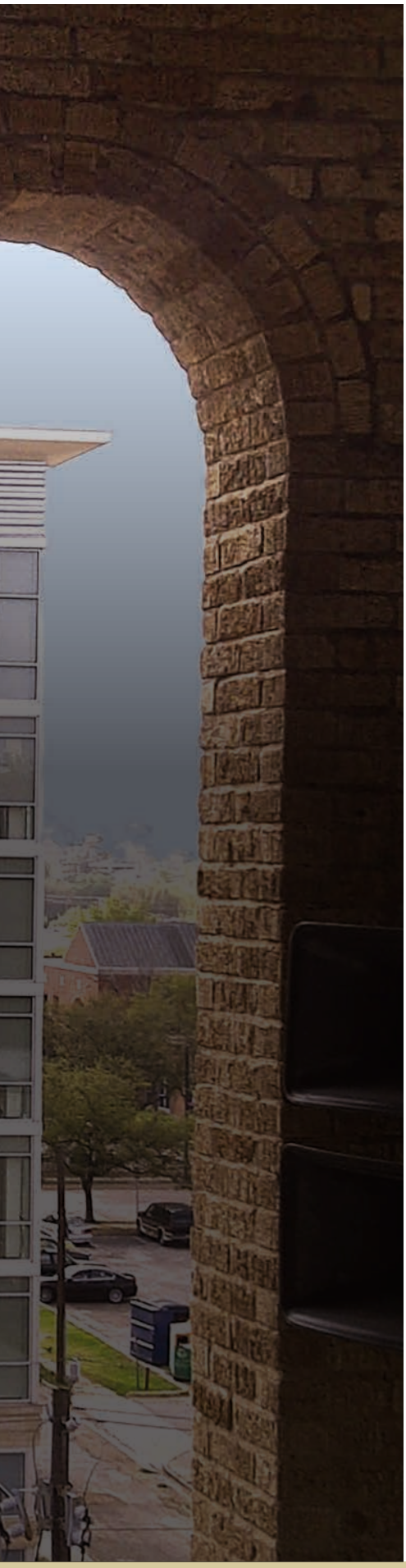
2. **Blow**
Blow the hole clean of dust and debris using compressed air. Overhead application need not be blown clean. Where a fixture is used, drive the anchor through the fixture into the hole until the head sits flush against the fixture.



3. **Drive**
Be sure the anchor is driven to the required embedment depth.

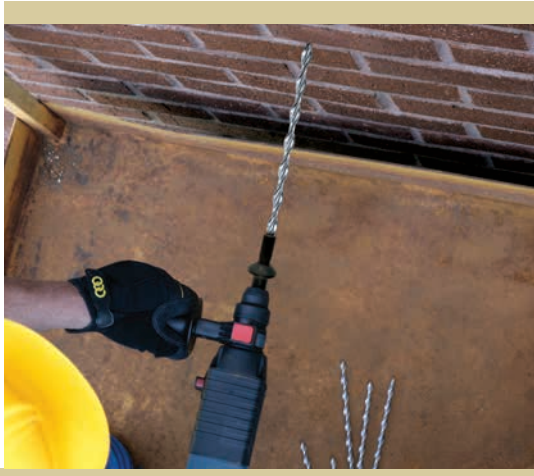


Product Index



Simpson Strong-Tie offers a line of products designed for structural and architectural rehabilitation of concrete and masonry.

Our restoration solutions provide reliable, easy-to-use products for a variety of applications, including structural restoration, pick-proof sealing and water-intrusion prevention.



ETI Injection Epoxy

ETI injection epoxies are two-component, high-solids formulations for the injection into cracks in concrete. Dispensed through a static mixing nozzle using either a manual dispensing tool, these epoxies provide a waterproof, high strength (structural) repair.

Features

- Bonds chemically to concrete, providing structural repair (meets the requirements of ASTM C881 for structural repair epoxy)
- Formulated for maximum penetration under pressure (all viscosities)
- Seals out moisture, protecting rebar in the concrete from corrosion and flooring from moisture damage
- Reliable mixing and ratio control when used with the Simpson Strong-Tie® Optimix® static mixing nozzle (included with cartridge)
- Suitable for pressure injection or gravity-feed applications
- Non-shrink material resists oils, salts and mild chemicals

ETI-SLV Super-Low-Viscosity Epoxy

- Super-low viscosity (350 cP) repairs hairline cracks (0.05 mm) and cracks up to 6 mm in width
- Penetrates smallest cracks

ETI-GV Gel-Viscosity Epoxy

- Gel-viscosity (non-sag) epoxy repairs medium cracks 2.4–6.4 mm in width
- Decreases in viscosity under pressure, increasing flow
- Suitable for use as pick-proof sealant around doors, windows and fixtures

Applications

- Suitable for repairing non-moving cracks in concrete walls, floors, slabs, columns and beams.
- ETI can be used to inject cracks in damp or wet conditions with excellent results. Not for use in actively leaking cracks. *(See Definitions on page 93)*
- Apply to concrete 15°C or above. For best results, warm material to 15°C or above prior to application.
- Mixed material in nozzle and injection fitting hardens in 15 minutes (ETI-SLV), and in 60 minutes (ETI-GV) at temperatures of 4°C or above.
- **Pressure injection applications require crack repair accessories (E-Z-Click™ Injection System and Paste-over Material). Refer to page 100 for further information.**

Base Material

- Cracked Concrete

Approvals

ETI-SLV Super-Low-Viscosity Epoxy

- Meets or exceeds AASHTO M-235 and ASTM C881 Type I and IV, Grade 1, Class B and C

ETI-GV Gel-Viscosity Epoxy

- Meets or exceeds AASHTO M-235 and ASTM C881 Type I and IV, Grade 3, Class C

Installation

Refer to pages 101–105 for installation procedures.

Refer to page 102 for cartridge usage estimation guide.

Shelf Life

24 months from date of manufacture in unopened cartridge.

ETISLV (488 ml)
(Includes 1 mixing nozzle EMN022)

ETIGV22 (650 ml)
(Includes 1 mixing nozzle EMN022)

Suitable for gravity-feed, pressure injection, and overhead applications.

Storage Conditions

For best results, store between 5–35°C.

Colour

Final product colour: ETI-SLV — dark purple/black; ETI-GV — grey.

Clean Up

Removal of cured adhesive — Chip or grind off surface. Uncured Adhesive — Wipe up with cotton cloths. If desired, scrub area with abrasive, waterbased cleaner and flush with water. If approved, solvents such as ketones (MEK, acetone, etc.), lacquer thinner, or adhesive remover can be used. DO NOT USE SOLVENTS TO CLEAN ADHESIVE FROM SKIN. Take appropriate precautions when handling flammable solvents. Solvents may damage surface to which they are applied.

Chemical Resistance

Very good to excellent against distilled water, inorganic acids and alkalis. Fair to good against organic acids and alkalis, and many organic solvents. Poor against ketones.

Material Properties

Property		Test Method	ETI-SLV Results*	ETI-GV Results*
Viscosity (24°C)		ASTM D2556	350 cps	Non-sag gel
Bond strength (moist cure)	2 days	ASTM C882	21.4 MPa	7.6 MPa
	14 days		26.9 MPa	27.5 MPa
Tensile strength (7 days)		ASTM D638	70.33 MPa	—
Tensile elongation at break			2.10%	—
Compressive yield strength (7 days)		ASTM D695	113.8 MPa	79.8 MPa
Compressive modulus			3,923 MPa	2,780 MPa
Heat-deflection temperature		ASTM D648	60°C	12.8°C
Water absorption (24 hour soak)		ASTM D570	0.25%	0.58%
Linear coefficient of shrinkage		ASTM D2566	0.0035	0.000
Gel time (60-gram mass)		ASTM C881	16 min.	135 min
Volatile Organic Compounds (VOC)		EPA Method 24 ASTM D2369	23 g/L	4 g/L
Initial cure (22°C)		—	24 hours	24 hours
Mixing Ratio by Volume (Part A:Part B)		—	2:1	1:1

*Material and curing conditions: 73 ± 2°F, unless otherwise noted.

Definitions

Dry Crack: A crack containing no moisture.

Wet Crack: A crack containing moisture (damp or containing standing water). The surface can be dried and will remain dry during the paste-over operation.

Seeping Crack: A wet crack that slowly oozes water. After being dried, the surface slowly becomes wet again.

Mildly Leaking Crack: A crack with a slow trickle of water emitting from its face.

Cartridge Size and Accessories

Cartridge	Size	Box Qty	Model No.
	488 ml	10	**ETISLV**
	650 ml	10	**ETIGV22**

Dispensing Tools	Description	Model No.
	Manual dispensing tool	**EDT22S**

Mixing Nozzles		
	Mixing nozzle Pack of 6	**EMNO22-RP6**

1. Use only appropriate Simpson Strong-Tie® mixing nozzles in accordance with Simpson Strong-Tie instructions. Modification or improper use of mixing nozzle may impair epoxy performance.
2. Dispensers must be configured for 2:1 cartridge ratio when using ETISLV.

Please see pages 99–100 for further information on crack repair accessories (Dispensers, E-Z-Click™ Injection System and Paste-over Material)

Crack-Pac® Injection Epoxy

The Crack-Pac® injection epoxy is designed to repair cracks in concrete walls, floors, slabs, columns and beams. The mixed adhesive has the viscosity of a light oil and a low surface tension, allowing it to penetrate fine to medium-width cracks in dry, damp or wet conditions with excellent results. Resin is contained in the cartridge and hardener is contained in the nozzle.

Features

- Dispenses with a standard size caulking tool, no special dispensing tool needed
- Clean and easy to mix
- Seals out moisture, protecting rebar in the concrete from corrosion and flooring from moisture damage
- Chemically bonds with the concrete to restore strength
- Non-shrink material resistant to oils, salts and mild chemicals
- Repairs fine to medium cracks 0.4–6.4 mm in width

Applications

- Suitable for repairing non-moving cracks in concrete walls, floors, slabs, columns and beams.
- Can be used to inject cracks in dry, damp or wet conditions with excellent results. Not for use in actively leaking cracks. *(See Definitions on page 95)*
- In order for components to mix properly, the resin and hardener must be conditioned to 15–26°C before mixing.
- **Pressure injection applications require crack repair accessories (E-Z-Click™ Injection System and Paste-over Material). Refer to page 100 for further information or use Crack-Pac® Injection Kit (ETIPAC10KT).**

Base Material

- Cracked Concrete

Approvals

- Meets the requirements of ASTM C881, Type I, Grade 1, Class C

Installation

Refer to pages 101–105 for installation procedures.

Refer to page 102 for cartridge usage estimation guide.

Shelf Life

24 months from date of manufacture in unopened cartridge.

Storage Conditions

For best results, store between 7–35°C.

Colour

Resin — blue, hardener — clear, mixed: light amber. The colour of epoxy will change from amber to blue during the cure process and then fade back to light amber within a few weeks of installation.

ETIPAC10 (266 ml)
Dispensing Systems: U.S. Patents 6,737,000 and 6,896,001 B2

Suitable for gravity-feed, pressure injection, and overhead applications.

Clean Up

Wipe up with cotton cloths. If desired scrub area with abrasive, waterbased cleaner and flush with water. If approved, solvents such as ketones (MEK, acetone, etc.), lacquer thinner, or adhesive remover can be used. DO NOT USE SOLVENTS TO CLEAN ADHESIVE FROM SKIN. Take appropriate precautions when handling flammable solvents. Solvents may damage surfaces to which they are applied. Cured material — Chip or grind off surface.

Chemical Resistance

Very good to excellent against distilled water, inorganic acids and alkalis. Fair to good against organic acids and alkalis, and many organic solvents. Poor against ketones.

Material Properties

Property		Test Method	ETIPAC10 Results*
Viscosity		ASTM D2556	1,400 cps
Bond strength (moist cure)	2 days	ASTM C882	13.86 MPa
	14 days		26.41 MPa
Tensile strength (7 days)		ASTM D638	40.40 MPa
Tensile elongation at break			14.1%
Compressive yield strength (7 days)		ASTM D695	77.70 MPa
Compressive modulus			2,196.67 MPa
Flexural Strength		ASTM D790	55.30 MPa
Water absorption (24 hours)		ASTM D570	0.082%
Linear coefficient of shrinkage		ASTM D2566	0.002
Gel time		ASTM C881	16 min — 60 g mass
Volatile Organic Compounds (VOC)		EPA Method 24 ASTM D2369	7 g/L
Initial cure (22°C)		—	24 hours
Mixing Ratio by Volume (Part A:Part B)		—	8:1

*Material and curing conditions: 73 ± 2°F, unless otherwise noted.

Additional Components

Condition	Paste-Over Material	Injection Ports
Dry Crack	ETR16, CIPLO22	EIP-EZA, EIPX-EZ-RP20 (Drill-In)
Wet Crack		

Please see page 100 for further information on crack repair accessories (E-Z-Click™ Injection System and Paste-over Material)

Definitions

Dry Crack: A crack containing no moisture.

Wet Crack: A crack containing moisture (damp or containing standing water). The surface can be dried and will remain dry during the paste-over operation.

Seeping Crack: A wet crack that slowly oozes water. After being dried, the surface slowly becomes wet again.

Mildly Leaking Crack: A crack with a slow trickle of water emitting from its face.

Cartridge Size and Accessories

Cartridge	Size	Box Qty	Ctn Qty	Model No.
	266 ml	1	12	**ETIPAC10**
	532 ml	1	2	**ETIPAC10KT**

Dispensing Tools	Description	Model No.
	High-quality, standard size caulking tool	**DT300**

1. Use only appropriate Simpson Strong-Tie® mixing nozzles in accordance with Simpson Strong-Tie instructions. Modification or improper use of mixing nozzle may impair epoxy performance.

Please see pages 99–100 for further information on crack repair accessories (Dispensers, E-Z-Click™ Injection System and Paste-over Material)

Crack-Pac® injection epoxy is also available in the Crack-Pac Injection Kit (**ETIPAC10KT**). The kit includes everything needed to pressure inject approximately 2.4 linear metres of cracks (assumes a concrete thickness of 100 mm and 1.5 mm crack width).

- 2 Crack-Pac cartridge/nozzle sets
- 12 E-Z-Click™ injection ports
- 2 E-Z-Click™ injection fittings with 300 mm tubing
- 473 ml of ETR paste-over epoxy (236 ml of resin + 236 ml of hardener)
- 4 disposable wood paste-over applicators
- 1 pair latex gloves
- Installation video

Crack-Pac® Flex-H_2O™ Polyurethane Crack Sealer

The Crack-Pac® Flex-H_2O™ hydrophobic polyurethane injection resin seals leaking cracks, voids or fractures in concrete or solid masonry. Designed to perform in applications where water is seeping or mildly leaking from the crack, the polyurethane is packaged in the cartridge and an accelerator is packaged in the nozzle. When the resin encounters water as it is injected into the crack, it becomes an expanding foam that provides a flexible seal in leaking and non-leaking cracks.

CPFH09 (266 ml)
Dispensing Systems: U.S. Patents 6,737,000 and 6,896,001 B2

Features

- Can be dispensed with a standard size caulking tool, no special dispensing tool needed
- Clean and easy to mix
- Can also be used on dry cracks if water is introduced to affected area
- Expands to fill voids and seal the affected area
- Fast reacting — reaction begins within 1 minute after exposure to moisture; expansion may be completed within 3 minutes (depending on the amount of moisture and the ambient temperature)
- 20:1 expansion ratio (unrestricted rise) means less material needed

Applications

- Suitable for sealing cracks ranging from 0.8–6.4 mm wide in concrete and solid masonry.
- Suitable for repair of cracks in dry, damp and wet conditions with excellent results. Designed to perform in applications where water is seeping or mildly leaking from the crack. *(See Definitions on 97)*
- In order for components to mix properly, the resin and hardener must be conditioned to 15–32°C before mixing.
- **IMPORTANT**: Must be pressure injected into crack.
- **Pressure injection applications require crack repair accessories (E-Z-Click™ Injection System and Paste-over Material). Refer to page 100 for further information.**

Suitable for pressure injection only

Base Material

- Concrete

Installation

Refer to pages 101–105, 106–108 for installation procedures.

Refer to page 102 for cartridge usage estimation guide.

Shelf Life

12 months from date of manufacture in unopened cartridge.

Storage Conditions

For best results, store between 7–32°C.
Product is very moisture sensitive

Colour

Polyurethane — clear, accelerator — green, cured — green.

Clean Up

Uncured material — Wipe up with cotton cloths. If desired scrub area with abrasive, waterbased cleaner and flush with water. If approved, solvents such as ketones (MEK, acetone, etc.), lacquer thinner, or adhesive remover can be used. DO NOT USE SOLVENTS TO CLEAN ADHESIVE FROM SKIN. Take appropriate precautions when handling flammable solvents. Solvents may damage surfaces to which they are applied. Cured material — scrape or brush off surface with a putty knife or wire brush. Tip: wetting the concrete or masonry surface immediately prior to injection will make cured resin easier to remove.

Chemical Resistance

Very good to excellent against water, most hydrocarbons and alkalis. Poor to fair against ketones, chlorinated solvents and concentrated acids.

Cartridge Size and Accessories

Cartridge	Size	Box Qty	Ctn Qty	Model No.
	266 ml	1	12	**CPFH09**

Dispensing Tools	Description	Model No.
	High-quality, standard size caulking tool	**DT300**

1. Use only appropriate Simpson Strong-Tie® mixing nozzles in accordance with Simpson Strong-Tie instructions. Modification or improper use of mixing nozzle may impair epoxy performance.

Please see pages 99–100 for further information on crack repair accessories (Dispensers, E-Z-Click™ Injection System and Paste-over Material)

Additional Components

Condition	Paste-Over Material	Injection Ports
Dry Crack	ETR16, CIPLO22	EIP-EZA, EIPX-EZ-RP20 (Drill-In)
Wet Crack		
Seeping Crack	Hydraulic Cement	
Mildly Leaking Crack		

Please see page 100 for further information on crack repair accessories (E-Z-Click™ Injection System and Paste-over Material)

Definitions

Dry Crack: A crack containing no moisture.

Wet Crack: A crack containing moisture (damp or containing standing water). The surface can be dried and will remain dry during the paste-over operation.

Seeping Crack: A wet crack that slowly oozes water. After being dried, the surface slowly becomes wet again.

Mildly Leaking Crack: A crack with a slow trickle of water emitting from its face.

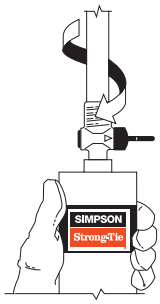
Cartridge Preparation and Mixing Instructions

For Crack-Pac® and Crack-Pac® Flex-H_2O™

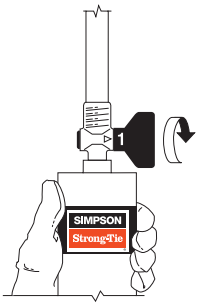
CAUTION: Wear gloves when handling the Crack-Pac® and Crack-Pac® Flex-H_2O™ cartridge once the resin and hardener are mixed, as material may become hot. Eye protection is recommended.

USAGE TIP: After the product is mixed, a small volume of air will remain in the cartridge. Keeping this cushion of air at the back of the cartridge during dispensing will allow the dispensing of the final bit of epoxy from the nozzle once the cartridge is empty.

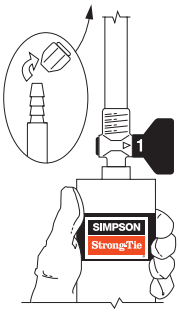
1. Remove the red cap from the top of the cartridge.



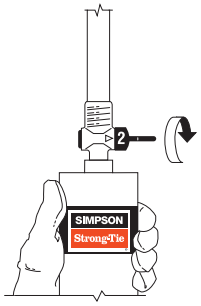
2. Screw the threaded portion of the nozzle into the cartridge.



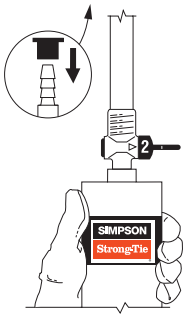
3. Turn the black valve so that the #1 on the valve aligns with the arrow on the neck of the nozzle.



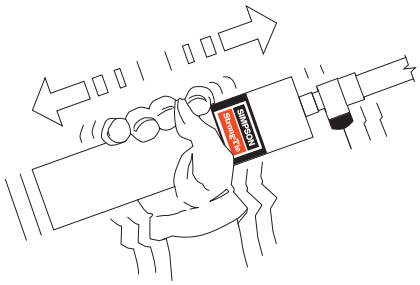
4. Twist off the tip of the nozzle and allow the material contained within to drain into the cartridge.



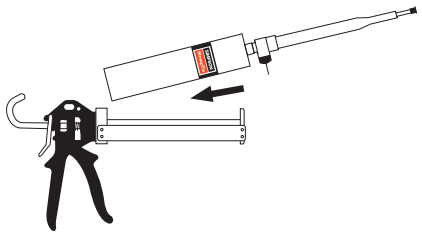
5. Turn the black valve to the #2 position.



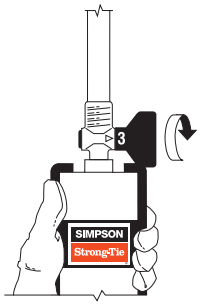
6. Attach the clear cap securely to the end of the nozzle.



7. Shake the cartridge at a rate of 2 shakes per second for 2 minutes or until the mixed material is a uniform colour.



8. Insert the cartridge into the caulking tool.



9. Turn the black valve to the #3 position and remove the black cap from the end of the nozzle. If performing gravity feed, the material is ready to dispense. If performing pressure injection, attach the E-Z-Click™ injection fitting to the end of the nozzle.

WARNING: Do not mix product until ready to use within 30 minutes. A full cartridge of mixed epoxy will harden in 65–75 minutes and will reach a peak temperature of 177°C within two hours. To prevent pressure build up possibly resulting in cartridge breach and injury, remove cartridge from the caulking tool when not dispensing. Use caution handling or disposing of cartridge until cool.

Crack Repair Dispensing Tools

EDT22S Manual Dispensing Tool for 650 ml Cartridges

The EDT22S epoxy adhesive tool features a steel carriage and is engineered for high-volume, continuous use. The tool can be easily convert from dispensing a 650 ml 1:1 ratio cartridge to a 488 ml 2:1 ratio cartridge.[1]

1. Refer to operating instructions supplied with tool.

Model No.	Pack Qty	Ctn Qty
EDT22S	1	5

DT300 Manual Dispensing Tool for Single Cartridge Adhesives

The DT300 is a high-quality, standard size caulking tool for single cartridge adhesives. The DT300 features a steel carriage for ultimate durability and is engineered for continuous, high-volume use. The DT300 also features double-gripping plates that help extend tool life.

Model No.	Pack Qty	Ctn Qty
DT300	1	12

Mixing Nozzles

Mixing nozzles are designed for the proper proportioning and mixing of the different adhesive formulations. Use only appropriate Simpson Strong-Tie mixing nozzle in accordance with Simpson Strong-Tie instructions. Modification or improper use of the mixing nozzle may impair epoxy performance.

EMNO22

The Optimix® static mixing nozzle is specifically designed for crack injection epoxies and ensures thorough mixing of epoxy components:

For use with both low-viscosity and gel-viscosity ETI formulations. Flow regulators ensure that resin and hardener flow at equal rates and prevent mixed epoxy from flowing back out of the nozzle into the cartridge. This ensures thorough mixing and prevents mixed product from curing in the neck of the cartridge, causing blockage. Testing shows that mixing with the Optimix nozzle is 4 times more consistent than a standard spiral mixing nozzle.

EMN22i

18-element mixing nozzle for use with 650 ml epoxy adhesives cartridges. This is a one-piece nozzle with integrated nut (separate retaining nut not required).

Model No.	Description	Pack Qty	Packs per Ctn
EMNO22-RP6	Nozzle to suit ETI crack injection epoxies	6	5
EMN22i-RP5	Nozzle to suit **CIPLO22** paste-over (NZ)	5	6
EMN22i-RP10	Nozzle to suit **CIPLO22** paste-over (AU)	10	3

E-Z-Click™ Injection System

The E-Z-Click injection system is comprised of a specially designed fitting and ports that take the mess out of your repair project while allowing you to work faster. The E-Z-Click injection fitting installs onto the end of the Optimix® mixing nozzle and clicks onto the E-Z-Click™ ports during injection.

Key Features

- Positive connection eliminates messy leakage, minimising waste and clean-up.
- No drilling of ports: E-Z-Click ports perform while pasted to the surface of the concrete. No drilling required for most applications (use EIPX-EZ-RP20 when drilling is required).
- Disconnect the fitting from the E-Z-Click port and the epoxy stops flowing, no leaky mess.
- After injecting, pull the head of the E-Z-Click port out to close it and prevent leakage.
- One person can work faster without having to hold the tube on the port.

Model No.	Description	Pack Qty	Packs per Ctn
EIPX-EZ-RP20	E-Z-Click™ Corner mount/ drilled-in injection port	20	5
EIP-EZA	E-Z-Click™ Flush mount injection port	100	—
EIF-EZ	E-Z-Click™ Injection fitting tube 300mm, Suits E-Z-Click ports	1	10
EIP-EZAKT	E-Z-Click™ Flush mount injection port kit— 20 Ports and 1 Injection fitting	20+1	5

EIPX-EZ-RP20
Corner mount/ drilled-in port

EIP-EZA
Flush mount port

EIF-EZ
Injection fitting

EIP-EZAKT
Injection port kit

Paste-over Material

CIP-LO is a low-odour, fast-curing epoxy paste-over used to seal cracks and secure injection ports at the surface of concrete substrates prior to implementing an epoxy or urethane foam injection repair. When properly mixed, the product will be a uniform grey colour. CIP-LO sets up rigid. When the crack repair is complete, the paste-over may be left in place or else ground or chiselled off the concrete substrate.

Key Features

- 1:1 two-component, high-solids, epoxy-amine based adhesive
- Mixed material is a grey colour
- Low-odour formulation
- Gel time: 6 minutes at 22°C, 28 minutes at 4°C
- Cure times: 75 minutes at 22°C, 2 hours at 15°C and 4–5 hours at 4°C
- Shelf life of two years from the date of manufacture
- Volatile organic compound (VOC): 4 g/L
- Manufactured in the USA using global materials

Model No.	Description	Pack Qty	Ctn Qty
CIPLO22	Low-odour crack-injection paste-over, 650 ml cartridge (EMN22i mixing nozzle sold separately)	1	10

ETR is ideal for pasting over the surface of cracks and attaching ports for pressure injection. The non-sag paste consistency enables paste-up on horizontal, vertical and overhead applications. Fast cure time means shorter time between paste-over and injection. Packaged as a kit in separate 236 ml canisters which are mixed manually to yield 473 ml of epoxy. Also ideal for small concrete repairs and miscellaneous patching. Each kit contains enough material to cover approximately 2.4 linear metres of cracks.

Model No.	Description	Pack Qty	Packs per Ctn
ETR16	Epoxy paste-over kit, contains (1) 236 ml Resin and (1) 236 ml Hardener	1	4

CIPLO22

ETR16

Cure Schedule

Base Material Temp. (°C)	Cure Time (hours)	
	CIPLO22	ETR16
4	5	24
16	2	2
22	1.25	—
27	—	1
38	—	1

Crack Injection Guide

Installation and Information Video

Scan this QR code to learn how to repair concrete with Crack-Pac® epoxy. The video includes information about cartridge mixing, crack preparation, epoxy injection, and more. ETI injection epoxies use similar methodology, use this video as a guide.

https://youtu.be/aPPz4jOqsa0

IMPORTANT: The following instructions are intended as recommended guidelines. Due to the variability of field conditions, selection of the proper material for the intended application and installation are the sole responsibility of the applicator.

Materials

Structural

ETISLV
for repair of hairline cracks
0.05–6 mm

ETIGV22
for repair of medium cracks
2.4–6.4 mm

Non-Structural

ETIPAC10
for repair of medium cracks
0.4–6.4 mm

CPFH09
for sealing cracks ranging from
0.8–6.4 mm

Paste-over

CIPLO22
for large-scale concrete repairs
and miscellaneous patching

ETR16
for small-scale concrete repairs
and miscellaneous patching

Accessories

EMNO22
for use with ETI formulations

EMN22i
for use with CIPLO22

E-Z-Click™ Injection System
injection ports, fitting and
other suitable accessories

Dispensing Tools

EDT22S
for use with ETI and CIPLO22

DT300
for use with ETIPAC10
and CPFH09

Crack Injection Guide

Crack Repair Adhesive Suitability Matrix

Application/Feature	ETI-SLV and ETI-GV	Crack-Pac®	Crack-Pac® Flex-H_2O™
Seals the crack against moisture	YES	YES	YES
Restores strength to the concrete	YES	NO	NO
Expands to fill voids	NO	NO	YES
Flexible (allows crack movement)	NO	NO	YES
Suitable to seal cracks in masonry	NO	NO	YES
Suitable for dry and wet crack	YES	YES	YES
Suitable for cracks actively leaking water	NO	NO	YES
Suitable installation procedure(s)	Pressure injection or gravity feed (ETI-SLV only suitable for pressure injection)	Pressure injection or gravity feed	Pressure injection only
Dispensing Tool	Manual: **EDT22S**	**DT300** or high-quality, standard size caulking tool	**DT300** or high-quality, standard size caulking tool

Estimating Guide for Epoxy Crack Injection

Width of Crack (mm)	Concrete Thickness (mm)	Approximate Coverage per 650 ml (linear metre)	Approximate Coverage per 265 ml (linear metre)
0.4	100	14	5.6
	150	9.6	3.7
	200	7.2	2.8
	250	5.8	2.2
0.8	100	7.2	2.8
	150	4.8	1.8
	200	3.6	1.4
	250	2.9	1.1
1.5	100	3.6	1.4
	150	2.4	0.9
	200	1.8	0.7
	250	1.4	0.6
3	100	1.8	0.7
	150	1.2	0.4
	200	0.9	0.3
	250	0.7	0.2
5	100	1.2	0.45
	150	0.8	0.3
	200	0.6	0.24
	250	0.5	0.18

Width of Crack (mm)	Concrete Thickness (mm)	Approximate Coverage per 650 ml (linear metre)
6	100	0.9
	150	0.6
	200	0.45
	250	0.4
8	100	0.7
	150	0.5
	200	0.4
	250	0.3
10	100	0.6
	150	0.4
	200	0.3
	250	0.2
11	100	0.5
	150	0.3
	200	0.25
	250	0.2
12	100	0.45
	150	0.3
	200	0.2
	250	0.18

These calculations are only estimates and to be used as a guide only.

Crack Injection Guide for ETI-SLV, ETI-GV and Crack-Pac® Injection Epoxy

IMPORTANT: The following instructions are intended as recommended guidelines. Due to the variability of field conditions, selection of the proper material for the intended application and installation are the sole responsibility of the applicator.

Epoxy injection is an economical method of repairing non-moving cracks in concrete walls, slabs, columns and piers and is capable of restoring the concrete to its pre-cracked strength. Prior to doing any injection it is necessary to determine the cause of the crack. If the source of cracking has not been determined and remedied, the concrete may crack again.

For larger-scale crack repair projects, Simpson Strong-Tie recommends preparing and attaching a few injection ports and paste-over for trial to ensure that the port spacing is adequate to achieve full epoxy injection penetration.

Definitions

Dry Crack: A crack containing no moisture.

Wet Crack: A crack containing moisture (damp or containing standing water). The surface can be dried and will remain dry during the paste-over operation.

Seeping Crack: A wet crack that slowly oozes water. After being dried, the surface slowly becomes wet again.

Mildly Leaking Crack: A crack with a slow trickle of water emitting from its face.

Preparation of the Crack for Injection

Clean the crack and the surface surrounding it to allow the paste-over to bond to sound concrete. At a minimum, the surface to receive paste-over should be brushed with a wire brush. Oil, grease or other surface contaminant must be removed in order to allow the paste-over to bond properly. Take care not to impact any debris into the crack during cleaning. Using clean, oil-free compressed air, blow out the crack to remove any dust, debris or standing water. Best results will be obtained if the crack is dry at the time of injection. If water is continually seeping from the crack, the flow must be stopped in order for epoxy injection to yield a suitable repair. Other materials such as polyurethane resins may be required to repair an actively leaking crack.

For many applications, additional preparation is necessary in order to seal the crack. Where a surfacing material has been removed using an acid or chemical solvent, prepare the crack as follows:

1. Using clean, compressed air, blow out any remaining debris and liquid.
2. Remove residue by high-pressure washing or steam cleaning.
3. Blow any remaining water from the crack with clean compressed air.

If a coating, sealant or paint has been applied to the concrete, it must be removed before placing the paste-over epoxy. Under the pressure of injection, these materials may lift and cause a leak. If the surface coating is covering the crack, it may be necessary to route out the opening of the crack in a "V" shape using a grinder in order to get past the surface contamination.

Sealing of the Crack and Attachment of E-Z-Click™ Injection Ports

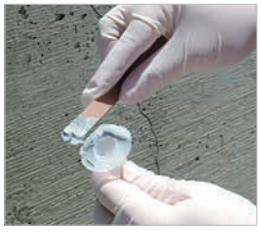
1. To adhere the port to the concrete, apply a small amount of paste-over around the bottom of the port base (Picture 1). Place the port at one end of the crack (Picture 2) and repeat until the entire crack is ported. As a rule of thumb, injection ports should be placed no more than 200 mm apart along the length of the crack.

IMPORTANT: Do not allow paste-over to block the port or the crack under it; this is where the injection epoxy must enter the crack.

2. Using a putty knife or other paste-over tool, generously work paste-over along the entire length of the crack (Picture 3). Take care to mound the paste-over around the base of the port to approximately 6 mm thick extending 25 mm out from the base of the port and to work out any holes in the material. It is recommended that the paste-over should be a minimum of 5 mm thick and 25 mm wide along the crack. Insufficient paste-over will result in leaks under the pressure of injection. If the crack passes completely through the concrete element, seal the back of the crack, if possible. If not, epoxy may be able to run out the back side of the crack, resulting in an ineffective repair.

3. Allow the paste-over to harden before beginning injection.

NOTE: CIP-LO and ETR epoxies are fast-cure materials and may harden prematurely if left in a mixed mass on the mixing surface while installing ports. Spreading paste-over into a thin film (approximately 3 mm) on the mixing surface will slow curing by allowing the heat from the reaction to dissipate.



Picture 1

Picture 2

Picture 3

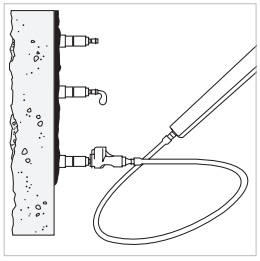
Crack Injection Guide for ETI-SLV, ETI-GV and Crack-Pac® Injection Epoxy

Injection Procedure

1. Follow cartridge preparation instructions on the cartridge label. Verify that the material flowing from the Optimix® mixing nozzle is a uniform and consistent colour: for ETI-SLV, the mixed product is black; and ETI-GV is grey. For Crack-Pac® injection epoxy, verify that the mixed material in the cartridge is a transparent amber colour.
2. Attach the E-Z-Click™ fitting to the end of the nozzle by pushing the tubing over the barbs at the end of the nozzle. Make sure that all ports are pushed in to the open position.
3. Attach the E-Z-Click™ injection fitting to the first E-Z-Click™ port until it clicks into place. Make sure that the heads of all the ports are pushed in to the open position. In vertical applications, begin injection at the lowest port and work your way up. In a horizontal application, start at one end of the crack and work your way to the other end.
4. Inject epoxy into the first port until it will no longer flow into the crack. If epoxy shows at the next port and the first port still accepts material, close the second port and continue to inject into the first port until it accepts no more epoxy. Continue closing ports where epoxy appears until the first port refuses epoxy. When the first port reaches the point of refusal, brace the base of the port and pull out gently on the head of the port to close it. Pulling too hard may dislodge the port from the surface of the concrete, causing a leak. Depress the steel tab on the head of the E-Z-Click fitting and remove it from the port.
5. Go to the last port where epoxy appeared while injecting the first port, open it, and continue injection at this port. If the epoxy has set up and the port is bonded closed, move to the next clean port and repeat the process until every portion of the crack has refused epoxy.

While this method may appear to leave some ports un-injected, it provides maximum pressure to force the epoxy into the smaller areas of the crack. Moving to the next port as soon as epoxy appears will allow the epoxy to travel along the wider parts of the crack to the next ports rather than force it into the crack before it travels to the next ports.

Picture 4



Picture 5

Gravity-Feed Procedure

In some horizontal applications where complete penetration isn't a requirement, cracks can be repaired using the gravity-feed method.

1. Follow cartridge preparation instructions on the cartridge label. Verify that the material flowing from the Optimix® mixing nozzle is a uniform and consistent colour: for ETI-GV is grey. For Crack-Pac® injection epoxy, verify that the mixed material in the cartridge is a transparent amber colour.
2. Starting at one end of the crack, slowly dispense epoxy into the crack, moving along the crack as it fills. It will probably be necessary to do multiple passes in order to fill the crack. It is possible that the epoxy will take some time to run into the crack, and the crack may appear empty several hours after the initial application. Reapply epoxy until the crack is filled.
3. In situations where the crack completely penetrates the member (e.g., concrete slab), the material may continue to run through the crack into the subgrade. It may be possible to use a small amount of coarse, dry sand to act as a barrier for the injection epoxy. Place the sand in the crack to a level no more than 6 mm thickness of the member and apply the injection epoxy as described in Step 2. The epoxy level will drop as it penetrates the sand, but should cure and provide a seal to the bottom of the crack. Reapply the epoxy until the crack is filled. In some cases, application of sand is impractical or not permitted and epoxy repair may not provide a complete and effective repair. Use of a gel viscosity injection epoxy (ETI-GV) may permit a surface repair to the crack with partial penetration.

Picture 6

Crack Injection Guide for ETI-SLV, ETI-GV and Crack-Pac® Injection Epoxy

INJECTION TIPS

- If using a pneumatic dispensing tool, set the tool at a low setting when beginning injection and increase pressure if necessary to get the epoxy to flow.
- For narrow cracks, it may be necessary to increase the pressure gradually until the epoxy begins to flow. It may also be necessary to wait for a few minutes for the epoxy to fill the crack and travel to the next port.
- If desired, once the injection epoxy has cured, remove the injection ports and paste-over. An epoxy-based paste-over can be removed with a chisel, scraper or grinder. The paste-over can be simply peeled off if CIP-LO is used. Using a heat gun to soften the epoxy is recommended when using a chisel or scraper.
- Mixing nozzles can be used for multiple cartridges as long as the epoxy does not harden in the nozzle. For injection epoxies in side-by-side cartridges, care must be taken to ensure the level of material is the same on both parts of the cartridge. This can be done by checking for air in the cartridge and the positions of the wipers in the back of the cartridge. If the liquid levels are off by more than ⅛", then Step 1 from the injection procedures must be repeated.

