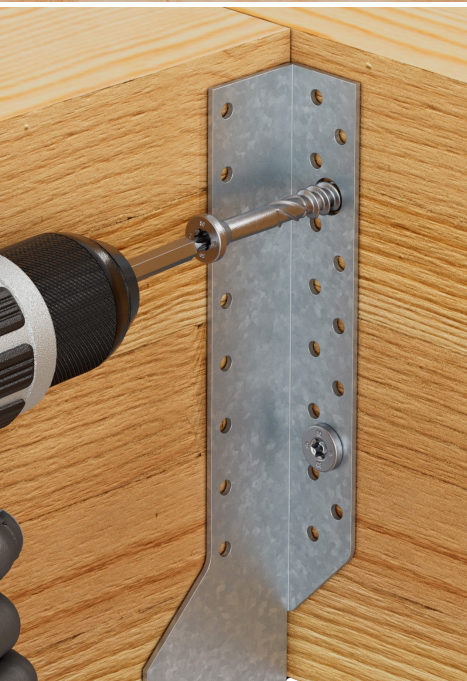


Structural Fasteners Technical Guide

C-F-EU-TG-2026-1 | strongtie.eu

SIMPSON

Strong-Tie®



SIMPSON

Strong-Tie®

Solid·Drive™

Deck·Drive™

Quik Drive®

From design to construction, put innovation to work.

At Simpson Strong-Tie a screw is not "just a screw". Just like the professionals who use our products, we continuously seek smarter methods to build safer, stronger structures. This dedication propels our ongoing pursuit of advancements in structural systems research and technology. Each fastening solution we engineer undergoes rigorous testing and refinement, tailored for every applications. Cross-laminated timber or glulam. Wood to steel. Timber Decks, Connector fastening and more.

Simpson Strong-Tie | strongtie.eu



Our “No-Equal” Pledge Includes:
quality products value-engineered for the lowest installed cost at the highest-rated performance levels, the most thoroughly tested and evaluated products in the industry, strategically located manufacturing and warehouse facilities, national code agency listings, the largest number of patented connectors in the industry, european locations with an international sales team, in-house R&D and tool and die professionals, and in-house product testing and quality control engineers

No-Equal Connectors, Anchors and Fasteners.



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3.2 Glulam Fastening

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Try the new Simpson Strong-Tie Fastener Designer

Design with recommended Simpson Strong-Tie fasteners available in your market and save time with our new, user-friendly web-app.

Fastener Designer is our new web-based tool that allows you to calculate complex fastening connections in a simple way.

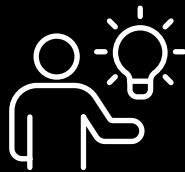
The tool provides a simple and easy-to-use interface, with a dynamic 3D viewer and integrated tutorials that help you get started.

The tool is free to use and does not require any login. Nevertheless, you can save your calculations to your device and continue your project later.

You can also save your calculation as a template which helps you save time on future calculations.

In the end, the tool will help you select Simpson Strong-Tie fasteners that meet the requirements. Ultimately it will guide you to our website, where you can find more information about the products.

Go to strongtie.eu/fastener-designer



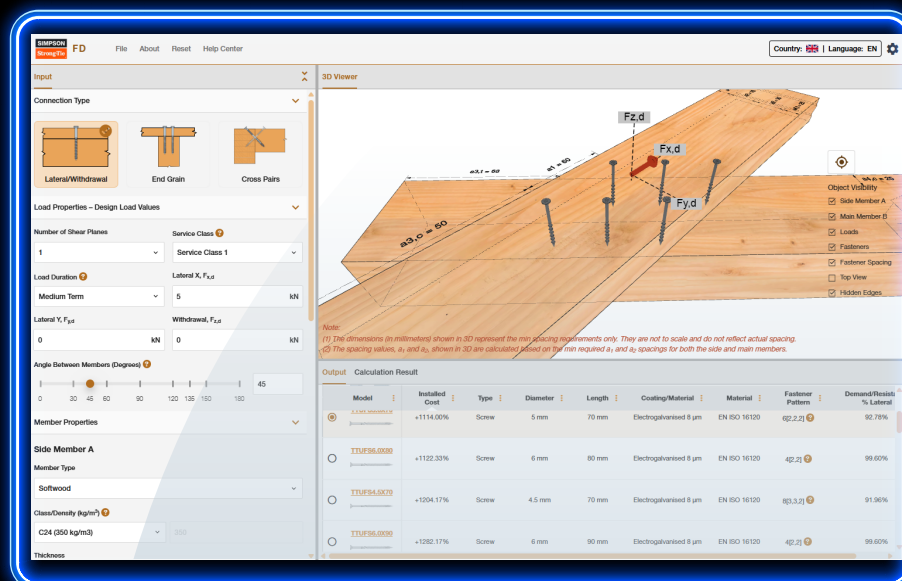
**Intuitive, dynamic
3D interface**



**Products acc. to
local availability**



**Time saving &
free to use**



**Calculating
fasteners
for wood
has never
been easier.**

strongtie.eu/fastener-designer





Exceptional strength.

SDCF Structural Fully Threaded WOOD Screw

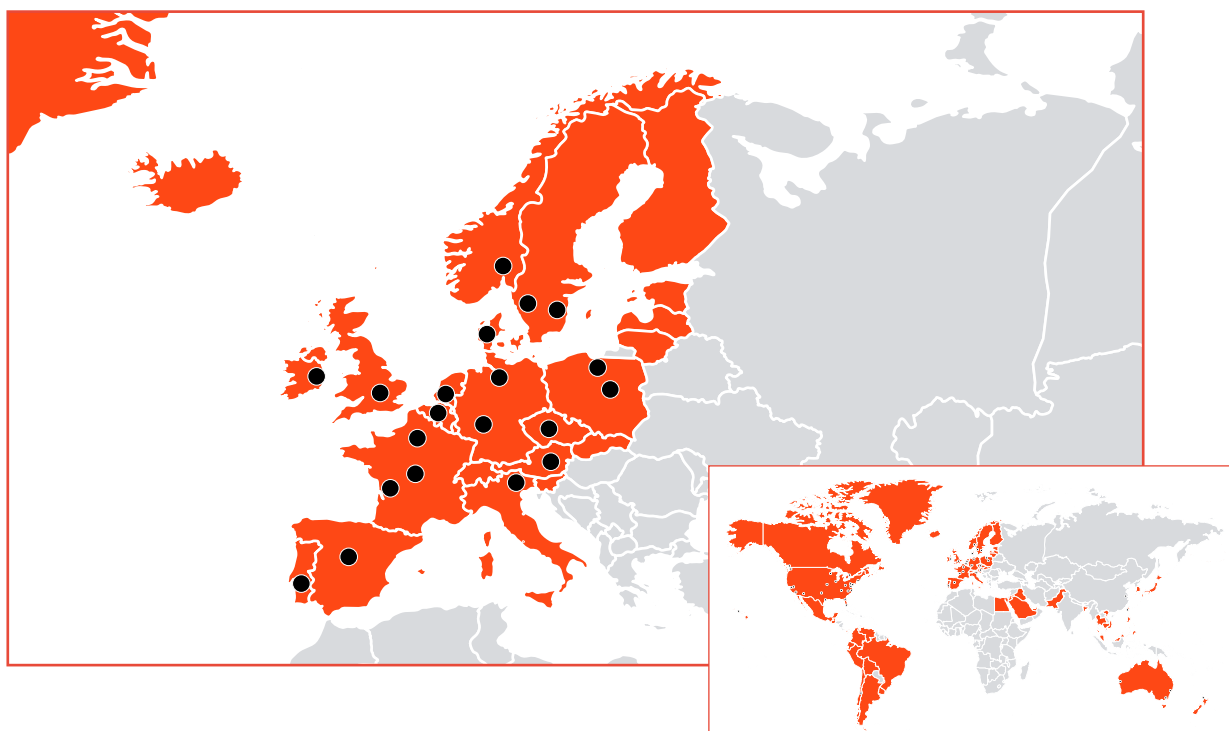
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Company Information

For more than 60 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. Our commitment to product development, engineering, testing and training is evident in the consistent quality and delivery of our products and services.

For more information, visit the company's website at strongtie.eu



● Factories, offices, or warehouses in Australia, Austria, Belgium, Canada, Chile, China, Czech Republic, Denmark, France, Germany, Ireland, Italy, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Taiwan, UK and USA.

■ Distribution in Australia, Canada, Chile, Western Europe, part of Eastern Europe, Middle East, Egypt, Japan, Korea and other Asian countries, Mexico, New Zealand, UK, part of South America and USA

European Fastener Manufacturing

Simpson Strong-Tie® has several manufacturing facilities placed strategically across the European continent, to ensure a high degree of product availability and a strong understanding of the local markets. We have fastener manufacturing in various locations across Europe and our close-knit logistical network ensures that there is always a Simpson Strong-Tie warehouse or distributor near you.

Company Information

The Simpson Strong-Tie® Company Inc. “No Equal” Pledge Includes:

- Quality products value-engineered for the lowest installed cost at the highest-rated performance levels
- Most thoroughly tested and evaluated products in the industry
- Strategically located manufacturing and warehouse facilities
- National code agency listings
- Largest number of patented connectors in the industry
- European locations with an international sales team
- In-house R&D and tool and die professionals
- In-house product testing and quality control engineers

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’s products and services.



Mike Olosky
Chief Executive Officer

Testing Laboratory Accreditation



The Andris Peterson European Test Laboratory, located in the UK in Tamworth, Staffordshire, is the first manufacturer’s facility to achieve third party accreditation to the international standard BS EN ISO/IEC 17025.

The world-class facility now conducts around 10,000 product tests annually and has recently benefited from a significant investment, which will enable double productivity. The fact that we extensively test our products give 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.



We Are ISO 9001-2015 Registered

Simpson Strong-Tie is an ISO 9001-2015 registered company. ISO 9001-2015 is an internationally-recognized quality assurance system which lets our domestic and international customers know that they can count on the consistent quality of Simpson Strong-Tie® products and services.



ISO 14001

Our Swedish, French (St. Gemme la Pleine) and UK facilities are ISO 14001 certified. This standard states the requirements for an environmental management system, and applies to the environmental aspects over which our company has control and can be expected to have an influence.



OHSAS 18001

Our Tamworth, UK facility is OHSAS 18001 certified. This certification reflects an internationally applied British Standard for occupational health and safety management systems.

To learn more about these certifications and organizations, please visit ISO.org, ICCSafe.org and bsigroup.com.

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General Information

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Online Tools & Support for Engineers



Technical Support

Experts in structural wood engineering, Simpson Strong-Tie is always at your side, making life easier with complete solutions, effective support, tools and advice.

With our proven track-record for service and support, peace of mind comes built-in. It's part of an engineer's DNA to plan for the unexpected. We've already spent over six decades doing just that.

We are with you every step of the way; from planning and tendering to site-build, we have people on the ground to support the process and to give further guidance. Our Technical Support team is on hand to answer your questions and provide some sound installation advice, from making sure you have the most suitable product, to the best ways to go about installing them.



CAD/BIM Library

From BIM models to XML, we have over 120,000 CAD friendly files for our construction solutions available for download right here!

This all-new facility puts BIM and CAD files for our entire product range just a few clicks away from implementation into all of the major construction design tools including Autocad, Cadwork, Revit, Sema and Tekla. File formats currently available:

- BIM: 2D and 3D Revit, IFC
- CAD: DXF, SAT, SKP, STL
- Other uses: PDF, XML

We are also constantly working on plugins that seamlessly integrate our entire BIM and CAD library with your design software of choice.



DoP/ETA Library

Our entire library of DoP (Declaration of Performance) and ETA documentation is available online. Here we provide DoP's in all main European languages.

If you know the name of the product family, you can search on each of our websites, or — alternatively — browse the products section as the relevant DoP and ETA file can also be found on each individual product's detail page.

Go to strongtie.eu to find more.



Environmental Product Declarations

At Simpson Strong-Tie we frequently consider the environmental impact of how we design and make our products. To support this, we have a suite of environmental product declaration (EPD) certificates conforming to EN 15804.

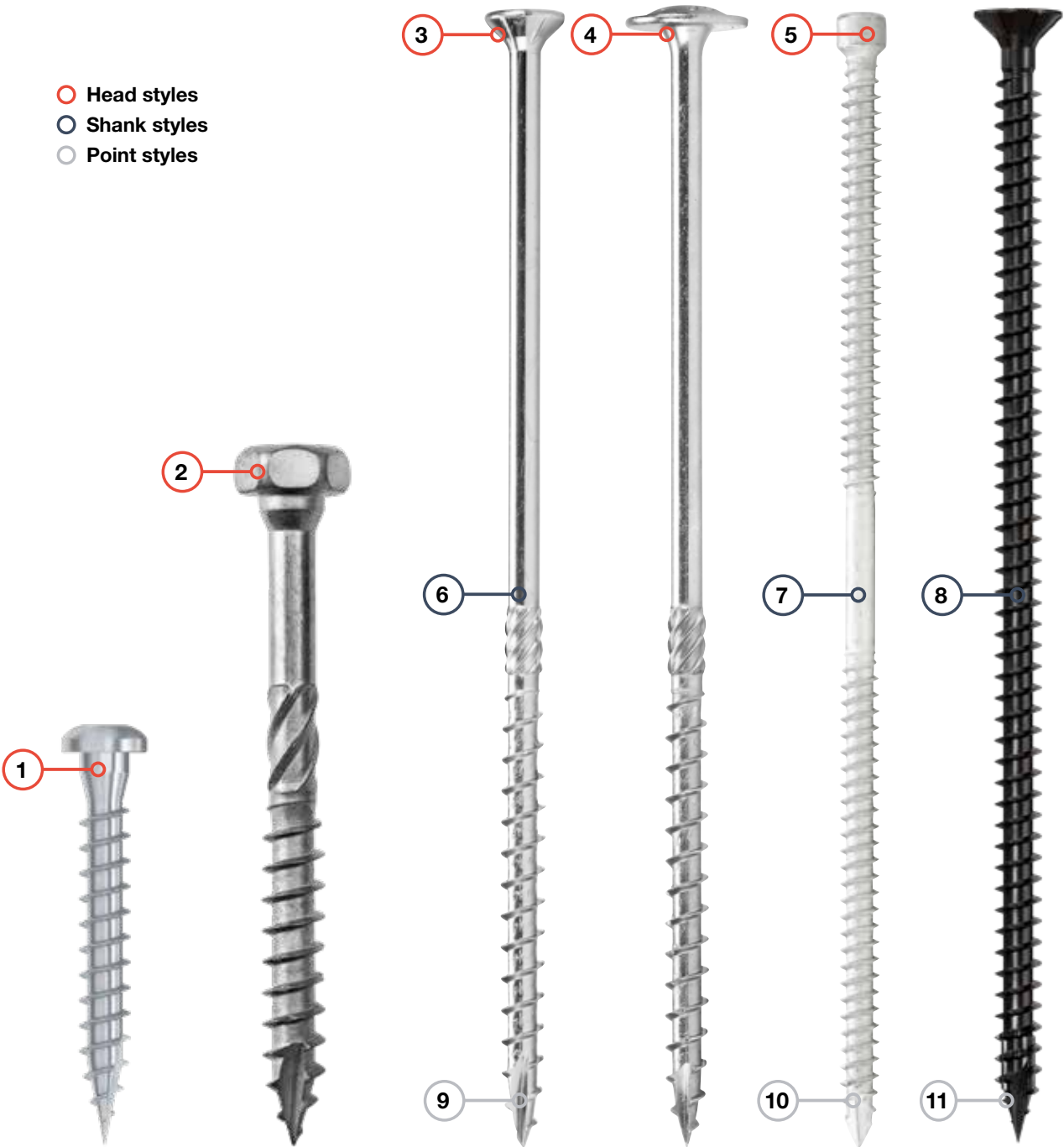


To help us to understand, monitor and mitigate our impact on the environment, we turned to construction industry experts: Institute Bauen und Umwelt (IBU) to conduct a full life cycle assessment of the Simpson Strong-Tie manufactured ranges of connectors, screws and nails.

Simpson Strong-Tie EPD certificates are available to download at strongtie.eu/epd

Fastener Features

- Head styles
- Shank styles
- Point styles



Fastener Types and Sizes

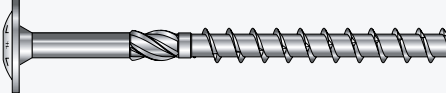
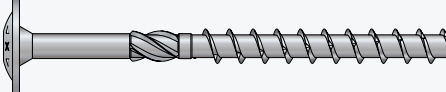
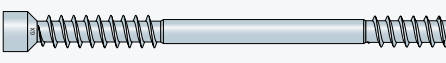
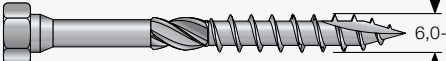
Solid-Drive™

Fastener Types and Sizes

**ETA-21/0670**

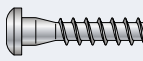
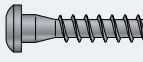
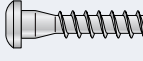
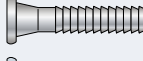
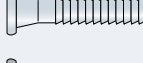
The Solid-Drive range consists of 25 high-quality fasteners designed to meet the demands of structural wood constructions.

The first 11 screws shown in this window are approved according to ETA-21/0670, which gives them a number of benefits, that are presented in the table on page 18.

TTUFS 50-180 mm		4,5-6,0 mm
TTZNFS 50-180 mm		4,5-6,0 mm
TTSFS 60-140 mm		5,0-6,0 mm
SWW 60-400 mm		6,0-10,0 mm
SWWZ 80-340 mm		6,0-10,0 mm
SWC 60-400 mm		6,0-10,0 mm
SWD 65-330 mm		6,5-8,0 mm
SSH 40-300 mm		6,0-12,0 mm
SSF 40-80 mm		8,0-10,0 mm
SDCF 120-600 mm		8,0-12,0 mm
SDCFC 120-1000 mm		8,0-10,0 mm

**ETA-04/0013**

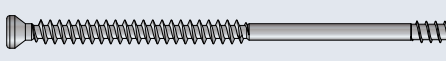
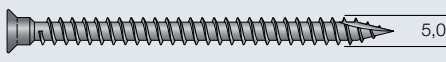
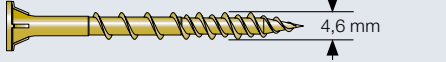
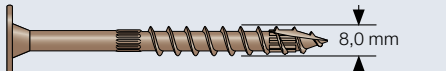
Our CNA connector nails and CSA connector screws are ETA-approved according to ETA-04/0013.

CSA 25-80 mm		4,0-5,0 mm
CSA-Z 35-40 mm		5,0 mm
CSA-S 25-40 mm		5,0 mm
CNA 35-100 mm		4,0 mm
CNA-G 50 mm		4,0 mm
CNA-S 40-60 mm		4,0 mm

**EN14592**

Furthermore, the Solid-Drive range includes six fasteners which are CE-marked according to EN14592.

With this range we give you precision engineered to meet any demand.

SWRS 210-480 mm		7,0 mm
SDD 93-173 mm		7,5 mm
CSFT 70-110 mm		5,0-6,0 mm
TTF 35-75 mm		4,2 mm
WSV 44-76 mm		4,6 mm
SDW 68-152 mm		7,9 mm
SDWS 75-252 mm		8,0 mm

Application Matrix

Product	Environment			Chapter 3 Timber to Timber										Chapter 4 Steel to Timber	Chapter 5 Boards to Timber
	Indoor	Outdoor	Severe	Solid Timber	Glulam				CLT						
					General Glulam	Inclined	Cross Pairs	Reinforce-ment	90° T-Connect.	Wall-Plate to CLT	CLT Half-Lap	CLT Butt-Joint	CLT Spline		
TTUFS	•			• (p. 78)	• (p. 103)				• (p. 152)	• (p. 163)	• (p. 174)		• (p. 191)	◦* (p. 216)	• (p. 234)
TTZNFS		•		• (p. 78)	• (p. 103)				•	•	•		•	◦* (p. 216)	• (p. 234)
TTSFS			•	• (p. 78)	• (p. 121)				•	•	•		•	◦* (p. 216)	• (p. 234)
SWW	•			• (p. 82)	• (p. 107)				• (p. 153)	• (p. 164)	• (p. 175)			◦	◦
SWWZ		•		• (p. 82)	• (p. 107)				•	•	•			◦	◦
SWC	•			• (p. 86)	• (p. 112)				• (p. 158)	• (p. 166)	• (p. 177)			◦* (p. 222)	◦
SWD	•			• (p. 89)	• (p.115)	• (p. 127)	• (p. 131)		• (p. 160)	• (p. 170)	• (p. 180)	• (p. 187, 189)			
SSH		•		◦ (p. 91)	◦ (p. 117)									• (p. 202)	
SSF		•		◦	◦									• (p. 206)	
SDCF	•			• (p. 94)	• (p. 119)	◦	◦	• (p. 137)		• (p. 172)				◦* (p. 225)	
SDCFC	•			• (p. 97)	• (p. 122)	• (p. 128)	• (p. 132)	• (p. 137)	• (p. 161)	• (p. 171)	• (p. 181)	• (p. 188, 190)			
CSA	•													• (p. 209)	
CSA-Z		•												• (p. 210)	
CSA-S			•											• (p. 210)	
CNA	•													• (p. 211)	
CNA-G		•												• (p. 212)	
CNA-S			•											• (p. 212)	
SWRS	•														
SDD	•													• (p. 198)	
CSFT	•													•* (p. 214)	
TTF	•												• (p. 194)		• (p. 230)
WSV	•												• (p. 193)		• (p. 232)
SDW	•			• (p. 199)	• (p. 124)										
SDWS		•		• (p. 100)	• (p. 125)										

• Recommended

◦ Suitable (but not always recommended - see Fastener Designer)

* Can be used, but hole in metal needs to be countersunk for full contact with screw head - see page 29.

ETA-approval

Benefits of using our ETA-approved fasteners

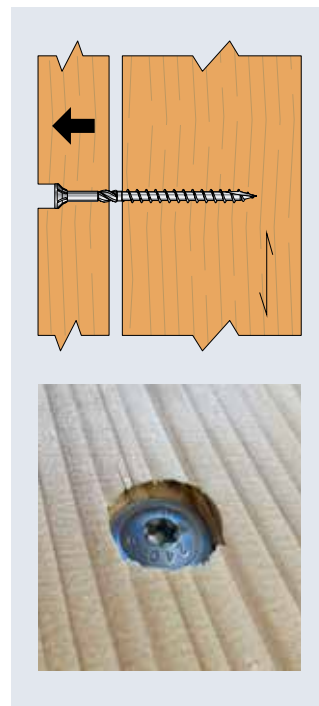
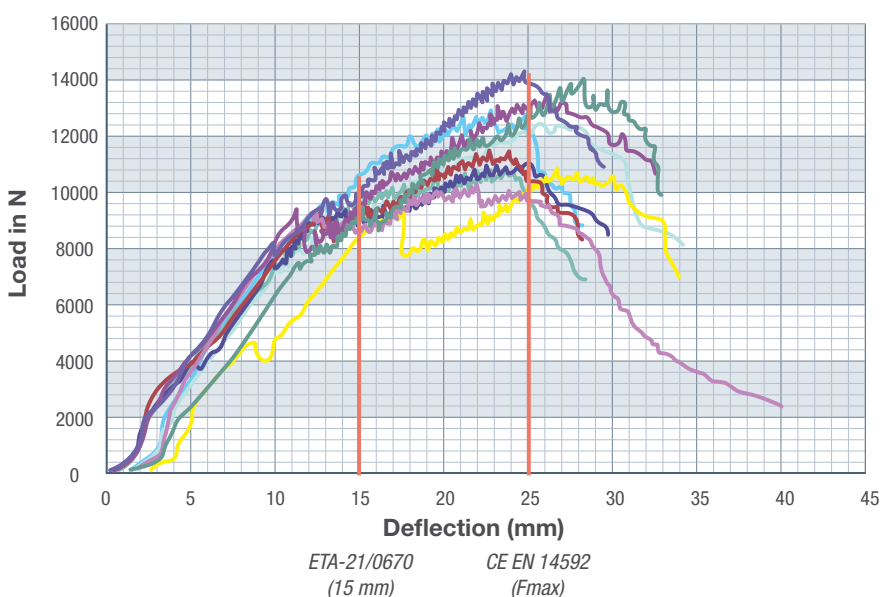


The ETA-21/0670 describes the properties of our main line of fasteners for structural timber constructions, in depth. For you, the ETA works as documentation that the fasteners have been rigorously tested. This ensures that you can rely on our documentation as the basis for your calculations and specifications of the products.

There are a number of specific advantages when using ETA certified fasteners compared to using fasteners that are CE marked according to a harmonized European standard. The ETA gives you more installation possibilities when using our fasteners.

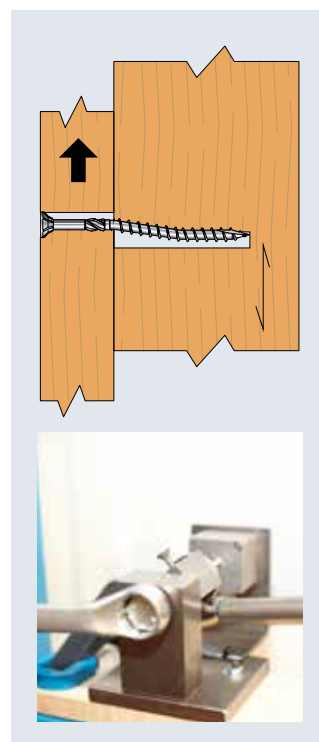
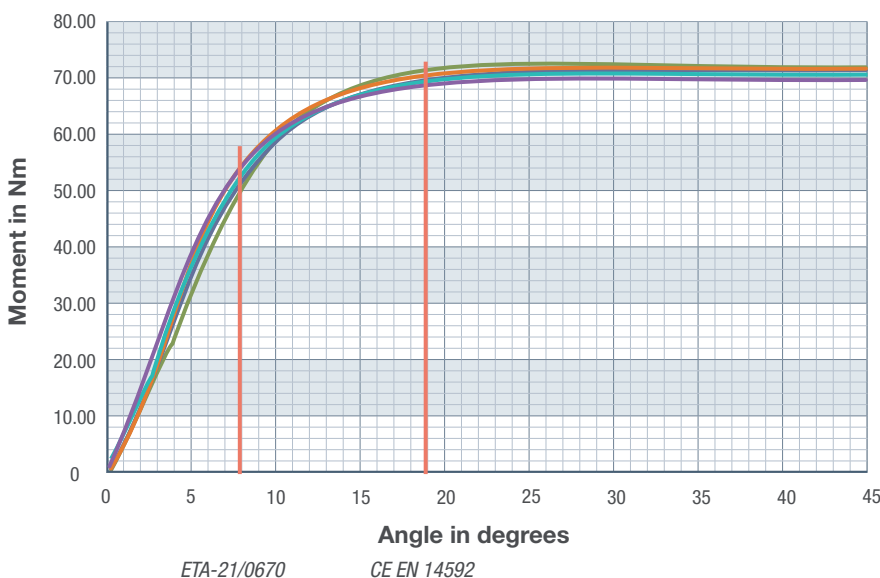
Head-Pull Through ($F_{head,k}$)

The declared capacity for head-pull through according to ETA-21/0670 is limited to a maximal displacement of 15 mm. According to EN 14592 there are no limitations and it is common to declare F_{max} values which normally allows a displacement up to 25-35 mm in the structure.



Yield Moment ($M_{y,k}$)

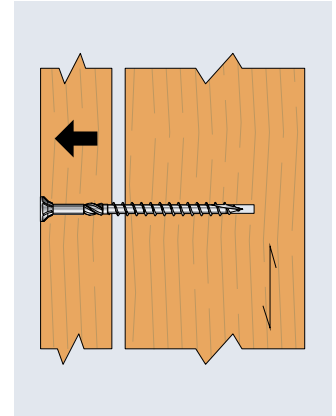
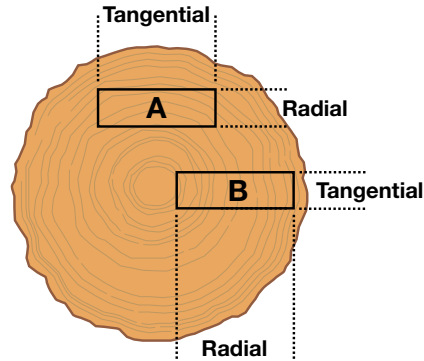
Yield moment capacities are based on the requirement in the EAD 130118-01-0603. The yield moment is the value at the plastic bending angle $\alpha = 45/d^{0.7}$ degrees, the ductility of our ETA approved fasteners have also been tested by a 20 degree higher bending angle than the standard requirement according to EN 14592.



ETA-approval

Withdrawal Capacity ($F_{ax,k}$)

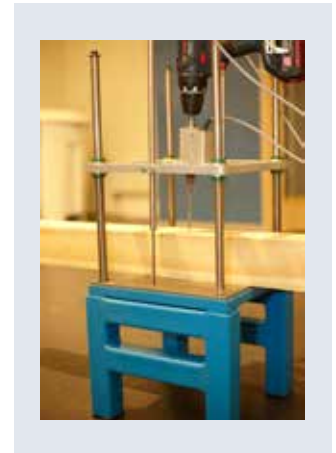
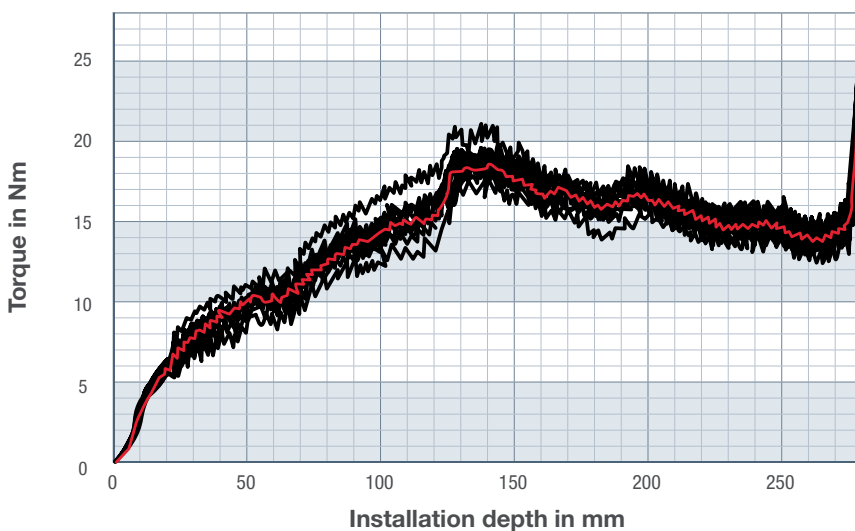
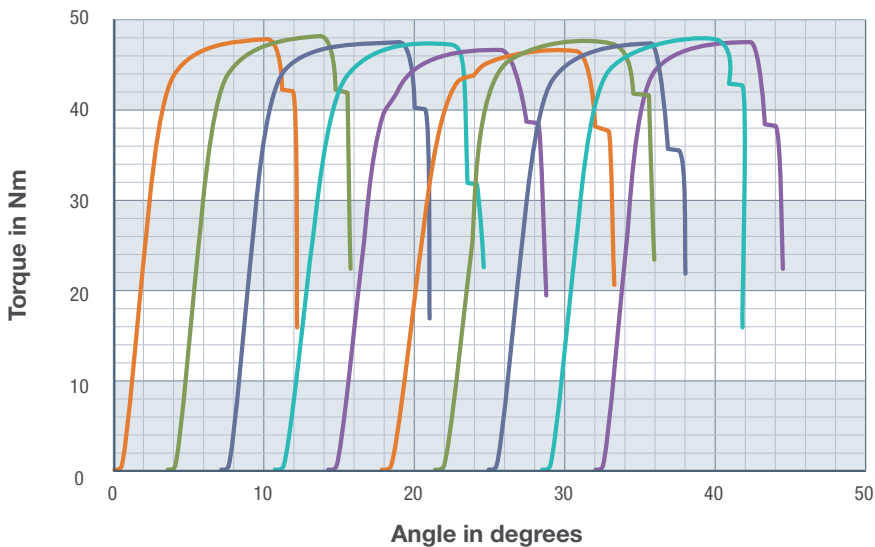
The withdrawal capacity for the ETA approved fasteners is valid for all grain directions, tangential, radial and parallel (vs. end grain). The number of test specimens are extended in comparison to the standard requirement.



General
Information

Insertion Moment ($F_{tor,k} / R_{tor,mean}$)

Our ETA approved fasteners have been installed and tested in LVL specimens with a density up to 550 kg/m^3 , the insertion moment was compared against the torsional strength and all screws fulfill the requirement $f_{tor,k} / R_{tor,mean} > 1,5$.



ETA-approval

Comparison of CE certified screws
acc. to **EN14592** and **Eurocode 5** vs. **ETA-21/0670** and **ETA-13/0796**

Property	EN14592 and Eurocode 5	ETA-21/0670
		
CLT calculations	Not included	Included in ETA ¹
LVL calculations	Partially included in EC5	Included in ETA ²
Calculations for rafter insulation	Not included	Included in ETA ³
Withdrawal 0°	Not included	Tested and approved for structural installations in any directions vs the grain direction 0-90°. (SWD screws with 8 mm thread diameter approved between 15-90°.)
Pre-drilling	Mandatory from d = 8 mm	Not required
Bending angle / ductility	Limited by $45/d^{0.7}$ degrees	Tested and approved for a 20° higher bending angle than the standard.
Space and edge distance	EC5 = (without examination)	Improved space and edge distance for SWD screws. The reduced values gives the opportunity to add more fasteners to the connection on a smaller area and get closer to the edges without pre-drilling.
Extended test program	10 test specimens per characteristic parameter	Extended number of test specimens per characteristic parameter
Displacement requirement head pull-through	No limitations	Test stopped at max. 15 mm displacement

¹⁾ Solid-Drive screws that are included in ETA-21/0670 can be used for CLT applications, you find all formulas for making the calculations in our ETA approval and also the space and edge distances. The quickest and easiest way for making CLT calculations is to use our software Solidwood where you in four simple steps can get load values based on your application.

²⁾ In the ETA-21/0670 you find support for LVL (softwood) calculations for all Solid-Drive Fasteners.

³⁾ Screws with diameters between 6 mm and 12 mm may also be used for the fixing of thermal insulation material on rafters and on vertical facades, you can find the calculations in the ETA.

Terms and Conditions

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Calculation and Design of Screw Connections

Calculation and Design

In the following pages we will go through the basics of how to calculate and design screw connections. There are a number of factors to take into consideration when calculating your screw

connections. For example the direction and duration of the loads. The characteristics of the wood and other materials and of course the impact of the environment in which the connection is placed.

Load Duration Classes

The design load capacity depends on the duration of the load. In the case of a combination of loads with different load durations, the class of the load with the shortest duration is selected.

For example, in the case of a load combination of dead weight (load duration class P) and wind load (load duration class S), the load duration is S.

Load Duration		
Load duration	Duration of characteristic load	
P	Permanent	More than 10 years. For example, weight of property
L	Long term	6 months - 10 years. For example, useful load in warehouse
M	Medium	1 week - 6 months. For example, payload and snow load
S	Short term	Less than 1 week. For example, wind load
I	Momentary	For example, accident load

Design Load Capacities

The design load carrying capacity $F_{R,d}$ is calculated by correcting the characteristic load carrying capacity $F_{R,k}$ by the factor k_{mod} and γ_m .

$$F_{R,d} = k_{mod} \frac{F_{R,k}}{\gamma_m}$$

γ_m is the partial factor for a material property.

k_{mod} is a modification factor taking into account the effect of the duration of load and moisture content.

Note: The values given in this document are the characteristic capacities except when other is communicated.

Service Class	k_{mod}				
	Load Duration				
	P	L	M	S	I
1	0,6	0,7	0,8	0,9	1,1
2	0,6	0,7	0,8	0,9	1,1
3	0,5	0,55	0,65	0,7	0,9

γ_m	
Fastener Designer	1,30
Glulam	1,25
CLT	1,30

Service Classes

When connecting timber structures, the dimensional load-bearing capacity is influenced by the effect of moisture. The requirements for

the corrosion protection of the fittings depend on the climate class in which the fastener is used.

Service Class	Description	Examples
1	Moisture content in the materials corresponding to a temperature of 20°C and the relative humidity of the surrounding air only exceeding 65% for a few weeks per year.	Warm roof, intermediate floors, timber frame walls - internal and party walls.
2	Moisture content in the materials corresponding to a temperature of 20°C and the relative humidity of the surrounding air only exceeding 85% for a few weeks per year.	Cold roof, ground floors, timber frame walls - external walls where member is protected from direct wetting.
3	Climatic conditions leading to higher moisture contents than in service class 2.	External uses - fully exposed.

Timber Grades

Timber Grades - Characteristic Densities (k_{dens} factor)

In this document, all values for **solid timber** are given for a C24 timber.

In case of **glulam** they are given for a GL24h glulam.

In case of **CLT**, the characteristic density used is $\rho_k = 350 \text{ kg/m}^3$.

For **boards**, the characteristic density used is $\rho_k = 380 \text{ kg/m}^3$.

For **plywood**, the characteristic density used is $\rho_k = 490 \text{ kg/m}^3$.

It is possible to change the timber class by multiplying the characteristic values by the k_{dens} factor.

$$k_{dens} = \left(\frac{\rho_k}{\rho_a} \right)^{0.8}$$

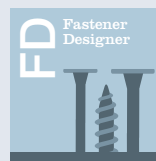
with:

ρ_k the target characteristic density according to EN 338

ρ_a the characteristic density of the timber according to EN 338

so, for solid timber the equation is:

$$k_{dens} = \left(\frac{\rho_k}{350} \right)^{0.8}$$



In this catalogue you will find the characteristic values for our fasteners in C24 solid timber and GL24h glulam.

For all other timber- and glulam grades you will find the characteristic values in Fastener Designer:

strongtie.eu/fastener-designer

Solid Timber -

The table below allows to go from C24 to other solid timber classes:

Timber grade		C14	C16	C18	C20	C22	C24
ρ_k	[kg/m³]	290	310	320	330	340	350
k_{dens}	[-]	0,86	0,91	0,93	0,95	0,98	1,00

For glulam the equation is:

$$k_{dens} = \left(\frac{\rho_k}{385} \right)^{0.8}$$

Glulam -

The table below allows to go from GL24h to other glulam classes:

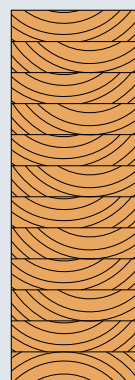
Glulam grade		GL20h	GL20c	GL22h	GL22c	GL24h
ρ_k	[kg/m³]	340	355	370	355	385
k_{dens}	[-]	0,91	0,94	0,97	0,94	1,00

Difference between GLT c and GLT h

Glued Laminated Timber made from one type wood grade planks is indicated with symbol h. The c mark indicate beams with different layers, where the wood of a better quality is used in the outer layers, while the planks of a lower class are used inside.



GLT c



GLT h

Correction Factors / Pre-Drilling Wood

Correction Factors

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_{ef} : $R_{k,n} = n_{ef} \times R_k$

Total number of fasteners - Tensile forces (or number of cross-screwed pairs)

Total load capacity is obtained by multiplying table values by factors on the left. The same table is used for n_{ef} number of cross-bolted screw pairs when sizing with SWD $n_{ef} = n^{0,9}$.

In case of tensile forces

Number of fasteners n	1	2	3	4	5	6	7	8	9
Effective number of fasteners n_{ef}	1,0	1,9	2,7	3,5	4,3	5,0	5,8	6,5	7,2

Shear loading

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:

TTUFS, TTZNFS, TTSFS, SWC, SWW, SWWZ, SWD, SSH, SSF, WSV.

On the same wood grain: $n_{ef} = n_{keff}$

Staggered arrangement of 1xd: $n_{ef} = n$

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

Recommended Pre-Drilling Hole Diameter Wood

All ETA approved fasteners can be driven into the wood with or without pre-drilling as long as the characteristic density of the member not exceed 550 kg/m³ for carbon steel, and 500 kg/m³ for stainless steel. The benefits of pre-drilling is reduced space & edge distances and increased shear capacity of the connection.

Recommended max. pre-drill hole diameter wood

Fastener	Fastener diameter d							
	Ø4,5	Ø5,0	Ø6,0	Ø6,5	Ø7,0	Ø8,0	Ø10,0	Ø12,0
TTUFS/TTZNFS	Ø2,5	Ø3,0	Ø3,5	-	-	-	-	-
TTSFS	-	Ø3,0	Ø3,5	-	-	-	-	-
TTUFP/TTZNFP	-	Ø3,0	Ø3,5	-	-	-	-	-
SWW	-	-	Ø3,5	-	-	Ø5,0	Ø6,0	-
SWC	-	-	Ø3,5	-	-	Ø5,0	Ø6,0	-
SWD	-	-	-	Ø3,5	-	Ø5,0	-	-
SSH/SSF	-	-	Ø3,5	-	-	Ø5,0	Ø6,0	Ø6,5
SDCF/SDCFC	-	-	Ø3,5	-	-	Ø5,0	Ø6,0	Ø6,5
SWRS	-	-	-	-	Ø5,0	-	-	-
SDW/SDWS	-	-	-	-	-	Ø5,0	-	-

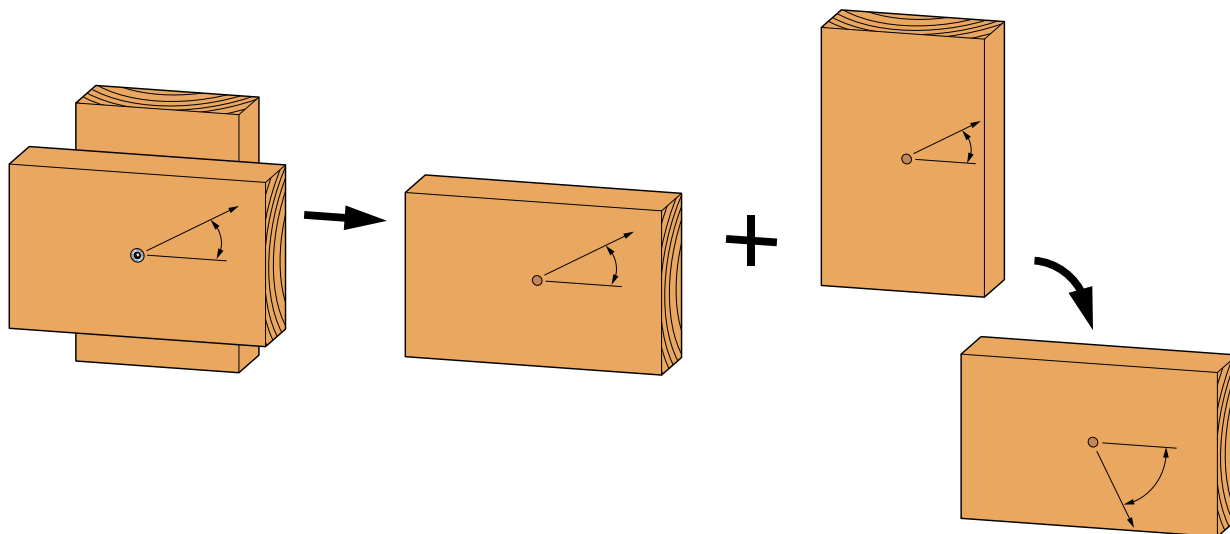
Space and Edge Distance

Space and Edge Distance

Edge and centre space distances for the specific applications are given in each chapter. Below you find the general values.

Edge & centre distances (All screws except SWD, SDCF and SDCFC) depend on a number of factors. These include:

1. The outer diameter of the screw d
2. Direction of force
3. Angle between transverse force direction and wood fibre direction α . This must be checked per piece of wood as the fibre direction may differ.



Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,u}$) is at least $25 \times d$.

For screws the minimum width / thickness for structural member shall be in accordance with:

Screw diameter	$d < 8 \text{ mm}$	$d = 8 \text{ mm}$	$d = 10 \text{ mm}$	$d = 12 \text{ mm}$
Minimum thickness t for structural members (mm)	24	30	40	80

Panel to timber Case

Refer to EN 1995-1-1 (Eurocode 5) clause 8.3.1.3, see page 23.

Steel to timber Case

Refer to EN 1995-1-1 (Eurocode 5) clause 8.3.1.4, see page 23.

Space and Edge Distance

Minimum Space and Edge Distances - Laterally or Combined Loaded Screws

For screws arranged at angles $\alpha \leq 90^\circ$ between screw axis and grain direction minimum spacing and distances are defined as follows:

Minimum spacing a_1 or a_2 is defined perpendicular to the fastener axis, minimum end or edge distances $a_{3,c}$, $a_{3,t}$, $a_{4,c}$ or $a_{4,t}$ parallel or

perpendicular to the grain, respectively, are defined between the centre of the threaded length (axial loading) or the length (lateral loading) in the respective timber member and the member surface as for axially loaded screws in EN 1995-1-1, Figure 8.11.a.

