Connectors & Fasteners for
Mass Timber Construction
Australia & New Zealand

SIMPSON Strong-Tie

C-MT-AUNZ23 | +64 9 477 4440 | strongtie.co.nz
1300 STRONGTIE (1300 787 664) | strongtie.com.au

Bringing premium products and service to mass timber.

For more than 65 years, Simpson Strong-Tie has focused on creating structural products that help people build safer and stronger homes and buildings. A leader in structural systems research and technology, Simpson Strong-Tie is one of the largest suppliers of structural building products in the world. The Simpson Strong-Tie commitment to product development, engineering, testing and training is evident in the consistent quality and delivery of its products and services.

Guaranteed performance.

The fact that we extensively test our connection solutions gives you the reassurance that they will perform in the toughest conditions. Our connector products comply with the AU/NZ timber connector requirements, and our fastener products comply with the European timber fastener requirements. They are suitable for use with AU and NZ sawn timbers, CLT, LVL, and other engineered timber products designed by specific engineering design using AS 1720, NZS AS 1720.1, or NZS 3603, or for prescriptive/conventional connector applications AS 1684 and NZS 3604.

The quality and variety of our product lines gives engineers and builders more freedom to design flexibly, while offering reliable and proven performance. In addition, customers can count on our technical support and a team of experienced field representatives.

The characteristic and design values published within this document have been determined from test and calculation values in accordance with AS 1649, AS 1720, and NZS 3603 for connectors and the fastener characteristic values from BS EN 14358 for use with Limit State Design methods. Corresponding deflection limits are published, where appropriate, which indicate the amount of slip in the connection at the design capacity.

Product Index

GENERAL INFORMATION

CONNECTORS

FASTENERS

The products contained within the catalogue may or may not be subject to protection under the ambit of patent law. To ascertain the status of the products in relation to patents, we strongly advise that you visit the website **strongtie.com.au/patents** and **strongtie.co.nz/patents** to access an up-to-date index of Australian and New Zealand patents.

For a full range of connectors to suit beams, joists, rafters or similar structural members, refer to our *timber connector* catalogue.

About 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. Simpson Strong-Tie is an ISO 9001 registered company. ISO 9001 is an internationally recognised quality management system standard, which lets our customers know that they can count on the consistent quality of Simpson Strong-Tie products and services.

Mike Olosky
Chief Executive Officer

Environmental, Health and Safety Policy

Simpson Strong-Tie continues to look for ways to build safer and stronger structures while being mindful of how we can help protect the environment and the health and safety of our employees. We are committed to environmental management, including health, safety and ecological protection.

Simpson Strong-Tie is accredited to the internationally recognised standards for environmental health and safety management systems.

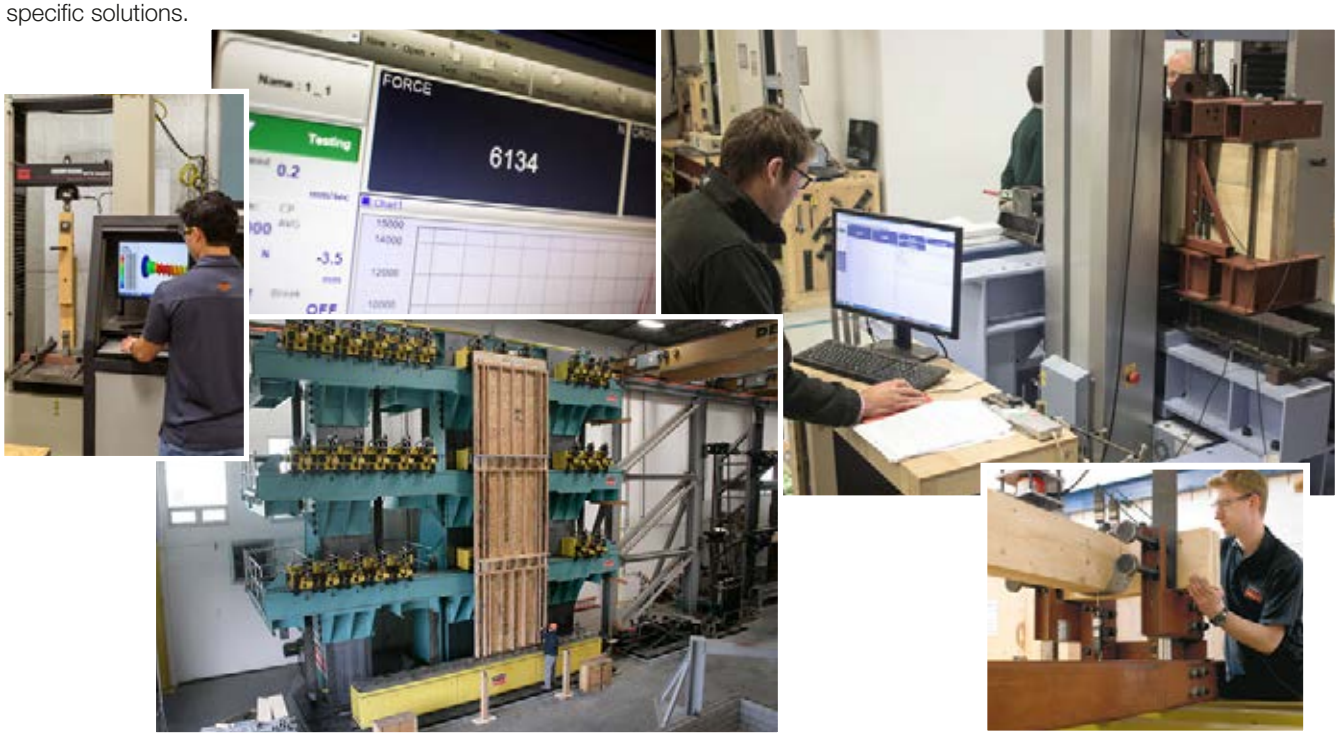
Testing Laboratories and Accreditation

Our European Test Laboratory located in Tamworth, Staffordshire, is the first manufacturer's facility to achieve third-party accreditation to the international standard BS EN ISO/IEC 17025.

The fact that we extensively test our products gives you the reassurance that they will perform in the toughest conditions. We strive to ensure that our products are compliant with the latest European requirements for construction products.

Our ISO 17025 Research Laboratories are accredited to dozens of international construction standards. The lab routinely tests product prototypes and construction code criteria. Engineers in the lab use a variety of equipment to test not only individual connectors, but entire structural systems. In addition to testing products, the lab focuses its research on corrosion, wood assemblies, and concrete and masonry. The state-of-the-art computer system and 3D printer are used to build and test prototypes, allowing us to respond to customer testing and criteria requests. Our Research Laboratory allows full-scale component and system testing using the seismic shake table and cyclic/static test frame.

Our North American branch laboratories (Texas, Ohio, Northern and Southern California, and Canada) address regional construction issues to service local customers. For example, customers frequently ask us to perform tests to help resolve installation issues that arise on the jobsite. These labs also help our engineers identify regional trends and create geographic-specific solutions.



Introduction to Cross-Laminated Timber

Cross-Laminated Timber (CLT) is growing in popularity as a sustainable and beautiful construction material. Practical as well, CLT can be used for walls, floors and ceilings, and is well suited to offsite assembly.

CLT has various benefits, making it an attractive building material. These benefits include:

Design flexibility — CLT has many applications. It can be used in walls, roofs or ceilings. The thickness of the panels can easily be increased by adding more layers, and the length of the panels can be increased by joining panels together.

Prefabrication — Floors or walls made from CLT can be fully manufactured before reaching the construction site, which decreases lead times and could potentially lower overall construction costs.

Engineers and architects are now favouring CLT for its elegance, sustainability and its cosmetic appearance.

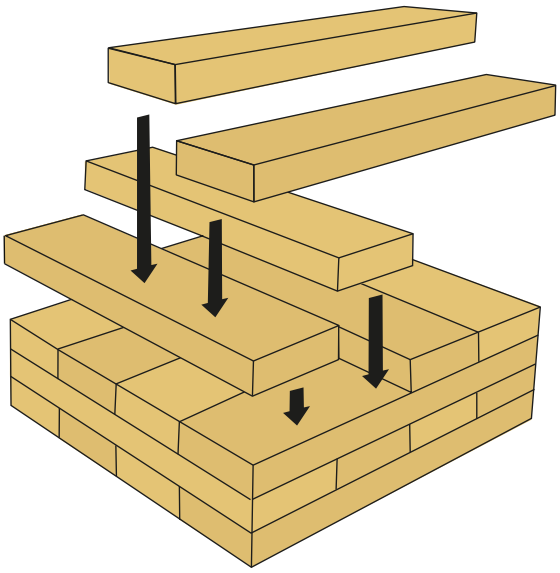
CLT Panel Manufacture

This is a highly involved and technical process.

Timber lengths are prepared and cut to suit the application and project requirements.

Adhesive is applied to the timber, and it is then arranged in perpendicular layers.

Hydraulic pressing is used for panels where higher pressures or specific pressure values at the panel edges are required. Otherwise, vacuum pressing is employed to assemble the panels as this allows several panels to be pressed simulataneously. This method also allows pressure to be applied to curved panels.



CLT is fabricated by using glue to connect layers of solid sawn timber together. Each layer of boards is orientated perpendicular to the adjacent layer, which is glued on the wide face.

Stadthaus, Murray Grove. Image courtesy of KLH UK.

Characteristic Capacity for Timber Construction Connectors

Load carrying capacities, characteristic and design capacities, for timber construction connectors used in accordance with New Zealand and Australian Standards can be derived using different methods.

NZS 3604:2011 clause 2.4.7 provides an equation to calculate the connector capacity based on its characteristic value determined from tests performed in accordance with BRANZ evaluation method EM1 or AS/NZS 2699:Part 2. NZS 3603:1993 Appendix A provides information for determining characteristic and design strengths for metal fasteners for timber construction, which is based on a modified AS 1649:2001 approach. Timber construction connector characteristic and design capacities in Australia are determined using AS 1649.

Simpson Strong-Tie NZ has published a NZS 3604 Characteristic Capacities catalogue containing load data determined in accordance with EM1, as referenced in NZS 3604. The capacities in the NZS 3604 Characteristic Capacities catalogue should therefore only be used for applications that are within the scope of NZS 3604, following clause 1.1.2.

Unless noted otherwise, other literature, including this catalogue, and load data for timber construction connectors and fasteners published on the Simpson Strong-Tie website, are based on characteristic capacities determined in general alignment with NZS 3603 and AS 1649. The characteristic capacities for the timber construction connectors in this catalogue do not consider joint slip, fastener, or bearing calculation limits, whereas design capacities do.

It is imperative that engineers designing structures beyond the general scope of NZS 3604 or AS 1684, particularly as mass timber, timber multi-storey, and timber commercial and industrial structures become more prevalent, use the appropriate load data instead of referring to load data traditionally developed primarily for one- and two-storey residential prescriptive design and construction.

Larger timber construction fasteners typically sourced from Europe and used in non-residential structures are often designed to European design methods. The current proposed draft replacement standard to NZS 3603 also captures this overseas design method. The timber construction fasteners in this catalogue fall into this category, and specific information is provided accordingly.

Engineers should be careful to avoid overseas determined characteristic capacities, such as those not derived in accordance with NZS 3604, NZS 3603, or AS 1649. The reason for this is that, while using the same term 'characteristic', the value is derived using a different methodology. Thus, the characteristic capacities derived using an overseas methodology will not necessarily be applicable to New Zealand and Australia and can result in incorrect design capacities being calculated when using New Zealand and Australian design standards.

As our timber construction connectors, except straight straps and flat plates, have characteristic capacities based on testing, their design capacity for seasoned timber construction in Australia and New Zealand may be determined as shown below. Note that the capacities shall be further reduced for unseasoned timber construction in accordance with AS 1720 for Australia and NZS 3603 for New Zealand.

$R_d = \Phi \times k_1 \times N \times Q_k$ or Q_n

Where, $R_d \geq$ N* or S* per AS 1720 or NZS 3603, respectively, and

Φ = capacity or strength factor per AS 1720 for Australia or NZS 3603 for New Zealand

k_1 = duration of load for joints. For tested timber connectors, the duration of load factor, k_1, is 1.0, except it may be 1.14 in Australia for short duration loading, such as from wind or earthquake.

N = number of connectors in the joint, with consideration of applicable table footnotes and catalogue notes, if any

Q_k or Q_n = tabulated connector characteristic capacity based on tests or fastener and bearing calculations for AS or NZS

For the straight straps and flat plates with nails, design capacity for seasoned timber construction in Australia and New Zealand may be determined as follows:

$R_d = \Phi \times k_1 \times k_{13} \times k_{16} \times k_{17} \times k_p \times$ (n-actual / n-specified) $\times Q_k$ or Q_n

Where, $R_d \geq$ N* or S* per AS 1720 or NZS 3603, respectively, and the following per AS 1720 for Australia or NZS 3603 for New Zealand

Φ = capacity or strength factor

k_1 = duration of load for joints

k_{13} = nails in side grain or end grain

k_{16} = nails driven through close fitting holes into metal side plates

k_{17} = factor for multiple nailed joints

k_p = nail penetration = actual penetration / 10D ≤ 1.0 with the minimum nail penetration being 5x nail diameter

n-actual = actual number of fasteners resisting the load

n-specified = specified number of fasteners resisting the load

Q_k or Q_n = tabulated strap or flat plate characteristic capacity for AS or NZS

Design Capacity for Timber Construction Connectors

Characteristic capacities in the tables in this catalogue are determined from test results conducted by an accredited testing laboratory, using test criteria established by industry, such as Australian, New Zealand, American, and European Union test standards. The test results for the timber construction connectors are converted into characteristic values based on NZS 3603 and AS1649 methodology, with further limitations as noted below. The exceptions to this are straight steel straps with code-referenced fasteners, as those characteristic capacities may be determined by the lesser of the load value calculated using the code referenced cold-formed steel and timber standards.

To obtain a design capacity — sometimes also referred to as design resistance or strength — in accordance with timber design Standards NZS 3603 or AS 1720:2010, the published characteristic capacities must be factored according to NZS 3603 or AS 1720 including for, but not limited to, the Australian capacity or New Zealand strength reduction factor (Φ) and application relevant load duration factor.

For Australia, the capacity factor (Φ) is 0.80 for nails and screws for structural joints in a Category 2 application. This will vary based on the category. For New Zealand, the strength reduction factor (Φ) is 0.80 for nails in lateral loading and 0.70 for other fasteners.

Test-derived design capacities consider joint slip limit, fastener and bearing calculations, as well as an ultimate load limit, with the average test serviceability limit load being at 3.2 mm deflection/joint slip, except for holdowns where the average test joint slip limit load is at 6.4 mm deflection/joint slip. Thus, design capacities published in this catalogue may be based on the ultimate load, fastener calculation, bearing calculation, or joint slip limitation.

The requirements for calculating a joint Design Capacity are detailed in sections 2 and 4 of AS 1720.1 for Australia and sections 2 and 4 of NZS 3603 for New Zealand.

For fasteners, see Understanding Screw Resistance on pp. 30–31.

Understanding the Corrosion Issue

Metal connectors and fasteners can corrode and lose 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 predict accurately whether, or when, corrosion will begin to reach a critical level. This relative uncertainty makes it crucial that specifiers and users be knowledgeable about the potential risks and select a product suitable for the intended use. When there is any uncertainty about the possible corrosion risks of any installation, a qualified professional should be consulted. Because of the risks posed by corrosion, periodic inspections should be performed by a qualified engineer or qualified inspector and maintenance performed accordingly.

It's 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 wood, fasteners, and connectors should be inspected by a qualified engineer or qualified inspector. Replacement of affected components may be appropriate.

Because of the many variables involved, Simpson Strong-Tie cannot provide estimates of the service life of connectors and fasteners. We suggest that all users and specifiers obtain recommendations on corrosion from the suppliers of the materials that will be used with Simpson Strong-Tie products, in particular, treated wood or concrete. We have attempted to provide basic knowledge on the subject here, and have additional information in our technical bulletins on the topic (**strongtie.com/info**). The Simpson Strong-Tie website should always be consulted for the latest information.

Corrosion Conditions

Corrosion can result from many combinations of environmental conditions, materials, construction design, and other factors, and no single guideline addresses all corrosion possibilities. The following discussion provides general guidelines and approaches for the selection of Simpson Strong-Tie products for various construction conditions, but is not intended to supersede building standards and codes.

Corrosion issues for Simpson Strong-Tie products generally fall into five categories:

1. Environmental and Construction Factors

Many environments and materials can cause corrosion, including ocean salt air, condensation, duration of wetness, fire retardants, fumes, fertilizers, chlorides, sulfates, preservative-treated wood, de-icing salts, dissimilar metals, soils, and more. Designers must take all of these factors into account when deciding which Simpson Strong-Tie products to use with which corrosion-resistant coatings or materials.

The design, quality of construction, and misinstallation can directly affect the corrosion resistance of products. A product intended and installed for use in dry-service environment may corrode if the structure design or building materials allow moisture intrusion, or expose the product to corrosive conditions, such as moisture or chemicals contained in the construction materials, soils, or atmospheres.

2. Chemically Treated Timber

Some wood-preservative or fire-retardant chemicals or chemical retention levels create increased risk of corrosion and are corrosive to steel connectors and fasteners. For example, testing by Simpson Strong-Tie has shown that ACQ-Type D is more corrosive than Copper Azole, Micronized Copper Azole, or CCA-C. At the same time, other tests have shown that inorganic boron treatment chemicals, specifically SBX-DOT, are less corrosive than CCA-C.