TROUBLESHOOTING

Epoxy is flowing into the crack, but not showing up at the next port.

This can indicate that the crack either expands and/or branches off under the surface of the concrete. Continue to inject and fill these voids. In situations where the crack penetrates completely through the concrete element, and the back-side of the concrete element cannot be sealed (e.g., basement walls, or footings with backfill), longer injection time may not force the epoxy to the next port. This most likely indicates that epoxy is running out the unsealed back side of the crack. In this case, the application may require a gel viscosity injection epoxy (ETI-GV) or may not be suitable for epoxy injection repair without excavation and sealing of the back side of the crack.

Epoxy is leaking from the pasted-over crack or around injection ports.

Stop injecting. If using a fast-cure paste-over material (ETR or CIP-LO), wipe off the leaking injection epoxy with a cotton cloth and reapply the paste-over material. Wait for the epoxy to completely harden. If the leak is large (e.g., the port broke off of the concrete surface), it is a good idea to wait approximately 30 minutes, or longer as necessary, to allow the paste-over to cure more completely. Check to see that the epoxy is hard before re-injecting, or the paste-over or ports may leak. Another option for small leaks is to clean off the injection epoxy and use paraffin or crayon to seal the holes.

More epoxy is being used than estimated.

This may indicate that the crack either expands or branches off below the surface. Continue to inject and fill these voids. This may also indicate that epoxy is running out the back side of the crack. If the crack penetrates completely through the concrete element and cannot be sealed, the application may require a gel viscosity injection epoxy (ETI-GV) or may not be suitable for injection repair.

Back pressure is preventing epoxy from flowing.

This can indicate several situations:

- The crack is not continuous, and the portion being injected is full. (See above instructions about injection after the port has reached refusal.)
- The port is not aligned over the crack properly.
- The crack is blocked by debris.
- The injection epoxy used has too high a viscosity.
- If the mixing nozzle has been allowed to sit for a few minutes full of epoxy, the material may have hardened in the nozzle. Attach the E-Z-Click™ fitting to a port at another un-injected location on the crack and attempt to inject. If the epoxy still won't flow, chances are the epoxy has hardened in the nozzle. If so, replace the nozzle.

Less epoxy is being used than estimated.

This may indicate that the crack is shallower than originally thought, or the epoxy is not penetrating the crack sufficiently before moving to the next port. Reinject some ports with a lower-viscosity epoxy to see if the crack will take more epoxy. Another option is to heat the epoxy to a temperature of 26–37°C, which will reduce its viscosity and allow it to penetrate into small cracks easier. The epoxy should be heated uniformly; do not overheat cartridge.

Crack Injection Guide for Crack-Pac® Flex-H_2O™ Crack Sealer

IMPORTANT: The following instructions are intended as recommended guidelines. Due to the variability of field conditions, selection of the proper material for the intended application and installation are the sole responsibility of the applicator.

Polyurethane injection is an effective and economical method of sealing cracks in concrete and solid masonry elements. Crack-Pac® Flex-H_2O™ crack sealer is suitable for sealing dry, wet, seeping and mildly leaking cracks in horizontal and vertical concrete and solid masonry elements ranging from 0.8–6.4 mm.

For larger-scale crack repair projects, Simpson Strong-Tie recommends preparing and attaching a few injection ports and paste-over for trial to ensure that the port spacing is adequate to achieve full epoxy injection penetration.

Definitions

Dry Crack: A crack containing no moisture.

Wet Crack: A crack containing moisture (damp or containing standing water). The surface can be dried and will remain dry during the paste-over operation.

Seeping Crack: A wet crack that slowly oozes water. After being dried, the surface slowly becomes wet again.

Mildly Leaking Crack: A crack with a slow trickle of water emitting from its face.

Preparation of the Crack for Injection

Clean the crack and the surface surrounding it to allow the paste-up material to bond to sound concrete. At a minimum, the surface to receive paste-over should be brushed with a wire brush. Oil, grease or other surface contaminates must be removed in order to allow the paste-over to bond properly. Take care not to impact any debris into the crack during cleaning. With dry cracks, use clean, oil-free compressed air to blow out as much dust and debris from the crack.

For many applications, additional preparation is necessary in order to seal the crack. Where a surfacing material has been removed using an acid or chemical solvent, prepare the crack as follows:

1. Using clean, oil-free compressed air, blow out any remaining debris and liquid.
2. Remove residue by high-pressure washing or steam cleaning.
3. Blow any remaining water from the crack with clean, oil-free compressed air.

If a coating, sealant or paint has been applied to the concrete it must be removed before placing the paste-over material. Under the pressure of injection these materials may lift and cause a leak. If the surface coating is covering the crack, it may be necessary to rout out the surface of the crack in a "V" shape using a grinder in order to get past the surface contamination.

Sealing of the Crack and Attachment of E-Z-Click™ Injection Ports

Dry or Wet Crack (use EIP-EZA)

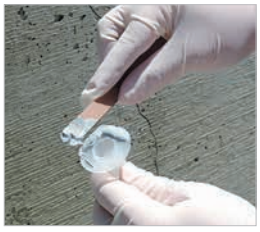
1. To adhere the port to the concrete, apply a small amount of epoxy around the bottom of the port base (Picture 1). Place the port at one end of the crack and repeat until the entire crack is ported (Picture 2). As a rule of thumb, injection ports should be placed 200 mm apart along the length of the crack.

IMPORTANT: Do not allow paste-over to block the port or the crack under it; this is where the injection epoxy must enter the crack.

2. Using a putty knife or other paste-over tool, generously work epoxy along the entire length of the crack (Picture 3). Take care to mound the epoxy around the base of ports and to work out any holes in the material. It is recommended that the paste-over should be a minimum of 5 mm thick and 25 mm wide. Insufficient paste-over will result in leaks under the pressure of injection. Allow the paste-over to cure before beginning injection.

3. Allow the paste-over to harden before beginning injection.

NOTE: CIP-LO and ETR epoxies are fast-cure materials and may harden prematurely if left in a mixed mass on the mixing surface while installing ports. Spreading paste-over into a thin film (approximately 3 mm) on the mixing surface will slow curing by allowing the heat from the reaction to dissipate.



Picture 1

Picture 2

Picture 3

Crack Injection Guide for Crack-Pac® Flex-H_2O™ Crack Sealer

Sealing of the Crack and Attachment of E-Z-Click™ Injection Ports (cont.)

Seeping Crack Application (use EIP-EZA)

1. Mix a small amount of quick-setting hydraulic cement with water in a container per manufacturer's recommendation (leave cement thick so it can be moulded). Apply the cement generously to the top of the port flange and hold the port onto the concrete/masonry surface at one end of the crack until it sticks when the hand is released (usually about 1 minute). Repeat until the entire crack is sealed and ported.

IMPORTANT: Be sure not to cover the port opening/closing interface with the cement. If this interface is covered, the cement must be cut away from this interface with a utility knife once it is cured, otherwise, the port will not close.

2. To seal the remaining portions of the crack, mix small amounts of the hydraulic cement and apply it to the crack in a similar fashion. It is recommended that the paste-over be 5 mm thick and 25 mm wide. Once the entire crack is covered, all leaking water should be directed through the open ports. If water is leaking from any parts of the paste-over, be sure to patch these areas with additional hydraulic cement before injecting the crack.

Mildly Leaking Crack (use EIPX-EZ-RP20)

1. Using a hammer drill or roto-hammer, drill 16 mm holes 19 mm deep at each end of the crack and along the crack approximately 200 mm apart.
2. Using the E-Z-Click Drilled-In port (model EIPX-EZ-RP20), gently hammer the port into the drilled hole at the top of a vertical crack or at either end of a horizontal crack. Mix a small amount of quick-setting hydraulic cement with water in a container per manufacturer's recommendation (leave cement thick so it can be moulded).
3. Apply the cement generously to the top of the port flange and hold until it sticks when the hand is released (usually about 1 minute). Repeat until the entire crack is sealed and ported.

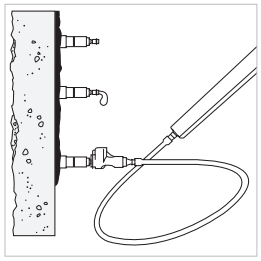
IMPORTANT: Be sure not to cover the port opening/closing interface with the cement. If this interface is covered, the cement must be cut away from this interface with a utility knife once it is cured, otherwise, the port will not close.

4. To seal the remaining portions of the crack, mix small amounts of the hydraulic cement and apply it to the crack in a similar fashion. Starting at one end and working toward the other. In vertical applications start at the top and work down. It is recommended that the paste-over be at least 5 mm thick and 25 mm wide. Once the entire crack is covered, all leaking water should be directed through the open ports. If water is leaking from any parts of the paste-over, be sure to patch these areas with additional hydraulic cement before injecting the crack.

Injection Procedure

1. Follow cartridge preparation instructions on the cartridge label. Verify that the material flowing from the nozzle is a uniform green colour.
2. Attach the E-Z-Click™ fitting to the end of the nozzle by pushing the tubing over the barbs at the end of the nozzle. Make sure that all ports are pushed in to the open position.
3. Attach the E-Z-Click™ injection fitting to the first E-Z-Click™ port until it clicks into place. Make sure that the head of the port is pushed in to the open position. In vertical applications, begin injection at the lowest port and work your way up. In a horizontal application start at one end of the crack and work your way to the other end.
4. Inject polyurethane into the first port until material shows at the next port. Remove the E-Z-Click fitting by bracing the base of the port and pulling out gently on the head of the port to close it. Pulling too hard may dislodge the port from the surface of the concrete, causing a leak. Depress the steel tab on the head of the E-Z-Click fitting and remove it from the port.
5. Move to the next port and repeat until all ports have been injected.

Picture 4



Picture 5

Crack Injection Guide for Crack-Pac® Flex-H_2O™ Crack Sealer

INJECTION TIPS

- For narrow cracks it may be necessary to increase the pressure gradually until the polyurethane begins to flow. It may also be necessary to wait a few minutes for the material to fill the crack and travel to the next port.
- If desired, once the polyurethane has cured, remove the injection ports and paste-over epoxy or hydraulic cement. The paste-over can be removed with a chisel, scraper or grinder

TROUBLESHOOTING

Polyurethane is flowing into the crack, but not showing up at the next port.

This can indicate that either the crack expands and/or branches off under the surface of the concrete. Continue to inject and fill these voids.

Back pressure is preventing epoxy from flowing.

This can indicate several situations:

- The crack is not continuous and the portion being injected is full.
- The port is not aligned over the crack properly.
- The crack is blocked by debris.

Polyurethane is leaking from the pasted-over crack or around injection ports.

Stop injecting. If using a fast cure paste-over material (ETR or CIP), wipe off the leaking injection epoxy with a cotton cloth and re-apply the paste over material. Wait until the paste-over epoxy has completely hardened. If the leak is large (e.g. the port broke off of the concrete surface) it is a good idea to wait approximately 30 minutes, or longer as necessary, to allow the paste-over to cure more completely. Check to see that the paste-over is hard before re-injecting or the paste-over or ports may leak.

Another option for small leaks is to clean off the injection adhesive and use paraffin or crayon to seal the holes.

More polyurethane is being used than estimated.

This may indicate that the crack either expands or branches off below the surface. Continue to inject and fill these voids.

Less polyurethane is being used than estimated.

This may indicate that the crack is shallower than originally thought, or the polyurethane is not penetrating the crack sufficiently before moving to the next port.

Heli-Tie™ Helical Stitching Tie

Restoration or repair of damaged brick and masonry structures presents a unique challenge to contractors and Designers. The Simpson Strong-Tie® Heli-Tie™ helical stitching tie provides a unique solution to the preservation and repair effort. Made of 304 stainless steel, the 6 mm diameter tie is installed into the bed joint of damaged or cracked masonry courses using non-shrink repair grout or mortar (by others).

Features

- Helical design distributes loads uniformly over a large surface area
- Installs into the mortar joint to provide an inconspicuous repair and preserve the appearance of the structure
- Type 304 stainless steel offers excellent corrosion resistance to original reinforcement
- Patented manufacturing process results in consistent, uniform helix configuration (U.S. Patent 7,269,987)
- Batch number printed on each tie for easy identification and inspection

Applications

- Repair of damaged masonry

Base Material

- Masonry

Finish

- Type 304 stainless steel

Heli-Tie™ Helical Stitching Tie
U.S. Patent 7,269,987

Helical design distributes loads uniformly over a large surface area

Installs into the mortar joint to provide an **inconspicuous repair** and preserve the appearance of the structure

Scan this QR code to watch installation animation on Heli-Tie™ Helical Stitching Tie.

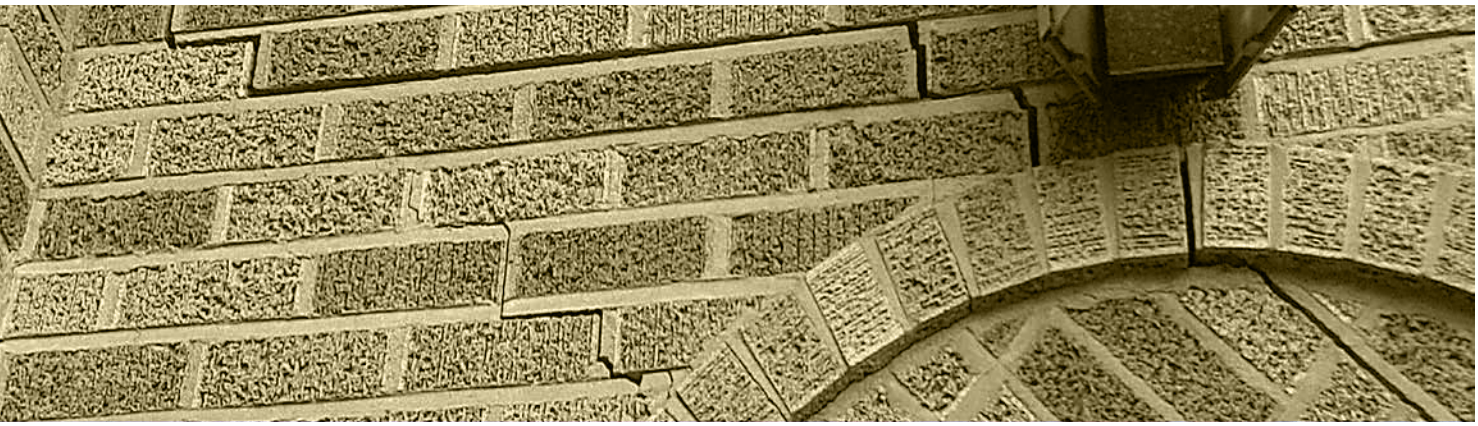
https://youtu.be/mebsrKkKDoA

Heli-Tie™ Helical Stitching Tie Product Availability

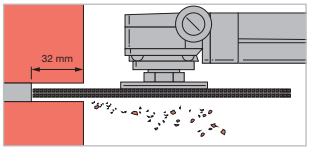
Size (mm)	Model No.	Pack Qty	Ctn Qty
6 x 1000	**HELIST254000** [1]	1	10
6 x 10,000	**HELIST06-10M** [2]	1	—

Special-order lengths available, contact Simpson Strong-Tie for details.
1. Only available in Australia
2. Only available in New Zealand

Heli-Tie™ Helical Stitching Tie Installation

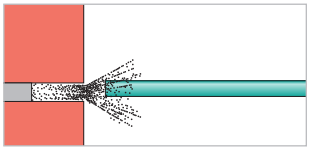


Installation Sequence



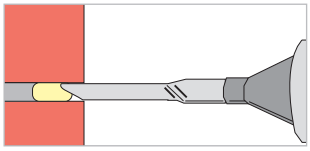
1. Grind

Chase bed joint 500 mm on either side of the affected area to a depth of approximately 32 mm with a rotary grinding wheel. Vertical spacing of installation sites should be approximately 300 mm for red brick or "every course" for concrete masonry units.



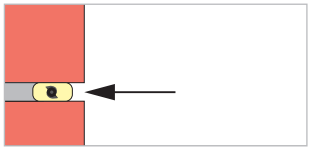
2. Clean

Clear bed joint of all loose debris.



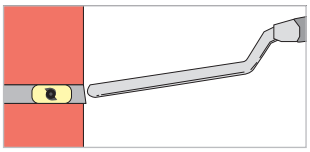
3. Fill

Mix non-shrink repair grout or mortar (by others) as per product instructions and place into the prepared bed joint, filling the void to approximately two-thirds of its depth.



4. Insert

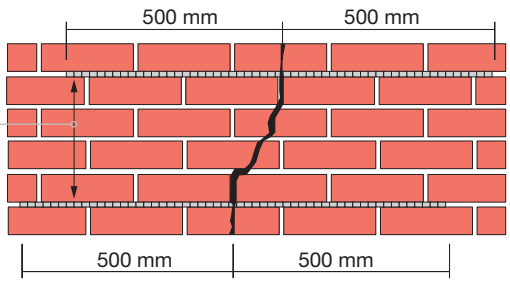
Embed the tie at one-half the depth of the void. Trowel displaced grout to fully encapsulate the tie.



5. Seal

Fill any remaining void and vertical cracks with repair mortar (by others) to conceal repair site.

- 300 mm. max. for brick
- Every other course for CMU applications



Heli-Tie™ Helical Wall Tie

The stainless-steel Heli-Tie™ wall tie is used to anchor building facades to structural members or to stabilise multiple-skin brick walls. The helical design enables the tie to be driven quickly and easily into a predrilled pilot hole (or embedded into mortar joints in new construction). As it is driven, the fins of the tie undercut the masonry to provide an expansion-free anchorage that will withstand tension and compression loads.

The Heli-Tie wall tie is installed using a proprietary setting tool that is used with an SDS-Plus shank rotohammer to drive and countersink the tie. Heli-Tie wall ties perform in concrete and masonry as well as timber and steel studs.

Features

- Can install in the face of brick or into the mortar bed joint
- Installs quickly and easily
- Provides an inconspicuous repair that helps preserve a building's appearance
- Type 316 stainless steel offers superior corrosion resistance when wall cavity exposure exists
- Patented manufacturing process enables easier driving and better interlock with the substrate
- Batch number printed on each tie for easy identification and inspection

Applications

- Repair of building facades

Base Material

- Brick

Finish

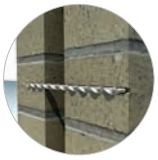
- Type 316 stainless steel

Ordering Information

- Available in precut and 10 m coils

Heli-Tie™ Helical Wall Tie
U.S. Patent 7,269,987

Batch number printed on each tie for **easy identification and inspection**



Patented manufacturing process enables **easier driving and better interlock** with the substrate

Complementary Products

Heli-Tie™ Fastener Installation Tool

Required to correctly install the Heli-Tie™ wall ties, this tool speeds up installation and automatically countersinks the tie into the facade material. The one-piece design with no moving parts, improves longevity and prevents the Heli-Tie fasteners from jamming. Installation tools sold separately.

Installation Tool Model No.

HELITOOL09

Heli-Tie™ Wall Tie Tension Tester

Recommended equipment for on-site testing to accurately determine load values in any specific structure, the Heli-Tie™ wall tie tension tester features a key specifically designed to grip the Heli-Tie fastener and provide accurate results. Replacement test keys sold separately.

Tester Model No.

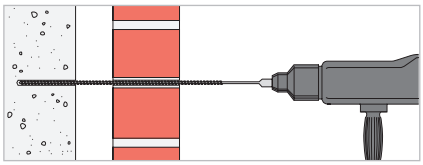
HELITEST09

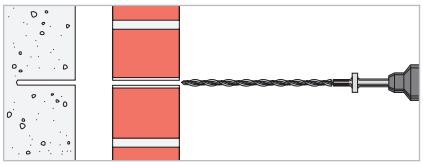
Test Key Model No.

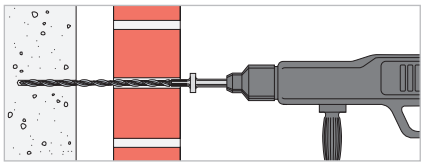
HELIKEY09

Heli-Tie™ Helical Wall Tie Installation

Installation Sequence







1. Drill

Drill pilot hole through the facade and to the specified embedment depth in the base material (add 25 mm to drill depth if base material is concrete). Drill should be in rotation only mode when drilling into soft masonry or into hollow backing material.

2. Insert

Position blue end of the Heli-Tie™ fastener in the installation tool and insert the tie into the pilot hole.

3. Drive

With the SDS-PLUS rotohammer in rotation and hammer mode, drive the tie until the tip of the installation tool enters the exterior surface of the masonry and countersinks the tie below the surface.

PLEASE NOTE: A test hole should be performed to ensure the tie will go in.

Patch the hole in the facade with a matching masonry mortar.

Heli-Tie™ Helical Wall Tie Product Availability

316 Stainless Steel

Size (mm)	Model No.	Drill Bit Dia.* (mm)	Pack Qty	Ctn Qty
9 x 180	**HELI09180A4**	5.5 or 6.5	100	400
9 x 205	**HELI09205A4**			
9 x 230	**HELI09230A4**			
9 x 255	**HELI09255A4**		150	300
9 x 280	**HELI09280A4**			
9 x 305	**HELI09305A4**			
9 x 10,000	**HELI09A4-10M** [1]		1	—

Special-order lengths available, contact Simpson Strong-Tie for details.

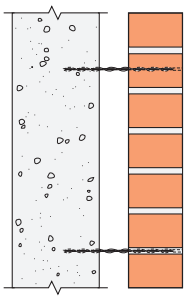
1. Only available in New Zealand

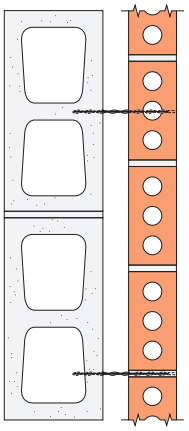
SIMPSON Strong-Tie

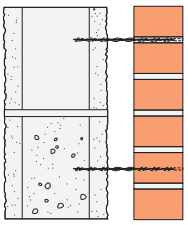
Heli-Tie™ Helical Wall Tie Guide Tension Loads in Various Base Materials

Size (mm)	Base Material	Anchor Location	Drill Bit Dia.* (mm)	Min. Embed. Depth (mm)	Tension Load[1]				
					Ultimate[2] (kN)	Standard Deviation (kN)	Charac-teristic (kN)	Load at Max. Permitted Displ.[3] (kN)	Coeffi-cient of Variation
9.0	Solid Brick[4]	Mortar Bed Joint	5.5	76	2.5	0.4	1.5	1.1	0.16
			6.5		1.6	0.2	1.1	0.6	0.13
		Brick Face	5.5		5.8	0.4	4.8	2.5	0.07
			6.5		3.6	0.3	2.8	1.6	0.08
	Hollow Brick[5]	Mortar Bed Joint	5.5		2.4	0.4	1.4	1.3	0.17
		Brick Face	5.5		3.4	0.2	2.9	1.8	0.06
			6.5		2.3	0.1	2.0	0.8	0.04
	Grout-Filled CMU[6]	Centre of Face Shell	5.5	70	5.2	0.4	4.2	1.8	0.08
			6.5		3.7	0.3	2.9	1.6	0.08
		Web	5.5		5.2	0.2	4.7	2.0	0.04
			6.5		3.6	0.4	2.6	1.5	0.11
		Mortar Bed Joint	5.5		3.2	0.3	2.4	1.4	0.09
			6.5		2.4	0.3	1.6	0.9	0.13
	Hollow CMU[7]	Centre of Face Shell	5.5		3.5	0.2	3.0	1.4	0.06
			6.5		2.2	0.2	1.7	1.1	0.09
		Web	5.5		5.3	0.2	4.8	2.0	0.04
			6.5		3.0	0.4	2.0	1.7	0.13
	Normal-Weight Concrete[8]	—	5.5	44	3.9	0.3	3.1	1.8	0.08
			6.5	70	4.4	0.4	3.4	1.7	0.09
	Timber Stud[9,11]	Centre of Thin Edge	5.5	70	2.6	0.1	2.3	1.6	0.04
			6.5		2.0	0.0	2.0	1.2	0.00
	Steel Stud[10,11]	Centre of Flange	5.5	25	0.9	0.0	0.9	0.5	0.00
			6.5		0.7	0.0	0.7	0.4	0.00

CAUTION: Loads are guide values based on laboratory testing. On-site testing shall be performed for verification of capacity since base material quality can vary widely.







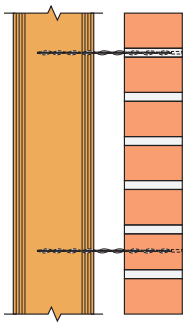
1. Tabulated loads are guide values based on laboratory testing. On-site testing shall be performed for verification of capacity since base material quality can vary widely.
2. Ultimate load is average load at failure of the base material. Heli-Tie™ fastener average ultimate steel strength is 17.3 kN and does not govern.
3. Load at maximum permitted displacement is average load at displacement of 4 mm. The designer shall apply a suitable factor of safety to these numbers to derive allowable service loads.
4. Solid brick values for nominal 100 mm wide solid brick conforming to ASTM C62/C216, Grade SW. Type N mortar is prepared in accordance with IBC Section 2103.8.
5. Hollow brick values for nominal 100 mm wide hollow brick conforming to ASTM C216/C652, Grade SW, Type HBS, Class H40V. Mortar is prepared in accordance with IBC Section 2103.8.
6. Grout-filled CMU values for 200 mm wide lightweight, medium-weight and normal-weight concrete masonry units. The masonry units must be fully grouted. Values for 200 mm wide concrete masonry units (CMU) with a minimum specified compressive strength of masonry, f'm, at 28 days is 10.34 MPa.
7. Hollow CMU values for 200 mm wide lightweight, medium-weight and normal-weight concrete masonry units.
8. Normal-weight concrete values for concrete with minimum specified compressive strength of 17.24 MPa.
9. 90 mm x 45 mm timber stud values for nominal 90 mm x 45 mm Spruce-Pine-Fir or Radiata Pine.
10. Steel stud values for 20-gauge C-shape steel stud.
11. For new construction. Anchor one end of tie into backup material. Embed other end into veneer mortar joint. Not for retrofits due to difficulty of locating centre of timber or steel stud flange.

*When selecting drill bit, 5.5 mm equates to 7⁄32" and 6.5 mm equates to ¼" imperial sized bit.

Heli-Tie™ Helical Wall Tie Compression (Buckling) Loads

Size (mm)	Unsupported Length (mm)	Ultimate Compression Load[1] (kN)
9.0	25	**8.5**
	50	**5.8**
	100	**4.4**
	150	**3.5**

1. The Designer shall apply a suitable factor of safety to these values to derive allowable service loads.




ULTRATECH
NITRILE FOAM
9674

Titen HD® 12 x 230 mm Masonry Screw

For retrofitting URM cavity walls for out-of-plane composite behaviour.

The Titen HD 12 mm x 230 mm masonry screw anchor provides a solution to tie two brick leaves together when a cavity exists between them.

Once the masonry screws are installed the new composite infill wall will be strengthened to resist out-of-plane forces that occur during a seismic event (refer to University of Auckland Report — LR0441 for guidance on installation patterns and analysis).

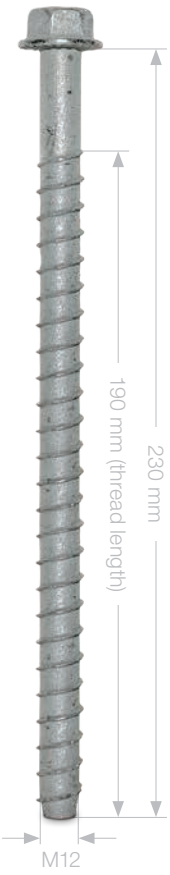
Base Material

- Masonry, Concrete

Finish

- Carbon Steel, Mechanically Galvanised

This product is only available in New Zealand



THD12230MG

Serrated teeth facilitate cutting and reduce installation torque

Easy post-installation inspection: The head is stamped with the Simpson Strong-Tie "≠" sign and the anchor size in mm

Highly ductile: Can be bent to a right angle (90 degrees) and remain intact without snapping or breakage

ETA European Technical Approval

Alternative Countersink Option

Titen HD® Threaded Rod Hanger Product Availability

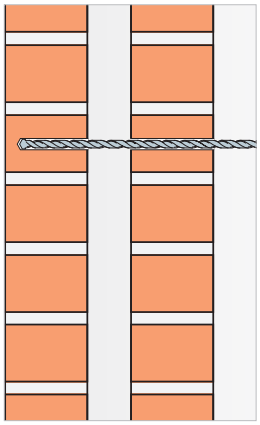
Mechanically Galvanised[1] Model No.	Anchor and Drill Bit Size	Total Length[2] (mm) L	Thread Length (mm) L	Wrench Size (mm)	Box Qty	Carton Qty
THD12230MG	M12	230	190	18	25	50

1. Mechanically galvanised finish is ≥ 12 microns in accordance with EN ISO 12683, Type 1. Not recommended for use in highly corrosive or unprotected outdoor environments.
2. Length is measured from the underside of the head to the tip of the anchor.
3. Only available in New Zealand.

Titen HD® 12 x 230 mm Masonry Screw Installation

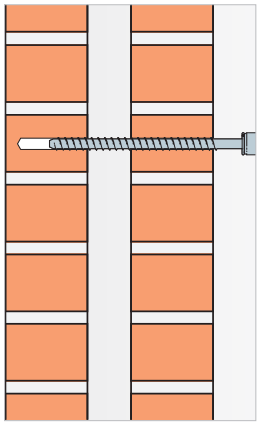
CAUTION: Oversized holes in the base material will reduce or eliminate the mechanical interlock of the threads with the base material and will reduce the anchor's load capacity. Use a Titen HD screw anchor one time only. Installing the anchor multiple times may result in excessive thread wear and reduce load capacity.

Installation Sequence



1. Drill

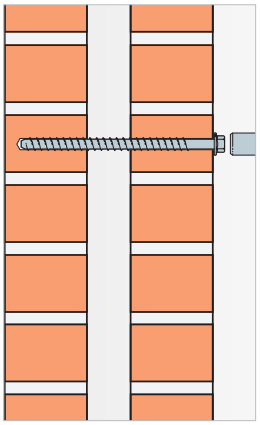
Drill a hole in the base material using a carbide drill bit the same diameter as the nominal diameter of the anchor to be installed. Drill the hole to the specified embedment depth plus 12 mm minimum to allow the thread tapping dust to settle



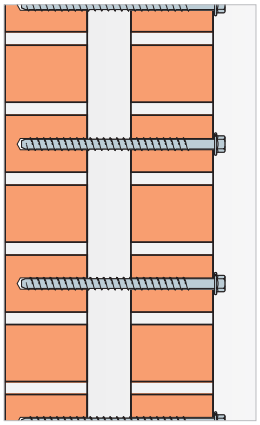
2. Install

Insert the anchor through the fixture and into the hole.

Tighten the anchor into the base material until the hex washer head contacts the surface.

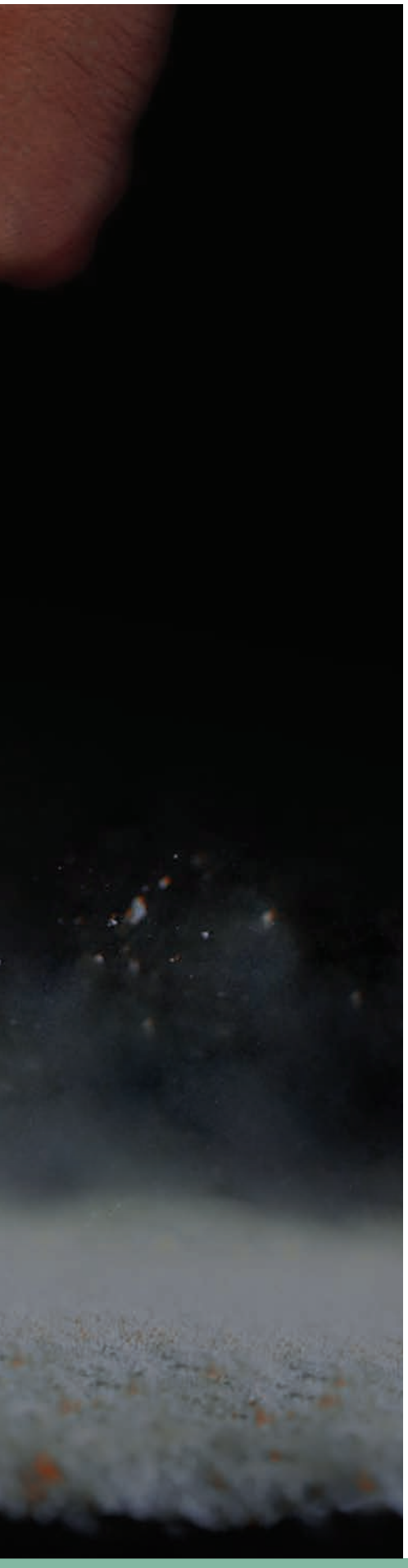


3. If the anchor will not install completely, remove the anchor and assure that all dust has been evacuated or drill the hole deeper. Begin re-installation of the anchor by hand to prevent cross-threading.



Direct Fastening Solutions

Product Index



On the jobsite, time is money. That's why Simpson Strong-Tie offers a range of powder-actuated tools and fasteners designed to maximise jobsite productivity and operator comfort in most applications.

Single-shot efficiently drive our line of PAT fasteners into concrete and steel. We also offer free online Powder-Actuated Tool Training and Certification.

Scan this QR code to go to our Powder-Actuated Tool Training and Certification


WARNING
FOR USE ONLY BY QUALIFIED
OPERATORS ACCORDING TO
MANUFACTURERS INSTRUCTION
MANUAL NO 951249

PT-27 General-Purpose Powder-Actuated Tool

Semi-Automatic

The PT-27 is a high quality semi-automatic and fast-cycling fastening tool

PT-27 tools are engineered for continuous use, high reliability and low maintenance. This versatile tool installs a variety of fastener types and lengths.

Features
- Reliable design
- Operator comfort from cushioned grip and reduced recoil
- Sound dampening muffler for quiet operation
- Fast-cycling
- Easy disassembly for cleaning and maintenance

Applications
- Electrical applications
- Framing members
- Bottom plates
- Drywall track
- Formwork
- Water proofing material and/or lathing

Base Material
- Concrete
- Steel

Specifications
- Fastener length: 16–72 mm
- Fastener type: 8 mm Diameter
- Firing action: Semi-automatic
- Load Calibre: .27 strip loads, brown through red (levels 2–5)
- Length: 340 mm
- Weight: 2.32 kg

Product Includes
Tool is sold in a rugged tool box complete with:
- Operator's manual
- Spall suppressor
- Safety glasses / ear plugs
- Tool lubricant
- Cleaning brushes
- Operator's exam and caution sign

Powder Loads and Fasteners
- Refer to page 122 for further information.

Powder Loads and Fasteners

Some products may not be available in your region Please contact your local office for availability.

Powder Loads — .27 Calibre Plastic, 10-shot strip loads

The P27SL strip loads work with Simpson Strong-Tie tools and most other .27 calibre strip load tools.

Description	Model No.	Box Qty	Carton Qty	Compatible Tools
.27 Cal.–Brown (Level 2)	**P27SL2**	100	10,000	**PT-27** and Others
.27 Cal.–Green (Level 3)	**P27SL3**	100	10,000	
.27 Cal.–Yellow (Level 4)	**P27SL4**	100	10,000	
.27 Cal.–Red (Level 5)	**P27SL5**	100	10,000	
.27 Cal.–Purple (Level 6)	**P27SL6**	100	10,000	Others

Fasteners for Simpson Strong-Tie® Powder-Actuated Tools

These fasteners work with Simpson Strong-Tie tools and most other tools.

PHN Loose drive pin

- Head: 8 mm
- Shank Diameter: 3.68 mm
- Tip: Ballistic point
- **Region:** AU

Length (mm)	Model No.	Box Qty	Ctn Qty	Compatible Tools
22	**PHN-22**	10	1000	**PT-27** and Others
27	**PHN-27**			
32	**PHN-32**			
37	**PHN-37**			
42	**PHN-42**			
47	**PHN-47**			
52	**PHN-52**			
57	**PHN-57**			
62	**PHN-62**			
72	**PHN-72A**			

PDPA Loose drive pins

- Head: 7.6 mm
- Shank Diameter: 3.98 mm
- Tip: Ballistic point
- **Region:** NZ

Length (mm)	Model No.	Box Qty	Ctn Qty	Compatible Tools
16	**PDPA-62K** (Knurled)	10	1000	**PT-27** and Others
19	**PDPA-75**			
27	**PDPA-100**			
29	**PDPA-106**			
32	**PDPA-125**			
37	**PDPA-150**			
47	**PDPA-187**			
52	**PDPA-200MG** *			
62	**PDPA-250MG** *			
72	**PDPA-287MG** *			

*Mechanically galvanised finish.

PHNW Washered drive pins

- Head: 8 mm
- Shank Diameter: 3.68 mm
- Washer: 25 mm
- Tip: Ballistic point
- **Region:** AU

Length (mm)	Model No.	Box Qty	Ctn Qty	Compatible Tools
27	**PHNW-27**	10	1000	**PT-27** and Others
32	**PHNW-32**			
42	**PHNW-42**			
52	**PHNW-52**			
62	**PHNW-62**			
72	**PHNW-72**			

PDPAW Washered drive pins

- Head: 7.6 mm
- Shank Diameter: 3.98 mm
- Washer: 19 mm
- Tip: Ballistic point
- **Region:** NZ

Length (mm)	Model No.	Box Qty	Ctn Qty	Compatible Tools
19	**PDPAW-75**	10	1000	**PT-27** and Others
27	**PDPAW-100**			
32	**PDPAW-125**			
37	**PDPAW-150**			
47	**PDPAW-187**			
52	**PDPAW-200**			
62	**PDPAW-250**			
72	**PDPAW-287**			

Fasteners for Simpson Strong-Tie® Powder-Actuated Tools (cont.)