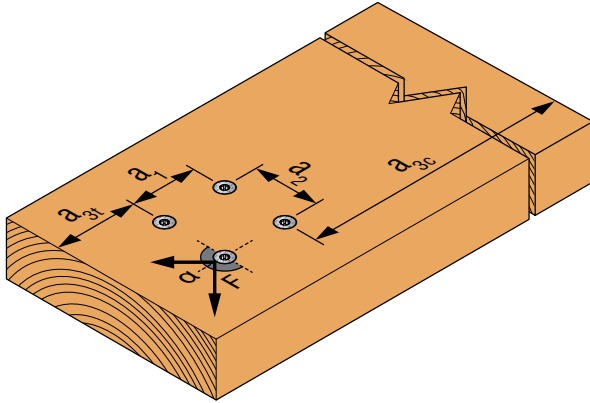


Illustration above shows angle between load direction and grain = 0°

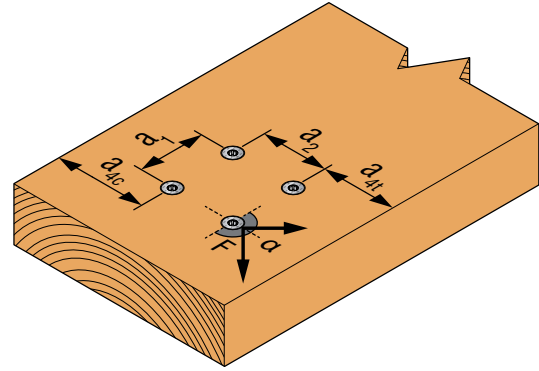
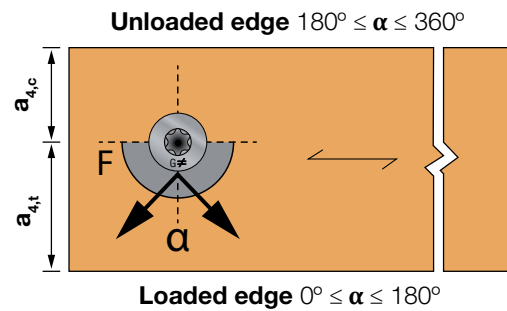
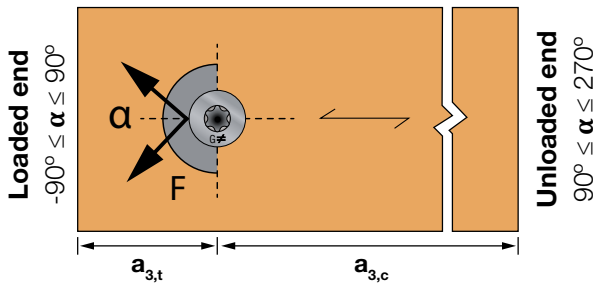


Illustration above shows angle between load direction and grain = 90°



Laterally Loaded Screws - Minimum spacing or end/edge distance				
	Angle α	Without predrilled holes		With predrilled holes
		$\rho_k \leq 420 \text{ kg/m}^3$	$420 \text{ kg/m}^3 < \rho_k \leq 500 \text{ kg/m}^3$	
a_1 Spacing (parallel to grain)	$0^\circ \leq \alpha \leq 360^\circ$	$d < 5 \text{ mm: } (5 + 5 \cos \alpha) d$ $d \geq 5 \text{ mm: } (5 + 7 \cos \alpha) d$	$(7 + 8 \cos \alpha) d$	$(4 + \cos \alpha) d$
a_2 Spacing (perpendicular to grain)	$0^\circ \leq \alpha \leq 360^\circ$	$5 d$	$7 d$	$(3 + \sin \alpha) d$
$a_{3,t}$ Distance (loaded end)	$-90^\circ \leq \alpha \leq 90^\circ$	$(10 + 5 \cos \alpha) d$	$(15 + 5 \cos \alpha) d$	$(7 + 5 \cos \alpha) d$
$a_{3,c}$ Distance (unloaded end)	$90^\circ \leq \alpha \leq 270^\circ$	$10 d$	$15 d$	$7 d$
$a_{4,t}$ Distance (loaded edge)	$0^\circ \leq \alpha \leq 180^\circ$	$d < 5 \text{ mm: } (5 + 2 \sin \alpha) d$ $d \geq 5 \text{ mm: } (5 + 5 \sin \alpha) d$	$d < 5 \text{ mm: } (7 + 2 \sin \alpha) d$ $d \geq 5 \text{ mm: } (7 + 5 \sin \alpha) d$	$d < 5 \text{ mm: } (3 + 2 \sin \alpha) d$ $d \geq 5 \text{ mm: } (3 + 4 \sin \alpha) d$
$a_{4,c}$ Distance (unloaded edge)	$180^\circ \leq \alpha \leq 360^\circ$	$5 d$	$7 d$	$3 d$

Notes:

EN 1995-1-1 (Eurocode 5) clause 8.3.1.2, table 8.2

For "Board to Timber" case, the space distances in the timber element can be multiplied by a factor 0.85

For "Steel to Timber" case, the space distances in the timber element can be multiplied by a factor 0.7

d = Outer thread diameter of the screw

ρ_k = characteristic timber density in kg/m^3

For Douglas fir members minimum spacing and distances parallel to the grain shall be increased by 50% if the members not are pre-drilled.

Space and Edge Distance

Minimum Space and Edge Distance - Axially Loaded Screws

Axially Loaded Screws - Minimum spacing or end/edge distance

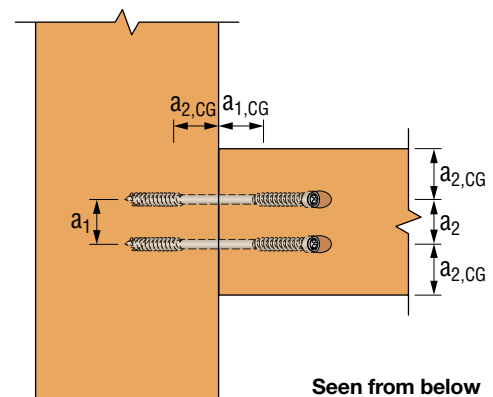
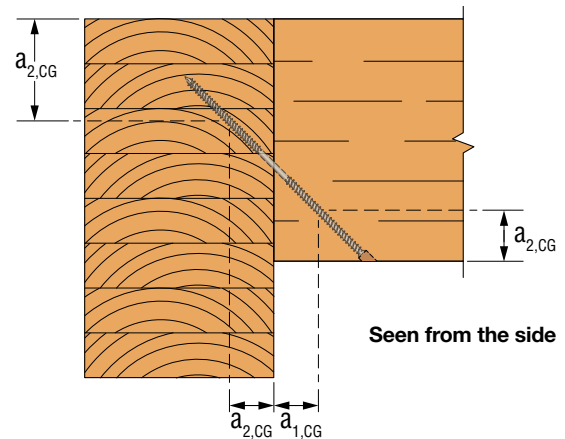
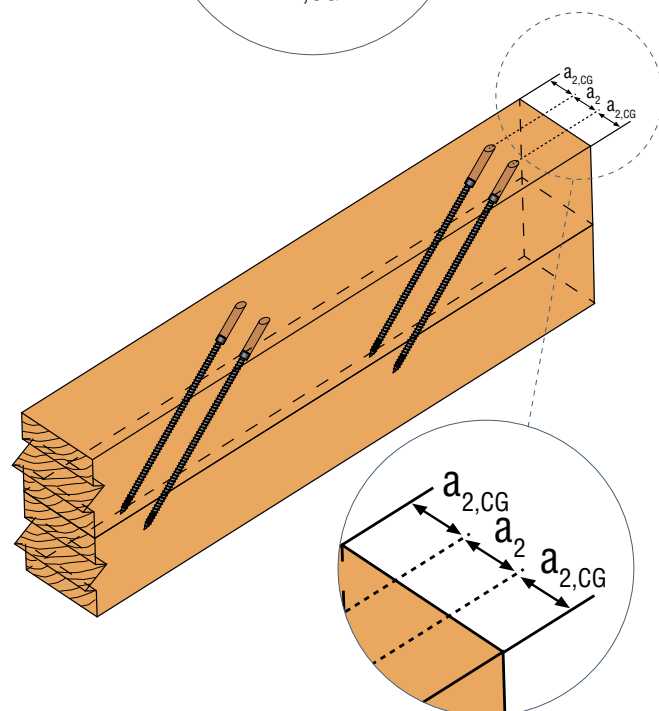
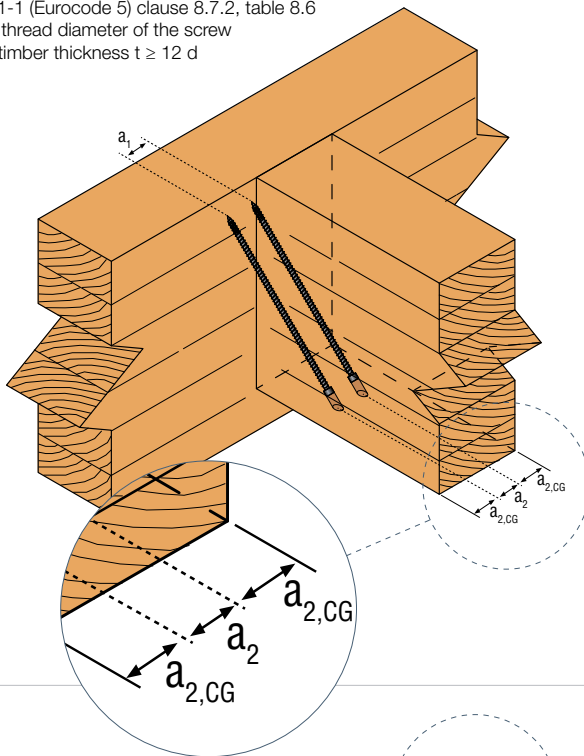
a_1 Minimum screw spacing parallel to the grain	7 d
a_2 Minimum screw spacing perpendicular to the grain	5 d
$a_{1,CG}$ Minimum end distance of the centre of gravity of the threaded part of the screw in the member	10 d
$a_{2,CG}$ Minimum edge distance of the centre of gravity of the threaded part of the screw in the member	4 d

For axially loaded screws installed perpendicular to the surface table 8.6 is used. Note that $a_{1,CG}$ is shown as $a_{3,c}$ and $a_{2,CG}$ is shown as $a_{4,c}$ on the illustrations for perpendicular installations in the chapter timber to timber. For axially loaded screws $a_{3,i}$ and $a_{4,i}$ are not relevant.

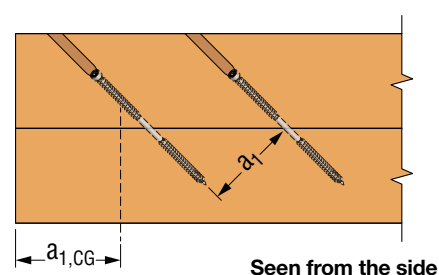
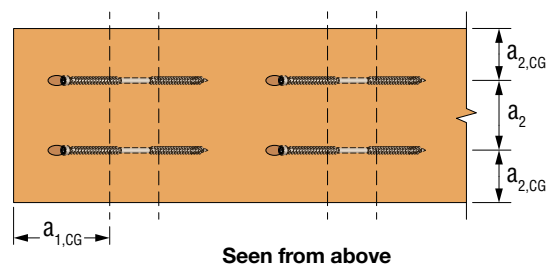
¹⁾ EN 1995-1-1 (Eurocode 5) clause 8.7.2, table 8.6

²⁾ d = Outer thread diameter of the screw

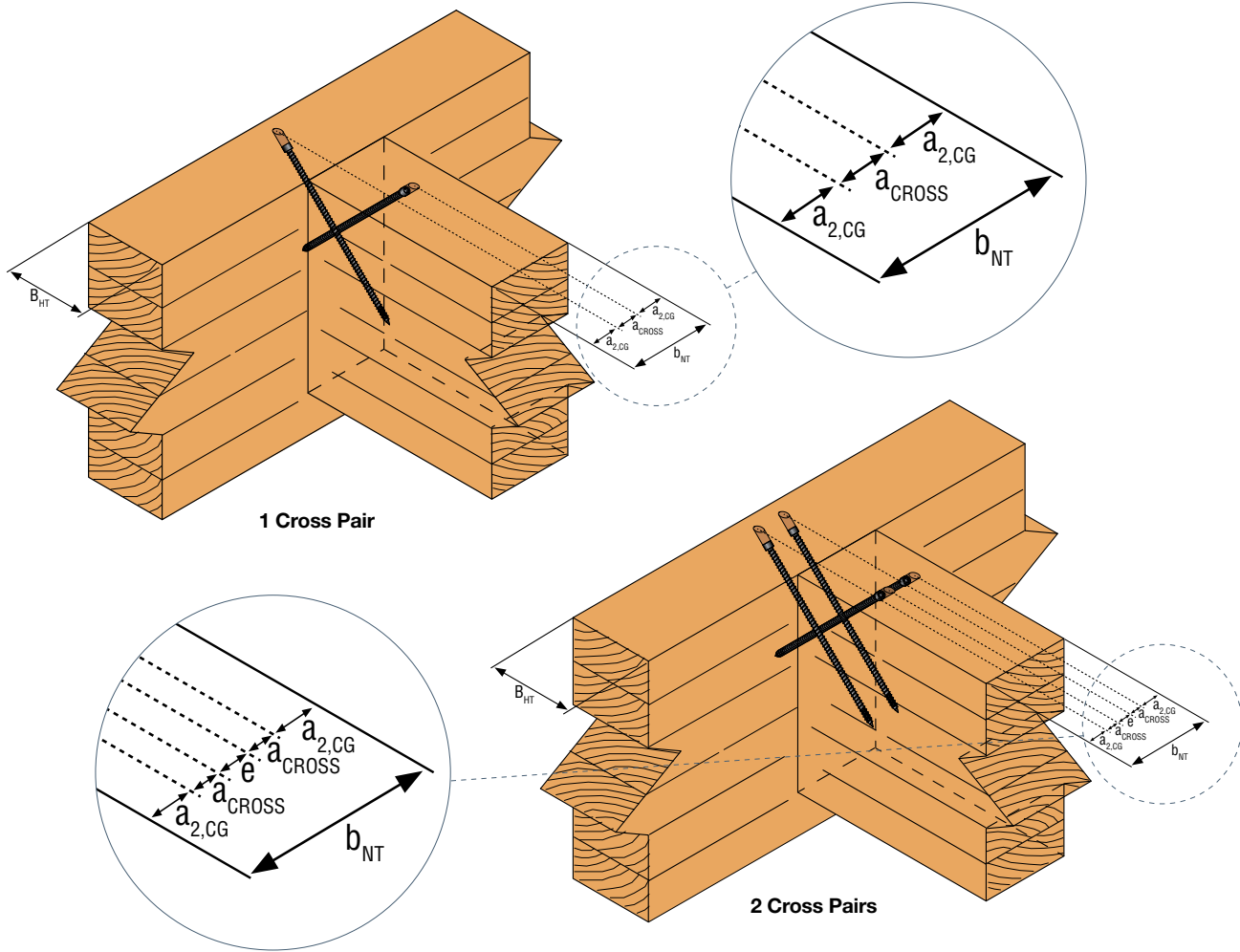
³⁾ Minimum timber thickness $t \geq 12$ d



a_1 is taken in the header when the screws are distributed along the grain
 a_2 in the joist where the screw are distributed perpendicularly to the grain.



Space and Edge Distance



1 Cross Pair

2 Cross Pairs

Double- & Full Threaded Screws

Alternative Axially Loaded Screws - Minimum spacing or end/edge distance

	Screw Family		
	SWD6.5	SWD8.0	SDCF/SDCFC
a_1 Minimum screw spacing parallel to the grain	10 d	10 d	10 d
a_2 Minimum screw spacing perpendicular to the grain	3 d	3 d	3 d
a_{cross} Minimum spacing between crossing screws for a crossed screw couple perpendicular to the grain	1.5 d	1.5 d	1.5 d
$a_{1,CG}$ Minimum end distance of the centre of gravity of the threaded part of the screw in the member	8 d	5 d	8 d
$a_{2,CG}$ Minimum edge distance of the centre of gravity of the threaded part of the screw in the member	3 d	3 d	3 d

- If $a_1 \cdot a_2 \geq 21 d^2$ can be kept for every screw
- If $a_1 \cdot a_2 \geq 25 d^2$ can be kept for every screw

Notes:

d = Outer thread diameter of the screw.

For a crossed screw couple in solid timber, glued laminated timber and similar glued products or in laminated veneer lumber the minimum distance between the screws (across) are $1,5 \cdot d$. Ensure that the crossed screw threads do not touch each other when being driven into the timber member.

SWD screws has been tested and approved for reduced space and edge distance according to ETA-21/0670, minimum timber thickness $t \geq 10 d$, in pre-drilled and non-predrilled holes.

SDCF/SDCF/SDCFC screws has been tested and approved for reduced space and edge distance according to ETA-13/0796, minimum timber thickness $t \geq 12 d$, in non-predrilled holes.

Space and Edge Distance

Space and Edge Distance - Screw Placement m_i

Installation of inclined screws require high accuracy to achieve the performance calculated. One of the key elements is the placement of the screw and the insertion angle. In order to achieve this, the distance m_i must be calculated.

m_i depends of several elements: the length of the screw (l), the threaded length (l_g), the head diameter of the screw (d_h), the angle of insertion (α).

This calculation works in case of the screw fully inserted in the timber element. As a reminder half the thread should be in each element.

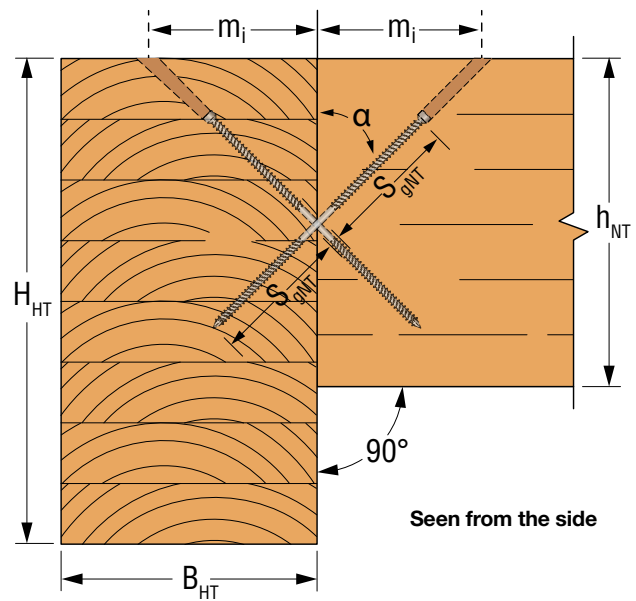
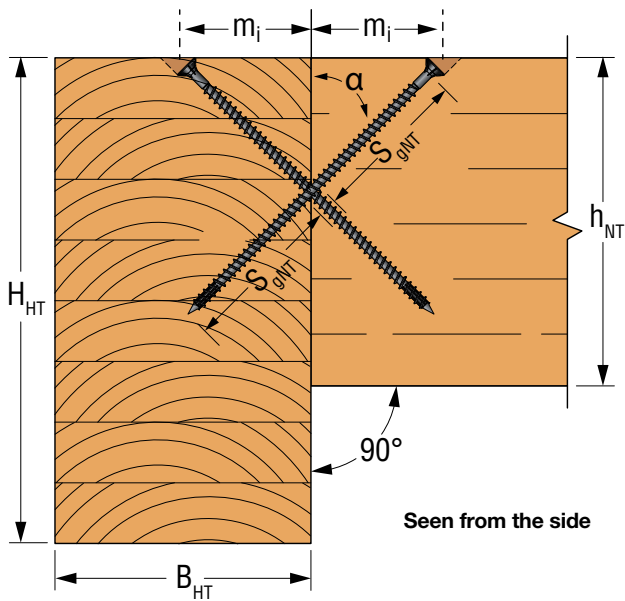
The minimum distance m_i is:

$$m_i = (l - l_g / 2 + d_h / 2 * \tan \alpha) * \sin \alpha$$

In this case the head of the screw is flushed to the top face.

If the screw pair is placed so it is in the middle of the height ($h/2$) of the joist or the panel thickness, the equation is:

$$m_i = h / 2 \tan \alpha$$



m_i = Distance between the shear plane and the insertion point

b_{nt} = Min. width of the secondary beam in [mm]

h_{nt} = Min. height of the secondary beam in [mm]

B_{HT} = Min. width of the main beam in [mm]

H_{HT} = Min. height of the main beam in [mm]

S_{gNT} = Effective thread length

α = the angle of insertion

Space and Edge Distance

Space and Edge Distance CLT

CLT - Edge Surface/Narrow Face

Unless specified otherwise in the technical specification (ETA or hEN) of the CLT panels, minimum distances and spacing for laterally or axially loaded screws in non-predrilled holes, in the edge surface of CLT members with a minimum thickness $t = 10 \times d$ and a minimum penetration depth perpendicular to the edge surface of $10 \times d$ may be taken as:

Minimum spacing or end/edge distance CLT - Edge surface/Narrow face

a_1 Minimum screw spacing parallel to the CLT plane 10 d

a_2 Minimum screw spacing perpendicular to the CLT plane 4 d

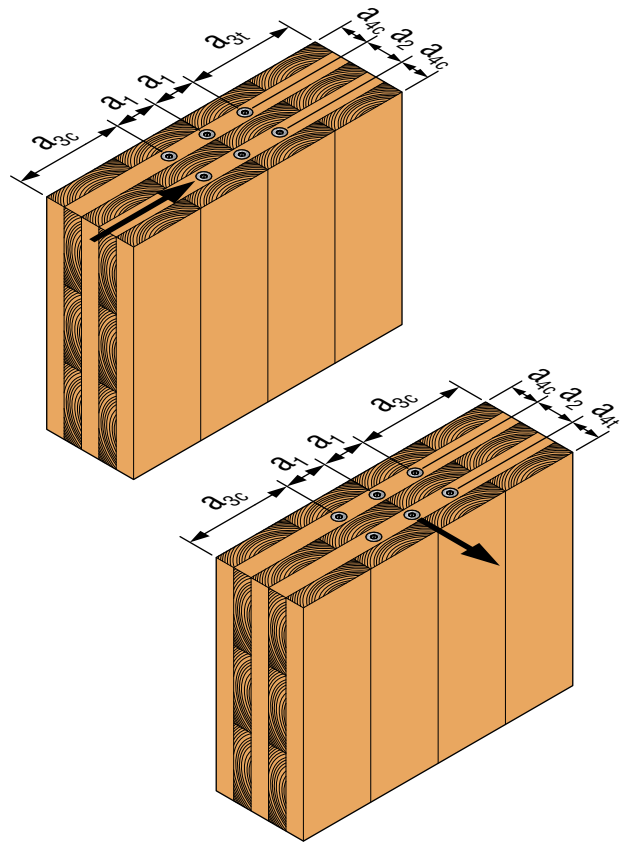
$a_{3,l}$ Minimum distance from centre of the screw in timber to the loaded end 12 d

$a_{3,c}$ Minimum distance from centre of the screw in timber to the unloaded end 7 d

$a_{4,l}$ Minimum distance from centre of the screw in timber to the loaded edge 6 d

$a_{4,c}$ Minimum distance from centre of the screw in timber to the unloaded edge 3 d

Compliant with ETA-21/0670



Space and Edge Distance

CLT - Plane Surface/Lateral Face

Unless specified otherwise in the technical specification (ETA or hEN) of CLT, minimum distances and spacing for laterally or axially loaded screws in non-predrilled holes, in the wide face of cross laminated timber members with a minimum thickness $t = 10 \times d$ may be taken as:

Minimum spacing or end/edge distance CLT - Plane surface/Lateral face

a_1 Minimum screw spacing parallel to the grain	4 d
a_2 Minimum screw spacing perpendicular to the grain	2.5 d
$a_{3,t}$ Minimum distance from centre of the screw in timber to the loaded end grain	6 d
$a_{3,c}$ Minimum distance from centre of the screw in timber to the unloaded end grain	6 d
$a_{4,t}$ Minimum distance from centre of the screw in timber to the loaded edge	6 d
$a_{4,c}$ Minimum distance from centre of the screw in timber to the unloaded edge	2.5 d

Compliant with ETA-21/0670

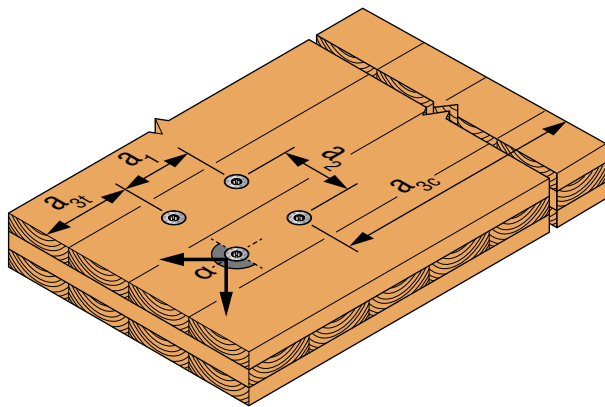


Illustration above shows angle between load direction and grain = 0°

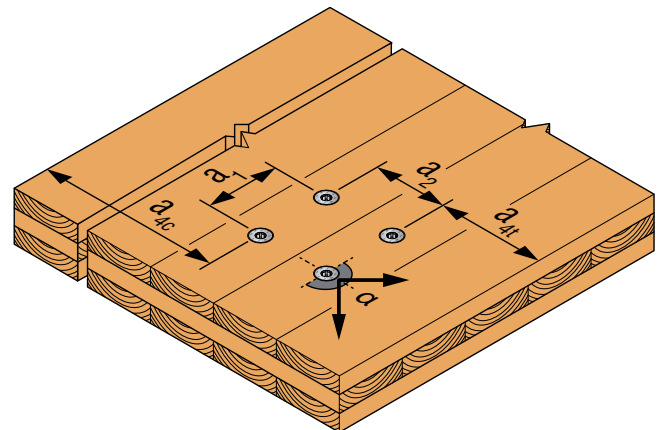
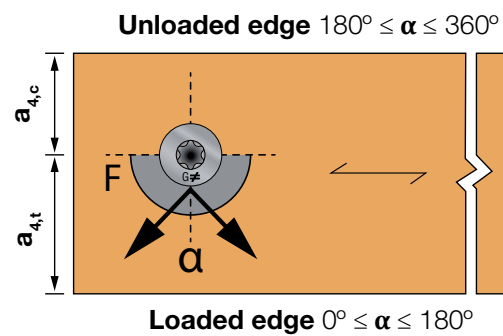
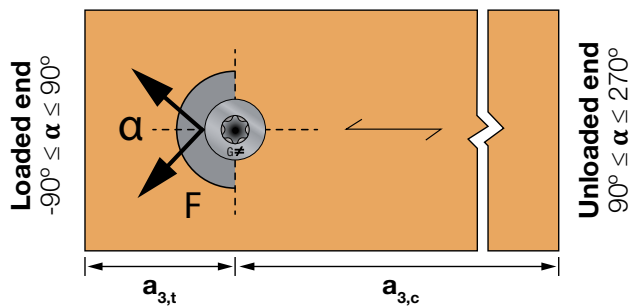


Illustration above shows angle between load direction and grain = 90°



Hole Diameter Steel / Space and Edge Distance Steel

Recommended Hole Diameter Steel

Recommended hole diameters in steel plates, all our screws developed for connectors have a cone under the head to ensure the connection between the fastener and the steel. The cone have the same diameter as the outer thread.

All our fasteners are tested and approved together as a system for our connectors.

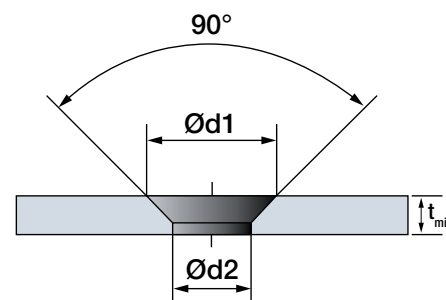
If you need a solution where the screw head is flush to the steel surface you can use countersunk screws, below is the recommended hole design for:

Recommended max. hole diameter steel

Fastener	Fastener diameter d					
	Ø4,0	Ø5,0	Ø6,0	Ø8,0	Ø10,0	Ø12,0
SSH	-	-	Ø7,0	Ø9,0	Ø11,0	Ø13,0
SSF	-	-	Ø7,0	Ø9,0	Ø11,0	Ø13,0
CSA	Ø4,0	Ø5,0	-	-	-	-
CNA	Ø5,0	-	Ø7,5	-	-	-

Recommended hole design in steel countersunk screws (TTUFS/TTZNFS/SWC/SDCF)

Diameter of screw	Ød1 _{min}	Ød2 _{min}	t _{min}
Ø4,5	12,0	5,0	3,0
Ø5,0	13,0	5,5	3,0
Ø6,0	15,5	6,5	3,5
Ø8,0	19,0	9,0	6,0
Ø10,0	22,5	11,0	7,0
Ø12,0	25,0	13,0	7,5



Calculations with Steel to Wood do not take the strength of the steel in consideration, but only the wood and the fastener, see Eurocode 3 for steel plate design.

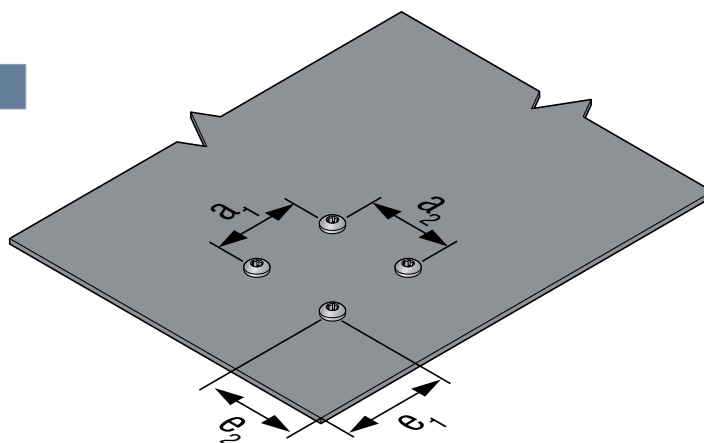
Space and Edge Distances Steel

The table below gives the values for pure steel according to Eurocode 3. In steel to timber connections, the limiting factor will always be the timber. See space and edge distances for Fastener Designer on

page 22.

a ₁ *	a ₂ *	e ₁ *	e ₂ *
2.2d	2.4d	1.2d	1.2d

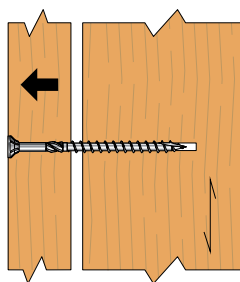
*according to EN 1993-1-8 §3.5



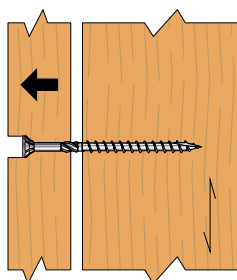
Screw Resistance

Screw Resistance

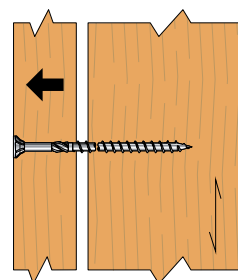
The timber to timber tensile strength $R_{ax,k}$ includes the following resistances:



1. Thread pull-out



2. Head pull-through



3. Steel under tensile load

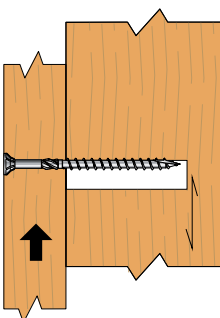
These resistances are valid for:

- 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.

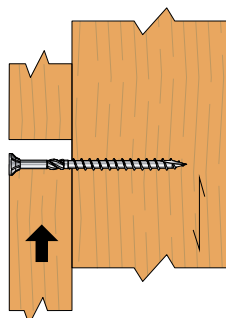
- Screw in the strips of the CLT with an angle from 0 to 45° between the screw axis and the grain of the timber. A reduction factor dependent on the angle applies to the axial strength (refer to ETA 21/0670).

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.

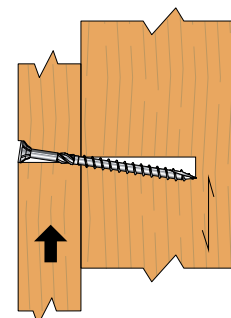
The timber to timber shear strength $R_{v,a,k}$ includes the following resistances:



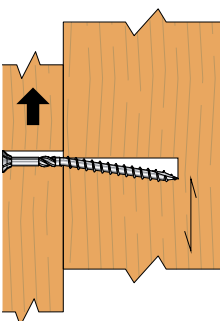
1. Compression timber 2



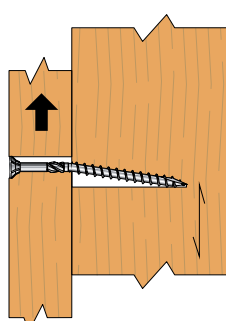
2. Compression timber 1



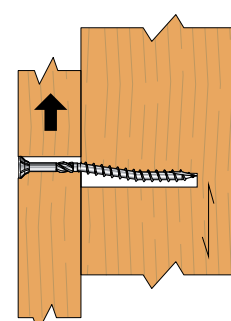
3. Double compression



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.

All tensile strengths are given for C24 graded timber.

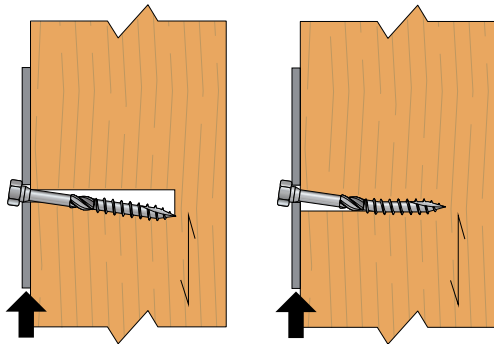
In case of part threaded screws, the strengths only apply to configurations where the thread does not exceed more than 5 mm into the timber element beneath the screw head to ensure the best possible fastening.

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.

Screw Resistance

The steel to timber shear strength $R_{v,\alpha,k}$ includes the following resistances:

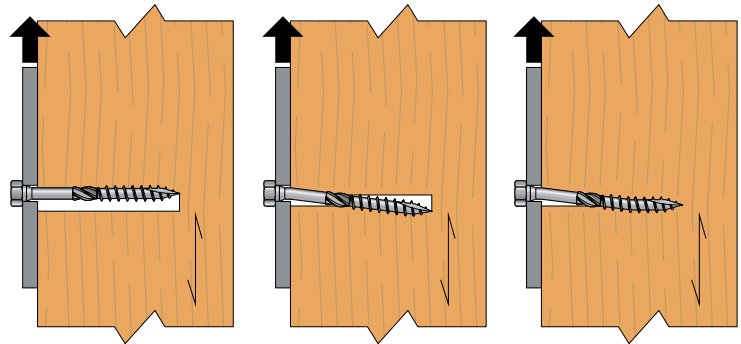
Thin steel $t_{st} \leq 0.5 d$



1. Timber compression

2. Plastic hinge

Thick steel $t_{st} \geq d$



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 to timber shear strength values seen earlier, according to EN1995-1-1:2004+A2:2014.

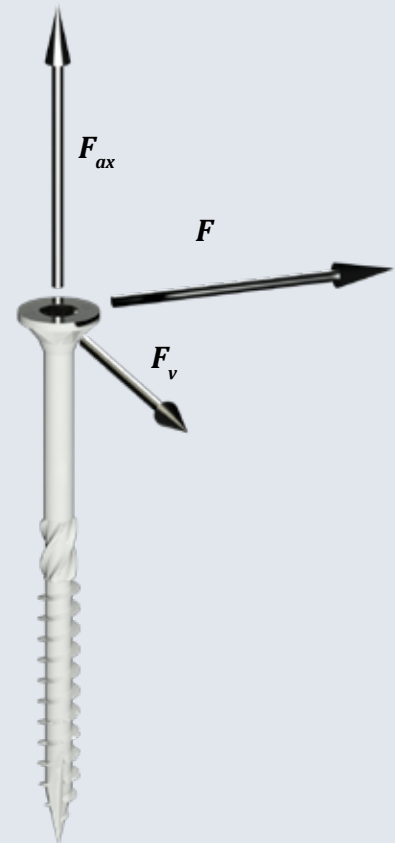
These resistances are valid for C24 graded timber and higher.

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.



Fire Calculation for Screws

Fire Calculation for Screws

Only screws in tension may be justified to fire. So we generally choose fully threaded screws or double threaded screws.

General information

As hidden connectors, screws are also placed in the middle of the timber, the way to calculate is mainly based on the edge distances. EN1995-1-2 (Eurocode 5 Part 2) is the main document that explain it.

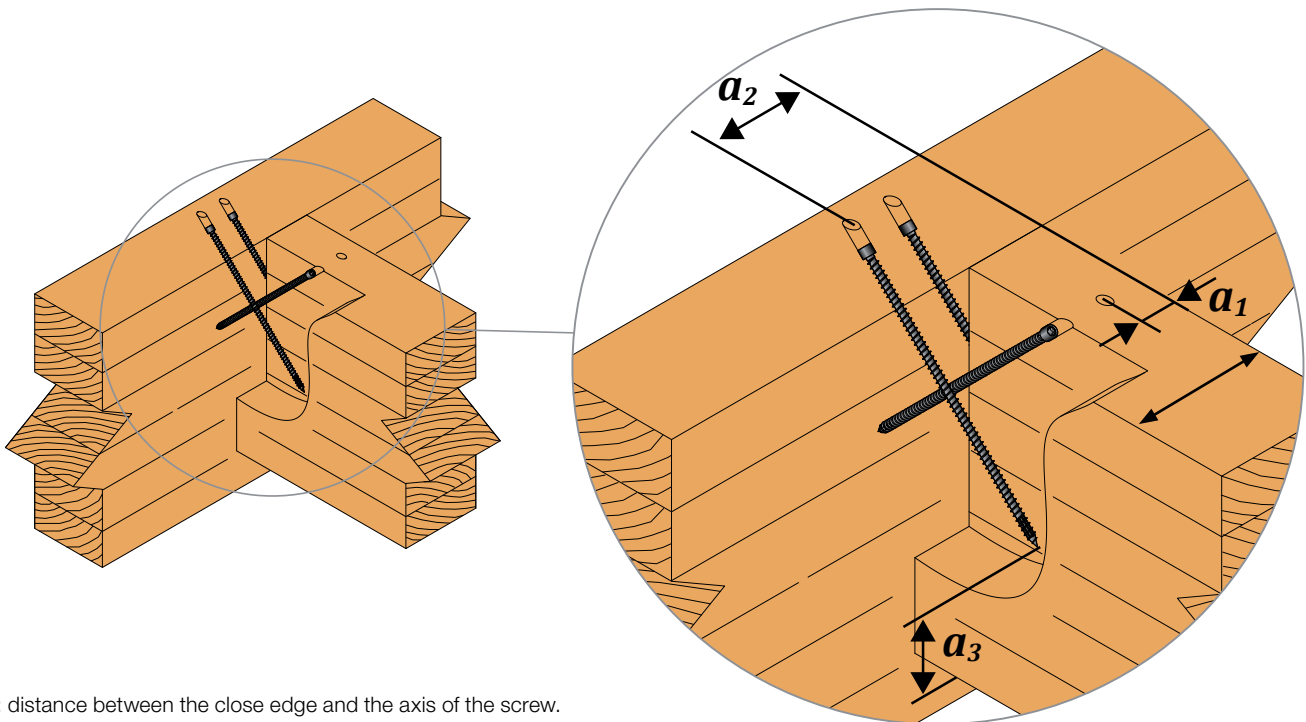
We need to check that :

$$E_{d,fi} \leq R_{d,30,fi} = \eta \times \frac{R_{20}}{\gamma_{M,fi}} = \eta \times k_{fi} \times \frac{R_{ax,k}}{\gamma_{M,fi}}$$

With :

- $E_{d,fi}$ = The load under fire.
- $R_{d,fi}$ = The resistance under fire.
- η = Conversion factor.
- R_{20} = 20% fractal of the resistance capacity.
- $\gamma_{M,fi}$ = Partial factor of timber in case of fire (equal to 1).
- k_{fi} = factor to go from the 20% fractal to the 5% fractal for tension loaded connection.
- $R_{ax,k}$ = characteristic capacity of the screw in tension.

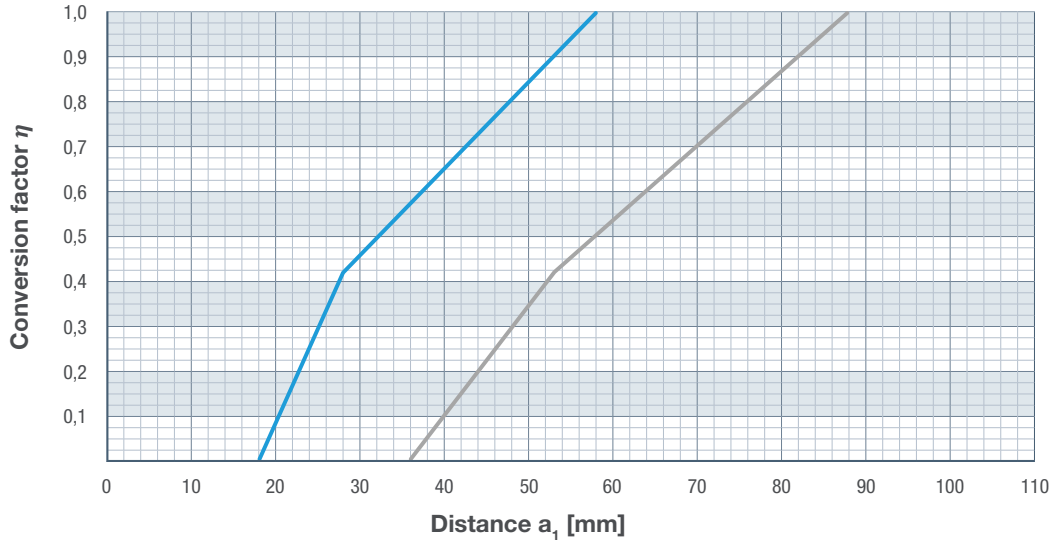
η depends on the edge distance a_1 (see drawing for the definition of a_1 drawing).



- a_1 : distance between the close edge and the axis of the screw.
- a_2 : distance between the far edge and the axis of the screw.
- a_3 : distance between the close edge and the point of the screw.

Fire Calculation for Screws

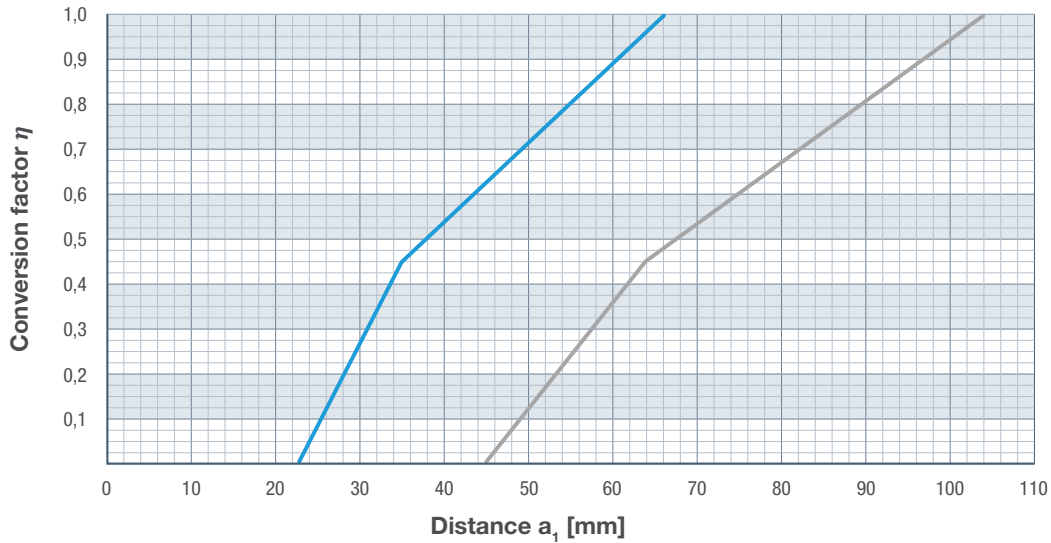
The curve below allows to find the η value.



General
Information

■ R60
■ R30

Note: the graph above is only valid for $a_2 \geq a_1 + 40$ and $a_3 \geq a_1 + 20$.
if $a_2 \geq a_1$ and $a_3 \geq a_1 + 20$ the graph below must be used:



■ R60
■ R30

Note: the equation is given below and in EN1995-1-2 6.4 (6.11).

$$\eta = \begin{cases} 0 & \text{for } a_1 \leq 0,6 t_{fi,d} & (a) \\ \frac{0,44 a_1 - 0,264 t_{d,fi}}{0,2 t_{d,fi} + 5} & \text{for } 0,6 t_{d,fi} \leq a_1 \leq 0,8 t_{d,fi} + 5 & (b) \\ \frac{0,56 a_1 - 0,36 t_{d,fi} + 7,32}{0,2 t_{d,fi} + 23} & \text{for } 0,8 t_{d,fi} \leq a_1 \leq t_{d,fi} + 28 & (c) \\ 1,0 & \text{for } a_1 \geq t_{d,fi} + 28 & (d) \end{cases}$$

The gap between the beams must be reduced at maximum. The edge distance must be checked both, in fire condition and in cold condition.

Fire Calculation for Screws

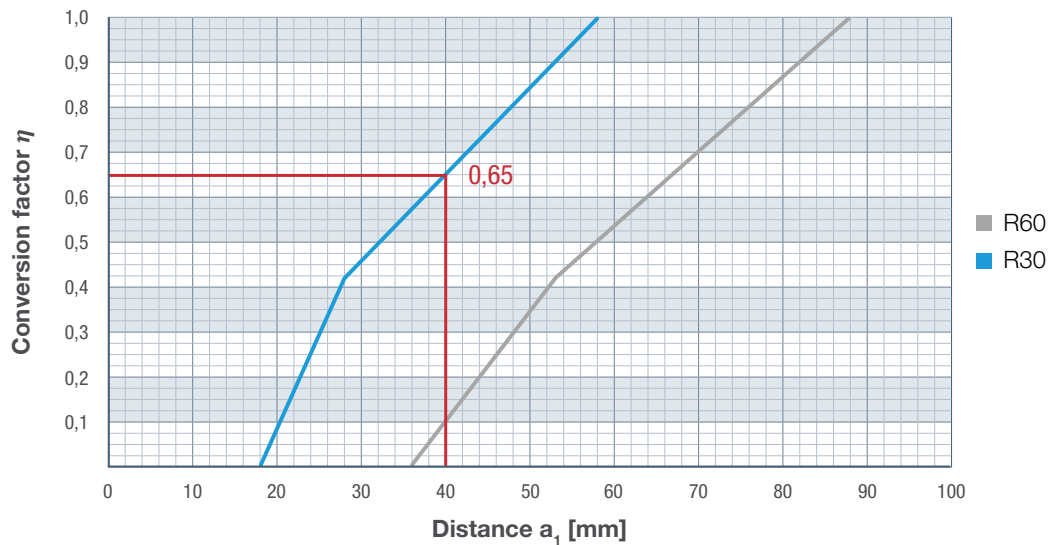
Example of calculation.