Because different chemical treatments of wood have different corrosion effects, it's important to understand the relationship between the wood treatment chemicals and the coatings and base metals of Simpson Strong-Tie products.

The preservative-treated wood supplier should provide all of the pertinent information about the treated wood product. The information should include the wood species group, wood treatment chemical, and chemical retention. Fire-retardant-treated wood (FRTW) can also affect corrosion of fasteners and connectors, and manufacturers' literature for such products should be consulted when deciding on which corrosion-resistant coating or material to specify for fasteners and connectors in FRT timber.

3. Dissimilar Metals and 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. Good detailing practice, including the following, can help reduce the possibility of galvanic corrosion of fasteners and connectors:

- Use fasteners or anchors and connectors with similar electrochemical properties
- Use insulating materials to separate dissimilar metals
- Ensure that the fastener or anchor is the cathode when dissimilar connector 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)

If you are uncertain about the galvanic corrosion potential of any installation, always consult with a corrosion expert. See the product pages for particular parts for more information regarding what coating systems are recommended or required for use with the parts in question.

4. Hydrogen-Assisted Stress Corrosion Cracking

Some hardened fasteners may experience premature failure from hydrogen-assisted stress-corrosion cracking if exposed to moisture. These fasteners are recommended for use only in dry-service conditions.

5. Indoor Swimming Pools

Indoor swimming pool environments are extremely corrosive to steel products. And some stainless steel is highly susceptible to stress corrosion cracking (SCC) under sustained loads in this environment.

SCC can result in sudden failures. Instead of stainless steel, it is advised to use a duplex coated, post-hot-dip galvanized or ZMAX®-coated low-carbon steel for any load bearing components used in swimming pool environments. Regular maintenance is strongly advised. See **strongtie.com/corrosion** for additional information.

Guidelines for Selecting Materials and Coatings

In the discussion and charts of this section, Simpson Strong-Tie presents a system to determine which product coatings and base metals to use in a range of corrosion conditions. These are general guidelines that may not consider all relevant application criteria and are not intended to specifically meet Australian or New Zealand Standards requirements. Refer to product-specific information for additional guidance.

Simpson Strong-Tie evaluated the AWPA Use Categories (See AWPA U1-16) and ICC-ES AC257 Exposure Conditions and developed a set of corrosion-resistance recommendations. These recommendations address the coating systems and materials used by Simpson Strong-Tie for fastener and connector products. Although the AWPA Use Categories and ICC-ES AC257 Exposure Conditions specifically address treated-wood applications and some common corrosion agents, Simpson Strong-Tie believes that its recommendations may be applied more generally to other application conditions, insofar as the service environments discussed are similar. You should consult with a corrosion engineer concerning the application where advisable, and compliance with Australian or New Zealand corrosion protection requirements must still be confirmed by the specifier. The information provided is to be taken as guidance based on global best practice, and not as a means of establishing regulatory compliance.

Step 1 — Evaluate the Corrosion Conditions

- **Dry Service:** Generally INTERIOR applications, including wall and ceiling cavities, raised floor applications in enclosed buildings that have been designed to prevent condensation and exposure to other sources of moisture. Prolonged periods of wetness during construction should also be considered, as this may constitute a Wet Service or Elevated Service condition. Keep in mind that dry-service environment may contain airborne salts or effects of chemicals. These conditions are generally considered Elevated corrosion risk categories.
- **Wet Service:** Generally EXTERIOR construction in conditions other than elevated service. These include Exterior Protected and Exposed and General Ground Contact.
- **Elevated Service:** Includes fumes, fertilizers, soil, industrial-zone atmospheres, acid rain, salt air, and other corrosive elements.
- **Uncertain:** Unknown exposure, materials, or treatment chemicals.
- **Ocean/Sea-spray Service:** Marine environments that include airborne chlorides, salt air, and some salt splash.

Step 2 — Determine Your Corrosion Resistance Classification

Corrosion Resistance Classifications

Environment	Material to Be Fastened						
	Untreated Wood or Other Material	Preservative-Treated Wood					FRT Wood
		SBX-DOT Zinc Borate	Chemical Retention ≤ AWPA, UC4A	Chemical Retention > AWPA, UC4A	ACZA	Other or Uncertain	
Dry Service	Low	Low	Low	High	Medium	High	Medium
Wet Service	Medium	N/A	Medium	High	High	High	High
Elevated Service	High	N/A	Severe	Severe	High	Severe	N/A
Uncertain	High	High	High	Severe	High	Severe	Severe
Ocean/Sea-spray	Severe	N/A	Severe	Severe	Severe	Severe	N/A

Additional Considerations

1. Always consider the importance of the connection as well as the cost of maintenance and replacement.
2. If the information about treatment chemicals in an application is incomplete, or if there is any uncertainty as to the service environment of any application, Simpson Strong-Tie recommends the use of a Type 300 Series stainless steel. Simpson Strong-Tie has evaluated the corrosion effects of various formulations of wood treatment chemicals ACZA, ACQ, CCA, MCA, CA, and salt as corrosion accelerators. Simpson Strong-Tie has not evaluated all formulations and retentions of the named wood treatment chemicals other than to use coatings and materials in the severe category. Manufacturers may independently provide test results or other product information. Simpson Strong-Tie expresses no opinion regarding such information.
3. Type 316/305/304 stainless steel products are recommended where preservative treated wood is used in ground contact.
4. Mechanical galvanizations C3 and N2000 should not be used in conditions that would be more corrosive than AWPA UC3A (exterior, above ground, rapid water run off).
5. Some chemically treated wood may have chemical retentions greater than specification, particularly near the surface, making it potentially more corrosive than chemically treated wood with lower retentions. If this condition is suspected, use Types 316/305/304 stainless steel, silicon bronze, or copper fasteners.
6. Some timber species, such as Merbau and Blackbutt contain tannins and are susceptible to staining. Apply a quality finish to all surfaces of the timber prior to installation can help reduce staining
7. Fasteners and connectors in contact with FRT timber shall be hot-dip galvanised or stainless steel, unless recommended otherwise by the FRT manufacturer. Many FRT manufacturers permit low-corrosion-resistant connector and fastener coatings for dry-service conditions.
8. Type 316 stainless steel is susceptible to corrosion when corrosion agents (e.g., chlorides) and conditions exceed critical threshold levels. Surface corrosion products can stain adjacent materials. Painting usually does not improve corrosion resistance of stainless steel.

Corrosion Resistance Classifications

Step 3 — Match Your Corrosion Resistance Classification to the Coatings and Materials Available

Not all products are available in all finishes. Contact Simpson Strong-Tie for product availability, ordering information and lead times.

Coatings and Materials Available for Connectors

Level of Corrosion Resistance	Coating or Material	Description	
		Connectors	**Fastener Material or Finish**
Low	**Gray or Black Paint**	Organic paint intended to protect the product while it is warehoused and in transit to the jobsite.	Bright, Hot-Dip Galvanised, Mechanically Galvanised, or Double-Barrier Coating
	Powder Coating	Baked-on paint finish that is more durable than standard paint.	
	Galvanised	Standard (Z275) zinc-galvanised coating containing 275g of zinc per square metre of surface area (total both sides).	
Medium	ZMAX G185	Zinc galvanised coating weight of 550g of zinc per square meter, total both sides. Hot-dip galvanised per ASTM A-653.These products require hot-dip galvanised fasteners (fasteners which meet the specifications of ASTM A153).	Hot-Dip Galvanised, Mechanically Galvanised, or Double-Barrier Coating **Bright fasteners may be used with ZMAX® or HDG connectors where low corrosion resistance is allowed.*
	HOT DIP HDG GALVANISED®	Products are hot-dip galvanised after fabrication (2.0mm and thicker). The coating weight increases with material thickness. The minimum average coating weight is 600g per square meter, total both sides. Hot-dip galvanised per ASTM A-123. These products require hot-dip galvanised fasteners (fasteners which meet the specifications of ASTM A153). Anchor bolts are hot-dip galvanised per ASTM F2329.	
High/Severe	316 Stainless Steel **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 nonmagnetic. It provides a level of corrosion protection suitable for severe environments, especially environments with chlorides.	Type 316 Stainless Steel

Dry Service

Wet Service

Elevated Service / Severe

Corrosion Resistance Classifications

Step 3 — Match Your Corrosion Resistance Classification to the Coatings and Materials Available (cont.)

Not all products are available in all finishes. Contact Simpson Strong-Tie for product availability, ordering information and lead times.

Coatings and Materials Available for Fasteners

Level of Corrosion Resistance	Coating or Material	Description	
		Fasteners	**Applicable Products**
Low	**Bright**	No surface coating.	Nails
	Electrocoating (E-coat)	Coating material deposited on the fastener by electrical current. After deposition, the coating is oven cured. Electrocoating provides corrosion protection suitable for dry service and low corrosive conditions.	Strong-Drive® SDWF, SDW and SDWV Screws
	Zinc galvanised per ASTM F1941	Zinc coatings with applied by electrogalvanizing processes with a conversion coat that is clear or yellow. This coating is for fasteners to be installed in dry service and with no environmental or material exposure corrosion hazard.	SD8 Wafer Head Screw ESCR, ESCRC, ESCRFTC, ESCRFTZ and ESCRFT Screws
Medium	**Zinc Plating with Baked-On Ceramic Coating**	A baked ceramic barrier coating applied over top of electroplated zinc provides increased protection in mildly corrosive environments.	Titen Turbo™ Concrete and Masonry Screw
	HOT DIP HDG GALVANISED® **ASTM A153, Class D**	Hot-dip galvanised fasteners 10 mm and smaller in diameter in accordance with ASTM A153, Class D.	Strong-Drive SCN CONNECTOR Nail
	Type 410 Stainless Steel with Protective Top Coat	Carbon martensitic grade of stainless steel that is inherently magnetic, with an added protective top coat. This material can be used in mild atmospheres and many mild chemical environments.	Titen Stainless-Steel Concrete and Masonry Screw
	Mechanically Galvanised Coating, ASTM B695, Class 55	Simpson Strong-Tie® Strong-Drive SD Connector screws are manufactured with a mechanically applied zinc coating in accordance with ASTM B695, Class 55, with a supplemental overcoat. These fasteners are compatible with painted and zinc-coated (Z275 and ZMAX®) connectors and are recognized in evaluation reports that can be found on **strongtie.com**.	Strong-Drive SD CONNECTOR Screw
	Double-Barrier Coating	Simpson Strong-Tie Strong-Drive SDS Heavy-Duty Connector screws and Outdoor Accents® structural wood screws are manufactured with double-barrier coating that provides a level of corrosion protection equaling that provided by HDG coating and are recognized in evaluation reports that can be found on **strongtie.com**.	Strong-Drive SDS HEAVY-DUTY CONNECTOR Screw SDWS and SDWH Screws Outdoor Accents Connector Screw and Structural Wood Screw
High	**Type 304 Stainless Steel**	Type 304 stainless steel is a nickel-chromium austenitic grade of stainless steel. It provides very good corrosion resistance and is suitable for use in many corrosive environments.	CNA Nail
Severe	HOT DIP HDG GALVANISED® **ASTM A153, Class C**	Simpson Strong-Tie Strong-Drive Timber-Hex screws are hot-dip galvanised in accordance with ASTM A153, Class C. These hot-dip galvanised fasteners have a minimum average of 380 grams/m^2 of zinc coating.	Strong-Drive TIMBER-HEX HDG Screw
	316 Stainless Steel **Type 316 Stainless Steel**	Type 316 stainless steel is a nickel-chromium austenitic grade of stainless steel with 2-3% molybdenum. It provides a level of corrosion protection suitable for severe environments, especially environments with chlorides.	Strong-Drive SCNR CONNECTOR Nail Strong-Drive SDS HEAVY-DUTY CONNECTOR Screw Strong-Drive SD CONNECTOR SS Screw Strong-Drive SDWS TIMBER SS Screw

Important Information and General Notes

Warning

Simpson Strong-Tie Company Inc. structural connectors, anchors, and other products are designed and tested to provide specified design loads. To obtain optimal performance from Simpson Strong-Tie products and achieve maximal allowable design load, the products must be properly installed and used in accordance with the corrosion information, installation instructions and design limits provided by Simpson Strong-Tie. To ensure proper installation and use, designers and installers must carefully read the following General Notes, General Instructions for the Installer, General Instructions for the Designer and Corrosion Information, as well as consult the applicable catalogue pages for specific product installation instructions and notes.

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

1. Be familiar with the application and correct use of the connector.
2. Read and follow all instructions and warnings on our website, in this and any other applicable catalogue and all other Simpson Strong-Tie publications. If any instructions or warnings are unclear, do not use the product and contact Simpson Strong-Tie.
3. Install all required fasteners per installation instructions provided by Simpson Strong-Tie: (a) use proper fastener type; (b) use proper fastener quantity; (c) fill all fastener holes; (d) do not overdrive or underdrive nails, including when using powder nailers; and (e) ensure screws are completely driven.
4. Only bend products that are specifically designed to be bent. For those products that require bending (such as strap-type holdowns, straight-end twist straps, etc.), do not bend more than one full cycle.
5. Cut joists to the correct length, do not “short-cut.” The gap between the end of the joist and the header material should be no greater than 3 mm unless otherwise noted.
6. Wear Personal Protective Equipment including head, skin, eye and ear protection when installing the products or visiting a jobsite.

Failure to follow fully 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 occurs from gravity loads as well as impact events such as earthquakes and high-velocity winds.

Simpson Strong-Tie provides no warranty for any products that have been modified, improperly installed or not used in accordance with the information set forth in this catalogue or on our website.

Important Information

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 must consult the Simpson Strong-Tie website at **strongtie.co.nz** or **strongtie.com.au** each time a product is used to obtain additional design and installation information.

Simpson Strong-Tie Limited Warranty

For the Limited Warranty that applies to Simpson Strong-Tie products, please consult **strongtie.co.nz/warranty** or **strongtie.com.au/warranty**.

The Limited Warranty contains important disclaimers, limitations and exclusions, and applies only if the products have been properly specified, installed, maintained, and used in accordance with the design limits and the structural, technical, and environmental specifications in the Simpson Strong-Tie Documentation. All future purchases of Simpson Strong-Tie products are subject to the terms of the Limited Warranty in effect as of the purchase date.

Although products are designed for a wide variety of uses, 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 therein. 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.

Terms and Conditions of Sale

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 licensed/certified building design professional, a licensed professional engineer or licensed architect (“designer”). You should review our website and consult a qualified designer familiar with all applicable building codes each time you use a Simpson Strong-Tie product.

Indemnity

Any designer or other person who modifies any products, changes any installation procedures or designs any 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 such products.

Non-Catalogue and Modified Products

Modifications to products or changes in installation procedures should only be made by a qualified professional designer. The performance of such modified products or altered installation procedures is the sole responsibility of the designer. Any person modifying Simpson Strong-Tie products must provide the installer with specific instructions on the modified products’ specifications, installation and use.

General Notes

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

a. Simpson Strong-Tie reserves the right to change specifications, designs and models without notice or liability for such changes. Review our website each time you use our products.

b. Steel used for each Simpson Strong-Tie® product is individually selected based on the product's steel specifications, including strength, thickness, formability, finish and weldability. Contact Simpson Strong-Tie for steel information on specific products.

c. Unless otherwise noted, dimensions are in milimeters, loads are in kilonewton (kN).

d. Do not overload. Do not exceed catalogue allowable loads.

e. Unless otherwise noted, allowable loads are for softwoods with a density higher than 480 kg/m^3 for timber connectors and 350 kg/m^3 for fasteners under continuously dry conditions. Allowable loads for other species or conditions must be adjusted according to the code.

f. All reference to bolts are for minimum grade 4.6 structural bolts as specified in AS1111.1 (not coach screws or dome head bolts) with the minimum washer size as per AS1720.1.

g. Unless otherwise noted, bending steel in the field may cause fractures at the bend line. Fractured steel will not carry load and must be replaced.

h. A fastener that splits the wood will not take the design load. Evaluate splits to determine if the connection will perform as required. Dry wood may split more easily and should be evaluated as required. If wood tends to split, consider pre-boring holes with diameters not exceeding 0.8 of the nail diameter. Use a 3.5 mm bit for Strong-Drive® SDS Heavy-Duty Connector screws and a 2.0 mm bit for Strong-Drive SD9/SD10 Connector screws.

i. Wood shrinks and expands as it loses and gains moisture, particularly perpendicular to its grain. Take wood shrinkage into account when designing and installing connections. Simpson Strong-Tie manufactures products to fit common dry-timber dimensions. If you need a connector with dimensions other than those listed in this catalogue, Simpson Strong-Tie may be able to vary connector dimensions; contact Simpson Strong-Tie Australia or New Zealand. The effects of wood shrinkage are increased in multiple lumber connections, such as floor-to-floor installations. This may result in the vertical rod nuts becoming loose, requiring post-installation tightening.

j. Top-flange hangers may cause unevenness. Possible remedies should be evaluated by a professional and include using a face-mount hanger, and routering the beam or cutting the subfloor to accommodate the top flange thickness.

k. Built-up timber (multiple plies) must be fastened together to act as one unit to resist the applied load (fastening of the members together does not include the connector fasteners). This must be determined by the designer.

l. Some model configurations may differ from those shown in this catalogue. Contact Simpson Strong-Tie Australia or New Zealand for details.

m. A qualified designer must always evaluate each connection, including carried and carrying member limitations, before specifying the product. Fill all fastener holes with fastener types specified in the tables, unless otherwise noted. Hanger configurations, height and fastener schedules may vary from the tables depending on joist size, skew and slope. See the allowable table load for the non-modified hanger, and adjust as indicated. Gauge may vary from that specified depending on the manufacturing process used.

n. Truss plates shown are the responsibility of the truss designer.

o. Do not weld products listed in this catalogue unless this publication specifically identifies a product as acceptable for welding, or unless specific approval for welding is provided in writing by Simpson Strong-Tie. Some steels have poor weldability and a tendency to crack when welded. Cracked steel will not carry load and must be replaced.

p. To achieve tabulated values for embedded concrete/masonry products, full consolidation of concrete or grout is required whether mounted to the form prior to the pour or wet set.