These fasteners work with most other tools.

PHSNA Collated drive pins

- Head: 8 mm
- Shank Diameter: 3.68 mm
- Tip: Ballistic point
- Collation: 10 pins per strip
- **Region:** AU

Length (mm)	Model No.	Box Qty	Ctn Qty	Compatible Tools
16	**PHSNA-16K** (Knurled)	10	1000	Others
19	**PHSNA-19**			
19	**PHSNA-19K** (Knurled)			
22	**PHSNA-22**			
27	**PHSNA-27**			
32	**PHSNA-32**			
37	**PHSNA-37**			
42	**PHSNA-42**			
47	**PHSNA-47**			
52	**PHSNA-52**			
57	**PHSNA-57**			
62	**PHSNA-62**			
72	**PHSNA-72**			

PDPAS Collated drive pins

- Head: 7.6 mm
- Shank Diameter: 3.98 mm
- Tip: Ballistic point
- Collation: 10 pins per strip
- **Region:** NZ

Length (mm)	Model No.	Box Qty	Ctn Qty	Compatible Tools
19	**PDPAS-75**	10	1000	Others
27	**PDPAS-100**			
32	**PDPAS-125**			
37	**PDPAS-150**			
47	**PDPAS-187**			
52	**PDPAS-200**			
62	**PDPAS-250**			
72	**PDPAS-287**			

PAT Application Guide

General Notes

1. Average pin embedment into concrete is 19–32 mm.
2. To determine pin length for concrete: add fixture thickness and embedment depths.
3. To determine pin length for steel applications: add fixture thickness plus steel thickness plus 3 mm. Getting the point to pass through steel 3 mm maximises holding strength.
4. When selecting a load power level, it is recommended to make a test fastening with the lowest power level. If the powder load does not set the fastener, try the next highest load, and so on, until the fastener is properly set.

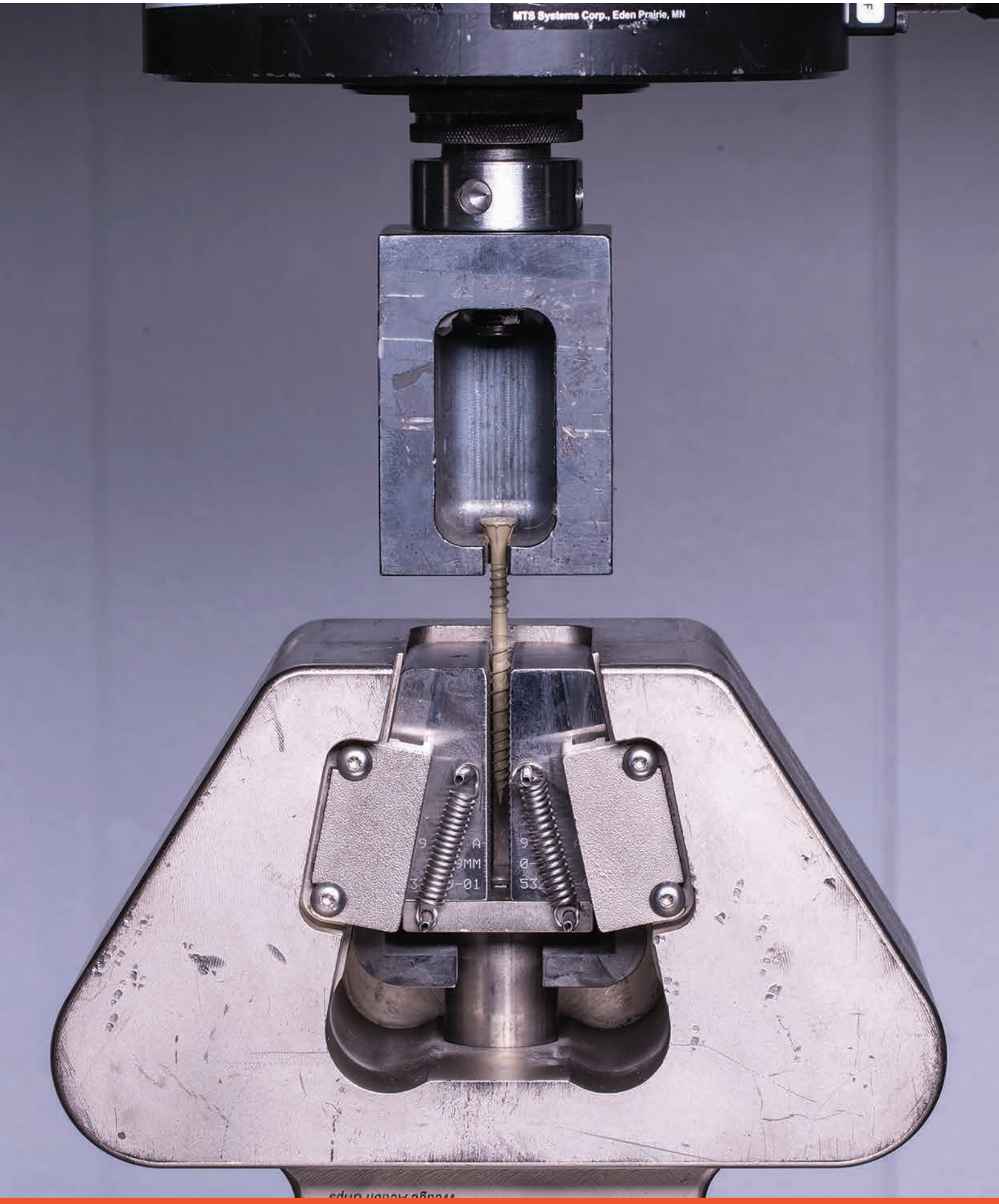
Typical Applications

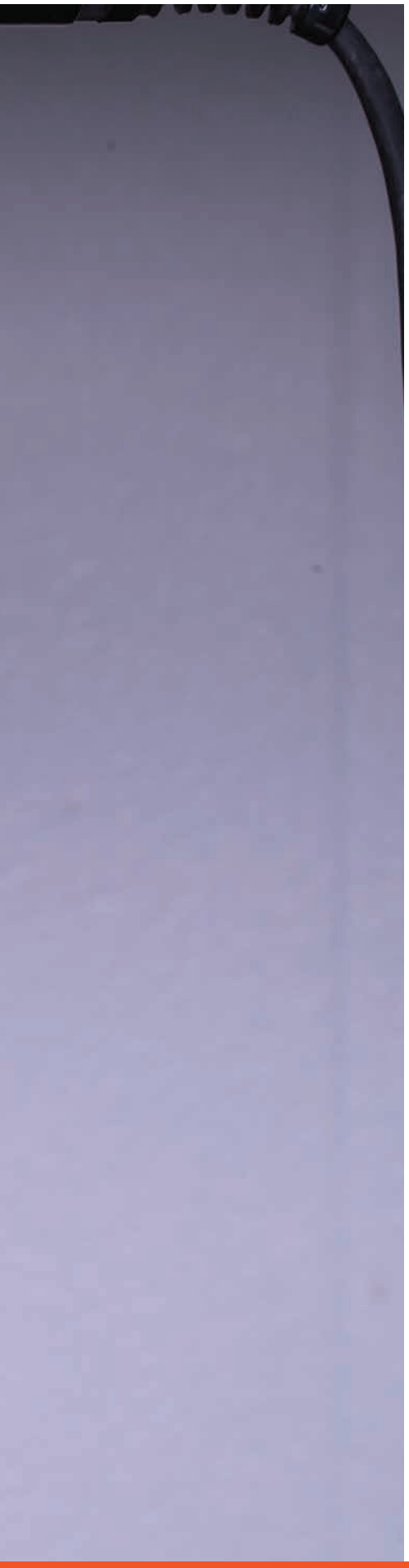
Level Key: 2–Brown | 3–Green | 4–Yellow | 5–Red

For fastening → / Into ↓	Timber (45mm thick)	Timber (25mm thick)	Plywood (19mm thick)	Steel Fixtures/ Conduit Clips (light steel)	Drywall Track
	Pin Length (mm)				
Concrete	72	52	42	27	19
Cement Block	72	52	42	27	27
Steel (5–6mm)	62	32 (washered)	32 (washered)	19	16 (knurled)
Steel (6–8mm)	62	42 (washered)	32 (washered)	19	16 (knurled)

1. To be used as a guide only—see General Notes
2. Recommended minimum embedment depth for maximum holding strength: Steel = 12 mm; Concrete/Cement Block = 25 mm

Fasteners — When Performance Is Critical

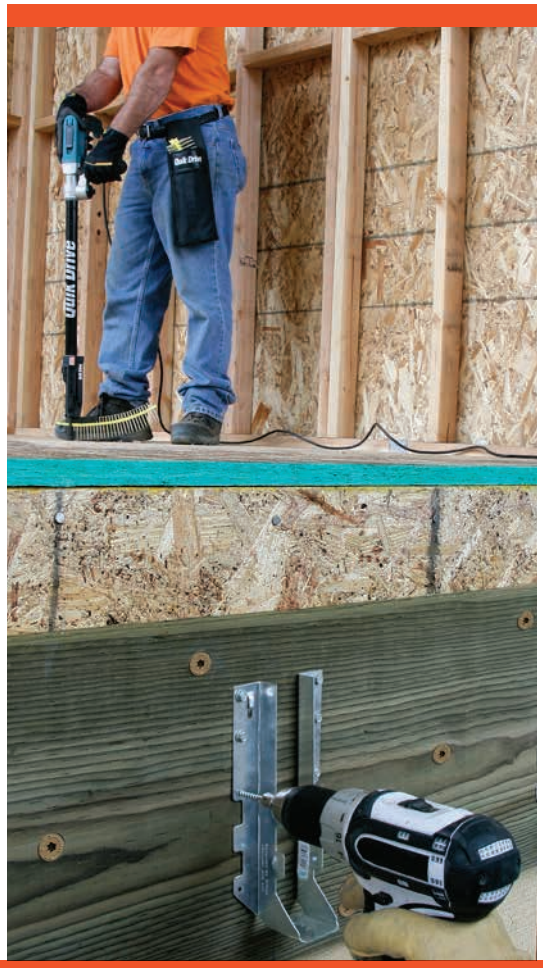


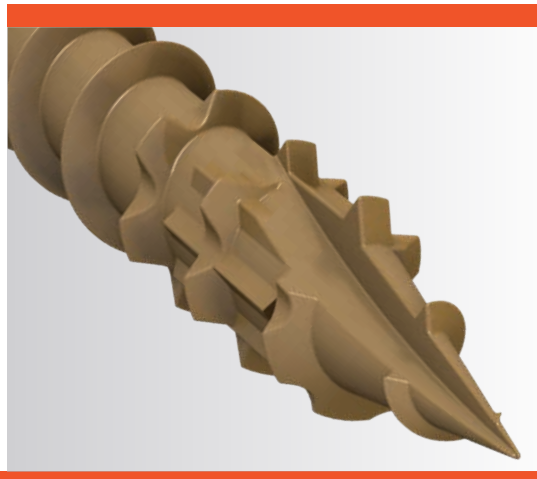


Driven To Exceed Expectations

In the fastener marketplace, Simpson Strong-Tie stands apart from the rest. Quality and reliability is our top priority. That's why we hire PHDs, metallurgists, materials engineers, and structural engineers to create the best possible fasteners. Each production run goes through rigorous testing to ensure our products can handle higher loads, resist corrosion, and make installation more efficient. It's the reason builders trust Simpson Strong-Tie.

For more information about custom fasteners or how we can contribute to the success of your next project, please call to speak with one of our knowledgeable, trained fastening professionals.





Decks, Docks and Boardwalks

Application	Timber			Composite Decking		
Fastening To	Steel Joist			Steel Joist	Timber Joist	
Max. Recommended Material Thickness	25mm	20	30	25mm	25mm	
Recommended Steel Thickness	1.2–2.4mm	1.2–8mm		0.8–2.4mm	—	
Screw Finish	316 Stainless Steel	Class 3 Mechanically Galvanised		Quik Guard® Coating	316 Stainless Steel	Quik Guard® Coating
Corrosion Resistance Level	Corrosion Resistance Level SEVERE	Corrosion Resistance Level MEDIUM		Corrosion Resistance Level MEDIUM	Corrosion Resistance Level SEVERE	Corrosion Resistance Level MEDIUM
Screw Gauge	10g	14g		10g		
Screw Length	50mm	45mm	60mm	60mm	70mm	
Image						
Loose Screw Code	SSBFHSD2R250	—		See product page for detail	See product page for detail	
Box Qty	250	—		250	250	
Loose Screw Page	148	—		150	149	
Collated Screw Code	SSBFHSD2SA	TBG1445SA	TBG1460SA	DCSD Series	DCU Series	
Box Qty	1000	1000	750	1000	1000	1000
Collated Screw Page	191	205		193	192	
 Compatible Tool	PRO250 | PRO300	HSD60		PRO250 | PRO300	PRO300	
Tool Page	— | 174	176		— | 174	174	

Decks, Docks and Boardwalks (cont.)

Application	Hardwood Decking				Softwood Decking			
Fastening To	Softwood Joist		Hardwood Joist		Softwood Joist			
Max. Recommended Material Thickness	20mm		20mm	25mm	20mm	25mm	20mm	25mm
Screw Finish	Class 3 Mechanically Galvanised	305 Stainless Steel	305 Stainless Steel		Quik Guard® Coating		305 Stainless Steel	
Corrosion Resistance Level	Corrosion Resistance Level MEDIUM	Corrosion Resistance Level HIGH	Corrosion Resistance Level HIGH		Corrosion Resistance Level MEDIUM		Corrosion Resistance Level HIGH	
Screw Gauge	10g							
Screw Length	60mm		50mm	60mm	50mm	65mm	50mm	65mm
Image								
Loose Screw Code	DHWG60R250	SSDHW60R250 SSDHW60R1100	SSDHSD50R250 SSDHSD50R1100	SSDHSD60R250 SSDHSD60R1100	DSVT2R250	DSVT212R250	S10200WPR250 S10200WPR1100	S10250WPR250 S10250WPR1100
Box Qty	250	250 | 1100	250 | 1100	250 | 1100	250		250 | 1100	250 | 1100
Loose Screw Page	146		147		144		145	
Collated Screw Code	DHWG60SA	SSDHW60SA	SSDHSD50S	SSDHSD60S	DSVT2S	DSVT212S	—	
Box Qty	1000				1500	1000	—	
Collated Screw Page	189		190		188		—	
 Compatible Tool	PRO250 | PRO300						—	
Tool Page	— | 174						—	

General Timber Applications

Application	Timber (General Connection)						
Fastening To	Timber						
Max. Recommended Material Thickness	13mm	20mm	25mm	30mm	20mm	25mm	30mm
Screw Finish	Yellow Zinc	Class 3 Mechanically Galvanised	Quik Guard® Coating	Quik Guard® Coating	305 Stainless Steel		
Corrosion Resistance Level	Corrosion Resistance Level LOW	Corrosion Resistance Level MEDIUM			Corrosion Resistance Level HIGH		
Screw Gauge	8g				10g		
Screw Length	32mm	50mm	65mm	75mm	50mm	65mm	75mm
Image							
Collated Screw Code	WSC114SA	DTHG2SA	DTHQ212S	DTHQ3S	SSDTH2SA	SSWSC2BSA10	SS3DSC212BS*	SS3DSC3BS*
Box Qty	2500	2000	1500	1000	2000		1500	1000
Collated Screw Page	197	208				197	209	
Compatible Tool	PRO200	PRO200 PRO250 PRO300	PRO250 | PRO300	PRO300	PRO200 PRO250 PRO300	PRO250 | PRO300		PRO300
Tool Page	173	173 | — | 174	— | 174	174	173 | — | 174	— | 174		174
Notes	Not recommended for decking applications. See "Fastening Timber Decks to Timber and Steel Framing" on page 19 for further information.					These fasteners may require predrilling. *Also available in 316 Stainless Steel through special order.		

Construction and Transportable Buildings

Application	Plywood	Sheet Flooring | Cement Sheet					
Fastening To	Steel Frame						Timber
Max. Recommended Material Thickness	19mm	5mm	12mm	20mm	30mm	50mm	18mm
Recommended Steel Thickness	0.8–1.6mm	0.8–2.4mm			1.2–3mm		—
Screw Finish	Yellow Zinc	Class 3 Mechanically Galvanised					
Corrosion Resistance Level	Corrosion Resistance Level LOW	Corrosion Resistance Level MEDIUM					
Screw Gauge	8g				10g		8g
Screw Length	48mm	25mm	32mm	42mm	42mm	55mm	75mm	42mm
Image							
Collated Screw Code	PPSD11516SA	CBSDG1SA	CBSDG114SA	CBSDG158SA	CBSDGL158SA	CBSDG214SA	CBSDGL3SA	WSCBGA158SA
Box Qty	2000	2500	1500			1000		2000
Collated Screw Page	200	198						207
Compatible Tool	PRO200 PRO250 PRO300	PRO200		PRO200 PRO250 PRO300	PRO250 | PRO300			
Tool Page	173 | — | 174	173		173 | — | 174	— | 174			
Notes					10 Gauge recommended for commercial applications			
		Can be used for magnesium oxide board if the application is internal with galvanised fasteners.						
	Not recommended for decking applications. See "Fastening Timber Decks to Timber and Steel Framing" on page 19 for further information.							

Construction and Transportable Buildings (cont.)

Application	Sheet Flooring						
Fastening To	Timber | Pine | I-Beam | I-Joist | Pozi Strut						
Max. Recommended Material Thickness	20mm			25mm		30mm	
Screw Finish	Yellow Zinc	Class 3 Mechanically Galvanised	305 Stainless Steel	Yellow Zinc	Class 3 Mechanically Galvanised	Yellow Zinc	Class 3 Mechanically Galvanised
Corrosion Resistance Level	Corrosion Resistance Level LOW	Corrosion Resistance Level MEDIUM	Corrosion Resistance Level HIGH	Corrosion Resistance Level LOW	Corrosion Resistance Level MEDIUM	Corrosion Resistance Level LOW	Corrosion Resistance Level MEDIUM
Screw Gauge	8g | 10g	8g	10g	8g			
Screw Length	45mm | 50mm	50mm		65mm		75mm	
Image							
Collated Screw Code	WSNTLA134SA WSNTLA2SA10	WSNTLG2SA	SSWSC2BSA10	WSNTL212SA	WSNTLG212S	WSNTL3S	WSNTLG3S
Box Qty	2000	2000	2000	1500	1500	1000	1000
Collated Screw Page	194	196	197	194	196	194	196
 Compatible Tool	PRO250 | PRO300	PRO200 PRO250 PRO300	PRO250 | PRO300			PRO300	
Tool Page	— | 174	173 | — | 174	— | 174			174	
Notes	Not recommended for decking applications. See "Fastening Timber Decks to Timber and Steel Framing" on page 19 for further information.						

Construction and Transportable Buildings (cont.)

Application	Bracing Plyboard		Ceramic Tile Underlay	
Fastening To	Steel Frame		Timber | Light Gauge Steel	
Max. Recommended Material Thickness	5mm	12mm	9mm	12mm
Recommended Steel Thickness	0.8–2.4mm		0.55–0.75mm	
Screw Finish	Class 3 Mechanically Galvanised			
Corrosion Resistance Level	Corrosion Resistance Level MEDIUM			
Screw Gauge	8g		7g	8g
Screw Length	25mm	32mm		
Image				
Collated Screw Code	CBSDG1SA	CBSDG114SA	MTHG114SA	WSCBGHLA114SA
Box Qty	2500	1500	2500	2000
Collated Screw Page	198		206	207
 Compatible Tool	PRO200			
Tool Page	173			
Notes	Not recommended for decking applications. See "Fastening Timber Decks to Timber and Steel Framing" on page 19 for further information.			

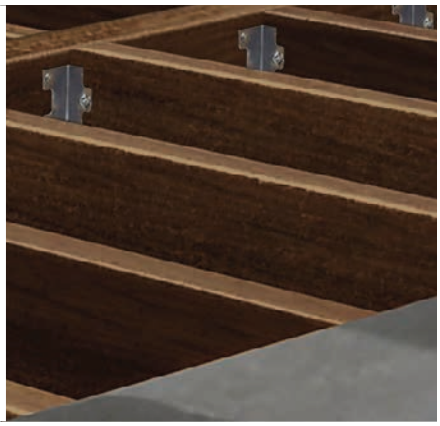
Construction and Transportable Buildings (cont.) | Plasterers

Application	Cladding, Steel, Metal Panelling	Timber Batten		Plasterboard — Fire Resistant, Single and Double Sheet		
Fastening To	Steel Frame	Timber Frame				
Max. Recommended Material Thickness	10mm	16mm	20mm	16mm	20mm	32mm
Recommended Steel Thickness	0.8–3mm	—				
Screw Finish	Class 3 Mechanically Galvanised	Yellow Zinc				
Corrosion Resistance Level	Corrosion Resistance Level MEDIUM	Corrosion Resistance Level LOW				
Screw Gauge	10g	6g				
Screw Length	19	32mm	42mm	32mm	42mm	50mm
Image						
Collated Screw Code	FPHSDG34SSFMIST	DWCZ114PSA	DWCZ158PSA	DWCZ114PSA	DWCZ158PSA	DWCZ2PS
Box Qty	2500	2500				
Collated Screw Page	204	203				
 Compatible Tool	PROPH	PRO200				
Tool Page	177	173				
Notes						

Plasterers (cont.)

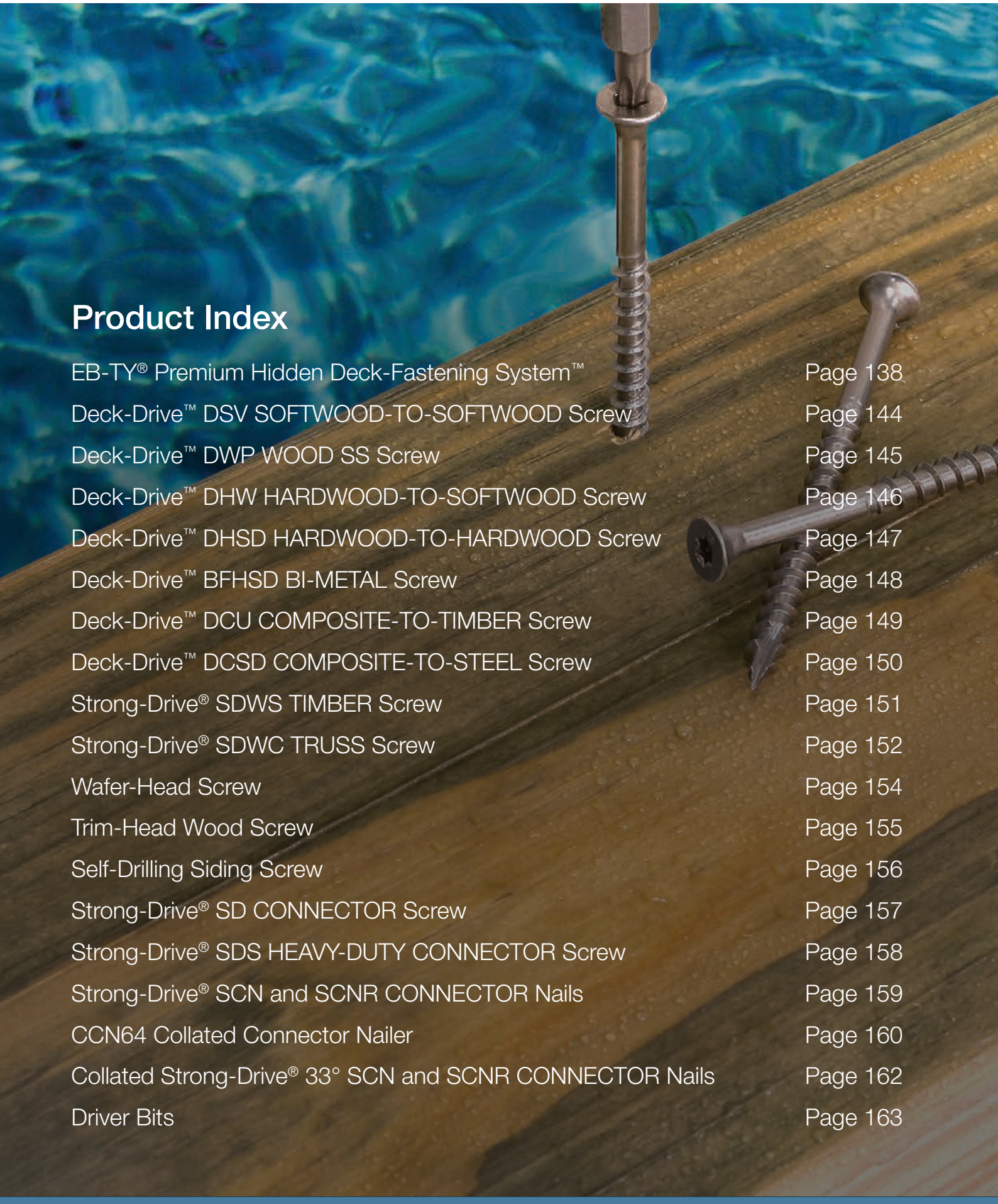
Application	Plasterboard — Fire Resistant, Single and Double Sheet						
Fastening To	Light Gauge Steel			Steel Frame			
Max. Recommended Material Thickness	10mm	16mm	32mm	15mm		30mm	45mm
Recommended Steel Thickness	0.5–0.75mm			0.8–1.6mm			
Screw Finish	Yellow Zinc			N2000®	Yellow Zinc		
Corrosion Resistance Level	Corrosion Resistance Level LOW			Corrosion Resistance Level MEDIUM	Corrosion Resistance Level LOW		
Screw Gauge	6g						
Screw Length	25mm	32mm	42mm	32mm		42mm	60mm
Image							
Collated Screw Code	DWFZ1PSA	DWFZ114PSA	DWFZ158PS	DWFSDG114PS	DWFZSD114PSA	DWFSD158PS	DWFZSD238PSA
Box Qty	2500						1500
Collated Screw Page	202			201			
 Compatible Tool	PRO200						PRO250 | PRO300
Tool Page	173						— | 174
Notes							

Plasterers (cont.)



Application	Fibre cement sheet		Compressed Cement Sheet					
Fastening To	Timber or Light Gauge Steel		Timber Frame	Steel Frame				
Max. Recommended Material Thickness	9mm	12mm	18mm	24mm	36mm	24mm	36mm	48mm
Recommended Steel Thickness	0.55–0.75mm		—	1.2–3mm		1.2–8mm		
Screw Finish	Class 3 Mechanically Galvanised							
Corrosion Resistance Level	Corrosion Resistance Level MEDIUM							
Screw Gauge	7g	8g		10g		14g		
Screw Length	32mm	32mm	42mm	42mm	55mm	45mm	60mm	75mm
Image								
Collated Screw Code	MTHG114SA	WSCBGHLA114SA	WSCBGA158SA*	CBSDHG158SA	CBSDHG214SA	TBG1445SA*	TBG1460SA*	TBG1475SA*
Box Qty	2500	2000	2000	1500	1000	1000	750	
Collated Screw Page	206	207		199		205		
Compatible Tool	 PRO200		PRO250 | PRO300			HSD60	HSD60 HSD75	HSD75
Tool Page	173		— | 174			176	176	176
Notes	Fibre cement sheet 6–9 mm Screwdriver should not exceed 2500 rpm. Compressed Cement Sheet 16–18 mm Screwdriver should not exceed 2000 rpm. Not recommended for magnesium board or decking applications. See "Fastening Timber Decks to Timber and Steel Framing" on page 19 for further information. *Compressed Cement Sheet countersinking may be required							

Screws and Nails

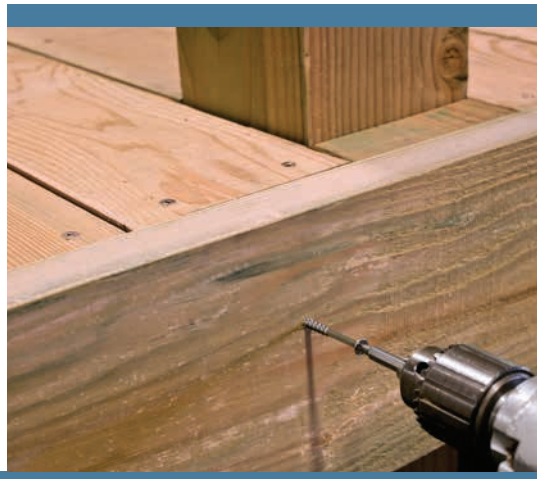


Product Index

Quality and Reliability is Our Top Priority

Simpson Strong-Tie is driven to exceed expectations. Our team of PHDs, metallurgists, material engineers and structural engineers are dedicated to create the best possible fasteners. Extensive testing is undertaken to ensure that each production run can handle higher loads, resist corrosion, and make installation more efficient.

For more information about how we may be able to help you on your next project, please speak with one of our knowledgeable, jobsite-trained fastening professionals.



EB-TY® Premium Hidden Deck-Fastening System™

There's nothing like premium hardwood timber decking to add the perfect finishing touch to a beautiful outdoor living space. When investing in hardwood decking, it's vital for you to choose the right fastening method to ensure durability while letting the beauty of the material shine through.

Versatile

- Easy to install for professional builders and DIYers
- Ideal for premium hardwoods
- For residential and commercial applications

Metal Reinforced

- Provides greater holding power and increased pullover resistance
- Stainless-steel plate ensures lasting durability in demanding environments
- Prevents over-driving of the screw, helping to ensure consistent, quality installations

Angled Screw Attachment

- Ensures direct attachment of the board to the joist
- Keeps the board from "walking" or sliding
- Allows tighter spacing

Radius Sides for Easier Alignment

- The patented arc shape of the EB-TY also helps ease insertion — works with pregrooved and biscuit-cut slots
- Chamfered edges for easier board alignment and installation of successive boards

Covers the Joist

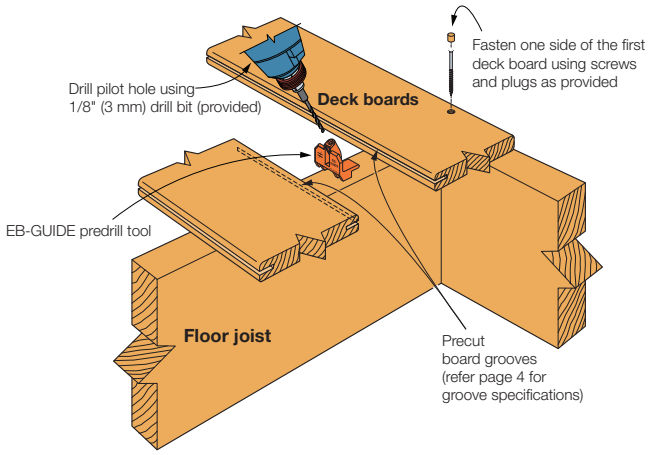
- Protection from direct exposure to sun and rain
- Visually more appealing after installation

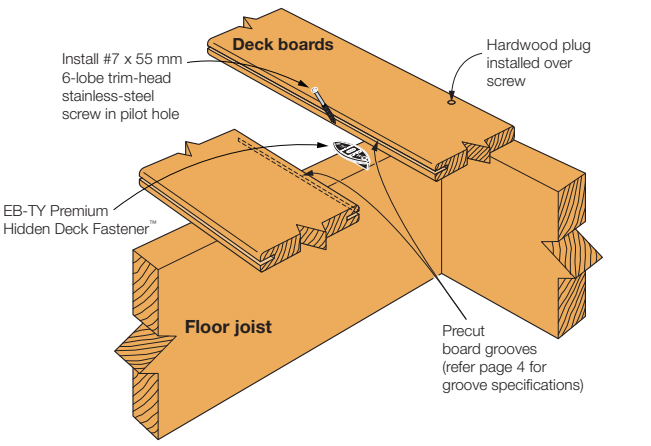
Hardwood Plugs Included for the Starter Board

One or more of these U.S. patents may apply: 6,402,415; 8,161,702 and patents pending.

The new EB-TY Premium Hidden Deck-Fastening System is the ideal solution that blends strength with ease of installation in a fastener that won't detract from the deck's finished appearance.

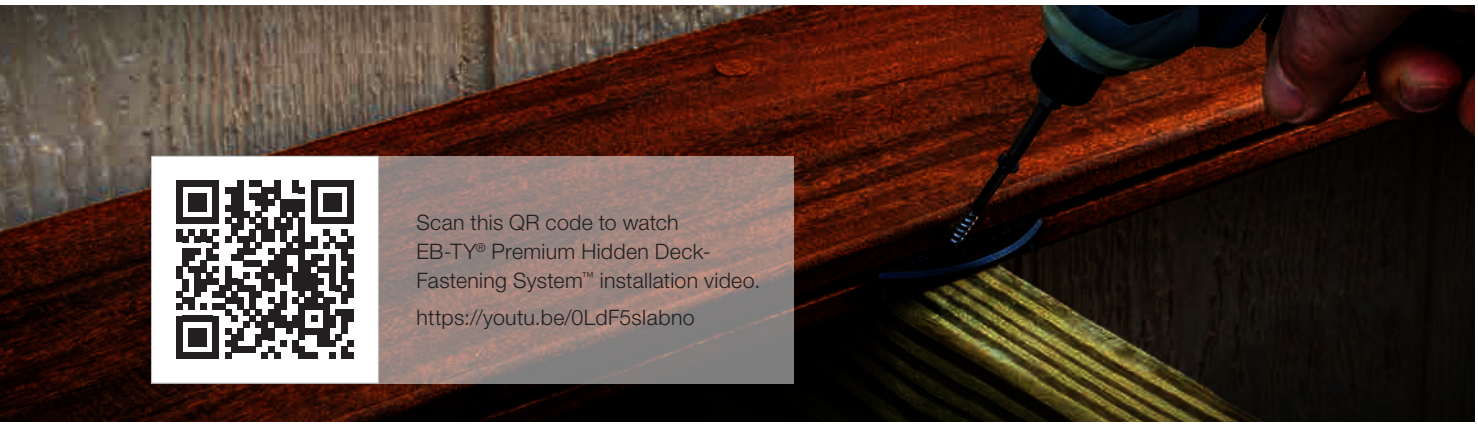
Simpson Strong-Tie has redesigned the award-winning EB-TY Hidden Deck-Fastening System by integrating a Type 300 series stainless-steel reinforcing plate that adds stiffness to hold boards in place securely, yet maintains flexibility when seasonal contraction and expansion occur. Combine this innovative new design with our EB-GUIDE predrilling tool, and you have a system that not only provides hidden strength, but is also easy to install.



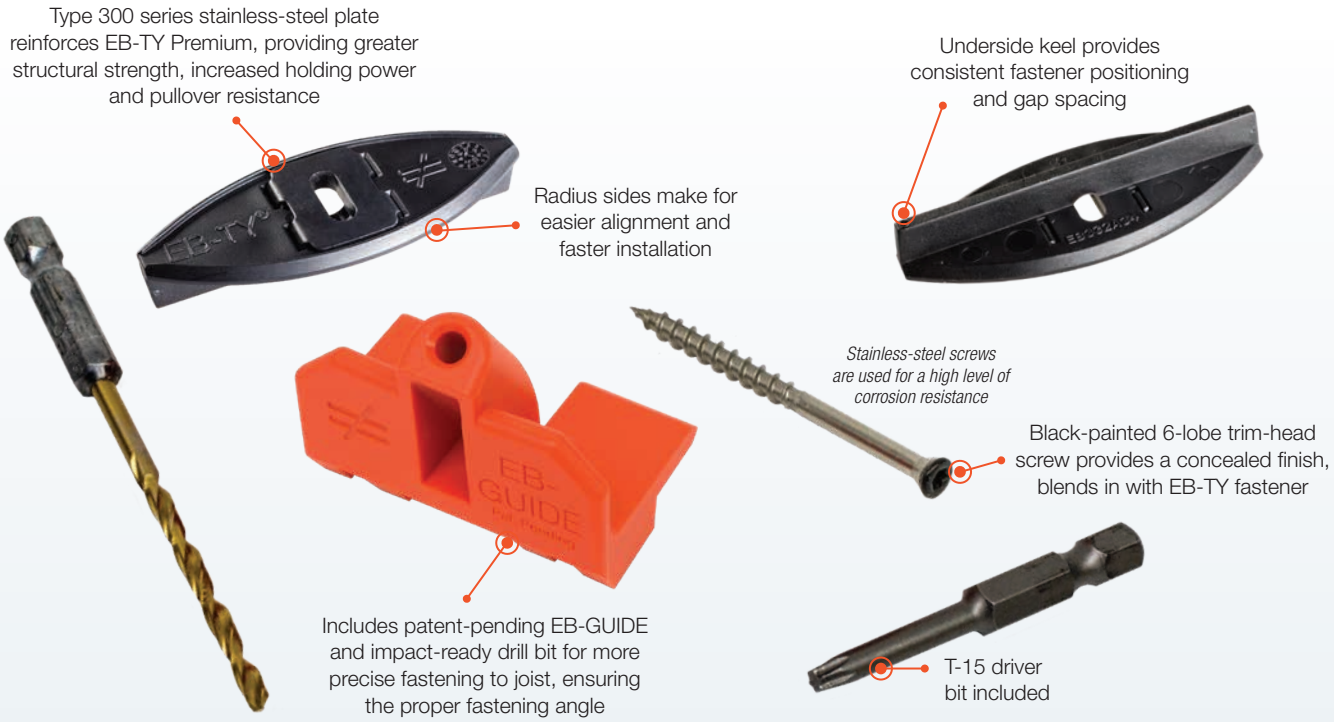


EB-TY Premium™ provides a unique method of fastening deck boards that leaves the fasteners virtually invisible. Fastening is done into the side of the board, leaving a clean, fastener-free deck surface. Apply construction adhesive to the joist for each deck board before installing the screw.

EB-TY® Advantages



The EB-TY Premium™ is a stainless-steel-reinforced polymer biscuit fastener that fits into deck boards' pre-cut slots (or into slots that the deck installer can make using a biscuit joiner saw). The biscuits are then fastened by a screw driven into the joist. Nesting each successive board against the EB-TY Premium ensures consistent spacing and uniform height.