Hypothesis:

- Used screw: SDCFC8.0x280
- Half of the thread is in each element
- $a_1 = 40 \text{ mm}$, $a_2 = 85 \text{ mm}$, $a_3 = 60 \text{ mm}$
- Characteristic capacity of the screw in tension in cold condition : $R_{ax,k} = 14.47 \text{ kN}$
- Calculation of the capacity after 30 minutes of fire

Calculation of the capacity:

- The graph below must be used because of the distance a_1 , a_2 and a_3
- So we got $\eta \approx 0.65$
- The tension capacity of the screw after half an hour in fire condition is:



$$R_{d,fi} = \eta \times \frac{R_{20}}{\gamma_{M,fi}} = \eta \times k_{fi} \times \frac{R_{ax,k}}{\gamma_{M,fi}} \approx 0.65 \times 1.05 \times \frac{14.67}{1} \approx 9.88 \text{ kN}$$



Corrosion

Understanding the Corrosion Issue

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

When corrosion is caused by airborne solutions (ocean air, swimming halls, spray from a salt-treated street in winter, etc.) the metal parts can be in environments that are directly exposed to rain. They can be covered by a roof or inside the ventilated area of a facade.

The many variables present in a building environment make it impossible to accurately predict if, or when, corrosion will begin or reach a critical level. This relative uncertainty makes it crucial that specifiers and users are knowledgeable of the potential risks and

select a product suitable for the intended use. It is also prudent that regular maintenance and periodic inspections are performed, especially for outdoor applications.

It is common to see some corrosion in outdoor applications. Even stainless steel can corrode. The presence of some kinds of corrosion, e.g. white rust on zinc, does not mean that load capacity has been affected or that failure is imminent. If significant corrosion, e.g. red rust, is apparent or suspected, then a qualified engineer or inspector should inspect the framing members, fasteners and connectors. Replacement or cleansing of affected components may be appropriate. Red rust corrosion of steels will mostly carry on increasing and will cause major damage at an advanced stage.

Galvanic Corrosion

Galvanic corrosion (also known as bimetallic corrosion, dissimilar metal corrosion or contact corrosion) may occur when dissimilar metals (e.g. galvanised mild steel and stainless steel) are in contact in a corrosive electrolyte (e.g. water containing salt, acid, etc.). When a galvanic couple forms, one of the metals in the couple becomes the anode and corrodes faster than it would all by itself, while the other becomes the cathode and corrodes slower than it would alone. For galvanic corrosion to occur, three conditions must be present:

1. Electrochemically dissimilar metals must be present,
2. These metals must be in electrical contact,
3. The metals must be exposed to an electrolyte.

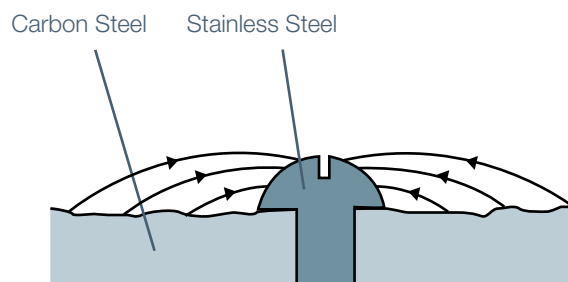
The relative nobility of a material can be predicted by measuring its corrosion potential. The well-known galvanic series, (see below) lists the relative nobility of certain materials in seawater. A small anode/cathode area ratio is highly undesirable. In this case, the galvanic current is concentrated onto a small anodic area. Rapid thickness loss of the dissolving anode tends to occur under these conditions. Adverse area ratios are likely to occur with fasteners at joints.

Galvanic Series of Metals

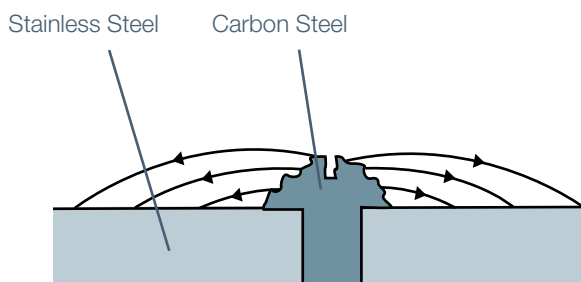
Corroded end (Anode)
Magnesium, Magnesium alloys and Zinc
Aluminium, Cadmium, Iron and Steel
Lead, Tin, Nickel and Ni-Cr alloy
Brasses, Copper and Cu-Ni alloys
Nickel
Stainless Steels
Protected end (Cathode)

Carbon steel fasteners used with stainless steel connectors should be avoided because the ratio of the area between the stainless steel to carbon steel is small and the fasteners will be subject to aggressive

attack, thus greater corrosion. Conversely, the rate of attack of a carbon steel connector secured by a stainless steel fastener is much slower. Prevention of bimetallic corrosion is possible by excluding an electrolyte from the connection by painting or taping over the joint. Alternatively, the two metals should be isolated from each other by painting each contact surface or using a non-metallic isolation material, typically nylon, neoprene or Teflon washers, pads, gaskets or bushes depending upon the particular application.



Large ANODE (Carbon Steel) area, small CATHODE (stainless steel fastener) area showing no attack on the fasteners and relatively insignificant attack of carbon steel.



Large Cathode (Stainless Steel) area, small ANODE (carbon steel fastener) area showing no attack on the stainless steel and relatively increased attack of the fastener.

Corrosion

Materials and Coatings - Solid-Drive Structural Fasteners

Electro Galvanised

C1 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

The coating system consists of an electro plated zinc base layer. Depending on the thickness of the zinc layer, it can provide corrosion resistance that is adequate for service class 1 or 2.

Yellow/Bright Zinc Plated

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

The coating system consists of an yellow plated zinc base layer. Depending on the thickness of the zinc layer, it can provide corrosion resistance that is adequate for service class 1 or 2.

Electrocoat

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

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

Protec® +

C3 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

Products are dipped in liquids that consists of zinc and aluminium flakes which is hardened in ovens after the spinning process. Finally a layer of wax is applied. Intended for outdoor applications.

Double Barrier

C3 acc. to EN ISO 12944-2
SC3 - 50 years acc. to EC5

The Simpson Strong-Tie® Double Barrier coating is a proprietary coating that provides a level of corrosion resistance that is equivalent to hot-dip galvanization and is intended for outdoor applications.

Hot-Dip Galvanised

C4 acc. to EN ISO 12944-2
SC3 - 50 years acc. to EC5

Hot dip galvanised nails are dipped in melted zinc 550-560°C, initiating a chemical reaction between the steel and the zinc. It provides a good corrosion resistance and is intended for outdoor applications.

Impreg® +

C4 - 15 years acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

Products are dipped in liquids that consists of zinc and nickel. It provides a good corrosion performance for outdoor applications and has a low risk of galvanic corrosion together with Aluminum or Stainless Steel.

Stainless Steel

CRC III acc. to EN1993-1-4(A1)
SC3 - 50 years acc. to EC5



Type 316 stainless steel is a nickel-chromium austenitic grade with 2-3% molybdenum. Type 316 stainless steel is not hardened by heat treatment and is inherently non-magnetic. It provides a level of corrosion protection suitable for marine and severe environments.

Impreg® +

Impreg+ is an electrolytic, inorganic, surface treatment consisting of zinc and nickel. Due to the strong alloy combination the coating is very robust and suitable for corrosive environments.



- **C4 approved for 15 years according to EN ISO 11997-1:2017, cycle B**
- Compliant with REACH, RoHS- and ELV-directive
- Chromium (VI) free
- No galvanic corrosion in aluminium connections
- Due to the strong adhesion between the steel and the coating, Impreg+ will maintain the corrosion resistance even after installation
- Withstands temperatures up to 300° (C)

Comparison test EN ISO 11997-1:2017, Cycle B, 1240 hours, low (electro galvanised), medium (Impreg+), severe (stainless steel A4).

Hydrogen Embrittlement

What is Hydrogen Embrittlement?

Hydrogen embrittlement is a significant permanent loss of strength that can occur in some steels when hydrogen atoms are present in the steel and stress is applied. Embrittlement occurs as hydrogen atoms migrate to the region of highest stress and cause microcracks. When a crack forms, the hydrogen then migrates to the tip of the crack (Figure 1) and causes continued crack growth until the effective fastener cross-section is so reduced that the remaining cross-section is overloaded and the fastener fails. These failures occur suddenly, without warning, after the fastener or rod has been loaded for a period of time.

All three of the below conditions must be present for hydrogen embrittlement to occur:

- A steel that is susceptible to hydrogen embrittlement
- Atomic hydrogen (H^+ ions, not H_2 gas)
- Stress, such as from tightening or applied loads

If an application involves these, then there is a possibility of hydrogen embrittlement and fastener failure. The possibility of and time to failure depend on the degree of each of these conditions. Therefore, the level

of concern should depend on the degree to which the Designer expects all three of these conditions to be present in the application.

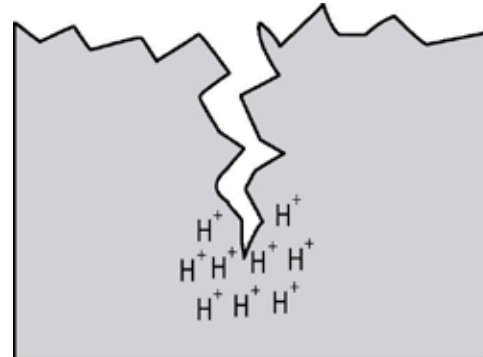


Figure 1 – Conceptualized migration of hydrogen to the crack tip causing further cracking.

What Steels are Sensitive to Hydrogen Embrittlement?

A fastener's susceptibility to hydrogen embrittlement increases with elevated tensile strength or hardness. It is generally accepted that good-quality fasteners with an actual (not specified) Rockwell C scale hardness of less than 38 (tensile strength of less than approximately 187 MPa) are not ordinarily susceptible to hydrogen embrittlement. Fastener manufacturers often establish lower hardness limits as an extra margin of safety for variability that may occur in production.

When are hydrogen atoms (H^+) present?

Hydrogen atoms can be introduced into a fastener from manufacturing or from the service environment.

Sources of hydrogen from manufacturing:

Hydrogen can be present in the steel-making process, but the amount present in good-quality steel is below the level that causes problems. The most common way that hydrogen is introduced during anchor and fastener manufacturing is from the cleaning and coating processes. These processes often utilize acids that produce hydrogen. Compounding this problem is that many popular coatings like zinc plating (EN ISO 2081) and hot-dip galvanizing (EN ISO 1461) create a barrier around the fastener that does not allow hydrogen to easily diffuse out of the fastener.

Manufacturers most commonly manage internal hydrogen sources by minimizing cleaning time and by baking plated fasteners after coating for a number of hours to help diffuse hydrogen through the coating and out of the fastener. In some cases, mechanical cleaning and alkaline cleaning are used to prevent hydrogen from being introduced.

In cases where internal hydrogen is not properly managed in the manufacturing process, failure usually occurs quickly, within 48 hours of fastener installation.

External sources of hydrogen:

Hydrogen can also be introduced from the service environment. Zinc coatings galvanically protect steel from corrosion in damp or wet service environments. However, this process results in an electric current being passed through the water (H_2O) to produce hydrogen (H^+) and hydroxide (OH^-) ions as shown in Figure 2. Since this process requires corrosion to generate the hydrogen, failures from externally generated hydrogen usually take much longer to occur than when internal hydrogen is the cause. Steel failure from externally generated hydrogen can take anywhere from weeks to years.

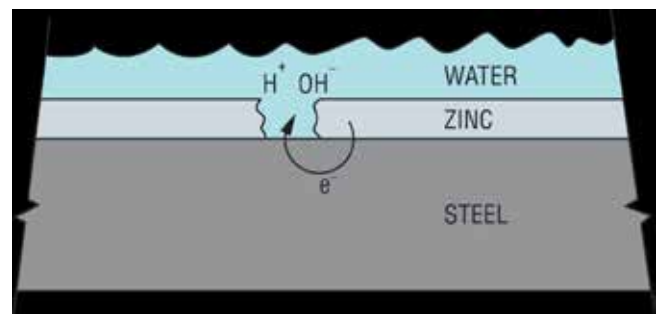


Figure 2 – Production of hydrogen (H^+) from the galvanic protection of steel by a zinc coating

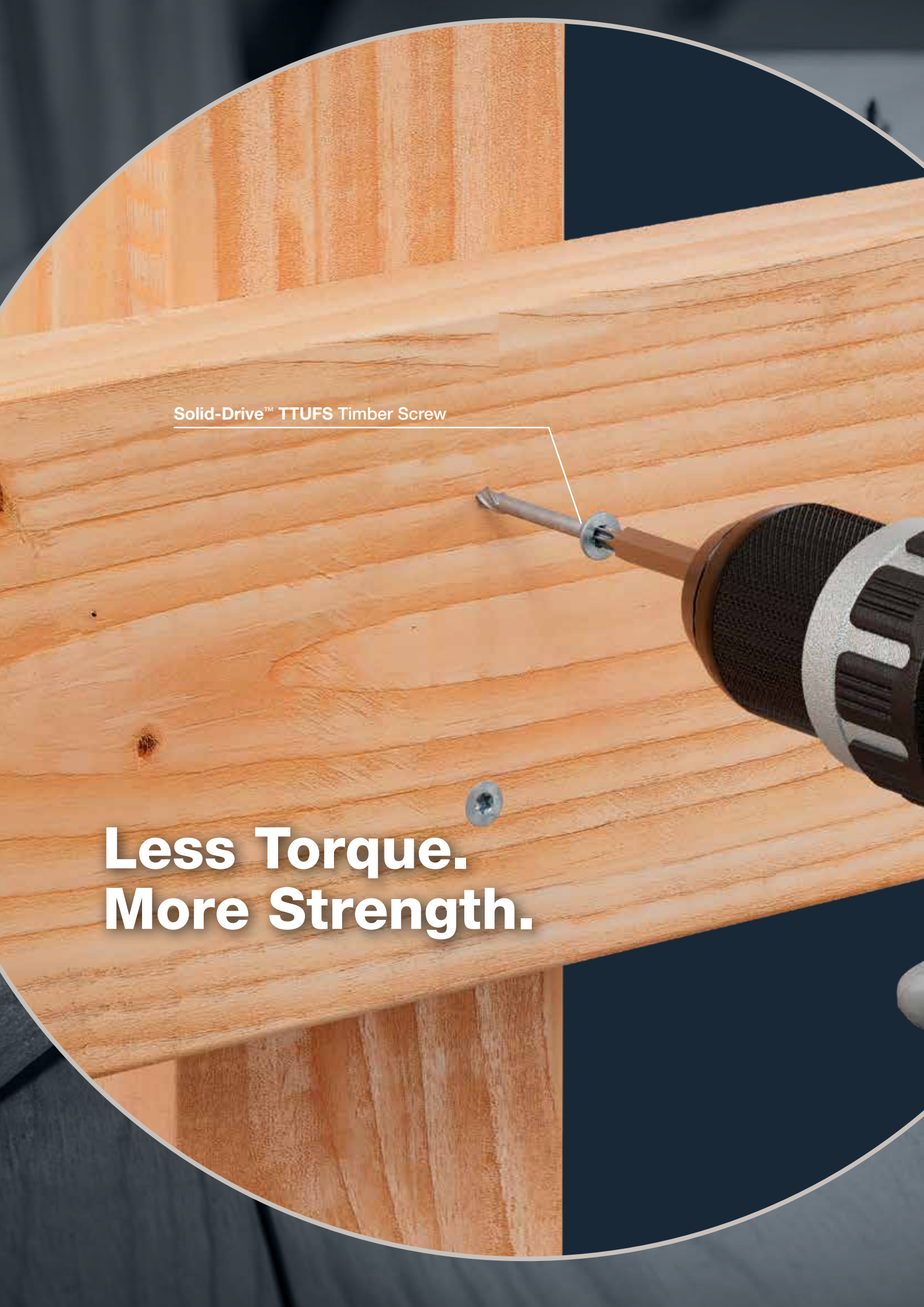
How much stress is too much stress?

Fortunately, for products that require very high-strength steels, hydrogen embrittlement risk diminishes, even for sensitive steels, as applied loads are reduced. At Simpson Strong-Tie, we control the risk of hydrogen embrittlement by carrying out complex tests during development and quality control. These tests ensure that the fasteners can be used for the intended application at the rated load.

How to minimise the risk of hydrogen embrittlement:

As illustrated in the discussion above, hydrogen embrittlement can be a serious concern for high-strength anchors and fasteners. A designer should exercise great care to guard against the sudden brittle steel failure that this phenomenon can produce. Within Simpson Strong-Tie, we are aware of this issue with high performance screws. This is why we are sensitive to the choice of our fasteners' steel grade and always seeking alternative coatings providing good performances and reducing the hydrogen embrittlement risk.

- Material choice: the steel grade is carefully chosen with a Rockwell C scale hardness of less than 36 (tensile strength of less than approximately 1118 MPa) to ensure enough strength while significantly reducing hydrogen embrittlement risk.
- Coating: we are constantly seeking for alternative coatings to provide enough corrosion resistance for the intended use and limit the hydrogen absorption during the process.



Solid-Drive™ TTUFS Timber Screw

**Less Torque.
More Strength.**

Fastener Types with Characteristic Parameters



TTUFS/TTZNFS/TTSFS Countersunk WOOD Screw	40
SWW/SWWZ Washer-Head WOOD Screw	44
SWC Countersunk WOOD Screw	48
SWD Double-Threaded WOOD Screw	50
SSH Hex-Head CONNECTOR Screw	52
SSF Flat Round-Head CONNECTOR Screw	54
SDCF Fully Threaded Countersunk WOOD Screw	56
SDCFG Fully Threaded Cylinder-Head WOOD Screw	58
SWRS Structural Roof & Wall Insulation WOOD Screw	60
CSA/CSA-Z/CSA-S CONNECTOR Screw	62
CNA/CNA-G/CNA-S CONNECTOR Nail	64
SDD Self-Drilling DOWEL	66
CSFT Fully Threaded CONNECTOR Screw	68
TTF Quik Drive® Collated WOOD Screw	70
WSV Quik Drive® Collated WOOD Screw	72
SDW/SDWS Structural WOOD Screw	74

Structural Fastening

Solid-Drive™

TTUFS/TTZNFS/TTSFS Countersunk **WOOD** Screw

Structural Timber to Timber Connections Including Glulam, CLT and General Timber Applications

The Solid-Drive® TTUFS, TTZNFS and TTSFS countersunk wood screws are available in a variety of dimensions and are designed for general timber to timber applications as well as for cross-laminated timber (CLT) and glulam construction.

TTUFS screws are electro galvanised for standard interior and dry applications only. TTZNFS screws are Impreg+ coated for increased corrosion protection and TTSFS screws are made in A4 stainless-steel material and can therefore be used in applications where premium corrosion protection is required.

Codes/Standards: ETA-21/0670

For more information, see pages 78, 103, 152, 163, 174, 191, 194, 216, 220, 230, 234.

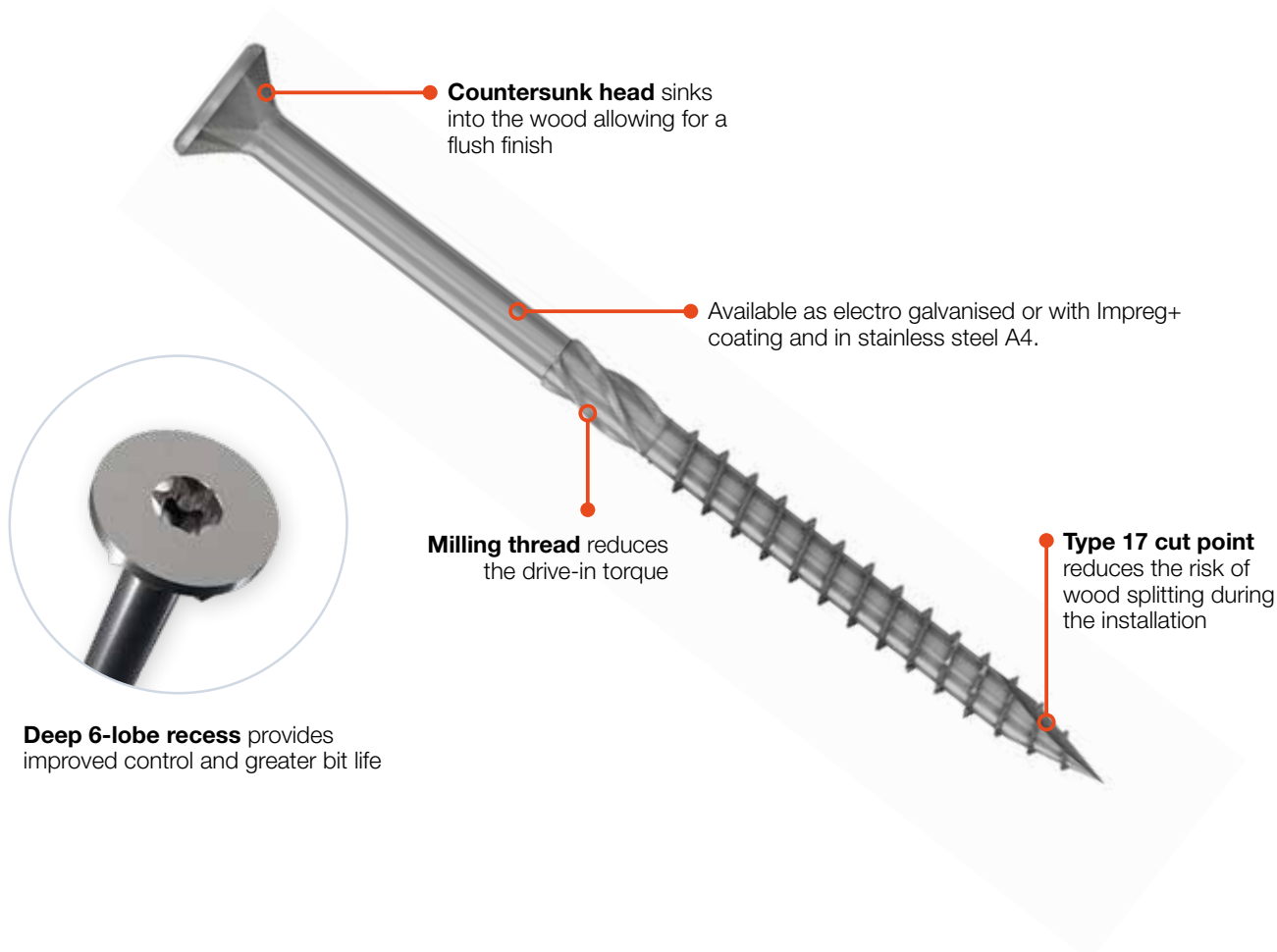


ETA-21/0670

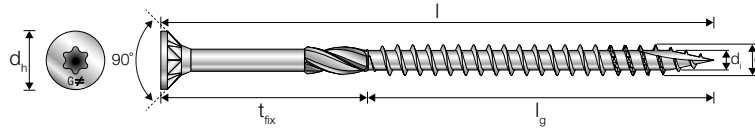


TTUFS Screws in a timber-to-timber application.

Features



Structural Fastening

Solid-Drive™TTUFS Countersunk **WOOD** Screw**Electro Galvanised**C1 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

TTUFS – Range Overview

Reference	Article code	Dimensions [mm]					
		d	l	l _g	d _h	d _i	t _{fix}
TTUFS4.5X25	74434	4,5	25	20	8,4	2,8	5
TTUFS4.5X30	74435	4,5	30	25	8,4	2,8	5
TTUFS4.5X35	74436	4,5	35	30	8,4	2,8	5
TTUFS4.5X40	74437	4,5	40	35	8,4	2,8	5
TTUFS4.5X45	74438	4,5	45	29	8,4	2,8	16
TTUFS4.5X50	74439	4,5	50	30	8,4	2,8	20
TTUFS4.5X60	74440	4,5	60	35	8,4	2,8	25
TTUFS4.5X70	74441	4,5	70	40	8,4	2,8	30
TTUFS4.5X80	74442	4,5	80	50	8,4	2,8	30
TTUFS5.0X30	74373	5,0	30	25	9,5	3,1	5
TTUFS5.0X40	74374	5,0	40	35	9,5	3,1	5
TTUFS5.0X50	74375	5,0	50	30	9,5	3,1	20
TTUFS5.0X60	74376	5,0	60	35	9,5	3,1	25
TTUFS5.0X70	74377	5,0	70	40	9,5	3,1	30
TTUFS5.0X80	74378	5,0	80	40	9,5	3,1	40
TTUFS5.0X90	74379	5,0	90	45	9,5	3,1	45
TTUFS5.0X100	74443	5,0	100	60	9,5	3,1	40
TTUFS5.0X120	74372	5,0	120	60	9,5	3,1	60
TTUFS6.0X40	74455	6,0	40	34	11,6	3,7	6
TTUFS6.0X50	74457	6,0	50	30	11,6	3,7	20
TTUFS6.0X60	74458	6,0	60	35	11,6	3,7	25
TTUFS6.0X70	74459	6,0	70	40	11,6	3,7	30
TTUFS6.0X80	74460	6,0	80	40	11,6	3,7	40
TTUFS6.0X90	74461	6,0	90	45	11,6	3,7	45
TTUFS6.0X100	74380	6,0	100	60	11,6	3,7	40
TTUFS6.0X120	74451	6,0	120	70	11,6	3,7	50
TTUFS6.0X140	74452	6,0	140	70	11,6	3,7	70
TTUFS6.0X160	74453	6,0	160	70	11,6	3,7	90
TTUFS6.0X180	74454	6,0	180	70	11,6	3,7	110

TTUFS – Characteristic Parameters

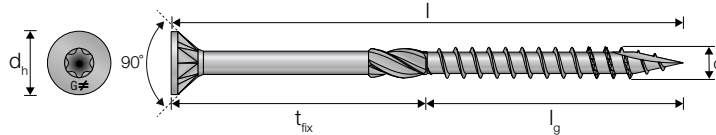
Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
TTUFS4.5	4660	14,7	7,8	4,7	15,6
TTUFS5.0	6720	15,0	7,9	6,0	17,1
TTUFS6.0	9500	12,5	11,1	9,4	16,6

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

Use Fastener Designer to make your calculations.

Go to strongtie.eu/fastener-designer

Structural Fastening

Solid-Drive™TTZNFS Countersunk **WOOD** Screw, Impreg®+

Impreg®+

C4 – 15 years acc. to EN
ISO 12944-2
SC2 – 50 years acc. to EC5

TTZNFS – Range Overview

Reference	Article code	Dimensions [mm]					
		d	l	l _g	d _h	d _i	t _{fix}
TTZNFS4.5X25	74481	4,5	25	20	8,4	2,8	5
TTZNFS4.5X30	74482	4,5	30	25	8,4	2,8	5
TTZNFS4.5X35	76582	4,5	35	30	8,4	2,8	5
TTZNFS4.5X40	74483	4,5	40	35	8,4	2,8	5
TTZNFS4.5X45	76561	4,5	45	29	8,4	2,8	16
TTZNFS4.5X50	74484	4,5	50	30	8,4	2,8	20
TTZNFS4.5X60	74485	4,5	60	35	8,4	2,8	25
TTZNFS4.5X70	74486	4,5	70	40	8,4	2,8	30
TTZNFS4.5X80	76563	4,5	80	50	8,4	2,8	30
TTZNFS5.0X30	76535	5,0	30	25	9,5	3,1	5
TTZNFS5.0X40	76536	5,0	40	35	9,5	3,1	5
TTZNFS 5.0X50	74489	5,0	50	30	9,5	3,1	20
TTZNFS 5.0X60	74490	5,0	60	35	9,5	3,1	25
TTZNFS5.0X70	74491	5,0	70	40	9,5	3,1	30
TTZNFS5.0X80	74493	5,0	80	40	9,5	3,1	40
TTZNFS5.0X90	74495	5,0	90	45	9,5	3,1	45
TTZNFS5.0X100	74487	5,0	100	60	9,5	3,1	40
TTZNFS5.0X120	74488	5,0	120	60	9,5	3,1	60
TTZNFS6.0X40	76566	6,0	40	34	11,6	3,7	6
TTZNFS6.0X50	76567	6,0	50	30	11,6	3,7	20
TTZNFS6.0X60	74504	6,0	60	35	11,6	3,7	25
TTZNFS6.0X70	74505	6,0	70	40	11,6	3,7	30
TTZNFS6.0X80	74506	6,0	80	40	11,6	3,7	40
TTZNFS6.0X90	74508	6,0	90	45	11,6	3,7	45
TTZNFS6.0X100	74497	6,0	100	60	11,6	3,7	40
TTZNFS6.0X120	74499	6,0	120	70	11,6	3,7	50
TTZNFS6.0X140	74501	6,0	140	70	11,6	3,7	70
TTZNFS6.0X160	74502	6,0	160	70	11,6	3,7	90
TTZNFS6.0X180	74503	6,0	180	70	11,6	3,7	110

TTZNFS – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
TTZNFS4,5	4660	14,7	7,8	4,7	15,6
TTZNFS5,0	6720	15,0	7,9	6,0	17,1
TTZNFS6,0	9500	12,5	11,1	9,4	16,6

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³

f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.

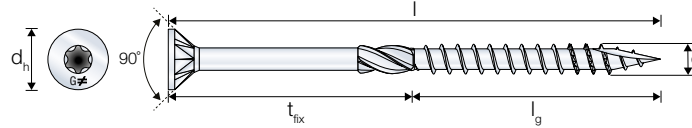
Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5



Use Fastener Designer to make your calculations.

Go to strongtie.eu/fastener-designer

Structural Fastening

Solid-Drive™TTSFS Countersunk **WOOD** Screw, Stainless Steel A4

Stainless Steel
CRC III acc. to
EN1993-1-4(A1)
SC3 – 50 years acc. to EC5



TTSFS – Range Overview

Reference	Article code	Dimensions [mm]					
		d	l	l _g	d _h	d _i	t _{fix}
TTSFS5.0X60	74446	5,0	60	32	9,5	3,1	28
TTSFS5.0X70	74447	5,0	70	35	9,5	3,1	35
TTSFS5.0X80	74448	5,0	80	40	9,5	3,1	40
TTSFS5.0X90	74449	5,0	90	45	9,5	3,1	45
TTSFS5.0X100	74444	5,0	100	55	9,5	3,1	45
TTSFS5.0X120	74445	5,0	120	60	9,5	3,1	60
TTSFS6.0X70	74473	6,0	70	35	11,6	3,7	35
TTSFS6.0X80	74474	6,0	80	40	11,6	3,7	40
TTSFS6.0X90	74475	6,0	90	45	11,6	3,7	45
TTSFS6.0X100	74450	6,0	100	55	11,6	3,7	45
TTSFS6.0X120	74471	6,0	120	60	11,6	3,7	60
TTSFS6.0X140	74472	6,0	140	65	11,6	3,7	75

TTSFS – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm ²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm ²]
TTSFS5.0	4710	14,9	6,3	4,9	16,0
TTSFS6.0	8570	13,6	9,5	8,8	16,2

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³

f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.

Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5



Use Fastener Designer to make your calculations.

Go to strongtie.eu/fastener-designer

Structural Fastening

Solid-Drive™

SWW/SWWZ Washer-Head WOOD Screw

Structural Timber to Timber Connections Including Glulam, CLT and General Timber Applications

SWW/SWWZ are washer-head structural screws designed for load-bearing wood structures. The SWW/SWWZ screws have a milling thread to allow for smooth driving of the shank. The large washer head gives high head pull-through resistance while allowing the wood members to close up firmly.

These partially-threaded, 6.0, 8.0 and 10.0 mm diameter structural fasteners are designed to pull structural members together with superb holding power and excellent load capacity. The large washer head provides extreme pull-through resistance while allowing the wood members to close up firmly. Predrilling is not typically required. SWW screws are yellow zinc plated for standard interior and dry applications only. SWWZ screws are Impreg+ coated for increased corrosion protection.

Codes/Standards: ETA-21/0670

For more information, see pages 82, 107, 153, 164, 175.



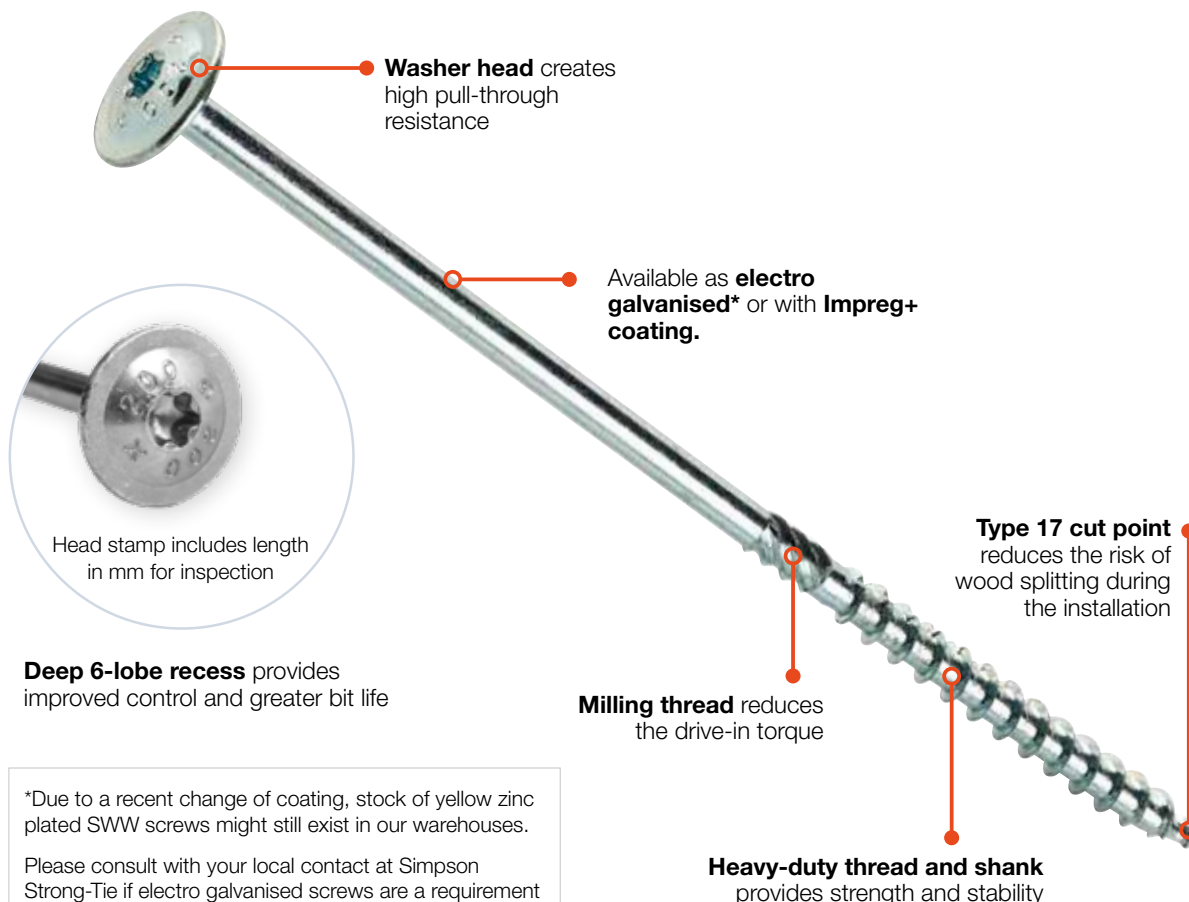
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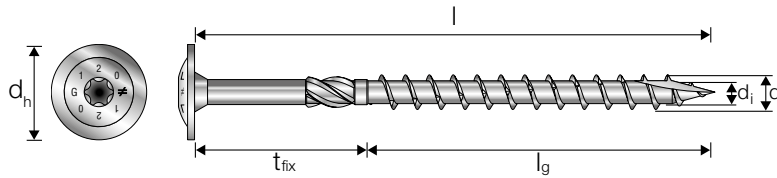


SWW screws in a 90° T-connection between two CLT walls.

Features



Structural Fastening

Solid-Drive™SWW Washer-Head **WOOD** Screw**Electro Galvanised***C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

SWW – Range Overview

Reference	Article code	Dimensions [mm]					
		d	l	l _g	d _h	d _i	t _{fix}
SWW6.0X60	75382	6.0	60	42	14	3,9	18
SWW6.0X80	75383	6.0	80	50	14	3,9	30
SWW6.0X100	75384	6.0	100	50	14	3,9	50
SWW6.0X120	75385	6.0	120	50	14	3,9	70
SWW6.0X140	75386	6.0	140	70	14	3,9	70
SWW6.0X160	75387	6.0	160	70	14	3,9	90
SWW6.0X180	75388	6.0	180	70	14	3,9	110
SWW6.0X200	75389	6.0	200	70	14	3,9	130
SWW6.0X220	75390	6.0	220	70	14	3,9	150
SWW6.0X240	75391	6.0	240	70	14	3,9	170
SWW6.0X260	75392	6.0	260	70	14	3,9	190
SWW6.0X280	75393	6.0	280	70	14	3,9	210
SWW6.0X300	75394	6.0	300	70	14	3,9	230
SWW8.0X80	75395	8.0	80	50	22	5,2	30
SWW8.0X100	75396	8.0	100	50	22	5,2	50
SWW8.0X120	75397	8.0	120	80	22	5,2	40
SWW8.0X140	75398	8.0	140	80	22	5,2	60
SWW8.0X160	75399	8.0	160	80	22	5,2	80
SWW8.0X180	75400	8.0	180	80	22	5,2	100
SWW8.0X200	75401	8.0	200	80	22	5,2	120
SWW8.0X220	75402	8.0	220	80	22	5,2	140
SWW8.0X240	75403	8.0	240	80	22	5,2	160
SWW8.0X260	75404	8.0	260	80	22	5,2	180
SWW8.0X280	75405	8.0	280	80	22	5,2	200
SWW8.0X300	75406	8.0	300	80	22	5,2	220
SWW8.0X320	75407	8.0	320	80	22	5,2	240
SWW8.0X340	75408	8.0	340	80	22	5,2	260
SWW8.0X360	75409	8.0	360	80	22	5,2	280
SWW8.0X380	75410	8.0	380	80	22	5,2	300
SWW8.0X400	75411	8.0	400	80	22	5,2	320

Table continues on next page.

SWW – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
SWW6.0	10500	13,0	12,3	11,0	16,1
SWW8.0	25900	12,6	23,7	27,4	10,5
SWW10.0	43700	12,2	33,8	48,9	10,2

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

Use Fastener Designer to make your calculations.

Go to strongtie.eu/fastener-designer

*Due to a recent change of coating, stock of yellow zinc plated SWW screws might still exist in our warehouses.

Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

Structural Fastening

SWW – Range Overview (continued)

Reference	Article code	Dimensions [mm]					
		d	l	l _g	d _h	d _i	t _{tx}
SWW10.0X100	76912	10.0	100	50	25	6,2	50
SWW10.0X120	76913	10.0	120	50	25	6,2	70
SWW10.0X140	76914	10.0	140	80	25	6,2	60
SWW10.0X160	75412	10.0	160	80	25	6,2	80
SWW10.0X180	75413	10.0	180	80	25	6,2	100
SWW10.0X200	75414	10.0	200	80	25	6,2	120
SWW10.0X220	75415	10.0	220	80	25	6,2	140
SWW10.0X240	75416	10.0	240	80	25	6,2	160
SWW10.0X260	75417	10.0	260	80	25	6,2	180
SWW10.0X280	75418	10.0	280	80	25	6,2	200
SWW10.0X300	75419	10.0	300	80	25	6,2	220
SWW10.0X320	75420	10.0	320	80	25	6,2	240
SWW10.0X340	75421	10.0	340	80	25	6,2	260
SWW10.0X360	75422	10.0	360	80	25	6,2	280
SWW10.0X380	75423	10.0	380	80	25	6,2	300
SWW10.0X400	75424	10.0	400	80	25	6,2	320

SWW – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
SWW6.0	10500	13,0	12,3	11,0	16,1
SWW8.0	25900	12,6	23,7	27,4	10,5
SWW10.0	43700	12,2	33,8	48,9	10,2

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³

f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.

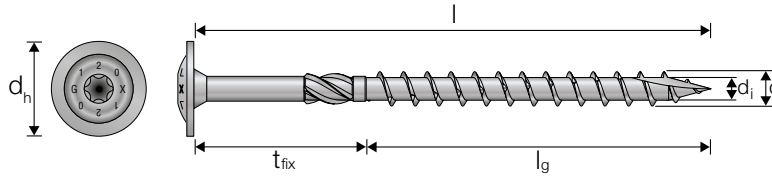
Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5



Use Fastener Designer to make your calculations.

Go to strongtie.eu/fastener-designer

Structural Fastening

Solid-Drive™**SWWZ Washer-Head WOOD Screw, Impreg®+**

Impreg®+
C4 – 15 years acc. to EN
ISO 12944-2
SC2 – 50 years acc. to EC5



SWWZ – Range Overview

Reference	Article code	Dimensions [mm]					
		d	l	l _g	d _h	d _i	t _{fix}
SWWZ6.0X80	76352	6,0	80	50	14	3,9	30
SWWZ6.0X90	76452	6,0	90	50	14	3,9	40
SWWZ6.0X100	76453	6,0	100	50	14	3,9	50
SWWZ6.0X120	76454	6,0	120	50	14	3,9	70
SWWZ8.0X80	76455	8,0	80	50	22	5,2	30
SWWZ8.0X90	76457	8,0	90	50	22	5,2	40
SWWZ8.0X100	76601	8,0	100	50	22	5,2	50
SWWZ8.0X120	76603	8,0	120	80	22	5,2	40
SWWZ8.0X140	76604	8,0	140	80	22	5,2	60
SWWZ8.0X180	76605	8,0	180	80	22	5,2	100
SWWZ8.0X200	76606	8,0	200	80	22	5,2	120
SWWZ8.0X240	76607	8,0	240	80	22	5,2	160
SWWZ8.0X300	76608	8,0	300	80	22	5,2	220
SWWZ8.0X340	76609	8,0	340	80	22	5,2	260
SWWZ10.0X160	76610	10,0	160	80	25	6,2	80
SWWZ10.0X180	76611	10,0	180	80	25	6,2	100
SWWZ10.0X200	76612	10,0	200	80	25	6,2	120
SWWZ10.0X240	76613	10,0	240	80	25	6,2	160

SWWZ – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
SWWZ6.0	10500	13,0	12,3	11,0	16,1
SWWZ8.0	25900	12,6	23,7	27,4	10,5
SWWZ10.0	43700	12,2	33,8	48,9	10,2

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³

f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.

Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5



Use Fastener Designer to make your calculations.

Go to strongtie.eu/fastener-designer

Structural Fastening

Solid-Drive™ SWC Countersunk **WOOD** Screw

Structural Timber to Timber Connections Including Glulam, CLT and General Interior Applications

SWC is a countersunk structural screw designed for load-bearing wood structures. The SWC screw has a milling thread to allow for smooth driving of the shank. The countersunk head gives flush fitting while allowing the wood members to close up firmly.

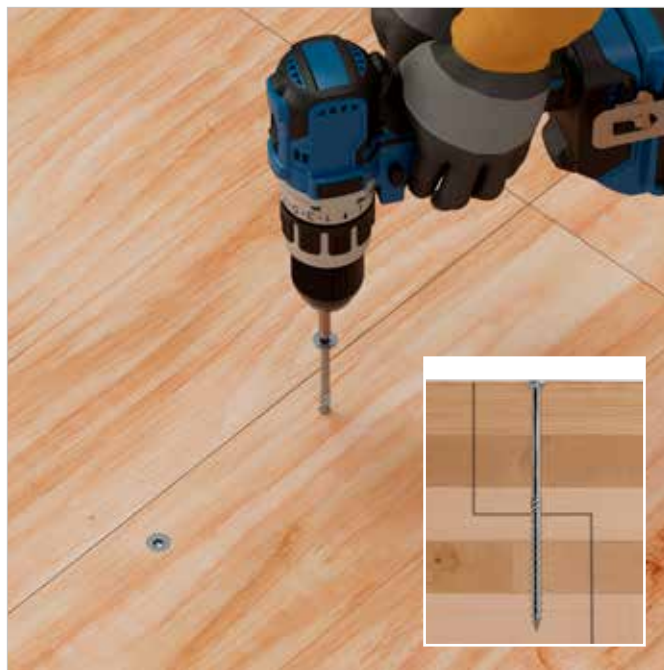
These partially-threaded, 6.0, 8.0 and 10.0 mm diameter structural fasteners are designed to pull structural members together with superb holding power and excellent load capacity. The countersunk head and underhead nibs provide for clean countersinking, flush with the surface. Predrilling is not typically required. For interior and dry applications only.

Codes/Standards: ETA-21/0670

For more information, see pages 86, 112, 158, 166, 177, 222.



ETA-21/0670



SWC screws installed in a CLT half-lap application.

Features

Countersunk head with underhead nibs creates a flush finish

White zinc plated* for interior and dry applications

Head stamp includes length in mm for inspection



Deep 6-lobe recess provides improved control and greater bit life

Type 17 cut point reduces the risk of wood splitting during the installation

Milling thread reduces the drive-in torque

Heavy-duty thread and shank provides strength and stability

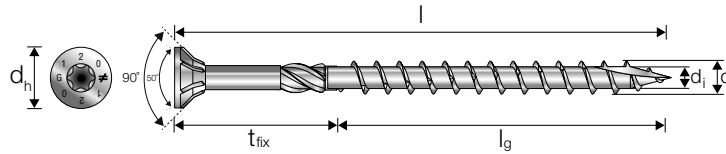
*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses.

Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

Structural Fastening

Solid-Drive™

SWC Countersunk WOOD Screw

**Electro Galvanised**C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

SWC – Range Overview

Reference	Article code	Dimensions [mm]					
		d	l	l _g	d _h	d _l	t _{fix}
SWC6.0X200	75346	6,0	200	70	11,8	3,9	130
SWC6.0X220	75347	6,0	220	70	11,8	3,9	150
SWC6.0X240	75348	6,0	240	70	11,8	3,9	170
SWC6.0X260	75349	6,0	260	70	11,8	3,9	190
SWC6.0X280	75350	6,0	280	70	11,8	3,9	210
SWC6.0X300	75351	6,0	300	70	11,8	3,9	230
SWC8.0X80	75352	8,0	80	50	14,6	5,2	30
SWC8.0X100	75353	8,0	100	50	14,6	5,2	50
SWC8.0X120	75354	8,0	120	80	14,6	5,2	40
SWC8.0X140	75355	8,0	140	80	14,6	5,2	60
SWC8.0X160	75356	8,0	160	80	14,6	5,2	80
SWC8.0X180	75357	8,0	180	80	14,6	5,2	100
SWC8.0X200	75358	8,0	200	80	14,6	5,2	120
SWC8.0X220	75359	8,0	220	80	14,6	5,2	140
SWC8.0X240	75360	8,0	240	80	14,6	5,2	160
SWC8.0X260	75361	8,0	260	80	14,6	5,2	180
SWC8.0X280	75362	8,0	280	80	14,6	5,2	200
SWC8.0X300	75363	8,0	300	80	14,6	5,2	220
SWC8.0X320	75364	8,0	320	80	14,6	5,2	240
SWC8.0X340	75365	8,0	340	80	14,6	5,2	260
SWC8.0X360	75366	8,0	360	80	14,6	5,2	280
SWC8.0X380	75367	8,0	380	80	14,6	5,2	300
SWC8.0X400	75368	8,0	400	80	14,6	5,2	320
SWC10.0X100	76916	10,0	100	50	17,8	6,2	50
SWC10.0X120	76917	10,0	120	50	17,8	6,2	70
SWC10.0X140	76918	10,0	140	80	17,8	6,2	60
SWC10.0X160	75369	10,0	160	80	17,8	6,2	80
SWC10.0X180	75370	10,0	180	80	17,8	6,2	100
SWC10.0X200	75371	10,0	200	80	17,8	6,2	120
SWC10.0X220	75372	10,0	220	80	17,8	6,2	140
SWC10.0X240	75373	10,0	240	80	17,8	6,2	160
SWC10.0X260	75374	10,0	260	80	17,8	6,2	180
SWC10.0X280	75375	10,0	280	80	17,8	6,2	200
SWC10.0X300	75376	10,0	300	80	17,8	6,2	220
SWC10.0X320	75377	10,0	320	80	17,8	6,2	240
SWC10.0X340	75378	10,0	340	80	17,8	6,2	260
SWC10.0X360	75379	10,0	360	80	17,8	6,2	280
SWC10.0X380	75380	10,0	380	80	17,8	6,2	300
SWC10.0X400	75381	10,0	400	80	17,8	6,2	320

SWC – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
SWC6.0	10500	13,0	12,3	11,0	11,9
SWC8.0	25900	12,6	23,7	27,4	12,5
SWC10.0	43700	12,2	33,8	48,9	11,2

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses.

Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

Structural Fastening

Solid-Drive™

SWD Double-Threaded **WOOD** Screw

Structural Timber to Timber Connections Including Glulam, CLT and General Interior Applications

The Solid-Drive® SWD is a double threaded structural screw designed to connect and pull together two wood members.

The small cylinder-head reduces the insertion torque and makes it possible to countersink the screws. The Protec+ coating is a wear resistant coating that can endure the friction of the installation and the exposure of high loads from the structural applications.

SWD screws are suitable for inclined and angled installations. Use the GSCREW screw guide to ensure that screws are installed with the correct angle into the timber.

Codes/Standards: ETA-21/0670

For more information, see pages 89, 115, 127, 131, 160, 170, 180, 187, 189.

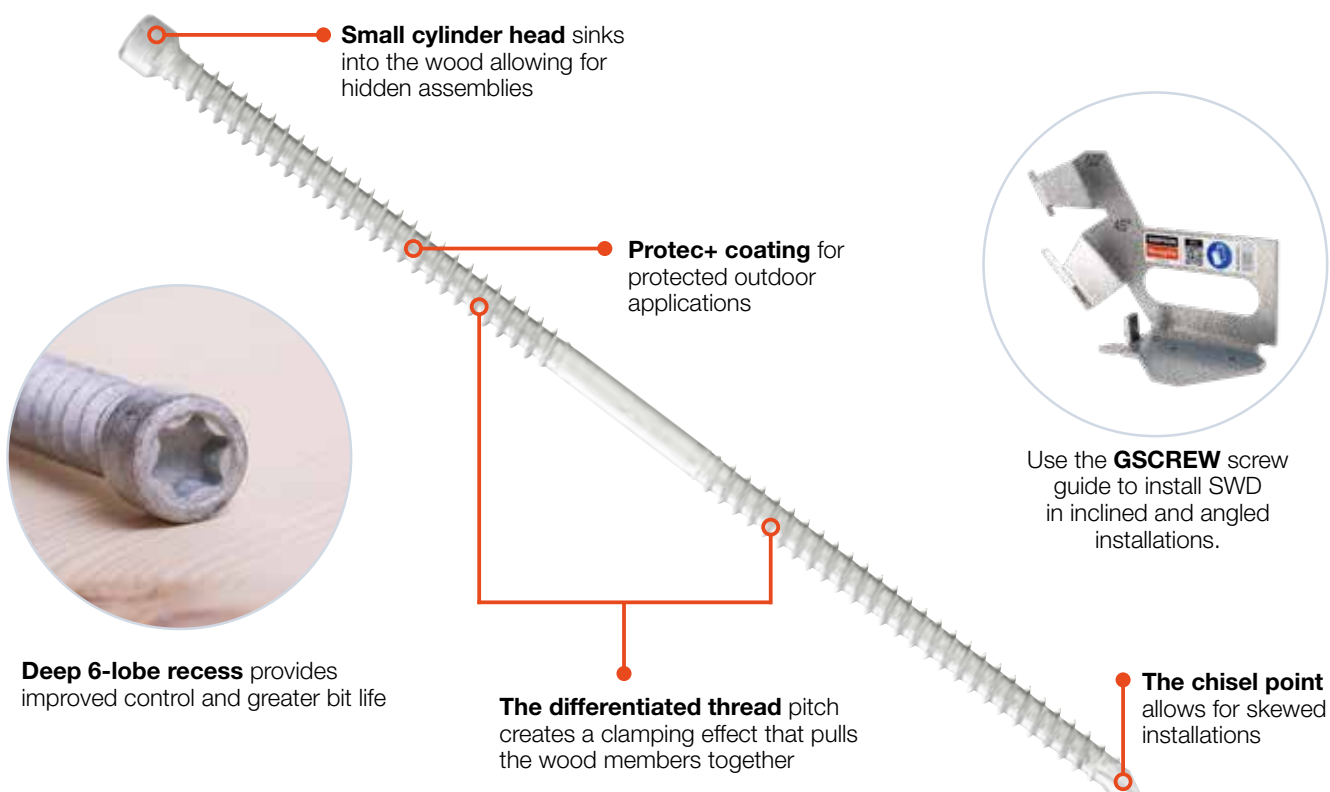


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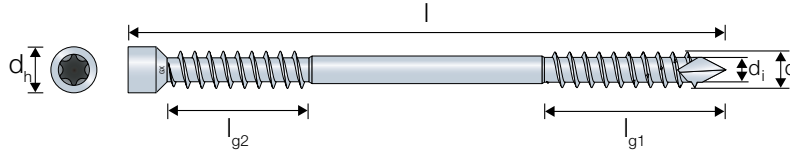


SWD screws in a CLT floor-to-wall application.

Features



Structural Fastening

Solid-Drive™SWD Double-Threaded **WOOD** Screw**Protec® +**C3 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

SWD – Range Overview

Reference	Article code	Dimensions [mm]					
		d	l	l _{g1}	l _{g2}	d _h	d _i
SWD6.5X65	75425	6,5	65	28	21,5	8	4
SWD6.5X90	75426	6,5	90	40	33,5	8	4
SWD6.5X130	75427	6,5	130	40	33,5	8	4
SWD6.5X160	75428	6,5	160	65	58,5	8	4
SWD6.5X190	75429	6,5	190	80	73,5	8	4
SWD6.5X220	75430	6,5	220	95	88,5	8	4
SWD8.0X90	75431	8,0	90	40	31,5	10	5,4
SWD8.0X130	75432	8,0	130	40	31,5	10	5,4
SWD8.0X160	75433	8,0	160	65	56,5	10	5,4
SWD8.0X190	75434	8,0	190	80	71,5	10	5,4
SWD8.0X220	75435	8,0	220	95	86,5	10	5,4
SWD8.0X245	75436	8,0	245	107	99	10	5,4
SWD8.0X275	75437	8,0	275	107	99	10	5,4
SWD8.0X300	75438	8,0	300	135	126,5	10	5,4
SWD8.0X330	75439	8,0	330	135	126,5	10	5,4

SWD – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
SWD6.5	12400	13,7	14,5	12,6	1000
SWD8.0	26800	13,1	25,3	27,7	1000

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

Use Fastener Designer to make your calculations.

Go to strongtie.eu/fastener-designer

Structural Fastening

Solid-Drive™ SSH Hex-Head **CONNECTOR** Screw

Simpson Strong-Tie® Connectors to Timber and General Steel to Timber Applications

The Solid-Drive® SSH hex-head screw is a structural fastener designed for cross-laminated timber (CLT), glulam construction and general metal to wood applications.

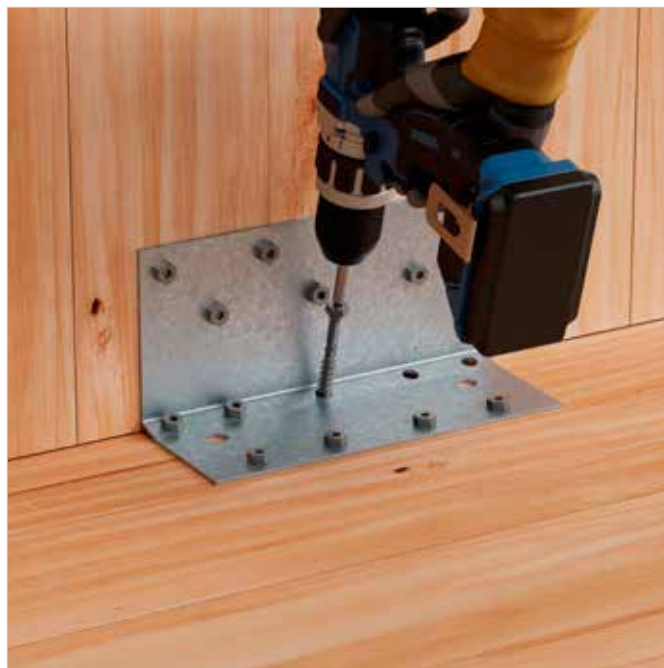
These partially-threaded, sturdy 6.0, 8.0, 10.0 and 12.0 mm diameter structural fasteners are designed to provide excellent connection strength, especially when connecting steel plate or angle connectors to wood. The unique head combining hex and torx allows for the convenience of driving with either a hex-driver bit or 6-lobe driver bit. The SSH screws are Impreg+ coated for increased corrosion protection. They have a robust knurled shank and type-17 cut-point for fast starts and low-torque driving.

Codes/Standards: ETA-21/0670

For more information, see pages 91, 117, 202.

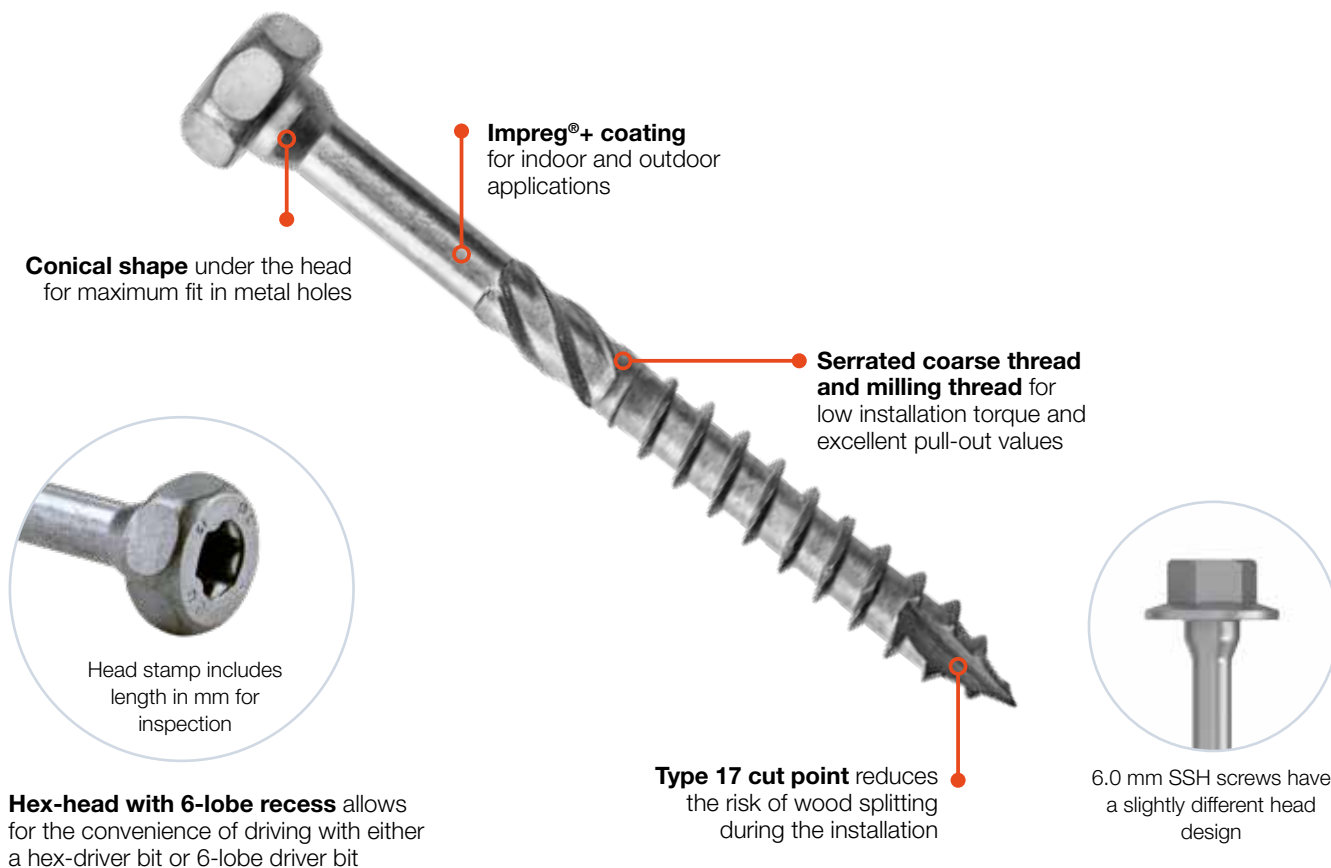


ETA-21/0670



SSH screws fastening of AB255SSH angle bracket.

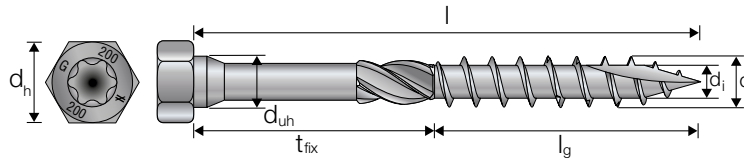
Features



Structural Fastening

Solid-Drive™

SSH Hex-Head CONNECTOR Screw



Impreg®+
C4 – 15 years acc. to EN
ISO 12944-2
SC2 – 50 years acc. to EC5



SSH – Range Overview

Reference	Article code	Dimensions [mm]					
		d/d _{uh}	l	l _g	d _h	d _i	t _{fix}
SSH6.0X40*	75128	6,0	40	24	14,5 (10)	3,65	16
SSH6.0X50*	75129	6,0	50	33	14,5 (10)	3,65	17
SSH6.0X60*	75130	6,0	60	42	14,5 (10)	3,65	18
SSH6.0X75*	75131	6,0	75	42	14,5 (10)	3,65	33
SSH6.0X90*	75132	6,0	90	42	14,5 (10)	3,65	48
SSH6.0X120*	75133	6,0	120	75	14,5 (10)	3,65	45
SSH8.0X40	75134	8,0	40	32	13	5,1	8
SSH8.0X50	75135	8,0	50	42	13	5,1	8
SSH8.0X60	75136	8,0	60	42	13	5,1	18
SSH8.0X80	75137	8,0	80	42	13	5,1	38
SSH8.0X90	75138	8,0	90	42	13	5,1	48
SSH8.0X100	75139	8,0	100	55	13	5,1	45
SSH8.0X120	75140	8,0	120	85	13	5,1	35
SSH8.0X140	75141	8,0	140	85	13	5,1	55
SSH8.0X160	75142	8,0	160	110	13	5,1	50
SSH8.0X180	75143	8,0	180	110	13	5,1	70
SSH8.0X200	75144	8,0	200	110	13	5,1	90
SSH8.0X240	75145	8,0	240	110	13	5,1	130
SSH8.0X260	75146	8,0	260	110	13	5,1	150
SSH8.0X280	75147	8,0	280	110	13	5,1	170
SSH8.0X300	75148	8,0	300	110	13	5,1	190

Reference	Article code	Dimensions [mm]					
		d/d _{uh}	l	l _g	d _h	d _i	t _{fix}
SSH10.0X40	75149	10,0	40	32	15	6,15	8
SSH10.0X50	75150	10,0	50	42	15	6,15	8
SSH10.0X60	75151	10,0	60	42	15	6,15	18
SSH10.0X80	75152	10,0	80	42	15	6,15	38
SSH10.0X90	75153	10,0	90	42	15	6,15	48
SSH10.0X100	75154	10,0	100	55	15	6,15	45
SSH10.0X120	75155	10,0	120	85	15	6,15	35
SSH10.0X140	75156	10,0	140	85	15	6,15	55
SSH10.0X160	75157	10,0	160	110	15	6,15	50
SSH10.0X180	75158	10,0	180	110	15	6,15	70
SSH10.0X200	75159	10,0	200	110	15	6,15	90
SSH10.0X240	75160	10,0	240	125	15	6,15	115
SSH10.0X280	75161	10	280	125	15	6,15	155
SSH12.0X60	75162	12,0	60	48	17	6,7	12
SSH12.0X80	75163	12,0	80	48	17	6,7	32
SSH12.0X90	75164	12,0	90	48	17	6,7	42
SSH12.0X100	75165	12,0	100	55	17	6,7	45
SSH12.0X120	75166	12,0	120	85	17	6,7	35
SSH12.0X140	75167	12,0	140	85	17	6,7	55
SSH12.0X160	75168	12,0	160	110	17	6,7	50
SSH12.0X180	75169	12,0	180	110	17	6,7	70
SSH12.0X200	75170	12,0	200	110	17	6,7	90

*) Different head design.

SSH – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
SSH6.0	10400	13,3	13,1	11,0	17,9
SSH8.0	25300	13,9	24,1	26,4	19,5
SSH10.0	38700	12,1	32,8	43,0	19,3
SSH12.0	52300	12,2	40,4	62,4	18,8

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

Use Fastener Designer to make your calculations.

Go to strongtie.eu/fastener-designer

Structural Fastening

Solid-Drive™

SSF Flat Round-Head CONNECTOR Screw

Simpson Strong-Tie® Connectors to Timber and General Steel to Timber Applications

SSF is used together with connectors where high load capability is required. The conical shape under the head makes a perfect fitting to the connector hole, creating a firm assembly. The type-17 cut-point prevents cracking and the milling thread and serrated thread reduce the insertion torque. SSF has a round flat head with 6 lobe drive, creating an esthetically improved end-result.

These partially-threaded, sturdy 8.0 and 10.0 mm diameter structural fasteners are designed to provide excellent connection strength, especially when connecting steel plates or angle connectors to wood. The SSF screws are Impreg+ coated for increased corrosion protection.

Codes/Standards: ETA-21/0670

For more information, see page 206.

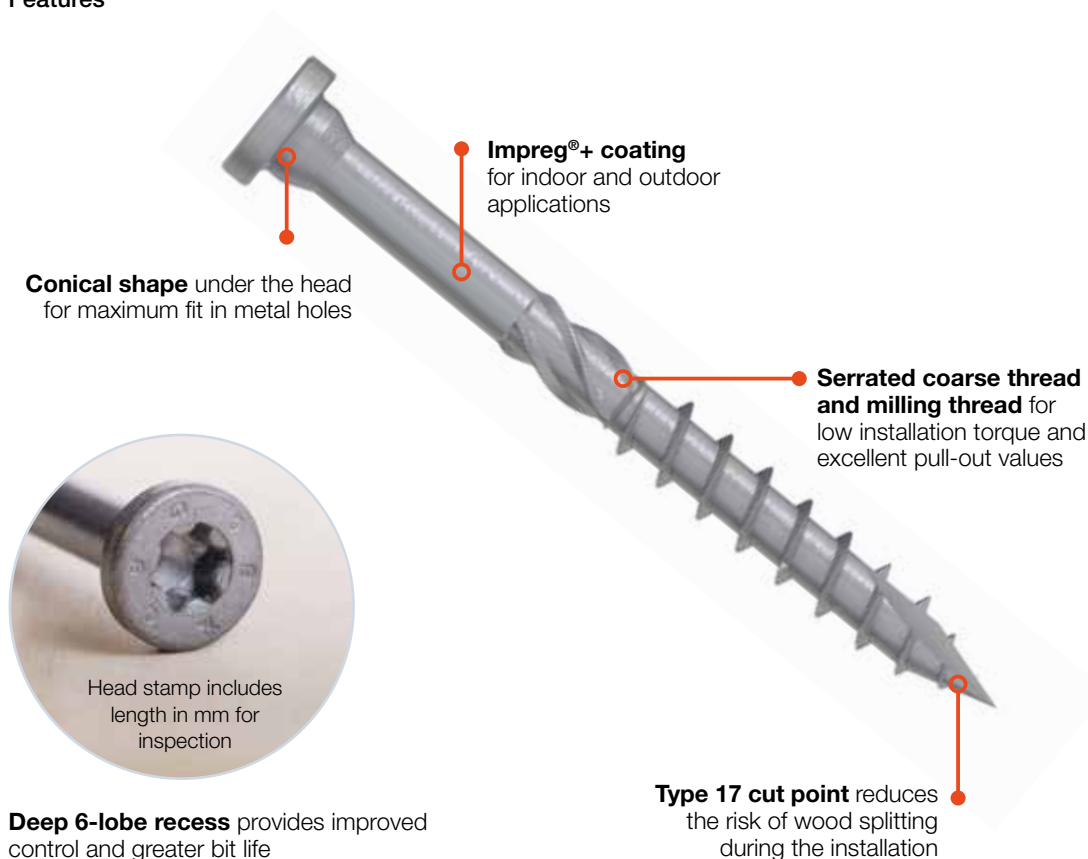


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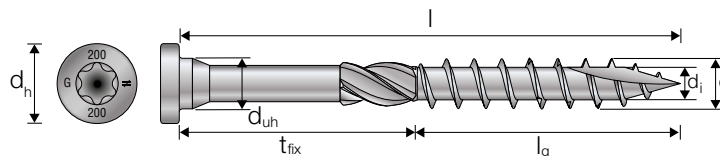


SSF screws fastening of BSNN joist hanger.

Features



Structural Fastening

Solid-Drive™SSF Flat Round-Head **CONNECTOR** Screw

Impreg®+

C4 – 15 years acc. to EN
ISO 12944-2
SC2 – 50 years acc. to EC5

SSF – Range Overview

Reference	Article code	Dimensions [mm]					
		d/d _{uh}	l	l _g	d _h	d _i	t _{fix}
SSF8.0X40	75185	8,0	40	32	13	5,1	8
SSF8.0X60	75186	8,0	60	42	13	5,1	18
SSF8.0X80	75187	8,0	80	42	13	5,1	38
SSF10.0X60	75189	10,0	60	42	15	6,15	18
SSF10.0X80	75190	10,0	80	42	15	6,15	38

SSF – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
SSF8.0	25300	13,9	24,1	26,4	-
SSF10.0	38700	12,1	32,8	43,0	-

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³

f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.

Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5



Use Fastener Designer to make your calculations.

Go to strongtie.eu/fastener-designer

Structural Fastening

Solid-Drive™

SDCF Fully Threaded Countersunk WOOD Screw

Structural Timber to Timber Connections Including Glulam Seat Reinforcement and CLT Applications

The Solid-Drive® SDCF screw is a structural fastener, designed for cross-laminated timber (CLT), mass timber construction and general interior applications.

These 8.0 mm, 10.0 mm, and 12.0 mm diameter structural fasteners provide uncompromised strength for these demanding applications. The large flat head with underhead nibs ensures clean countersinking and a flush finish. The SDCF Screw has been redesigned to incorporate black e-coat and a sawtooth point. Its SawTooth® point technology ensures fast starts, reducing installation torque and eliminating the need for predrilling in most applications.

Codes/Standards: ETA-21/0670

For more information, see pages 94, 119, 137, 172, 185, 225.

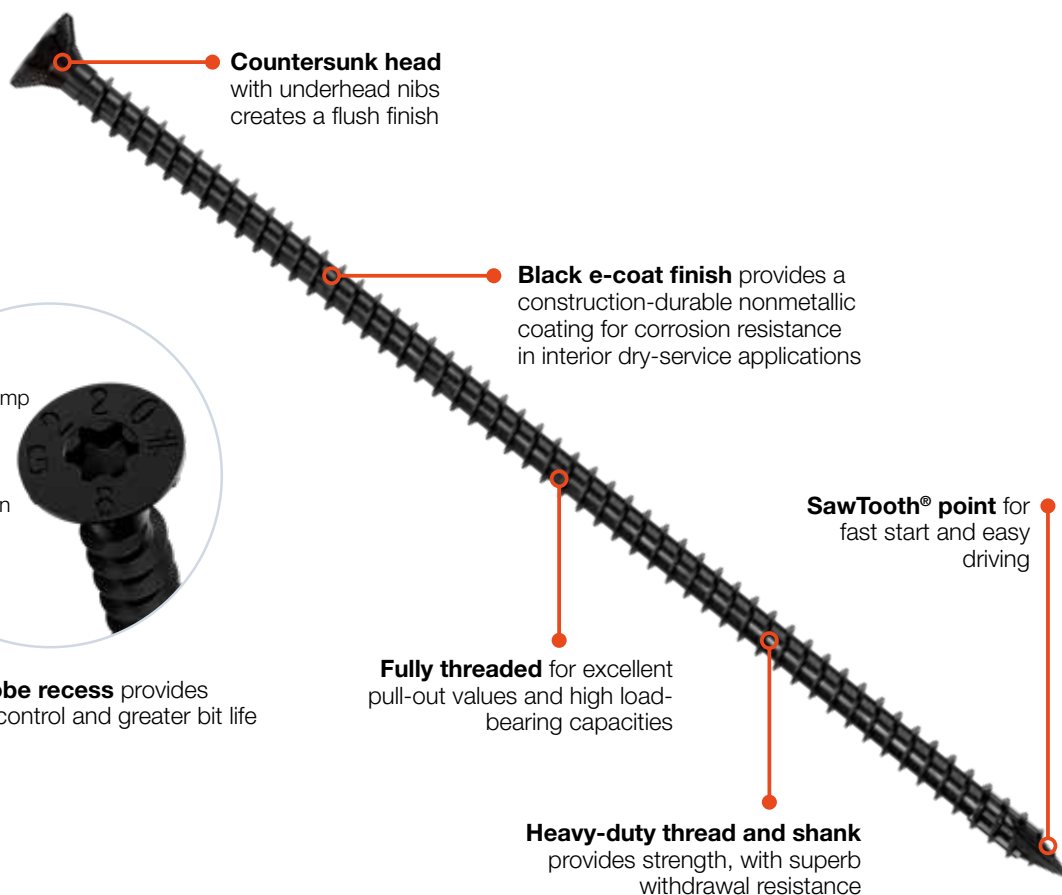


SDCF screws in mass timber application.



ETA-21/0670

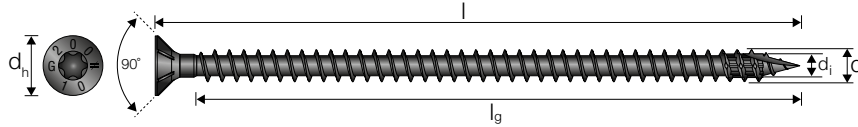
Features



Head stamp includes length in mm for inspection

Deep 6-lobe recess provides improved control and greater bit life

Structural Fastening

Solid-Drive™SDCF Fully Threaded Countersunk **WOOD** Screw**Black E-Coat**C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

SDCF – Range Overview

Reference	Article code	Dimensions [mm]				
		d	l	l _g	d _h	d _i
SDCF8X120	78423	8,0	120	110	15	5,2
SDCF8X140	78424	8,0	140	130	15	5,2
SDCF8X160	78425	8,0	160	150	15	5,2
SDCF8X180	78426	8,0	180	170	15	5,2
SDCF8X200	78427	8,0	200	190	15	5,2
SDCF8X220	78428	8,0	220	210	15	5,2
SDCF8X240	78429	8,0	240	230	15	5,2
SDCF8X260	78430	8,0	260	250	15	5,2
SDCF8X300	78431	8,0	300	290	15	5,2
SDCF8X350	78432	8,0	350	340	15	5,2
SDCF10X160	78433	10,0	160	148	18,5	6,2
SDCF10X200	78434	10,0	200	188	18,5	6,2
SDCF10X240	78435	10,0	240	228	18,5	6,2
SDCF10X280	78436	10,0	280	268	18,5	6,2
SDCF10X360	78437	10,0	360	348	18,5	6,2
SDCF10X400	78438	10,0	400	388	18,5	6,2
SDCF10X450	78439	10,0	450	426	18,5	6,2
SDCF12X200	78440	12,0	200	180	22,2	6,8
SDCF12X240	78441	12,0	240	220	22,2	6,8
SDCF12X280	78442	12,0	280	260	22,2	6,8
SDCF12X350	78443	12,0	350	330	22,2	6,8
SDCF12X450	78444	12,0	450	425	22,2	6,8
SDCF12X600	78445	12,0	600	575	22,2	6,8

SDCF – Characteristic Parameters

Reference	Characteristic Parameters					
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]	f _{y,k} [N/mm²]
SDCF8	21,9	13,4	21,7	25	9,4	1000
SDCF10	37,9	13	32,9	46	9,4	1000
SDCF12	44,3	10,3	38,3	59	9,4	1000

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

Use Fastener Designer to make your calculations.

Go to strongtie.eu/fastener-designer

Structural Fastening

Solid-Drive™

SDCFC Fully Threaded Cylinder-Head **WOOD** Screw

Structural Timber to Timber Connections Including Glulam and CLT Cross Pair Applications

The newly redesigned Solid-Drive® SDCFC screw is a robust structural fastener for demanding applications involving large members such as mass timber. A fully threaded shank provides withdrawal resistance, and the compact cylinder head creates a clean finish when left exposed, or a concealed finish when countersunk. The SawTooth® point ensures fast starts, reducing installation torque and eliminating the need for predrilling in most applications. The black e-coat finish enhances aesthetics and, along with the optimized hardness profile, helps mitigate risk of brittle fracture for reliable, long-term performance.

Codes/Standards: ETA-21/0670

For more information, see pages 97, 122, 128, 132, 161, 171, 181, 183, 188, 190.



ETA-21/0670



SDCFC screws in glulam application.

Features

Compact cylinder head
helps countersink the screw
for a clean finish

Fully threaded for excellent
pull-out values and high load-
bearing capacities

Black e-coat finish provides
a construction-durable
nonmetallic coating for
corrosion resistance in interior
dry-service applications

Use the **GSCREW** screw
guide to install SDCFC
in inclined and angled
installations.

Head stamp
includes
length in
mm for
inspection



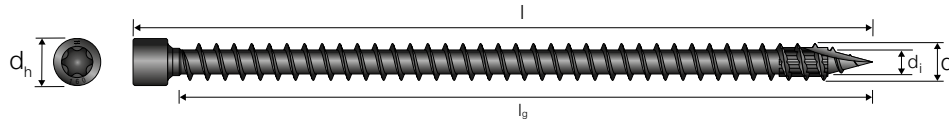
Deep 6-lobe recess
provides improved control
and greater bit life

Heavy-duty thread and shank
provides strength, with superb
withdrawal resistance

SawTooth® point for fast
start and easy driving



Structural Fastening

Solid-Drive™SDCFC Fully Threaded Cylinder-Head **WOOD** Screw**Black E-Coat**C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

SDCFC – Range Overview

Reference	Article code	Dimensions [mm]				
		d	l	l _g	d _h	d _i
SDCFC8X120	78446	8,0	120	110	10,2	5,2
SDCFC8X160	78447	8,0	160	150	10,2	5,2
SDCFC8X200	78448	8,0	200	190	10,2	5,2
SDCFC8X240	78449	8,0	240	230	10,2	5,2
SDCFC8X280	78450	8,0	280	270	10,2	5,2
SDCFC8X330	78451	8,0	330	320	10,2	5,2
SDCFC8X350	78452	8,0	350	340	10,2	5,2
SDCFC10X240	78456	10,0	240	228	13,4	6,2
SDCFC10X300	78457	10,0	300	288	13,4	6,2
SDCFC10X380	78458	10,0	380	368	13,4	6,2
SDCFC10X500	78459	10,0	500	476	13,4	6,2
SDCFC10X600	78460	10,0	600	576	13,4	6,2
SDCFC10X800	78461	10,0	800	776	13,4	6,2
SDCFC10X1000	78462	10,0	1000	976	13,4	6,2

SDCFC – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{y,k} [N/mm²]
SDCFC8	21,9	13,4	21,7	25	1000
SDCFC10	37,9	13	32,9	46	1000

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

Use Fastener Designer to make your calculations.

Go to
fastenerdesigner.strongtie.eu

Structural Fastening

Solid-Drive™

SWRS Structural Roof and Exterior Wall Insulation WOOD Screw

Structural Timber to Timber Connections Including Rafter-Insulation Applications

The CE marked SWRS screw is the ideal fixing option for hard or soft insulation applications. The screw can absorb shear and compressive forces to avoid pressing the insulation material to the background, this improves the insulation performance.

Codes/Standards: EN14592

For more information, see our website strongtie.eu (characteristic values for rafter insulation are not included in this catalogue, but you can find it on our website).

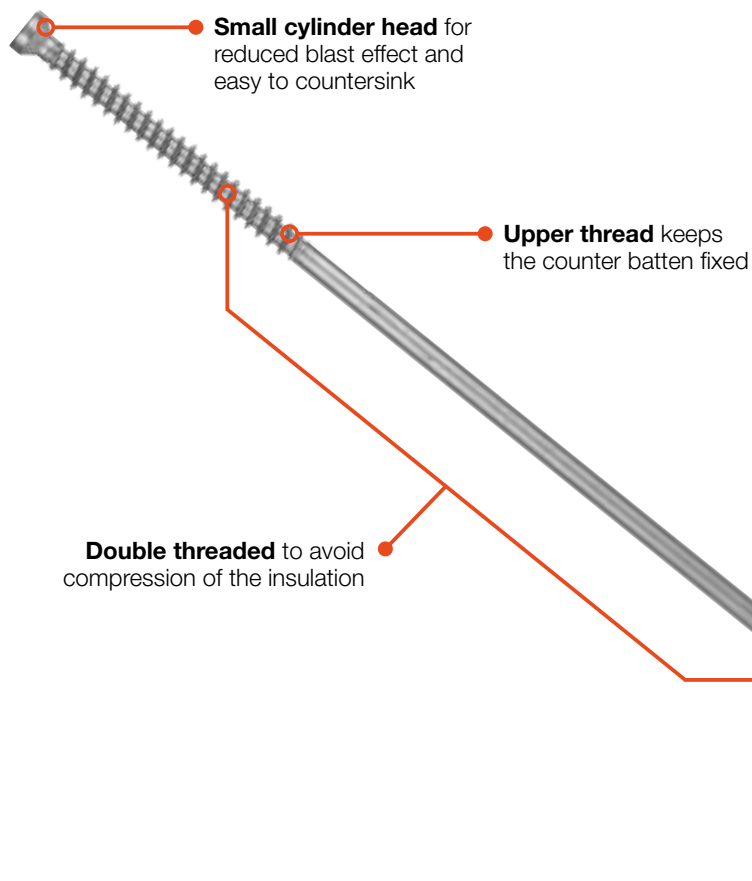


EN14592



SWRS screws in rafter insulation application.

Features

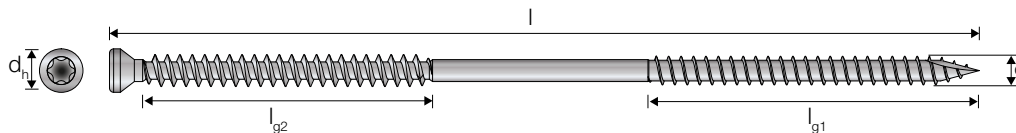


Use the **GSCREW** screw guide to install SWRS in inclined and angled roof and wall insulation installations.

Structural Fastening

Solid-Drive™

SWRS Structural Roof and Exterior Wall Insulation WOOD Screw



Supracoat 2C

SC2 – 50 years acc. to EC5

SWRS - Range Overview

Reference	Article code	Dimensions [mm]					
		d	l	d _h	d _i	l _{g1}	l _{g2}
SWRS7.0X210	77924	7.0	210	10.5	5.0	80	70
SWRS7.0X230	77925	7.0	230	10.5	5.0	80	70
SWRS7.0X250	77926	7.0	250	10.5	5.0	80	70
SWRS7.0X270	77927	7.0	270	10.5	5.0	80	70
SWRS7.0X300	77928	7.0	300	10.5	5.0	80	70
SWRS7.0X330	77929	7.0	330	10.5	5.0	80	70
SWRS7.0X360	77931	7.0	360	10.5	5.0	80	70
SWRS7.0X400	77932	7.0	400	10.5	5.0	80	70
SWRS7.0X440	77934	7.0	440	10.5	5.0	80	70
SWRS7.0X480	77935	7.0	480	10.5	5.0	80	70

SWRS – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
SWRS7.0	15400	15.6	12.4	-	-

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³

f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.

Ratio of the characteristic torsional strength to the mean insertion moment: $f_{tor,k} / R_{tor,mean} \geq 1,5$



Use Fastener Designer to make your calculations.

Go to fastenerdesigner.strongtie.eu

Structural Fastening

Solid-Drive™ CSA/CSA-Z/CSA-S CONNECTOR Screw

Simpson Strong-Tie® Connectors to Timber

The Solid-Drive™ CSA connector screw is developed for installing of Simpson Strong-Tie® connectors to wood, in order to obtain the published load bearing capacities.

The conical shape under the head secures full contact to the connector, which increases the transfer of force. A fixed connection with larger cross-bearing capacity than for standard screws is obtained. The 6 lobe recess helps to fix the screw during insertion.

With the Quik Drive collated CSA screws, Simpson Strong-Tie offers an extremely efficient method for installing connectors to CLT and glulam. CLT connectors often require many screws per installation, so by using the Quik Drive system, the installer can save considerable time.

Codes/Standards: ETA-04/0013

For more information, see page 209.



ETA-04/0013

UK
CA



Quik Drive collated CSA screws fastening
HTT31 holdown in CLT wall to concrete
slab installation.

Features

Conical shape under the head
for maximum fit in metal holes



Deep 6-lobe recess provides improved
control and greater bit life

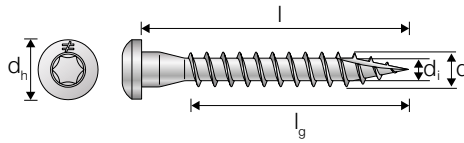
Type 17 cut point reduces
the risk of wood splitting
during the installation

Available as electro galvanised or with
Impreg+ coating and in stainless steel A4.

Quik Drive QDBPC50E
system is designed
specifically for installing
CSA connector screws.

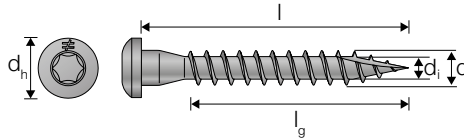


Structural Fastening

Solid-Drive™**CSA/CSA-Z/CSA-S CONNECTOR Screws****Electro Galvanised**C1 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

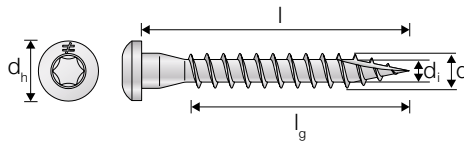
CSA – Range Overview

Reference	Dimensions [mm]				
	d	l	l _g	d _h	d _i
CSA5.0X25	4,85	25	19	8,3	3,15
CSA5.0X35	4,85	35	29	8,3	3,15
CSA5.0X40	4,85	40	34	8,3	3,15
CSA5.0X50	4,85	50	44	8,3	3,15
CSA5.0X80	4,85	80	74	8,3	3,15

**Impreg®+**C4 – 15 years acc. to EN
ISO 12944-2
SC2 – 50 years acc. to EC5

CSA-Z – Range Overview

Reference	Dimensions [mm]				
	d	l	l _g	d _h	d _i
CSA5.0X35Z	4,85	35	29	8,3	3,15
CSA5.0X40Z	4,85	40	34	8,3	3,15
CSA5.0X50Z	4,85	50	44	8,3	3,15

**Stainless Steel**CRC III acc. to
EN1993-1-4(A1)
SC3 – 50 years acc. to EC5

CSA-S – Range Overview

Reference	Dimensions [mm]				
	d	l	l _g	d _h	d _i
CSA5.0X25S	4,85	25	19	8,3	3,15
CSA5.0X35S	4,85	35	29	8,3	3,15
CSA5.0X40S	4,85	40	34	8,3	3,15

CSA/CSA-Z/CSA-S – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
CSA5.0	5000	15,0	6,8	-	-

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

Use Fastener Designer to make your calculations.

Go to strongtie.eu/fastener-designer

Structural Fastening

Solid-Drive™ CNA/CNA-G/CNA-S CONNECTOR Nail

Simpson Strong-Tie® Connectors to Timber

The Solid-Drive CNA connector nail, which is supplied in many different lengths and sizes, loose and collated, is a fully documented ETA-approved fastener used for installing metal connectors to wood. Guaranteed load bearing capacities when using CNA nails to install Simpson Strong-Tie connectors.

CNA is available in a variety of different collations and is compatible with many pneumatic and gas-driven tools on the market. The collated nails are available as 34° plastic collated and 34° paper collated as well as 15° plastic coil collated.

Codes/Standards: ETA-04/0013

For more information, see page 211.



ETA-04/0013

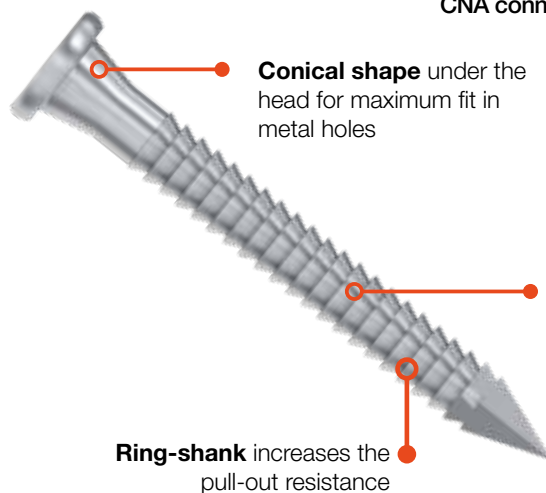


CNA connectors nails used to fasten joist hanger.

Features

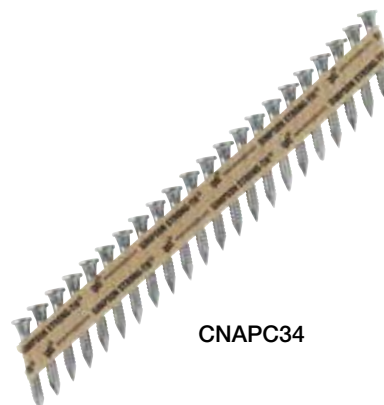
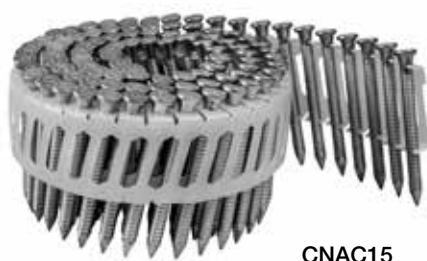


Head-stamp makes it easy to identify the length after installation.

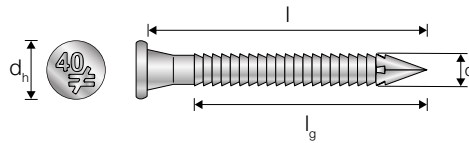


Available as electro galvanised, hot-dip galvanised and in stainless steel A4.

Available in different types of collations:

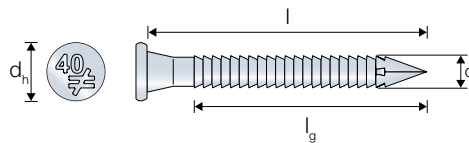


Structural Fastening

Solid-Drive™**CNA/CNA-G/CNA-S CONNECTOR Nail****Electro Galvanised**C1 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

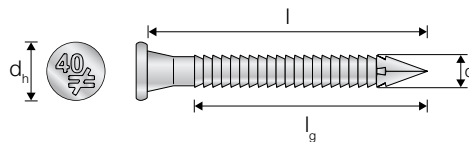
CNA – Range Overview

Reference	Dimensions [mm]			
	d	l	l _g	d _h
CNA4.0X35	4,4	35	20	7
CNA4.0X40	4,4	40	25	7
CNA4.0X50	4,4	50	35	7
CNA4.0X60	4,4	60	45	7
CNA4.0X75	4,4	75	59	7
CNA4.0X100	4,4	100	65	7

**Hot-Dip Galvanised**C4 acc. to EN ISO 12944-2
SC3 – 50 years acc. to EC5

CNA-G – Range Overview

Reference	Dimensions [mm]			
	d	l	l _g	d _h
CNA4.0X40G	4,4	40	40	7

**Stainless Steel**CRC III acc. to
EN1993-1-4(A1)
SC3 – 50 years acc. to EC5

CNA-S – Range Overview

Reference	Dimensions [mm]			
	d	l	l _g	d _h
CNA4.0X35S	4,4	35	20	7
CNA4.0X40S	4,4	40	25	7
CNA4.0X50S	4,4	50	35	7
CNA4.0X60S	4,4	60	45	7

CNA/CNA-G/CNA-S – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm ²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm ²]
CNA4.0	6617	*	7,5	-	-

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

*See ETA-04/0013 for withdrawal parameter calculation.

Use Fastener Designer to make
your calculations.Go to strongtie.eu/fastener-designer

Structural Fastening

Solid-Drive™ SDD Self-Drilling DOWEL

Glulam and CLT Applications with Concealed Steel Connectors

The CE marked SDD self-drilling dowel offer an efficient fastening method for glulam and CLT in combination with aluminium connectors.