General Instructions for the Installer

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

a. All specified fasteners must be installed according to the instructions in this catalogue. Incorrect fastener quantity, size, placement, type, material, or finish may cause the connection to fail.
   - Larger-diameter fasteners may be substituted for smaller-diameter fasteners in connectors provided the larger fastener does not cause splitting in the timber member and the connector holes are not enlarged.
   - Simpson Strong-Tie Strong Drive® SD Connector screws are available for use with our connectors. They are designed to replace nails in certain products.

b. Fill all fastener holes as specified in the installation instructions for that product.

c. Do not overdrive nails. Overdriven nails reduce shear capacity.

d. Products shall be installed for the use specified. Use the materials specified in the installation instructions. Substitution of or failure to use specified materials may cause the connection to fail. Do not alter installation procedures from those set forth in this catalogue.

e. Do not add fastener holes or otherwise modify Simpson Strong-Tie Company Inc. products. The performance of modified products may be substantially weakened. Simpson Strong-Tie will not warrant or guarantee the performance of such modified products.

f. The proper use of certain products requires that the product be bent. For those products, installers must not bend the product more than one time (one full cycle).

g. Bolt holes shall be approximately 10% greater than the bolt diameter (as per AS1720.1).

h. Install all specified fasteners before loading the connection.

i. Some hardened fasteners may have premature failure if exposed to moisture. These fasteners are recommended to be used in dry interior applications.

j. Use proper safety equipment.

k. Welding galvanised steel may produce harmful fumes; follow proper welding procedures and safety precautions. Welding should be in accordance with AS/NZS 1554 standard series. Unless otherwise noted Simpson Strong-Tie® connectors cannot be welded.

l. Pneumatic or power-actuated fasteners may deflect and injure the operator or others. Pneumatic nail tools may be used to install connectors, provided the correct quantity and type of nails (length and diameter) are properly installed in the nail holes. Connectors with tool embossments or tools with nail hole-locating mechanisms should be used. Follow the manufacturer's instructions and use the appropriate safety equipment. Contact Simpson Strong-Tie. Power-actuated fasteners should not be used to install connectors, unless noted otherwise.

m. Joist shall bear completely on the connector seat, and the gap between the joist end and the header shall not exceed 3 mm (unless specifically noted otherwise).

n. Nuts shall be installed such that the end of the threaded rod or bolt is at least flush with the top of the nut.

o. When installing hurricane ties on the inside of the wall special considerations must be taken to prevent condensation on the inside of the completed structure in cold climates.

p. Unless otherwise noted, connectors shown in this catalogue have been designed to be installed at the time the framing members or CLT panel are installed.

General Instructions for the Designer

These general instructions for the designer are provided to ensure proper selection and installation of Simpson Strong-Tie Company Inc. 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.

c. All installations should be designed only in accordance with the characteristic and design capacities set forth in this catalogue.

d. See p. 7 for characteristic and design capacity information.

e. The product loads are based in general agreement with AS 1649, AS 1720, NZS 3603 for connectors and BS EN 14358 for fasteners.

f. Unless otherwise noted, loads include capacity factors, load duration and other factors from AS 1720.1 or NZ S3603

g. Unless otherwise noted, timber capacity is not considered in the loads given; reduce allowable loads when timber capacity is limiting.

h. Simpson Strong-Tie strongly recommends the following addition to construction drawings and specifications: "Simpson Strong-Tie® connectors and fasteners 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 should evaluate and give written approval for substitution prior to installation."

i. Verify that the dimensions of the supporting member are sufficient to receive the specified fasteners, and develop the top flange bearing length.

j. Some catalogue illustrations show connections that could cause cross-grain tension or bending of the timber during loading if not sufficiently reinforced. In this case, mechanical reinforcement should be considered.

k. The published design data has been carefully divided in this catalogue into two distinct sections and design methods to avoid confusion:

- The section covering connectors provides both characteristic and design capacities aligned with NZS3603 and AS1649
- The section covering fasteners provides design parameters aligned with the Eurocode 5: Design of timber structures (EC5) standard.

l. For joist hangers, Simpson Strong-Tie recommends the hanger height shall be at least 60% of joist height for stability against rotation while under construction prior to sheathing install.

m. Local and/or regional building codes may require meeting special conditions. Building codes often require special inspection of anchors installed in concrete and 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.

n. Throughout the catalogue there are installation drawings showing the load transfer from one element in the structure to another. Additional connections may be required to safely transfer the loads through the structure. It is the designer's responsibility to specify and detail all necessary connections to ensure that a continuous load path is provided as required by the building code.

o. Top flange hanger allowable loads are typically based on testing with solid headers. Load reductions may apply when using headers comprised of multiple plies of dimensioned lumber.

p. For connections involving members with different specific gravities, use the characteristic capacity corresponding to the lowest specific gravity in the connection, unless noted otherwise.

Sections in this catalogue

As this catalogue contains information on timber construction connectors and also timber construction fasteners, the published design data has been carefully divided in this catalogue into two distinct sections and design methods to avoid confusion:

- The section covering connectors provides both characteristic and design capacities aligned with AS 1720 and NZS 3603.
- The section covering fasteners provides design parameters aligned with the Eurocode 5: Design of timber structures (EC5) standard, and NSZ/AS 1720.1.

SIMPSON Strong-Tie

Mass Timber Connectors

HDU Holdown and HTT Tension Tie

Ideal for existing or new construction, the HTT tension tie provides a high-strength timber-to-concrete, or timber-to-timber tension connection.

The long vertical legs on the HTT range make it possible to add the required number of fasteners, nails or screws in a post or beam to obtain the robust load capacity to suit different applications or loading requirements.

The HDU is designed for use in shearwalls and braced-wall panels, as well as other uplift or tension application in timber ction. The HDU uses Strong-Drive® SDS Heavy-Duty Connector screws, which install easily, reduce fastener slip and provide a greater net section than bolts.

Finish: Galvanised

HDU8-SDS6.4

HTT4

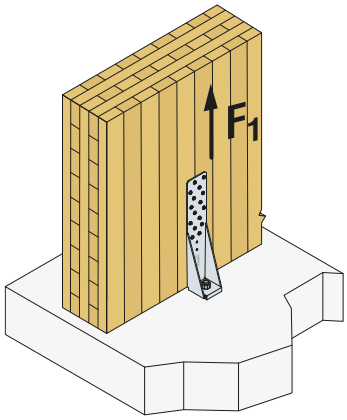
HTT5KT

HTT22E

HDU Holdown and HTT Tension Tie

Model No.	Dimensions (mm)						Fasteners		Minimum Wood Member Size (Breadth or Depth x Breadth, mm)	Country	Characteristic Tension Capacity (kN)	Design Tension Capacity (kN)	Deflection at Design Capacity (mm)
	Thickness	W	L	B	CL	SO	Anchor Bolt Dia. (mm)	Wood Fasteners (No. – Length x Dia., mm)					
HDU8-SDS6.4	3.5	75	420	90	35	38	22	20 – SDS6.4x64 Screws	75	Aus	26.1	$\frac{k_t = 1.14}{25.3}$	2.2
										NZ	26.1	$\frac{k_t = 1.0}{18.2}$	1.8
									90	Aus	29.0	$\frac{k_t = 1.14}{27.5}$	2.7
										NZ	29.0	$\frac{k_t = 1.0}{20.3}$	2.0
									115	Aus	31.1	$\frac{k_t = 1.14}{29.5}$	2.5
										NZ	31.1	$\frac{k_t = 1.0}{21.8}$	1.7
HTT4	3	65	315	50	33	11	16	18 - 40x3.75 Nails	140x38	Aus	12.2	$\frac{k_t = 1.14}{11.6}$	2.0
										NZ	12.2	$\frac{k_t = 1.0}{9.8}$	1.7
									90x75	Aus	14.7	$\frac{k_t = 1.14}{14.0}$	2.2
										NZ	14.5	$\frac{k_t = 1.0}{11.6}$	1.6
								18 - SD#10x38 Screws	140x38 or 90x75	Aus	18.4	$\frac{k_t = 1.14}{17.5}$	2.5
										NZ	18.4	$\frac{k_t = 1.0}{12.9}$	1.8
HTT5KT	3	64	406	50	36.5	11	16	26 – SD#10x64 Screws	90x75	Aus	23.0	$\frac{k_t = 1.14}{20.9}$	2.5
										NZ	23.0	$\frac{k_t = 1.0}{16.1}$	2.0
HTT22E	3	64	559	60	36.5	12.5	16	31 – SD#10x64 Screws	90x75	Aus	22.2	$\frac{k_t = 1.14}{20.3}$	1.8
										NZ	22.2	$\frac{k_t = 1.0}{17.8}$	1.4

1. Design Capacity is the lesser of (1) the Characteristic Capacity multiplied by the Australian Capacity Factor, or the NZ Strength Reduction Factor (**Φ**), and applicable the k modification factors following AS 1720.1 and NZS 3603 and (2) the Serviceability Capacity, which is the load at 6.4 mm joint slip. Design Capacity is the minimum of test data and structural joint calculation.
2. For Australia, the Capacity Factor (**Φ**) is 0.80 for nails and screws for structural joints in a Category 2 application. Change tabulated values where other Category applications govern. For NZ, the Strength Reduction Factor (**Φ**) is 0.80 for nails in lateral loading and 0.70 for other fasteners.
3. Duration of Load Factor (k_t) is as shown for wind and earthquake loading. Reduce Duration of Load Factor (k_t) where applicable. Capacities may not be increased.
4. The timber species design density for joint design is 480 kg/m³.
5. Fasteners: Nail dimensions in the table are listed diameter by length. SD screws are Strong-Drive SD Connector screws. For additional information, see Fastener Types and Sizes Specified for Simpson Strong-Tie Connectors.
6. Strong-Drive SDS Heavy Duty Connector screws are included with the HDU8.
7. The designer must specify anchor bolt type, length and embedment.
8. Anchor bolt nut should be finger tight plus 1/3 to 1/2 turn with a hand wrench. Care should be taken not to over-tighten the nut.
9. Post or beam design by specifier. Posts may consist of multiple members provided they are connected independently of the holdown fasteners.
10. Structural composite timber columns have sides that either show the wide face or the edges of the timber strands/veneers, known as the narrow face.
11. Values in the table reflect installation into the wide face.
12. Holdowns and tension ties are for use in vertical or horizontal applications.
13. Holdowns and tension ties may be installed raised up to 460 mm above the top of the concrete with no load reduction, provided that additional elongation of the anchor rod is taken into account.

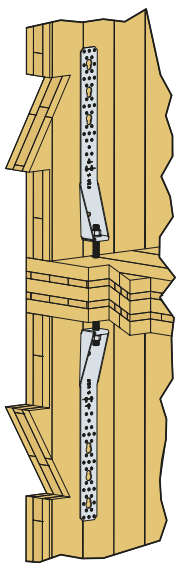


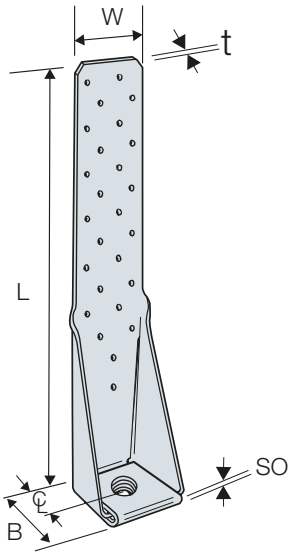
It must be checked, that the anchor fullfills the following formula:

$\frac{F_{1,d}}{R_{d,anchor}} \leq 1$

$F_{1,d}$ = Design tension load

$R_{d,anchor}$ = Design Capacity of the anchor



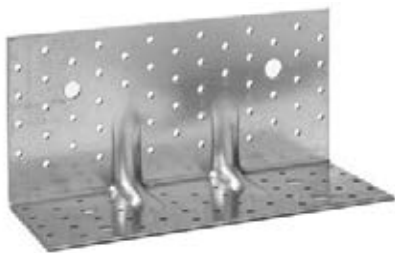


ABR255 Angle Bracket

The ABR255 is a angle bracket designed for fixing CLT panels to concrete/timber floors and parapet walls. Very versatile, it is particularly resistant to shear loads, thanks to its optimised geometry.

- One-piece connector
- 255 mm wide with 120 and 100 mm length legs
- Reinforcing ribs provide enhanced performance
- High performance for horizontal (F_2 / F_3) and vertical (F_1) loading directions

Finish: Galvanised

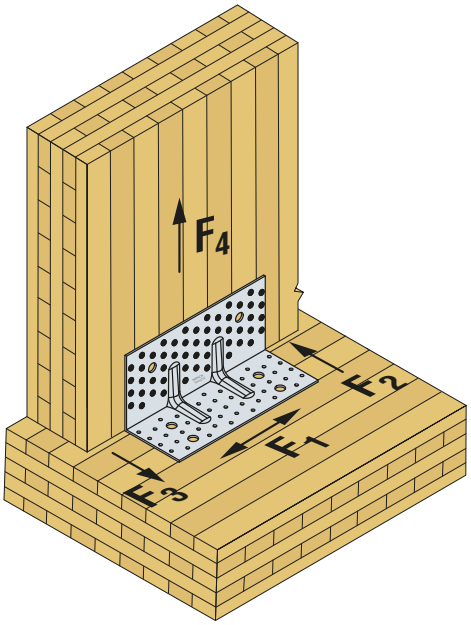


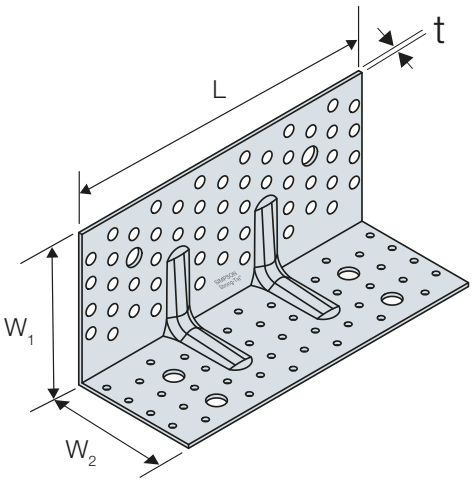
ABR255

ABR — Angle Brackets for Cross-Laminated Timber

Model No.	Dimensions (mm)				Fasteners				Country	Characteristic Capacity (kN)				Design Capacity (kN)			
	Thickness	W_1	W_2	L	Horizontal Leg		Vertical Leg			F1	F2	F3	F4	F1	F2	F3	F4
					Quantity	Type	Quantity	Type									
ABR255	3	120	100	255	41	CNA4x60	52	CNA4x60	Aus	19.5	13.1	20.6	13.2	k_1 = 1.14	k_1 = 1.14	k_1 = 1.14	k_1 = 1.14
														17.8	11.9	18.8	12.1
									NZ	19.5	13.1	20.6	13.2	k_1 = 1.0	k_1 = 1.0	k_1 = 1.0	k_1 = 1.0
														15.6	10.4	16.5	10.6
ABR255	3	120	100	255	41	SD10212	52	SD10212	Aus	19.5	23.0	18.9	19.1	k_1 = 1.14	k_1 = 1.14	k_1 = 1.14	k_1 = 1.14
														17.8	21.0	17.2	17.4
									NZ	19.5	23.0	18.9	19.1	k_1 = 1.0	k_1 = 1.0	k_1 = 1.0	k_1 = 1.0
														15.6	16.1	13.2	13.4

1. Design Capacity is the lesser of (1) the Characteristic Capacity multiplied by the Australian Capacity Factor, or the NZ Strength Reduction Factor (Φ), and applicable the k modification factors following AS 1720.1 and NZS 3603 and (2) the Serviceability Capacity, which is the load at 3.2 mm joint slip. Design Capacity is the minimum of test data and structural joint calculation.
2. For Australia, the Capacity Factor (Φ) is 0.80 for nails and screws for structural joints in a Category 2 application. Change tabulated values where other Category applications govern. For NZ, the Strength Reduction Factor (Φ) is 0.80 for nails in lateral loading and 0.70 for other fasteners.
3. Duration of Load Factor (k_1) is as shown for wind and earthquake loading. Reduce Duration of Load Factor (k_1) where applicable. Capacities may not be increased.
4. The timber species design density for joint design is 480 kg/m^3.
5. Installation and fastener schedule assume platform framing, i.e., install vertical leg at bottom edge of CLT wall panel, and horizontal leg on CLT floor panel with 99 mm minimum edge distance.
6. Nails: CNA 4 x 60 nail = 4 mm diameter x 60 mm long proprietary ring shank nail.
7. Screws: SD10212 = 4 mm shank diameter x 64 mm long Strong-Drive® SD Connector screw.