Screw Size	Screw Material (Trim Head)	EB-TY Premium Qty.	Screw Qty.	Merbau Style Hardwood Plug Qty.	Model No.
2.4mm Board Spacing — 19–25mm decking					
#7 x 55mm	Type 305	175	190	12	**EB332WDR175**
#7 x 55mm	Type 316	175	190	12	**EB332WD316R175**

1. Model numbers corresponding to kits with 175 count EB-TY Premium include 1 drill bit, T-15 driver bit and EB-GUIDE tool.
2. Kiln-dried decking has a moisture content of generally 19% or less. Air-dried decking is generally greater than 19% moisture content.

Each Kit Contains

- EB-TY Premium biscuits
- Type 305 or 316 stainless-steel trim-head, 6-lobe screws with black-painted heads
- Hardwood plugs
- EB-GUIDE predrilling guide
- ⅛" (3 mm) quick-release drill bit
- T-15 6-lobe driver bit

Replacement Parts

Description	Quantity	Model No.
Replacement T15 6-Lobe Driver Bit	3	**BIT15T-2-RC3**
⅛" (3mm) Quick-Release Wood Drill Bit	3	**WDB18QR3-R3**
Hardwood Plug ⅜" (10mm)	100	**WDPLUG-100**
EB-GUIDE Predrill Tool	1	**EB-GUIDE**

EB-TY® Product Detail and Installation

Items Needed

- Caulk gun with exterior polyurethane construction adhesive
- Exterior wood glue
- Drill
- ⅛" (3 mm) quick-release drill bit (included) — can be used with impact drivers
- ⅜" (10 mm) countersink if using hardwood plugs
- Mallet or dead-blow hammer
- Flush-cut saw, belt or orbital sander with 80-grit sandpaper for finishing plugs
- Router with a 5⁄32" (4 mm) slot cutting bit, plate or biscuit joiner (not needed for pregrooved boards)
- Board straightening tool or similar tool to move boards in place
- Measuring device

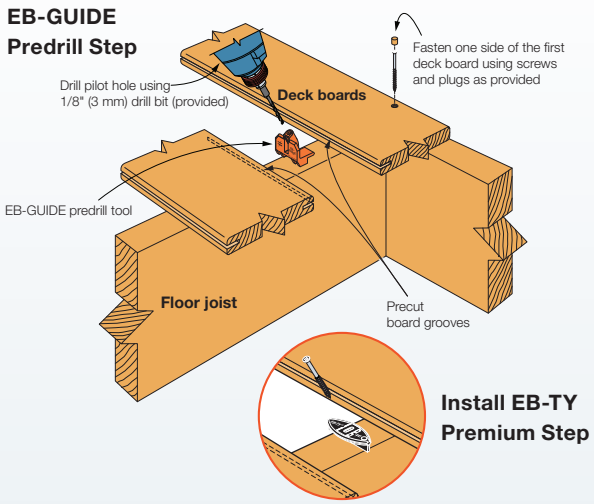
EB332WD

ATTENTION

BUILDER: Please review the timber decking installation instructions provided by the timber supplier and/or manufacturer prior to installing EB-TY Premium™ fasteners. Allow moisture in the deck boards to reach equilibrium moisture content (EMC) with the surrounding environment prior to installation by allowing the decking boards to acclimate site on, well ventilated for 2-3 weeks prior to installation. Adequate airflow and proper ventilation beneath the decking are important to long-term performance of the deck.

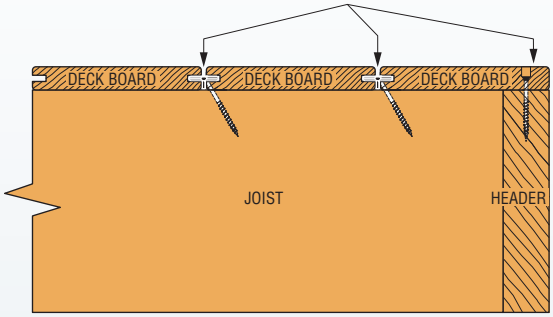
EB-TY Premium Installation — Overview

Apply construction adhesive to joist for each deck board prior to installing screws.



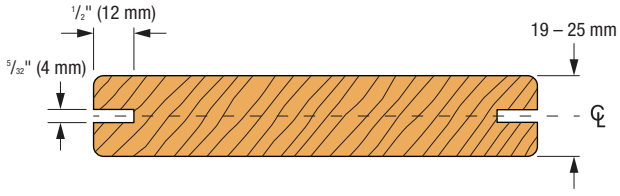
EB-TY Premium Installation — Side View

First and last deck board screwed to header
Other deck boards attached to joists with EB-TY® Premium Fasteners



EB-TY Pregroove Schematic

Use the schematic below to pregroove or specify your decking boards to accept EB-TY Premium fasteners.



CUT GROOVE AT THE CENTRELINE OF MATERIAL THICKNESS.
This will also allow you to flip boards if you discover a bad surface.

EB-TY® Installation and Product Detail

Quick Installation Guide

For detailed instructions on installing the EB-TY Premium Hidden Deck-Fastening System™ refer to page 142.

Step 1.

Install first board by applying construction adhesive and screwing and countersinking directly into the face of the deck board and into the joist; glue an hardwood plug in the hole.

Step 2.

Predrill using the EB-GUIDE drill guide.

Step 3.

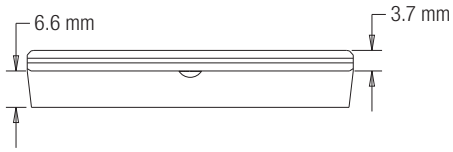
Place EB-TY Premium™ in deck board groove. Fasten with trim-head screw (included) through the EB-TY and deck board and into the joist.

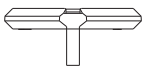
Repeat Step 2.

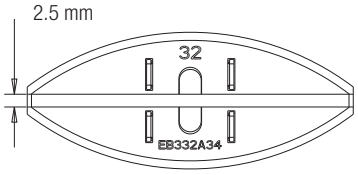
Apply construction adhesive to the joist. Slide adjoining deck board onto exposed EB-TY Premium radius sides. Repeat Steps 2–4, and install last board using Step 1.

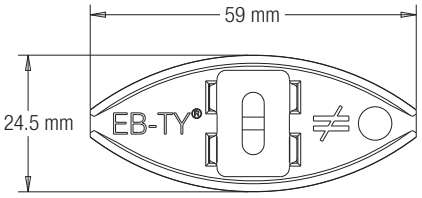
EB-TY Premium Hidden Deck Fastener™ Series EB332

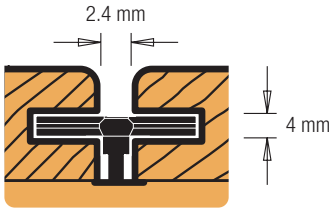
- With integrated stainless-steel plate for added strength.
- For use with 19–25 mm thick deck boards, including Merbau, etc.
- For use in air-dried decking that will shrink as it acclimates to the environment.
- Provides an initial 2.4 mm spacing between deck boards.











EB-TY Premium Fastener Usage Chart

Fasteners / Square Metres Chart Dimensions	Number of EB-TY Premium Hidden Deck Fasteners™ Needed per Square Metre
90mm boards with 450mm on centre joists	33
140mm boards with 450mm on centre joists	21

EB-TY® Detailed Installation Instructions

Installing the First Board

1. Apply adhesive

Apply a bead of exterior construction adhesive to each joist that will be under the first board — about 10 mm wide.

2. Drill and countersink

Drill a ⅛" (3 mm) pilot hole through the deck board (but not into the joist) at each joist intersection of the first deck board, about 25 mm from the outer edge of the board. Drill the ⅜" (10 mm) countersink approximately 8 mm deep.

3. Drive screws to secure first board

Drive a #7 stainless-steel trim-head screw (included) in each countersink, fastening the board tightly to the joist. Each EB-TY Premium™ kit includes additional screws for attaching the first board.

4. Apply glue

Place a drop of wood glue into the hole and insert the hardwood plug.

Tip: *Try to align the wood plug grain with the board grain for a more concealed look.*

5. Install plug

Tap plugs tight with a mallet. Each EB-TY Premium kit includes hardwood plugs for the first board. If using a different type of wood, you can use a ⅜" (10 mm) plug cutter to make plugs from scrap board.

6. Trim plugs and sand paper flush with board surface

Trim any plug material extending above the board surface using a flush-cut saw or sander — 80-grit paper is recommended. Sand all plugs until they are even with the deck board surface.

7. Cut groove using biscuit joiner saw or router. **If using pregrooved boards, skip to Step 8.**

Using a biscuit joiner, cut a slot in the side of the deck board. Cut one slot at each deck board and joist intersection.

Alternatively, you can also use a router with a 5⁄32" (4 mm) slotting bit instead of a biscuit joiner.

Tip: *When cutting slots, always measure from the top surface of the board. This will help to ensure that the slots align perfectly with adjacent boards. Cut groove at the centreline of material thickness. This will also allow you to flip boards if you discover a bad surface.* *Refer to EB-TY Pregroove Schematic on page 140*

8. Slide in EB-GUIDE

Slide the EB-GUIDE into the deck board's grooved side, centring above the joist.

9. Drill pilot hole

Using the drill or impact driver with the ⅛" (3 mm) drill bit (included), insert the drill bit into the EB-GUIDE hole and drill through the edge of the deck board.

10. Insert EB-TY

Insert one EB-TY Premium fastener into the slot at each joist intersection, aligning EB-TY Premium over the predrilled pilot hole.

12. Drive screw

Install a #7 screw (included) through the EB-TY Premium fastener into the pilot hole and tighten until snug to the EB-TY Premium fastener.

When deck boards meet end to end over the top of the joist, only one EB-TY Premium fastener is needed. Slot the deck board ends to accommodate the EB-TY Premium fastener.

EB-TY® Detailed Installation Instructions

Installing Additional Deck Boards

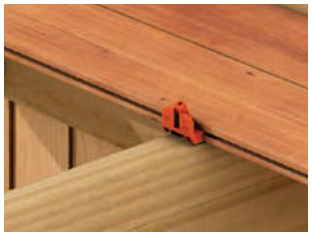
13. Apply adhesive

If deck boards are not pregrooved, repeat the process from Step 7, but cutting slots on both edges of the deck board.

Apply a bead of exterior construction adhesive to each joist, approximately 10 mm wide.

14. Align boards

Place the board so the slots slip over the exposed EB-TY Premium™ fasteners from the preceding board. Use a rubber mallet, board straightening tool or similar tool to move boards into proper alignment as needed.



15. Slide in EB-GUIDE

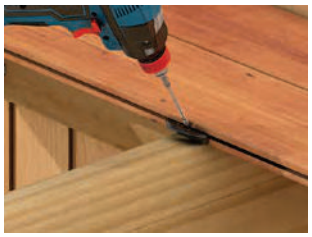
Slide the EB-GUIDE into the deck board's grooved side, centring above the joist.

16. Drill pilot hole

Using the drill or impact driver with the ⅛" (3 mm) drill bit (included), insert the drill bit into the EB-GUIDE hole and drill through the edge of the deck board.

17. Insert EB-TY

Insert one EB-TY Premium fastener into the slot at each joist intersection, aligning EB-TY Premium over the predrilled pilot hole.



18. Drive screw

Install a #7 screw (included) through the EB-TY Premium fastener into the pilot hole and tighten until snug to the EB-TY Premium fastener.

When deck boards meet end to end over the top of the joist, only one EB-TY Premium fastener is needed. Slot the deck board ends to accommodate the EB-TY Premium fastener.

19. Repeat

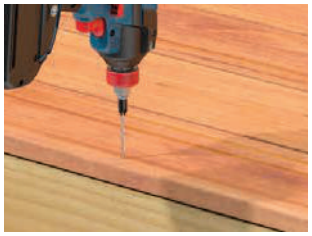
Repeat the above steps 13–18 for the remainder of the deck except for the last board.

Installing the Last Board

20. Setup

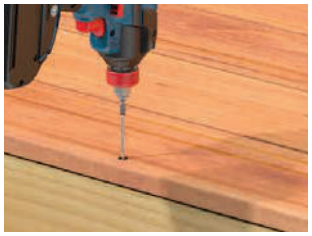
Cut slots as needed only on the inside edge of the last board to fit over the exposed EB-TY Premium fasteners.

Apply a 10 mm-wide bead of exterior construction adhesive to each joist



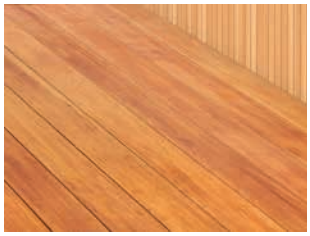
21. Drill and countersink

Place the board so the slots slip over the exposed EB-TY Premium fasteners from the preceding board.



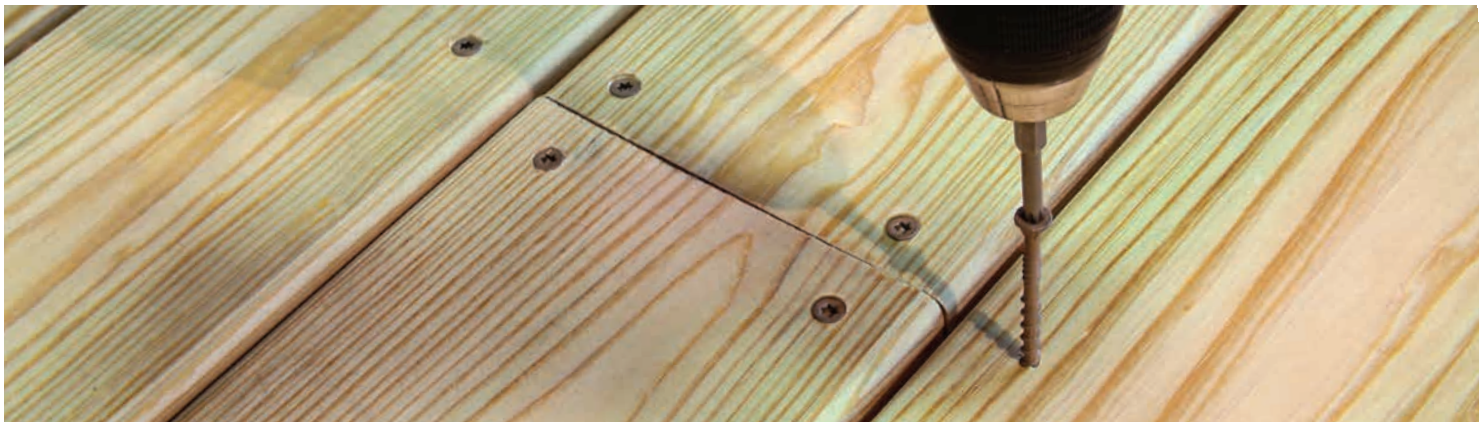
22. Install screw

Repeat Step 2–3, applying fasteners only on the outer edge of the entire deck board.



Finished Deck

Deck·Drive™ DSV SOFTWOOD-TO-SOFTWOOD Screw



The DSV screw is a powerful fastening solution for preservative-treated decking applications. With its under-head nibs and fast-start tip, the DSV is ideally suited to be driven and countersunk into today's timber deck boards. The shank is designed to withstand the swelling and shrinkage that is common with fast-growth timber.

Features

- Rimmed flat-head with nibs countersinks easily
- No predrilling required
- Low-torque, special upper thread design increases deck board pulldown
- Quik Guard® coating provides corrosion resistance for exterior and certain preservative-treated timber applications
- Tan colour blends in with most timber
- Fast-start hi-lo tip easily pierces preservative-treated and other softwood deck boards

Application

- Preservative-treated softwood decking and exterior softwood-to-softwood
- Maximum recommended board thickness: 50 mm screw — 20 mm; 65 mm screw — 25 mm

Finish

- Quik Guard® coating

Corrosion Resistance Level
MEDIUM

This screw is also available collated for the Quik Drive® system. *See page 188 for details.*

Deep, 6-lobe recess reduces cam-out, making driving easier

Rimmed flat-head with nibs countersinks easily

Fast-start hi-lo tip easily pierces preservative-treated and other softwood deck boards

Scan this QR code to watch how to fasten pressure treated decking using Deck-Drive™ DSV Wood Screw.

https://youtu.be/f1LsBxE5Bi8

Please note: DSV is only available in tan colour.

10 Gauge Softwood-to-Softwood

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
DSVT2R250	4.9mm	50mm	Coarse Threads	Sharp Point	250	6-lobe T-25	BIT25T-2-RC3
DSVT212R250		65mm					

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Deck-Drive™ DWP WOOD SS Screw

The DWP softwood-to-softwood screw is a powerful fastening solution for decking and general exterior applications where extra corrosion protection is required. With its specially designed sharp-point tip and unique box-thread design the DWP is suited to a majority of softwood timber used for decking.

Features

- Box thread design with raised-ridge technology greatly reduces driving torque, which allows you to drive more screws on a single battery charge
- 305 Stainless Steel where extra corrosion protection is required, ideal for outdoor exposure and wet service environments
- Specially-designed sharp point penetrates softwood timber products with ease
- 6-lobe drive helps prevent driver-bit cam-out, resulting in easier driving and longer bit life

Application

- Decking
- Maximum recommended board thickness: 50 mm screw — 20 mm; 65 mm screw — 25 mm

Finish

- 305 Stainless Steel

Corrosion Resistance Level
HIGH

T-25, 6-lobe drive reduces cam-out, making driving easier

Box thread greatly reduces driving torque

Sharp point easily penetrates softwood timber decking

Scan this QR code to watch video of Deck-Drive™ DWP Wood Screw.
https://youtu.be/EBtsqyp3JDY

10 Gauge Softwood-to-Softwood

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
S10200WPR250	4.9mm	50mm	Box Thread	Sharp Point	250	6-lobe T-25	BIT25T-2-RC3
S10200WPR1100 *					1100		
S10250WPR250		65mm			250		
S10250WPR1100 *					1100		

*Only available in New Zealand.
Predrilling and countersinking may be required.

Deck·Drive™ DHW HARDWOOD-TO-SOFTWOOD Screw

The DHW is a premium decking fastener designed for no predrilling in hardwood decking applications. The winged design and hardwood drill point virtually eliminates splitting of timber without predrilling in the hardest timber applications.

Features

- Compact head for countersunk finish and discreet appearance
- Designed to penetrate the hardest timber without predrilling
- Wings on the shaft counter-bore hard timber to allow the head to countersink for clean look
- Available in Class 3 Galvanised or for additional corrosion protection 305 Stainless Steel

Application

- Hardwood decking and exterior hardwood-to-softwood
- Maximum recommended board thickness 20 mm

Finish

- Class 3 Galvanised (DHWG60R250)
- 305 Stainless Steel (SSDHW60R250, SSDHW60R1100)

Corrosion Resistance Level MEDIUM

Corrosion Resistance Level HIGH

This screw is also available collated for the Quik Drive® system. *See page 189 for details.*

PLEASE NOTE: Refer to pages 19–26 for use of galvanised decking fasteners.

Compact head countersinks easily.

Winged design easily bores out hardwood to allow head to countersink perfectly.

Hardwood drill point requires no predrilling.

10 Gauge Hardwood-to-Softwood

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
DHWG60R250	4.9mm	60mm	Coarse Threads	Hardwood Drill Point	250	#2 Undersize Square Drive	BIT2SU-2-RC3
SSDHW60R250						#2 Square Drive	BIT2S-2-RC3
SSDHW60R1100 *					1100		

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

*Only available in New Zealand.

Deck·Drive™ DHSD HARDWOOD-TO-HARDWOOD Screw

The DHSD Hardwood-to-Hardwood screw is ideal for hardwood decking applications and is specifically designed to penetrate the hardest timber with ease. The unique drill point virtually eliminates splitting all without the need of predrilling. The raised compact head delivers a professional finish for a decorative style deck.

Features

- Raised countersinking head
- Unique ribbed shank provides greater strength and holding power
- Design virtually eliminates splitting of hardwood decking
- No predrilling required in hardwood joists

Application

- Hardwood to hardwood decking applications
- Maximum recommended board thickness:
  50 mm screw — 20 mm; 60 mm screw — 25 mm

Finish

- 305 Stainless Steel

Corrosion Resistance Level
HIGH

This screw is also available collated for the Quik Drive® system. *See page 190 for details.*

Raised compact head
for a decorative finish

Ribbed shank provides greater holding power

Hardwood drill point
virtually eliminates splitting and the need for predrilling

10 Gauge Hardwood-to-Hardwood

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
SSDHSD50R250	4.9mm	50mm	Coarse Threads	Hardwood Drill Point	250	#2 Square Drive	BIT2S-2-RC3
SSDHSD50R1100 *					1100		
SSDHSD60R250		60mm			250		
SSDHSD60R1100 *					1100		

*Only available in New Zealand.

Deck·Drive™ BFHSD BI-METAL Screw

The BFHSD Bi-Metal screw is designed for timber to steel joist (1.2–2.4 mm steel thickness) applications. The winged design cuts a clearance hole and avoids sheet ride. The Bi-metal design consists of 316 stainless steel and a carbon steel tip which is perfect for steel joist applications without compromising on corrosion resistance.

Features

- Drives easily through 1.2–2.4 mm steel without predrilling
- 316 Stainless steel for severe corrosion resistance
- Winged design avoids sheet ride
- Zinc coating to avoid dissimilar metal corrosion

Application

- Timber-to-steel decking
- Maximum recommended board thickness 25 mm

Finish

- 316 Stainless Steel with carbon steel tip

Corrosion Resistance Level
SEVERE

This screw is also available collated for the Quik Drive® system. *See page 191 for details.*

Ribbed flat head for countersink finish

Winged design easily bores out timber to allow head to countersink perfectly

#2 Drill point design easily drills into 1.2–2.4 mm steel without the need for predrilling

10 Gauge Timber-to-Steel

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
316 SSBFHSD2R250	4.9mm	50mm	16 TPI	#2 Drill Point	250	#2 Square Drive	BIT2S-2-RC3

Deck-Drive™ DCU COMPOSITE-TO-TIMBER Screw

The Deck-Drive™ DCU Composite screw is engineered to provide beautiful fastening results for all types of composite decking while also offering greater ease of installation, a clean finish and superb corrosion resistance.

Deck-Drive DCU Composite decking screws are available in carbon steel with our Quik Guard® coating. For superior corrosion resistance in marine or high-exposure environments, choose the appropriate stainless-steel DCU screw (Type 316). DCU screws provide a clean finish because of their special head design and are available in 4 colours.

Features

- Tri-lobe thread design
- Double-cut point penetrates composite-decking with ease for faster starts
- Cap-head prevents mushrooming and material from rising up above the deck for a smoother, clean looking installation
- Available in 4 colours

Application

- Composite-to-timber decking
- Maximum recommended board thickness 30 mm

Finish

- Quik Guard® coating
- 316 Stainless Steel (DCU234SS316R250)

Corrosion Resistance Level
MEDIUM
Corrosion Resistance Level
SEVERE

This screw is also available collated for the Quik Drive® system. See page 192 for details.

Cap head prevents mushrooming for a cleaner finish

Tri-lobe thread design reduces cracking or splitting in the composite board during driving, as debris is automatically extracted

Double cut point penetrates even the hardest types of composite decking with ease for faster starts

10 Gauge Composite-to-Timber

Bit(s) included with every box of screws

Model No.	Colour	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
DCU234BRR250	Brown	4.9mm	70mm	Tri-lobe Threads	Double-cut	250	T-20 6-lobe	BIT20T-2-RC3
DCU234GRR250	Grey							
DCU234RDR250	Red							
DCU234TNR250	Tan							
DCU234SS316R250	–							

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Deck·Drive™ DCSD COMPOSITE-TO-STEEL Screw

The DCSD Composite-to-steel screw is designed to easily drive through composite decking into 0.8–2.4 mm steel. The special cap head provides a clean, less noticeable installation and is available in 4 colours to suit composite timber.

Features

- Drives easily through 0.8–2.4 mm steel without predrilling
- Compact head provides a clean, finished deck surface with no mushrooming
- Available in 4 colours

Application

- Composite-to-steel decking
- Recommended steel thickness 0.8–2.4 mm
- Maximum recommended board thickness 25 mm

Finish

- Quik Guard® coating

Corrosion Resistance Level
MEDIUM

This screw is also available collated for the Quik Drive® system. *See page 193 for details.*

Cap head for a cleaner less noticeable fixing

Inverted upper threads clear excess material to ensure the screw is seated properly and consistently

Drill flute ejects composite material for easier installation

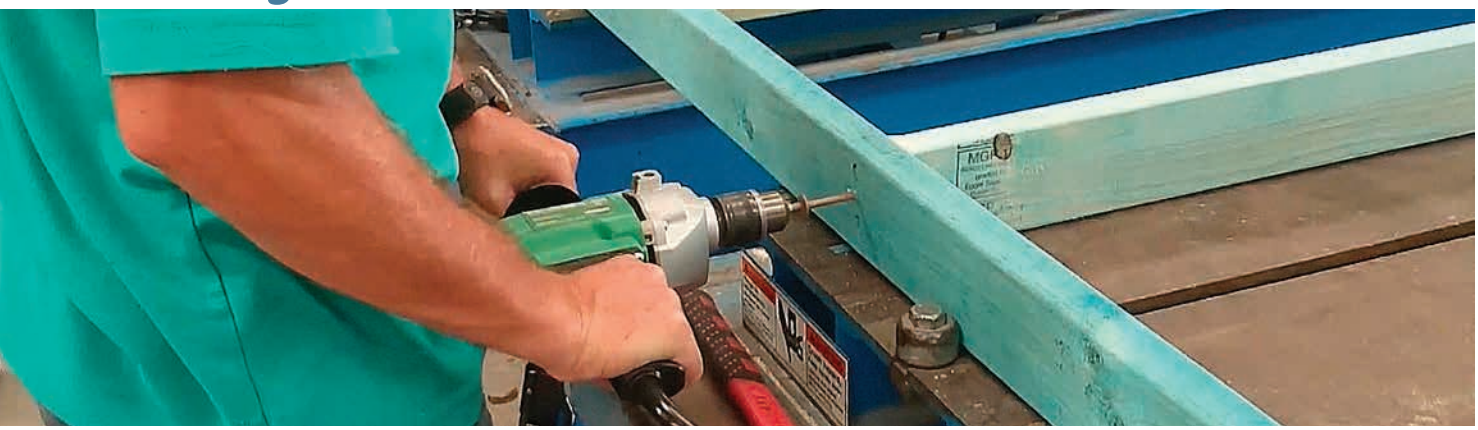
10 Gauge Composite-to-Steel Screw

Bit(s) included with every box of screws

Model No.	Colour	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
DCSD238BRR250	Brown	4.9mm	60mm	16 TPI	#2 Drill point	250	#2 Undersize Square Drive	BIT2SU-2-RC3
DCSD238GRR250	Grey							
DCSD238RDR250	Red							
DCSD238TNR250	Tan							

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Strong-Drive® SDWS TIMBER Screw



Designed to provide an easy-to-install, high-strength alternative to through-bolting and traditional lag screws. The Strong-Drive® SDWS Timber Screw is specifically designed for structural timber-to-timber applications.

Features

- Bold thread design that provides superior holding power
- Patented SawTooth™ point that ensures fast starts, reduces installation torque and eliminates the need for predrilling in most applications
- Large washer head provides maximum bearing area

Application

- Structural Timber-to-Timber Framing Connections
- Landscaping

Finish

- Double Barrier Coating

Corrosion Resistance Level
MEDIUM

For Engineering Loads Tables contact your local Simpson Strong-Tie branch.

Scan this QR code to watch a video of Strong-Drive® SDWS TIMBER Screw.
https://youtu.be/VpZmjgz2ckE

Head stamp for easy screw identification

Patented SawTooth™ point for faster starts, less torque and no predrilling

Maximum bearing area The combination of a large washer head and bold thread design provides **superior clamping and holding power**, even into the end grain of timber.

5.6 mm Timber Screw

Bit(s) included with every box of screws

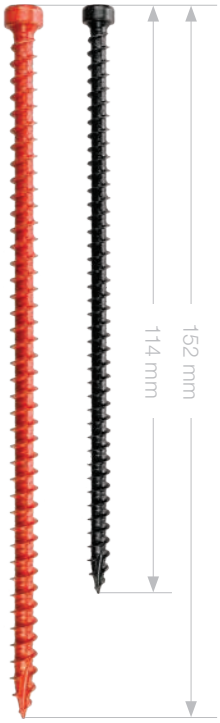
Model No.				Dia.	Length (mm)	Point	Drive Size	Replacement Bit
12 Pack	50 Pack	Bulk Pack	Qty					
SDWS22300DB-RC12	SDWS22300DB-R50	SDWS22300DB	950	5.6mm	75	SawTooth™	T-40 6-lobe	BIT40T-134-RC3
SDWS22400DB-RC12	SDWS22400DB-R50	SDWS22400DB	600		100			
SDWS22500DB-RC12	SDWS22500DB-R50	SDWS22500DB			125			
SDWS22600DB-RC12	SDWS22600DB-R50	SDWS22600DB	500		150			
SDWS22800DB-RC12	SDWS22800DB-R50	SDWS22800DB	400		200			
SDWS221000DBRC12	SDWS221000DB-R50	SDWS221000DB	250		250			

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Strong-Drive® SDWC TRUSS Screw

The Strong-Drive® SDWC TRUSS screw provides a truss and rafter-to-top plate connection as well as a method to fasten stud-to-top and bottom plate. The fully-threaded shank engages the entire length of the fastener providing a secure connection.

The SDWC uplift values listed were analysed and calculated based on the characteristic values determined following AS1649-2001 (Timber-Methods of Test for Mechanical Fasteners and Connectors-Basic Working Loads and Characteristic Strength). The SDWC has also been tested in accordance with ICC-ES AC233 (screw) and AC13 (wall assembly and roof-to-wall assembly) for uplift and lateral loads between wall plates and vertical wall framing and between the top plate and the roof rafters or trusses.



Cap-head countersinks fully into the double top plate to avoid interference with drywall or finish trades

Fully threaded shank for secure connection between roof and wall framing members

Installation guide included in pack to help ensure proper installation angle

Features

- Cap-style head countersinks fully into the double top plate to avoid interference with drywall or finish trades
- Orange colour for easy inspection of 152 mm screws
- Fully-threaded shank engages the entire length of the fastener, providing a secure connection between the roof and wall framing members
- Type-17 point for faster starts and easier driving
- Wide tolerance on installation angle makes it easy to install the SDWC correctly — Installation guide included to help ensure proper installation angle
- Can be installed from inside the structure, eliminating exterior work on the upper stories and enhancing job safety
- Fastening can be performed before or after exterior sheathing is applied for added flexibility

Application

- Truss-to-plate connection
- Stud-to-top and bottom plate

Finish

- Clear Zinc coating with orange top coat (SDWC15600-KT)
- E-Coat® black (SDWC15450-KT)

Corrosion Resistance Level
LOW

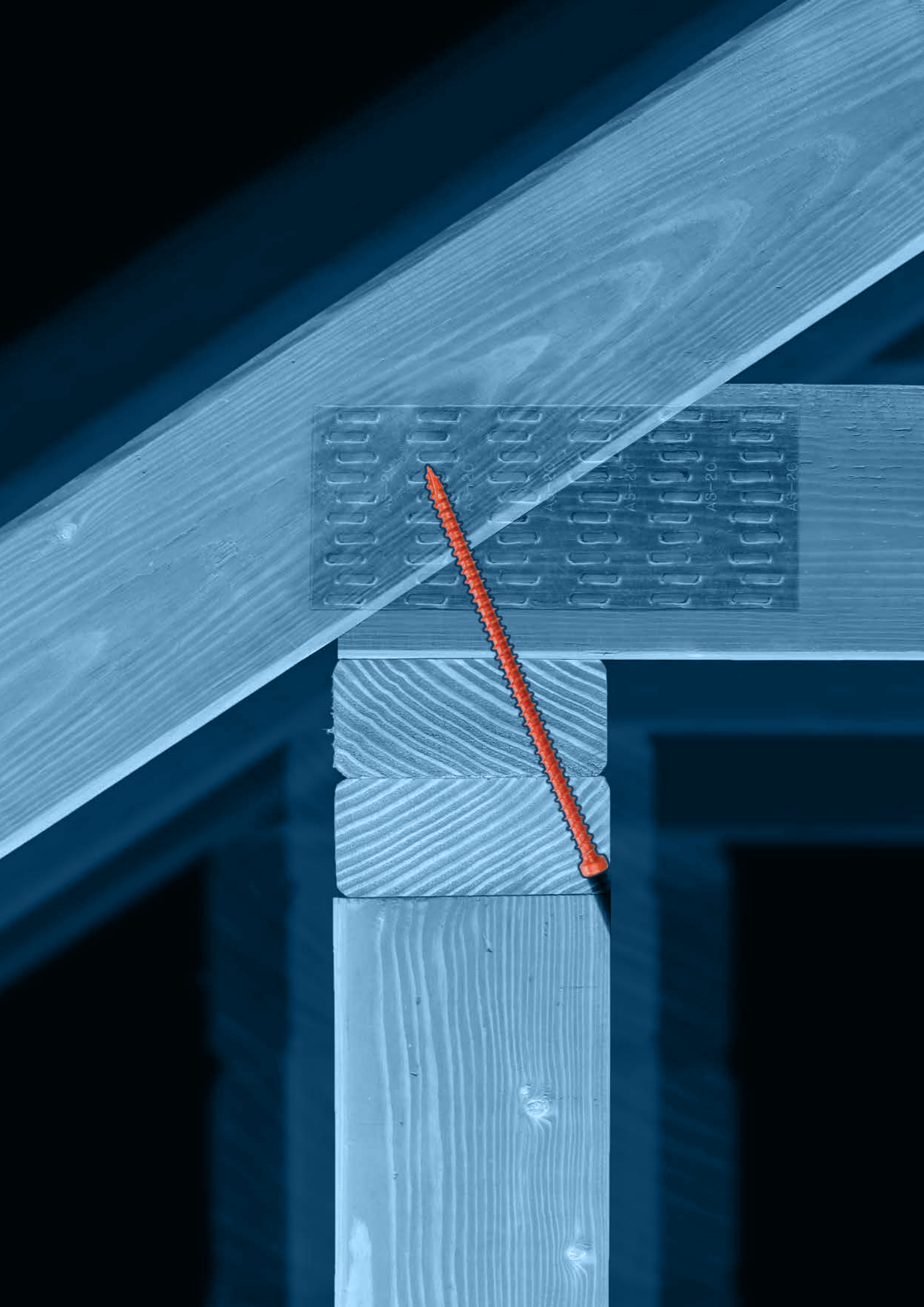
Scan this QR code to watch video of Strong-Drive® SDWC Truss Screw.
https://youtu.be/TQWzBmpAJxQ

For Engineering Loads Tables contact your local Simpson Strong-Tie branch.

3.9 mm Truss Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
SDWC15600-KT	3.9mm	152mm	7 TPI	Type 17	50	T-30 6-lobe	BIT30T-2-RC3
SDWC15450-KT		114mm					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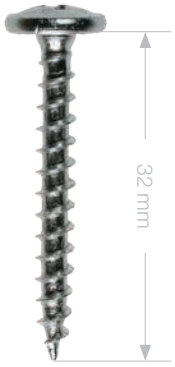
Wafer-Head Screw

The Wafer-Head screw is a general timber-to-timber fastening option with a deep #2 Phillips drive to make driving easier and a sharp point for fast starts.



Wafer head for a low profile finish

Sharp point for fast starts

Features

- Wafer head
- Deep #2 Phillips drive reduces cam-out and makes driving easier
- Clear Zinc electro galvanised finish

Application

- General Timber-To-Timber Fastening
- Can be used with connectors where specified

Finish

- Clear Zinc electro galvanised finish

Corrosion Resistance Level
LOW

8 Gauge Wafer-Head Screw

Bit(s) not included

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
SD8X1.25-R	4.2mm	32mm	Coarse Threads	Sharp	100	#2 Phillips	–

Trim-Head Wood Screw

The Trim-Head Wood screw has a trim-style head for a less noticeable fixing for finishing, millwork and trim. Available in 305 Stainless Steel where higher corrosion resistance is required. Predrilling recommended near board ends to prevent splitting

Features

- Trim-style head is less noticeable on the decking surface
- Type-17 point for fast starts
- Coarse threads on approximately ⅔ of the shank draw the material tightly to the framing
- Driver bit included in each package

Application

- General timber-to-timber application in exterior environments
- Maximum recommended board thickness 20 mm

Finish

- 305 Stainless Steel

Corrosion Resistance Level
HIGH

Trim head ideal for a less noticeable fixing

Coarse threads draw the decking and other material tightly to the framing

Type 17 point for fast starts

7 Gauge Tim-Head Wood Screw

Bit(s) included with every box of screws

Model No.	Colour	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
S07225FCBB	Painted Black Head	4.2mm	55mm	Coarse Threads	Type 17	1750	#1 Square Drive	BIT1S-2-RC3

Self-Drilling Siding Screw

The Self Drilling Siding Screw are finished in 410 Stainless Steel and are designed for attaching timber siding, timber panels and steel trim to steel studs. Please note that it does not offer the same level of corrosion resistance of either Type 316 or 305 stainless steel.

Features

- Trim head
- Threaded ⅔ of overall length
- #3 drill point
- Type 410 stainless steel can be hardened through heat treatment, giving it the ability to drill through steel. It does not offer the same level of corrosion resistance of either Type 316 or 305 stainless steel.

Application

- Attach timber siding, timber panels and steel trim to steel studs
- Recommended steel thickness 0.8–2.4 mm
- Maximum recommended board thickness 15 mm

Finish

- 410 Stainless steel

Corrosion Resistance Level
LOW

- **Warning:** Hardened stainless-steel fasteners should not be used with steel framing in environments with high humidity, condensation or other moisture that will be present at the dissimilar-metal interface.