The double threaded dowel has a cylinder head with an T-40 6-lobe drive and the unique point design reduces the splitting of the timber. The groove on the lower thread allows the wood chips to be removed during installation.

Compared to traditional fastening of glulam beams to concealed beam hangers made with standard dowels, the SDD offers a significant improvement of efficiency, as no pre-drilling is required for this method.

Codes/Standards: EN14592

For more information, see page 198.

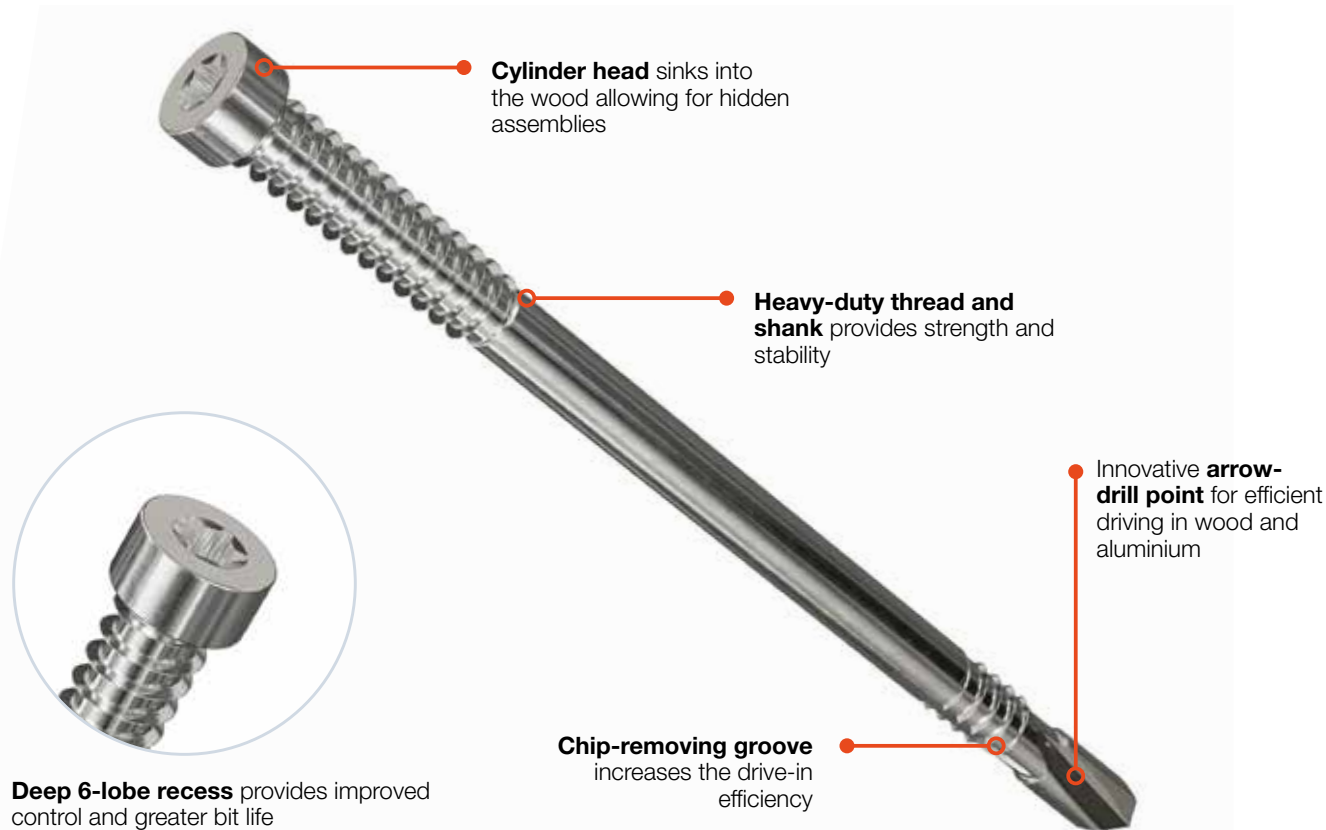


EN14592



Glulam beam-to-beam connection with SDD dowels in a BTALU connector.

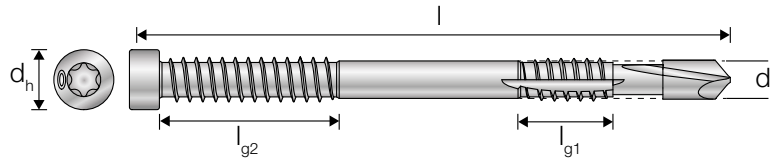
Features



Structural Fastening

Solid-Drive™

SDD Self-Drilling DOWEL

**Electro Galvanised**C1 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

SDD - Range Overview

Reference	Article code	Dimensions [mm]					
		d	l	d _h	d ₁	l _{g1}	l _{g2}
SDD7.5X93	78119	7.5	93	12.0	6.9	8.5	27
SDD7.5X113	78120	7.5	113	12.0	6.9	12.5	36
SDD7.5X133	78121	7.5	133	12.0	6.9	12.5	36
SDD7.5X153	78122	7.5	153	12.0	6.9	12.5	36
SDD7.5X173	78123	7.5	173	12.0	6.9	12.5	36

SDD – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
SDD7.5	37800	-	-	-	-

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³

f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.

Ratio of the characteristic torsional strength to the mean insertion moment: $f_{tor,k} / P_{tor,mean} \geq 1,5$

Structural Fastening

Solid-Drive™

CSFT Fully Threaded **CONNECTOR** Screw

Simpson Strong-Tie CCS Connectors to Wood and General Metal-to-Wood Applications

CSFT connector screw is designed for steel to wood connections and load rated together with specific Simpson Strong-Tie connectors. The new head shape ensure a good fit in the connector and the full thread increase the load bearing capacity. The flat head makes it possible to get a flush surface after installation.

The head geometry allows screwing into the countersunk holes of the CCS connectors without protrusion, which is essential for trouble-free installation of the connectors.

Codes/Standards: EN14592

For more information, see page 214.

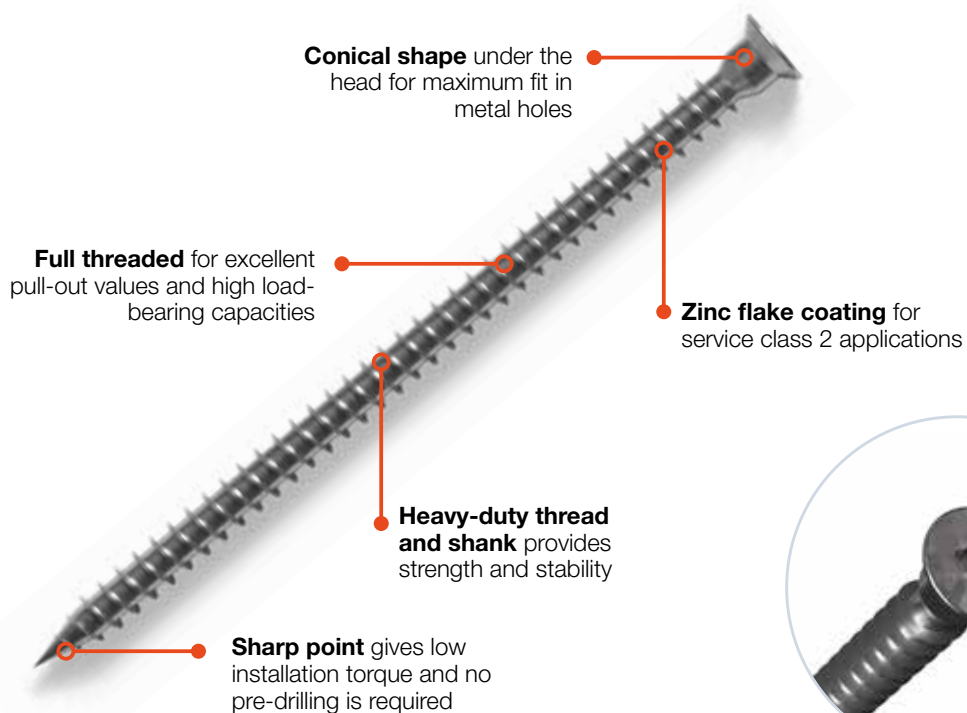


EN14592



CCS connector fastened with CSFT screws.

Features

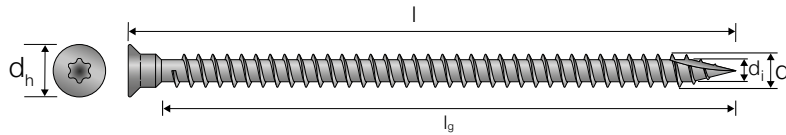


Deep 6-lobe recess provides improved control and greater bit life

Structural Fastening

Solid-Drive™

CSFT Fully Threaded CONNECTOR Screw



CSFT Zinc Flake Coating

Model No.	Item code	Dimensions [mm]			
		d	l	d _h	l _g
CSFT5.0X70	77308	5.0	70	8.5	65
CSFT6.0X85	77309	6.0	85	9.5	79
CSFT6.0X110	77310	6.0	110	9.5	103

CSFT – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
CSFT5.0	7700	17.8	10.7	-	-
CSFT6.0	10500	13.6	12.9	-	-

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³

f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.

Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

Structural Fastening

Solid-Drive™

TTF Quik Drive® Collated **WOOD** Screw

Chipboard to Timber, Plywood to Timber, OSB to Timber

The TTF wood fibre board screw is used indoors for fastening OSB, chipboard and plywood to wood battens. The screws has a cutpoint, which effectively drives the screws into hard wood.

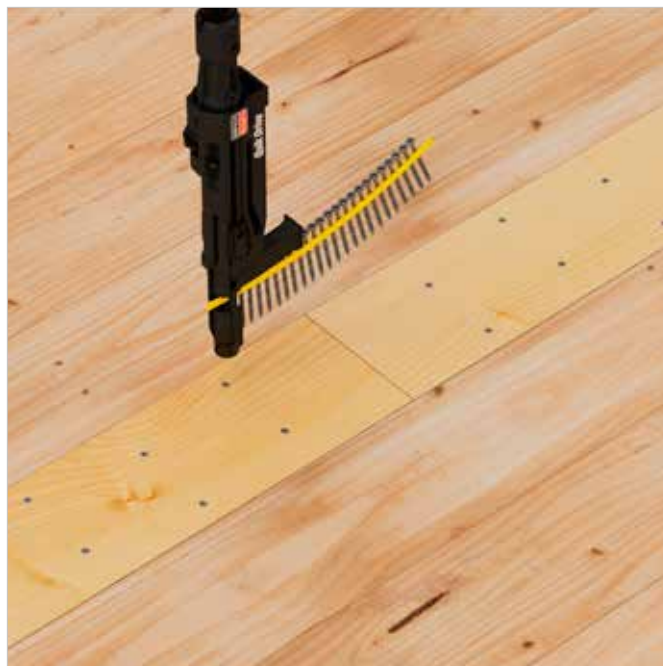
The Quik Drive collated TTF screws are ideal for fastening of timber splines in CLT panels. With Quik Drive, the screws can be installed standing, which significantly improves the ergonomics for the installer.

Codes/Standards: EN14592

For more information, see page 194, 230.



EN14592



TTF screws in CLT spline application.

Features

Ribbed head design countersinks easily and provides a clean, finished appearance

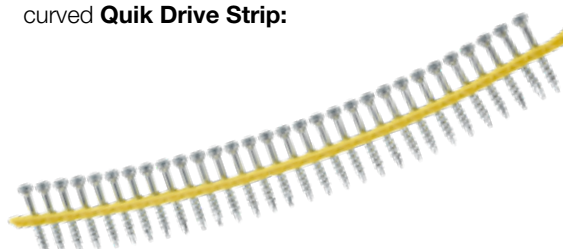
Quik Drive QDPRO76SKE system is designed for efficient installation of timber screws.

Aggressive variable thread provides lower driving torque, resulting in faster, easier driving

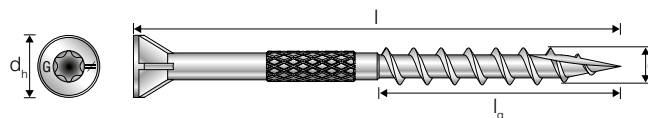


Deep 6-lobe recess provides improved control and greater bit life

Collated with patented curved **Quik Drive Strip**:



Structural Fastening

Solid-Drive™TTF Quik Drive® Collated **WOOD** Screw**Electro Galvanised**C1 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

TTF - Range Overview

Reference	Dimensions [mm]			
	d	l	d _h	l _g
TTF35E	4.2	35	7.0	21
TTF45E	4.2	45	7.0	27
TTF55E	4.2	55	7.0	30
TTF75E	4.2	75	7.0	42

TTF – Characteristic Parameters

Reference	Characteristic Parameters					
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]	f _{y,k} [N/mm²]
TTF4.2	4545	10.2	6.6	-	-	-

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

Structural Fastening

Solid-Drive™ WSV Quik Drive® Collated **WOOD** Screw

Structural Timber to Timber Connections and General Interior Applications

The Quik Drive collated WSV wood screw has been developed for quick and reliable fastening of timber to timber using the Quik Drive auto-feed screw driving system.

The point and thread pattern provides easy starts and less torque, which leads to faster driving. This also means less wear on tools.

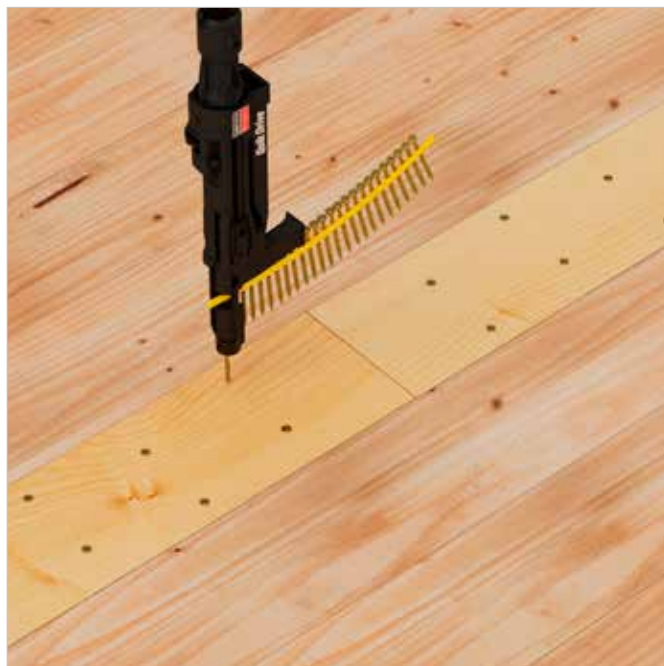
The deep 6-lobe recess and ribbed underhead provide secure bit retention and clean countersinking.

Codes/Standards: EN14592

For more information, see pages 193, 232.



EN14592



WSV screws in CLT spline application.

Features

Ribbed head design countersinks easily and provides a clean, finished appearance

Aggressive **variable thread** provides lower driving torque, resulting in faster, easier driving

Quik Drive QDPRO76SKE system is designed for efficient installation of timber screws.



Deep 6-lobe recess provides improved control and greater bit life

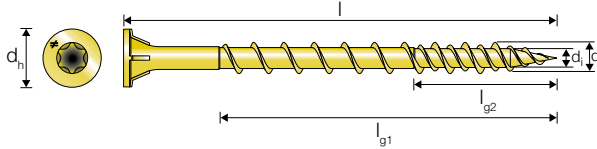
Collated with patented curved **Quik Drive Strip**:



Structural Fastening

Solid-Drive™

WSV Quik Drive® Collated **WOOD** Screw



Yellow Zinc Plated

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

WSV – Range Overview

Reference	Dimensions [mm]				
	d	l	l _g	d _h	d _i
WSV44E	4,6	44	31	8,5	3,1
WSV51E	4,6	51	37	8,5	3,1
WSV64E	4,6	64	50	8,5	3,1
WSV76E	4,6	76	55	8,5	3,1

WSV – Characteristic Parameters

Reference	Characteristic Parameters					
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]	f _{y,k} [N/mm²]
WSV4.6	3500	14,7	8,2	6,1	31,3	900

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³

f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.

Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

Structural Fastening

Solid-Drive™ SDW/SDWS Structural **WOOD** Screw

Structural Timber to Timber Connections and General Interior (SDW) and Exterior (SDWS) Applications

SDW/SDWS are structural wood screws available in a variety of lengths and are designed for cross-laminated timber assemblies, mass timber construction, log-home construction, ledgers and general interior applications.

These structural fasteners require less torque to install than comparable fasteners, and the large-diameter washer head pulls members down easily, eliminating the need to use extra washers.

Codes/Standards: EN14592

For more information, see pages 99, 124.

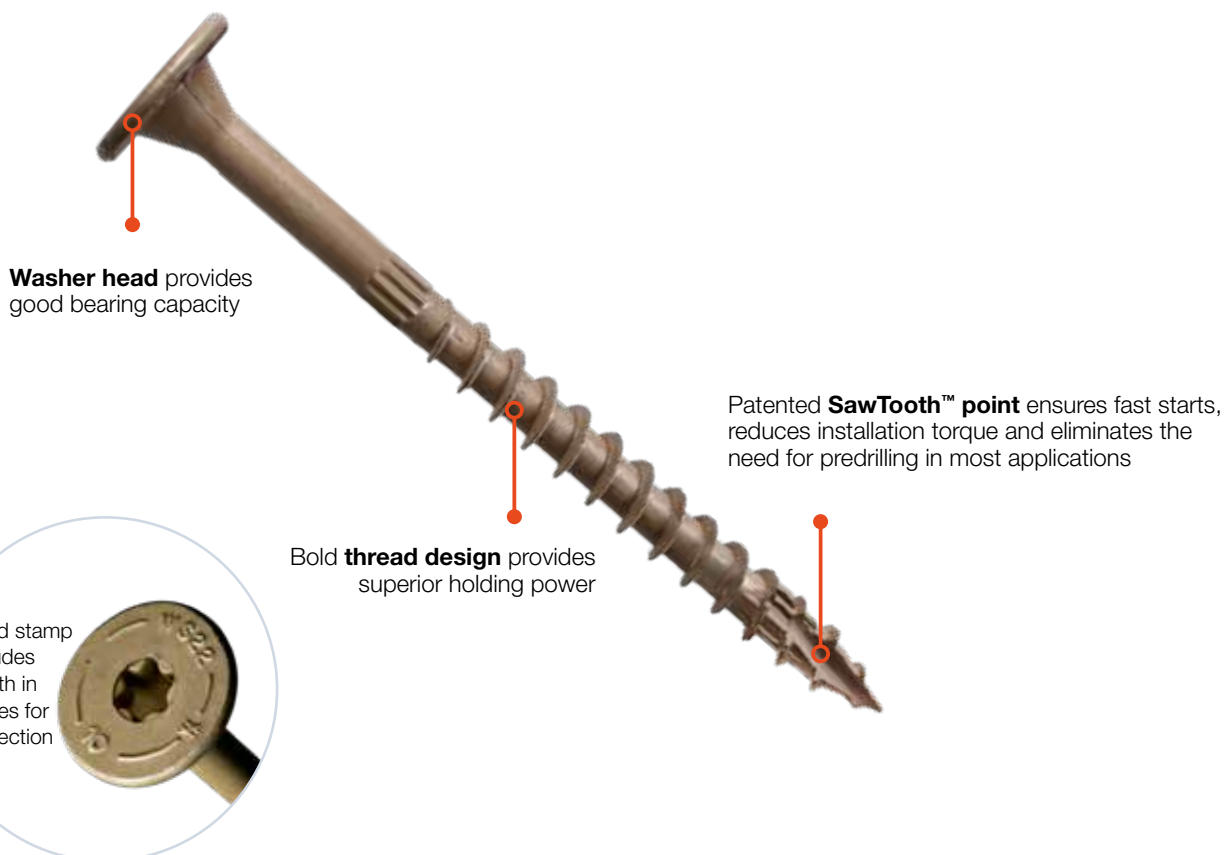


EN14592



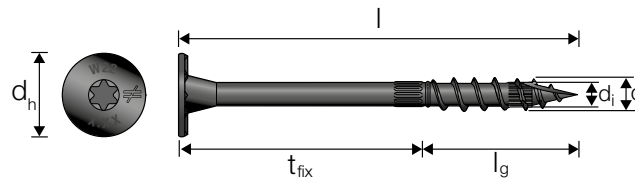
SDWS in ledger application.

Features



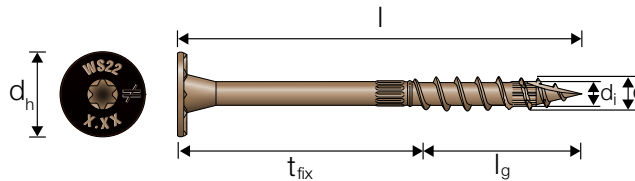
Deep 6-lobe recess provides improved control and greater bit life

Structural Fastening

Solid-Drive™SDW/SDWS Structural **WOOD** Screw**Electrocoat**C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

SDW – Range Overview

Reference	Dimensions [mm]					
	d	l	l _g	d _h	d _i	t _{fix}
SDW22258-R50E	8,0	66	36	19	5,6	30
SDW22300-R50E	8,0	76	37	19	5,6	39
SDW22338-R50E	8,0	86	40	19	5,6	46
SDW22438-R50E	8,0	111	37	19	5,6	74
SDW22458-R50E	8,0	117	37	19	5,6	80
SDW22500-R50E	8,0	127	40	19	5,6	87
SDW22600-R50E	8,0	152	37	19	5,6	115
SDW22638-R50E	8,0	162	37	19	5,6	125
SDW22634-R50E	8,0	172	40	19	5,6	132

**Double Barrier**C3 acc. to EN ISO 12944-2
SC3 – 50 years acc. to EC5

SDWS – Range Overview

Reference	Dimensions [mm]					
	d	l	l _g	d _h	d _i	t _{fix}
SDWS08X75DB	8,0	75	37	19,4	5,2	38
SDWS08X100DB	8,0	100	59	19,4	5,2	41
SDWS08X126DB	8,0	126	69	19,4	5,2	57
SDWS08X151DB	8,0	151	69	19,4	5,2	82
SDWS08X202DB	8,0	202	69	19,4	5,2	133
SDWS08X252DB	8,0	252	69	19,4	5,2	183

SDW/SDWS – Characteristic Parameters

Reference	Characteristic Parameters				
	M _{y,k} [Nmm]	f _{ax,k} [N/mm²]	f _{tens,k} [kN]	f _{tor,k} [Nm]	f _{head,k} [N/mm²]
SDW/SDWS8.0	17400	13,2	21,4	24,2	21,4

f_{ax,k} is the characteristic withdrawal parameter for timber with a characteristic density of 350 kg/m³f_{head,k} is the characteristic head pull through parameter for timber with a characteristic density of 350 kg/m³ at max. 15 mm embedment.Ratio of the characteristic torsional strength to the mean insertion moment: f_{tor,k} / R_{tor,mean} ≥ 1,5

Use Fastener Designer to make your calculations.

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stronger structures.**

Timber to Timber Fastening

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3.1 Solid Timber Fastening

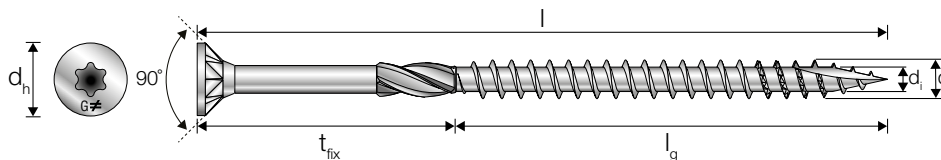
Solid-Drive™

TTUFS Countersunk WOOD Screw for Timber to Timber

Electro Galvanised

C1 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

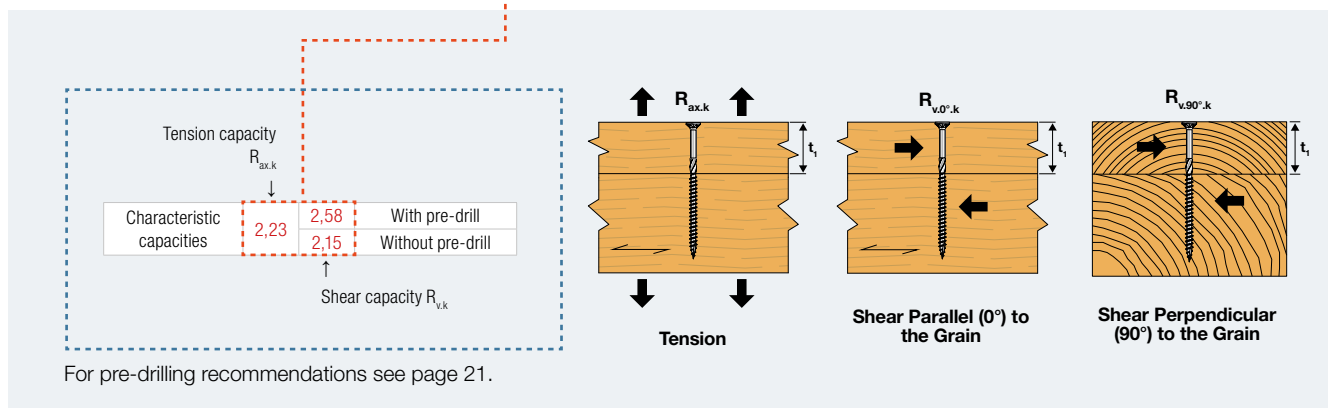
ETA-21/0670



TTUFS – Characteristic Tension and Shear Capacities Timber to Timber C24

Product Reference	Thread Length L_g [mm]	Max Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_i [kN]													
			Wood Thickness t_i [mm]													
			36	45	50	60	63	70	75	80	100	36	45	50	60	63
TTUFS5.0X80	40	40	1,54	1,94	-	-	-	-	-	-	-	1,54	1,94	-	-	-
			1,64	1,64	-	-	-	-	-	-	-	1,64	1,64	-	-	-
TTUFS5.0X90	45	45	1,54	1,94	1,54	1,94	-	-	-	-	-	1,54	1,94	1,54	1,94	-
			1,64	1,64	1,64	1,64	-	-	-	-	-	1,64	1,64	1,64	1,64	-
TTUFS5.0X100	60	40	1,54	1,94	-	-	-	-	-	-	-	1,54	1,94	-	-	-
			1,64	1,64	-	-	-	-	-	-	-	1,64	1,64	-	-	-
TTUFS5.0X120	60	60	1,54	1,94	1,54	1,94	1,54	1,94	-	-	-	1,54	1,94	1,54	1,94	-
			1,64	1,64	1,64	1,64	1,64	1,64	-	-	-	1,64	1,64	1,64	1,64	-
TTUFS6.0X80	40	40	2,23	2,58	-	-	-	-	-	-	-	2,23	2,58	-	-	-
			2,09	2,06	-	-	-	-	-	-	-	2,09	2,06	-	-	-
TTUFS6.0X90	45	45	2,23	2,58	2,23	2,58	-	-	-	-	-	2,23	2,58	2,23	2,58	-
			2,09	2,15	2,15	2,15	-	-	-	-	-	2,09	2,15	2,15	2,15	-
TTUFS6.0X100	60	40	2,23	2,58	-	-	-	-	-	-	-	2,23	2,58	-	-	-
			2,09	2,15	-	-	-	-	-	-	-	2,09	2,15	-	-	-
TTUFS6.0X120	70	50	2,23	2,58	2,23	2,58	2,23	2,58	-	-	-	2,23	2,58	2,23	2,58	-
			2,09	2,15	2,15	2,15	2,15	2,15	-	-	-	2,09	2,15	2,15	2,15	-
TTUFS6.0X140	70	70	2,23	2,58	2,23	2,58	2,23	2,58	2,23	2,58	-	2,23	2,58	2,23	2,58	-
			2,09	2,15	2,15	2,15	2,15	2,15	2,15	2,15	-	2,09	2,15	2,15	2,15	-
TTUFS6.0X160	70	90	2,23	2,58	2,23	2,58	2,23	2,58	2,23	2,58	2,23	2,23	2,58	2,23	2,58	-
			2,09	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,09	2,15	2,15	2,15	-
TTUFS6.0X180	70	110	2,23	2,58	2,23	2,58	2,23	2,58	2,23	2,58	2,23	2,23	2,58	2,23	2,58	2,58
			2,09	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,09	2,15	2,15	2,15	2,15

For dimensions and calculation parameters see p. 40.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the fully threaded screws.

For additional values in other configurations use Fastener Designer – online dimensioning tool. Go to strongtie.eu/fastener-designer

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Solid Wood to determine the capacity of the screw.

3.1 Solid Timber Fastening

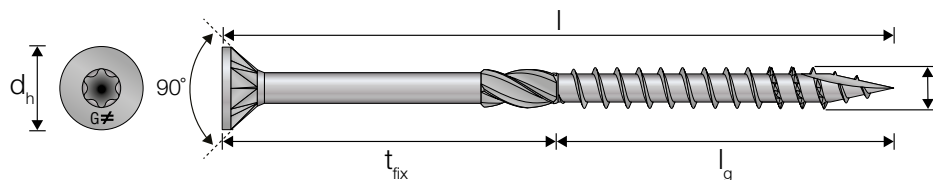
Solid-Drive™

TTZNFS Countersunk WOOD Screw for Timber to Timber

Impreg®+

C4 – 15 years acc. to EN
ISO 12944-2
SC2 – 50 years acc. to EC5UK
CA

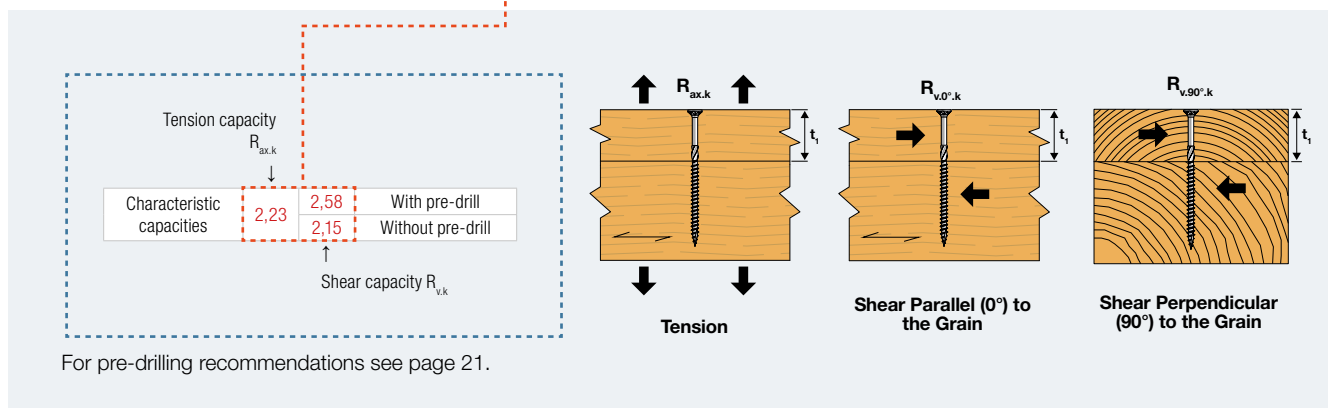
ETA-21/0670



TTZNFS – Characteristic Tension and Shear Capacities Timber to Timber C24

Product Reference	Thread Length L_g [mm]	Max Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]										
			Wood Thickness t_l [mm]										
			36	45	50	60	63	70	75	80	100		
TTZNFS5.0X80	40	40	1,54	1,94 1,64	1,54	1,94 1,64	-	-	-	-	-	-	-
TTZNFS5.0X90	45	45	1,54	1,94 1,64	1,54	1,94 1,64	1,54	1,94 1,64	-	-	-	-	-
TTZNFS5.0X100	60	40	1,54	1,94 1,64	1,54	1,94 1,64	-	-	-	-	-	-	-
TTZNFS5.0X120	60	60	1,54	1,94 1,64	1,54	1,94 1,64	1,54	1,94 1,64	1,54	1,94 1,64	-	-	-
TTZNFS6.0X80	40	40	2,23	2,58 2,09	2,23	2,58 2,06	-	-	-	-	-	-	-
TTZNFS6.0X90	45	45	2,23	2,58 2,09	2,23	2,58 2,15	2,23	2,58 2,15	-	-	-	-	-
TTZNFS6.0X100	60	40	2,23	2,58 2,09	2,23	2,58 2,15	-	-	-	-	-	-	-
TTZNFS6.0X120	70	50	2,23	2,58 2,09	2,23	2,58 2,15	2,23	2,58 2,15	-	-	-	-	-
TTZNFS6.0X140	70	70	2,23	2,58 2,09	2,23	2,58 2,15	2,23	2,58 2,15	2,23	2,58 2,15	2,23	2,58 2,15	-
TTZNFS6.0X160	70	90	2,23	2,58 2,09	2,23	2,58 2,15	2,23	2,58 2,15	2,23	2,58 2,15	2,23	2,58 2,15	-
TTZNFS6.0X180	70	110	2,23	2,58 2,09	2,23	2,58 2,15	2,23	2,58 2,15	2,23	2,58 2,15	2,23	2,58 2,15	2,23

For dimensions and calculation parameters see p. 40.



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For additional values in other configurations use Fastener Designer – online dimensioning tool. Go to strongtie.eu/fastener-designer

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Solid Wood to determine the capacity of the screw.

3.1 Solid Timber Fastening

Solid-Drive™

TTSFS Countersunk **WOOD** Screw for Timber to Timber

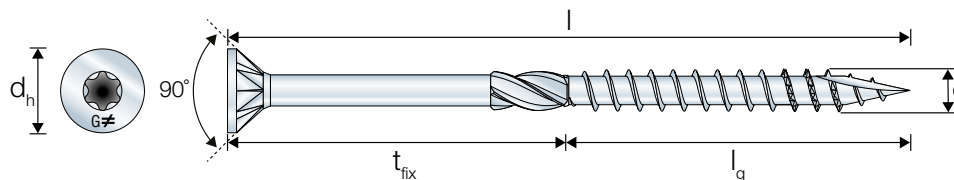
Stainless Steel
ORC III acc. to
EN1993-1-4(A1)
SC3 – 50 years acc. to EC5

A4
INOX

UK
CA



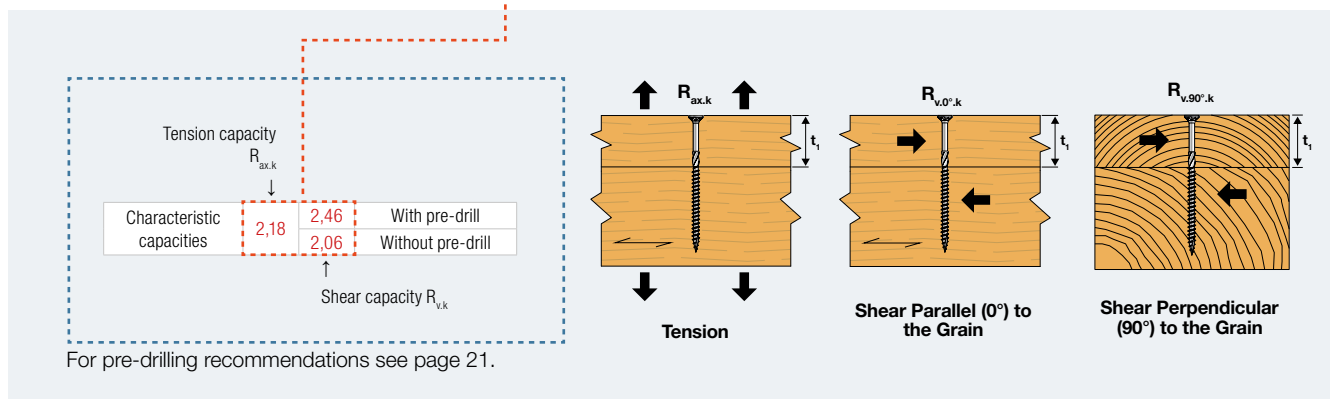
ETA-21/0670



TTSFS – Characteristic Tension and Shear Capacities Timber to Timber C24

Product Reference	Thread Length L_g [mm]	Max Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]									
			Wood Thickness t_l [mm]									
			36	45	50	60	63	70	75	80	100	
TTSFS5.0X70	35	35	1,44	1,66 1,41	-	-	-	-	-	-	-	-
TTSFS5.0X80	40	40	1,44	1,66 1,41	1,44	1,66 1,41	-	-	-	-	-	-
TTSFS5.0X90	45	45	1,44	1,66 1,41	1,44	1,66 1,41	1,44	1,66 1,41	-	-	-	-
TTSFS5.0X100	55	45	1,44	1,66 1,41	1,44	1,66 1,41	1,44	1,66 1,41	-	-	-	-
TTSFS5.0X120	60	60	1,44	1,66 1,41	1,44	1,66 1,41	1,44	1,66 1,41	1,44	1,66 1,41	-	-
TTSFS6.0X70	35	35	2,18	2,46 1,99	-	-	-	-	-	-	-	-
TTSFS6.0X80	40	40	2,18	2,46 2,05	2,18	2,46 2,02	-	-	-	-	-	-
TTSFS6.0X90	45	45	2,18	2,46 2,05	2,18	2,46 2,06	2,18	2,46 2,06	-	-	-	-
TTSFS6.0X100	55	45	2,18	2,46 2,05	2,18	2,46 2,06	2,18	2,46 2,06	-	-	-	-
TTSFS6.0X120	60	60	2,18	2,46 2,05	2,18	2,46 2,06	2,18	2,46 2,06	2,18	2,46 2,06	-	-
TTSFS6.0X140	65	75	2,18	2,46 2,05	2,18	2,46 2,06	2,18	2,46 2,06	2,18	2,46 2,06	2,18	2,46 2,06

For dimensions and calculation parameters see p. 40.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the fully threaded screws.

For additional values in other configurations use Fastener Designer – online dimensioning tool. Go to strongtie.eu/fastener-designer

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Solid Wood to determine the capacity of the screw.

3.1 Solid Timber Fastening

TTUFS/TTZNFS/TTSFS – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Timber to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
4.5	With pre-drill	23	14	32	54	14	14	18	18	32	23	14	32
	Without pre-drill	45	23	45	68	23	23	23	23	45	45	23	32
5.0	With pre-drill	25	15	35	60	15	15	20	20	35	25	15	35
	Without pre-drill	60	25	50	75	25	25	25	25	50	50	25	50
6.0	With pre-drill	30	18	42	72	18	18	24	24	42	30	18	42
	Without pre-drill	72	30	60	90	30	30	30	30	60	60	30	60

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA21/0670

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

TTUFS/TTZNFS/TTSFS – Minimum Distances for Axially Loaded Screws Timber to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
4.5	32	23	45	18
5.0	35	25	50	20
6.0	42	30	60	24

*Valid if the applied centre distances comply with $a_1, a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

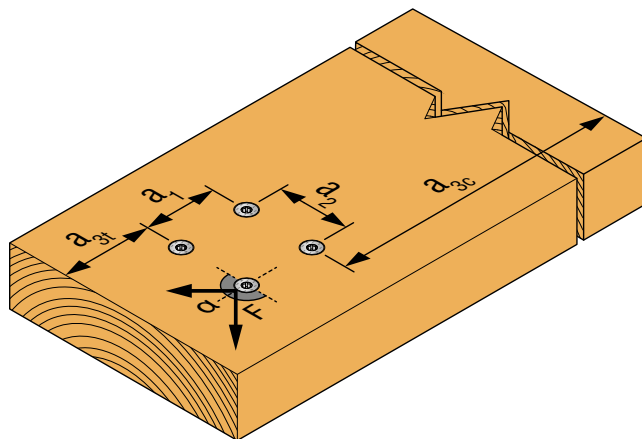


Illustration above shows angle between load direction and grain = 0°

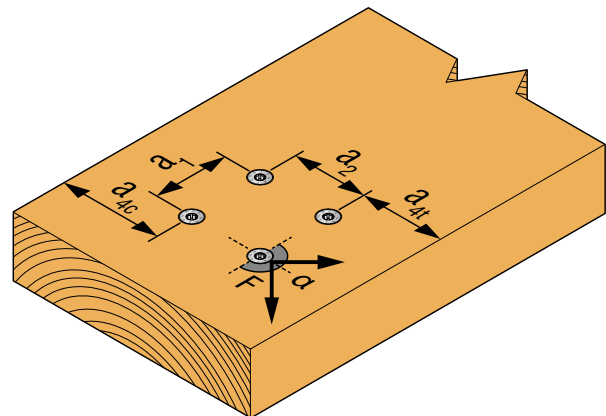


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.



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3.1 Solid Timber Fastening

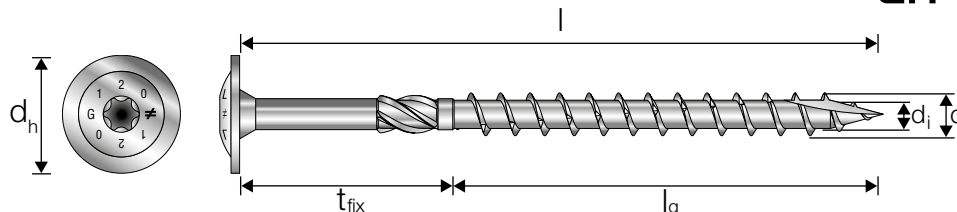
Solid-Drive™

SWW Structural Washer-Head WOOD Screw for Timber to Timber

Electro Galvanised*

C1 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

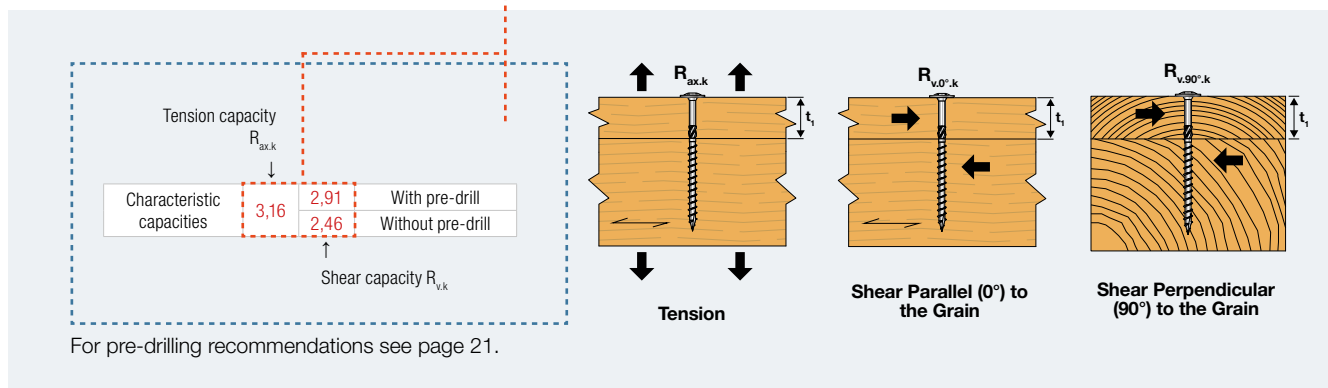
ETA-21/0670



SWW – Characteristic Tension and Shear Capacities Timber to Timber C24

Product Reference	Thread Length L_g [mm]	Max Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]									
			Wood Thickness t_l [mm]									
			36	45	50	60	63	70	75	80	100	
SWW6.0X100	50	50	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	-	-	-	-
SWW6.0X120	50	70	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X140	70	70	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X160	70	90	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X180	70	110	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X200	70	130	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X220	70	150	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X240	70	170	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X260	70	190	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X280	70	210	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X300	70	230	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46

Table continues on next page.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the fully threaded screws.

For additional values in other configurations use Fastener Designer – online dimensioning tool. Go to strongtie.eu/fastener-designer

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Solid Wood to determine the capacity of the screw.