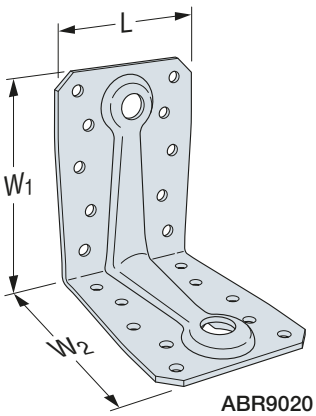




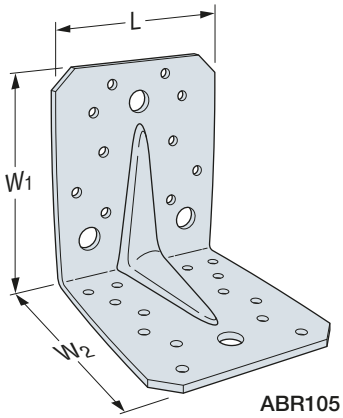
ABR Angle Brackets

The ABR9020 and ABR105 angle brackets are designed for fixing CLT panels to timber floors and parapet walls. Reinforcing ribs provide enhanced performance.

Finish: Galvanised



ABR9020

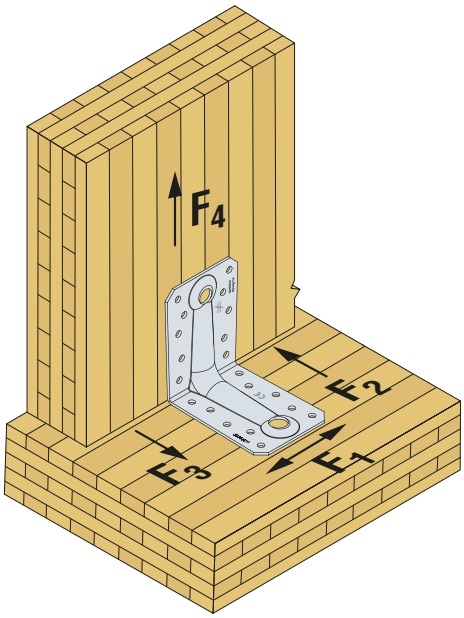


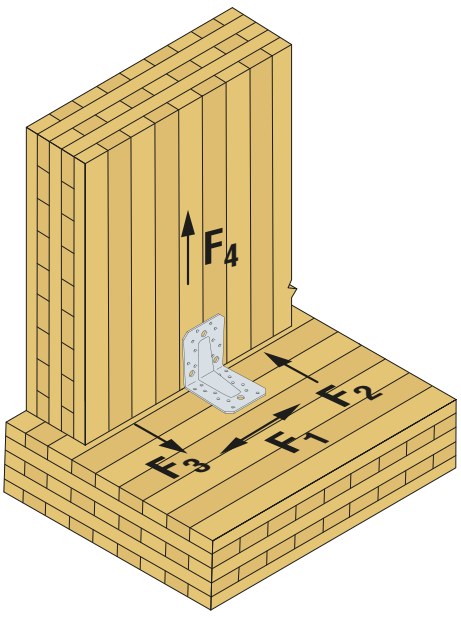
ABR105

ABR — Angle Brackets for Cross-Laminated Timber

Model No.	Dimensions (mm)				Fasteners				Country	Characteristic Capacity (kN)				Design Capacity (kN)			
	Thickness	W_1	W_2	L	Horizontal Leg Quantity	Horizontal Leg Type	Vertical Leg Quantity	Vertical Leg Type		F1	F2	F3	F4	F1	F2	F3	F4
ABR105	3	105	105	90	14	CNA4x60	10	CNA4x60	Aus	9.0	5.3	18.0	6.8	k_1 = 1.14 6.0	k_1 = 1.14 4.9	k_1 = 1.14 13.7	k_1 = 1.14 6.2
									NZ	9.0	5.3	18.0	6.8	k_1 = 1.0 6.0	k_1 = 1.0 4.3	k_1 = 1.0 13.7	k_1 = 1.0 5.5
ABR105	3	105	105	90	14	SD10212	10	SD10212	Aus	12.0	7.7	21.1	9.4	k_1 = 1.14 11.0	k_1 = 1.14 7.0	k_1 = 1.14 19.2	k_1 = 1.14 8.6
									NZ	12.0	7.7	21.1	9.4	k_1 = 1.0 9.6	k_1 = 1.0 5.4	k_1 = 1.0 14.7	k_1 = 1.0 6.6
ABR9020	2	88	88	65	10	CNA4x60	10	CNA4x60	Aus	7.9	5.1	12.8	4.0	k_1 = 1.14 4.8	k_1 = 1.14 4.7	k_1 = 1.14 8.9	k_1 = 1.14 3.7
									NZ	7.9	5.1	12.8	4.0	k_1 = 1.0 4.8	k_1 = 1.0 4.1	k_1 = 1.0 8.9	k_1 = 1.0 3.2
ABR9020	2	88	88	65	10	SD10212	10	SD10212	Aus	9.4	7.3	12.8	6.5	k_1 = 1.14 8.5	k_1 = 1.14 6.7	k_1 = 1.14 8.9	k_1 = 1.14 5.9
									NZ	9.4	7.3	12.8	6.5	k_1 = 1.0 7.5	k_1 = 1.0 5.1	k_1 = 1.0 8.9	k_1 = 1.0 4.6

1. Design Capacity is the lesser of (1) the Characteristic Capacity multiplied by the Australian Capacity Factor, or the NZ Strength Reduction Factor (Φ), and applicable the k modification factors following AS 1720.1 and NZS 3603 and (2) the Serviceability Capacity, which is the load at 3.2 mm joint slip. Design Capacity is the minimum of test data and structural joint calculation.
2. For Australia, the Capacity Factor (Φ) is 0.80 for nails and screws for structural joints in a Category 2 application. Change tabulated values where other Category applications govern. For NZ, the Strength Reduction Factor (Φ) is 0.80 for nails in lateral loading and 0.70 for other fasteners.
3. Duration of Load Factor (k_1) is as shown for wind and earthquake loading. Reduce Duration of Load Factor (k_1) where applicable. Capacities may not be increased.
4. The timber species design density for joint design is 480 kg/m^3.
5. Installation and fastener schedule assume platform framing, i.e., install vertical leg at bottom edge of CLT wall panel, and horizontal leg on CLT floor panel with 99 mm minimum edge distance.
6. Nails: CNA 4 x 60 nail = 4 mm diameter x 60 mm long proprietary ring shank nail.
7. Screws: SD10212 = 4 mm shank diameter x 64 mm long Strong-Drive® SD Connector screw.



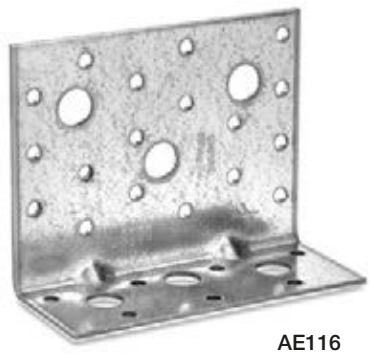


AE116 Angle Bracket

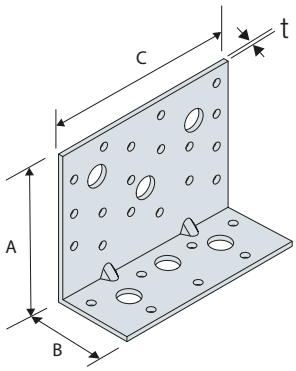
Thanks to its extra-wide design, the AE116 angle bracket is especially suited to withstand lateral loads. It can be used on both timber and rigid substrates.

- High shear resistance
- Versatile

Finish: Galvanised



AE116



AE116 — Angle Bracket for Cross-Laminated Timber — CLT Floor Values

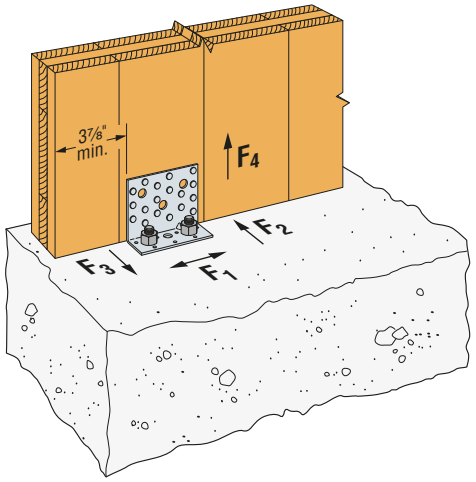
Model No.	Connector Dimensions (mm)				Fasteners				Country	Characteristic Capacity (kN)				Design Capacity (kN)			
	Thickness	W1	W2	L	Horizontal Leg		Vertical Leg			F1	F2	F3	F4	F1	F2	F3	F4
					Quantity	Type	Quantity	Type									
AE116	3	91	48	116	7	SD#10x64	18	SD#10x64	Aus	15.9	9.6	16.2	6.5	k_1 = 1.14	k_1 = 1.14	k_1 = 1.14	k_1 = 1.14
														14.5	8.8	14.8	5.9
									NZ	15.9	9.6	16.2	6.5	k_1 = 1.0	k_1 = 1.0	k_1 = 1.0	k_1 = 1.0
														12.7	6.7	11.3	4.6
AE116	3	91	48	116	7	CNA4x60	18	CNA4x60	Aus	10.9	7.5	10.2	4.4	k_1 = 1.14	k_1 = 1.14	k_1 = 1.14	k_1 = 1.14
														8.0	6.9	9.3	4.0
									NZ	10.9	7.5	10.2	4.4	k_1 = 1.0	k_1 = 1.0	k_1 = 1.0	k_1 = 1.0
														8.0	6.0	8.2	3.5

1. Design Capacity is the lesser of (1) the Characteristic Capacity multiplied by the Australian Capacity Factor, or the NZ Strength Reduction Factor (Φ), and applicable the k modification factors following AS 1720.1 and NZS 3603 and (2) the Serviceability Capacity, which is the load at 3.2 mm joint slip. Design Capacity is the minimum of test data and structural joint calculation.
2. For Australia, the Capacity Factor (Φ) is 0.80 for nails and screws for structural joints in a Category 2 application. Change tabulated values where other Category applications govern. For NZ, the Strength Reduction Factor (Φ) is 0.80 for nails in lateral loading and 0.70 for other fasteners.
3. Duration of Load Factor (k_1) is as shown for wind and earthquake loading. Reduce Duration of Load Factor (k_1) where applicable. Capacities may not be increased.
4. The timber species design density for joint design is 480 kg/m^3.
5. Installation and fastener schedule assume platform framing, i.e., install vertical leg at bottom edge of CLT wall panel, and horizontal leg on CLT floor panel with 99 mm minimum edge distance.
6. Nails: CNA4x60 = 4 mm diameter x 60 mm long proprietary ring shank nail.
7. Screws: SD10212 = 4 mm shank diameter x 64 mm long Strong-Drive® SD Connector screw.

AE116 — Angle Bracket for Cross-Laminated Timber — Anchorage to Concrete Values

Model No.	Connector Dimensions (mm)				Fasteners				Country	Characteristic Capacity (kN)				Design Capacity (kN)			
	Thickness	W_1	W_2	L	Horizontal Leg		Vertical Leg			F1	F2	F3	F4	F1	F2	F3	F4
					Quantity	Type	Quantity	Type									
AE116	3	91	48	116	2	M12	18	SD#10x64	Aus	23.3	9.6	33.1	24.4	k_1 = 1.14	k_1 = 1.14	k_1 = 1.14	k_1 = 1.14
														21.3	8.8	18.1	17.0
									NZ	23.3	9.6	33.1	24.4	k_1 = 1.0	k_1 = 1.0	k_1 = 1.0	k_1 = 1.0
														18.7	6.7	18.1	17.0

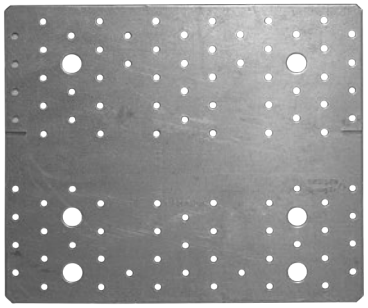
1. Design Capacity is the lesser of (1) the Characteristic Capacity multiplied by the Australian Capacity Factor, or the NZ Strength Reduction Factor (Φ), and applicable the k modification factors following AS 1720.1 and NZS 3603 and (2) the Serviceability Capacity, which is the load at 3.2 mm joint slip. Design Capacity is the minimum of test data and structural joint calculation.
2. For Australia, the Capacity Factor (Φ) is 0.80 for nails and screws for structural joints in a Category 2 application. Change tabulated values where other Category applications govern. For NZ, the Strength Reduction Factor (Φ) is 0.80 for nails in lateral loading and 0.70 for other fasteners.
3. Duration of Load Factor (k_1) is as shown for wind and earthquake loading. Reduce Duration of Load Factor (k_1) where applicable. Capacities may not be increased.
4. The timber species design density for joint design is 480 kg/m^3.
5. The designer must specify the anchor bolt type, length and embedment. Allowable load shall be taken as lower of anchorage capacity per designer and the loads listed on the table.
6. Screws: SD10212 = 4 mm shank diameter x 64 mm long Strong-Drive® SD Connector screw.
7. Designer to design concrete anchorage.



NPB Nail Plate

The NPB255 nail plate has been developed specifically to fix CLT panels to timber or concrete.

Finish: Galvanised

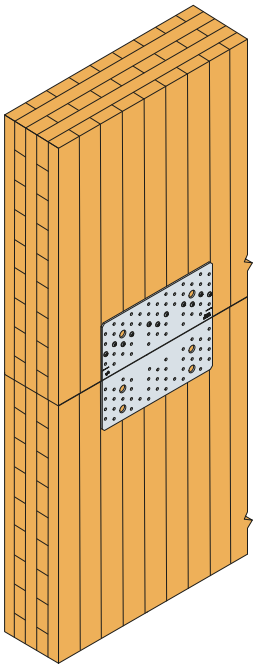


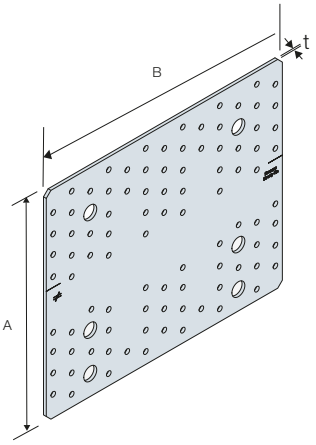
NPB255

NPB — Nail Plate for Butt Joints with CLT

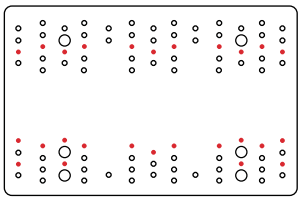
Model No.	Dimensions (mm)			Fasteners (No. – Type)		Direction of Load	Country	Characteristic Capacity (kN)	Design Capacity (kN)
	Thickness	A	B	Upper	Lower			Uplift	Uplift
NPB255	3	214	255	11 – CSA5x50	15 – CSA5x50	Perpendicular	Aus	23.4	k_1 = 1.14 21.4
							NZ	22.8	k_1 = 1.0 18.3
						Parallel	Aus	23.4	k_1 = 1.14 21.4
							NZ	22.8	k_1 = 1.0 18.3

1. Design Capacity is the lesser of (1) the Characteristic Capacity multiplied by the Australian Capacity Factor, or the NZ Strength Reduction Factor (Φ), and applicable the k modification factors following AS 1720.1 and NZS 3603 and (2) the Serviceability Capacity, which is the load at 3.2 mm joint slip. Design Capacity is the minimum of steel and structural joint calculation.
2. For Australia, the Capacity Factor (Φ) is 0.80 for nails and screws for structural joints in a Category 2 application. Change tabulated values where other Category applications govern. For NZ, the Strength Reduction Factor (Φ) is 0.80 for nails in lateral loading and 0.70 for other fasteners.
3. Duration of Load Factor (k_1) is as shown for wind and earthquake loading. Reduce Duration of Load Factor (k_1) where applicable. Capacities may not be increased.
4. The timber species design density for joint design is 480 kg/m^3.
5. Screws: 3.15 mm shank diameter x 50 mm long CSA Connector Screws

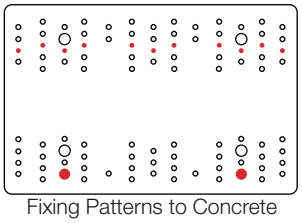




Fixing Patterns

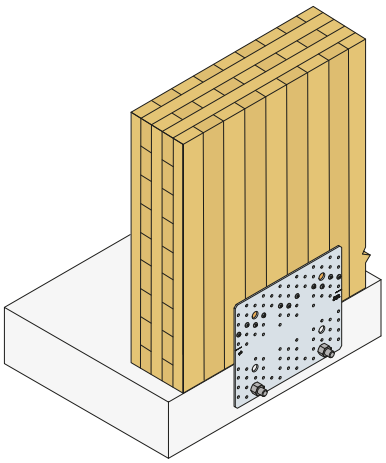


Fixing Patterns to Wood



Fixing Patterns to Concrete

Note: For connection to concrete, evaluation of anchor to concrete is not included here and is by the designer.



CBH Concealed Beam Hanger

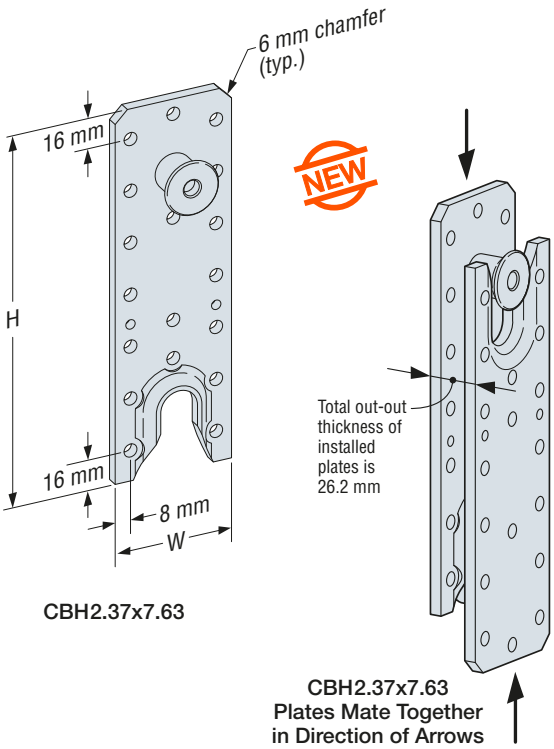
Computer modeling and CNC manufacturing enables glulam to be delivered to the jobsite in precise lengths and with preinstalled concealed hangers. The CBH concealed beam hanger is specifically designed for such applications and is installed with readily available Strong-Drive® SDS Heavy-Duty Connector screws. The CBH hanger design provides for a +/- 1 mm beam length tolerance at each connector, making it easier to crane into place than other concealed hanger designs.