Trim head for less noticeable installation

Fine threads
⅔ of overall length

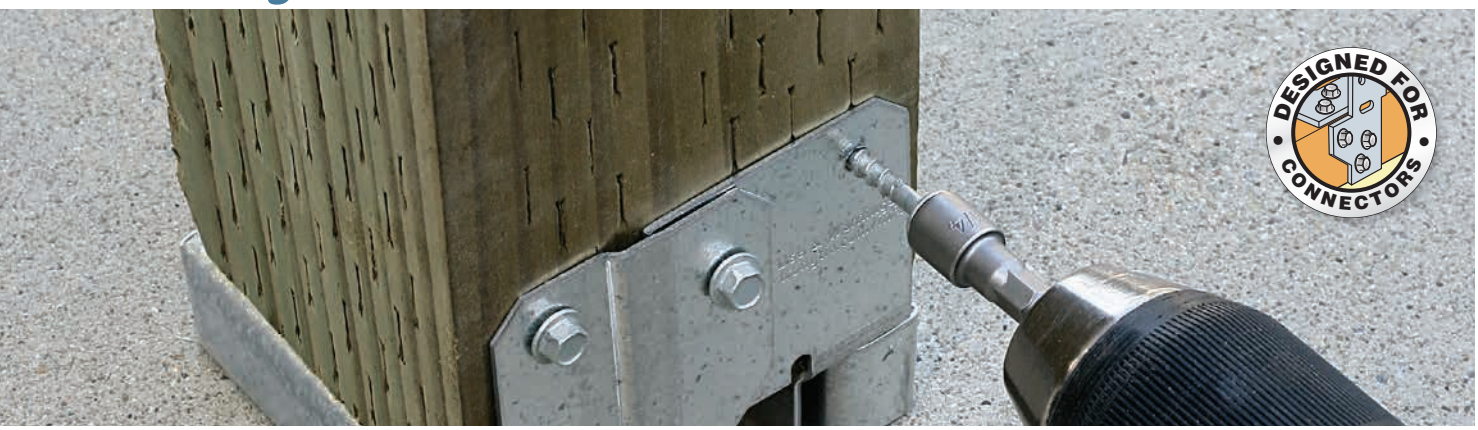
#3 Drill Point drives easily through 0.8–2.4 mm steel

7 Gauge Self-Drilling Siding Screw

Bit(s) not included

Model No.	Colour	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
F07T162TDC	–	3.7mm	42mm	19 TPI	#3 Drill Point	100	#1 Square Drive	BIT1S-2-RC3
F07T162TDB	–					5,000		
F07T162TDBBK	Painted Black Head							

Strong-Drive® SD CONNECTOR Screw



Simpson Strong-Tie offers the Strong-Drive® SD Connector screw for use with our connectors. Designed to replace nails in certain products, the load-rated Strong-Drive® SD Connector screw has been tested and approved for use in many popular Simpson Strong-Tie® products.

In certain applications screws are easier and more convenient to install than nails, and the single-fastener load values achieved by the SD9 and SD10 exceed those of typical 10d common or 16d common nails, respectively. In addition, the galvanised coating makes the Strong-Drive® SD Connector screw ideal for interior and most exterior conditions.

The Strong-Drive® SD Connector screw features an optimised shank, specifically designed for capability with the fastener holes in Simpson Strong-Tie connectors.

Head stamp for easy screw identification

Ductility and Strength through optimised heat treating

Patented Serrated Threads and Sharp Point make driving easier

Features

- Specifically designed to replace nails in certain Simpson Strong-Tie® connectors, and is the only screw approved for that application
- ¼" hex head reduces cam-out for easier installation
- Shank is specifically designed to match the fastener holes in Simpson Strong-Tie connectors
- Patented serrated threads and sharp point make driving easier
- Optimised heat treating for ductility and strength

Application

- Simpson Strong-Tie® Connectors

Finish

- Mechanically Galvanised

Corrosion Resistance Level
MEDIUM

9 and 10 Gauge Connector Screw

Bit(s) included with every box of screws

Model No.		Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
SD9112R100	915	#9	38mm	Serrated Threads	Sharp Point	100	¼" Hex Head	—
SD9212R100	925		64mm					
SD10112R100	1015	#10	38mm					
SD10212R100	1025		64mm					

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Strong-Drive® SDS HEAVY-DUTY CONNECTOR Screw

The Strong-Drive® SDS HEAVY-DUTY CONNECTOR screw is a 6.4 mm diameter structural wood screw ideal for various connector installations as well as timber-to-timber applications. It installs with no predrilling and has been extensively tested in various applications.

The SDS Strong-Drive® screws are also available in Type 316 stainless steel. The new stainless-steel SDS screws are appropriate for higher-exposure environments where maximum corrosion-resistance is required.

The SDS screws are suitable for use with the following connectors;

- DTT2Z* and DTT2SS* — (Deck) Tension Ties
- HDU8-SDS2.5* — Holdown
- CJT* — Concealed Joist Tie
- TA — Staircase angles
- PGT — Pipe Grip Ties

**Screws are included with these connectors.*

Head stamp for easy screw identification

Double-barrier coating provides corrosion resistance equivalent to hot-dip galvanisation

Designed for installation in Simpson Strong-Tie® structural connectors

Features

- Designed for installation in certain Simpson Strong-Tie® structural connectors as well as timber-to-timber applications
- Type-17 point enable easy driving with no predrilling and minimal splitting
- Double-barrier coating provides corrosion resistance

Application

- Heavy-Duty Simpson Strong-Tie® Connectors

Finish

- Double Barrier Coating

Corrosion Resistance Level
MEDIUM

- 316 Stainless Steel

Corrosion Resistance Level
SEVERE

6.4 mm Heavy-Duty Connector Screw

Bit(s) not included

Model No.		Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit
SDS25112-R25	S1.5	6.4mm	38mm	Serrated Threads	Type 17	25	⅜" Hex Head	—
SDS25212-R25	S2.5		64mm					
SDS25300-R25	S3		76mm					
SDS25112SS-R25	S1.5		38mm					
SDS25212SS-R25	S2.5		64mm					
SDS25300SS-R25	S3		76mm					

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Strong-Drive® SCN and SCNR CONNECTOR Nails

Strong-Drive® Connector Nails *(SCN)* have been developed as the optimum nail for connector products. The 316 stainless steel version feature "Rings" on the shank *(SCNR)* providing superior holding power.

Both types are the best choice for achieving maximum load values in Simpson Strong-Tie® structural connectors. Choose Type 316 stainless steel when using stainless steel connectors.

Head stamp for easy nail identification

Annular threads (SCNR) create an interlock between the shank of the nail and the wood, providing superior holding power. Generally considered the nail type with the best withdrawal resistance.

Diamond Point provides lower driving resistance

Features

SCN

- Full round head with embossed size identification
- Smooth shank makes for easier driving

SCNR

- Full round head with "≠" identifier
- Annular threads or "rings"on the shank increase withdrawal capacity

Application

- Simpson Strong-Tie® Connectors

Finish

- Hot-Dip Galvanised — SCN
- 316 Stainless Steel — SCNR

Corrosion Resistance Level MEDIUM

Corrosion Resistance Level SEVERE

Nails are also available collated for the ***CCN64****.* *See page 162 for details.*

3.32 mm and 3.75 mm Connector Nails

	Model No.			Diameter	Length	Shank	Point	Head Type	Head Pattern	≈ Box Qty
	N8DHDG-R	(SCN)	8	3.32mm	38mm	Smooth	Diamond	Full Round	Smooth Head	147
	N8D5HDG-R									735
■	N10DHDG-R		10	3.75mm						120
	N10D5HDG-R									600
	10D5HDG-R				75mm					250
316	SSNA8D	(SCNR)	≠ All Sizes	3.32mm	38mm	Annular-Ring				147
316	SSNA8D5									735
316	SSNA10D			3.75mm						126
316	SSNA10D5									630
316	SSA10DD				75mm					66
316	SSA10D5									330

■ These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Avoid Mis-installation of Timber Connectors

The CCN64 is designed to easily and precisely locate the connector hole to minimise the risk of mis-installation of timber connectors.

In order to meet the required design capacity published for timber connectors it is important to install the connector as per the manufacturer's specification. There are many variables that can impact the installation of connectors such as overdriving nails, placing a nail too close to the edge of the connector, placing a nail in a position that damages the metal of the connector or not using the right nail specification or number of nails as per the design. If the nails are not located correctly, you may damage the connector and reduce the effectiveness of the connection. It is important to remember that what nail size has been used has a direct effect on the actual load capacity. The size must match the specified nails used in the testing or the suitable reduction factor must be applied. Ultimately, the actual connector capacity can be affected if incorrectly installed.

The CCN64 Collated Connector Nailer helps ensure the correct installation of connectors through its clever design and is considerably faster than traditional hand nailing. The CCN64 has been designed so that connector nails protrude from the tip of the tool. This allows the user to easily locate the tip of the nail into the connector hole so that the connector will not be damaged. The nails are hammered into the timber via multiple blows which helps prevent the nail from being overdriven.

With a narrow nose piece and compact design the CCN64 collated connector nailer can reach into those tight spaces for easy connector nailing. At only 2.1 kg the tool is robust but lightweight enough to manoeuvre around the jobsite.

CCN64 Collated Connector Nailer

Precise & Fast Connector Nailing

The CCN64 Collated Connector Nailer precisely installs connector nails faster than traditional hand nailing. The CCN64 Collated Connector Nailer is designed so that the connector nail protrudes from the tip of the tool. As such, connector holes are easily located and as pressure is applied the tool uses multiple blows to hammer the nail in. This type of nailing helps prevent the nail from being overdriven and potentially damaging the connector. The compact design allows access into tight locations for ease of use onsite and greater flexibility.

Features

- Helps ensure the correct installation of connectors
- Faster than traditional hand nailing
- Nail tip protrudes to easily locate connector hole
- Multi-blow action hammers in, and helps prevent the nail from being overdriven
- Compact design to get into tight spaces
- Lightweight at only 2.1 kg for increased user comfort
- Single hand operation
- Drives 38 mm and 64 mm collated nails

Product data

Dimensions:	L305 x W119 x H273 mm
Action:	Multi-Blow
Weight:	2.1 kg
Operating Pressure:	90–120 psi*
Magazine:	Single strip (approx. 28 nails)

CCN64 includes

- CCN64 tool
- Operation manual
- Allen Keys
- Safety glasses
- Tool Oil
- Rugged toolbox

CCN64 Collated Connector Nailer

Scan this QR code to watch video of the CCN64 Collated Connector Nailer being used with LUS Double Shear Joist Hangers.

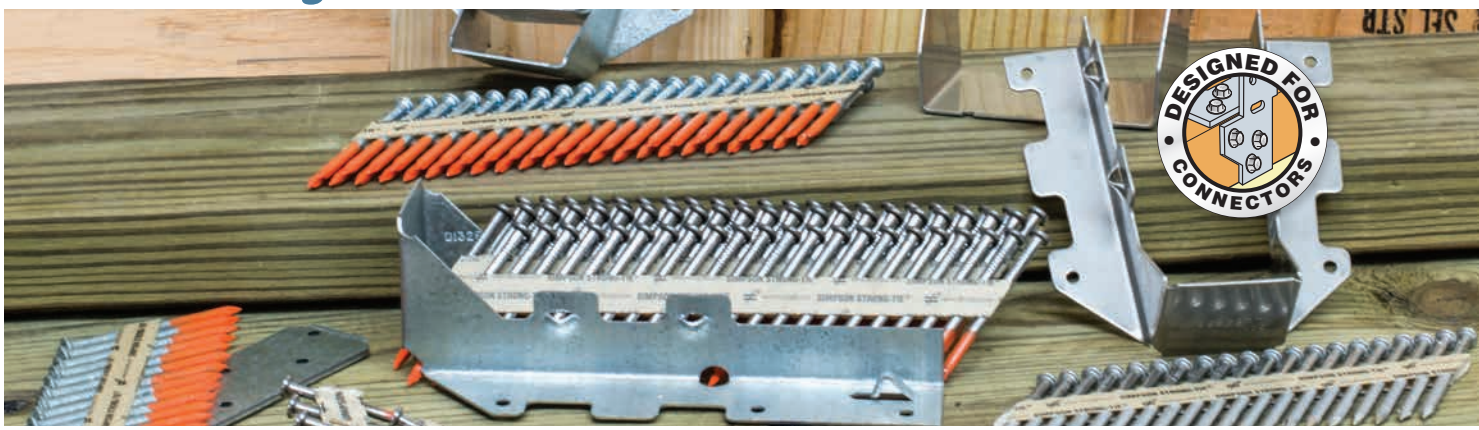
https://youtu.be/CUj3p_44qeA

Nail Suitability

Angle:	33°–35°
Collation:	Paper tape
Head:	Full round head
Diameter:	3.3 | 3.8 | 4.1 mm
Length:	38 | 64 mm (± 2 mm)

See page 162 for
Collated ***Strong-Drive*** 33° SCN and SCNR **CONNECTOR** Nails

Collated ***Strong-Drive***® 33° SCN and SCNR **CONNECTOR** Nails



Strong-Drive® Connector Nails *(SCN)* have been developed as the optimum nail for connector products. The 316 stainless steel version feature "Rings" on the shank *(SCNR)* providing superior holding power.

Both types are the best choice for achieving maximum load values in Simpson Strong-Tie® structural connectors. Choose Type 316 stainless steel when using stainless steel connectors.

Features

SCN

- Full round head with embossed size identification
- Smooth shank makes for easier driving
- Orange tips help with quick alignment through CCN64 Collated Connector Nailer

SCNR

- Full round head with "≠" identifier
- Annular threads on the shank increase withdrawal capacity

Application

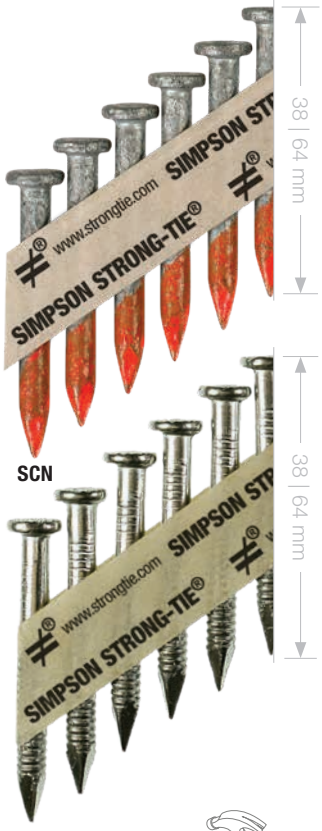
- Simpson Strong-Tie® Connectors

Finish

- Hot-Dip Galvanised — SCN
- 316 Stainless Steel — SCNR

Corrosion Resistance Level MEDIUM

Corrosion Resistance Level SEVERE



Head stamp for easy nail identification

Annular threads create an interlock between the shank of the nail and the wood, providing superior holding power. Generally considered the nail type with the best withdrawal resistance.

Diamond Point provides lower driving resistance

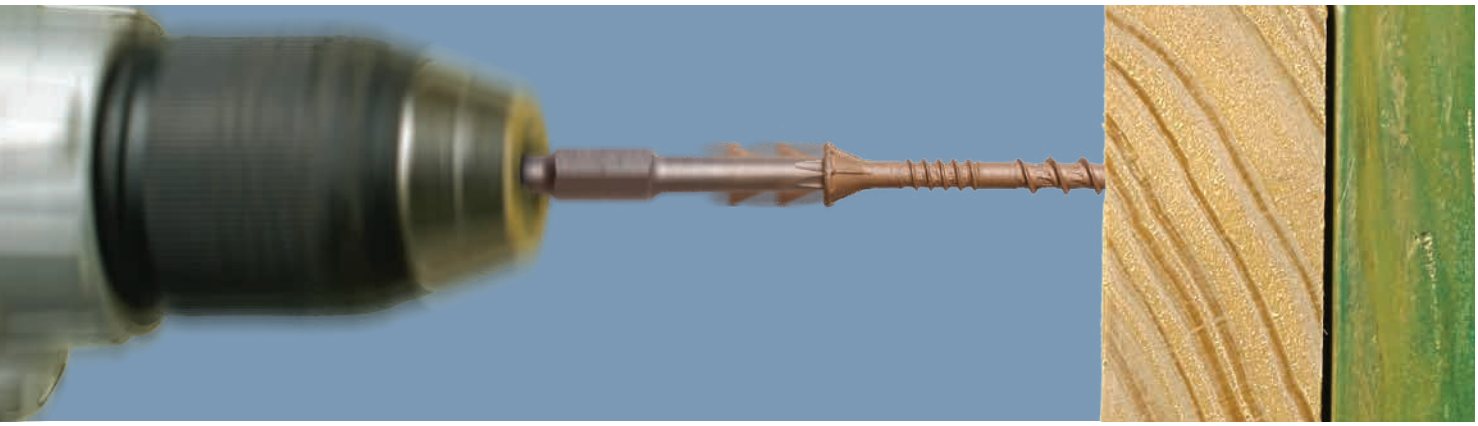
These nails are also available loose for hand-drive installation. *See page 159 for details.*

Collated 3.32 mm and 3.75 mm Connector Nails

	Model No.			Diameter	Length	Shank	Point	Head Type	Nails/Strip	≈ Box Qty
	N8HDGPT500	(SCN)	8	3.32mm	38mm	Smooth	Diamond	Full Round Smooth Head	22 per paper-collated strip	500
	N8HDGPT4000									4,000
	N10HDGPT500		10	3.75mm						500
	N10HDGPT3000									3,000
	N10DHDGPT500				64mm					500
	N10DHDGPT2500									2,500
316	T10A150MCN	(SCNR)	≠ All Sizes	3.32mm	38mm	Annular-Ring				1,500
316	T9A150MCN			3.75mm						1,500
316	T9A250MCN				64mm					1,000

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Replacement Parts and Accessories



Driver Bits

Our industrial-grade driver bits are specially designed for a secure fit with the recess of Simpson Strong-Tie® fasteners. Available in both square and six-lobe drive configurations, our bits will outperform sub-standard bits commonly prone to cam-out and stripping.

Square Drive

Driver Bits	Model No.	Drive	Bit Length (mm)	Bit Type	Pack Qty
	**BIT1S-2-RC3**	#1 Square drive	50	Power Bits	3
	**BIT2S-2-RC3**	#2 Square drive			
	**BIT2SU-2-RC3**	#2 Undersize Square drive			

6-Lobe

Driver Bits	Model No.	Drive	Bit Length (mm)	Bit Type	Pack Qty
	**BIT15T-2-RC3**	T-15 6-lobe drive	50	Power Bits	3
	**BIT20T-2-RC3**	T-20 6-lobe drive			
	**BIT25T-2-RC3**	T-25 6-lobe drive			
	**BIT30T-2-RC3**	T-30 6-lobe drive			
	**BIT40T-134-RC3**	T-40 6-lobe drive	45	Power Bits	

Quik Drive® Screw Driving Systems

Product Index

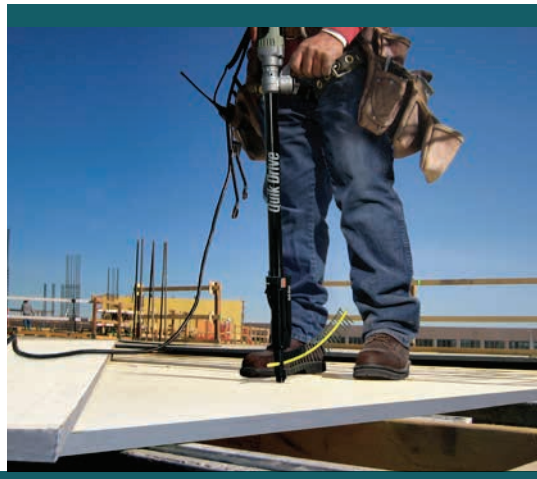
Scan this QR code to learn about our Quik Drive auto-feed screw driving systems. From plasterboard and decks to subfloor and tile roofing, these systems make it easier and faster to secure a variety of building materials.

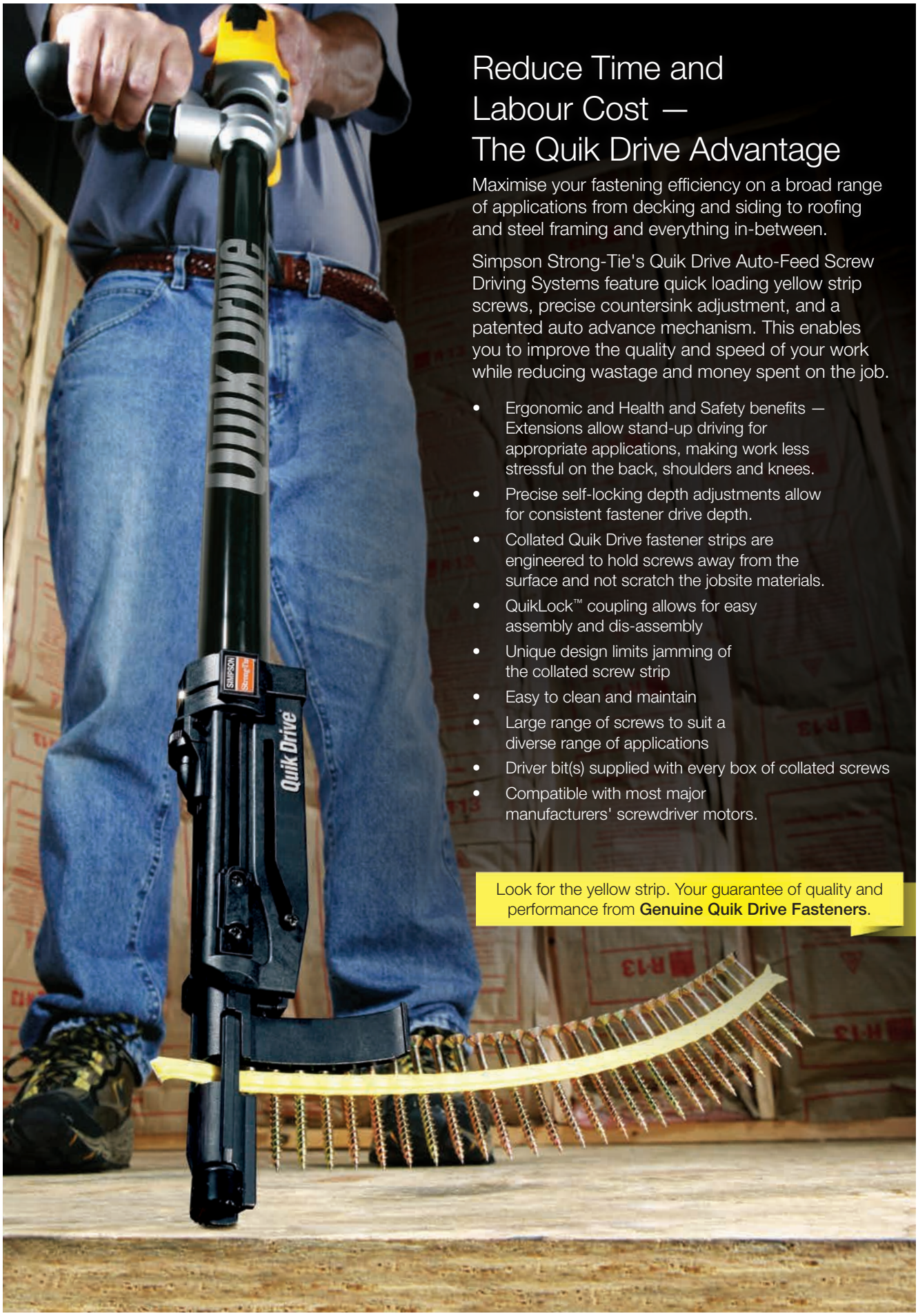
https://youtu.be/WTyLNpK_6xQ

Quik Drive® auto-feed screw driving systems turn repetitive fastening into opportunities to increase efficiency and save time.

Quik Drive auto-feed screw driving systems turn repetitive fastening into opportunities to increase efficiency and save time. Extensive research goes into the design of each system and screw to understand the intended applications, faster performance demands and the work flow in which installations take place. This results in professional quality auto-feed solutions that truly make work easier.

- Patented Quik Drive auto-feed attachments and collated fasteners eliminate the need to handle (and fumble with) individual screws. The result: faster installations and less waste!
- Extensions allow stand-up driving for appropriate applications, making work less stressful on the back, shoulders and knees.
- Precise self-locking depth adjustments allow for consistent fastener drive depth.





Reduce Time and Labour Cost — The Quik Drive Advantage

Maximise your fastening efficiency on a broad range of applications from decking and siding to roofing and steel framing and everything in-between.

Simpson Strong-Tie's Quik Drive Auto-Feed Screw Driving Systems feature quick loading yellow strip screws, precise countersink adjustment, and a patented auto advance mechanism. This enables you to improve the quality and speed of your work while reducing wastage and money spent on the job.

- Ergonomic and Health and Safety benefits — Extensions allow stand-up driving for appropriate applications, making work less stressful on the back, shoulders and knees.
- Precise self-locking depth adjustments allow for consistent fastener drive depth.
- Collated Quik Drive fastener strips are engineered to hold screws away from the surface and not scratch the jobsite materials.
- QuikLock™ coupling allows for easy assembly and dis-assembly
- Unique design limits jamming of the collated screw strip
- Easy to clean and maintain
- Large range of screws to suit a diverse range of applications
- Driver bit(s) supplied with every box of collated screws
- Compatible with most major manufacturers' screwdriver motors.

Look for the yellow strip. Your guarantee of quality and performance from **Genuine Quik Drive Fasteners**.

Frequently Asked Questions

What are the benefits of Simpson Strong-Tie's Quik Drive Auto-Feed Screw Driving Systems?

The Quik Drive auto-feed screw driving system delivers consistent, reliable and high-quality results all with the benefit of labour saving speed. Ergonomically-friendly, the Quik Drive allows fastening from a standing position and is engineered to be durable and light in weight. Collated screw fastening means no wastage, increased speed, efficiency and safety versus hand-drive fasteners.

What are the benefits of Quik Drive collated fasteners?

- Engineered for top performance in their intended application — look for the yellow strip to ensure you are getting Quik Drive Collated Fasteners.
- Improved pull-down, and withdrawal resistance versus nails.
- Increased speed, efficiency and safety versus bulk fasteners.
- Ensures you drive every screw on the strip — no wasted fasteners.
- Specifically designed for use with the Quik Drive auto-feed screw driving system to ensure problem-free system performance.

Where can Quik Drive tools be used?

Common applications (but not limited to):

- Cement board
- Subflooring and underlayment
- Composite and timber deck and dock material
- Clay and ceramic roofing tile
- Plasterboard to timber or steel framing
- Manufactured housing operations
- Steel framing and cladding
- Steel decking and stitching
- Crate and pallet manufacture

Are special skills needed to operate Quik Drive tools?

The Quik Drive tool is easy to use and training can usually be done in a few minutes. As with any tool, there are good and bad operating methods and efficiency will increase with experience. Please see "Trouble Shooting Guide" on page 179 to prevent the more common mistakes and increase your efficiency.

How easy is it to reload?

Just feed (or slide) in a new strip. Most of the rigid strips have a pointed end so there's no doubt which way they go. There's nothing to loosen, tighten or adjust. Slide the strip into a short channel until you hear it click and continue driving.

How durable are Quik Drive tools?

Our Quik Drive tools are built of hardened steel and engineered polymer. We have field tested several generations of our current basic design to deliver a trim, light weight tool, robust for the jobsite. All Quik Drive PRO tools are the most durable auto-feed drivers on the market — backed by our two-year warranty.

What kind of screws can be driven with Quik Drive tools?

Quik Drive offers the widest variety of any collated screw system. See "Collated Screws for the Quik Drive® System" from page 186, which shows our more commonly used screws. If you don't see a screw you would normally use, please contact your Simpson Strong-Tie Representative who will help find a solution to your fixing needs.

Where can I purchase Quik Drive tools?

Simpson Strong-Tie sells Quik Drive through distributors. For a list of distributors near you please visit our online Dealer Locator, or contact our Sales Department.

Are driver bits included, and I purchase additional bits?

Additional bits can be purchased from your distributor. However, free bits come in each box of genuine Quik Drive collated screws. In general, we provide enough bits to drive a full box of screws. It is a good habit to install a fresh bit as soon as you open a new box of screws.

How do I change the driver bit?

Free bits come in each box of genuine Quik Drive screws. It is a good habit to install a fresh bit as soon as you open a new box of screws. Each Quik Drive tool has a bit key which can be easily used to unclick the bit from the mandrel. See the bottom of page 168 for more information.

Quik Drive Adjustable Countersink Feature

The Quik Drive auto feed screw driving system features a countersink adjustment function that allows the user to adjust the driving depth of the fastener to ensure consistent fastener penetration based on the material and application.

Once the countersink depth is set the driver bit will automatically disengage from the head of the fastener once the desired penetration depth is achieved, thus preventing over-driving. With screws driven at the desired depth every time without the need to slow down or check each fastener you can work faster with more consistent results.

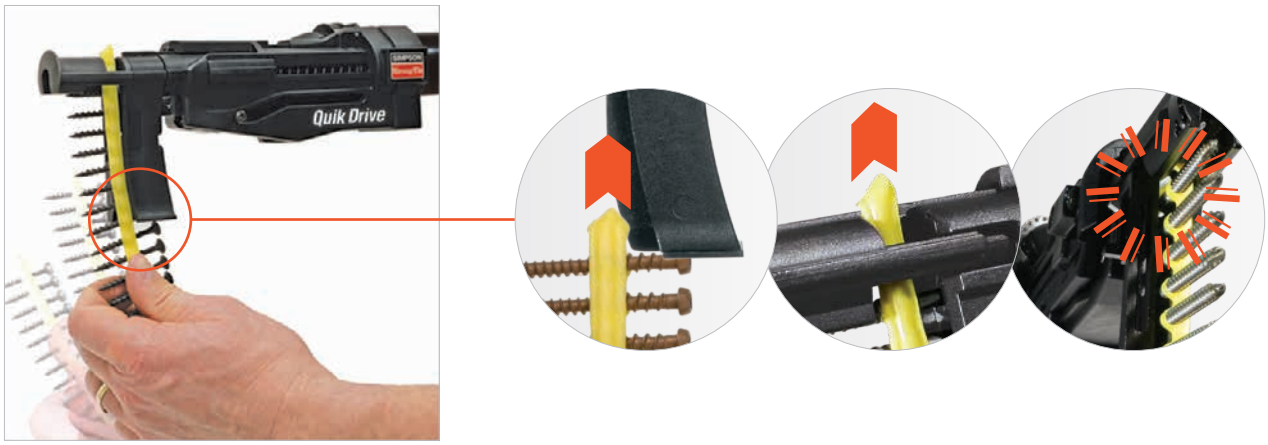
How to get the most out of the countersink feature:

Test and adjust the countersink depth using a scrap piece of material to ensure you have the correct depth setting.

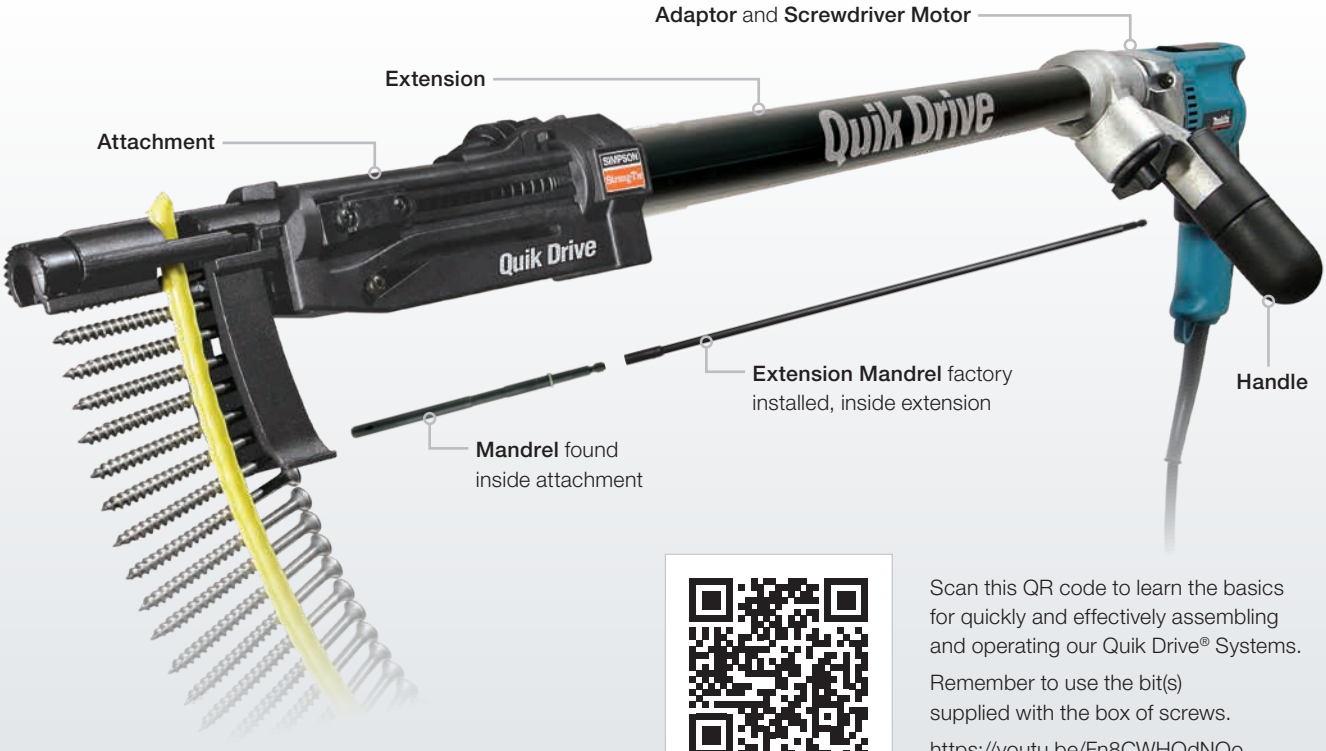
Stainless steel screws are softer than carbon steel screws, therefore care should be taken to correctly set the countersink adjustment wheel to a depth that will not over-drive the screw during installation. Over-driving stainless steel screws may cause breakage.

Quik Drive Collated Strip Loading

The Quik Drive auto feed screw driving system reloads quickly by simply feeding (sliding) the rigid strip into the short channel until you hear a click. Every Quik Drive collated screw strip has a pointed end so there is no doubt which way the are loaded.



System Components

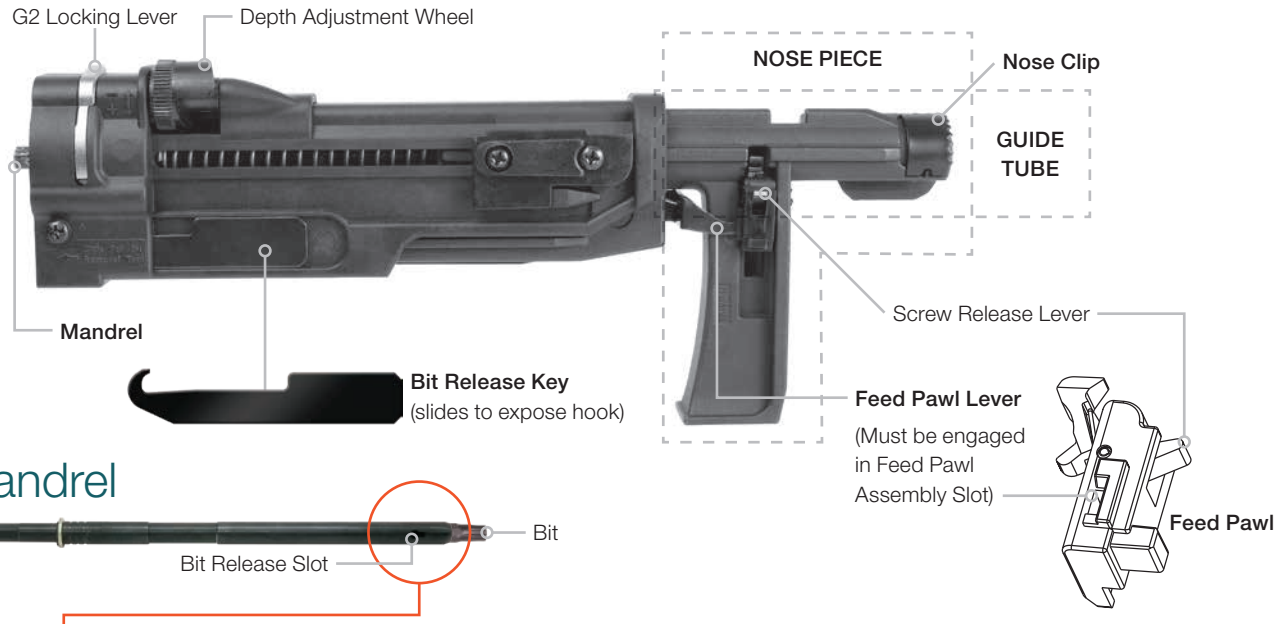


Scan this QR code to learn the basics for quickly and effectively assembling and operating our Quik Drive® Systems.

Remember to use the bit(s) supplied with the box of screws.

https://youtu.be/Fn8CWHQdNQo

Attachment



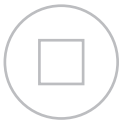
Mandrel

Scan this QR code to watch a short video to see just how easy it is to replace a bit on a Quik Drive® auto-feed screw driving system.

https://youtu.be/Fw6f6nMxF8g

Drive Types and Replacement Driver Bits

To ensure optimum results with a Quik Drive System it is necessary to use the correct driver bit with the right fastener. The bit(s) that are included in each box of Quik Drive collated fasteners should be sufficient to drive the entire box, however variations in materials and driving techniques may shorten driver-bit life. Replacement bits are available in Bit Packs: reference the label on the bit included in the box of screws or the box label to ensure correct driver-bit selection. See page 185 for model number and pack information.