3.1 Solid Timber Fastening

SWW – Characteristic Tension and Shear Capacities Timber to Timber C24 (continued)

Product Reference	Thread Length L _g [mm]	Max Advised Wood Thickness t _{fix} [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t _l [kN]																	
			Wood Thickness t _l [mm]																	
			36		45		50		60		63		70		75		80		100	
SWW8.0X100	50	50	5,04	4,63 3,49	5,04	5,06 3,76	5,04	5,06 3,81	-	-	-	-	-	-	-	-	-	-	-	-
SWW8.0X120	80	40	5,08	4,64 3,50	5,08	5,07 3,77	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW8.0X140	80	60	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	-	-	-	-	-	-	-	-
SWW8.0X160	80	80	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	-	-
SWW8.0X180	80	100	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X200	80	120	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X220	80	140	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X240	80	160	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X260	80	180	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X280	80	200	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X300	80	220	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X320	80	240	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X340	80	260	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X360	80	280	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X380	80	300	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X400	80	320	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW10.0X100	50	50	-	-	6,10	6,56 4,53	6,10	6,87 4,50	-	-	-	-	-	-	-	-	-	-	-	-
SWW10.0X120	50	70	-	-	6,10	6,56 4,72	6,10	6,92 4,89	6,10	6,99 5,10	6,10	6,99 5,11	6,10	6,92 4,89	5,49	6,56 4,72	-	-	-	-
SWW10.0X140	80	60	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	-	-	-	-	-	-	-	-
SWW10.0X160	80	80	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	-	-
SWW10.0X180	80	100	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X200	80	120	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X220	80	140	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X240	80	160	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X260	80	180	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X280	80	200	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X300	80	220	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X320	80	240	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X340	80	260	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X360	80	280	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X380	80	300	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X400	80	320	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67

3.1 Solid Timber Fastening

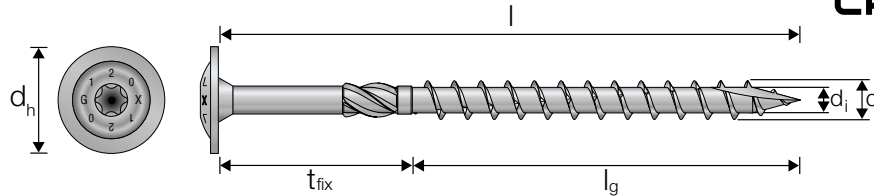
Solid-Drive™

SWWZ Structural Washer-Head WOOD Screw for Timber to Timber

Impreg®+

C4 – 15 years acc. to EN
ISO 12944-2
SC2 – 50 years acc. to EC5UK
CA

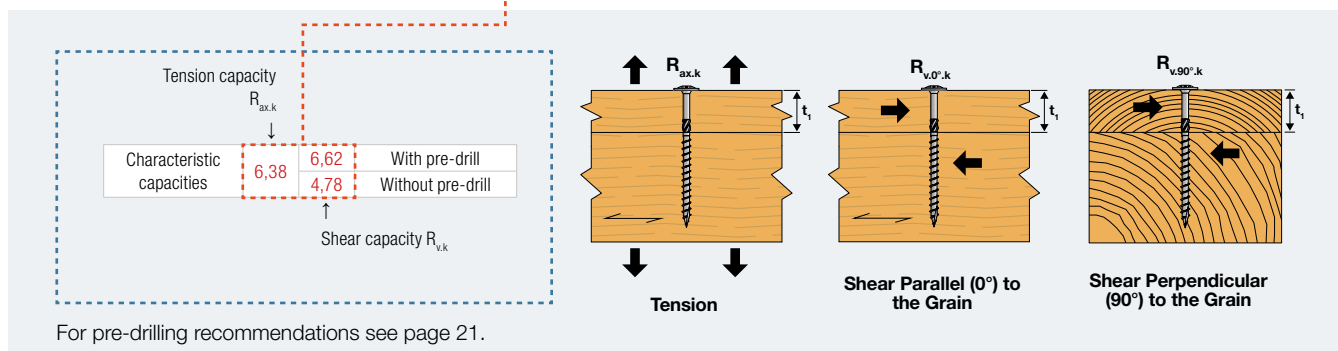
ETA-21/0670



SWWZ – Characteristic Tension and Shear Capacities Timber to Timber C24

Product Reference	Thread Length L _g [mm]	Max Advised Wood Thickness t _{fix} [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t _i [kN]																
			Wood Thickness t _i [mm]																
			36		45		50		60		63		70		75		80		100
SWWZ6.0X90	50	40	3,16	2,91 2,35	3,16	2,91 2,46	-	-	-	-	-	-	-	-	-	-	-	-	-
SWWZ6.0X100	50	50	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	-	-	-	-	-	-	-	-	-	-	-
SWWZ6.0X120	50	70	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	-	-	-
SWWZ8.0X90	50	40	5,04	4,63 3,49	4,54	5,06 3,55	-	-	-	-	-	-	-	-	-	-	-	-	-
SWWZ8.0X100	50	50	5,04	4,63 3,49	5,04	5,06 3,76	5,04	5,06 3,81	-	-	-	-	-	-	-	-	-	-	-
SWWZ8.0X120	80	40	5,08	4,64 3,50	5,08	5,07 3,77	-	-	-	-	-	-	-	-	-	-	-	-	-
SWWZ8.0X140	80	60	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	-	-	-	-	-	-	-
SWWZ8.0X180	80	100	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08
SWWZ8.0X200	80	120	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08
SWWZ8.0X240	80	160	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08
SWWZ8.0X300	80	220	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08
SWWZ8.0X340	80	260	5,08	4,64 3,50	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08
SWWZ10.0X160	80	80	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38
SWWZ10.0X180	80	100	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38
SWWZ10.0X200	80	120	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38
SWWZ10.0X240	80	160	-	-	6,38	6,62 4,78	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38

For dimensions and calculation parameters see p. 44.



3.1 Solid Timber Fastening

SWW/SWWZ – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Timber to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
6.0	With pre-drill	30	18	42	72	18	18	24	24	42	30	18	42
	Without pre-drill	72	30	60	90	30	30	30	30	60	60	30	60
8.0	With pre-drill	40	24	56	96	24	24	32	32	56	40	24	56
	Without pre-drill	96	40	80	120	40	40	40	40	80	80	40	80
10.0	With pre-drill	50	30	70	120	30	30	40	40	70	50	30	70
	Without pre-drill	120	50	100	150	50	50	50	50	100	100	50	100

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA21/0670

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

SWW/SWWZ – Minimum Distances for Axially Loaded Screws Timber to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
6.0	42	30	60	24
8.0	56	40	80	32
10.0	70	50	100	40

*Valid if the applied centre distances comply with $a_1, a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

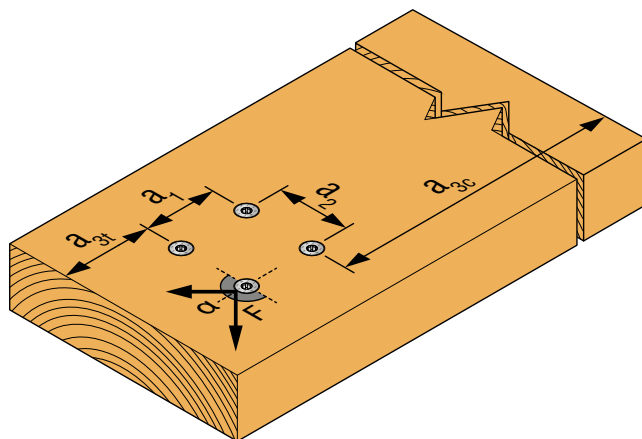


Illustration above shows angle between load direction and grain = 0°

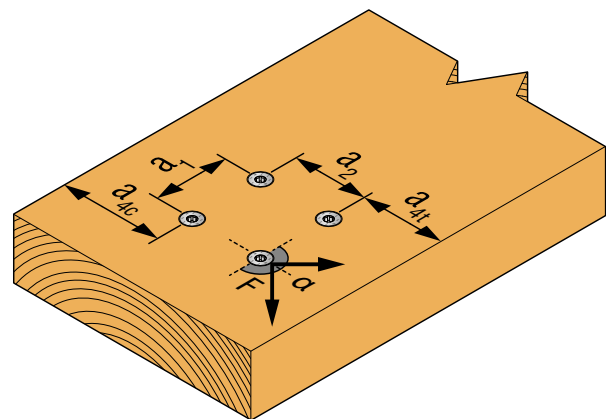


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.



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3.1 Solid Timber Fastening

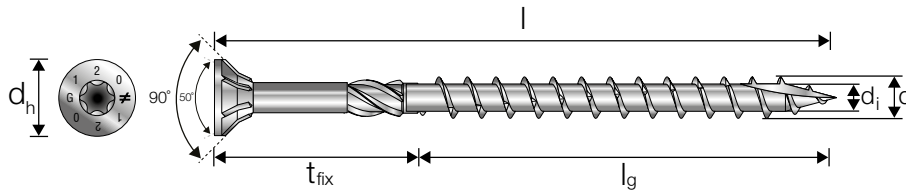
Solid-Drive™

SWC Structural Countersunk WOOD Screw for Timber to Timber

Electro Galvanised*
C1 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5



ETA-21/0670



SWC – Characteristic Tension and Shear Capacities Timber to Timber C24

Product Reference	Thread Length L _g [mm]	Max Advised Wood Thickness t _{fix} [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t _i [kN]																	
			Wood Thickness t _i [mm]																	
			36		45		50		60		63		70		75		80		100	
SWC6.0X200	70	130	1,66	2,53 1,97	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09
SWC6.0X220	70	150	1,66	2,53 1,97	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09
SWC6.0X240	70	170	1,66	2,53 1,97	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09
SWC6.0X260	70	190	1,66	2,53 1,97	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09
SWC6.0X280	70	210	1,66	2,53 1,97	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09
SWC6.0X300	70	230	1,66	2,53 1,97	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09	1,66	2,53 2,09
SWC8.0X100	50	50	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,21	-	-	-	-	-	-	-	-	-	-	-	-
SWC8.0X120	80	40	2,66	4,04 2,90	2,66	4,47 3,17	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC8.0X140	80	60	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	-	-	-	-	-	-	-	-
SWC8.0X160	80	80	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	-	-
SWC8.0X180	80	100	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X200	80	120	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X220	80	140	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X240	80	160	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X260	80	180	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X280	80	200	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X300	80	220	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X320	80	240	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X340	80	260	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X360	80	280	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X380	80	300	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X400	80	320	2,66	4,04 2,90	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57

Table continues on next page.

*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses.
Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

3.1 Solid Timber Fastening

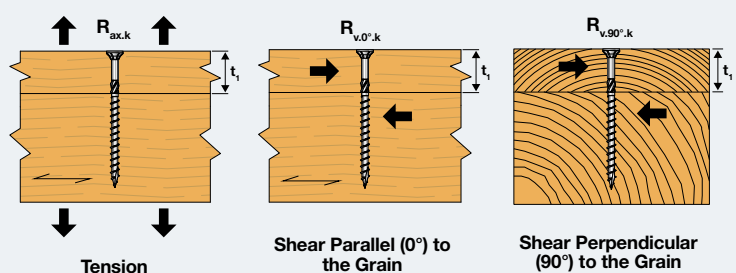
SWC – Characteristic Tension and Shear Capacities Timber to Timber C24 (continued)

Product Reference	Thread Length L_g [mm]	Max Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]									
			Wood Thickness t_l [mm]									
			36	45	50	60	63	70	75	80	100	
SWC10.0X100	50	50	-	3,55	5,92 3,89	3,55	6,24 3,87	-	-	-	-	-
SWC10.0X120	50	70	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,47	3,55	6,28 4,25	5,92 4,08
SWC10.0X140	80	60	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	-
SWC10.0X160	80	80	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55
SWC10.0X180	80	100	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55
SWC10.0X200	80	120	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55
SWC10.0X220	80	140	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55
SWC10.0X240	80	160	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55
SWC10.0X260	80	180	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55
SWC10.0X280	80	200	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55
SWC10.0X300	80	220	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55
SWC10.0X320	80	240	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55
SWC10.0X340	80	260	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55
SWC10.0X360	80	280	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55
SWC10.0X380	80	300	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55
SWC10.0X400	80	320	-	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55

For dimensions and calculation parameters see p. 48.

Tension capacity $R_{ax,k}$		
Characteristic capacities	3,55	5,92
	4,08	
Shear capacity $R_{v,k}$		
	3,55	5,92
	4,08	
With pre-drill		
Without pre-drill		

For pre-drilling recommendations see page 21.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the fully threaded screws.

For additional values in other configurations use Fastener Designer – online dimensioning tool. Go to strongtie.eu/fastener-designer

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Solid Wood to determine the capacity of the screw.

3.1 Solid Timber Fastening

SWC – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Timber to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
6.0	With pre-drill	30	18	42	72	18	18	24	24	42	30	18	42
	Without pre-drill	72	30	60	90	30	30	30	30	60	60	30	60
8.0	With pre-drill	40	24	56	96	24	24	32	32	56	40	24	56
	Without pre-drill	96	40	80	120	40	40	40	40	80	80	40	80
10.0	With pre-drill	50	30	70	120	30	30	40	40	70	50	30	70
	Without pre-drill	120	50	100	150	50	50	50	50	100	100	50	100

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA21/0670

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

SWC – Minimum Distances for Axially Loaded Screws Timber to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
6.0	42	30	60	24
8.0	56	40	80	32
10.0	70	50	100	40

*Valid if the applied centre distances comply with $a_1, a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

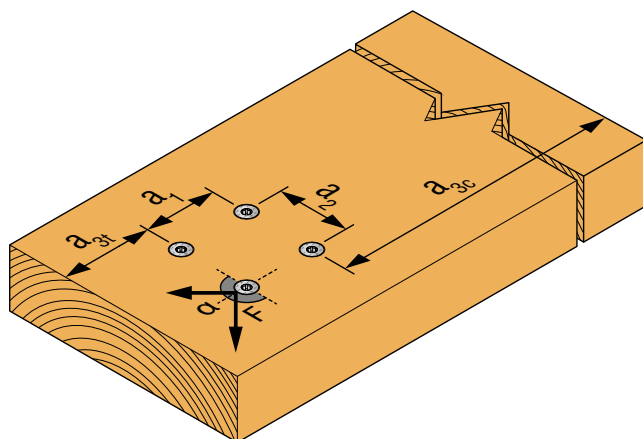


Illustration above shows angle between load direction and grain = 0°

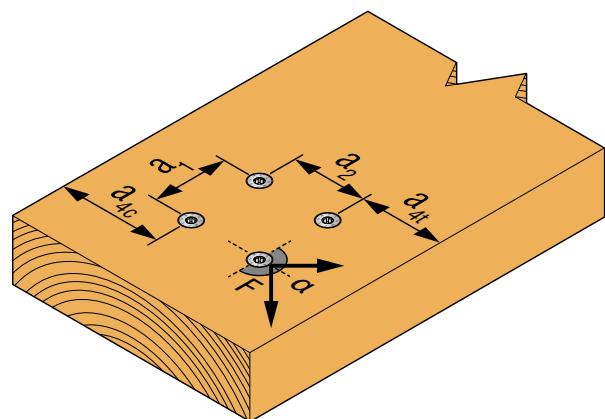


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.



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3.1 Solid Timber Fastening

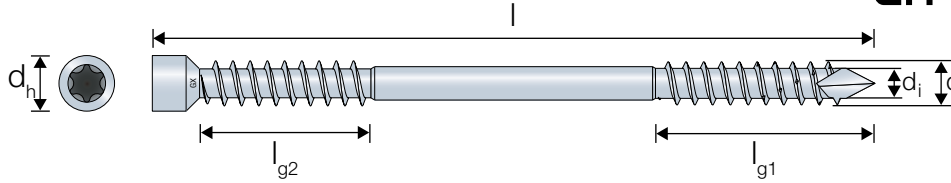
Solid-Drive™

SWD Double Threaded **WOOD** Screw for Timber to Timber

Protec® +

C3 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

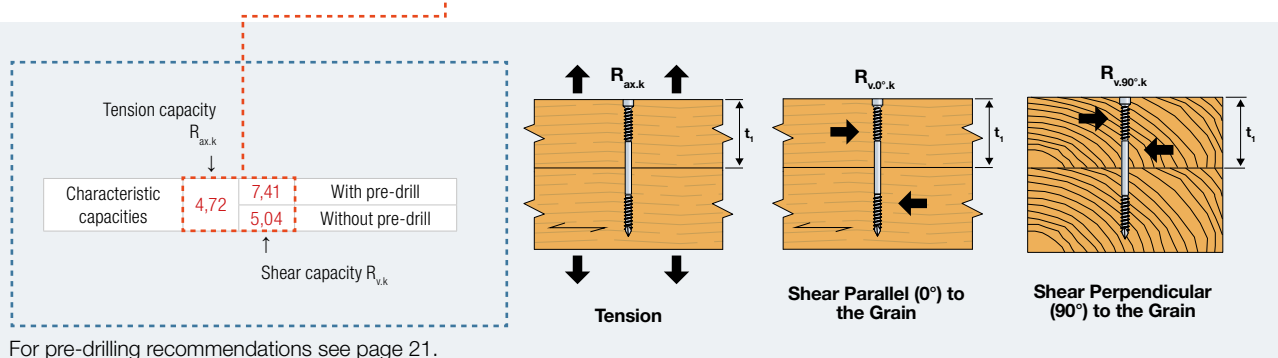
ETA-21/0670



SWD – Characteristic Tension and Shear Capacities Timber to Timber C24

Product Reference	Thread Length L_g [mm]	Max Advised Wood Thickness t_{ix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_i [kN]									
			Wood Thickness t_i [mm]									
			36	45	50	60	63	70	75	80	100	
SWD6.5X65	28	37	1,91	2,82 2,07	-	-	-	-	-	-	-	-
SWD6.5X90	40	50	2,98	3,28 2,57	2,98	3,28 2,76	2,98	3,28 2,69	-	-	-	-
SWD6.5X130	40	90	2,98	3,28 2,57	2,98	3,28 2,76	2,98	3,28 2,76	2,98	3,28 2,76	2,98	3,28 2,76
SWD6.5X160	65	95	3,21	3,84 3,13	4,01	3,84 3,32	4,45	3,84 3,32	5,21	3,84 3,32	5,21	3,84 3,32
SWD6.5X190	80	110	3,21	4,17 3,36	4,01	4,17 3,65	4,45	4,17 3,65	5,34	4,17 3,65	5,61	4,17 3,65
SWD6.5X220	95	125	3,21	4,51 3,36	4,01	4,51 3,74	4,45	4,51 3,74	5,34	4,51 3,74	5,61	4,51 3,74
SWD8.0X90	40	50	3,30	4,44 3,30	3,30	4,92 3,34	3,30	4,67 3,37	-	-	-	-
SWD8.0X130	40	90	3,30	4,44 3,30	3,30	4,92 3,57	3,30	4,92 3,73	3,30	4,92 4,00	3,30	4,92 4,00
SWD8.0X160	65	95	3,77	5,10 3,96	4,72	5,57 4,22	5,24	5,57 4,39	5,92	5,57 4,66	5,92	5,57 4,66
SWD8.0X190	80	110	3,77	5,49 4,35	4,72	5,97 4,62	5,24	5,97 4,78	6,29	5,97 5,05	6,60	5,97 5,05
SWD8.0X220	95	125	3,77	5,88 4,43	4,72	6,36 5,01	5,24	6,36 5,17	6,29	6,36 5,44	6,60	6,36 5,44
SWD8.0X245	107	138	3,77	6,20 4,43	4,72	6,67 5,04	5,24	6,67 5,37	6,29	6,67 5,76	6,60	6,67 5,76
SWD8.0X275	107	168	3,77	6,20 4,43	4,72	6,67 5,04	5,24	6,67 5,37	6,29	6,67 5,76	6,60	6,67 5,76
SWD8.0X300	135	165	3,77	6,79 4,43	4,72	7,41 5,04	5,24	7,41 5,37	6,29	7,41 5,91	6,60	7,41 5,91
SWD8.0X330	135	195	3,77	6,79 4,43	4,72	7,41 5,04	5,24	7,41 5,37	6,29	7,41 5,91	6,60	7,41 5,91

For dimensions and calculation parameters see p. 50.



3.1 Solid Timber Fastening

SWD – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Timber to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
6.5	With pre-drill	33	20	46	78	20	20	26	26	46	33	20	46
	Without pre-drill	78	33	65	98	33	33	33	33	65	65	33	65
8.0	With pre-drill	40	24	56	96	24	24	32	32	56	40	24	56
	Without pre-drill	96	40	80	120	40	40	40	40	80	80	40	80

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA21/0670

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

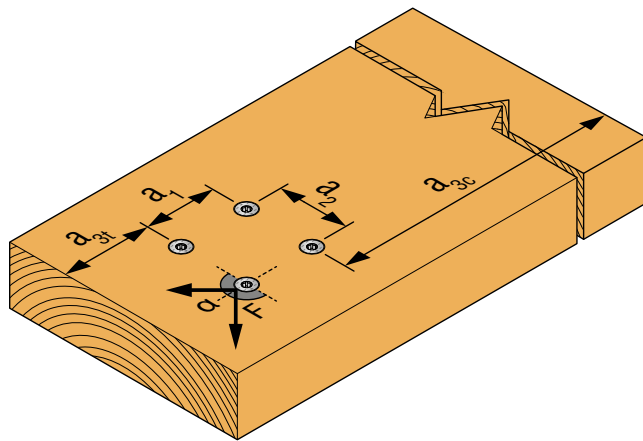


Illustration above shows angle between load direction and grain = 0°

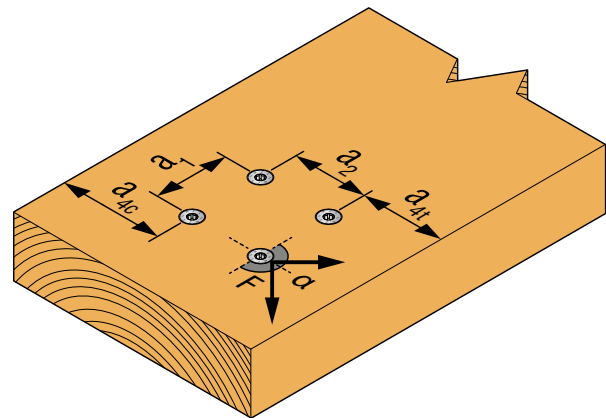


Illustration above shows angle between load direction and grain = 90°

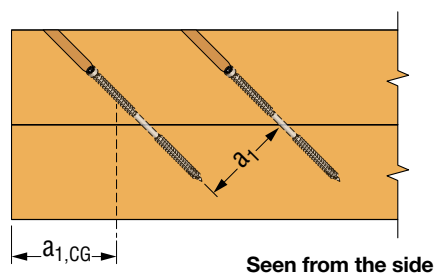
See explanation of α in General Introduction page 23.

SWD – Minimum Distances for Axially Loaded Screws Timber to Timber C24

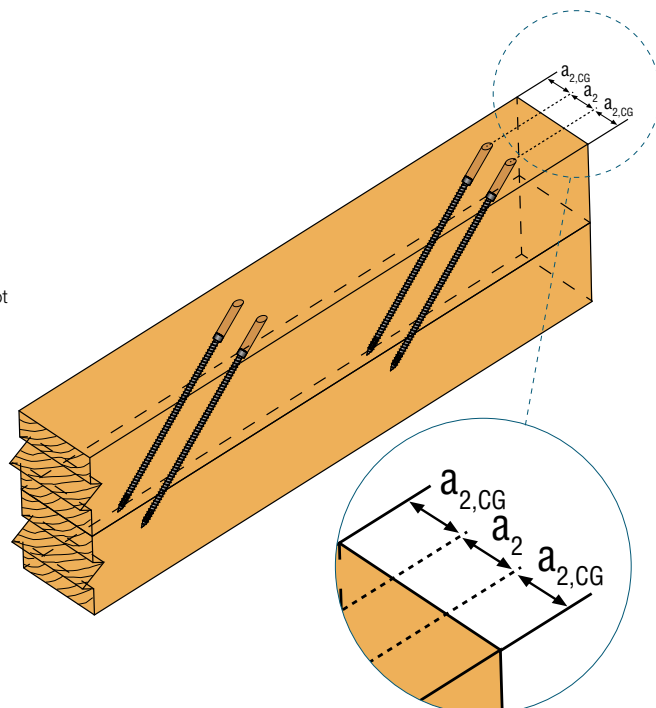
Outer Thread Diameter d [mm]	a ₁	a ₂	a _{1,cg}	a _{2,cg}
6.5	65	20	52	20
8.0	80	24	40	24

*Valid if the applied centre distances comply with $a_1, a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.



Seen from the side

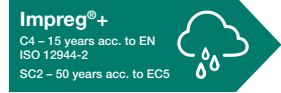


See explanation of min. space and edge distances in General Introduction page 24.

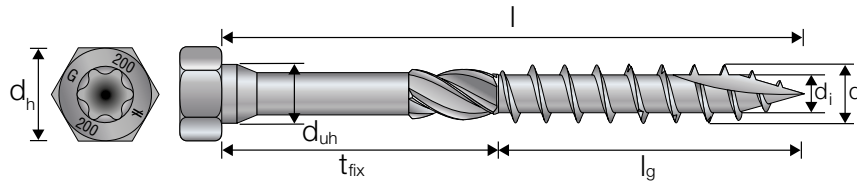
3.1 Solid Timber Fastening

Solid-Drive™

SSH Structural Hex-Head **WOOD** Screw for Timber to Timber



ETA-21/0670



SSH – Characteristic Tension and Shear Capacities Timber to Timber C24

Product Reference	Thread Length L _g [mm]	Max Advised Wood Thickness t _{fix} [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t _l [kN]																
			Wood Thickness t _l [mm]																
			36	45		50		60		63		70		75		80		100	
SSH6.0X75 ¹⁾	42	33	3,11	2,95 2,39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SSH6.0X90 ¹⁾	42	48	3,35	2,95 2,39	3,35	2,95 2,50	3,19	2,95 2,50	-	-	-	-	-	-	-	-	-	-	-
SSH6.0X120 ¹⁾	75	45	3,76	3,05 2,50	3,76	3,05 2,60	3,76	3,05 2,60	-	-	-	-	-	-	-	-	-	-	-
SSH8.0X80	42	38	3,30	4,18 2,88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SSH8.0X90	42	48	3,30	4,18 3,04	3,30	4,58 3,12	3,30	4,41 3,14	-	-	-	-	-	-	-	-	-	-	-
SSH8.0X100	55	45	3,30	4,18 3,04	3,30	4,58 3,31	3,30	4,58 3,37	-	-	-	-	-	-	-	-	-	-	-
SSH8.0X120	85	35	3,30	4,18 3,04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SSH8.0X140	85	55	3,30	4,18 3,04	3,30	4,58 3,31	3,30	4,58 3,48	3,30	4,58 3,69	-	-	-	-	-	-	-	-	-
SSH8.0X160	110	50	3,30	4,18 3,04	3,30	4,58 3,31	3,30	4,58 3,48	-	-	-	-	-	-	-	-	-	-	-
SSH8.0X180	110	70	3,30	4,18 3,04	3,30	4,58 3,31	3,30	4,58 3,48	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	-	-	-
SSH8.0X200	110	90	3,30	4,18 3,04	3,30	4,58 3,31	3,30	4,58 3,48	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	-
SSH8.0X240	110	130	3,30	4,18 3,04	3,30	4,58 3,31	3,30	4,58 3,48	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30
SSH8.0X260	110	150	3,30	4,18 3,04	3,30	4,58 3,31	3,30	4,58 3,48	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30
SSH8.0X280	110	170	3,30	4,18 3,04	3,30	4,58 3,31	3,30	4,58 3,48	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30
SSH8.0X300	110	190	3,30	4,18 3,04	3,30	4,58 3,31	3,30	4,58 3,48	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30	4,58 3,69	3,30

¹⁾ 6.0mm screws have a different head design – see page 52.

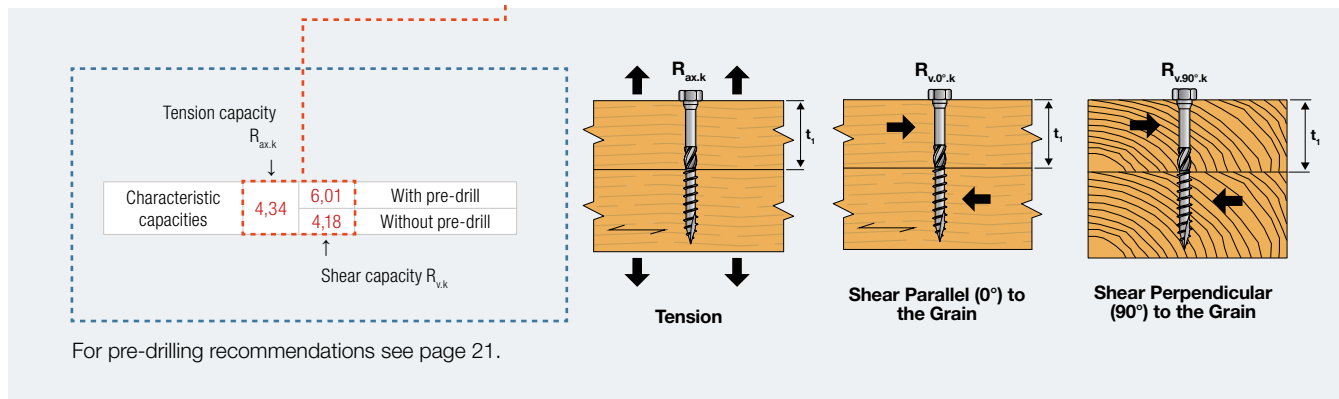
Table continues on next page.

3.1 Solid Timber Fastening

SSH – Characteristic Tension and Shear Capacities Timber to Timber C24 (continued)

Product Reference	Thread Length L_g [mm]	Max Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]										
			Wood Thickness t_l [mm]										
			36	45	50	60	63	70	75	80	100		
SSH10.0X90	42	48	-	-	4,34	5,90	4,34	5,65	-	-	-	-	-
			-	-	3,77	3,79	-	-	-	-	-	-	-
SSH10.0X100	55	45	-	-	4,34	6,01	4,34	6,23	-	-	-	-	-
			-	-	4,09	4,06	-	-	-	-	-	-	-
SSH10.0X140	85	55	-	-	4,34	6,01	4,34	6,23	4,34	6,23	-	-	-
			-	-	4,18	4,36	4,75	-	-	-	-	-	-
SSH10.0X160	110	50	-	-	4,34	6,01	4,34	6,23	-	-	-	-	-
			-	-	4,18	4,36	-	-	-	-	-	-	-
SSH10.0X180	110	70	-	-	4,34	6,01	4,34	6,23	4,34	6,23	4,34	6,23	-
			-	-	4,18	4,36	4,75	4,87	4,92	4,92	-	-	-
SSH10.0X200	110	90	-	-	4,34	6,01	4,34	6,23	4,34	6,23	4,34	6,23	4,34
			-	-	4,18	4,36	4,75	4,87	4,92	4,92	4,92	4,92	-
SSH10.0X220	125	95	-	-	4,34	6,01	4,34	6,23	4,34	6,23	4,34	6,23	4,34
			-	-	4,18	4,36	4,75	4,87	4,92	4,92	4,92	4,92	4,34
SSH10.0X240	125	115	-	-	4,34	6,01	4,34	6,23	4,34	6,23	4,34	6,23	4,34
			-	-	4,18	4,36	4,75	4,87	4,92	4,92	4,92	4,92	4,34
SSH10.0X280	125	155	-	-	4,34	6,01	4,34	6,23	4,34	6,23	4,34	6,23	4,34
			-	-	4,18	4,36	4,75	4,87	4,92	4,92	4,92	4,92	4,34

For dimensions and calculation parameters see p. 52.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the fully threaded screws.

For additional values in other configurations use Fastener Designer – online dimensioning tool. Go to strongtie.eu/fastener-designer

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Solid Wood to determine the capacity of the screw.

3.1 Solid Timber Fastening

SSH – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Timber to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
6.0	With pre-drill	30	18	42	72	18	18	24	24	42	30	18	42
	Without pre-drill	72	30	60	90	30	30	30	30	60	60	30	60
8.0	With pre-drill	40	24	56	96	24	24	32	32	56	40	24	56
	Without pre-drill	96	40	80	120	40	40	40	40	80	80	40	80
10.0	With pre-drill	50	30	70	120	30	30	40	40	70	50	30	70
	Without pre-drill	120	50	100	150	50	50	50	50	100	100	50	100
12.0	With pre-drill	60	36	84	144	36	36	48	48	84	60	36	84
	Without pre-drill	144	60	120	180	60	60	60	60	120	120	60	120

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA21/0670

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

SSH – Minimum Distances for Axially Loaded Screws Timber to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
6.0	42	30	60	24
8.0	56	40	80	32
10.0	70	50	100	40
12.0	84	60	120	48

*Valid if the applied centre distances comply with $a_1, a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

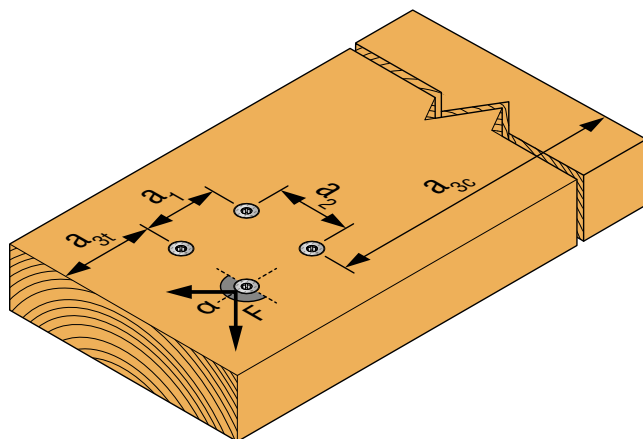


Illustration above shows angle between load direction and grain = 0°

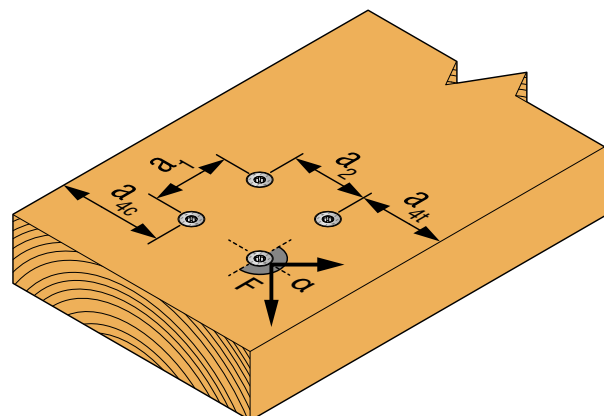


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.

3.1 Solid Timber Fastening

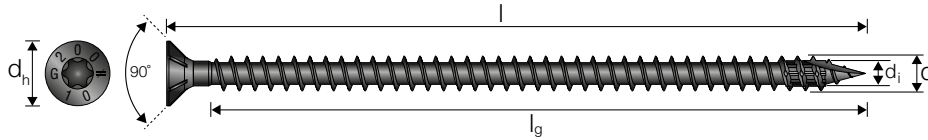
Solid-Drive™

SDCF Fully Threaded **WOOD** Screw for Timber to Timber

Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

ETA-21/0670



SDCF – Characteristic Tension and Shear Capacities Timber to Timber C24

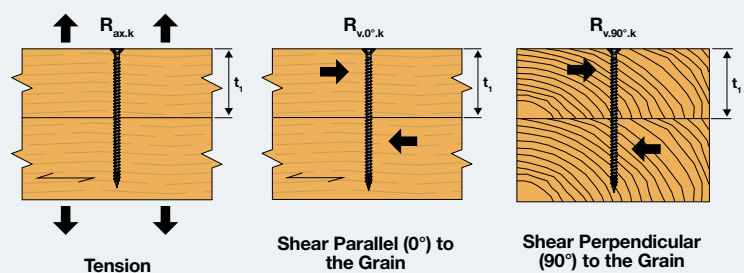
Product Reference	Thread Length L _g [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t _f [kN]																	
		Wood Thickness t _f [mm]																	
		36		45		50		60		63		70		75		80		100	
SDCF8X120	110	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	5,36	3,81 3,23	4,82	3,68 3,09	4,29	3,55 2,96	2,14	3,00 2,31
SDCF8X140	130	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	6,43	4,08 3,50	4,29	3,55 2,96
SDCF8X160	150	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	6,43	4,08 3,50
SDCF8X180	170	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	8,58	4,62 4,03
SDCF8X200	190	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	9,65	4,89 4,30
SDCF8X220	210	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	9,65	4,89 4,30
SDCF8X240	230	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	9,65	4,89 4,30
SDCF8X260	250	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	9,65	4,89 4,30
SDCF8X300	290	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	9,65	4,89 4,30
SDCF8X350	340	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	9,65	4,89 4,30
SDCF10X160	150	3,12	4,38 3,47	4,29	4,67 3,76	4,94	4,83 3,92	6,24	5,16 4,25	6,63	5,26 4,34	7,54	5,48 4,57	8,19	5,65 4,73	8,84	5,81 4,90	7,80	5,55 4,64
SDCF10X200	190	3,12	4,38 3,47	4,29	4,67 3,76	4,94	4,83 3,92	6,24	5,16 4,25	6,63	5,26 4,34	7,54	5,48 4,57	8,19	5,65 4,73	8,84	5,81 4,90	11,44	6,46 5,55
SDCF10X240	230	3,12	4,38 3,47	4,29	4,67 3,76	4,94	4,83 3,92	6,24	5,16 4,25	6,63	5,26 4,34	7,54	5,48 4,57	8,19	5,65 4,73	8,84	5,81 4,90	11,44	6,46 5,55

Table continues on next page.

Tension capacity $R_{ax,k}$		
Characteristic capacities	4,29	4,67
		3,76
Shear capacity $R_{v,k}$		
		4,67
		3,76
		4,94

With pre-drill
Without pre-drill

For pre-drilling recommendations see page 21.



3.1 Solid Timber Fastening

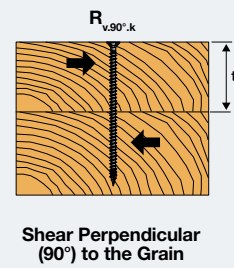
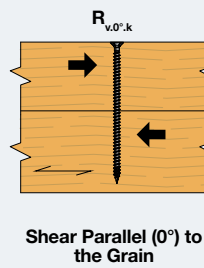
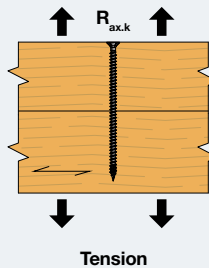
SDCF – Characteristic Tension and Shear Capacities Timber to Timber C24 (continued)

Product Reference	Thread Length L _g [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t ₁ [kN]																	
		Wood Thickness t ₁ [mm]																	
		36		45		50		60		63		70		75		80		100	
SDCF10X280	270	3,12	4,38 3,47	4,29	4,67 3,76	4,94	4,83 3,92	6,24	5,16 4,25	6,63	5,26 4,34	7,54	5,48 4,57	8,19	5,65 4,73	8,84	5,81 4,90	11,44	6,46 5,55
SDCF10X360	350	3,12	4,38 3,47	4,29	4,67 3,76	4,94	4,83 3,92	6,24	5,16 4,25	6,63	5,26 4,34	7,54	5,48 4,57	8,19	5,65 4,73	8,84	5,81 4,90	11,44	6,46 5,55
SDCF10X400	390	3,12	4,38 3,47	4,29	4,67 3,76	4,94	4,83 3,92	6,24	5,16 4,25	6,63	5,26 4,34	7,54	5,48 4,57	8,19	5,65 4,73	8,84	5,81 4,90	11,44	6,46 5,55
SDCF10X450	440	1,56	3,99 3,08	2,73	4,28 3,37	3,38	4,44 3,53	4,68	4,77 3,86	5,07	4,87 3,95	5,98	5,09 4,18	6,63	5,26 4,34	7,28	5,42 4,51	9,88	6,07 5,16
SDCF12X200	190	1,98	4,71 3,59	3,09	4,99 3,87	3,71	5,14 4,02	4,94	5,45 4,33	5,31	5,54 4,42	6,18	5,76 4,64	6,80	5,91 4,79	7,42	6,07 4,95	9,89	6,69 5,57
SDCF12X240	230	1,98	4,71 3,59	3,09	4,99 3,87	3,71	5,14 4,02	4,94	5,45 4,33	5,31	5,54 4,42	6,18	5,76 4,64	6,80	5,91 4,79	7,42	6,07 4,95	9,89	6,69 5,57
SDCF12X280	270	1,98	4,71 3,59	3,09	4,99 3,87	3,71	5,14 4,02	4,94	5,45 4,33	5,31	5,54 4,42	6,18	5,76 4,64	6,80	5,91 4,79	7,42	6,07 4,95	9,89	6,69 5,57
SDCF12X350	340	1,98	4,71 3,59	3,09	4,99 3,87	3,71	5,14 4,02	4,94	5,45 4,33	5,31	5,54 4,42	6,18	5,76 4,64	6,80	5,91 4,79	7,42	6,07 4,95	9,89	6,69 5,57
SDCF12X450	440	1,36	4,55 3,43	2,47	4,83 3,71	3,09	4,99 3,87	4,33	5,30 4,18	4,70	5,39 4,27	5,56	5,60 4,48	6,18	5,76 4,64	6,80	5,91 4,79	9,27	6,53 5,41
SDCF12X600	590	1,36	4,55 3,43	2,47	4,83 3,71	3,09	4,99 3,87	4,33	5,30 4,18	4,70	5,39 4,27	5,56	5,60 4,48	6,18	5,76 4,64	6,80	5,91 4,79	9,27	6,53 5,41

For dimensions and calculation parameters see p. 56.

Tension capacity $R_{ax,k}$		
Characteristic capacities	2,63	9,77
	6,11	With pre-drill
Shear capacity $R_{v,k}$		
6,11		

For pre-drilling recommendations see page 21.



3.1 Solid Timber Fastening

SDCF – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Timber to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
8.0	With pre-drill	40	24	96	56	24	24	32	32	56	56	56	24
	Without pre-drill	96	40	120	80	40	40	40	40	80	80	80	40
10.0	With pre-drill	50	30	120	70	30	30	40	40	70	70	70	30
	Without pre-drill	120	50	150	100	50	50	50	50	100	100	100	50
12.0	With pre-drill	60	36	144	84	36	36	48	48	84	84	84	36
	Without pre-drill	144	60	180	120	60	60	60	60	120	120	120	60

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA-13/0796

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

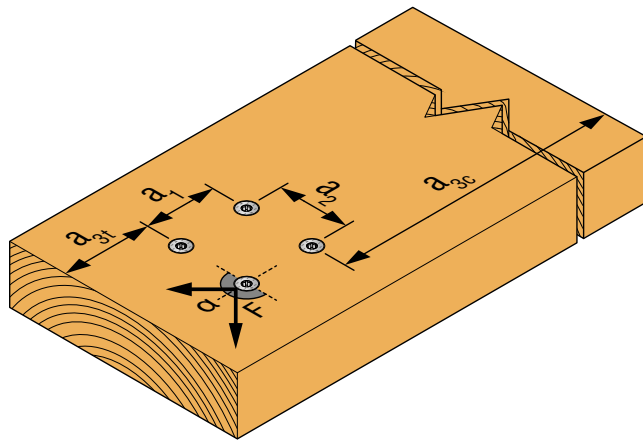


Illustration above shows angle between load direction and grain = 0°

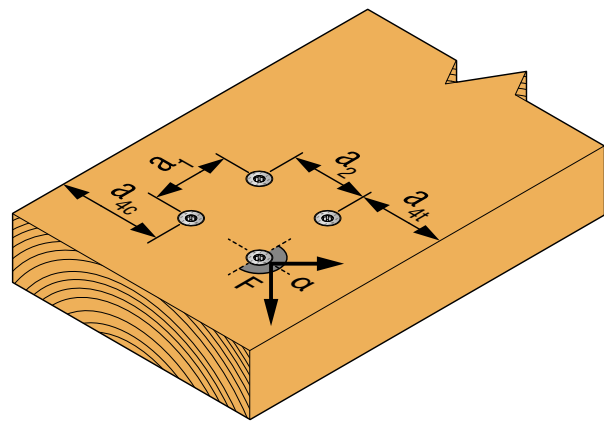


Illustration above shows angle between load direction and grain = 90°

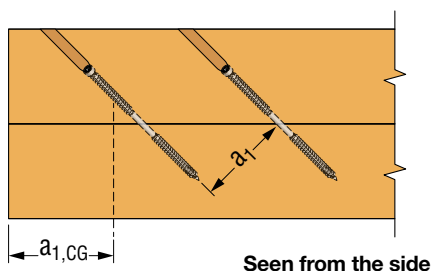
See explanation of α in General Introduction page 23.

SDCF – Minimum Distances for Axially Loaded Screw Timber to Timber C24

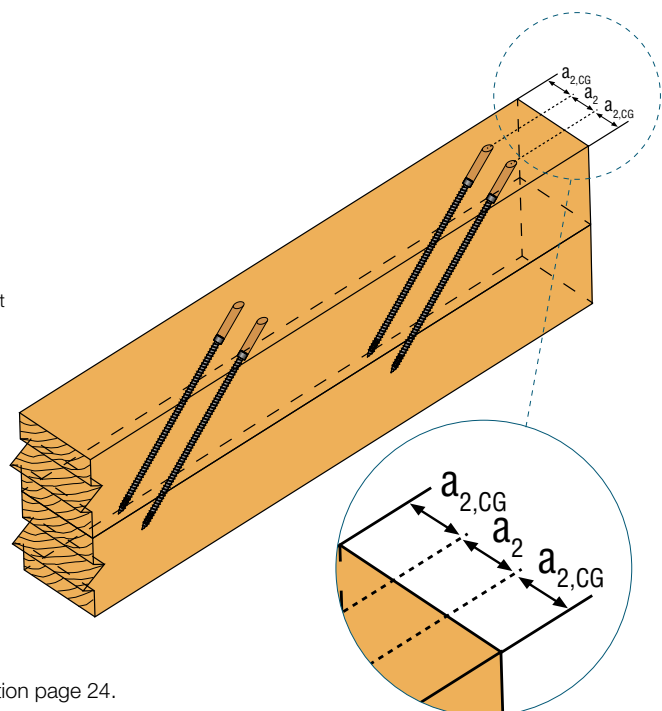
Outer Thread Diameter d [mm]	a ₁	a ₂	a _{1,cg}	a _{2,cg}
8.0	80	24	64	24
10.0	100	30	80	30
12.0	120	36	96	36

*Valid if the applied centre distances comply with $a_1, a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.



Seen from the side



See explanation of min. space and edge distances in General Introduction page 24.