Material: 6 mm

Finish: Galvanised

Installation:

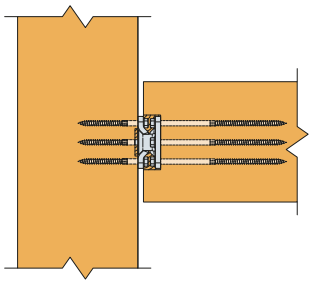
- Use all specified fasteners; see General Notes.
- Rout carried and/or carrying member according to application needs.
- A 6 mm minimum gap is recommended between the carried and carrying members to prevent timber-timber binding during field assembly. Project specific fire sealant is required at the CBH connection location when considering fire resistance at the CBH connection. Gaps larger than 6 mm may further improve ease of installation but need to be approved by the engineer when considering fire resistance. One- and two-hour fire resistance ratings per ASTM E119 (see L-C-CBHCHAR).
- Do not overdrive SDS screws during fastener installation. Doing so can reduce the clearance for stud engagement and can complicate final installation.
- Predrilling lead holes for SDS screws is recommended if wood members tend to split, or if driving the SDS fasteners properly at 90 degrees to the face of the timber member is difficult due to timber grain resistance. Lead holes for the SDS screws shall be 4 mm diameter.
- For installation clearance, an additional 3 mm deep rout allowing for the CBH stud head is recommended in the supporting beam/column face.
- Install CBH plates on carried and carrying members using all specified SDS fasteners.
- Mate carried member to carrying member according to installation illustrations.
- In order to ensure smooth installation, care should be taken to ensure that the mating surfaces between the carried and carrying members are precisely parallel with one another.



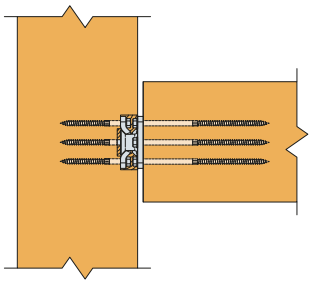
CBH2.37x7.63

CBH2.37x7.63 Plates Mate Together in Direction of Arrows

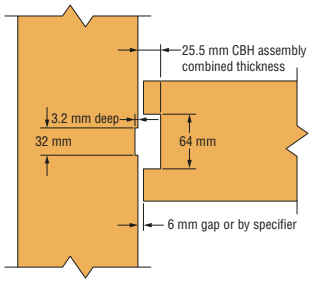
Plan View



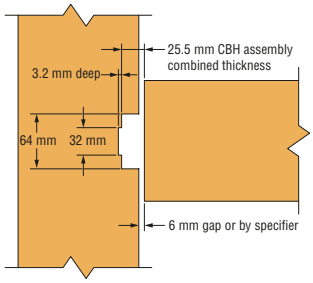
CBH Concealed in Carried Member



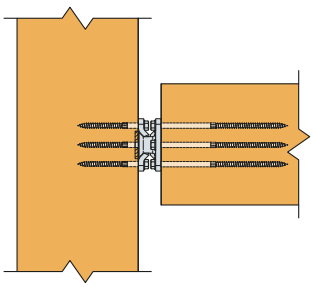
CBH Concealed in Carrying Member



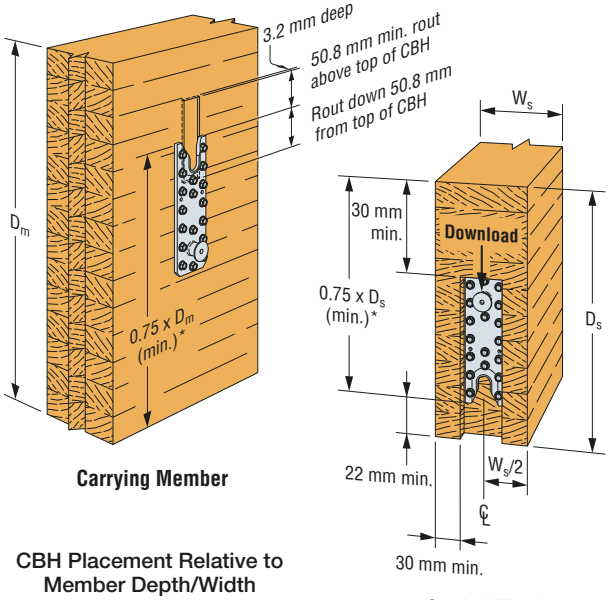
CBH Not Shown for Clarity



CBH Not Shown for Clarity



CBH Not Concealed



CBH Placement Relative to Member Depth/Width

*Dimension line is to bottom of CBH

CBH Concealed Beam Hanger (cont.)

CBH — Concealed Beam Hanger for Cross-Laminated Timber

Model No.	Dimensions (mm)				Fasteners (No. – Length x Dia., mm)		Country	Characteristic Capacity (kN)	Design Capacity (kN)	
	Thickness	W	H	Route Depth	Joist	Beam		Download	Download	
									Floor	Roof
CBH2.37x5.5B-KT	6	60	140	25.5	13 – SDS6.4x152	13 – SDS6.4x76	Aus	22.6	**k_1 = 0.69**	**k_1 = 0.77**
									18.1	18.1
							NZ	22.6	**k_1 = 0.80**	**k_1 = 0.80**
									15.8	15.8
CBH2.37x7.63-KT	6	60	194	25.5	18 – SDS6.4x152	18 – SDS6.4x76	Aus	28.8	**k_1 = 0.69**	**k_1 = 0.77**
									23.0	23.0
							NZ	28.8	**k_1 = 0.80**	**k_1 = 0.80**
									20.2	20.2

1. Design Capacity is the lesser of (1) the Characteristic Capacity multiplied by the Australian Capacity Factor, or the NZ Strength Reduction Factor (Φ), and applicable the k modification factors following AS 1720.1 and NZS 3603 and (2) the Serviceability Capacity, which is the load at 3.2 mm joint slip. Design Capacity is the minimum of test data and structural joint calculation.
2. For Australia, the Capacity Factor (Φ) is 0.80 for nails and screws for structural joints in a Category 2 application. Change tabulated values where other Category applications govern. For NZ, the Strength Reduction Factor (Φ) is 0.80 for nails in lateral loading and 0.70 for other fasteners.
3. Duration of Load Factor (k_1) is as shown. Reduce Duration of Load Factor (k_1) where applicable. Capacities may not be increased.
4. The timber species design density for joint design is 480 kg/m^3.
5. Member sizes based on minimum fastener edge distances will achieve tabulated allowable download, but do not consider required char edge distances for desired fire ratings. Member sizes required to achieve desired fire ratings shall be determined by the designer.
6. Mimimum SDS edge distance is 38 mm.
7. Screws: 6.07 mm shank diameter x 152 mm and 76 mm Long SDS Heavy Duty Connector Screws

Straps tested and proven for CLT.

Lab-tested, load-rated CLT tension straps, surface splines and fasteners from Simpson Strong-Tie provide strength, versatility and reliability you can depend on.

To learn more, visit **strongtie.co.nz** or **strongtie.com.au**.

MSTC/MDCST Straps

Tension Straps for Cross-Laminated Timber (CLT) Applications

Straps are designed to carry tension loads in a wide variety of applications.

MSTC78 — A high-capacity strap that utilises a staggered nail pattern to help minimise timber splitting. Nail slots have been countersunk to provide a lower nail head profile.

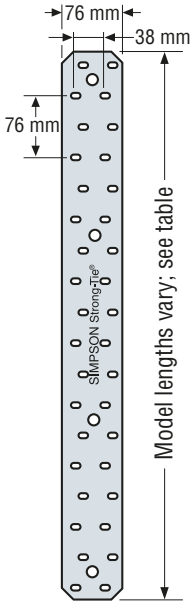
MDCST48 — A high-capacity strap specifically designed to carry tension across a CLT floor or wall-panel joint. The MDCST48 installs with Strong-Drive® SDS Heavy-Duty Connector screws.

Material: See table

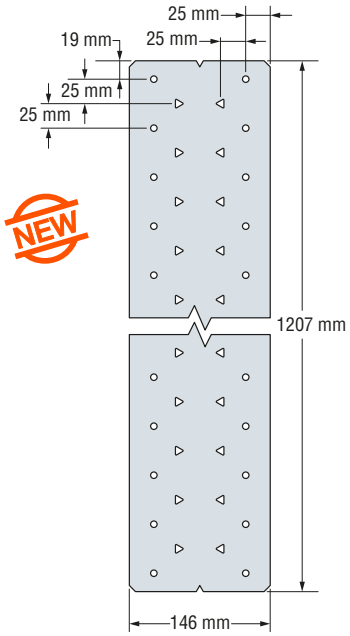
Finish: Galvanised Z275

Installation:

- Use all specified fasteners; see table below



MSTC78



MDCST48

MSTC78 — Medium Strap Tie with Countersunk Nail Slots

Model No.	Dimensions (mm)			Nails (Total) (mm)	Country	Characteristic Tension Capacity (kN)	Design Tension Capacity (kN)
	Thickness	W	L				
MSTC78	2	76	1,975	76 – 3.75x64	Aus	15.1	k_1 = 1.14
							13.6
					NZ	12.9	k_1 = 1.0
							11.6

1. Design Capacity is the lesser of (1) the Characteristic Capacity multiplied by the Australian Capacity Factor, or the NZ Strength Reduction Factor (Φ), and applicable the k modification factors following AS 1720.1 and NZS 3603 and (2) the Serviceability Capacity, which is the load at 3.2 mm joint slip. Design Capacity is the minimum of steel and structural joint calculation.
2. For Australia, the Capacity Factor (Φ) is 0.80 for nails and screws for structural joints in a Category 2 application. Change tabulated values where other Category applications govern. For NZ, the Strength Reduction Factor (Φ) is 0.80 for nails in lateral loading.
3. Duration of Load Factor (k_1) is as shown for wind and earthquake loading. Reduce Duration of Load Factor (k_1) where applicable. Capacities may not be increased.
4. The timber species design density for joint design is 480 kg/m^3.
5. See Straps and Ties General Notes.
6. Fasteners: Nail dimensions in the table are listed diameter by length. For additional information, see Fastener Types and Sizes Specified for Simpson Strong-Tie Connectors.

MDCST48 — Medium Duty Diaphragm Chord Strap Tie – Allowable Tension Loads

Model No.	Dimensions (mm)			Screws (Total) (mm)	Country	Characteristic Tension Capacity (kN)	Design Tension Capacity (kN)
	Thickness	W	L				
MDCST48	2	146	1,207	36 – SDS6.4x76	Aus	62.1	k_1 = 1.14
							55.9
					NZ	62.1	k_1 = 1.0
							55.9

1. Design Capacity is the lesser of (1) the Characteristic Capacity multiplied by the Australian Capacity Factor, or the NZ Strength Reduction Factor (Φ), and applicable the k modification factors following AS 1720.1 and NZS 3603 and (2) the Serviceability Capacity, which is the load at 3.2 mm joint slip. Design Capacity is the minimum of steel and structural joint calculation.
2. For Australia, the Capacity Factor (Φ) is 0.80 for nails and screws for structural joints in a Category 2 application. Change tabulated values where other Category applications govern. For NZ, the Strength Reduction Factor (Φ) is 0.80 for nails in lateral loading and 0.70 for other fasteners.
3. Duration of Load Factor (k_1) is as shown for wind and earthquake loading. Reduce Duration of Load Factor (k_1) where applicable. Capacities may not be increased.
4. The timber species design density for joint design is 480 kg/m^3.
5. If timber tends to split, consider pre-boring holes with diameters not exceeding 80% of the nail diameter (AS 1720.1 4.2.6). Use a 4 mm bit for Strong-Drive® SDS Heavy-Duty Connector screws.
6. Use half of the required fasteners in each member being connected to achieve the listed loads.
7. Tension loads apply for uplift as well when installed vertically.
8. When using the MDCST48 as a single strap, fill only round holes. When using the MDCST48 as a double/overlapped strap, fill round and triangle holes. When strap is doubled, use double the tabulated loads and double the fasteners.
9. Screws: 6.07 mm shank diameter x 76 mm Long SDS Heavy Duty Connector Screws

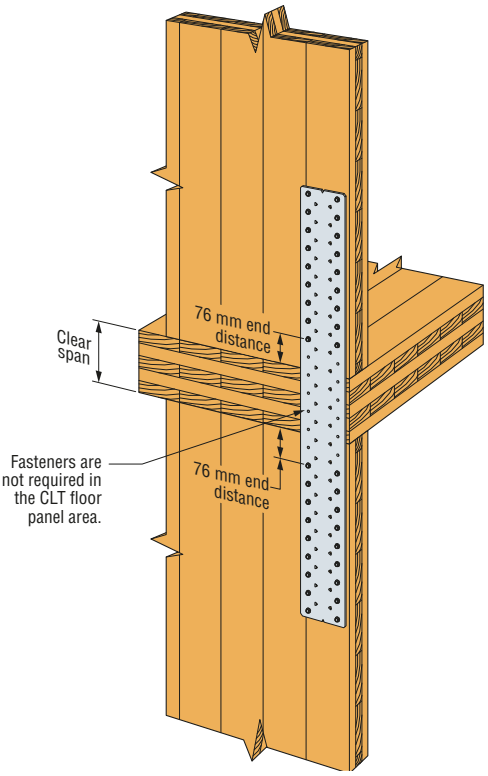
MSTC/MDCST Straps (cont.)

Tension Straps for Cross-Laminated Timber (CLT) Applications (cont.)

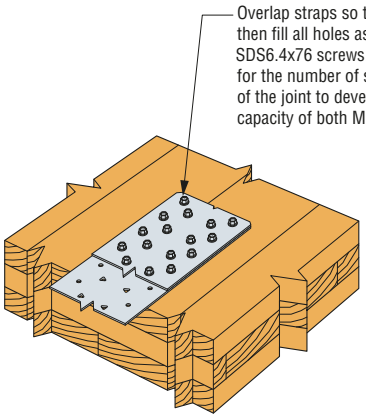
Floor-to-Floor Clear Span Table

Model No.	CLT Plies	Clear Span (mm)	Fasteners (Total)	Country	Characteristic Tension Capacity (kN)	Design Tension Capacity (kN)
MSTC78	3	105	96 – 64x3.75	Aus	62.1	k_1 = 1.14 13.6
				NZ	62.1	k_1 = 1.0 11.6
	5	175	92 – 64x3.75	Aus	62.1	k_1 = 1.14 13.6
				NZ	62.1	k_1 = 1.0 11.6
	7	245	88 – 64x3.75	Aus	62.1	k_1 = 1.14 13.6
				NZ	62.1	k_1 = 1.0 11.6
	9	314	84 – 64x3.75	Aus	62.1	k_1 = 1.14 13.6
				NZ	62.1	k_1 = 1.0 11.6
MDCST48	3	105	36 – 64x3.75	Aus	62.1	k_1 = 1.14 55.9
				NZ	62.1	k_1 = 1.0 55.9
	5	175	36 – 64x3.75	Aus	62.1	k_1 = 1.14 55.9
				NZ	62.1	k_1 = 1.0 55.9
	7	245	32 – 64x3.75	Aus	58.4	k_1 = 1.14 53.3
				NZ	62.1	k_1 = 1.0 46.1
	9	314	28 – 64x3.75	Aus	51.1	k_1 = 1.14 46.6
				NZ	62.1	k_1 = 1.0 44.4
MDCST48 (Doubled/ Overlapped)	3	105	72 – 64x3.75	Aus	124.2	k_1 = 1.14 111.8
				NZ	124.2	k_1 = 1.0 111.8
	5	175	68 – 64x3.75	Aus	124.2	k_1 = 1.14 111.8
				NZ	124.2	k_1 = 1.0 92.2
	7	245	64 – 64x3.75	Aus	116.9	k_1 = 1.14 106.6
				NZ	124.2	k_1 = 1.0 92.1
	9	314	56 – 64x3.75	Aus	102.2	k_1 = 1.14 93.2
				NZ	124.2	k_1 = 1.0 88.7

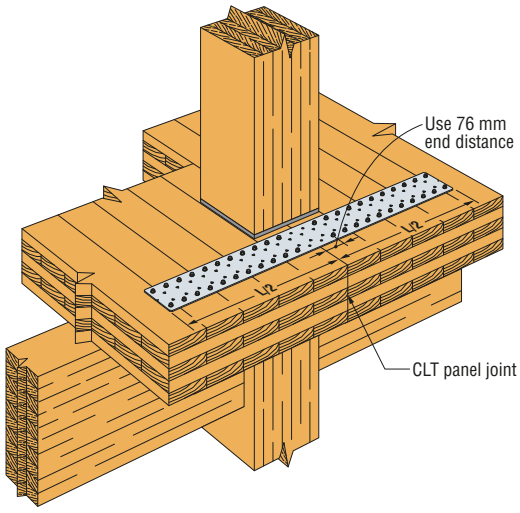
1. Allowable loads have been increased for wind or seismic loading with no further increase allowed; reduce where other loads govern.
2. If timber tends to split, consider pre-boring holes with diameters not exceeding 0.75 of the nail diameter and for Strong-Drive® SDS Heavy-Duty Connector screws, use a 4 mm bit.
3. Use half of the required fasteners in each member being connected to achieve listed loads.
4. When using the MDCST48 as a single strap, fill only round holes. When using the MDCST48 as a double/overlapping strap, fill round and triangle holes.