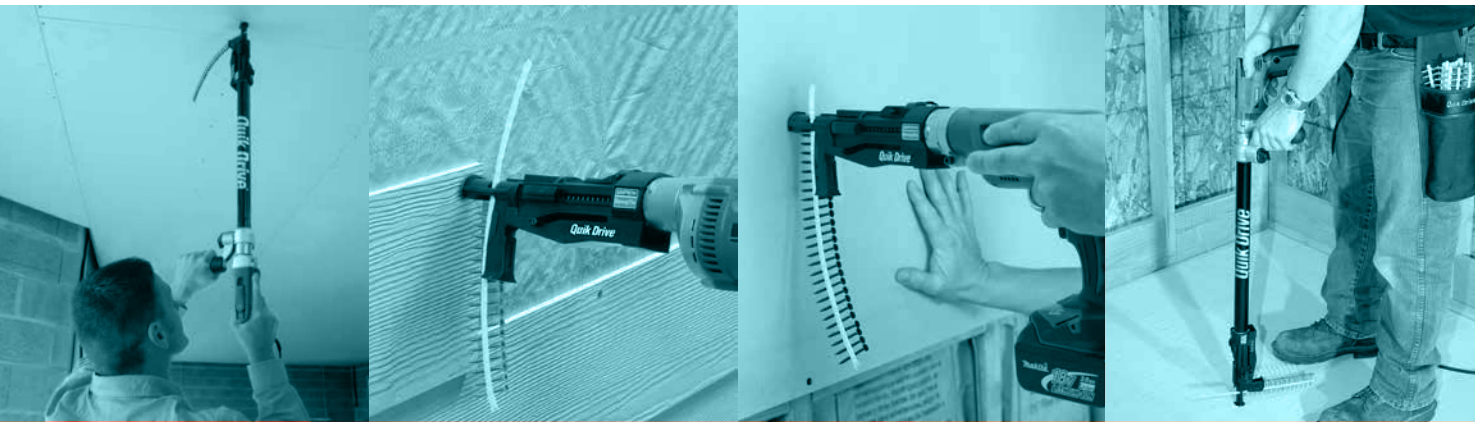
Drive Type	Size	Bit	Description
	#2 Square drive		BIT2S — for most screws with #2 recess and interior-grade coating
	#2U (#2 undersized)		BIT2SU — for most screws with #2 recess and exterior-grade coating
	#3 Square drive		BIT3S — for most screws with #3 recess and interior-grade coating
	#3U (#3 undersized)		BIT3SU — for most screws with #3 recess and exterior-grade coating
	#2 Phillips		BIT2P — for all Quik Drive screws with Phillips recess
	T-20 6-lobe drive bit		BITTX-20 — for all Quik Drive screws with T-20 6-lobe recess
	T-25 6-lobe drive bit		BITTX-25 — for all Quik Drive screws with T-20 6-lobe recess
	5/16" Lobular Hex Drive		BITHEXLB516 — For most screws with 5/16" lobular hex drive

Quik Drive System Comparison

	 PRO200	 PRO250	 PRO300S	 HSD60	 HSD75	 PROPH
Page	173	—	174	176	176	177
Screw length (mm)	25–50	40–65	40–75	45–60	60–75	18–25
Screw gauge	6–8	8–10	8–10	14	14	8–12
 Smooth nosepiece	✓	—	—	✓	✓	✓
 Non-skid teeth noseclip	—	✓	✓	—	—	—
 Countersink adjustment	✓	✓	✓	✓	✓	✓
 Decking clip compatible	—	✓	✓	—	—	—
 Extension pole compatible	✓	✓	✓	✓	✓	✓


Quik Drive
Quik Drive

PRO200 Auto-Feed Screw Driving System



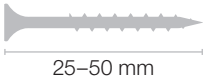
Plasterboard and Underlay Applications

The PRO200 system is ideal for, but not limited to, plasterboard and underlay applications because our precision countersink adjustment produces consistent depth and the auto-feed mechanism allows fast, hassle-free driving. The holding power of screws reduces gaps that can cause floor squeaks. Screws prevent fastener heads from popping up above the boards. Our extension pole (optional accessory) enables stand-up-and-drive fastening.

Features

1. Compact body for reduced weight and easy handling
2. Slim profile allows for easy driving in corners
3. Smooth nose will limit marking the plasterboard surface
4. Rigid strip collation prevents jamming
5. QuikLock™ coupling allows for easy assembly and disassembly so system can be used with extension pole (optional accessory)
6. Built-in bit wrench makes bit changes quick and easy
7. Sure-grip guide tube increases stability with shorter screws
8. Uniform countersink on smooth surfaces

Drive these Quik Drive collated screws



QDPRO200G2A includes

- PRO200 Attachment
- Mandrel
- Rugged toolbox

See pages 184–185 for adaptors and accessories

For more information on screwdriver motors and RPM recommendations per application, please see page 180.

screwgun and adaptor not included

PRO200 Options

System Options	Description	Model No.
	PRO200 Attachment with toolbox[1]	QDPRO200G2A
Parts	**Description**	**Model No.**
	PRO200 Mandrel	PMANDREL65
	Feed pawl	PFEEDPAWLTL
Accessories		
	Standard extension	QDEXTG2

1. Get the right adaptor for your model screwgun, please see pages 180–181 for further information.

PRO300 Auto-Feed Screw Driving System

Decking, Cladding, Sheathing, Subfloor and Underlay Applications

The PRO300 system is ideal for, but not limited to, underlay, subfloor, sheathing and decking applications. Designed to drive 40–75 mm (8–10 gauge) screws the PRO300S is a truly flexible tool to cater for a wide range of applications. Incorporating a precision countersink adjustment that produces consistent screw depth, combined with the auto-feed mechanism delivers fast, hassle-free driving on the jobsite.

Features

1. Expanded depth settings for high-density flooring materials
2. Reversible and replaceable non-skid teeth
3. Sure-grip guide tube increases stability for a wide range of screws
4. Rigid strip collation prevents jamming
5. Extension enables stand-up driving to save time and reduce worker fatigue
6. QuikLock™ coupling allows for easy assembly and disassembly so system can be used without extension pole
7. Built-in bit wrench makes bit changes quick and easy

PRO300SKA includes

- PRO300 Attachment
- Extension
- Rugged toolbox
- Adaptors; MAA3G2, HIAG2 (Suit Makita® FS2300, Hitachi® Screwguns)
  *New Zealand: Supplied with any one adaptor of choice on request.

See pages 184–185 for adaptors and accessories

For more information on screwdriver motors and RPM recommendations per application, please see page 180.

PDECKNC-RC (sold separately)
The decking nose clip positions the screw on the deck board and positions it over the joist for an easy, uniform installation from a standing position.

Drive these Quik Drive collated screws

PRO300 Options

System Options	Description	Model No.
	PRO300SKA with **Makita®** 2500rpm screwdriver motor	**PRO300SM25KA** *(extra adaptors not included)*
	PRO300SKA with **Milwaukee®** 2500rpm screwdriver motor	**PRO300SMW25K** *(extra adaptors not included)*
Parts		
	PRO300 Attachment with toolbox[1]	**QDPRO300SG2A**
	PRO300 Mandrel	**PMANDREL75**

1. Get the right adaptor for your model screwgun, please see pages 180–181 for further information.

PROSDD Combo Auto-Feed Screw Driving System

Plasterboard, Decking, Cladding, Sheathing, Subfloor and Underlay Applications

The PROSDD system is a multipurpose system for, but not limited to, subfloor, decking and plasterboard applications. The PROSDD is a truly flexible tool to cater for a wide range of applications. Incorporating a precision countersink adjustment that produces consistent screw depth, combined with the auto-feed mechanism delivers fast, hassle-free driving on the jobsite.

Features

1. Expanded depth settings for high-density flooring materials
2. PRO300 Reversible and replaceable non-skid teeth
3. Sure-grip guide tube increases stability for a wide range of screws
4. Rigid strip collation prevents jamming
5. Extension enables stand-up driving to save time and reduce worker fatigue
6. QuikLock™ coupling allows for easy assembly and disassembly so system can be used without extension pole
7. Built-in bit wrench makes bit changes quick and easy
8. PRO200 Smooth nose will limit marking the plasterboard surface

PROSDDKA includes

- PRO300 Attachment
- PRO200 Attachment
- Extension
- Rugged toolbox
- Adaptors; MAA3G2, HIAG2 (Suit Makita® FS2300, Hitachi® Screwguns)
  *New Zealand: Supplied with any one adaptor of choice on request.

See pages 184–185 for adaptors and accessories

For more information on screwdriver motors and RPM recommendations per application, please see page 180.

PDECKNC-RC (sold separately)
The decking nose clip positions the screw on the deck board and positions it over the joist for an easy, uniform installation from a standing position.

Drive these Quik Drive collated screws

PRO200 6–8 gauge | PRO300 8–10 gauge

PRO200 25–50 mm | PRO300 40–75 mm

PROSDD Options

System Options	Description	Model No.
	PROSDDKA with **Makita®** 2500rpm screwdriver motor	**PROSDDM25KA** *(extra adaptors not included)*
Parts		
	PRO300 Attachment with toolbox[1]	**QDPRO300SG2A**
	PRO200 Attachment with toolbox[1]	**QDPRO200G2A**
	PRO300 Mandrel	**PMANDREL75**
	PRO200 Mandrel	**PMANDREL65**

1. Get the right adaptor for your model screwgun, please see pages 180–181 for further information.

PROHSD Auto-Feed Screw Driving System

Timber-to-Steel Heavy Duty Fastening Applications

The PROHSD system is ideal for heavy duty fastening applications. The PROHSD60 is designed to drive 40–60 mm (14 gauge) screws whereas the PROHSD70 can drive 60–75 mm (14 gauge) screws. The PROHSD drives fasteners that meet AS 3566 making it a specialised tool for heavy duty fastening.

Features

1. Expanded depth settings for high-density flooring materials
2. Slim profile for driving in corners
3. Sure-grip guide tube increases stability for a wide range of screws
4. Rigid strip collation prevents jamming
5. QuikLock™ coupling allows for easy assembly and disassembly so system can be used without extension pole
6. Built-in bit wrench makes bit changes quick and easy
7. Broad nose increases stability and protects surfaces

- Extension enables stand-up driving to save time and reduce worker fatigue (sold separately)

Drive these Quik Drive collated screws

PROHSD60 40–60 mm | PROHSD75 60–75 mm

QDHSD60 and QDHSD75 includes

- Attachment
- Mandrel
- Rugged toolbox

See pages 184–185 for adaptors and accessories

For more information on screwdriver motors and RPM recommendations per application, please see page 180.

screwgun and adaptor not included

PROHSD Options

System Options	Description	Model No.
	PROHSD60 Attachment with toolbox[1]	**QDHSD60**
	PROHSD75 Attachment with toolbox[1]	**QDHSD75**
Parts	**Description**	**Model No.**
	Attachment mandrel	**PMANDREL75**
Accessories		
	Standard Extension	**QDEXTG2**

1. Get the right adaptor for your model screwgun, please see pages 180–181 for further information.

PROPH Auto-Feed Screw Driving System

Steel Framing and Stitching Applications

Compact in its design the PROPH system is ideal for, but not limited to, steel framing and sheet steel stitching fastening applications. Hands-free screw advancement increases speed onsite and the use of a collated system means less screw wastage.

Features

1. Compact body for reduced weight and easy handling
2. Slim profile allows for easy driving in corners
3. Precise depth adjustment prevents over and under driving
4. Rigid strip collation prevents jamming
5. Rubber non-skid nose piece for ease of fastening
6. Built-in bit wrench makes bit changes quick and easy
7. QuikLock™ coupling allows for easy assembly and disassembly so system can be used with extension pole (optional accessory)
8. Sure-grip guide tube increases stability with shorter screws

Drive these Quik Drive collated screws

8–12 gauge

18–25 mm

QDPROPHG2 includes

- PROPH Attachment
- Mandrel
- Rugged toolbox

See pages 184–185 for adaptors and accessories

For more information on screwdriver motors and RPM recommendations per application, please see page 180.

screwgun and adaptor not included

PROPH Options

System Options	Description	Model No.
	PROPH Attachment with toolbox[1]	QDPROPHG2
Parts	**Description**	**Model No.**
	Attachment mandrel	PMANDREL65
	Feed pawl	PFEEDPAWL
	Leaf Spring	QDLEAFSPRING2
	Rubber noseguard 5 pack	PNOSEGUARD-5
Accessories		
	Standard extension	QDEXTG2

* PROPH Only available in Australia.

1. Get the right adaptor for your model screwgun, please see pages 180–181 for further information.

PDECKNC-RC Decking Clips

Decking Applications

Achieve perfectly spaced deck boards and screws without measuring or guessing. The PDECKNC-RC acts as a guide to ensure proper placement of screws when attaching deck boards to 45 mm joists. Each PDECKNC-RC includes a 3 mm and 5 mm deck spacer, and hex key.

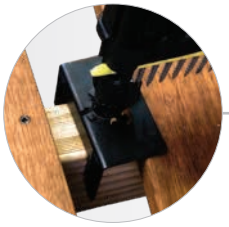
Features

- Compatible with PRO250, and PRO300 Systems
- Provides consistent screw placement and quality finish
- Sets either 5 mm or 3 mm spacing between the boards
- A perfect deck without the need to bend your back

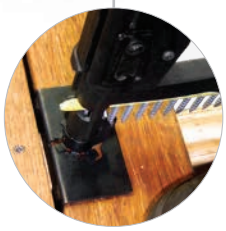
PDECKNC-RC Decking Clips

Easily connected to the PRO300 and PRO250 auto-feed attachment.

Consistent screw placement and quality finish, 20 mm in from the edge of the decking board.



The Quik Drive Decking Clip straddles a 45 mm wide joist to give consistent screw placement without marking.



No need to bend at all The Quik Drive Decking Clips create either a 5 mm or 3 mm spacing between the decking board.

Trouble Shooting Guide

Simpson Strong-Tie Quik Drive tools are easy to use. As with any power tool, please read the operating instructions before use for best performance.

Failure Mode	Solution
Screws won't drive. They spin for a second, then lay over on their side. Little or no penetration.	• Make sure the screwdriver motor is set to forward. • Start screwgun before applying driving pressure.
Screws won't drive completely. They go down about halfway, then the bit spins out.	• Check to be sure you are using the correct bit for the type of screws you are driving. • Check for bit wear. It may be time to install a new bit. • Continue to apply pressure, keeping bit engaged until screw is fully driven and clutch releases. • Keep screwgun running between screws.
Screws won't drive completely. They are almost completely driven but won't countersink completely.	• Verify that all components of system are securely seated and locked. • Check the depth adjustment on the attachment. Reset if necessary. • You may have missed the substrate. Example: In flooring, this will occur if you miss the joist. • Be sure that Quik Drive unit is not being angled to one side. Tool should be at a 90 degree angle to application surface. • Make sure that screwdriver is of appropriate RPM for the chosen task. • Verify that the clutch is functioning properly in your screwdriver. Break screw off strip and try driving with only mandrel (with correct bit) inserted in screwdriver. • Evaluate application, certain types may require predrilling.
Screws don't advance properly causing tool to jam.	• Use only Simpson Strong-Tie Quik Drive brand collated screws. • Be sure the screw strip is inserted correctly — pointed end first. • Lift the tool completely off the work surface after driving each screw. • Don't drag screw strips on the work surface as you move to the next position. • Be sure the feed pawl assembly is intact and feed lever is engaged.

Screwdriver Motor RPM Recommendations

It is important to select a motor with RPM specifications that suit the intended application(s) to ensure the best results.

Many variables such as the material being fastened, user skill level and weather conditions can affect screwdriver performance for a given application.

Applications	Cordless	1700rpm	2500rpm	4000rpm	4500rpm	6000rpm	1000–2000rpm 2 Speed
Subfloor and sheet flooring	–	GOOD	**BEST**	–	–	–	GOOD
Hardwood-to-hardwood decking/docks	–	**BEST**	GOOD	–	–	–	**BEST**
Other decking/docks	–	BETTER	**BEST**	–	–	–	GOOD
Drywall	–	–	GOOD	BETTER	BETTER	GOOD	–
Fibre-cement cladding	–	GOOD	**BEST**	–	–	–	–
Tile roofing	–	–	**BEST**	–	–	–	–
Steel framing	GOOD	GOOD	**BEST**	–	–	–	–
Underlayment and flooring	GOOD	BETTER	**BEST**	–	–	–	–
Truck and trailer beds	–	**BEST**	GOOD	–	–	–	**BEST**
General purpose	GOOD	–	**BEST**	–	–	–	–

Screwdriver Motor Comparison Chart

Brand	Model	Rated Input	No Load Speed (RPM)	Manufacturer Application	Adaptor	Raw No. on Adaptor
Bosch®	GSR6-40TE*	500W	0–4000	Drywall	**ADBG2**	201119
	GSR6-25TE*	500W	0–2500	General Screw Driving	**ADBG2**	201119
	GSR6-20TE*	600W	0–2000	Tek Screw Driver	**ADBG2**	201119
	GSR6-25TE	701W	0–2500	General Screw Driving	**BOA1G2**	105368
De Walt®	256	540W	0–4000	Drywall	**DWAG2**	105777
	266	540W	0–2500	General Screw Driving	**DWAG2**	105777
Hitachi®	W6V3*	600W	0–4000	Drywall	**HIAG2**	201110
	W6V4*	620W	0–4500	Drywall	**HIAG2**	201110
	W6VA3*	600W	0–2600	Drywall and Roofing	**HIAG2**	201110
	W6VA4	620W	0–3000	Drywall and Roofing	**HIAG2**	201110
	W6VB3	620W	0–2600	General Screw Driving	**HIAG2**	201110
	W8VB2	600W	0–1700	Tek Screw Driver (reduction gearing)	**HIAG2**	201110
	W6VM*	620W	0–6000	Drywall	**HIAG2**	201110
	WH18DL	18V	0–2600	Impact Driver — Cordless	**HIA1G2**	105367

Screwdriver Motor Comparison Chart (cont.)

Brand	Model	Rated Input	No Load Speed (RPM)	Manufacturer Application	Adaptor	Raw No. on Adaptor
Makita®	6802*	510W	0–2500	General Screw Driving	**MAAG2**	105590
	6805*	500W	0–2500	Heavy Duty	**ADM27G2AU**	150915AU
	6807	500W	1000/2200	Heavy Duty	**MAA6807G2**	201129
	6823*	570W	0–2500	Drywall	**MAAG2**	105590
	6824*	570W	0–4500	Drywall	**MAAG2**	105590
	6825*	570W	0–6000	Drywall	**MAAG2**	105590
	6826*	570W	0–2500	General Screw Driving	**MAAG2**	105590
	6827*	570W	0–2500	Flooring	**ADM27G2AU**	150915AU
	6831*	12V	0–2500	Drywall — Cordless	**ADM31DG2**	201130
	6842	470	4000	Drywall	**ADM31DG2**	201130
	BFR440RFE, BFR540RFE	14.4V	4000	Drywall — Cordless	**ADM31DG2**	201130
	BFR550RFE	18V	4000	Drywall — Cordless	**ADM31DG2**	201130
	LXSF01Z	18V	4000	Drywall — Cordless	**MAA3G2**	201143
	FS2300	570W	0–2500	General Screw Driving	**MAA3G2**	201143
	FS2500	570W	0–2500	General Screw Driving	**MAA3G2**	201143
	FS2700	570W	0–2500	General Screw Driving	**ADM27G2AU**	150915AU
	FS6300	570W	0–6000	Drywall	**MAA3G2**	201143
Milwaukee®	DWSE 4000Q	725W	0–4000	Drywall	**MIAG2**	105597
	TKSE 2500Q	725W	0–2500	Self Drilling/Self Tapping Screws	**MIAG2**	105597
Ramset®	SD4000*	500	0–4000	Drywall	**ADBG2**	201119
	SD2000*	600	0–2000	Tek Screw Driver	**ADBG2**	201119

*Discontinued Models

1. Please contact Simpson Strong-Tie Representative for detailed instructions.

Adaptor Fitting Instructions

Please contact your Simpson Strong-Tie Representative for any models not listed.

Bosch® Screwdriver (ADBG2) GSR model threaded

Unscrew the plastic nose cone to expose the thread on the gearbox housing. Screw the adaptor onto the front of the screwdriver. When using the attachment without the extension there may be a need to reduce the diameter of the zinc washer on the mandrel. The washer needs to pass into the brass housing of the screwdriver to activate the clutch in the power tool. (Note — R is right hand rotation, forward not reverse).

Bosch® Screwdriver (BOA1G2) GSR model no thread

Remove the plastic nose piece and remove the hex bit holder. Fix the adaptor firmly back so the adaptor is fully back to gearbox housing. Tighten the grub screws. The grub screws need to be tightened evenly (nip screw to tight and then tighten each screw ¼ turn until all are fully locked) so the adaptor stays in alignment to the tool, over tightening one grub screw fully can pull the adaptor out of alignment causing excess wear on system. The Quik Drive attachment is now ready to fit

Dewalt® Screwdriver (DWAG2)

Unscrew the plastic nose cone on the front of the screwdriver to expose the threaded front of the gear case. Screw the adaptor on until the back of the adaptor is firmly against the gearbox case. The Quik Drive attachment is now ready to fit.

Hitachi® Screwdriver (HIAG2)

Unscrew the plastic nose cone to expose the threaded gearbox housing with 2 grooves on either side. Screw the adaptor on and stop 3 turns short of being fully threaded onto the housing. Try the tool to ensure that the depth is correct for the application at hand (understanding that there is depth adjustment in the tool as well). Turn until the grub screws are aligned with the grooves on the side of the screwdriver. Tighten the grub screws and the tool is now set. The Quik Drive attachment is now ready to fit. (Note — R is right hand rotation, forward not reverse)

Hitachi® Impact Driver (HIA1G2)

Remove rubber protection ring to expose gearbox housing. Align adaptor so grub screws are over the recess running around the housing. The grub screws need to be tightened evenly (nip screw to tight and then tighten each screw ¼ turn until all are fully locked) so the adaptor stays in alignment to the tool. To fit mandrel, use small screw driver to push sleeve forward for mandrel to fit into hex drive. The Quik Drive attachment is now ready to fit.

Makita® Screwdriver (MAAG2)

Unscrew the plastic nose cone on the front of the screwdriver to expose the threaded front of the gear case. Screw the adaptor on until the back of the adaptor is firmly against the gearbox case. The Quik Drive attachment is now ready to fit.

Makita® Screwdriver (MAA6807G2)

Remove depth sensitive nose piece and black retaining clip. Fit adaptor to locate firmly against the gear box housing. Rotate to lock into position. The grub screws need to be tightened evenly (nip screw to tight and then tighten each screw ¼ turn until all are fully locked) so the adaptor stays in alignment to the tool. The Quik Drive attachment is now ready to fit.

Makita® Screwdriver (ADM27G2AU)

Unscrew knurled front nose piece. Screw adaptor fully onto front of screwdriver and tighten grub screw. The Quik Drive attachment is now ready to fit. Make sure that tension clutch is set to highest torque.

Makita® Screwdriver (MAA3G2)

Remove plastic nose cone. Remove the zinc yellow clip and the black circlip. Put the adaptor on the tool to with the screw lug at 3 or 9 o'clock and pull hard back, rotate the adaptor to 6 or 12 o'clock, you will feel the adaptor fitted to the tool not being able to pull forward. Finish by tightening cap screw locking adaptor to tool. The Quik Drive attachment is now ready to fit.

Makita® Collated Screwdriver (ADM31DG2)

Remove collated feed system and long screwdriver bit. Fit adaptor right back over steel shaft against body housing. The grub screws need to be tightened evenly (nip screw to tight and then tighten each screw ¼ turn until all are fully locked) so the adaptor stays in alignment to the tool. For PRO200 Insert mandrel by pushing sleeve back and then put feeder onto adaptor. For pole installation connect extension pole as normal for any adaptor.

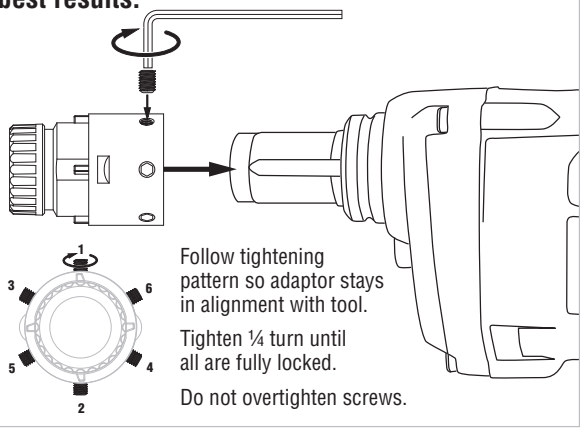
Milwaukee® Screwdriver (MIAG2)

Pull the plastic nose cone off the front to expose the cast steel section of the screwdriver. Slide the adaptor over the front of the nose and set back as far as possible. Fit the adaptor onto the screwdriver by tightening the 3 grub screws onto the nose of the screwdriver. The grub screws need to be tightened evenly so the adaptor stays in alignment to the tool, over tightening one grub screw fully can pull the adaptor out of alignment causing excess wear on system The Quik Drive attachment is now ready to fit.

Adaptor Fitting Instructions

Set Screw Tightening Pattern

For best results:



Follow tightening pattern so adaptor stays in alignment with tool.

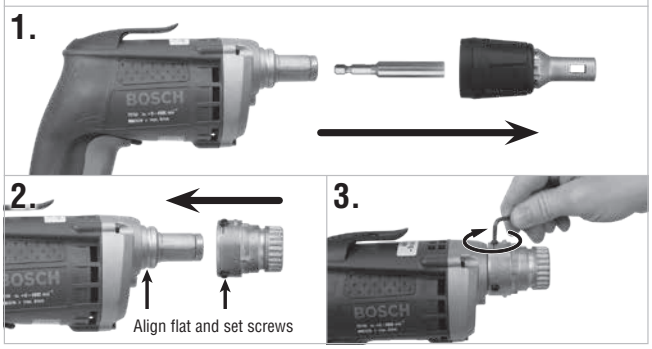
Tighten ¼ turn until all are fully locked.

Do not overtighten screws.

BOSCH®

GSR6-25TE

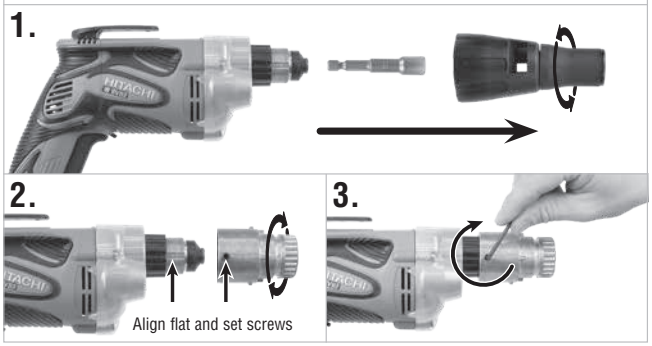
BOA1G2
[105368]



HITACHI®

W6V3, W6VA3, W6VB3, W8VB2, W8V3

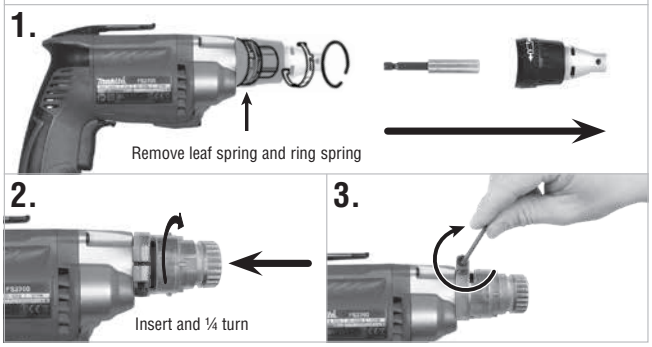
HIAG2
[201110]



MAKITA®

FS2500, FS2300, FS6300

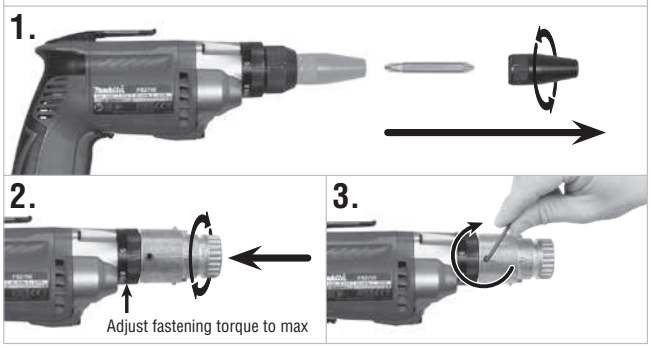
MAA3G2
[201143]



MAKITA®

6805, 6827, FS2700

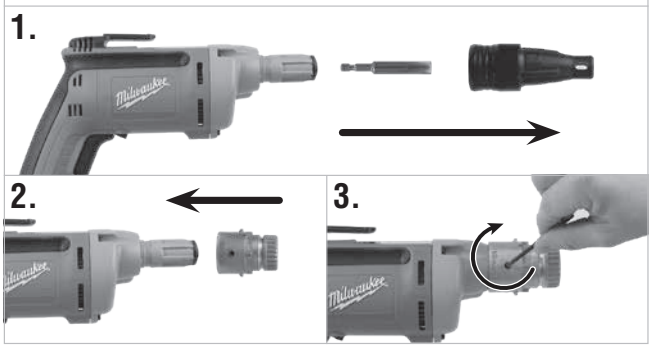
ADM27G2AU
[150915]



MILWAUKEE®

DWSE-4000-Q, TKSE-2500-Q

MIAG2
[105597]



Replacement Parts and Accessories

Adaptors	Model No.	Description
	**ADBG2**	Bosch adaptor suits GSR6-40TE, GSR-625TE (threaded model), GSR6-20TE [201119]
	**BOA1G2**	Bosch adaptor suits GSR-625TE (non-thread model) [105368]
	**DWAG2**	De Walt adaptor suits 256, 266 [105777]
	**HIAG2**	Hitachi adaptor suits W6V3, W6VA3, W6VB3, W8VB2, W8V3 [201110]
	**HIA1G2**	Hitachi adaptor suits WH18DL, WH18DBDL Impact Driver [105367]
	**MAAG2**	Makita adaptor suits 6801, 6802*, 6823, 6824, 6825, 6826 (*requires modification) [105590]
	**MAA3G2**	Makita adaptor suits FS2500, FS2300, FS6300 (remove wire and circlips) [201143]
	**ADM27G2AU**	Makita adaptor suits 6805, 6827 and FS2700 [150915]
	**MAA6807G2**	Makita adaptor suits 6807 [201129]
	**ADM31DG2**	Makita adaptor suits 6831, 6842, BFR440RFE, BFR540RFE, BFR550RFE [201130]
	**MIAG2**	Milwaukee adaptor suits DWSE4000Q, TKSE2500Q [105597]
	**ADBG2**	Ramset adaptor suits SD4000, SD2000 [201119]
Decking Clip		
	**PDECKNC-RC**	Decking clip set for screw and space setting 3 mm & 5 mm (Suits PRO250 and PRO300 only)
Nose Pieces		
	**NPA2G2**	50 mm Nose piece to suit PRO200 Attachment
	**PNOSECLIP**	Noseclip to suit PRO250, PRO300 attachments

Replacement Parts and Accessories

Replacement Parts	Model No.	Description
	**BITKEY**	Bit release key for Quik Drive attachments
	**G2HANDLE**	Extension replacement handle, G2 Series
	**PFEEDPAWL**	Feed pawl, for PRO250, PRO300, PROPH attachments
	PFEEDPAWLTL	Feed pawl, twist lock for PROHSD, SDS, PRO200 attachments
	**QDLEAFSPRING**	Leafspring, PROHSD attachments
	QDLEAFSPRING2	Leafspring, PROPH attachments
Mandrels		
	PMANDREL65	Mandrel for PRO200, PROPH attachments 160 mm long
	PMANDREL75	Mandrel for PRO250, PRO300, PROHSD attachments 190 mm long
	PMANDRELEXTG2	Mandrel for QDEXTG2 extension 515 mm long
Driver Bits		
	**BIT2P-RC10**	#2 Phillips drive bit (10 Pack)
	BIT2S-RC10	#2 Square drive bit (10 Pack)
	**BIT2SU-RC10**	#2 Square undersize drive bit (10 Pack)
	**BIT3S-RC10**	#3 Square drive bit (10 Pack)
	BIT3SU-RC10	#3 Square undersize drive bit (10 Pack)
10 pack	**BITTX20-RC10**	T-20 6-lobe drive bit (10 Pack)
	**BITTX25-RC10**	T-25 6-lobe drive bit (10 Pack)
	**QRP2-50**	#2 Phillips drive bit (50 Pack)
	QRS2-50	#2 Square drive bit (50 Pack)
	QRSU2-50	#2 Square undersize drive bit (50 Pack)
50 pack	**QRS3-50**	#3 Square drive bit (50 Pack)
	**QRSU3-50**	#3 Square undersize drive bit (50 Pack)
Extensions		
	**QDEXTG2**	Extension, 515 mm, G2 series (Standard)

Collated Screws for the Quik Drive® System

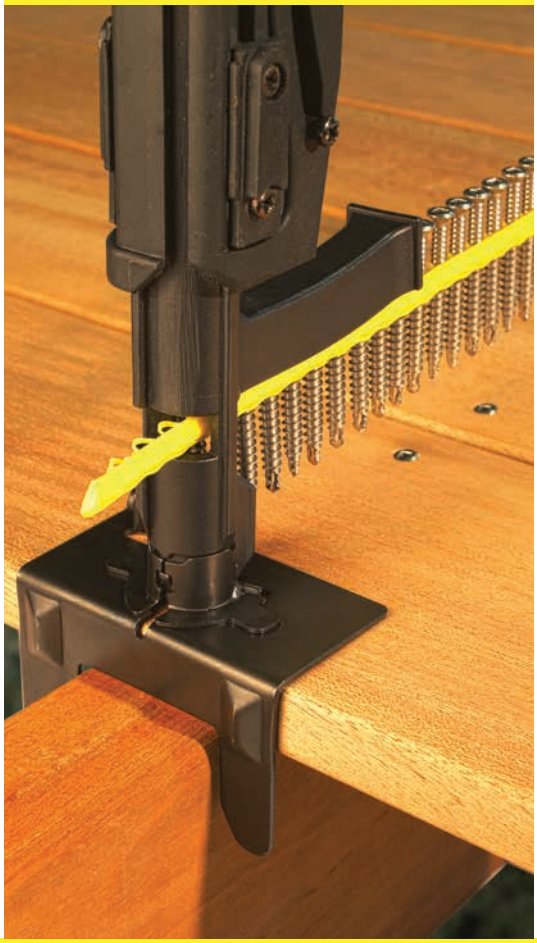
Product Index

Sometimes you need a fastener that does more. Maybe you're looking for higher loads or additional corrosion resistance, or perhaps an installation method that saves time on a repetitive application. Whatever it is, you are no longer looking for just a fastener, what you are really looking for is a solution.

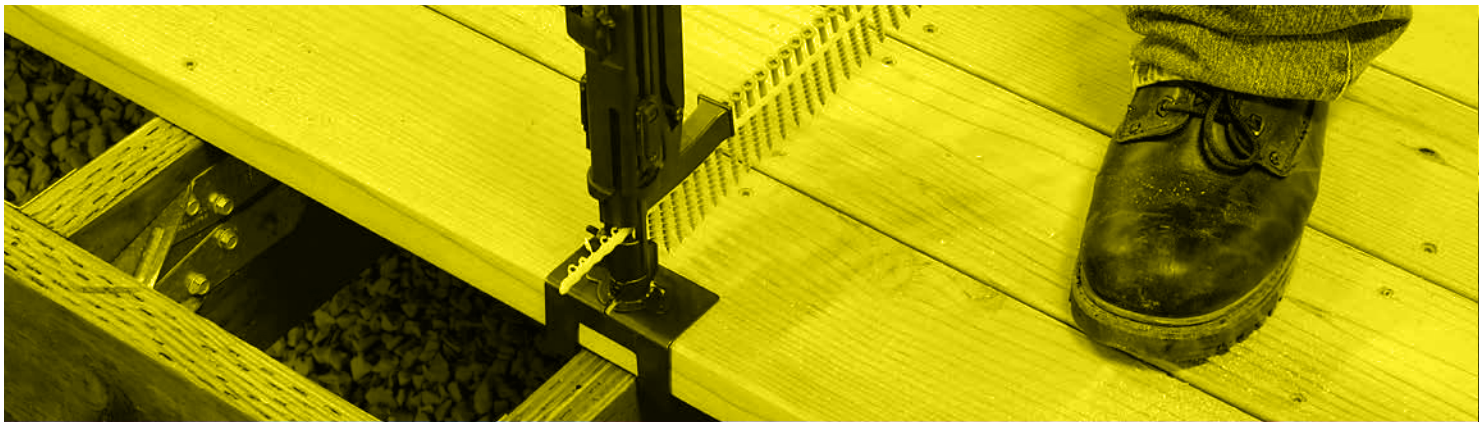
We have the widest range of solutions of any collated screw driving system on the market. You'll be surprised by how many different collated fasteners we have engineered to meet best quality, for a better product, and better finish.

Doing the job right doesn't have to take more time. Rather than installing individual screws, or other more complicated fastening options, Quik Drive operators can work faster, in most cases from an ergonomic standing position. When time is money, Quik Drive is the faster fastening solution.

Look for the yellow strip. Your guarantee of quality and performance from **Genuine Quik Drive Fasteners**.



Deck·Drive™ DSV SOFTWOOD-TO-SOFTWOOD Screw



The DSV screw is a powerful fastening solution for preservative-treated decking applications. With its under-head nibs and fast-start tip, the DSV is ideally suited to be driven and countersunk into today's timber deck boards. The shank is designed to withstand the swelling and shrinkage that is common with fast-growth timber.

Features

- Rimmed flat-head with nibs countersinks easily
- No predrilling required
- Low-torque, special upper thread design increases deck board pulldown
- Quik Guard® coating provides corrosion resistance for exterior and certain preservative-treated timber applications
- Tan colour blends in with most timber
- Fast-start hi-lo tip easily pierces preservative-treated and other softwood deck boards

Application

- Preservative-treated softwood decking and exterior softwood-to-softwood joist
- Maximum recommended board thickness: 50 mm screw — 20 mm; 65 mm screw — 25 mm; 75 mm screw — 30 mm

Finish

- Quik Guard® Coating

Corrosion Resistance Level
MEDIUM

This screw is also available loose for hand-drive installation. *See page 144 for details.*

Deep, 6-lobe recess reduces cam-out, making driving easier

Rimmed flat-head with nibs countersinks easily

Fast-start hi-lo tip easily pierces preservative-treated and other softwood deck boards

Scan this QR code to watch how to fasten pressure treated decking using Deck-Drive™ DSV Wood Screw.

https://youtu.be/f1LsBxE5Bi8

Please note: DSV is only available in tan colour.