3.1 Solid Timber Fastening

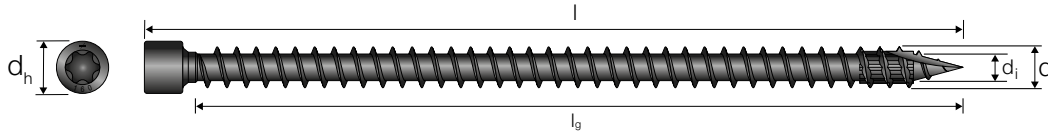
Solid-Drive™

SDCFC Fully Threaded WOOD Screw for Timber to Timber

Black E-Coat

 C2 acc. to EN ISO 12944-2
 SC2 – 50 years acc. to EC5

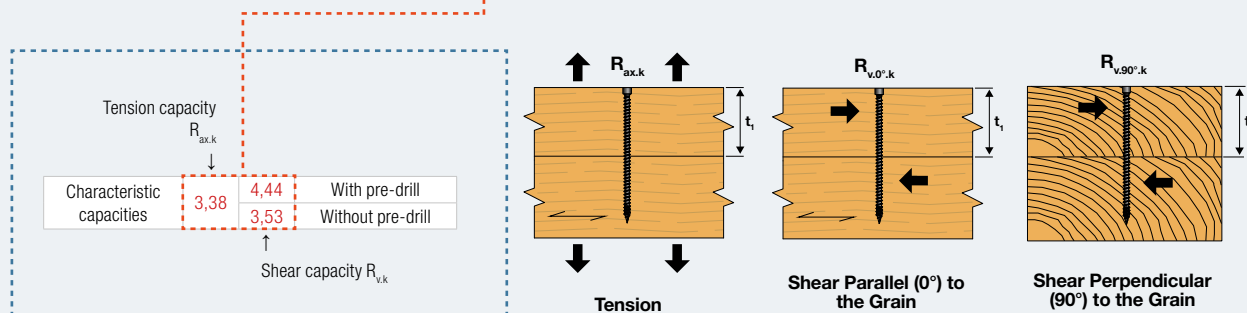

ETA-21/0670



SDCFC – Characteristic Tension and Shear Capacities Timber to Timber C24

Product Reference	Thread Length L _g [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t _i [kN]																	
		Wood Thickness t _i [mm]																	
		36		45		50		60		63		70		75		80		100	
SDCFC8X120	110	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	5,36	3,81 3,23	4,82	3,68 3,09	4,29	3,55 2,96	2,14	3,00 2,31
SDCFC8X160	150	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	6,43	4,08 3,50
SDCFC8X200	190	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	9,65	4,89 4,30
SDCFC8X240	230	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	9,65	4,89 4,30
SDCFC8X280	270	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	9,65	4,89 4,30
SDCFC8X330	320	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	9,65	4,89 4,30
SDCFC8X350	340	2,79	3,17 2,59	3,75	3,41 2,83	4,29	3,55 2,96	5,36	3,81 3,23	5,68	3,89 3,31	6,43	4,08 3,50	6,97	4,22 3,63	7,50	4,35 3,76	9,65	4,89 4,30
SDCFC10X240	228	3,12	4,38 3,47	4,29	4,67 3,76	4,94	4,83 3,92	6,24	5,16 4,25	6,63	5,26 4,34	7,54	5,48 4,57	8,19	5,65 4,73	8,84	5,81 4,90	11,44	6,46 5,55
SDCFC10X300	288	3,12	4,38 3,47	4,29	4,67 3,76	4,94	4,83 3,92	6,24	5,16 4,25	6,63	5,26 4,34	7,54	5,48 4,57	8,19	5,65 4,73	8,84	5,81 4,90	11,44	6,46 5,55
SDCFC10X380	368	3,12	4,38 3,47	4,29	4,67 3,76	4,94	4,83 3,92	6,24	5,16 4,25	6,63	5,26 4,34	7,54	5,48 4,57	8,19	5,65 4,73	8,84	5,81 4,90	11,44	6,46 5,55
SDCFC10X500	476	1,56	3,99 3,08	2,73	4,28 3,37	3,38	4,44 3,53	4,68	4,77 3,86	5,07	4,87 3,95	5,98	5,09 4,18	6,63	5,26 4,34	7,28	5,42 4,51	9,88	6,07 5,16
SDCFC10X600	576	1,56	3,99 3,08	2,73	4,28 3,37	3,38	4,44 3,53	4,68	4,77 3,86	5,07	4,87 3,95	5,98	5,09 4,18	6,63	5,26 4,34	7,28	5,42 4,51	9,88	6,07 5,16
SDCFC10X800	776	1,56	3,99 3,08	2,73	4,28 3,37	3,38	4,44 3,53	4,68	4,77 3,86	5,07	4,87 3,95	5,98	5,09 4,18	6,63	5,26 4,34	7,28	5,42 4,51	9,88	6,07 5,16
SDCFC10X1000	976	1,56	3,99 3,08	2,73	4,28 3,37	3,38	4,44 3,53	4,68	4,77 3,86	5,07	4,87 3,95	5,98	5,09 4,18	6,63	5,26 4,34	7,28	5,42 4,51	9,88	6,07 5,16

For dimensions and calculation parameters see p. 58.



3.1 Solid Timber Fastening

SDCF – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Timber to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
8.0	With pre-drill	40	24	96	56	24	24	32	32	56	56	56	24
	Without pre-drill	96	40	120	80	40	40	40	40	80	80	80	40
10.0	With pre-drill	50	30	120	70	30	30	40	40	70	70	70	30
	Without pre-drill	120	50	150	100	50	50	50	50	100	100	100	50

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA-13/0796

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,y}$) is at least $25 \times d$.

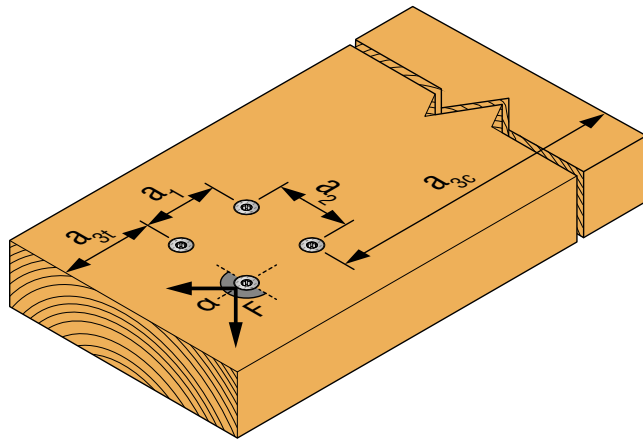


Illustration above shows angle between load direction and grain = 0°

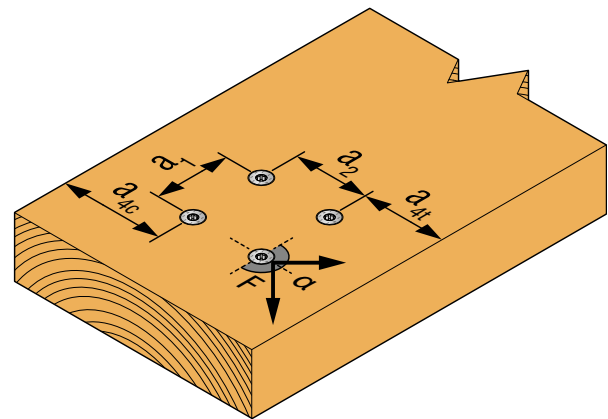


Illustration above shows angle between load direction and grain = 90°

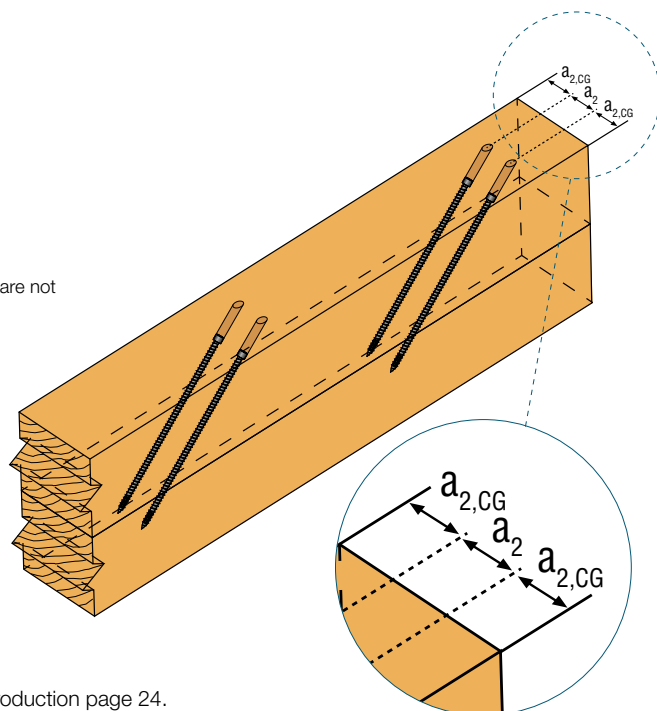
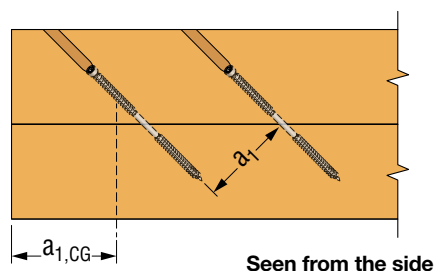
See explanation of α in General Introduction page 23.

SDCF – Minimum Distances for Axially Loaded Screws Timber to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{1,cg}	a _{2,cg}
8.0	80	24	64	24
10.0	100	30	80	30

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014

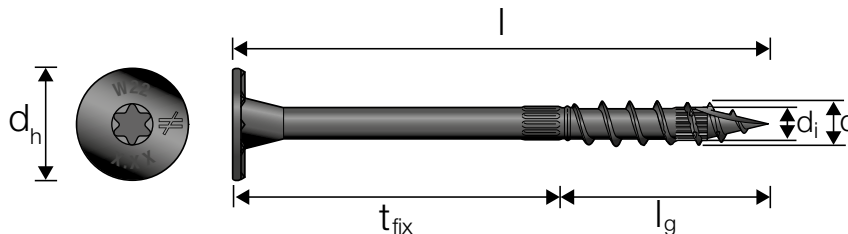
For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.



See explanation of min. space and edge distances in General Introduction page 24.

3.1 Solid Timber Fastening

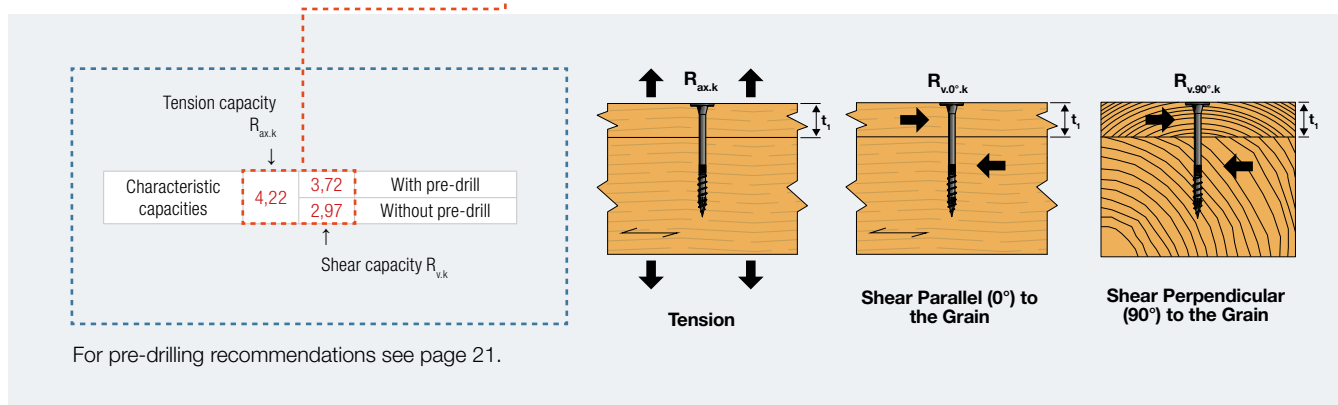
Solid-Drive™ SDW Structural **WOOD** Screw for Timber to Timber

Electrocoat
 C2 acc. to EN ISO 12944-2
 SC2 – 50 years acc. to EC5


SDW – Characteristic Tension and Shear Capacities Timber to Timber C24

Product Reference	Thread Length L_g [mm]	Max Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]										
			Wood Thickness t_l [mm]										
			36	45	50	60	63	70	75	80	100		
SDW22258(8.0x68)	33	35	3,38	3,06	-	-	-	-	-	-	-	-	-
			2,25	-	-	-	-	-	-	-	-	-	-
SDW22300(8.0x76)	36	40	3,80	3,38	3,27	3,17	-	-	-	-	-	-	-
			2,49	2,53	-	-	-	-	-	-	-	-	-
SDW22338(8.0x86)	40	46	4,22	3,48	4,22	3,70	3,80	3,48	-	-	-	-	-
			2,75	2,79	-	-	-	-	-	-	-	-	-
SDW22438(8.0x111)	37	74	3,91	3,41	3,91	3,65	3,91	3,65	3,91	3,62	3,41	-	-
			2,67	2,89	-	-	-	-	-	-	-	-	-
SDW22458(8.0x118)	36	82	3,80	3,38	3,80	3,62	3,80	3,62	3,80	3,62	3,80	3,46	-
			2,64	2,86	-	-	-	-	-	-	-	-	-
SDW22500(8.0x127)	40	87	4,22	3,48	4,22	3,72	4,22	3,72	4,22	3,72	4,22	3,72	-
			2,75	2,97	-	-	-	-	-	-	-	-	-
SDW22600(8.0x152)	37	115	3,91	3,41	3,91	3,65	3,91	3,65	3,91	3,65	3,91	3,65	3,65
			2,67	2,89	-	-	-	-	-	-	-	-	3,08
SDW22638(8.0x162)	36	126	3,80	3,38	3,80	3,62	3,80	3,62	3,80	3,62	3,80	3,62	3,62
			2,64	2,86	-	-	-	-	-	-	-	-	3,07
SDW22634(8.0x171)	40	131	4,22	3,48	4,22	3,72	4,22	3,72	4,22	3,72	4,22	3,72	3,72
			2,75	2,97	-	-	-	-	-	-	-	-	3,17

For dimensions and calculation parameters see p. 74.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the fully threaded screws.

For additional values in other configurations use Fastener Designer – online dimensioning tool. Go to strongtie.eu/fastener-designer

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Solid Wood to determine the capacity of the screw.

3.1 Solid Timber Fastening

Solid-Drive™

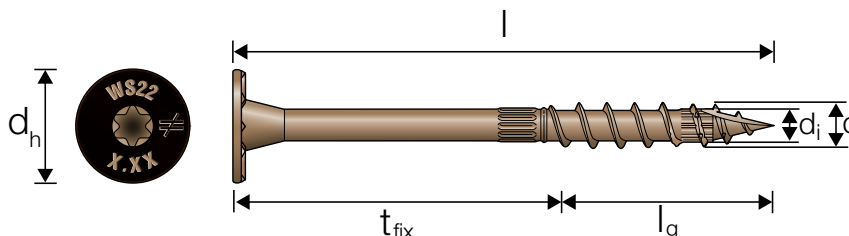
SDWS Structural **WOOD** Screw for Timber to Timber

Double Barrier

C3 acc. to EN ISO 12944-2
SC3 – 50 years acc. to EC5UK
CA

CE

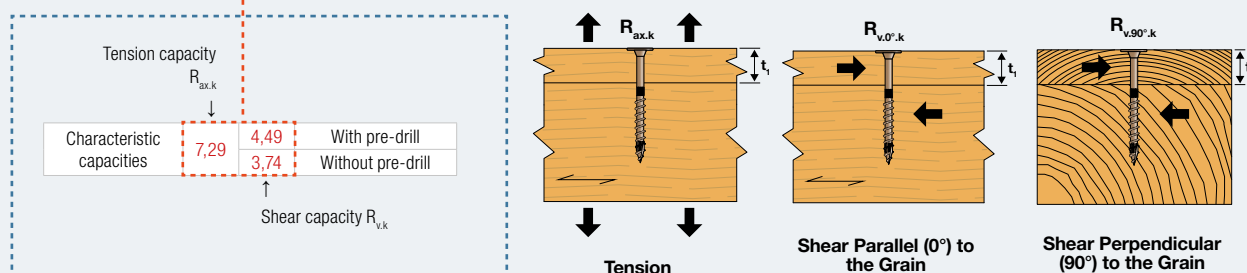
EN14592



SDWS – Characteristic Tension and Shear Capacities Timber to Timber C24

Product Reference	Thread Length L_g [mm]	Max Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]											
			Wood Thickness t_l [mm]											
			36	45	50	60	63	70	75	80	100			
SDWS08X75DB	36	40	3,80	3,38 2,49	3,27 2,53	-	-	-	-	-	-	-	-	-
SDWS08X100DB	58	43	6,12	3,96 3,22	5,91 3,45	-	-	-	-	-	-	-	-	-
SDWS08X126DB	69	57	7,29	4,25 3,38	4,49 3,74	7,29 3,87	4,49 3,94	6,97	-	-	-	-	-	-
SDWS08X151DB	69	83	7,29	4,25 3,38	4,49 3,74	7,29 3,87	4,49 3,94	7,29	4,49 3,94	7,29	4,49 3,94	7,29	4,49 3,94	-
SDWS08X202DB	69	135	7,29	4,25 3,38	4,49 3,74	7,29 3,87	4,49 3,94	7,29	4,49 3,94	7,29	4,49 3,94	7,29	4,49 3,94	4,49 3,94
SDWS08X252DB	69	184	7,29	4,25 3,38	4,49 3,74	7,29 3,87	4,49 3,94	7,29	4,49 3,94	7,29	4,49 3,94	7,29	4,49 3,94	4,49 3,94

For dimensions and calculation parameters see p. 74.



For pre-drilling recommendations see page 21.

3.1 Solid Timber Fastening

SDW/SDWS – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Timber to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
8.0	With pre-drill	39	24	54	93	24	24	31	31	54	39	24	54
	Without pre-drill	93	39	77	116	39	39	39	39	77	77	39	77

1) Minimum distances comply with EN 1995-1-1 (Eurocode 5)

2) Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

3) Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

SDW/SDWS – Minimum Distances for Axially Loaded Screws Timber to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
8.0	54	39	77	31

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

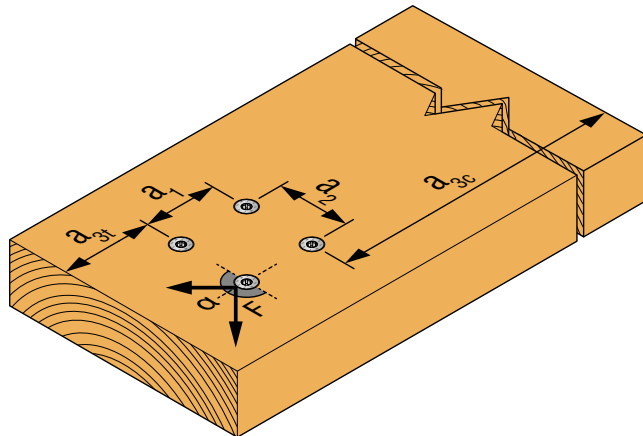


Illustration above shows angle between load direction and grain = 0°

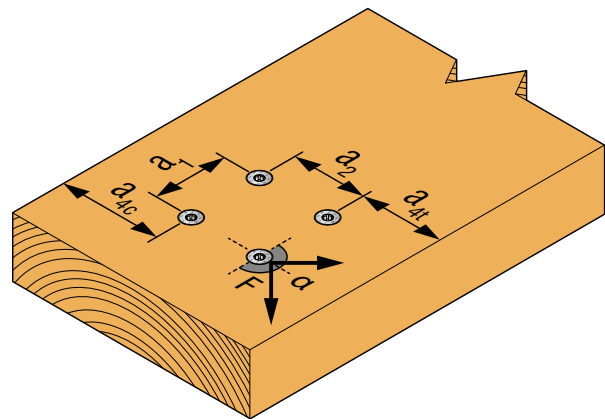


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.



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3.2 Glulam Fastening

General Introduction - Glulam Fastening

In this chapter you will find the characteristic values for our Solid-Drive structural fasteners in a variety of glulam applications, such as general glulam fastening, inclined installations, cross pairs and seat reinforcement.

In the tables, we give you the values both with and without pre-drilling. This is to ensure that you are always aware of the difference in capacity, and to avoid any misunderstandings.

The Minimum space and edge distances are also given for each of our fasteners. Again, we present you with the data both with and without pre-drilling.

All values given in this chapter are for GL24h. For other glulam classes see page 20.

If you are planning on using other wood thicknesses or a different glulam class than shown in the tables please refer to Fastener Designer strongtie.eu/fastener-designer, or contact our technical support functions via email or telephone.

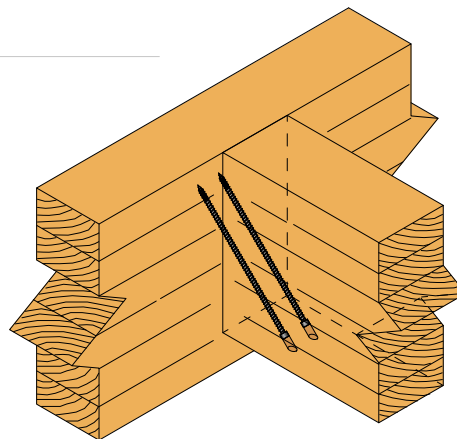
Inclined Screws

Simpson Strong-Tie double- and fully threaded screws are suitable for inclined screw beam to beam installations.

By installing the screws with a 30°, 45° or 60° angle inclined upwards through the secondary beam into the primary beam, you create a strong connection, taking advantage of the high load-bearing capacity of the long screws.

One of the benefits of using the inclined screws installation of glulam is that installation when standing below the beams.

Read more about inclined screws on pages 166-169 in this chapter.

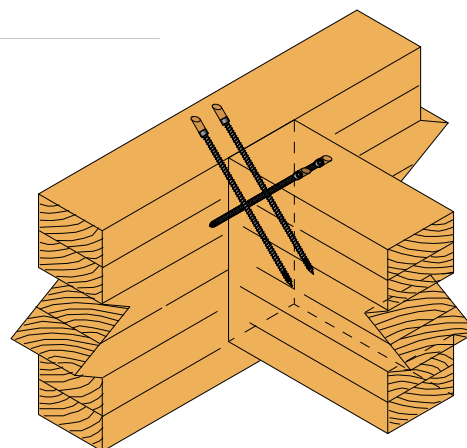


Cross Pairs

Simpson Strong-Tie double- and fully threaded screws are suitable for cross pair installations. Cross pair installations can be made by creating a single or a double screws in the middle of the glulam beam to beam connection.

Cross pairs create a very strong connection and can take both the downward loads as well as uplift. The installation is made from above the beams screwing downwards into the beams at a 45° angle.

Read more about cross pairs on pages 170-173 in this chapter.

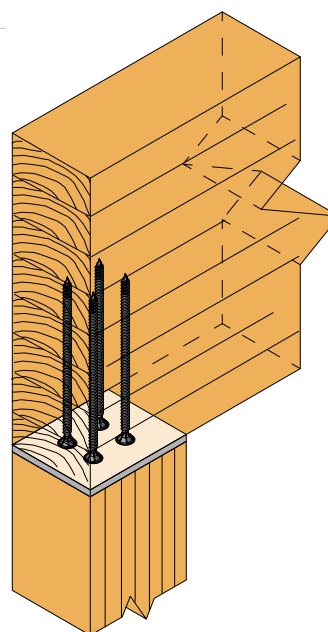


Seat Reinforcement

Glulam elements can transfer large vertical loads on bearings. In many situations the support element might have a much higher compression resistance than the glulam element. This is the case for concrete or steel supports. This might even happen for glulam post supports as the timber compression resistance parallel to the grain is much higher than it is perpendicular to the grain.

Normally designers might increase the width of the glulam element to create a bigger area of contact. However, an efficient alternative solution to this is to reinforce the seat area with fully threaded screws, that can take over the compression forces. A steel plate is needed to distribute the forces from screws onto the bearing.

Read more about seat reinforcement on pages 174-185 in this chapter.



3.2.1 Glulam Fastening

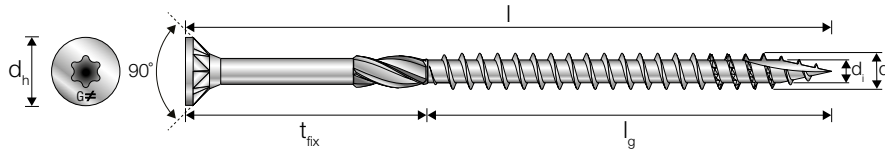
Solid-Drive™

TTUFS Countersunk WOOD Screw for Glulam

Electro Galvanised

C1 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

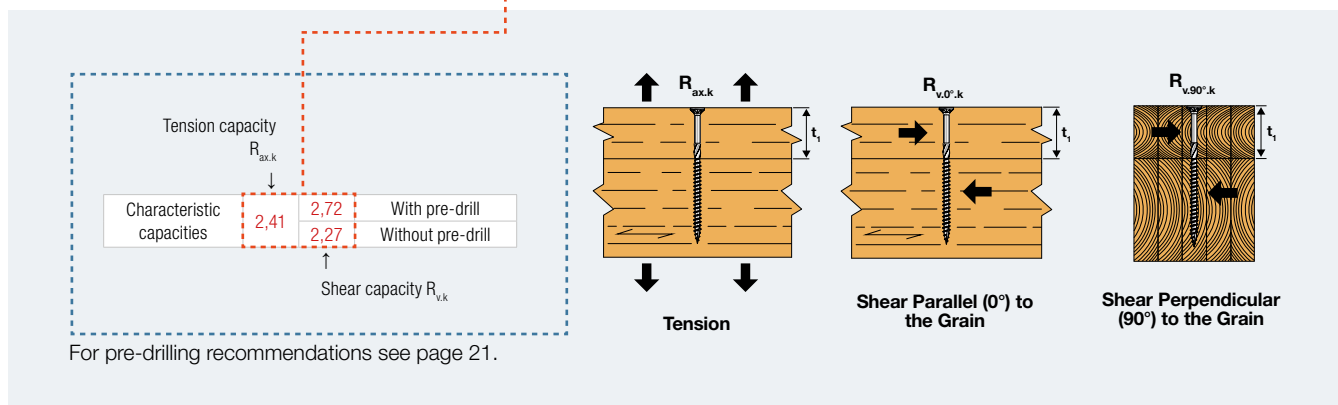
ETA-21/0670



TTUFS - Characteristic Tension and Shear Capacities Glulam to Glulam GL24h

Product Reference	Thread Length L_g [mm]	Max. Advised Wood Thickness t_{fx} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]															
			Wood Thickness t_l [mm]															
			42	48	56	60	66	80	90	100	115	42	48	56	60	66	80	90
TTUFS5.0X80	40	40	1,67	2,05	-	-	-	-	-	-	-	1,73	2,05	-	-	-	-	-
TTUFS5.0X90	45	45	1,67	2,05	1,67	2,05	-	-	-	-	-	1,73	2,05	-	-	-	-	-
TTUFS5.0X100	60	40	1,67	2,05	-	-	-	-	-	-	-	1,73	2,05	-	-	-	-	-
TTUFS5.0X120	60	60	1,67	2,05	1,67	2,05	1,67	2,05	-	-	-	1,73	2,05	-	-	-	-	-
TTUFS6.0X80	40	40	2,41	2,72	-	-	-	-	-	-	-	2,27	2,72	-	-	-	-	-
TTUFS6.0X90	45	45	2,41	2,72	2,41	2,72	-	-	-	-	-	2,27	2,72	-	-	-	-	-
TTUFS6.0X100	60	40	2,41	2,72	-	-	-	-	-	-	-	2,27	2,72	-	-	-	-	-
TTUFS6.0X120	70	50	2,41	2,72	2,41	2,72	-	-	-	-	-	2,27	2,72	-	-	-	-	-
TTUFS6.0X140	70	70	2,41	2,72	2,41	2,72	2,41	2,72	2,41	2,72	-	2,27	2,72	-	-	-	-	-
TTUFS6.0X160	70	90	2,41	2,72	2,41	2,72	2,41	2,72	2,41	2,72	2,41	2,27	2,72	2,41	2,72	-	-	-
TTUFS6.0X180	70	110	2,41	2,72	2,41	2,72	2,41	2,72	2,41	2,72	2,41	2,27	2,72	2,41	2,72	2,41	2,72	2,41

For dimensions and calculation parameters see p. 40.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that Max. half the thread +/- 5 mm is in each element for the full-threaded screws.

For additional values in other configurations use Fastener Designer - online dimensioning tool. Go to strongtie.eu/fastener-designer.

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Fastener Designer to determine the capacity of the screw.

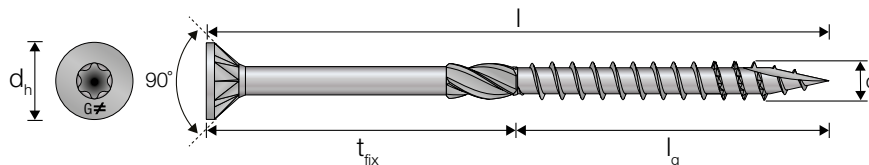
3.2.1 Glulam Fastening

Solid-Drive™TTZNFS Countersunk **WOOD** Screw
for Glulam

Impreg®+

C4 - 15 years acc. to EN
ISO 12944-2
SC2 - 50 years acc. to EC5UK
CA

ETA-21/0670

TTZNFS - Characteristic Tension and Shear Capacities
Glulam to Glulam GL24h

Product Reference	Thread Length L_g [mm]	Max. Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_i [kN]															
			Wood Thickness t_i [mm]															
			42	48	56	60	66	80	90	100	115	42	48	56	60	66	80	90
TTZNFS5.0X80	40	40	1,67	2,05	-	-	-	-	-	-	-	1,73	2,05	-	-	-	-	-
TTZNFS5.0X90	45	45	1,67	2,05	1,67	2,05	-	-	-	-	-	1,73	2,05	-	-	-	-	-
TTZNFS5.0X100	60	40	1,67	2,05	-	-	-	-	-	-	-	1,73	2,05	-	-	-	-	-
TTZNFS5.0X120	60	60	1,67	2,05	1,67	2,05	1,67	2,05	-	-	-	1,73	2,05	-	-	-	-	-
TTZNFS6.0X80	40	40	2,41	2,72	-	-	-	-	-	-	-	2,27	2,72	-	-	-	-	-
TTZNFS6.0X90	45	45	2,41	2,72	2,41	2,72	-	-	-	-	-	2,27	2,72	-	-	-	-	-
TTZNFS6.0X100	60	40	2,41	2,72	-	-	-	-	-	-	-	2,27	2,72	-	-	-	-	-
TTZNFS6.0X120	70	50	2,41	2,72	2,41	2,72	-	-	-	-	-	2,27	2,72	-	-	-	-	-
TTZNFS6.0X140	70	70	2,41	2,72	2,41	2,72	2,41	2,72	2,41	2,72	-	2,27	2,72	-	-	-	-	-
TTZNFS6.0X160	70	90	2,41	2,72	2,41	2,72	2,41	2,72	2,41	2,72	2,41	2,27	2,72	2,41	2,72	-	-	-
TTZNFS6.0X180	70	110	2,41	2,72	2,41	2,72	2,41	2,72	2,41	2,72	2,41	2,27	2,72	2,41	2,72	2,41	2,72	2,72

For dimensions and calculation parameters see p. 40.

Tension capacity $R_{ax,k}$

Characteristic capacities	2,41	2,72	With pre-drill
		2,27	Without pre-drill

Shear capacity $R_{v,k}$

For pre-drilling recommendations see page 21.

$R_{ax,k}$

Tension

$R_{v,0^\circ,k}$

Shear Parallel (0°) to the Grain

$R_{v,90^\circ,k}$

Shear Perpendicular (90°) to the Grain

To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the full-threaded screws.

For additional values in other configurations use Fastener Designer - online dimensioning tool. Go to strongtie.eu/fastener-designer.

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Fastener Designer to determine the capacity of the screw.

3.2.1 Glulam Fastening

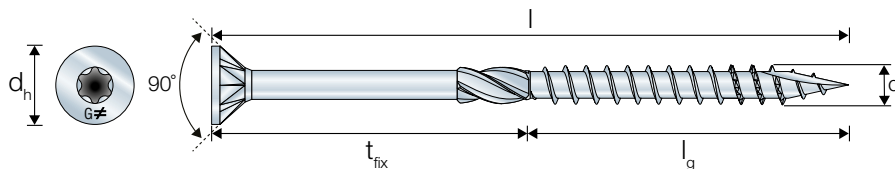
Solid-Drive™

TTSFS Countersunk WOOD Screw for Glulam

Stainless Steel

CRC III acc. to
EN1993-1-4(A1)
SC3 - 50 years acc. to EC5A4
INOXUK
CA

ETA-21/0670



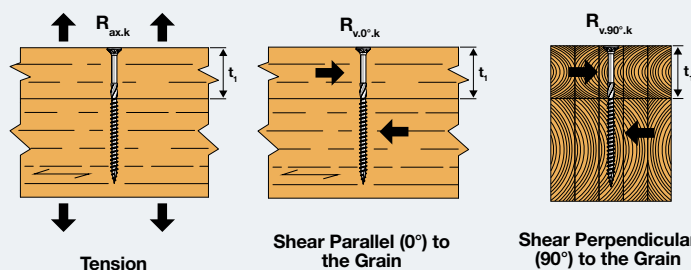
TTSFS - Characteristic Tension and Shear Capacities Glulam to Glulam GL24h

Product Reference	Thread Length L_g [mm]	Max. Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]															
			Wood Thickness t_l [mm]															
			42	48	56	60	66	80	90	100	115	42	48	56	60	66	80	90
TTSFS5.0x80	40	40	1,56	1,76	-	-	-	-	-	-	-	1,49	1,76	-	-	-	-	-
TTSFS5.0x90	45	45	1,56	1,76	1,56	1,76	-	-	-	-	-	1,49	1,76	-	-	-	-	-
TTSFS5.0x100	55	45	1,56	1,76	1,56	1,76	-	-	-	-	-	1,49	1,76	-	-	-	-	-
TTSFS5.0x120	60	60	1,56	1,76	1,56	1,76	1,56	1,76	-	-	-	1,49	1,76	-	-	-	-	-
TTSFS6.0x80	40	40	2,35	2,60	-	-	-	-	-	-	-	2,17	2,60	-	-	-	-	-
TTSFS6.0x90	45	45	2,35	2,60	2,35	2,60	-	-	-	-	-	2,17	2,60	-	-	-	-	-
TTSFS6.0x100	55	45	2,35	2,60	2,35	2,60	-	-	-	-	-	2,17	2,60	-	-	-	-	-
TTSFS6.0x120	60	60	2,35	2,60	2,35	2,60	2,35	2,60	-	-	-	2,17	2,60	-	-	-	-	-
TTSFS6.0x140	65	75	2,35	2,60	2,35	2,60	2,35	2,60	2,35	2,60	2,35	2,17	2,60	2,35	2,60	2,35	2,60	2,17

For dimensions and calculation parameters see p. 40.

Tension capacity $R_{ax,k}$	
Characteristic capacities	2,35
	2,60
	2,17
Shear capacity $R_{v,k}$	
	2,35
	2,60
	2,17

For pre-drilling recommendations see page 21.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the full-threaded screws.

For additional values in other configurations use Fastener Designer - online dimensioning tool. Go to strongtie.eu/fastener-designer.

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Fastener Designer to determine the capacity of the screw.

3.2.1 Glulam Fastening

TTUFS/TTZNFS/TTSFS - Minimum distances for Screws in Shear or Combined Loads¹⁾ Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
4.5	With pre-drill	23	14	32	54	14	14	18	18	32	23	14	32
	Without pre-drill	45	23	45	68	23	23	23	23	45	45	23	32
5.0	With pre-drill	25	15	35	60	15	15	20	20	35	25	15	35
	Without pre-drill	60	25	50	75	25	25	25	25	50	50	25	50
6.0	With pre-drill	30	18	42	72	18	18	24	24	42	30	18	42
	Without pre-drill	72	30	60	90	30	30	30	30	60	60	30	60

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA 21/0670

²⁾ Values given in the table are based on the $\rho_k \leq 385 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

TTUFS/TTZNFS/TTSFS - Minimum distances for Axially Loaded Screws Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
4.5	32	23	45	18
5.0	35	25	50	20
6.0	42	30	60	24

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

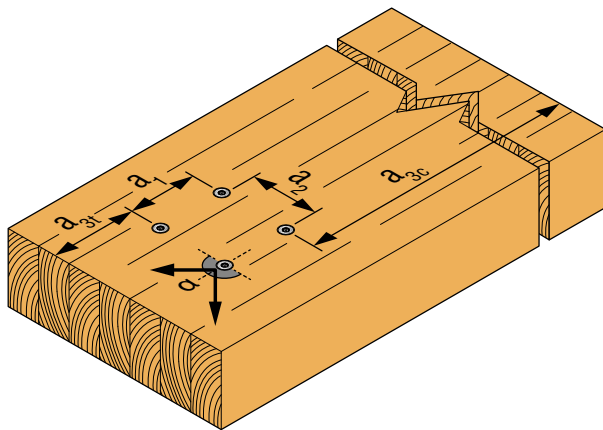


Illustration above shows angle between load direction and grain = 0°

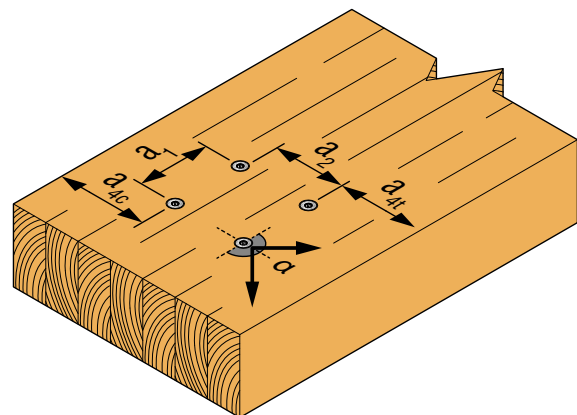


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.



Fastener Designer

Design with recommended Simpson Strong-Tie fasteners available in your market and save time with our new, user-friendly web-app.

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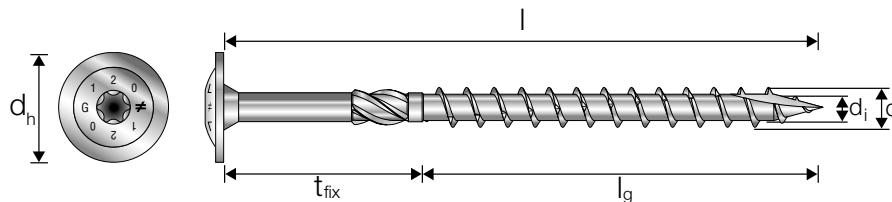
3.2.1 Glulam Fastening

Solid-Drive™ SWW Washer-Head **WOOD** Screw for Glulam

Electro Galvanised*
C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5



ETA-21/0670



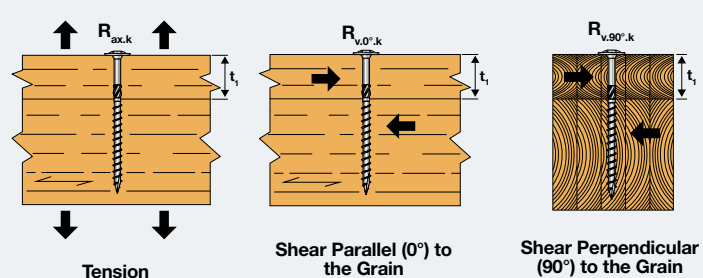
SWW - Characteristic Tension and Shear Capacities Glulam to Glulam GL24h

Product Reference	Thread Length L_g [mm]	Max. Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]									
			Wood Thickness t_l [mm]									
			80	90	100	115	120	140	160	180	200	
SWW6.0X160	70	90	3,41	3,08 2,60	3,41	3,08 2,60	-	-	-	-	-	-
SWW6.0X180	70	110	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	-	-	-	-
SWW6.0X200	70	130	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	-	-
SWW6.0X220	70	150	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	-	-
SWW6.0X240	70	170	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	3,08 2,60	-
SWW6.0X260	70	190	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60
SWW6.0X280	70	210	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60
SWW6.0X300	70	230	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60	3,41	3,08 2,60

Table continues on next page.

Tension capacity $R_{ax,k}$		
Characteristic capacities	3,41	3,08
		2,60
		With pre-drill
		Without pre-drill
Shear capacity $R_{v,k}$		

For pre-drilling recommendations see page 21.



*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses. Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the full-threaded screws.

For additional values in other configurations use Fastener Designer - online dimensioning tool. Go to strongtie.eu/fastener-designer.

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Fastener Designer to determine the capacity of the screw.

3.2.1 Glulam Fastening

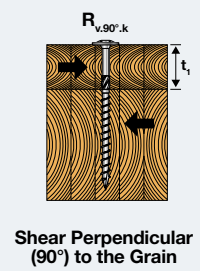
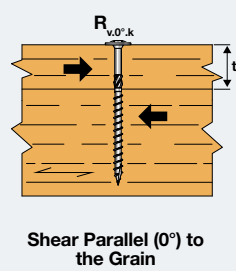
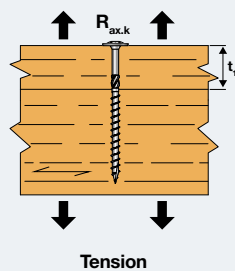
SWW - Characteristic Tension and Shear Capacities Glulam to Glulam GL24h (continued)

Product Reference	Thread Length L_g [mm]	Max. Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]									
			Wood Thickness t_l [mm]									
			80	90	100	115	120	140	160	180	200	
SWW8.0X160	80	80	5,48	5,36 4,42	-	-	-	-	-	-	-	-
SWW8.0X180	80	100	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	-	-	-	-
SWW8.0X200	80	120	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	-	-
SWW8.0X220	80	140	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	-	-
SWW8.0X240	80	160	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42
SWW8.0X260	80	180	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42
SWW8.0X280	80	200	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42
SWW6.0X300	80	220	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42
SWW8.0X320	80	240	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42
SWW8.0X340	80	260	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42
SWW8.0X360	80	280	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42
SWW8.0X380	80	300	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42
SWW8.0X400	80	320	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42

Table continues on next page.

Tension capacity $R_{ax,k}$		
Characteristic capacities	5,48	5,36
	4,42	4,42
	With pre-drill	
	Without pre-drill	
Shear capacity $R_{v,k}$		

For pre-drilling recommendations see page 21.



3.2.1 Glulam Fastening

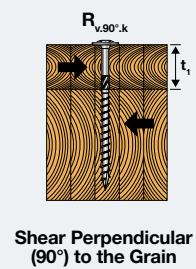
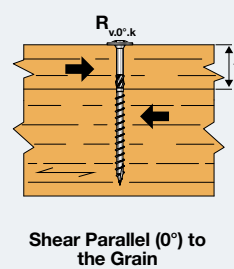
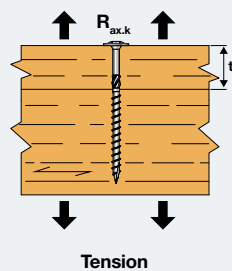
SWW - Characteristic Tension and Shear Capacities Glulam to Glulam GL24h (continued)

Product Reference	Thread Length L_g [mm]	Max. Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]										
			Wood Thickness t_l [mm]										
			80	90	100	115	120	140	160	180	200		
SWW10.0X160	80	80	6,88	7,45 6,00	-	-	-	-	-	-	-	-	-
SWW10.0X180	80	100	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	-	-	-	-	-
SWW10.0X200	80	120	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	-	-	-
SWW10.0X220	80	140	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	-
SWW10.0X240	80	160	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	-
SWW10.0X260	80	180	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	-
SWW10.0X280	80	200	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88
SWW10.0X300	80	220	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88
SWW10.0X320	80	240	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88
SWW10.0X340	80	260	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88
SWW10.0X360	80	280	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88
SWW10.0X380	80	300	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88
SWW10.0X400	80	320	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88

For dimensions and calculation parameters see p. 44.

Tension capacity $R_{ax,k}$		
Characteristic capacities	6,88	7,45
	6,00	6,00
Shear capacity $R_{v,k}$		
With pre-drill		
Without pre-drill		

For pre-drilling recommendations see page 21.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the full-threaded screws.

For additional values in other configurations use Fastener Designer - online dimensioning tool. Go to strongtie.eu/fastener-designer.

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Fastener Designer to determine the capacity of the screw.

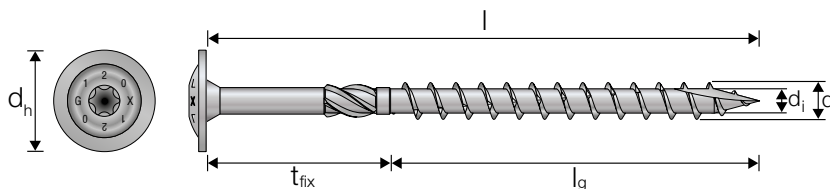
3.2.1 Glulam Fastening

Solid-Drive™**SWWZ Washer-Head WOOD Screw for Glulam**

Impreg®+

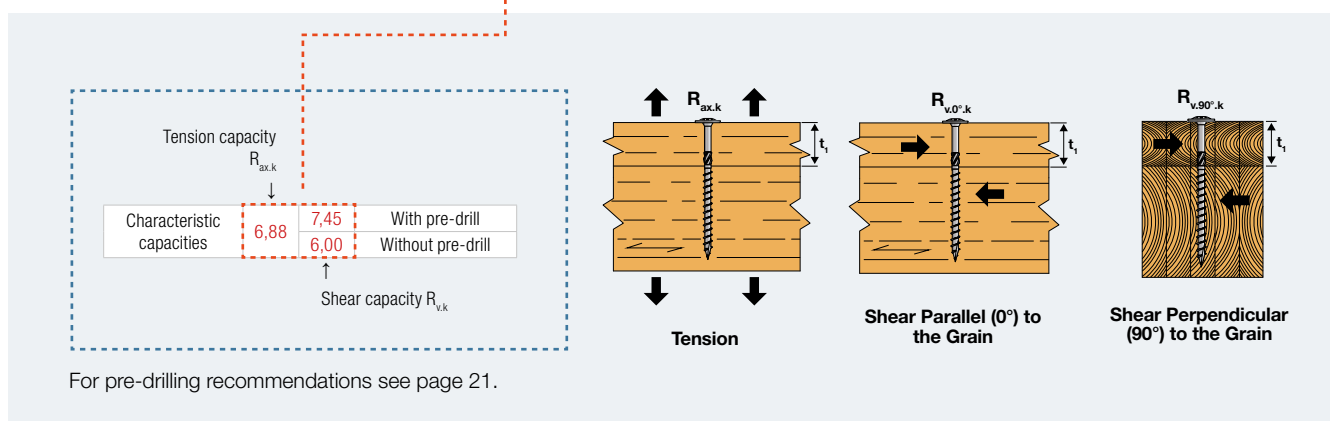
C4 - 15 years acc. to EN
ISO 12944-2
SC2 - 50 years acc. to EC5UK
CA

ETA-21/0670

**SWWZ - Characteristic Tension and Shear Capacities
Glulam to Glulam GL24h**

Product Reference	Thread Length L _g [mm]	Max. Advised Wood Thickness t _{fix} [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t _l [kN]																	
			Wood Thickness t _l [mm]																	
			80		90		100		115		120		140		160		180		200	
SWWZ8.0X180	80	100	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	-	-	-	-	-	-	-	-	-	-	-	
SWWZ8.0X200	80	120	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	-	-	-	-	-	-	-	
SWWZ8.0X240	80	160	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	-	-	-	
SWWZ8.0X300	80	220	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	
SWWZ8.0X340	80	260	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	5,36 4,42	5,48	
SWWZ10.0X160	80	80	6,88	7,45 6,00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWWZ10.0X180	80	100	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	-	-	-	-	-	-	-	-	-	-	-	
SWWZ10.0X200	80	120	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	-	-	-	-	-	-	-	
SWWZ10.0X240	80	160	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	6,88	7,45 6,00	-	-	-	

For dimensions and calculation parameters see p. 44.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the full-threaded screws.