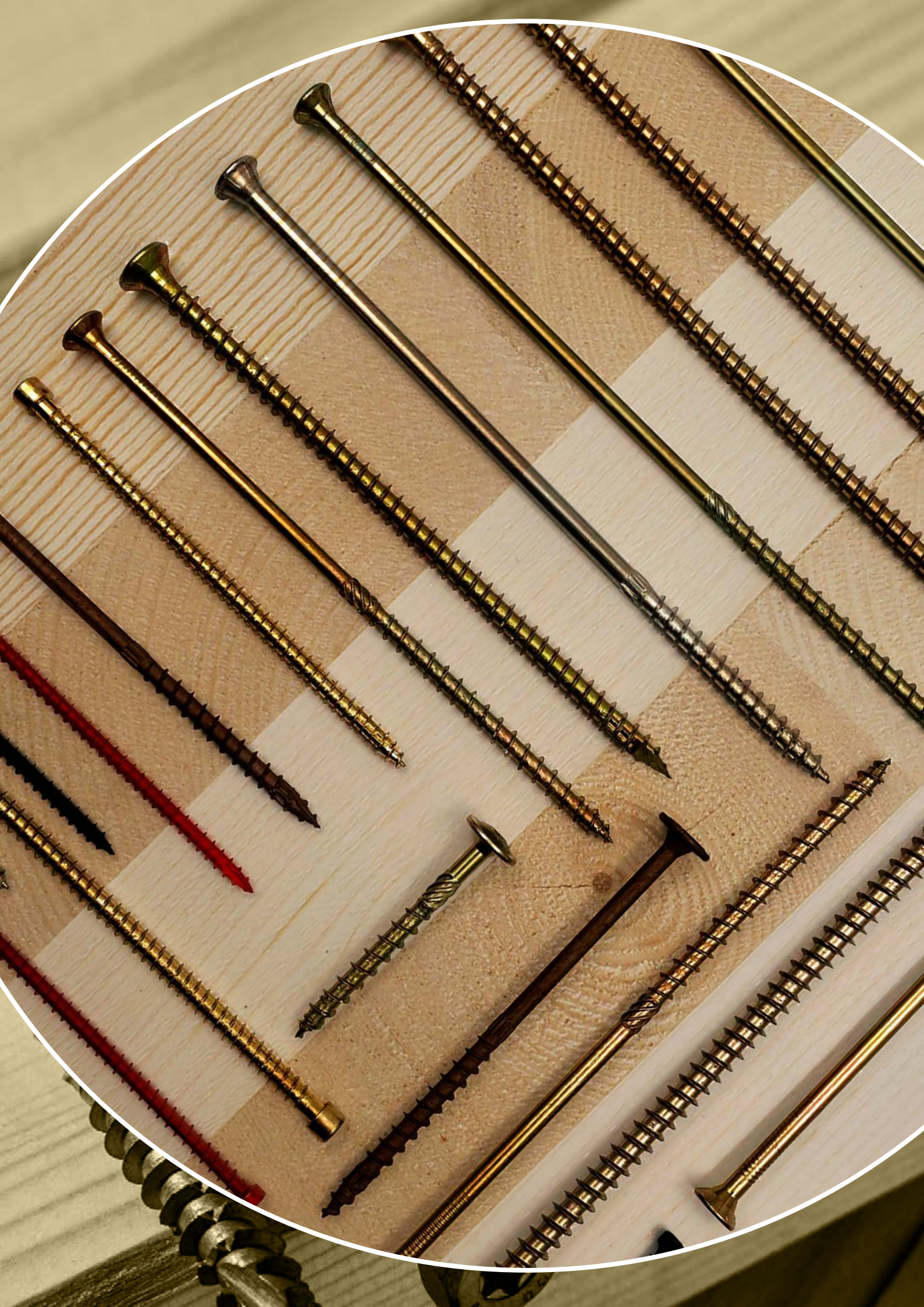
Typical Floor-to-Floor Tie Installation with MDCST48 and SDS Heavy-Duty Connector Screws at Three-Ply CLT Walls and Five-Ply CLT Floor
(other strap options similar; other CLT-ply combinations similar)



Typical Installation of Double/Overlapped MDCST48



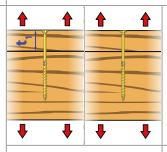
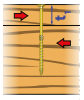
Typical MDCST48 Installation for Diaphragm Chord Tension Across a Five-Ply CLT Panel Joint
(three-ply and seven-ply CLT similar; other strap options similar)



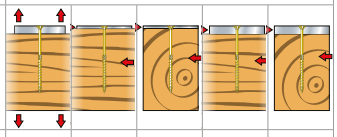
Fasteners for CLT

Understanding Screw Resistance

Instructions for using the Simpson Strong-Tie fastener tables

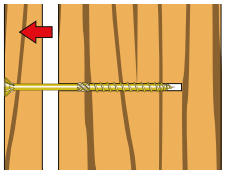
		C24 Graded Timber/Timber					
	Thread length						
		Axial $R_{ax.k}$		Shear parallel to the grain $R_{v.0°.k}$ according to t_1			
Item no.	L_g	t_1	$R_{ax.k}$	35	40	45	...
ESCRC5.0x50	30	20	1.46	-	-	-	...
ESCRC5.0x60	30	30	1.46	1.48	-	-	...
ESCRC5.0x70	37	33	1.46	1.67	-	-	...
ESCRC5.0x80	37	43	1.46	1.67	1.67	1.67	...

1 2

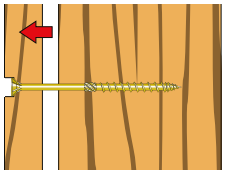
	C24 Graded Timber/Timber			Steel/C24 Graded Timber				
								
	Shear perpendicular to the grain $R_{v.90°.k}$ according to t_1			$R_{ax.st.k}$	$R_{v.0.st.k}$	$R_{v.90.st.k}$	$R_{v.0.st.k}$	$R_{v.90.st.k}$
Item no.	35	40	...	Axial[1]	Shear thin plate[2]		Shear thick plate[3]	
ESCRC5.0x50	-	-	...	2.04	1.81	1.81	2.35	2.35
ESCRC5.0x60	1.48	-	...	2.04	1.81	1.81	2.35	2.35
ESCRC5.0x70	1.67	-	...	2.52	1.93	1.93	2.47	2.47
ESCRC5.0x80	1.67	1.67	1.67	2.52	1.93	1.93	2.47	2.47

2 3

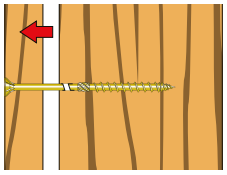
1 The timber/timber tensile strength $R_{ax.k}$ includes the following resistances:



1: thread pullout



2: head pull-through



3: steel under tensile load

These resistances are valid for timber of density 350kg/m³ or higher:

- A timber thickness beneath the head less than or equal to the value t_1 displayed in the adjacent column.
- Screw in the lateral faces of the CLT with an angle from 45 to 90° between the screw axis and the grain of the timber.
- Screw in the strips of the CLT with an angle from 0 to 45° between the screw axis and the grain of the timber. A reduction factor dependent on the angle applies to the axial strength (refer to ETA 13/0796).

All tensile strengths are given for C24 graded timber. If using a material of a different density and if failure mode 3 is not design critical (which is the case for all timber-to-timber assemblies), the tensile strength can be multiplied by the following factor:

$$K_{dens} = (\rho_k/350)^{0.8}$$

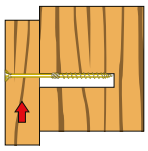
Where:

350 kg/m³: characteristic density of the C24 graded timber according to EN 338

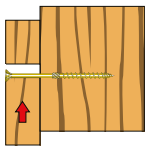
ρ_K: characteristic density of the timber used according to EN 338

For fastening screws (part threaded), dimension t_1 corresponds to the maximum thickness for which the thread is fully inserted pointside in the timber, which ensures effective tightening during installation.

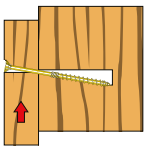
2 The timber/timber shear strength $R_{v.\alpha.k}$ includes the following resistances:



1: compression timber 2

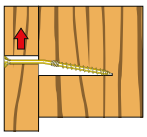


2: compression timber 1



3: rigid rotation

4: plastic hinge - timber 1



5: plastic hinge - timber 2

6: double plastic hinge

Shear strengths are provided for several timber thicknesses beneath the screw head t_1 and for the following configurations:

- Screw in the lateral faces of the CLT with an angle from 45 to 90° between the screw axis and the grain of the timber. Local bearing strength $f_{h,k}$ is calculated according to EN 1995-1-1:2004+A2:2014.
- Screw in the strips of the CLT with an angle from 0 to 45° between the screw axis and the grain of the timber. Local bearing strength $f_{h,k}$ is calculated according to the report entitled "Bemessungsvorschläge für Verbindungsmittel in Brettsperrholz" by Univ.-Prof. Dr.-Ing Han Joachim Blass & Dipl.-Ing. Thomas Uibel.

The minimum distances and spacings are calculated according to the above report. Note that the calculated strengths and minimum spacings according to the above report apply with or without pilot holes.

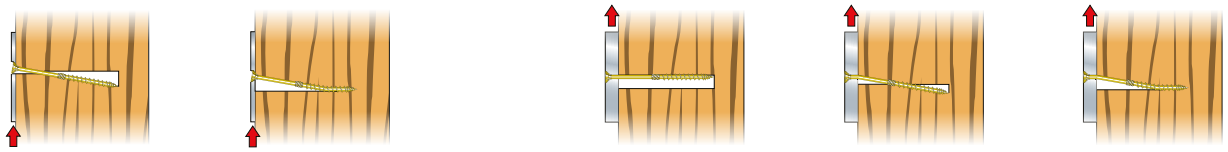
In case of partially threaded screws, the strengths only apply to configurations where the thread does not exceed more than 5 mm in the timber element beneath the screw head to ensure the best possible fastening.

Clause (2) of Part 8.3.1.2 in EN 1995-1-1:204+A2:2014 on the pointside penetration depth does not apply to this calculation.

Understanding Screw Resistance

❸ The steel/timber shear strength $R_{v.\alpha.k}$ includes the following resistances:

Thin steel $t_{st} \leq 0.5\ d$ | **Thick steel $t_{st} \geq d$**



1: timber compression | 2: plastic hinge | 3: timber compression | 4: plastic hinge | 5: double plastic hinge

Shear strengths are provided for thick steel (t_{st} = d) and thin steel (t_{st} = 0.5d). For the following configurations:
The strength values for intermediate steel thicknesses can be obtained by interpolating the values for thick and thin steel plates.
Local bearing strength $f_{h,k}$ and the minimum distances/spacings are calculated in the same way as the timber/timber shear strength values seen earlier, according to EN 1995-1-1:2004+A2:2014 and the report entitled "Bemessungsvorschläge für Verbindungsmittel in Brettsperrholz" by Univ.-Prof. Dr.-Ing Han Joachim Blass & Dipl.-Ing. Thomas Uibel.

Note that the calculated strengths and minimum spacings according to the above report apply with or without pilot holes.

These resistances are valid for timber of density 350kg/m³ or higher.

All design calculations conform to EN 1995-1-1:2004+A2:2014 and the associated ETAs and DoPs for the screws.

Characteristic values / Design values

The values provided in these tables are the characteristic strengths R_k according to Eurocode 5 (EN 1995-1-1:2005 + A1:2008 + A2:2014). The corresponding design strength $R_{d.i}$ can be obtained with the following formula:

$$R_d = \frac{R_k \times k_{mod}}{\gamma_M}$$

Where:
$k_{mod.i}$: modification factor associated with the load duration, service class and material used (refer to Table 3.1 in Eurocode 5)
γ_m: partial factor for material properties
This design value should be compared with the corresponding weighted stress.

However, standard practice is to compare a characteristic weighted stress (the worst case scenario is the easiest to identify) directly against the characteristic strength. The following can then be verified:

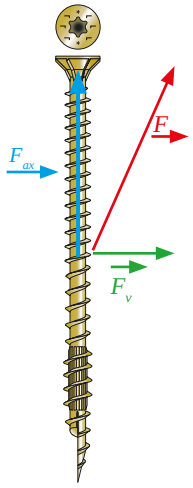
$$max\left(\frac{F_{d,i} \times \gamma_M}{k_{mod.i}}\right) \leq R_k$$

Combined or oblique stresses

If a screw or group of screws is subjected to axial and lateral forces at the same time (case of oblique stresses), the following combination must be verified:

$$\left(\frac{F_{ax.d.i}}{R_{ax.d.i}}\right)^2 + \left(\frac{F_{v.d.i}}{R_{v.d.i}}\right)^2 \leq 1$$

$F_{ax.d.i}$ and $F_{v.d.i}$ correspond to the projected oblique stresses respectively according to the screw axis and perpendicular to the screw axis.



Effective number

The strength $R_{k.n}$ of a group of screws can be calculated by multiplying the strength of a single screw by n_{eff}:

$$R_{k.n} = n_{eff}\ x\ R_k$$

Axially loaded screw:

$n_{eff} = n^{0.9}$

n	2	3	4	5	6
n_{eff}	1.87	2.69	3.48	4.26	5.02

Screws subject to shear loading:
TTUFS, ESCR/C/HRD d=5 and 6

On the same timber grain: $n_{eff} = n^{keff}$
Staggered arrangement of 1xd: $n_{eff} = n$
Perpendicular to the grain: $n_{eff} = n$

Spacing	k_{eff}
$a_1 \geq 14d$	1.0
$a_1 = 10d$	0.85
$a_1 = 7d$	0.7
$a_1 = 4d$	0.5

Screws subject to shear loading:
ESCR/C/HRD/FTC/FTZ/FT d ≥ 8

On the same timber grain: $n_{eff} = min\left\{n^{0.9} \times \sqrt[4]{\frac{a_1}{13d}}\right\}^n$

Perpendicular to the grain: $n_{eff} = n$

Strong-Drive® SDS HEAVY-DUTY CONNECTOR Screw

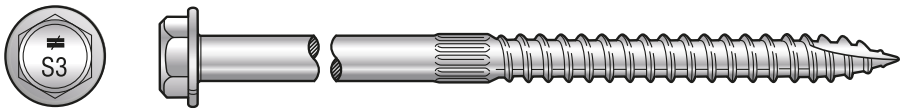
Heavy-Duty Simpson Strong-Tie Connectors

The Strong-Drive SDS Heavy-Duty Connector Screw is a 6.4 mm-diameter, high-strength structural timber screw ideal for various connector installations, as well as timber-to-timber and engineered timber applications.

Special Features:

- Type-17 point enables easy driving with no predrilling
- Available with a double-barrier coating and Type 316 stainless steel
- ⅜" hex head with 12.0 mm integrated washer
- Head is stamped with the Simpson Strong-Tie "≠" sign and fastener length for easy identification after installation
- Replacement driver bit: BITHEXR38-R1

Install Tips: A low-speed drill with a ⅜" hex driver is the recommended tool for installation.



Strong-Drive SDS HEAVY-DUTY CONNECTOR Screw Specifications

Model No.	Size (mm)	Point	Material and Finish	Box Qty.	Drive Size
SDS25112-R25	6.4 x 38	Type-17	Carbon Steel Double-Barrier Coating	25	3/8" Hex Head
SDS25212-R25	6.4 x 64				
SDS25300-R25	6.4 x 76				
SDS25112SS-R25	6.4 x 38		Type 316 Stainless Steel		
SDS25212SS-R25	6.4 x 64				
SDS25300SS-R25	6.4 x 76				

1. 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.
2. For applications in higher-exposure applications, consider Type 300 Series stainless-steel fasteners for superior corrosion resistance. Bit(s) included with every box of screws.
3. Predrilling and countersink may be necessary at ends, butt joints, and on applications where denser material is used. Follow board manufacturer's recommendations where applicable.
4. SDS Heavy Duty Connector Screws: 6.07 mm shank diameter x various lengths all in mm.

Strong-Drive 33° SCN SMOOTH-SHANK CONNECTOR Nail

Features:

- 33° collation angle
- Full round head
- Head ID stamp

Hot-Dip Galvanised — ASTM A153, Class D

Shank Dia. x Length (mm)	Head Diameter (mm)	Carton Quantity	Model No.
3.75 x 64	7	500	N10DHDGPT500
		2,500	N10DHDGPT2500

CSA Structural Connector to Timber Screw

CSA is a self-drilling flat-head screw with a Type-17 point tip suitable for installing construction connectors to timber structures.

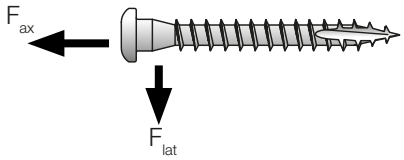
- Use to install selected Simpson Strong-Tie connectors
- Flat head
- Type-17 point
- Carbon steel or Type 316 stainless steel
- 250 screws per box

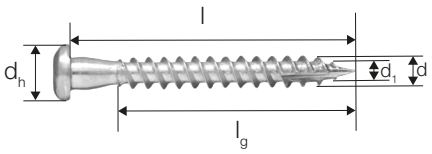
CSA Product Dimensions

Model No.	Product Dimensions [mm]					
	d	l	d_h	d_1	l_g	Bit
CSA5.0x40	4.9	40	8.3	3.2	34	T20
CSA5.0x40S	4.9	40	8.3	3.2	34	T20
CSA5.0x50	4.85	50	8.3	3.15	44	T20

Carbon Steel

Stainless Steel





CNA Ring Shank Nail

CNA ring shank nail is tested and approved for use with Simpson Strong-Tie joist hangers, brackets, straps and nail plates.