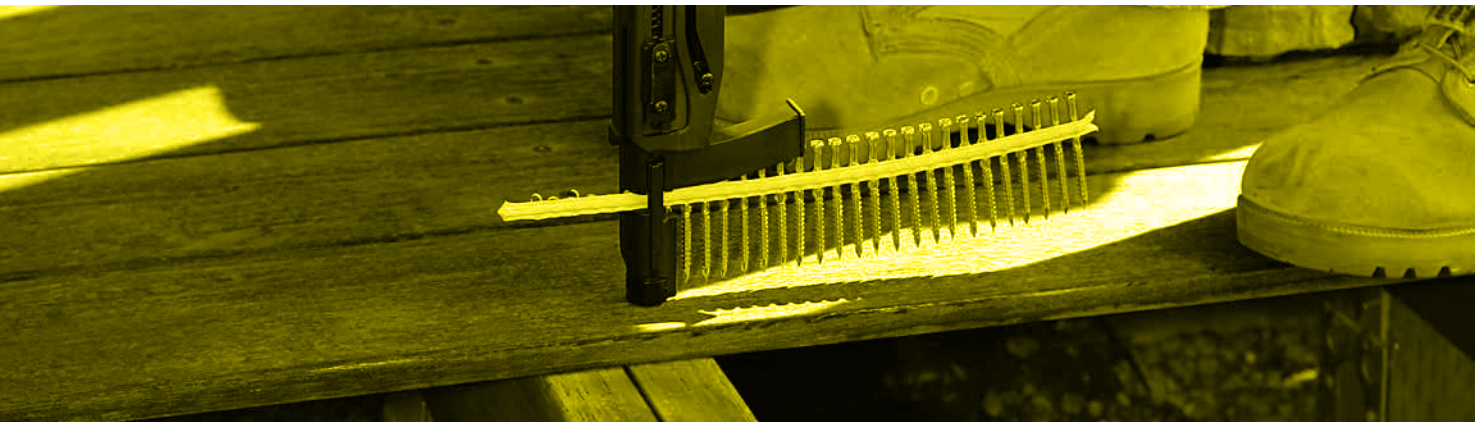
10 Gauge Softwood-to-Softwood Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
DSVT2S	4.9mm	50mm	Coarse Threads	Sharp Point	1,500	6-lobe T-25	BITTX25-RC10	—	✓	✓
DSVT212S		65mm			1,000					
DSVT3S		75mm							—	

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Deck·Drive™ DHW HARDWOOD-TO-SOFTWOOD Screw



The DHW is a premium decking fastener designed for no predrilling in hardwood decking applications. The winged design and hardwood drill point virtually eliminates splitting of timber without predrilling in the hardest timber applications.

Features

- Compact head for countersunk finish and discreet appearance
- Designed to penetrate the hardest timber without predrilling
- Wings on the shaft counter-bore hard timber to allow the head to countersink for clean look
- Available in Class 3 Galvanised or for additional corrosion protection 305 Stainless Steel

Application

- Hardwood decking and exterior hardwood-to-softwood joist
- Maximum recommended board thickness 20 mm

Finish

- Class 3 Galvanised (DHW60SA)

Corrosion Resistance Level MEDIUM

- 305 Stainless Steel (SSDHW60SA)

Corrosion Resistance Level HIGH

This screw is also available loose for hand-drive installation. *See page 146 for details.*

PLEASE NOTE: Refer to pages 19–26 for use of galvanised decking fasteners.

Compact head countersinks easily.

Winged design easily bores out hardwood to allow head to countersink perfectly.

Hardwood drill point requires no predrilling.

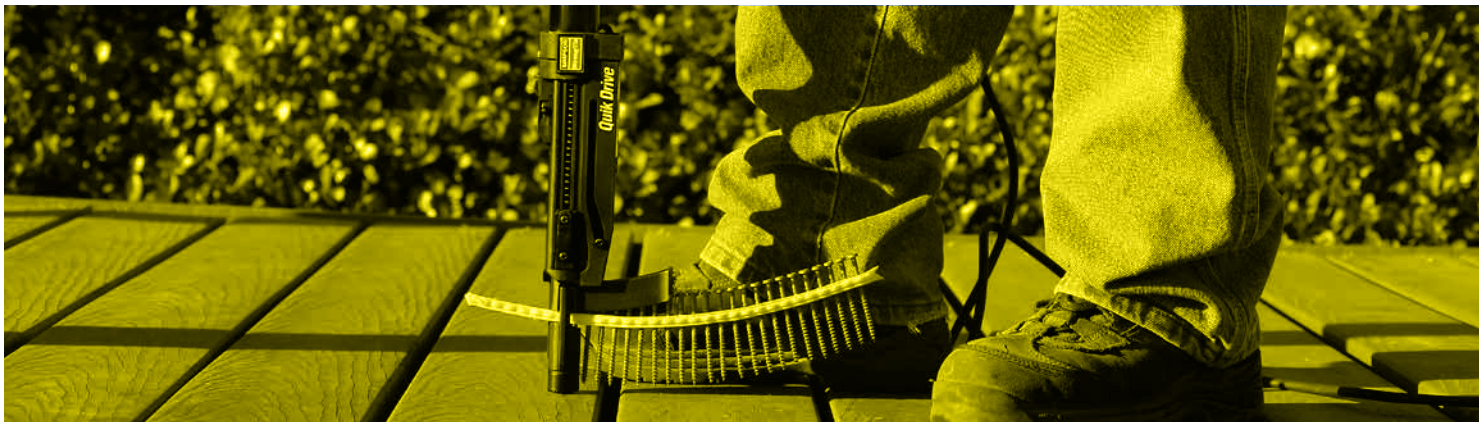
10 Gauge Hardwood-to-Softwood Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
DHWG60SA	4.9mm	60mm	Coarse Threads	Hardwood Drill Point	1,000	#2 Undersize Square Drive	BIT2SU-RC10	–	✓	✓
SSDHW60SA						#2 Square Drive	BIT2S-RC10			

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Deck·Drive™ DHSD HARDWOOD-TO-HARDWOOD Screw



The DHSD Hardwood-to-Hardwood screw is ideal for hardwood decking applications and is specifically designed to penetrate the hardest timber with ease. The unique drill point virtually eliminates splitting all without the need of predrilling. The raised compact head delivers a professional finish for a decorative style deck.

Features

- Raised countersinking head
- Unique ribbed shank provides greater strength and holding power
- Design virtually eliminates splitting of hardwood decking
- No predrilling required in hardwood joists

Application

- Hardwood to hardwood decking applications
- Maximum recommended board thickness:
  50 mm screw — 20 mm; 60 mm screw — 25 mm

Finish

- 305 Stainless Steel

Corrosion Resistance Level
HIGH

This screw is also available loose for hand-drive installation. *See page 147 for details.*

Raised compact head
for a decorative finish

Ribbed shank provides greater holding power

Hardwood drill point
virtually eliminates splitting and the need for predrilling

10 Gauge Hardwood-to-Hardwood Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
SSDHSD50S	4.9mm	50mm	Coarse Threads	Hardwood Drill Point	1,000	#2 Square Drive	BIT2S-RC10	—	✓	✓
SSDHSD60S		60mm								

Deck·Drive™ BFHSD BI-METAL Screw

The BFHSD Bi-Metal screw is designed for timber to steel joist (1.2–2.4 mm steel thickness) applications. The winged design cuts a clearance hole and avoids sheet ride. The Bi-metal design consists of 316 stainless steel and a carbon steel tip which is perfect for steel joist applications without compromising on corrosion resistance.

Features

- Drives easily through 1.2–2.4 mm steel without predrilling
- 316 Stainless steel for severe corrosion resistance
- Winged design avoids sheet ride
- Zinc coating to avoid dissimilar metal corrosion

Application

- Timber-to-steel decking
- Maximum recommended board thickness 25 mm
- Recommended steel thickness 1.2–2.4 mm

Finish

- 316 Stainless Steel with carbon steel tip

Corrosion Resistance Level
SEVERE

This screw is also available loose for hand-drive installation. *See page 148 for details.*

Ribbed flat head for countersink finish

Winged design easily bores out timber to allow head to countersink perfectly

#2 Drill point design easily drills into 1.2–2.4 mm steel without the need for predrilling

10 Gauge Timber-to-Steel Bi-Metal Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
SSBFHSD2SA	4.9mm	50mm	16 TPI	#2 Drill Point	1,000	#2 Square Drive	BIT2S-RC10	–	✓	✓

Deck-Drive™ DCU COMPOSITE-TO-TIMBER Screw

The Deck-Drive™ DCU Composite screw is engineered to provide beautiful fastening results for all types of composite decking while also offering greater ease of installation, a clean finish and superb corrosion resistance.

Deck-Drive DCU Composite decking screws are available in carbon steel with our Quik Guard® coating. For superior corrosion resistance in marine or high-exposure environments, choose the appropriate stainless-steel DCU screw (Type 316). DCU screws provide a clean finish because of their special head design and are available in 4 colours.

Features

- Tri-lobe thread design
- Double-cut point penetrates composite-decking with ease for faster starts
- Cap-head prevents mushrooming and material from rising up above the deck for a smoother, clean looking installation
- Available in 4 colours

Application

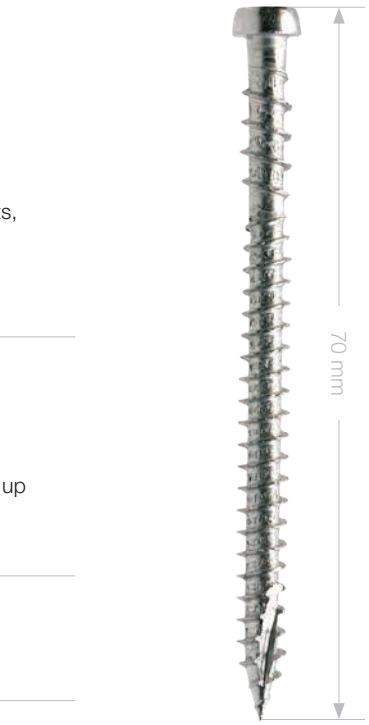
- Composite-to-timber decking
- Maximum recommended board thickness 25 mm

Finish

- Quik Guard® coating
- 316 Stainless Steel (DCU234S316)

Corrosion Resistance Level
MEDIUM
Corrosion Resistance Level
SEVERE

This screw is also available loose for hand-drive installation.
See page 149 for details.



Cap head prevents mushrooming for a cleaner finish

Tri-lobe thread design reduces cracking or splitting in the composite board during driving, as debris is automatically extracted

Double cut point penetrates even the hardest types of composite decking with ease for faster starts

10 Gauge Composite-to-Timber Screw

Bit(s) included with every box of screws

Model No.	Colour	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 250	PRO 300
DCU234SBR01	Brown	4.9mm	70mm	Tri-lobe Threads	Double-Cut	1000	T-20 6-Lobe	BITTX20-RC10	–	✓
DCU234SGR	Grey									
DCU234SRD	Red									
DCU234STN03	Tan									
DCU234S316	–									

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Deck·Drive™ DCSD COMPOSITE-TO-STEEL Screw

The DCSD Composite-to-steel screw is designed to easily drive through composite decking into 0.8–2.4 mm steel. The special cap head provides a clean, less noticeable installation and is available in 4 colours to suit composite timber.

Features

- Drives easily through 0.8–2.4 mm steel without predrilling
- Compact head provides a clean, finished deck surface with no mushrooming
- Available in 4 colours

Application

- Composite-to-steel decking
- Recommended steel thickness 0.8–2.4 mm
- Maximum recommended board thickness 25 mm

Finish

- Quik Guard® coating

Corrosion Resistance Level
MEDIUM

This screw is also available loose for hand-drive installation. *See page 150 for details.*

Cap head for a cleaner less noticeable fixing

Inverted upper threads clear excess material to ensure the screw is seated properly and consistently

Drill flute ejects composite material for easier installation

10 Gauge Composite-to-Steel Screw

Bit(s) included with every box of screws

Model No.	Colour	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 250	PRO 300
DCSD238SBR01	Brown	4.9mm	60mm	16 TPI	#2 Drill Point	1000	#2 Undersize Square Drive	BIT2SU-RC10	✓	✓
DCSD238SGR01	Grey									
DCSD238SRD01	Red									
DCSD238STN02	Tan									

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Strong-Drive® WSNTL SUBFLOOR Screw

WSNTL Subfloor screws are an ideal solution for fastening subfloor, bracing, sill plate and stair applications. The WSNTL screws reduces the gaps between the joist and subfloor that cause floor squeaks due to its superior holding power.

Features

- Twin Lead thread for enhanced holding power and faster driving
- Sharp point for fast starts saving time on the worksite
- Superior holding power compared to 3.75 mm nails

Application

- Subfloor and sheathing to timber
- Maximum recommended board thickness:
  45 mm and 50 mm screw — 20 mm;
  65 mm screw — 25 mm; 75 mm screw — 30 mm

Finish

- Yellow Zinc

Corrosion Resistance Level
LOW

Complies with AS 1860.2
WSNTLA2SA10,
WSNTLA2LSA-2500

Twin lead thread for enhanced holding power and faster driving

Sharp Point for fast starts saving time on the worksite

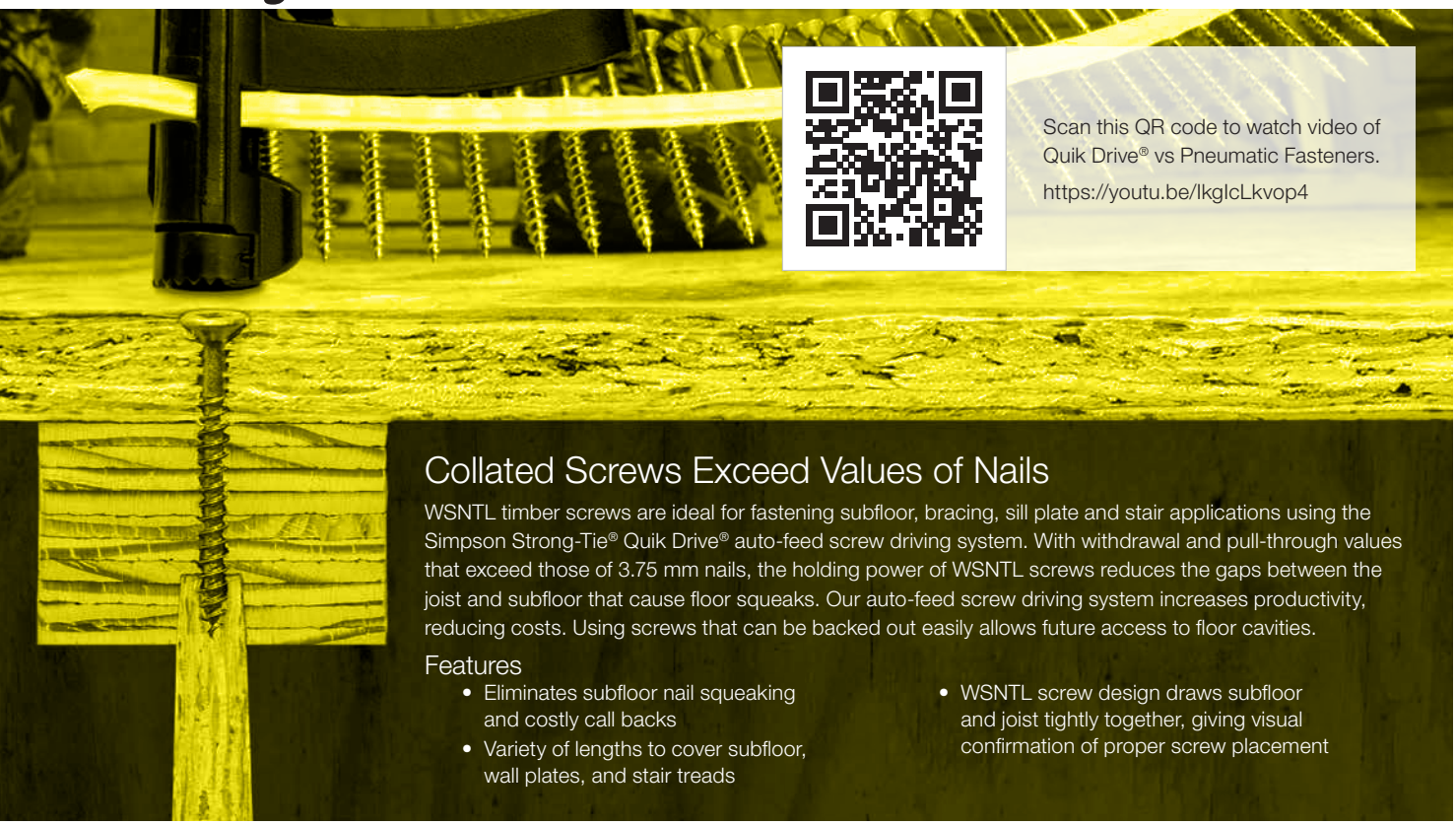
Scan this QR code to watch Quik Drive® Auto-Feed Screw Driving System for Subfloor Fastening.
https://youtu.be/G_Zmv5al8vM

8 and 10 Gauge Subfloor Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
WSNTLA134SA	4.5mm	45mm	Twin Lead Threads	Sharp Point	2000	#3 Square Drive	BIT3S-RC10	✓	✓	✓
WSNTL2LSA		50mm						–		
WSNTLA2SA10	4.9mm	50mm								
WSNTLA2LSA-2500					2500					
WSNTL212SA	4.5mm	65mm			1500					
WSNTL3S		75mm			1000				–	

Strong-Drive® WSNTL SUBFLOOR Screw



Scan this QR code to watch video of Quik Drive® vs Pneumatic Fasteners.

https://youtu.be/lkglcLkvop4

Collated Screws Exceed Values of Nails

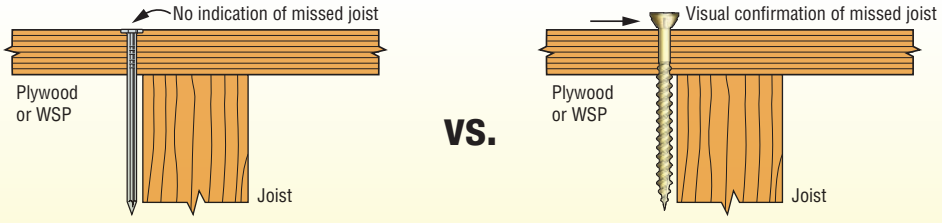
WSNTL timber screws are ideal for fastening subfloor, bracing, sill plate and stair applications using the Simpson Strong-Tie® Quik Drive® auto-feed screw driving system. With withdrawal and pull-through values that exceed those of 3.75 mm nails, the holding power of WSNTL screws reduces the gaps between the joist and subfloor that cause floor squeaks. Our auto-feed screw driving system increases productivity, reducing costs. Using screws that can be backed out easily allows future access to floor cavities.

Features

- Eliminates subfloor nail squeaking and costly call backs
- Variety of lengths to cover subfloor, wall plates, and stair treads
- WSNTL screw design draws subfloor and joist tightly together, giving visual confirmation of proper screw placement

See the Difference on the Jobsite

The WSNTL timber screw gives visual confirmation of a secure joist connection by countersinking, while "shot-in" pneumatic fasteners look the same whether or not they hit the joist. Missed fasteners could result in floor flexing that can cause squeaking in other parts of the structure and reduced diaphragm load capacity.

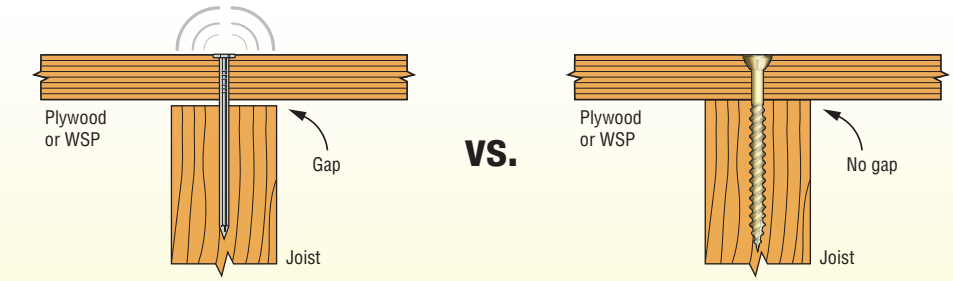


Subfloor Fastened with Pneumatic Fasteners

Subfloor Fastened with WSNTL Wood Screws

Hear the Difference over Time

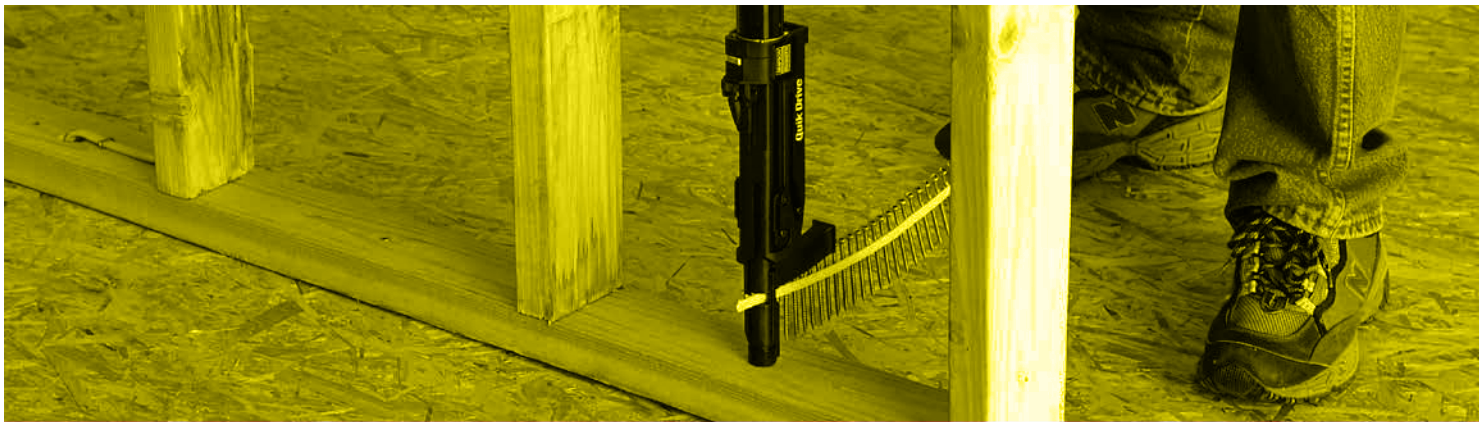
Squeaking of newly installed floors can result in the expenses (in travel, labour, materials) of callbacks and possibly a damaged reputation. Fastening subflooring with WSNTL timber screws rather than pneumatic fasteners provides the power necessary to pull together joists and plywood, eliminating any gaps, holding the materials firm and therefore reducing squeaks.



Subfloor Fastened with Pneumatic Fasteners
Fastening with pneumatic fasteners can leave gaps or allow gaps to develop over time. These gaps cause the subfloor to ride up and down on the pneumatic fastener's shank, which leads to squeaks.

Subfloor Fastened with WSNTL Wood Screws
Subfloor fastened with screws is pulled down tight against the joist, and kept tight with no gaps to cause squeaking.

WSNTLG Timber Screw



WSNTLG timber screws are ideal for fastening subfloor, cladding, sill plates, stair treads and general exterior timber-to-timber applications using the Simpson Strong-Tie® Quik Drive® auto-feed screw driving system. The holding power of WSNTL screws reduces the gaps between the joist and subfloor that cause floor squeaks.

Features

- Flat head with nibs for easy countersinking
- #3 square drive (driver bit in each box)
- Twin lead
- Sharp point
- Curved collation

Application

- Exterior timber-to-timber
- Maximum recommended board thickness:
  50 mm screw — 20 mm; 65 mm screw — 25 mm;
  75 mm screw — 30 mm

Finish

- Class 3 Mechanically Galvanised

Corrosion Resistance Level
MEDIUM

Flat head with nibs
for easy countersinking

Twin lead for better clamping force

Sharp point for easy starts into timber

8 Gauge Timber Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
WSNTLG2SA	4.5mm	50mm	Coarse Threads	Sharp Point	2000	#3 Undersize Square Drive	BIT3SU-RC10	✓	✓	✓
WSNTLG212S		65mm			1500			–		
WSNTLG3S		75mm			1000				–	

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

WSC Timber Screw

The WSC timber screw is ideal for timber to timber applications with its coarse thread and flat head with nibs. The flat head with nibs design allows for easy countersinking for a clean flush finish.

Features

- Flat head with nibs for easy countersinking
- #2 Square drive (driver bit included in box)
- Coarse threads
- Type-17 point

Application

- Timber-to-timber
- Maximum recommended board thickness:
  32 mm screw — 13 mm; 50 mm screw — 20 mm

Finish

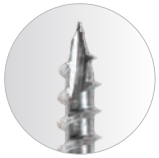
- Yellow Zinc (WSC114SA)

Corrosion Resistance Level
LOW

- 305 Stainless Steel (SSWSC2BSA10)

Corrosion Resistance Level
HIGH

Flat head with nibs
for easy countersinking



Type 17 point ideal for timber applications

8 and 10 Gauge Timber Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
WSC114SA	4.2mm	32mm	Coarse Threads	Type 17	2500	#2 Square Drive	BIT2S-RC10	✓	–	–
SSWSC2BSA10	4.9mm	50mm			2000	#3 Square Drive	BIT3S-RC10	–	✓	✓

CBSDG Timber-to-Steel Screw

CBSDG Cement Sheet Screws are ideal for fixing cement sheeting-to-steel joists. The CBSDG winged self-drilling screw requires no predrilling, making them easier and faster to install than standard winged self-drilling screws.

Features

- Ribbed flat head with nibs for easy countersinking
- #2 undersized square drive (driver bit in each box; replacement bit model BIT2SU)
- #2 drill point with wings

Application

- Sheathing to cold-formed steel
- Maximum recommended board thickness:
  25 mm screw — 5 mm; 32 mm screw — 12 mm;
  42 mm screw — 20 mm; 55 mm screw — 30 mm;
  75 mm screw — 50 mm
- Recommended steel thickness; 0.8–2.4 mm CBSDG Series, 1.2–3 mm CBSDGL Series

Finish

- Class 3 Galvanised

Corrosion Resistance Level
MEDIUM

Ribbed flat head with nibs for easy countersinking

Wings to cut clearance hole means no sheet ride

8 and 10 Gauge Timber-to-Steel Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
CBSDG1SA	4.2mm	25mm	18TPI	#2 Drill	2500	#2 Undersize Square Drive	BIT2SU-RC10	✓	–	–
CBSDG114SA		32mm			1500					
CBSDG158SA		42mm							✓	✓
CBSDGL158SA	4.9mm	42mm						–		
CBSDGL214SA		55mm			1000					
CBSDGL3SA		75mm								

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

CBSDHG Compressed Cement Sheet-to-Steel Screw

CBSDHG Compressed Cement Sheet Screw are ideal for fixing compressed fibre cement sheeting-to-steel joists. The CBSDHG winged self-drilling screw requires no predrilling, making them easier and faster to install than standard winged self-drilling screws.

Features

- Aggressive countersinking head for easy embedment
- #3 Square drive for ease of drive and torque — driver bits included
- Reinforced wings to cut clearance hole — no sheet ride
- Drill Point no predrilling required (1.2–3 mm steel)

Application

- Cement sheeting/cladding-to-steel
- Maximum recommended board thickness:
  42 mm screw — 20 mm; 55 mm screw — 30 mm
- Recommended steel thickness 1.2–3 mm

Finish

- Class 3 Galvanised

Corrosion Resistance Level
MEDIUM

Countersinking head
for clean finish

Wings to cut clearance hole means no sheet ride

10 Gauge Compressed Cement Sheet-to-Steel Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
CBSDHG158SA	4.9mm	42mm	16TPI	#2 Drill	1500	#3 square	BIT3S-RC10	—	✓	✓
CBSDHG214SA		55mm			1000					

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Timber-to-Steel Screw

The PPSD pilot point screw is ideal for timber to steel applications. Engineered for steel framing up to 1.6 mm the fastener design prevents timber and plywood materials (up to 19 mm) from riding up the threads. The flat head with nibs delivers a clean flush finish.

Features

- Flat head with nibs
- #3 square drive (driver bit in each box)
- Fine threads
- Pilot point

Application

- Subfloor/sheathing to cold-formed steel
- Maximum recommended board thickness 19 mm
- Recommended steel thickness 0.8–1.6 mm

Finish

- Yellow Zinc

Corrosion Resistance Level
LOW

Flat head with nibs for perfect countersink finish

Pilot Point ideal for subfloor to cold form steel

8 Gauge Timber-to-Steel Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
PPSD11516SA	4.2mm	48mm	18 TPI	#2 Drill	2000	#3 Square	BIT3S-RC10	✓	✓	✓

DWFSD Drywall-to-CFS Screw

The DWFSD fastener with its fine thread and #2 drill point is ideal for drywall to cold-formed-steel applications. Available in lengths from 32 mm up to 60 mm to suit a diverse range of installation applications.

Features

- Bugle head
- #2 Phillips (driver bit in each box)
- Fine threads
- #2 drill point

Application

- Drywall to cold-formed steel
- Maximum recommended board thickness:
  32 mm screw — 15 mm; 42 mm screw — 30 mm;
  60 mm screw — 45 mm
- Recommended steel thickness 0.8–1.6 mm

Finish

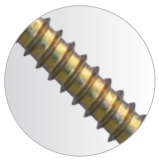
- Class 3 N2000® Galvanised (DWFSDG114PS)

Corrosion Resistance Level
MEDIUM

- Yellow Zinc

Corrosion Resistance Level
LOW

Bugle head for countersink finish in drywall



Fine thread perfect for embedment into cold form steel

6 and 8 Gauge Drywall-to-CFS Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
DWFSDG114PS	3.5mm	32mm	20 TPI	#2 Drill	2500	#2 Phillips	BIT2P-RC10	✓	–	–
DWFZSD114PSA										
DWFZSD158PSA		42mm								
DWFZSD238PSA	4.2mm	60mm			1500			–	✓	✓

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Collated Screws for the Quik Drive® System

DWFZ Drywall-to-CFS Screw

The DWFZ is designed for drywall to light gauge steel applications with a sharp point for fast starts, fine thread for steel embedment and a bugle head to cleanly pull down drywall to steel framing.

Features

- Bugle head
- #2 Phillips — BIT2P
- Fine thread
- Sharp point

Application

- Drywall-to-light gauge steel
- Maximum recommended board thickness:
  25 mm screw — 10 mm; 32 mm screw — 16 mm;
  42 mm screw — 45 mm
- Recommended steel thickness 0.5–0.75 mm

Finish

- Yellow Zinc

Corrosion Resistance Level
LOW

Bugle head for countersink finish in drywall

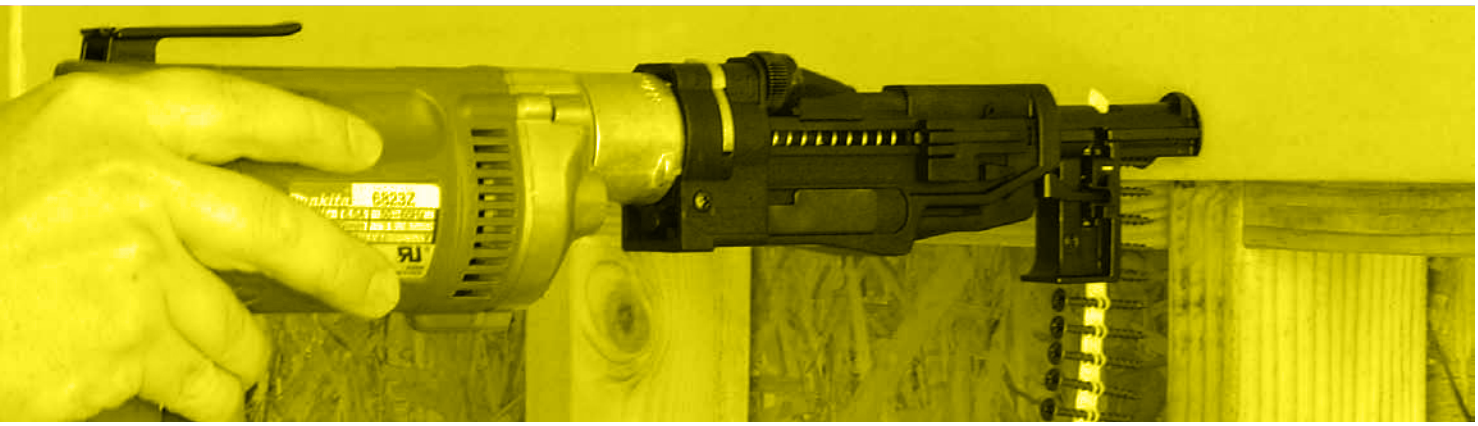
Fine thread ideal for drywall to cold form steel applications

6 Gauge Drywall-to-CFS Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
DWFZ1PSA	3.5mm	25mm	Fine Threads	Sharp	2500	#2 Phillips	BIT2P-RC10	✓	–	–
DWFZ114PSA		32mm								
DWFZ158PSA		42mm								

DWCZ Drywall-to-Timber Screw



The DWCZ screws design is ideal for drywall to timber applications with a bugle head to cleanly pull down the drywall to the timber and a sharp point for easy starts.

Features

- Bugle head
- #2 Phillips — BIT2P
- Coarse thread
- Sharp point

Application

- Drywall-to-timber
- Maximum recommended board thickness:
  32 mm screw — 16 mm; 42 mm screw — 45 mm

Finish

- Yellow Zinc

Corrosion Resistance Level
LOW

Bugle head for countersink finish in drywall

Coarse thread ideal for drywall to timber applications

6 Gauge Drywall-to-Timber Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
DWCZ114PSA	3.5mm	32mm	Coarse Threads	Sharp	2500	#2 Phillips	BIT2P-RC10	✓	–	–
DWCZ158PSA		42mm								

Strong-Drive® FPHSD FRAMING-TO-CFS Screw

The FPHSD is a self-drilling screw that is ideal for fastening cold-formed steel framing and sheet steel cladding to cold-formed steel.

Flat pan head for lower profile finish

Self drilling #3 drill point

Features

- Flat pan head
- #3 square drive (driver bit included in box)
- #3 Drill point
- Straight collation

Application

- Cold form steel framing and sheet steel sheathing-to-cold form steel
- Maximum steel thickness 0.8–3 mm

Finish

- Class 3 Galvanised, painted Surf Mist®

Corrosion Resistance Level
MEDIUM

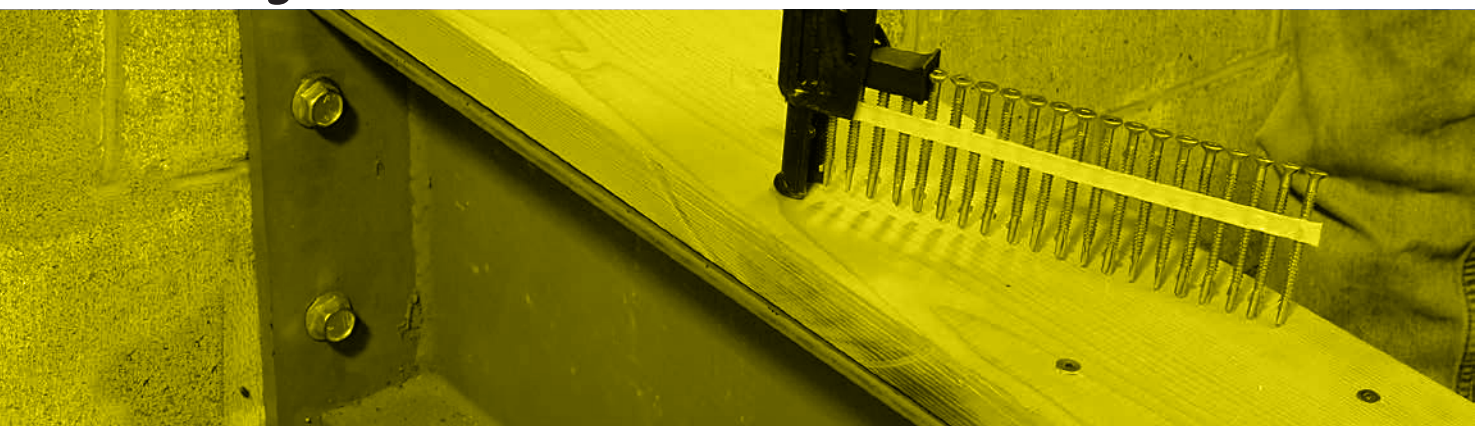
10 Gauge Framing-to-CFS Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PROPH
FPHSDG34SSFMIST	4.9mm	19mm	16 TPI	#3 Drill	2500	#3 Square	BIT3S-RC10	✓

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Strong-Drive® TB TIMBER-TO-STEEL Screw



The TB Timber-to-steel screw is a heavy duty 14 gauge fastener designed for timber to steel connection. The wing design creates a clearance hole in the timber resulting in no sheet ride.

Features

- Flat head with nibs for easy countersinking
- #3 square drive (driver bit included in box)
- #4 drill point with wings

Application

- Timber to hot-rolled steel
- Maximum recommended board thickness:
  45 mm screw — 20 mm; 60 mm screw — 30 mm;
  75 mm screw — 50 mm
- Recommended steel thickness 1.2–8 mm

Finish

- Class 3 Galvanised

Corrosion Resistance Level
MEDIUM

Flat head with nibs
for easy countersinking

Wing design to create clearance hole means no sheet ride

14 Gauge Timber-to-Steel Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	HSD60	HSD75
TBG1445SA	6.2mm	45mm	14 TPI	#4 Drill	1000	#3 Undersize Square Drive	BIT3SU-RC10	✓	–
TBG1460SA		60mm			750				✓
TBG1475SA		75mm						–	

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

MTHG Underlayment Screw

The MTHG underlay screw is designed for fast and secure underlayment to subfloor installations. Unlike nails, the MTHG Underlayment screw has an intricate thread pattern designed to prevent squeaking by holding underlayment tight to the subfloor and thus preventing pull-out. Its compact trim-head allows for a flush surface and prevents floor coverings from settling in countersink recesses.