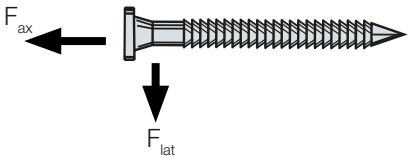
- Annular ring shank
- Carbon steel for interior applications only
- Type 304 stainless steel for exterior applications and corrosive environments

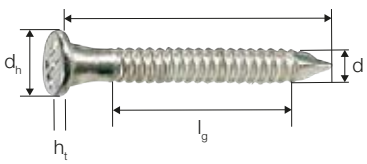
CNA Product Dimensions

Model No.	Product Dimensions [mm]				
	d	l	d_h	d_1	l_g
CNA4.0x50	4.0	50	8	4.4	34
CNA4.0x60S	4.0	60	8	4.4	44
CNA4.0x60	4.0	60	8	4.4	44

Carbon Steel

Stainless Steel





QDBPC50E Construction Connector System

The revolutionary screw connector attachment, QDBPC50E, is used to install Simpson Strong-Tie CE-labelled CSA connector screws. The QDBPC50E provides a significant timesaving value of at least 50% as no time is wasted searching for loose screws in a box, installing them with a screwdriver, and starting the process all over again. When using the attachment, a new screw is ready as soon as the first has been installed. There is no waiting or lost screws with this system.

QDBPC50E Attachment

- Part of the Quik Drive® system
- Use with CSA collated screws to install connectors such as angle brackets and joist hangers to timber
- Suitable for screws 35 mm to 50 mm long
- Use with Mandrel code: MANDREL 128E
- Connects easily with screw gun or Quik Drive extension
- Teflon™ coated moving parts for a long life

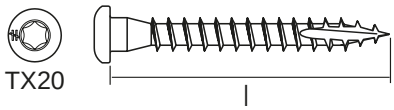
QDBPC50E includes	Model No.	Compatible Screws
Attachment	QDBPC50E	CSA
Mandrel	MANDREL 128E	
Spare Bits	BITLTX20E (x1)	

The CSA connector screw is specifically designed to fasten steel brackets to wood. The smooth shaft under the head fits tightly to the hole in the bracket. This provides a stiff connection with larger cross-resistance than standard screws. Fibre-cut tip allows for easy and fast driving. In most load-bearing capacity tables for brackets, CNA connector nails are listed as fasteners.

CSA screws can replace CNA nails, when used in the same connection detail, as they have greater pullout strength per unit than a CNA nail, and at least the same cross-bearing capacity.

Minimum requirements for spacing and minimum edge and end distances for connector screws CSA5,0xℓ are the same as for connector nails CNA4,0xℓ.

Model No.	Length [mm]	Diameter	Qty. per Strip	Material	Application	Qty. per Pack
CSA5.0X40T	40	5.0	25	Carbon Steel	For fastening connectors to wood	1,500



ESCR Washer Head Structural Timber Screw

The ESCR screws have a washer head and 6-lobe drive to aid installation and give excellent pull-through capacities.

- High pullout resistance.
- Reamer allows smooth driving.
- Connects two or more timbers together.

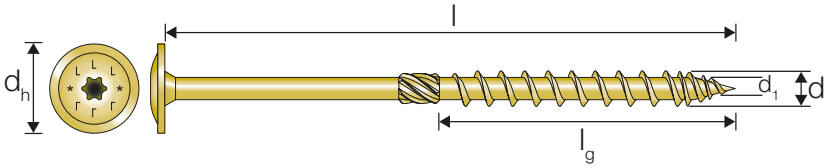
Material: Heat-treated carbon steel.

Finish: Yellow zinc plated.

Warning: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, the ESCR timber screws should only be used in dry, interior and noncorrosive environments.

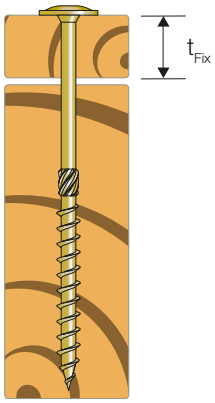
Installation:

- Screws install best with an impact driver and a T40 6-lobe bit (included in the box).
- Predrilling is typically not required.
- Drive the fastener so that the top of the head is slightly embedded into the top surface of the timber. To ensure correct performance, do not under- or over-drive the fastener.



ESCR Product Dimensions

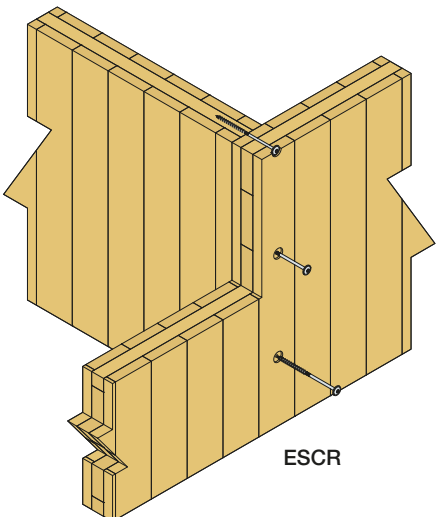
Model No.	Product Dimensions [mm]						
	d	l	d_h	d_1	l_g	t_{fix} (Max.)	Bit
ESCR8.0x80	8.0	80	20	5.3	54	26	T40
ESCR8.0x100	8.0	100	20	5.3	54	46	T40
ESCR8.0x120	8.0	120	20	5.3	54	66	T40
ESCR8.0x140	8.0	140	20	5.3	84	56	T40
ESCR8.0x160	8.0	160	20	5.3	84	76	T40
ESCR8.0x180	8.0	180	20	5.3	100	80	T40
ESCR8.0x200	8.0	200	20	5.3	100	100	T40
ESCR8.0x220	8.0	220	20	5.3	100	120	T40
ESCR8.0x240	8.0	240	20	5.3	100	140	T40
ESCR8.0x260	8.0	260	20	5.3	100	160	T40
ESCR8.0x280	8.0	280	20	5.3	100	180	T40
ESCR8.0x300	8.0	300	20	5.3	100	200	T40
ESCR8.0x320	8.0	320	20	5.3	100	220	T40



ESCR Performance Data

Model No.	Yield Moment $M_{y,k}$ [Nm]	Withdrawal Parameter $f_{ax,k}$ [N/mm²]	Head Pull-Through $f_{head,k}$ [N/mm²]	Tensile Capacity $f_{tens,k}$ [kN]	Torsional Strength $f_{tor,k}$ [kN]	Characteristic Yield Strength [N/mm²]
ESCR8.0	22.6	10.7	17.6	22.7	25.6	900

Mechanical properties based upon timber characteristic density ρ_k = 350 kg/m³.



ESCR

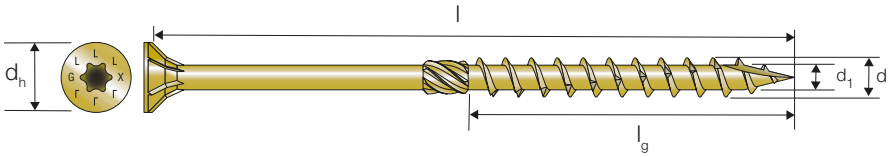
ESCRC Countersunk Structural Timber Screw

The ESCRC is a countersunk head screw designed to connect two or more timber members together. The countersunk head gives flush fitting while allowing the timber members to close up firmly.

- High pullout resistance
- Reamer allows smooth driving
- Connects two or more timber members together
- No predrilling required
- The countersunk head gives flush fitting while allowing the timber members to close up firmly
- Milling threads
- T40 6-lobe drive

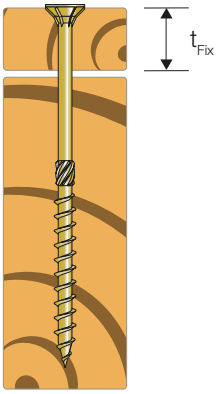
Material: Carbon steel

Finish: Yellow zinc plated



ESCRC Product Dimensions

Model No.	Product Dimensions [mm]						
	d	l	d_h	d_1	l_g	t_{fix} (Max.)	Bit
ESCRC8.0X80	8.0	80	15	5.3	54	26	T40
ESCRC8.0X100	8.0	100	15	5.3	54	46	T40
ESCRC8.0X120	8.0	120	15	5.3	54	66	T40
ESCRC8.0X140	8.0	140	15	5.3	84	56	T40
ESCRC8.0X160	8.0	160	15	5.3	84	76	T40
ESCRC8.0X180	8.0	180	15	5.3	100	80	T40
ESCRC8.0X200	8.0	200	15	5.3	100	100	T40
ESCRC8.0X220	8.0	220	15	5.3	100	120	T40
ESCRC8.0X240	8.0	240	15	5.3	100	140	T40
ESCRC8.0X260	8.0	260	15	5.3	100	160	T40
ESCRC8.0X280	8.0	280	15	5.3	100	180	T40
ESCRC8.0X300	8.0	300	15	5.3	100	200	T40
ESCRC8.0X320	8.0	320	15	5.3	100	220	T40



ESCRC Performance Data

Model No.	Yield Moment $M_{y,k}$ [Nm]	Withdrawal Parameter $f_{ax,k}$ [N/mm²]	Head Pull-Through $f_{head,k}$ [N/mm²]	Tensile Capacity $f_{tens,k}$ [kN]	Torsional Strength $f_{tor,k}$ [kN]	Characteristic Yield Strength [N/mm²]
ESCRC8.0	22.6	10.7	12.4	22.7	25.6	900

Mechanical properties based upon timber characteristic density ρ_k = 350 kg/m³.

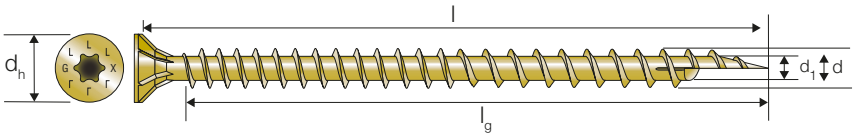
ESCRFTC Fully Threaded Structural Timber Screw

The ESCRFTC is a countersunk head screw designed to connect two or more timber members together. The countersunk head gives flush fitting while allowing the timber members to close up firmly.

- High pullout resistance
- Fully threaded shank engages the entire length of the fastener, providing a secure connection between timber members
- Connects two or more timber members together
- The countersunk head gives a flush finish
- Split point for fast starts on any angle
- T40 6-lobe drive

Material: Carbon steel

Finish: Yellow zinc plated



ESCRFTC Product Dimensions

Model No.	Product Dimensions [mm]					
	d	l	d_h	d_1	l_g	Bit
ESCRFTC8.0x180	8.0	180	15	5.2	170	T40
ESCRFTC8.0x200	8.0	200	15	5.2	190	T40
ESCRFTC8.0x240	8.0	240	15	5.2	230	T40
ESCRFTC8.0x300	8.0	300	15	5.2	290	T40
ESCRFTC8.0x400	8.0	400	15	5.2	390	T40
ESCRFTC10.0x180	10.0	180	18.5	6.1	168	T50
ESCRFTC10.0x220	10.0	220	18.5	6.1	208	T50
ESCRFTC10.0x240	10.0	240	18.5	6.1	228	T50
ESCRFTC10.0x300	10.0	300	18.5	6.1	288	T50
ESCRFTC10.0x350	10.0	350	18.5	6.1	338	T50

ESCRFTC Performance Data

Model No.	Yield Moment $M_{y,k}$ [Nm]	Withdrawal Parameter $f_{ax,k}$ [N/mm²]	Head Pull-Through $f_{head,k}$ [N/mm²]	Tensile Capacity $f_{tens,k}$ [kN]	Torsional Strength $f_{tor,k}$ [kN]	Characteristic Yield Strength [N/mm²]
ESCRFTC8.0	20.3	13.1	12.4	24.1	25.8	950
ESCRFTC10.0	36.7	12.5	12.2	40.0	55.0	950

Mechanical properties based upon timber characteristic density ρ_k = 350 kg/m³.

ESCRFTZ/ESCRFT Cylinder Head Fully Threaded Structural Timber Screw

The ETA-approved ESCRFTZ and ESCRFT are fully threaded cylinder head structural screws designed for load-bearing timber structures.

Features:

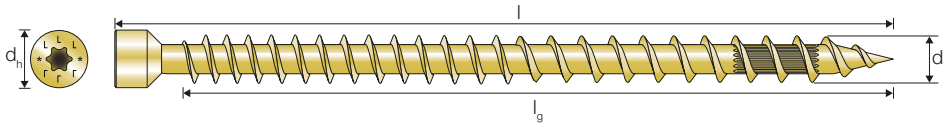
- No predrilling required
- High withdrawal resistance
- Fully threaded
- Cylinder head

Material: Carbon steel

Finish: Yellow zinc plated

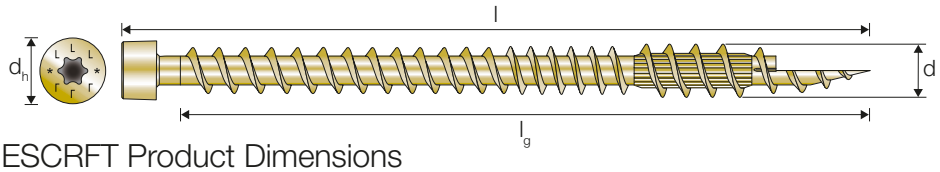
Application:

- Timber-to-timber connections, reinforcements, glulam, CLT, timber-based panels
- Ideal for applications where pairs of screws are driven in at angles



ESCRFTZ Product Dimensions

Model No.	Dimensions [mm]				Bit	
	d	l	d_h	l_g		
ESCRFTZ8.0X120	8.0	120	10.2	110	T40	50
ESCRFTZ8.0X140	8.0	140	10.2	130	T40	50
ESCRFTZ8.0X160	8.0	160	10.2	150	T40	50
ESCRFTZ8.0X180	8.0	180	10.2	170	T40	50
ESCRFTZ8.0X200	8.0	200	10.2	190	T40	50
ESCRFTZ8.0X220	8.0	220	10.2	210	T40	50
ESCRFTZ8.0X240	8.0	240	10.2	230	T40	50
ESCRFTZ8.0X260	8.0	260	10.2	250	T40	50
ESCRFTZ8.0X280	8.0	280	10.2	270	T40	50
ESCRFTZ8.0X300	8.0	300	10.2	290	T40	50
ESCRFTZ8.0X350	8.0	350	10.2	340	T40	50
ESCRFTZ8.0X400	8.0	400	10.2	390	T40	50



ESCRFT Product Dimensions

Model No.	Dimensions [mm]				Bit	
	d	l	d_h	l_g		
ESCRFT10.0X450	10.0	450	13.4	426	T50	25
ESCRFT10.0X500	10.0	500	13.4	476	T50	25

Design Parameters

Model No.	Characteristic Yield Moment $M_{y,k}$ [Nm]	Characteristic Withdrawal Parameter $f_{ax,k,90°}$ [N/mm²]	Characteristic Head Pull-Through Parameter $f_{head,k}$ [N/mm²]	Characteristic Tensile Capacity $f_{tens,k}$ [kN]	Characteristic Yield Strength [N/mm²]
ESCRFTZ8	20.3	13.1	—	24.1	950
ESCRFT10	36.7	12.5	—	40.0	950

Mechanical properties based upon timber characteristics density Pk = 35 kg/m³

Strong-Drive® SDWS TIMBER Screw (Exterior Grade)

Surface Splines, Lap Joints, Timber Framing Applications

The Strong-Drive SDWS Timber screw is a structural timber screw available in a variety of lengths and is designed for cross-laminated timber construction, mass timber construction applications. These 7.8 mm-diameter structural fasteners require less torque to install than comparable fasteners. The large diameter washer head pulls members down easily, eliminating the need to use extra washers.