Features

- Trim head with nibs for easy countersinking
- #2 square drive (driver bit in each box; replacement bit model BIT2S)
- High-low threads
- Sharp point
- Curved collation

Application

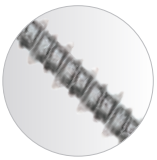
- Timber underlay to timber and steel
- Maximum recommended board thickness 9 mm
- Recommended steel thickness 0.55–0.75 mm

Finish

- Class 3 Galvanised

Corrosion Resistance Level
MEDIUM

Trim head with nibs for easy countersinking



High-Low threads for secure holding down of underlayment to timber and steel frame

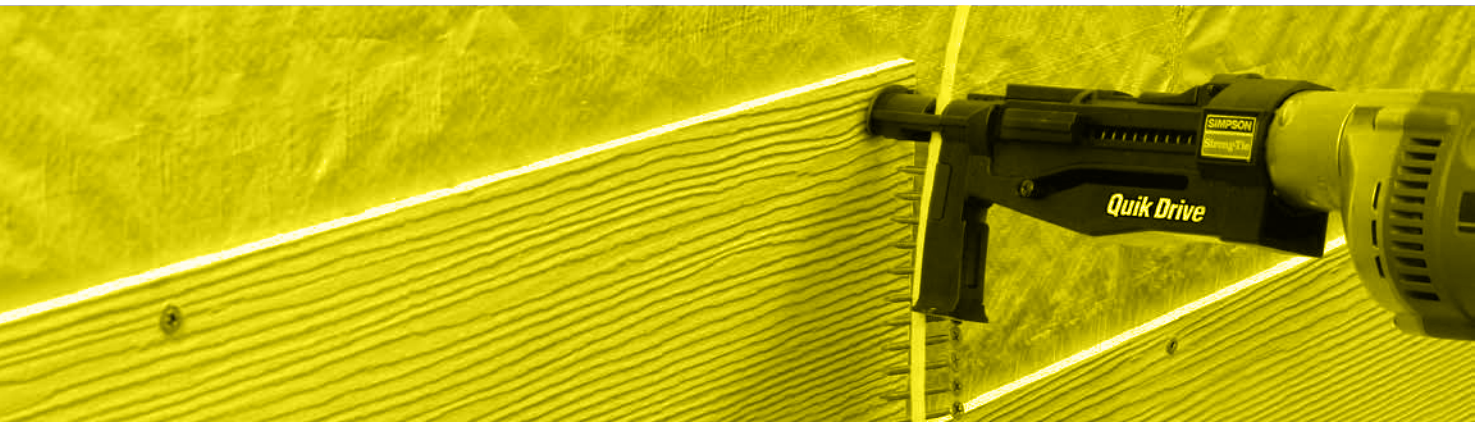
7 Gauge Underlayment Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
MTHG114SA	4.0mm	32mm	Hi-Lo Threads	Sharp	2500	#2 Square	BIT2S-RC10	✓	–	–

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

WSCBG Underlayment Screw



The WSCBGHLA114SA is designed for cement board-to-steel (0.55–0.75 mm) applications with its sharp point and high-low thread design. Whereas the WSCBGA158SA with its Type 17 point and coarse thread is designed for cement board-to-timber applications.

Features

- Ribbed wafer head with nibs for easier countersinking
- Broad head for greater pulldown

Application

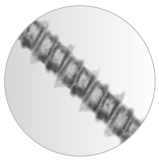
- Cement board-to-timber and steel
- Maximum recommended board thickness:
  32 mm screw — 12 mm; 42 mm screw — 18 mm
- Recommended steel thickness 0.55–0.75 mm

Finish

- Class 3 Galvanised

Corrosion Resistance Level
MEDIUM

Broad head for greater pulldown



High-Low threads for secure holding down of underlayment to timber and steel frame (WSCBGHLA114SA)

Drill flute ejects composite material for easier installation

8 Gauge Underlayment Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
WSCBGHLA114SA	4.2mm	32mm	Hi-Lo Threads	Sharp	2000	#2 Undersize Square Drive	BIT2SU-RC10	✓	—	—
WSCBGA158SA	4.5mm	42mm	Coarse Threads	Type 17				—	✓	✓

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

Collated Screws for the Quik Drive® System

DTH Trim-Head Screw

The DTH trim-head timber screws are ideal for timber-to-timber applications that require a clean and less noticeable finish.

Features

- Trim head with nibs for easy countersinking (Nibs on Class 3 screws)
- Coarse threads
- Box threads (SSDTH2SA)

Application

- Finishing
- Millwork
- Trim

Finish

- Class 3 Mechanically Galvanised (DTHG2SA)
- Quik Guard© coating (DTHQ Series)
- 305 Stainless Steel (SSDTH2SA)

Corrosion Resistance Level
MEDIUM

Corrosion Resistance Level
HIGH

Trim head ideal for a less noticeable fixing

Box thread greatly reduces driving torque. (SSDTH2SA)

Type 17 point ideal for timber applications (Class 3 screws)

8 Gauge Trim-Head Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
DTHG2SA	4.2mm	50mm	Coarse Threads	Type 17	2000	#2 Undersize Square Drive	BIT2SU-RC10	✓	✓	✓
DTHQ212S		65mm			1500			–		
DTHQ3S		75mm			1000				–	
SSDTH2SA		50mm	Box Threads	Sharp	2000	#2 Square	BIT2S-RC10	✓		–

These coated fasteners possess a level of corrosion resistance that makes them suitable for use in some exterior and corrosive environments and with some preservative-treated timber. For applications in higher-exposure applications, consider Type-300 series stainless-steel fasteners for superior corrosion resistance. See pages 20–26 for additional important information before selecting a fastener for a specific application.

SS3DSC Bugle-Head Timber Screw

The SSDSC are perfect for decking applications where 65 mm or 75 mm stainless steel fasteners are required. The bugle head provides a clean countersunk finish whilst the Type 17 point is perfect for timber to timber decking applications.

Features

- Coarse thread
- Type 17 point
- Bugle head

Application

- Timber decking to timber

Finish

- 305 Stainless Steel

Corrosion Resistance Level
HIGH

- 316 Stainless Steel

Corrosion Resistance Level
SEVERE

Bugle head for clean, flush, countersunk finish

Option of **305** or **316 Stainless Steel**

10 Gauge Bugle-Head Timber Screw

Bit(s) included with every box of screws

Model No.	Diameter	Length	Thread	Point	Box Qty	Drive Size	Replacement Bit	PRO 200	PRO 250	PRO 300
SS3DSC212BS	4.9mm	65mm	Coarse Threads	Type 17	1500	#3 Square	BIT3S-RC10	–	✓	✓
316 SS3DSC212BS316										
SS3DSC3BS		75mm			1000				–	
316 SS3DSC3BS316										

Predrilling and countersinking may be required

Appendix

Index

To keep you as informed as possible, the topics on the previous page are included in this Appendix.

Adhesive (Bonded) Anchors in Accordance with EOTA Technical Report TR 029

Designer should reference the latest TR029 for a complete description of all variables and calculations

1. Tension Resistance

The Design Tension Load, (N_{Sd}), shall be less than the controlling (lowest) Design Resistance, $N_{Rd} = (N_{Rk}/\gamma_M)$, per the following table:

Failure Mode	Single Anchor	Anchor Group	
Steel	$N_{Sd} \le N_{Rk,s}/\gamma_{Ms}$	$N^h_{Sd} \le N_{Rk,s}/\gamma_{Ms}$	
Combined Pull-out and Concrete Cone	$N_{Sd} \le N_{Rk,p}/\gamma_{Mp}$	$N^h_{Sd} \le N_{Rk,p}/\gamma_{Mp}$	
Concrete Cone	$N_{Sd} \le N_{Rk,c}/\gamma_{Mc}$		$N^g_{Sd} \le N_{Rk,c}/\gamma_{Mc}$
Concrete Splitting	$N_{Sd} \le N_{Rk,sp}/\gamma_{Msp}$		$N^g_{Sd} \le N_{Rk,sp}/\gamma_{Msp}$

γ_M = the relevant material partial safety factor given in the product's ETA

A. Steel Resistance, $\mathbf{N_{Rk,s}}$ (given in the relevant ETA, or calculated based on the steel insert properties)

B. Combined Pull-out and Concrete Cone Resistance, $\mathbf{N_{Rk,p}}$,determined as follows:

$\mathbf{N_{Rk,p}}$ = $N_{0Rk,p}\,(A_{p,N}/A^0_{p,N})\,\Psi_{s,Np}\,\Psi_{g,Np}\,\Psi_{ec,Np}\,\Psi_{re,Np}$

$N^0_{Rk,p}$ = $\pi\, d\, h_{ef}\, \tau_{Rk}$

$A^0_{p,N}$ = influence area of an individual anchor with large spacing and edge distance at the concrete surface, idealizing the concrete cone as a pyramid with a base length equal to $s_{cr,Np}$

$A_{p,N}$ = actual area; it is limited by overlapping areas of adjoining anchors ($s \le s_{cr,Np}$) as well as by edges of the concrete member ($c \le c_{cr,Np}$)

$\Psi_{s,Np}$ - takes account of the disturbance of the distribution of stresses in the concrete due to edges of the concrete member

$\Psi_{g,Np}$ - takes account of the effect of the failure surface for anchor groups

$\Psi_{ec,Np}$ - takes account of a group effect when different tension loads are acting on the individual anchors of a group

$\Psi_{re,Np}$ - takes account of the effect of a reinforcement

C. Concrete Cone Resistance, $\mathbf{N_{Rk,c}}$, determined as follows:

$\mathbf{N_{Rk,c}}$ = $N^0_{Rk,c}\,(A_{c,N}/A^0_{c,N})\,\Psi_{s,N}\,\Psi_{re,N}\,\Psi_{ec,N}$

$N^0_{RK,c}$ = $k_1\,(f_{ck,cube})^{0.5}\,h_{ef}^{1.5}$
k1 = 7.2 for applications in cracked concrete
k1 = 10.1 for applications in non-cracked concrete

$A^0_{c,N}$ = influence area of an individual anchor with large spacing and edge distance at the concrete surface, idealizing the concrete cone as a pyramid with a base length equal to $s_{cr,N}$

$A_{c,N}$ = actual area; it is limited by overlapping areas of adjoining anchors ($s \le s_{cr,N}$) as well as by edges of the concrete member ($c \le c_{cr,N}$)

$\Psi_{s,N}$ = $[0.7 + 0.3(c/c_{cr,N})] \le 1$; takes account of the disturbance of the distribution of stresses in the concrete due to edges of the concrete member

$\Psi_{re,N}$ = $[0.5 + (h_{ef}/200)] \le 1$; shell spalling factor takes account of the effect of reinforcement

$\Psi_{ec,N}$ = $[1/(1 + 2e_N/s_{cr,N})] \le 1$; takes account of a group effect when different tension loads are acting on the individual anchors of a group, where e_N = eccentricity of the resulting tensile load acting on the tensioned anchors

D. Splitting resistance due to load, $\mathbf{N_{Rk,sp}}$, determined as follows:

$\mathbf{N_{Rk,sp}}$ = $N^0_{Rk,c}\,(A_{c,N}/A^0_{c,N})\,\Psi_{s,N}\,\Psi_{re,N}\,\Psi_{ec,N}\,\Psi_{h,sp}$
where $N^0_{Rk,c}$; $\Psi_{s,N}$; $\Psi_{re,N}$; $\Psi_{ec,N}$ are determined in part C. above

$A^0_{c,N}$ = influence area of an individual anchor with large spacing and edge distance at the concrete surface, idealizing the concrete cone as a pyramid with a base length equal to $s_{cr,sp}$

$A_{c,N}$ = actual area; it is limited by overlapping areas of adjoining anchors ($s \le s_{cr,sp}$) as well as by edges of the concrete member ($c \le c_{cr,sp}$)

$\Psi_{h,sp}$ = $(h/h_{min})^{2/3}$; factor to account for the influence of the actual member depth, h, on the splitting resistance for anchors according to current experience

$\mathbf{N_{Rk}}$ is the lesser of: $N_{Rk,s}$; $N_{Rk,p}$; $N_{Rk,c}$; $N_{Rk,sp}$
$\mathbf{N_{Rd}} = N_{Rk}/\gamma_M$

2. Shear Resistance

The Design Shear Load, (V_{Sd}), shall be less than the controlling (lowest) Design Resistance, $V_{Rd} = (V_{Rk}/\gamma_M)$, per the following table:

Failure Mode	Single Anchor	Anchor Group	
Steel Resistance, shear load without lever arm	$V_{Sd} \le V_{Rk,s}/\gamma_{Ms}$	$V^h_{Sd} \le V_{Rk,s}/\gamma_{Ms}$	
Steel Resistance, shear load with lever arm	$V_{Sd} \le V_{Rk,s}/\gamma_{Ms}$	$V^h_{Sd} \le V_{Rk,s}/\gamma_{Ms}$	
Concrete Pry-out Resistance	$V_{Sd} \le V_{Rk,cp}/\gamma_{Mc}$		$V^g_{Sd} \le V_{Rk,cp}/\gamma_{Mc}$
Concrete Edge Resistance	$V_{Sd} \le V_{Rk,c}/\gamma_{Mc}$		$V^g_{Sd} \le V_{Rk,c}/\gamma_{Mc}$

γ_M = the relevant material partial safety factor given in the product's ETA

A. Steel Resistance, $\mathbf{V_{Rk,s}}$ (given in the relevant ETA, or calculated based on the steel insert properties)

B. Concrete Pry-out Resistance, $\mathbf{V_{Rk,cp}}$, determined as follows:

$\mathbf{V_{Rk,cp}}$ = k multiplied by the lower of $N_{Rk,c}$ and $N_{Rk,p}$
k is taken from the relevant ETA report

C. Characteristic Concrete Edge Resistance, $\mathbf{V_{Rk,c}}$, determined as follows:

$\mathbf{V_{Rk,c}} = V^0_{Rk,c} (A_{c,V}/A^0_{c,V}) \Psi_{s,V} \Psi_{h,V} \Psi_{\alpha,V} \Psi_{ec,V} \Psi_{re,V}$

$V^0_{Rk,c} = k_1 d_{nom}^{\alpha} h_{ef}^{ß} (f_{ck,cube})^{0.5} c_1^{1.5}$
k_1 = 1.7 for applications in cracked concrete
k_1 = 2.4 for applications in non-cracked concrete
$\alpha = 0.1 (l_f / c_1)^{0.5}$
$ß = 0.1 (d_{nom} / c_1)^{0.2}$

$A^0_{c,V}$ = area of concrete cone of an individual anchor at the lateral concrete surface not affected by edges parallel to the assumed loading direction, member thickness or adjacent anchors, assuming the shape of the fracture area as a half pyramid with a height equal to c_1 and a base-length of 1.5 c_1 and 3 c_1

$A_{c,V}$ = actual area of concrete cone of anchorage at the lateral concrete surface. It is limited by the overlapping concrete cones of adjoining anchors ($s \le 3\ c_1$) as well as by edges parallel to the assumed loading direction ($c_2 \le 1.5\ c_1$) and by member thickness ($h \le 1.5\ c_1$).

$\Psi_{s,V}$ = $[0.7 + (0.3\ c_2 / 1.5\ c_1)] \le 1.0$; takes account of the disturbance of the distribution of stresses in the concrete due to further edges of the concrete member on the shear resistance

$\Psi_{h,V}$ = $[1.5c_1/h]^{1/2} \le 1.0$; takes account of the fact that the shear resistance does not decrease proportionally to the member thickness as assumed by the ratio $A_{c,V}/A^0_{c,V}$

$\Psi_{\alpha,V}$ = $[1 / [(\cos_{\alpha,V})^2 + (\sin_{\alpha,V} / 2.5)^2]] \ge 1.0$; takes account of the angle $\alpha_{,V}$ between the load applied, V_{Sd}, and the direction perpendicular to the free edge of the concrete member

$\Psi_{ec,V}$ = $[1 / (1 + 2e_v / 3c_1)] \le 1.0$; takes account of a group effect when different shear loads are acting on the individual anchors of a group

$\Psi_{re,V}$ = 1.0 anchorage in non-cracked concrete and anchorage in cracked concrete without edge reinforcement or stirrups

$\Psi_{re,V}$ = 1.2 anchorage in cracked concrete with straight edge reinforcement (≥ Ø12 mm)

$\Psi_{re,V}$ = 1.4 anchorage in cracked concrete with edge reinforcement and closely spaced stirrups (a ≤ 100 mm)

$\mathbf{V_{Rk}}$ is the lesser of $V_{Rk,s}$; $V_{Rk,cp}$; $V_{Rk,c}$
$\mathbf{V_{Rd}} = V_{Rk}/\gamma_M$

3. Combined Tension & Shear

The following conditions must first be met:
ßN ≤ 1, where $ßN = N_{Sd}/N_{Rd}$
AND
ßV ≤ 1 where $ßV = V_{Sd}/V_{Rd}$

For Combined Tension and Shear Loading:
ßN + ßV ≤ 1.2 (more conservative results)
OR
$(ßN)^{\alpha} + (ßV)^{\alpha} \le 1$ (more accurate results)

α = 2.0 if N_{Rd} and V_{Rd} are governed by steel resistance
α = 1.5 for all other failure modes

Mechanical Anchors in Accordance with EOTA ETA 001, Annex C

Designer should reference the latest ETA 001 for a complete description of all variables and calculations

1. Tension Resistance

The Design Tension Load, (N_{Sd}), shall be less than the controlling (lowest) Design Resistance, $N_{Rd} = (N_{Rk}/\gamma_M)$, per the following table:

Failure Mode	Single Anchor	Anchor Group	
Steel	$N_{Sd} \le N_{Rk,s}/\gamma_{Ms}$	$N^h_{Sd} \le N_{Rk,s}/\gamma_{Ms}$	
Pull-out	$N_{Sd} \le N_{Rk,p}/\gamma_{Mp}$		$N^h_{Sd} \le N_{Rk,p}/\gamma_{Mp}$
Concrete Cone	$N_{Sd} \le N_{Rk,c}/\gamma_{Mc}$		$N^g_{Sd} \le N_{Rk,c}/\gamma_{Mc}$
Concrete Splitting	$N_{Sd} \le N_{Rk,sp}/\gamma_{Msp}$		$N^g_{Sd} \le N_{Rk,sp}/\gamma_{Msp}$

γ_M = the relevant material partial safety factor given in the product's ETA

A. Steel Resistance, $\mathbf{N_{Rk,s}}$ (given in the relevant ETA)

B. Characteristic Pull-out Resistance, $\mathbf{N_{Rk,p}}$ (given in the relevant ETA)

C. Concrete Cone Resistance, $\mathbf{N_{Rk,c}}$, determined as follows:

$\mathbf{N_{Rk,c}} = N^0_{Rk,c}\,(A_{c,N}/A^0_{c,N})\,\Psi_{s,N}\,\Psi_{re,N}\,\Psi_{ec,N}$

$N^0_{RK,c} = k_1\,(f_{ck,cube})^{0.5}\,h_{ef}^{1.5}$

k1 = 7.2 for applications in cracked concrete

k1 = 10.1 for applications in non-cracked concrete

$A^0_{c,N}$ = influence area of an individual anchor with large spacing and edge distance at the concrete surface, idealizing the concrete cone as a pyramid with a base length equal to $s_{cr,N}$

$A_{c,N}$ = actual area; it is limited by overlapping areas of adjoining anchors ($s \le s_{cr,N}$) as well as by edges of the concrete member ($c \le c_{cr,N}$)

$\Psi_{s,N}$ = $[0.7 + 0.3(c/c_{cr,N})] \le 1$; takes account of the disturbance of the distribution of stresses in the concrete due to edges of the concrete member

$\Psi_{re,N}$ = $[0.5 + (h_{ef}/200)] \le 1$; shell spalling factor takes account of the effect of reinforcement

$\Psi_{ec,N}$ = $[1/(1 + 2e_N/s_{cr,N})] \le 1$; takes account of a group effect when different tension loads are acting on the individual anchors of a group, where e_N = eccentricity of the resulting tensile load acting on the tensioned anchors

D. Splitting resistance due to load, $\mathbf{N_{Rk,sp}}$, determined as follows:

$\mathbf{N_{Rk,sp}} = N^0_{Rk,c}\,(A_{c,N}/A^0_{c,N})\,\Psi_{s,N}\,\Psi_{re,N}\,\Psi_{ec,N}\,\Psi_{h,sp}$

where $N^0_{Rk,c}$; $\Psi_{s,N}$; $\Psi_{re,N}$; $\Psi_{ec,N}$ are determined in part C. above

$A^0_{c,N}$ = influence area of an individual anchor with large spacing and edge distance at the concrete surface, idealizing the concrete cone as a pyramid with a base length equal to $s_{cr,sp}$

$A_{c,N}$ = actual area; it is limited by overlapping areas of adjoining anchors ($s \le s_{cr,sp}$) as well as by edges of the concrete member ($c \le c_{cr,sp}$)

$\Psi_{h,sp}$ = $(h/h_{min})^{2/3}$; factor to account for the influence of the actual member depth, h, on the splitting resistance for anchors according to current experience

$\mathbf{N_{Rk}}$ is the lesser of: $N_{Rk,s}$; $N_{Rk,p}$; $N_{Rk,c}$; $N_{Rk,sp}$

$\mathbf{N_{Rd}} = N_{Rk}/\gamma_M$

2. Shear Resistance

The Design Shear Load, (V_{Sd}), shall be less than the controlling (lowest) Design Resistance, $V_{Rd} = (V_{Rk}/\gamma_M)$, per the following table:

Failure Mode	Single Anchor	Anchor Group	
Steel Resistance, shear load without lever arm	$V_{Sd} \le V_{Rk,s}/\gamma_{Ms}$	$V^h_{Sd} \le V_{Rk,s}/\gamma_{Ms}$	
Steel Resistance, shear load with lever arm	$V_{Sd} \le V_{Rk,s}/\gamma_{Ms}$	$V^h_{Sd} \le V_{Rk,s}/\gamma_{Ms}$	
Concrete Pry-out Resistance	$V_{Sd} \le V_{Rk,cp}/\gamma_{Mc}$		$V^g_{Sd} \le V_{Rk,cp}/\gamma_{Mc}$
Concrete Edge Resistance	$V_{Sd} \le V_{Rk,c}/\gamma_{Mc}$		$V^g_{Sd} \le V_{Rk,c}/\gamma_{Mc}$

γ_M = the relevant material partial safety factor given in the product's ETA

A. Steel Resistance, $\mathbf{V_{Rk,s}}$ (given in the relevant ETA, or calculated based on the steel insert properties)

B. Concrete Pry-out Resistance, $\mathbf{V_{Rk,cp}}$, determined as follows:

$\mathbf{V_{Rk,cp}} =$ $k\ N_{Rk,c}$
k is taken from the relevant ETA report

C. Characteristic Concrete Edge Resistance, $\mathbf{V_{Rk,c}}$, determined as follows:

$\mathbf{V_{Rk,c}} =$ $V^0_{Rk,c}\ (A_{c,V}/A^0_{c,V})\ \Psi_{s,V}\ \Psi_{h,V}\ \Psi_{\alpha,V}\ \Psi_{ec,V}\ \Psi_{re,V}$

$V^0_{Rk,c} =$ $k_1\ d_{nom}{}^{\alpha}\ h_{ef}{}^{ß}\ (f_{ck,cube})^{0.5} c_1{}^{1.5}$
k_1 = 1.7 for applications in cracked concrete
k_1 = 2.4 for applications in non-cracked concrete
$\alpha = 0.1\ (l_f / c_1)^{0.5}$
$ß = 0.1\ (d_{nom} / c_1)^{0.2}$

$A^0_{c,V} =$ area of concrete cone of an individual anchor at the lateral concrete surface not affected by edges parallel to the assumed loading direction, member thickness or adjacent anchors, assuming the shape of the fracture area as a half pyramid with a height equal to c_1 and a base-length of 1.5 c_1 and 3 c_1

$A_{c,V} =$ actual area of concrete cone of anchorage at the lateral concrete surface. It is limited by the overlapping concrete cones of adjoining anchors ($s \le 3\ c_1$) as well as by edges parallel to the assumed loading direction ($c_2 \le 1.5\ c_1$) and by member thickness ($h \le 1.5\ c_1$).

$\Psi_{s,V} =$ $[0.7 + (0.3\ c_2 / 1.5\ c_1)] \le 1.0$; takes account of the disturbance of the distribution of stresses in the concrete due to further edges of the concrete member on the shear resistance

$\Psi_{h,V} =$ $[1.5c_1/h]^{1/2} \le 1.0$; takes account of the fact that the shear resistance does not decrease proportionally to the member thickness as assumed by the ratio $A_{c,V}/A^0_{c,V}$

$\Psi_{\alpha,V} =$ $[1 / [(\cos_{\alpha,V})^2 + (\sin_{\alpha,V} / 2.5)^2]] \ge 1.0$; takes account of the angle αV between the load applied, V_{Sd}, and the direction perpendicular to the free edge of the concrete member

$\Psi_{ec,V} =$ $[1 / (1 + 2e_v / 3c_1)] \le 1.0$; takes account of a group effect when different shear loads are acting on the individual anchors of a group

$\Psi_{re,V} =$ 1.0 anchorage in non-cracked concrete and anchorage in cracked concrete without edge reinforcement or stirrups

$\Psi_{re,V} =$ 1.2 anchorage in cracked concrete with straight edge reinforcement (≥ Ø12 mm)

$\Psi_{re,V} =$ 1.4 anchorage in cracked concrete with edge reinforcement and closely spaced stirrups (a ≤ 100 mm)

$\mathbf{V_{Rk}}$ is the lesser of $V_{Rk,s}$; $V_{Rk,cp}$; $V_{Rk,c}$

$\mathbf{V_{Rd}} = V_{Rk}/\gamma_M$

3. Combined Tension & Shear

The following conditions must first be met:

$ßN \le 1$, where $ßN = N_{Sd}/N_{Rd}$

AND

$ßV \le 1$ where $ßV = V_{Sd}/V_{Rd}$

For Combined Tension and Shear Loading:

$ßN + ßV \le 1.2$ (more conservative results)

OR

$(ßN)^{\alpha} + (ßV)^{\alpha} \le 1$ (more accurate results)

$\alpha = 2.0$ if N_{Rd} and V_{Rd} are governed by steel resistance
$\alpha = 1.5$ for all other failure modes

Glossary of Terms

ACI — American Concrete Institute

ACRYLIC — Polymer based on resins prepared from a combination of acrylic and methacrylic esters.

ADHESIVE ANCHOR — Typically, a threaded rod or rebar that is installed in a predrilled hole in a base material with a two-part chemical compound.

ADMIXTURE — A material other than water, aggregate or hydraulic cement used as an ingredient of concrete and added to concrete before or during its mixing to modify its properties.

AERATED CONCRETE — Concrete that has been mixed with air-entraining additives to protect against freeze-thaw damage and provide additional workability.

AGGREGATE — A granular material, such as sand, gravel, crushed stone and iron blast-furnace slag, used with a cementing medium to form a hydraulic cement concrete or mortar.

AISC — American Institute of Steel Construction

ALLOWABLE LOAD — The maximum design load that can be applied to an anchor. Allowable loads for mechanical and adhesive anchors are based on applying a factor of safety to the average ultimate load.

AMINE CURING AGENT — Reactive ingredient used as a setting agent for epoxy resins to form highly crosslinked polymers.

ANCHOR CATEGORY — The classification for an anchor that is established by the performance of the anchor in reliability tests such as sensitivity to reduced installation effort for mechanical anchors or sensitivity to hole cleaning for adhesive anchors.

ANSI — American National Standards Institute

AS — Australian Standards.

ASTM — American Society for Testing and Materials

BASE MATERIAL — The substrate (concrete, CMU, etc.) into which adhesive or mechanical anchors are to be installed.

BOND STRENGTH — The mechanical interlock or chemical bonding capacity of an adhesive to both the insert and the base material.

BRICK — A solid masonry unit of clay or shale formed into a rectangular prism while plastic and burned or fired in a kiln that may have cores or cells comprising less than 25% of the cross sectional area.

CAMA — Concrete Anchor Manufacturer's Association

CAST-IN-PLACE ANCHOR — A headed bolt, stud or hooked bolt installed into formwork prior to placing concrete.

CHARACTERISTIC DESIGN VALUE — The nominal strength for which there is 90% confidence that there is a 95% probability of the actual strength exceeding the nominal strength.

CONCRETE — A mixture of Portland cement or any other hydraulic cement, fine aggregate, coarse aggregate and water, with or without admixtures. Approximate weight is 150 pcf.

CONCRETE BRICK — A solid concrete masonry unit (CMU) made from Portland cement, water, and aggregates.

CONCRETE COMPRESSIVE STRENGTH (f'_c) — The specified compressive load carrying capacity of concrete used in design, expressed in pounds per square inch (psi) or megapascals (MPa).

CONCRETE MASONRY UNIT (CMU) — A hollow or solid masonry unit made from cementitious materials, water and aggregates.

CORE DRILL — A method of drilling a smooth wall hole in a base material using a special drill attachment.

CREEP — Displacement under a sustained load over time.

CURE TIME — The elapsed time required for an adhesive anchor to develop its ultimate carrying capacity.

DESIGN LOAD — The calculated maximum load that is to be applied to the anchor for the life of the structure.

DESIGN STRENGTH — The nominal strength of an anchor calculated per ACI 318, ICC-ES AC193 or ICC-ES AC308 and then multiplied by a strength reduction factor (ϕ).

DROP-IN ANCHOR — A post-installed mechanical anchor consisting of an internally-threaded steel shell and a tapered expander plug. The bottom end of the steel shell is slotted longitudinally into equal segments. The anchor is installed in a pre-drilled hole using a hammer and a hand-setting tool. The anchor is set when the tapered expander plug is driven toward the bottom end of the anchor such that the shoulder of the hand-setting tool makes contact with the top end of the anchor. A drop-in anchor may also be referred to as a displacement controlled expansion anchor.

DYNAMIC LOAD — A load whose magnitude varies with time.

EDGE DISTANCE:

EDGE DISTANCE (C) — The measure between the anchor centreline and the free edge of the concrete or masonry member.

CRITICAL EDGE DISTANCE (C_{cr} or C_{ac}) — The least edge distance at which the allowable load capacity of an anchor is applicable without reductions.

MINIMUM EDGE DISTANCE (C_{min}) — The least edge distance at which the anchors are tested for recognition.

Glossary of Terms

EFFECTIVE EMBEDMENT DEPTH — The dimension measured from the concrete surface to the deepest point at which the anchor tension load is transferred to the concrete.

EMBEDMENT DEPTH — The distance from the top surface of the base material to the installed end of the anchor. In the case of a post-installed mechanical anchor, the embedment depth is measured prior to application of the installation torque.

EPOXY RESIN — A viscous liquid containing epoxide groups that can be crosslinked into final form by means of a chemical reaction with a variety of setting agents.

ETA — European Technical Assessment.

EXPANSION ANCHOR — A mechanical fastener placed in hardened concrete or assembled masonry, designed to expand in a self-drilled or predrilled hole of a specified size and engage the sides of the hole in one or more locations to develop shear and/or tension resistance to applied loads without grout, adhesive or drypack.

FATIGUE LOAD TEST — A test in which the anchor is subjected to a specified load magnitude for 2 x 10^6 cycles in order to establish the endurance limit of the anchor.

GEL TIME — The elapsed time at which an adhesive begins to increase in viscosity and becomes resistant to flow.

GROUT — A mixture of cementitious material and aggregate to which sufficient water is added to produce pouring consistency without segregation of the constituents.

GROUTED MASONRY (or GROUT-FILLED MASONRY) — Hollow-unit masonry in which the cells are filled solidly with grout. Also, double or triple-wythe wall construction in which the cavity(s) or collar joint(s) is filled solidly with grout.

HOT-DIP GALVANISED — A part coated with a relatively thick layer of zinc by means of dipping the part in molten zinc.

IAPMO UES — IAPMO Uniform Evaluation Service. An ISO 17065 ANSI-accredited company that issues evaluation reports expressing a professional opinion as to a product's building code compliance.

ICC-ES — ICC Evaluation Service. An ISO 17065 ANSI-accredited company that issues evaluation reports expressing a professional opinion as to a product's building code compliance.

LEGACY ACCEPTANCE CRITERIA — A past version of an ICC-ES anchor qualification criteria. These are no longer current standards, but are the basis for legacy allowable load data for anchors in concrete. These standards have been replaced by modern standards such as ICC-ES AC193 and AC308.

LIGHTWEIGHT CONCRETE — Concrete containing lightweight aggregate. The unit weight of lightweight concrete is not to exceed 115 pcf.

MASONRY — Brick, structural clay tile, stone, concrete masonry units or a combination thereof bonded together with mortar.

MECHANICALLY GALVANISED — A part coated with a layer of zinc by means of mechanical impact. The thickest levels of mechanical galvanising (ASTM B695, Class 55 or greater) are considered to be alternatives to hot-dip galvanising and provide a medium level of corrosion resistance.

MORTAR — A mixture of cementitious materials, fine aggregate and water used to bond masonry units together.

NOMINAL STRENGTH — The strength of an element as calculated per ACI 318, ICC-ES AC193 or ICC-ES AC308.

NORMAL WEIGHT CONCRETE — Concrete containing normal weight aggregate. The unit weight of normal weight concrete is approximately 150 pcf.

NZS — New Zealand Standards.

OBLIQUE LOAD — A load that is applied to an anchor, which can be resolved into tension and shear components.

PLAIN CONCRETE — Structural concrete with no reinforcement or with less reinforcement than the minimum specified for reinforced concrete.

PORTLAND CEMENT — Hydraulic cement consisting of finely pulverised compounds of silica, lime and alumina.

POST-INSTALLED ANCHOR — Either a mechanical or adhesive anchor installed in a pre-drilled hole in the base material.

POST-TENSION — A method of prestressing in which tendons are tensioned after concrete has hardened.

POT LIFE — The length of time a mixed adhesive remains workable (flowable) before hardening.

PRECAST CONCRETE — A concrete structural element cast elsewhere than its final position in the structure.

PRESTRESSED CONCRETE — Structural concrete in which internal stresses have been introduced to reduce potential tensile stresses in concrete resulting from loads.

PRETENSIONING — A method of prestressing in which tendons are tensioned before concrete is placed.

REBAR — Deformed reinforcing steel which comply with ASTM A615.

REINFORCED CONCRETE — Structural concrete reinforced with no less than the minimum amount of prestressed tendons or nonprestressed reinforcement specified in ACI 318.

REINFORCED MASONRY — Masonry units and reinforcing steel bonded with mortar and/or grout in such a manner that the components act together in resisting forces.

REQUIRED STRENGTH — The factored loads and factored load combinations that must be resisted by an anchor.

SCREEN TUBE — Typically a wire or plastic mesh tube used with adhesives for anchoring into hollow base materials to prevent the adhesive from flowing uncontrolled into voids.

SCREW ANCHOR — A post-installed anchor that is a threaded mechanical fastener placed in a predrilled hole. The anchor derives its tensile holding strength from the mechanical interlock of the fastener threads with the grooves cut into the concrete during the anchor installation.

SHEAR LOAD — A load applied perpendicular to the axis of an anchor.

SHOTCRETE — Concrete that is pneumatically projected onto a surface at high velocity. Also known as gunite.

SLEEVE ANCHOR — A post-installed mechanical anchor consisting of a steel stud with nut and washer, threaded on the top end and a formed uniform tapered mandrel on the opposite end around which a full length expansion sleeve formed from sheet steel is positioned. The anchor is installed in a predrilled hole and set by tightening the nut by torquing thereby causing the expansion sleeve to expand over the tapered mandrel to engage the base material.

SPACING:

SPACING (S) — The measure between anchors, centreline-to-centreline distance.

CRITICAL SPACING (S_{cr}) — The least anchor spacing distance at which the allowable load capacity of an anchor is applicable such that the anchor is not influenced by neighbouring anchors.

MINIMUM SPACING (S_{min}) — The least anchor spacing at which the anchors are tested for recognition.

STAINLESS STEEL — A family of iron alloys containing a minimum of 12% chromium. Type-316 stainless steel provides greater corrosion resistance than Types 303 or 304.

STANDARD DEVIATION — As it pertains to this catalogue, a statistical measure of how widely dispersed the individual test results were from the published average ultimate loads.

STATIC LOAD — A load whose magnitude does not vary appreciably over time.

STRENGTH DESIGN (SD) — A design method in which an anchor is selected such that the anchor's design strength is equal to or greater than the anchor's required strength.

STRENGTH REDUCTION FACTOR (ϕ) — A factor applied to the nominal strength to allow for variations in material strengths and dimensions, inaccuracies in design equations, required ductility and reliability, and the importance of the anchor in the structure.

TENDON — In pretensioned applications, the tendon is the prestressing steel. In post-tensioned applications, the tendon is a complete assembly consisting of anchorages, prestressing steel, and sheathing with coating for unbonded applications or ducts with grout for bonded applications.

TENSION LOAD — A load applied parallel to the axis of an anchor.

THIXOTROPIC — The ability of a fluid to become less viscous (resistant to flow) under shear, then thicken when the shear force is removed.

TMR — Transport and Main Roads.

TORQUE — The measure of the force applied to produce rotational motion usually measured in foot-pounds. Torque is determined by multiplying the applied force by the distance from the pivot point to the point where the force is applied.

ULTIMATE LOAD — The average value of the maximum loads that were achieved when five or more samples of a given product were installed and statically load tested to failure under similar conditions. The ultimate load is used to derive the allowable load by applying a factor of safety.

UNDERCUT ANCHOR — A post-installed anchor that develops its tensile strength from the mechanical interlock provided by undercutting of the concrete at the embedded end of the anchor.

UNREINFORCED MASONRY (URM) — A form of clay brick masonry bearing wall construction consisting of multiple wythes periodically interconnected with header courses. In addition, this type of wall construction contains less than the minimum amounts of reinforcement as defined for reinforced masonry walls.

WEDGE ANCHOR — A post-installed mechanical anchor consisting of a steel stud with nut and washer, threaded on the top end and a formed uniform tapered mandrel on the opposite end around which an expansion clip formed from sheet steel is positioned. The anchor is installed in a predrilled hole and set by tightening the nut by torquing, thereby causing the expansion clip to expand over the tapered mandrel to engage the base material. A wedge anchor may also be referred to as a torque controlled expansion anchor.

WYTHE — A continuous vertical section of masonry one unit in thickness.

ZINC PLATED — A part coated with a relatively thin layer of zinc by means of electroplating.

Symbols

A

B

C

D

E

F

G

H

M

N

P

Q

S

T

W

Notes

Notes

Every day we work hard to earn your business, blending the talents of our people with the quality of our products and services to exceed your expectations. This is our pledge to you.

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This catalogue reflects changes in the design capacities and configurations of some Simpson Strong-Tie Company Inc. products. ***This catalogue is effective until August 31, 2020****, and supersedes all information in all earlier publications, including catalogues, brochures, fliers, technical bulletins, etc. Use this edition as a current printed reference. Information on design capacities and configurations is updated annually.*

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C-AF-AUNZ18 Effective 01/08/2018 Expires 31/08/2020