Special Features:

- SawTooth® point ensures fast starts, reduces installation torque and eliminates the need for predrilling in most applications
- Low-profile head design makes countersinking easy
- Serrated thread reduces splitting and damage
- Large washer head with nibs provides maximum bearing area
- 6-lobe, T40 drive provides positive engagement that makes the screw easy to drive (replacement driver bit: BIT40T-134-R2)
- Size identification on all Simpson Strong-Tie screws
- Double-barrier coating provides corrosion resistance equivalent to hot-dip galvanisation, making it suitable for certain exterior and preservative-treated timber applications

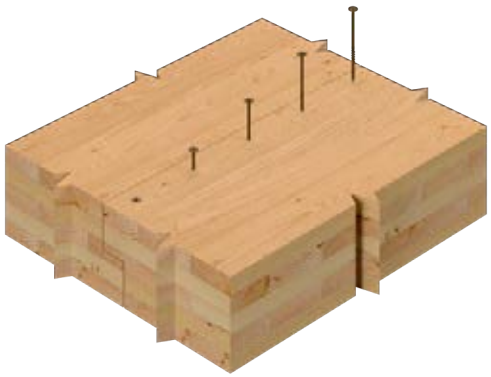
SDWS TIMBER Product Dimensions

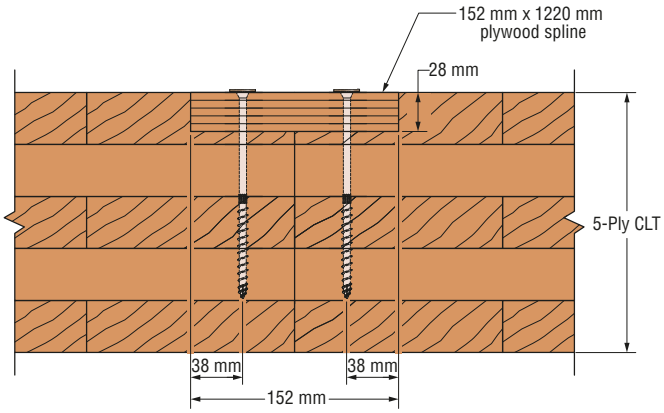
Model No.	Product Dimensions [mm]						
	d_h	d_s	d_i	d	P	l	l_g
SDWS22300DB	19.0	5.6	5.0	7.8	5.1	76	48
SDWS22400DB	19.0	5.6	5.0	7.8	5.1	102	57
SDWS22500DB	19.0	5.6	5.0	7.8	5.1	127	76
SDWS22600DB	19.0	5.6	5.0	7.8	5.1	152	76
SDWS22800DB	19.0	5.6	5.0	7.8	5.1	203	76
SDWS221000DB	19.0	5.6	5.0	7.8	5.1	254	76

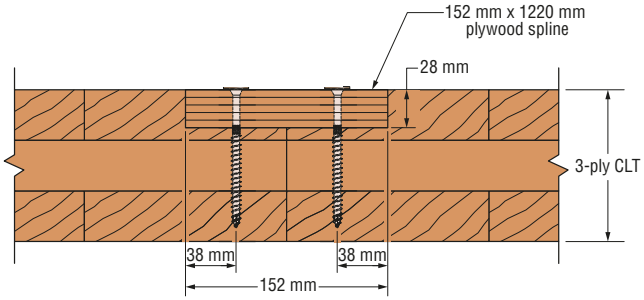
SDWS TIMBER Performace Data

Model No.	Yield Moment $M_{y,k}$ [Nm]	Withdrawal Parameter $f_{ax,k}$ [N/mm²]	Head Pull-Through $f_{head,k}$ [N/mm²]	Tensile Capacity $f_{tens,k}$ [kN]	Torsional Strength $f_{tor,k}$ [N-m]
SDWS22DB	18.2	13.8	10.7	18.2	21.5

1. Mechanical properties based upon timber density pk = 420 kg/m³







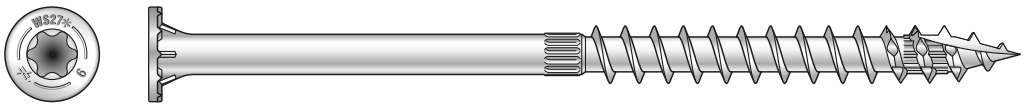
Strong-Drive® SDWS TIMBER SS Screw

Structural Timber and Engineered Timber Connections

The SDWS Timber SS screw is a 9.8 mm-diameter Type 316 stainless-steel fastener suitable for cross-laminated timber and mass timber applications, where severe corrosion resistance is a necessity. The SDWS Timber SS screw has a SawTooth® point and flat washer head that make it the ideal choice for use in applications where fast starts, low-torque driving and superb holding power are desired.

Special Features:

- 7.0 mm-shank diameter for heavy-duty structural applications
- SawTooth point ensures fast starts, reduces installation torque and eliminates the need for predrilling in most applications
- No counterboring required for most applications
- Large flat head with nibs is designed to be driven flush to surface — no protrusions
- Large, deep T50 6-lobe recess for a secure drive (replacement driver bit: BIT50T-2-R1)



SDWS TIMBER SS Product Dimensions

Model No.	Product Dimensions [mm]						
	d_h	d_s	d_i	d	P	l	l_g
SDWS27300SS	16.5	7	6	9.8	5.1	76	50
SDWS27400SS	16.5	7	6	9.8	5.1	102	70
SDWS27500SS	16.5	7	6	9.8	5.1	127	70
SDWS27600SS	16.5	7	6	9.8	5.1	152	70
SDWS27800SS	16.5	7	6	9.8	5.1	203	70
SDWS271000SS	16.5	7	6	9.8	5.1	254	70

SDWS TIMBER SS Performace Data

Model No.	Yield Moment $M_{y,k}$ [Nm]	Withdrawal Parameter $f_{ax,k}$ [N/mm²]	Head Pull-Through $f_{head,k}$ [N/mm²]	Tensile Capacity $f_{tens,k}$ [kN]	Torsional Strength $f_{tor,k}$ [N-m]
SDWS27SS	20.7	13.2	10.7	18.5	32.8

1. Mechanical properties based upon timber density pk = 420 kg/m³

Strong-Drive® SDWC TRUSS Screw

The Strong-Drive SDWC Truss screw is 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. SDWC15450 is recognised for use in chemically treated timber as described in the evaluation report.

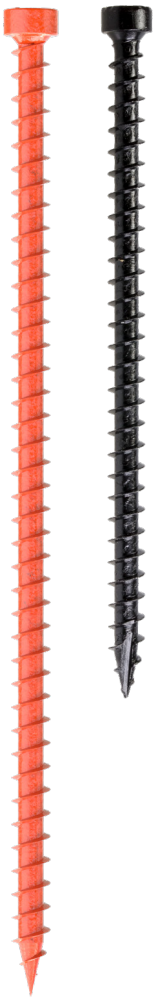
Material: Carbon steel

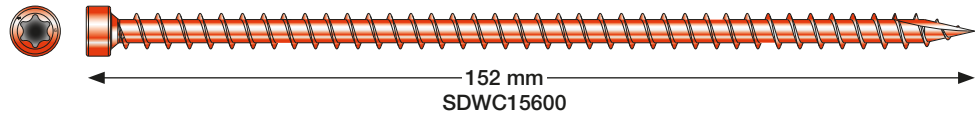
Finish: SDWC15450—E-coat;
SDWC15600—Clear zinc coating (with orange topcoat)

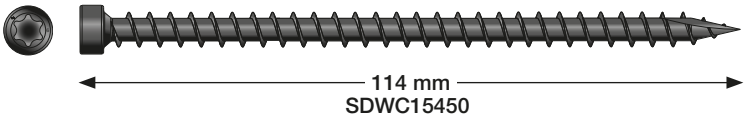
Product and Packaging Information

SDWC15450-KT and SDWC15600-KT contains:

- (50) Strong-Drive SDWC Truss screws
- (1) Matched-tolerance driver bit (Part no. BIT30T-2-RC2; also sold separately)
- (1) Metal installation guide tool - SDWC-GUIDE (for SDWC15600 only; also sold separately) or - SDWC-GUIDE275 (for SDWC15450 only; also sold separately)







Strong-Drive SDWC TRUSS Screw Specifications

Model No.	Fastener Length (mm)	Thread Length (mm)	Diameter (mm)			Fastener Strength		
			Head	Major	Minor	Bending Yield Strength (MPa)	Tension (kN)	Shear (kN)
SDWC15450	114	108	8.3	6.0	3.9	1,345	15.5	10.9
SDWC15600	152	146						

1. For the purposes of measuring overall length, fasteners shall be measured from the top of the head to the end of the point. Length of thread includes the point.
2. Bending yield strength is calculated as the 5% offset value based on the minor diameter as determined following ASTM F1575.
3. Tension and shear properties are average ultimate values. Shear strength is shear through the threads.

Characteristic Single-Shear Lateral Design Values for the Strong-Drive SDWC Truss Screws

Model No.	Fastener Length (mm)	Thread Length (mm)	Side Member		Main Member		Lateral Characteristic Design Value, Q_{kL} (N)			
			Min. Thickness (mm)	Grain	Min. Thickness (mm)	Grain	Q_{kL} para		Q_{kL} perp	
							JD4	JD5	JD4	JD5
SDWC15450	114	108	38	Face	38	End	—	—	2,220	2,220
SDWC15600	152	146	2–38	Face	38	Edge	4,200	3,500	5,300	5,100
			38	Face	38	End	—	—	2,950	2,650
			2–38	Face	38	End	—	—	4,650	4,150

1. The main member is the part where the fastener tip is embedded; the side member is the part adjacent to the head. Minimum penetration into the main member shall be 25 mm.
2. The main and side members shall be sawn timber or structural composite timber with the design density or equivalent design density typical of JD4 and JD5 grades.
3. Screws shall be installed into the side grain of the wood side member with the screw axis at a 90° angle to the surface of the member.
4. Para: Parallel-to-grain loading in the side member and perpendicular-to-grain loading in the main member.
5. Perp: Perpendicular-to-grain loading in the side member and perpendicular-to-grain loading in the main member, except where the main member is loaded parallel-to-grain.

Strong-Drive® SDWC TRUSS Screw (cont.)




Characteristic Withdrawal and Pull-Through for the Strong-Drive SDWC Truss Screws

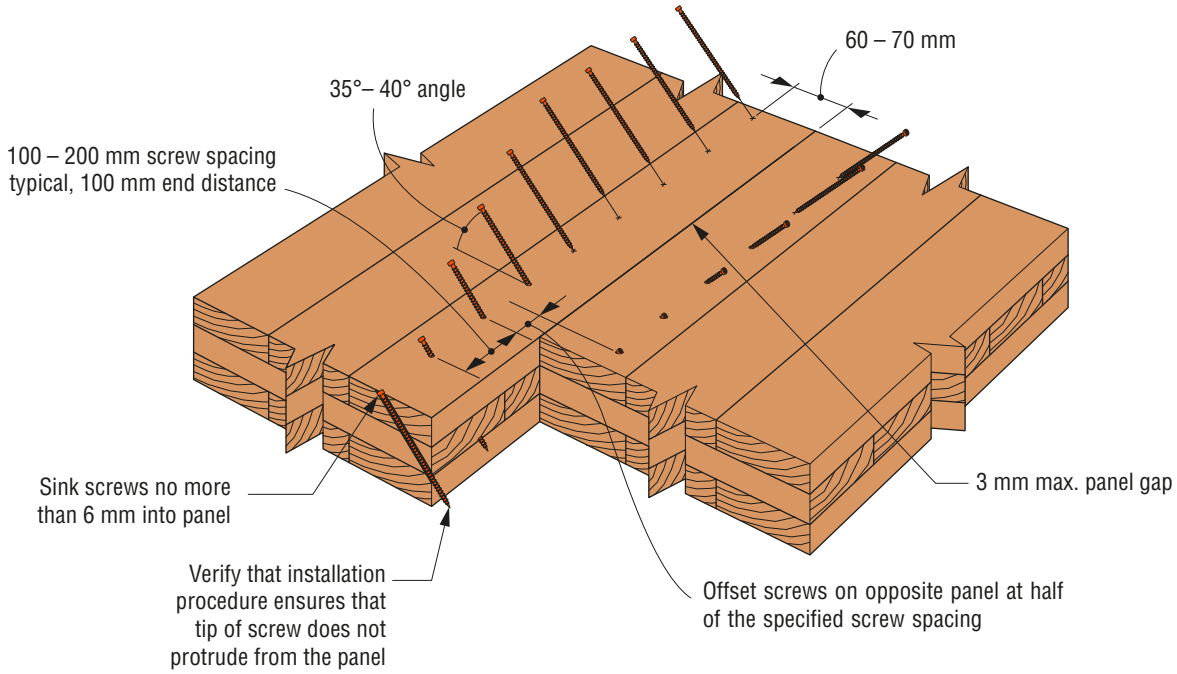
Model No.	Thread Length (mm)	Thread Length (mm)	Main Member		Withdrawal Characteristic Design Value, Q_{kw} (N/mm)		Pull-Through Characteristic Design Value, Q_{kp} (N/mm)	
			Min. Thickness (mm)	Grain	JD4	JD5	JD4	JD5
SDWC15450	114	108	38	Edge	133	84	—	—
SDWC15600	152	146	38	End	78	50	96	82
			38	Face	110	75	108	97
			2–38	Face	118	102	131	105

1. Withdrawal and pull-through characteristic values are in N/mm of thread penetration into the main member and side member, respectively.
2. Face and edge installations are at a 90° angle to the grain, and end installation is along the grain.
3. Withdrawal and pull-through loads shall be checked against tension strength in design.

Connection Geometry for Strong-Drive SDWC Truss Screws

Condition		Minimum Distance or Spacing (mm)	
		SDWC15450	SDWC15600
Edge Distance	Load in Any Direction	30	30
End Distance	Load Along Grain Toward End	60	60
	Load Along Grain Way From End	60	60
	Loading Across Grain	60	60
Spacing Between Fasteners in a Row	Loaded Along Grain	90	90
	Loaded Across Grain	60	60

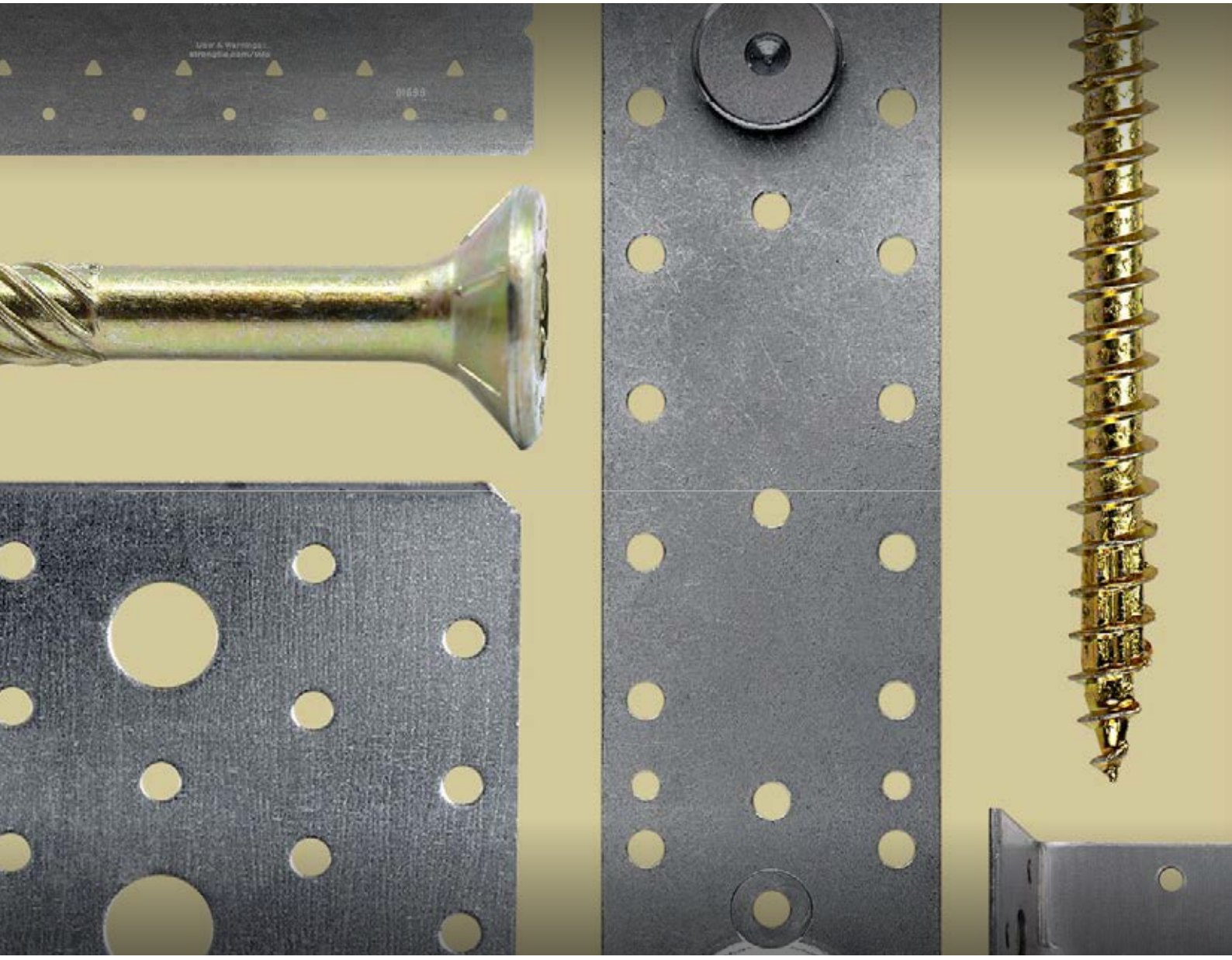
1. Edge distances, end distances, and spacing of screws shall be sufficient to prevent splitting of the timber or as required in this table, or when applicable, as recommended by the structural composite timber manufacturer, whichever is more restrictive.
2. Edge and end distances based on AS 1720.1, Table 4.8.



Typical SDWC15600 Installation with Three-Ply CLT

Connectors & Fasteners for
Mass Timber Construction
Australia & New Zealand

C-MT-AUNZ23 | +64 9 477 4440 | strongtie.co.nz
1300 STRONGTIE (1300 787 664) | strongtie.com.au



Simpson Strong-Tie® Australia Pty. Limited
ABN: 590 8888 3863

1300 STRONGTIE (1300 787664)
strongtie.com.au

Sydney

1/16 Kenoma Place
Arndell Park NSW 2148
Australia

+61 2 9830 4200
+61 2 9831 2726 Fax

Melbourne

1/475 Blackburn Rd
Mount Waverley VIC 3149
Australia

+61 3 9544 2140
+61 3 9562 8982 Fax

Simpson Strong-Tie® (New Zealand) Limited
GST: 106789002

strongtie.co.nz

Auckland

52A Arrenway Drive
Albany, Auckland 0632
New Zealand

+64 9 477 4440

C-MT-AUNZ23 Effective 1/5/2023