For additional values in other configurations use Fastener Designer - online dimensioning tool. Go to strongtie.eu/fastener-designer.

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Fastener Designer to determine the capacity of the screw.

3.2.1 Glulam Fastening

SWW/SWWZ - Minimum distances for Screws in Shear or Combined Loads¹⁾ Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
6.0	With pre-drill	30	18	42	72	18	18	24	24	42	30	18	42
	Without pre-drill	72	30	60	90	30	30	30	30	60	60	30	60
8.0	With pre-drill	40	24	56	96	24	24	32	32	56	40	24	56
	Without pre-drill	96	40	80	120	40	40	40	40	80	80	40	80
10.0	With pre-drill	50	30	70	120	30	30	40	40	70	50	30	70
	Without pre-drill	120	50	100	150	50	50	50	50	100	100	50	100

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA 21/0670

²⁾ Values given in the table are based on the $\rho_k \leq 385 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

SWW/SWWZ - Minimum distances for Axially Loaded Screws Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
6.0	42	30	60	24
8.0	56	40	80	32
10.0	70	50	100	40

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

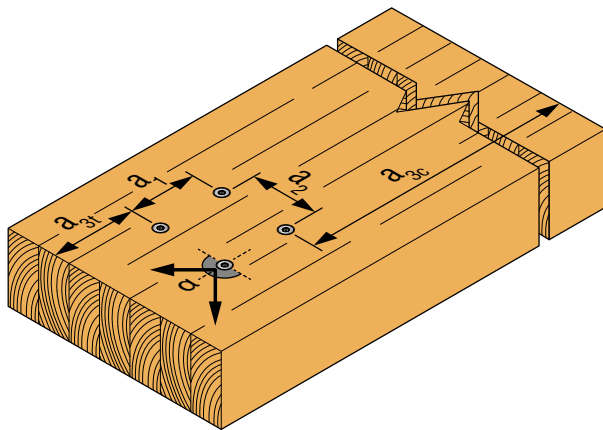


Illustration above shows angle between load direction and grain = 0°

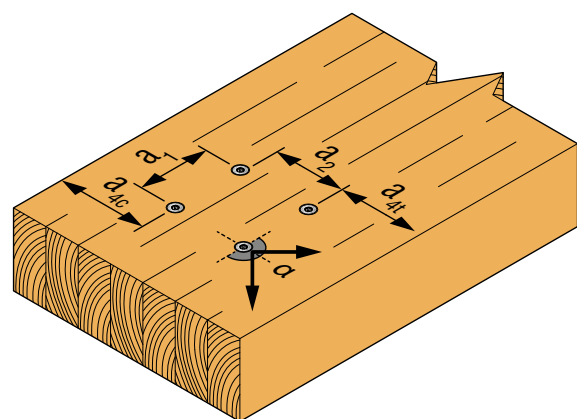


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.



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Try Fastener Designer today. Go to strongtie.eu/fastener-designer

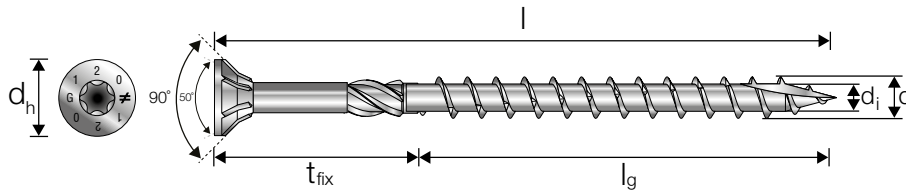
3.2.1 Glulam Fastening

Solid-Drive™SWC Countersunk **WOOD** Screw
for Glulam

Electro Galvanised*

C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

ETA-21/0670

SWC - Characteristic Tension and Shear Capacities
Glulam to Glulam GL24h

Product Reference	Thread Length L _g [mm]	Max. Advised Wood Thickness t _{fix} [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t _l [kN]																	
			Wood Thickness t _l [mm]																	
			80		90		100		115		120		140		160		180		200	
SWC6.0X200	70	130	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	-	-	-	-	-	-	-	-
SWC6.0X220	70	150	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	-	-	-	-	-	-
SWC6.0X240	70	170	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20		
SWC6.0X260	70	190	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20		
SWC6.0X280	70	210	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20
SWC6.0X300	70	230	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20	1,79	2,67 2,20
SWC8.0X160	80	80	2,88	4,71 3,76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC8.0X180	80	100	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	-	-	-	-	-	-	-	-	-	-	-	-
SWC8.0X200	80	120	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	-	-	-	-	-	-	-	-
SWC8.0X220	80	140	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	-	-	-	-	-	-
SWC8.0X240	80	160	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	-	-	-	-
SWC8.0X260	80	180	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	-	-
SWC8.0X280	80	200	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76
SWC6.0X300	80	220	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76
SWC8.0X320	80	240	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76
SWC8.0X340	80	260	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76
SWC8.0X360	80	280	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76
SWC8.0X380	80	300	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76
SWC8.0X400	80	320	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76	2,88	4,71 3,76

Table continues on next page.

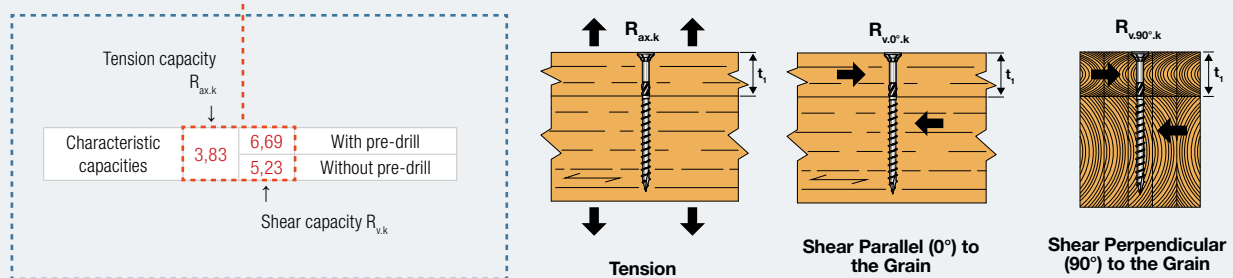
*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses.
Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

3.2.1 Glulam Fastening

SWC - Characteristic Tension and Shear Capacities Glulam to Glulam GL24h (continued)

Product Reference	Thread Length L_g [mm]	Max. Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]									
			Wood Thickness t_l [mm]									
			80	90	100	115	120	140	160	180	200	
SWC10.0X160	80	80	3,83	6,69 5,23	-	-	-	-	-	-	-	-
SWC10.0X180	80	100	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	-	-	-	-
SWC10.0X200	80	120	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	-	-	-	-
SWC10.0X220	80	140	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	-	-
SWC10.0X240	80	160	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23
SWC10.0X260	80	180	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23
SWC10.0X280	80	200	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23
SWC10.0X300	80	220	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23
SWC10.0X320	80	240	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23
SWC10.0X340	80	260	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23
SWC10.0X360	80	280	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23
SWC10.0X380	80	300	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23
SWC10.0X400	80	320	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23	3,83	6,69 5,23

For dimensions and calculation parameters see p. 48.



For pre-drilling recommendations see page 21.

To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the full-threaded screws.

For additional values in other configurations use Fastener Designer - online dimensioning tool. Go to strongtie.eu/fastener-designer.

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Fastener Designer to determine the capacity of the screw.

3.2.1 Glulam Fastening

SWC - Minimum distances for Screws in Shear or Combined Loads¹⁾ Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
6.0	With pre-drill	30	18	42	72	18	18	24	24	42	30	18	42
	Without pre-drill	72	30	60	90	30	30	30	30	60	60	30	60
8.0	With pre-drill	40	24	56	96	24	24	32	32	56	40	24	56
	Without pre-drill	96	40	80	120	40	40	40	40	80	80	40	80
10.0	With pre-drill	50	30	70	120	30	30	40	40	70	50	30	70
	Without pre-drill	120	50	100	150	50	50	50	50	100	100	50	100

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA 21/0670

²⁾ Values given in the table are based on the $\rho_k \leq 385 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

SWC - Minimum distances for Axially Loaded Screws Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
6.0	42	30	60	24
8.0	56	40	80	32
10.0	70	50	100	40

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.
 Calculation according to EN1995-1-1:2004+A2:2014

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

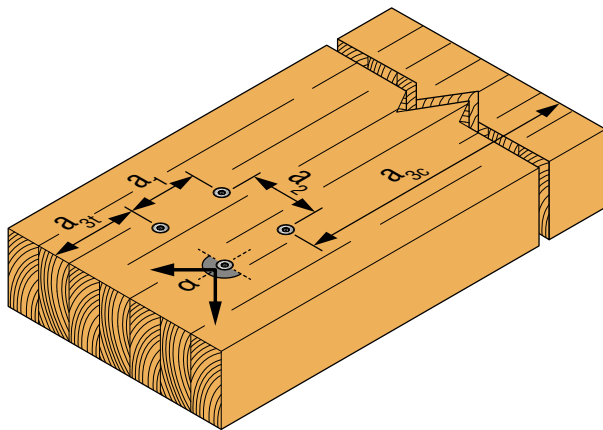


Illustration above shows angle between load direction and grain = 0°

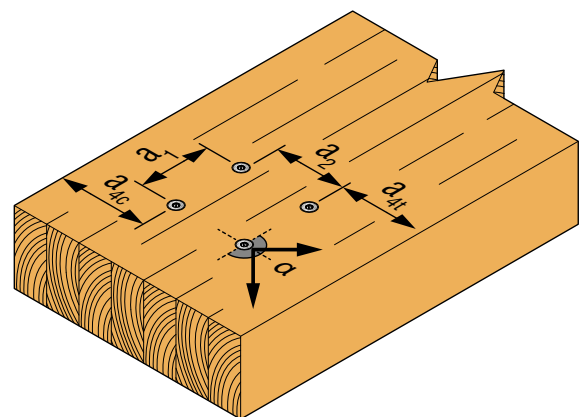


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.



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3.2.1 Glulam Fastening

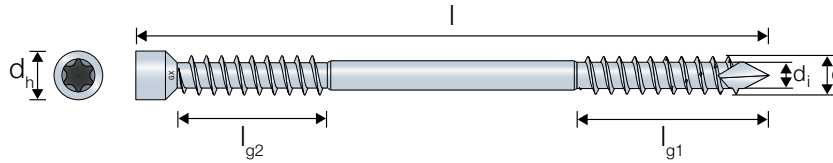
Solid-Drive™

SWD Double-Threaded **WOOD** Screw for Glulam

Protec® +

C3 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

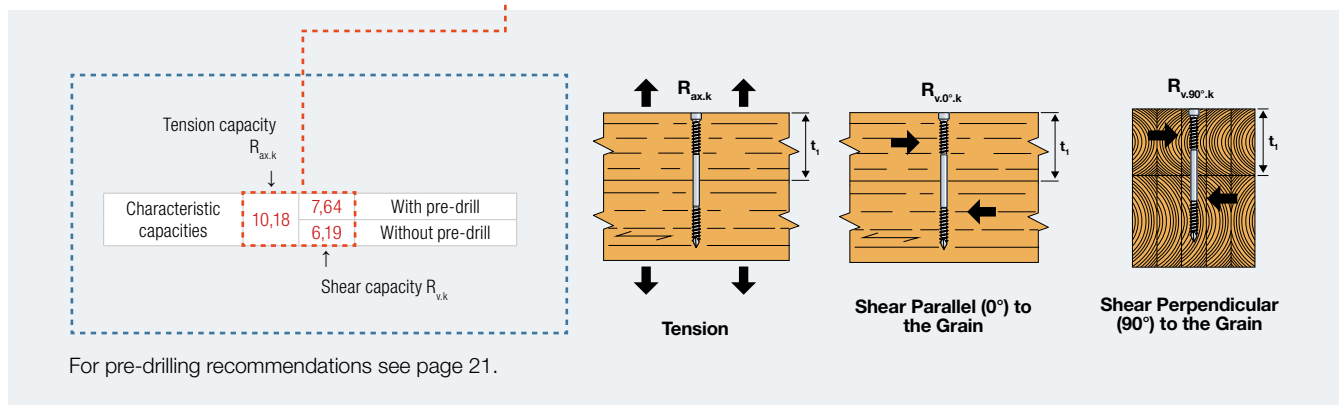
ETA-21/0670



SWD - Characteristic Tension and Shear Capacities Glulam to Glulam GL24h

Product Reference	Thread Length L _g [mm]	Max. Advised Wood Thickness t _{fix} [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t _i [kN]																	
			Wood Thickness t _i [mm]																	
			80		90		100		115		120		140		160		180		200	
SWD6.5X130	40	90	3,22	3,31 2,76	3,22	3,31 2,75	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWD6.5X160	65	95	5,62	3,91 3,36	5,62	3,91 3,36	5,62	3,91 3,36	-	-	-	-	-	-	-	-	-	-	-	
SWD6.5X190	80	110	7,06	4,27 3,73	7,06	4,27 3,73	7,06	4,27 3,73	7,06	4,27 3,73	-	-	-	-	-	-	-	-	-	
SWD6.5X220	95	125	7,69	4,63 3,92	8,51	4,63 3,92	8,51	4,63 3,92	8,51	4,63 3,92	8,51	4,63 3,92	-	-	-	-	-	-	-	
SWD8.0X130	40	90	3,56	4,95 3,79	3,56	4,81 3,43	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWD8.0X160	65	95	6,39	5,66 4,69	6,39	5,66 4,69	6,39	5,66 4,69	-	-	-	-	-	-	-	-	-	-	-	
SWD8.0X190	80	110	8,09	6,08 5,12	8,09	6,08 5,12	8,09	6,08 5,12	8,09	6,08 5,12	-	-	-	-	-	-	-	-	-	
SWD8.0X220	95	125	9,05	6,50 5,54	9,78	6,50 5,54	9,78	6,50 5,54	9,78	6,50 5,54	9,78	6,50 5,54	-	-	-	-	-	-	-	
SWD8.0X245	107	138	9,05	6,86 5,90	10,18	6,86 5,90	11,20	6,86 5,90	11,20	6,86 5,90	11,20	6,86 5,90	11,20	6,86 5,90	-	-	-	-	-	
SWD8.0X275	107	168	9,05	6,86 5,90	10,18	6,86 5,90	11,20	6,86 5,90	11,20	6,86 5,90	11,20	6,86 5,90	11,20	6,86 5,90	11,20	6,86 5,90	-	-	-	
SWD8.0X300	135	165	9,05	7,64 6,19	10,18	7,64 6,19	11,31	7,64 6,19	13,01	7,64 6,19	13,57	7,64 6,19	14,31	7,64 6,19	14,31	7,64 6,19	-	-	-	
SWD8.0X330	135	195	9,05	7,64 6,19	10,18	7,64 6,19	11,31	7,64 6,19	13,01	7,64 6,19	13,57	7,64 6,19	14,31	7,64 6,19	14,31	7,64 6,19	14,31	7,64 6,19	7,64 6,19	

For dimensions and calculation parameters see p. 50.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the full-threaded screws.

For additional values in other configurations use Fastener Designer - online dimensioning tool. Go to strongtie.eu/fastener-designer.

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Fastener Designer to determine the capacity of the screw.

3.2.1 Glulam Fastening

SWD - Minimum distances for Screws in Shear or Combined Loads¹⁾

Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
6.5	With pre-drill	33	20	46	78	20	20	26	26	46	33	20	46
	Without pre-drill	78	33	65	98	33	33	33	33	65	65	33	65
8.0	With pre-drill	40	24	56	96	24	24	32	32	56	40	24	56
	Without pre-drill	96	40	80	120	40	40	40	40	80	80	40	80

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA 21/0670

²⁾ Values given in the table are based on the $\rho_k \leq 385 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

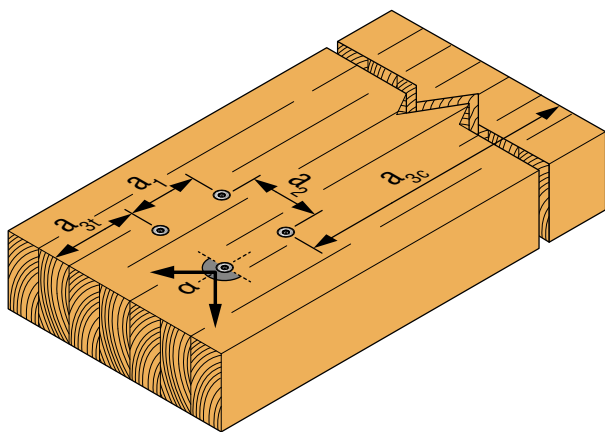


Illustration above shows angle between load direction and grain = 0°

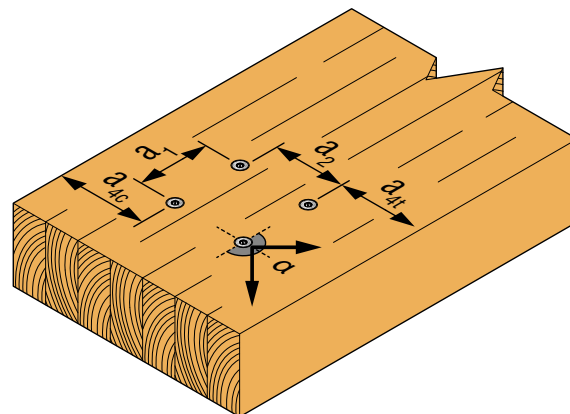


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.

SWD - Minimum distances for Axially Loaded Screws

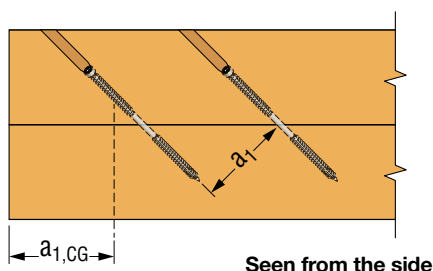
Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{1,cg}	a _{2,cg}
6.5	65	20	52	20
8.0	80	24	40	24

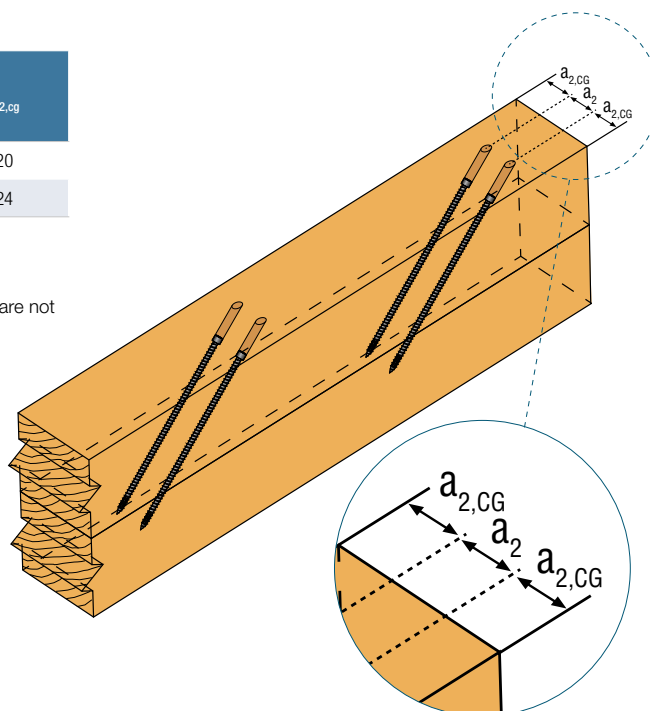
*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.

Calculation according to EN1995-1-1:2004+A2:2014

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

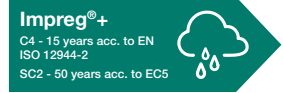


Seen from the side

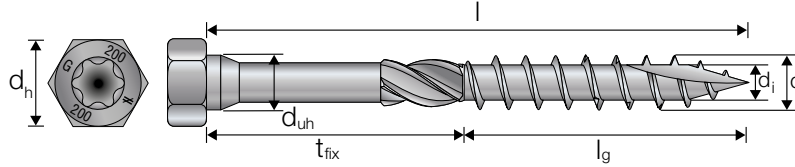


3.2.1 Glulam Fastening

Solid-Drive™ SSH Hex-Head WOOD Screw for Glulam



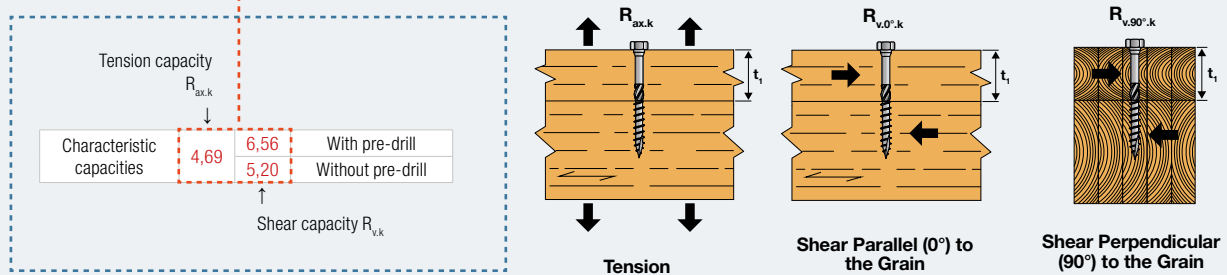
ETA-21/0670



SSH - Characteristic Tension and Shear Capacities Glulam to Glulam GL24h

Product Reference	Thread Length L _g [mm]	Max. Advised Wood Thickness t _{fix} [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t _i [kN]																	
			Wood Thickness t _i [mm]																	
			80		90		100		115		120		140		160		180		200	
SSH8.0X200	110	90	3,56	4,83 3,90	3,56	4,83 3,90	-	- -	-	- -	-	- -	-	- -	-	- -	-	- -	-	- -
SSH8.0X240	110	130	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	-	- -	-	- -	-	- -	-	- -
SSH8.0X260	110	150	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	-	- -	-	- -	-	- -
SSH8.0X280	110	170	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90			-	-
SSH8.0X300	110	190	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	3,56	4,83 3,90	-	-
SSH10.0X200	110	90	4,69	6,56 5,20	4,69	6,56 5,20	-	- -	-	- -	-	- -	-	- -	-	- -	-	- -	-	- -
SSH10.0X220	125	95	4,69	6,56 5,20	4,69	6,56 5,20	4,69	6,56 5,20	-	- -	-	- -	-	- -	-	- -	-	- -	-	- -
SSH10.0X240	125	115	4,69	6,56 5,20	4,69	6,56 5,20	4,69	6,56 5,20	4,69	6,56 5,20	4,69	6,56 5,20	-	- -	-	- -	-	- -	-	- -
SSH10.0X280	125	155	4,69	6,56 5,20	4,69	6,56 5,20	4,69	6,56 5,20	4,69	6,56 5,20	4,69	6,56 5,20	4,69	6,56 5,20	4,69	6,56 5,20	-	- -	-	- -

Table continues on next page.



For pre-drilling recommendations see page 21.

To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the full-threaded screws.

For additional values in other configurations use Fastener Designer - online dimensioning tool. Go to strongtie.eu/fastener-designer.

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Fastener Designer to determine the capacity of the screw.

3.2.1 Glulam Fastening

SSH - Minimum distances for Screws in Shear or Combined Loads¹⁾ Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
6.0	With pre-drill	30	18	42	72	18	18	24	24	42	30	18	42
	Without pre-drill	72	30	60	90	30	30	30	30	60	60	30	60
8.0	With pre-drill	40	24	56	96	24	24	32	32	56	40	24	56
	Without pre-drill	96	40	80	120	40	40	40	40	80	80	40	80
10.0	With pre-drill	50	30	70	120	30	30	40	40	70	50	30	70
	Without pre-drill	120	50	100	150	50	50	50	50	100	100	50	100
12.0	With pre-drill	60	36	84	144	36	36	48	48	84	60	36	84
	Without pre-drill	144	60	120	180	60	60	60	60	120	120	60	120

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA 21/0670

²⁾ Values given in the table are based on the $\rho_k \leq 385 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

SSH - Minimum distances for Axially Loaded Screws Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
6.0	42	30	60	24
8.0	56	40	80	32
10.0	70	50	100	40
12.0	84	60	120	48

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.

Calculation according to EN1995-1-1:2004+A2:2014

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

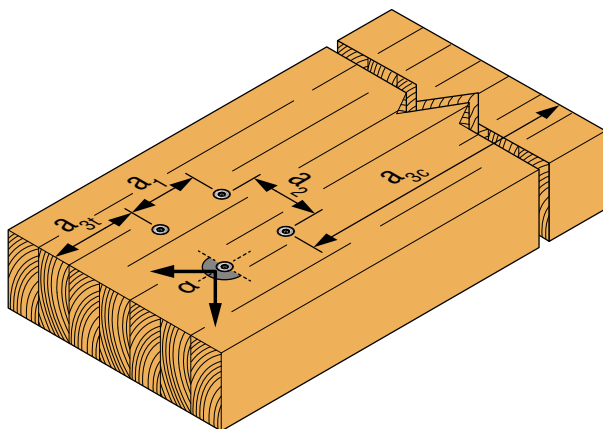


Illustration above shows angle between load direction and grain = 0°

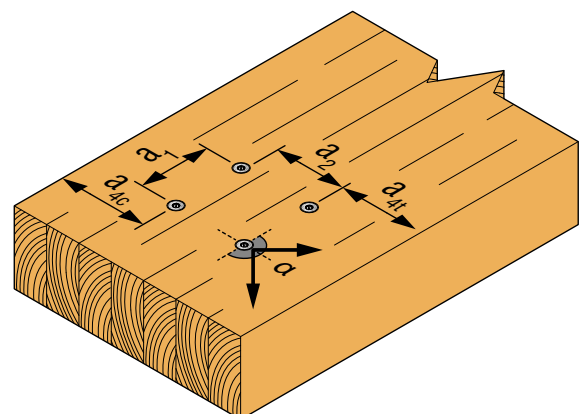


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.

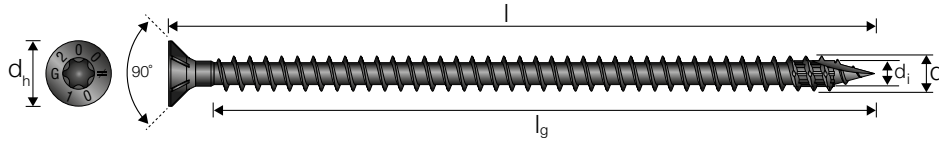
3.2.1 Glulam Fastening

Solid-Drive™

SDCF Fully Threaded WOOD Screw for Glulam

Black E-Coat
 C2 acc. to EN ISO 12944-2
 SC2 - 50 years acc. to EC5

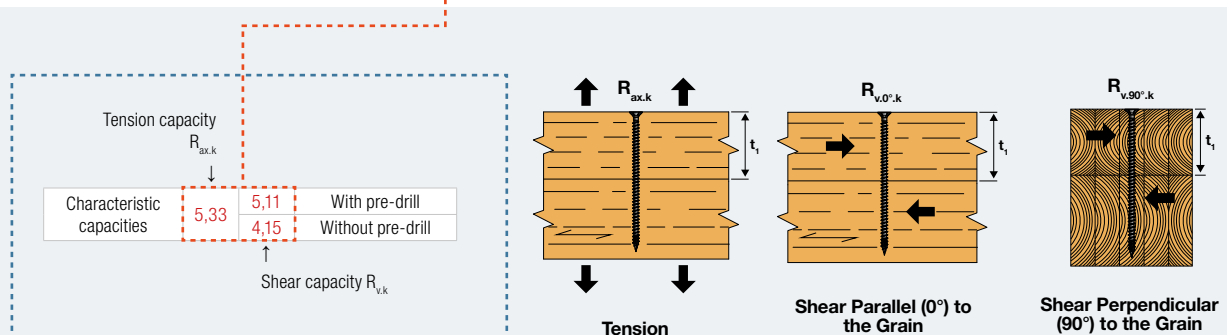

ETA-21/0670



SDCF - Characteristic Tension and Shear Capacities Glulam to Glulam GL24h

Product Reference	Thread Length L_g [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_i [kN]															
		Wood Thickness t_i [mm]															
		80	90	100	115	120	140	160	180	200	80	90	100	115	120	140	160
SDCF8X120	110	3,01	3,35 2,73	4,05 2,99	3,61 2,99	4,63 3,14	3,75 3,14	5,78 3,42	4,04 3,42	4,13 3,51	5,78 3,42	4,04 3,42	5,21 3,71	3,90 3,28	4,63 3,71	3,75 3,14	2,31 2,45
SDCF8X140	130	3,01	3,35 2,73	4,05 2,99	3,61 2,99	4,63 3,14	3,75 3,14	5,78 3,42	4,04 3,42	4,13 3,51	6,94 3,71	4,33 3,71	7,52 3,86	4,47 3,86	6,94 4,00	4,33 4,00	4,63 4,58
SDCF8X160	150	3,01	3,35 2,73	4,05 2,99	3,61 2,99	4,63 3,14	3,75 3,14	5,78 3,42	4,04 3,42	4,13 3,51	6,94 3,71	4,33 3,71	7,52 3,86	4,47 3,86	8,1 4,00	4,62 4,00	6,94 4,58
SDCF8X180	170	3,01	3,35 2,73	4,05 2,99	3,61 2,99	4,63 3,14	3,75 3,14	5,78 3,42	4,04 3,42	4,13 3,51	6,94 3,71	4,33 3,71	7,52 3,86	4,47 3,86	8,1 4,00	4,62 4,00	9,26 4,29
SDCF8X200	190	3,01	3,35 2,73	4,05 2,99	3,61 2,99	4,63 3,14	3,75 3,14	5,78 3,42	4,04 3,42	4,13 3,51	6,94 3,71	4,33 3,71	7,52 3,86	4,47 3,86	8,1 4,00	4,62 4,00	10,41 4,58
SDCF8X220	210	3,01	3,35 2,73	4,05 2,99	3,61 2,99	4,63 3,14	3,75 3,14	5,78 3,42	4,04 3,42	4,13 3,51	6,94 3,71	4,33 3,71	7,52 3,86	4,47 3,86	8,1 4,00	4,62 4,00	10,41 4,58
SDCF8X240	230	3,01	3,35 2,73	4,05 2,99	3,61 2,99	4,63 3,14	3,75 3,14	5,78 3,42	4,04 3,42	4,13 3,51	6,94 3,71	4,33 3,71	7,52 3,86	4,47 3,86	8,1 4,00	4,62 4,00	10,41 4,58
SDCF8X260	250	3,01	3,35 2,73	4,05 2,99	3,61 2,99	4,63 3,14	3,75 3,14	5,78 3,42	4,04 3,42	4,13 3,51	6,94 3,71	4,33 3,71	7,52 3,86	4,47 3,86	8,1 4,00	4,62 4,00	10,41 4,58
SDCF8X300	290	3,01	3,35 2,73	4,05 2,99	3,61 2,99	4,63 3,14	3,75 3,14	5,78 3,42	4,04 3,42	4,13 3,51	6,94 3,71	4,33 3,71	7,52 3,86	4,47 3,86	8,1 4,00	4,62 4,00	10,41 4,58
SDCF8X350	340	3,01	3,35 2,73	4,05 2,99	3,61 2,99	4,63 3,14	3,75 3,14	5,78 3,42	4,04 3,42	4,13 3,51	6,94 3,71	4,33 3,71	7,52 3,86	4,47 3,86	8,1 4,00	4,62 4,00	10,41 4,58
SDCF10X160	150	3,37	4,62 3,66	4,63 3,97	4,93 3,97	5,33 4,15	5,11 4,15	6,73 4,50	5,46 4,50	5,56 4,61	8,14 4,85	5,81 4,85	8,84 5,03	5,98 5,03	9,54 5,20	6,16 5,20	8,42 4,92
SDCF10X200	190	3,37	4,62 3,66	4,63 3,97	4,93 3,97	5,33 4,15	5,11 4,15	6,73 4,50	5,46 4,50	5,56 4,61	8,14 4,85	5,81 4,85	8,84 5,03	5,98 5,03	9,54 5,20	6,16 5,20	12,35 5,90
SDCF10X240	230	3,37	4,62 3,66	4,63 3,97	4,93 3,97	5,33 4,15	5,11 4,15	6,73 4,50	5,46 4,50	5,56 4,61	8,14 4,85	5,81 4,85	8,84 5,03	5,98 5,03	9,54 5,20	6,16 5,20	12,35 5,90

Table continues on next page.



For pre-drilling recommendations see page 21.

3.2.1 Glulam Fastening

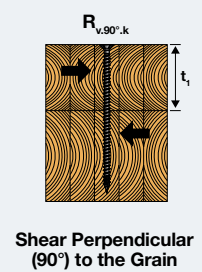
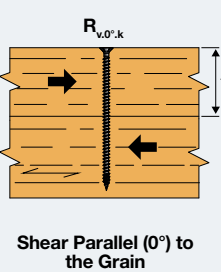
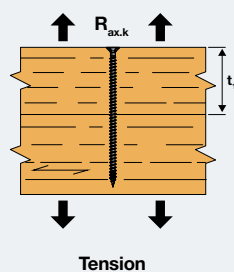
SDCF - Characteristic Tension and Shear Capacities Glulam to Glulam GL24h (continued)

Product Reference	Thread Length L _g [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t _l [kN]																	
		Wood Thickness t _l [mm]																	
		80		90		100		115		120		140		160		180		200	
SDCF10X280	270	3,37	4,62 3,66	4,63	4,93 3,97	5,33	5,11 4,15	6,73	5,46 4,50	7,16	5,56 4,61	8,14	5,81 4,85	8,84	5,98 5,03	9,54	6,16 5,20	12,35	6,86 5,90
SDCF10X360	350	3,37	4,62 3,66	4,63	4,93 3,97	5,33	5,11 4,15	6,73	5,46 4,50	7,16	5,56 4,61	8,14	5,81 4,85	8,84	5,98 5,03	9,54	6,16 5,20	12,35	6,86 5,90
SDCF10X400	390	3,37	4,62 3,66	4,63	4,93 3,97	5,33	5,11 4,15	6,73	5,46 4,50	7,16	5,56 4,61	8,14	5,81 4,85	8,84	5,98 5,03	9,54	6,16 5,20	12,35	6,86 5,90
SDCF10X450	440	1,68	4,19 3,24	2,95	4,51 3,55	3,65	4,69 3,73	5,05	5,04 4,08	5,47	5,14 4,18	6,45	5,39 4,43	7,16	5,56 4,61	7,86	5,74 4,78	10,66	6,44 5,48
SDCF12X200	190	2,13	4,95 3,78	3,33	5,25 4,08	4	5,42 4,25	5,34	5,75 4,58	5,74	5,85 4,68	6,67	6,09 4,91	7,34	6,25 5,08	8	6,42 5,25	10,67	7,09 5,91
SDCF12X240	230	2,13	4,95 3,78	3,33	5,25 4,08	4	5,42 4,25	5,34	5,75 4,58	5,74	5,85 4,68	6,67	6,09 4,91	7,34	6,25 5,08	8	6,42 5,25	10,67	7,09 5,91
SDCF12X280	270	2,13	4,95 3,78	3,33	5,25 4,08	4	5,42 4,25	5,34	5,75 4,58	5,74	5,85 4,68	6,67	6,09 4,91	7,34	6,25 5,08	8	6,42 5,25	10,67	7,09 5,91
SDCF12X350	340	2,13	4,95 3,78	3,33	5,25 4,08	4	5,42 4,25	5,34	5,75 4,58	5,74	5,85 4,68	6,67	6,09 4,91	7,34	6,25 5,08	8	6,42 5,25	10,67	7,09 5,91
SDCF12X450	440	1,47	4,79 3,61	2,67	5,09 3,91	3,33	5,25 4,08	4,67	5,59 4,41	5,07	5,69 4,51	6	5,92 4,75	6,67	6,09 4,91	7,34	6,25 5,08	10	6,92 5,75
SDCF12X600	590	1,47	4,79 3,61	2,67	5,09 3,91	3,33	5,25 4,08	4,67	5,59 4,41	5,07	5,69 4,51	6	5,92 4,75	6,67	6,09 4,91	7,34	6,25 5,08	10	6,92 5,75

For dimensions and calculation parameters see p. 56.

Tension capacity $R_{ax,k}$	
Characteristic capacities	3,33
	5,25
	4,08
Shear capacity $R_{v,k}$	
	3,33
	5,25
	4,08

For pre-drilling recommendations see page 21.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the full-threaded screws.

For additional values in other configurations use Fastener Designer - online dimensioning tool. Go to strongtie.eu/fastener-designer.

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Fastener Designer to determine the capacity of the screw.

3.2.1 Glulam Fastening

SDCF - Minimum distances for Screws in Shear or Combined Loads¹⁾ Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
8.0	With pre-drill	40	24	96	56	24	24	32	32	56	56	56	24
	Without pre-drill	96	40	120	80	40	40	40	40	80	80	80	40
10.0	With pre-drill	50	30	120	70	30	30	40	40	70	70	70	30
	Without pre-drill	120	50	150	100	50	50	50	50	100	100	100	50
12.0	With pre-drill	60	36	144	84	36	36	48	48	84	84	84	36
	Without pre-drill	144	60	180	120	60	60	60	60	120	120	120	60

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA-13/0796

²⁾ Values given in the table are based on the $\rho_k \leq 385 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

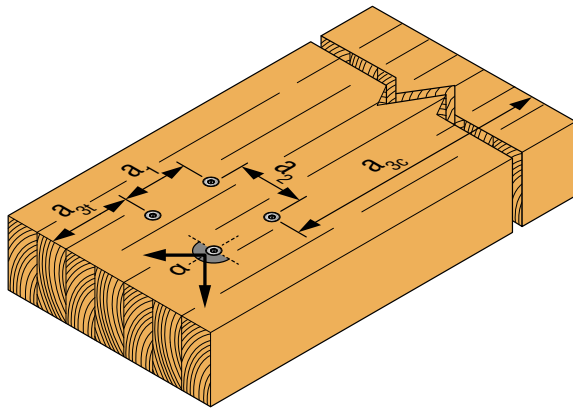


Illustration above shows angle between load direction and grain = 0°

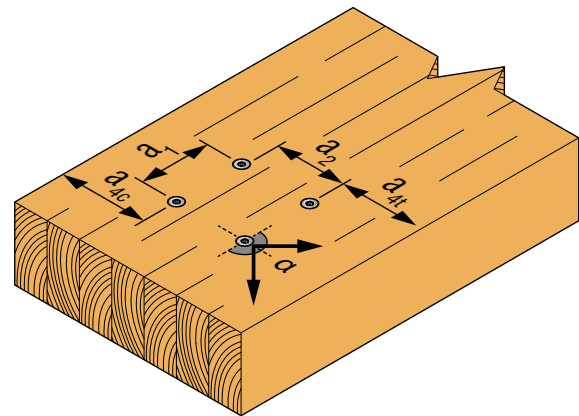


Illustration above shows angle between load direction and grain = 90°

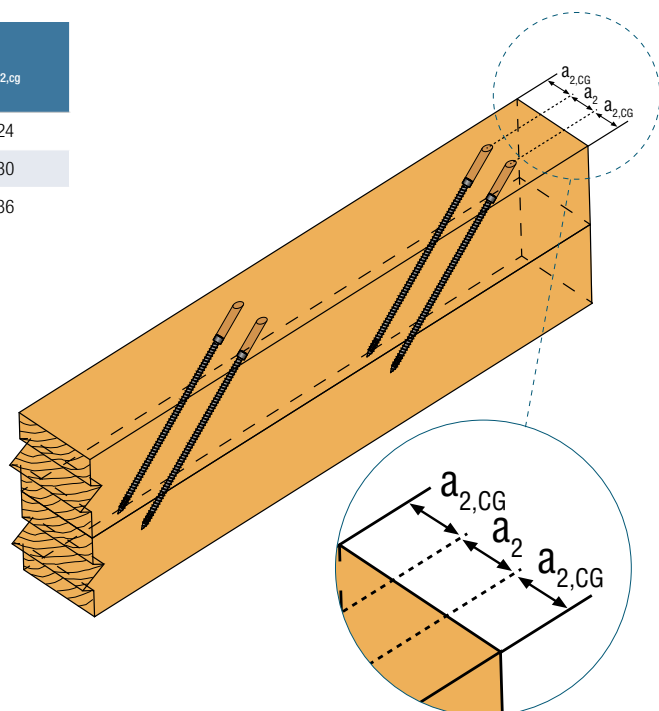
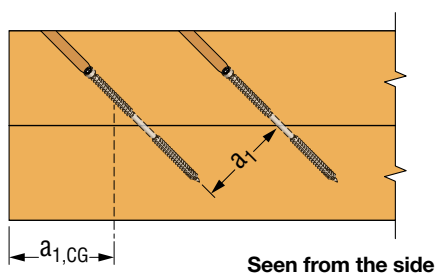
See explanation of α in General Introduction page 23.

SDCF - Minimum distances for Axially Loaded Screw Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{1,cg}	a _{2,cg}
8.0	80	24	64	24
10.0	100	30	80	30
12.0	120	36	96	36

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.
 Calculation according to EN1995-1-1:2004+A2:2014

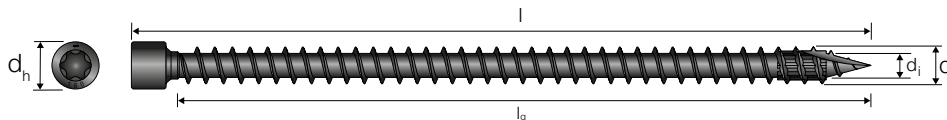
For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.



3.2.1 Glulam Fastening

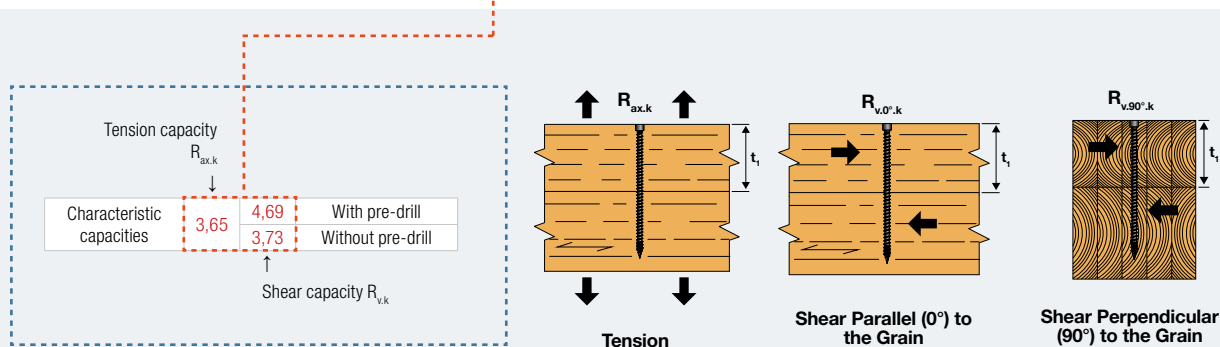
Solid-Drive™SDCFC Fully Threaded **WOOD** Screw
for Glulam**Black E-Coat**C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

ETA-21/0670

SDCFC - Characteristic Tension and Shear Capacities
Glulam to Glulam GL24h

Product Reference	Thread Length L _g [mm]	Tension Capacity R _{ax,k} and Shear Capacity R _{v,k} Depending on t _l [kN]																	
		Wood Thickness t _l [mm]																	
		80		90		100		115		120		140		160		180		200	
SDCFC8X120	110	3,01	3,35 2,73	4,05	3,61 2,99	4,63	3,75 3,14	5,78	4,04 3,42	6,13	4,13 3,51	5,78	4,04 3,42	5,21	3,90 3,28	4,63	3,75 3,14	2,31	3,17 2,45
SDCFC8X160	150	3,01	3,35 2,73	4,05	3,61 2,99	4,63	3,75 3,14	5,78	4,04 3,42	6,13	4,13 3,51	6,94	4,33 3,71	7,52	4,47 3,86	8,1	4,62 4,00	6,94	4,33 3,71
SDCFC8X200	190	3,01	3,35 2,73	4,05	3,61 2,99	4,63	3,75 3,14	5,78	4,04 3,42	6,13	4,13 3,51	6,94	4,33 3,71	7,52	4,47 3,86	8,1	4,62 4,00	10,41	5,20 4,58
SDCFC8X240	230	3,01	3,35 2,73	4,05	3,61 2,99	4,63	3,75 3,14	5,78	4,04 3,42	6,13	4,13 3,51	6,94	4,33 3,71	7,52	4,47 3,86	8,1	4,62 4,00	10,41	5,20 4,58
SDCFC8X280	270	3,01	3,35 2,73	4,05	3,61 2,99	4,63	3,75 3,14	5,78	4,04 3,42	6,13	4,13 3,51	6,94	4,33 3,71	7,52	4,47 3,86	8,1	4,62 4,00	10,41	5,20 4,58
SDCFC8X330	320	3,01	3,35 2,73	4,05	3,61 2,99	4,63	3,75 3,14	5,78	4,04 3,42	6,13	4,13 3,51	6,94	4,33 3,71	7,52	4,47 3,86	8,1	4,62 4,00	10,41	5,20 4,58
SDCFC8X350	340	3,01	3,35 2,73	4,05	3,61 2,99	4,63	3,75 3,14	5,78	4,04 3,42	6,13	4,13 3,51	6,94	4,33 3,71	7,52	4,47 3,86	8,1	4,62 4,00	10,41	5,20 4,58
SDCFC10X240	228	3,37	4,62 3,66	4,63	4,93 3,97	5,33	5,11 4,15	6,73	5,46 4,50	7,16	5,56 4,61	8,14	5,81 4,85	8,84	5,98 5,03	9,54	6,16 5,20	12,35	6,86 5,90
SDCFC10X300	288	3,37	4,62 3,66	4,63	4,93 3,97	5,33	5,11 4,15	6,73	5,46 4,50	7,16	5,56 4,61	8,14	5,81 4,85	8,84	5,98 5,03	9,54	6,16 5,20	12,35	6,86 5,90
SDCFC10X380	368	3,37	4,62 3,66	4,63	4,93 3,97	5,33	5,11 4,15	6,73	5,46 4,50	7,16	5,56 4,61	8,14	5,81 4,85	8,84	5,98 5,03	9,54	6,16 5,20	12,35	6,86 5,90
SDCFC10X500	476	1,68	4,19 3,24	2,95	4,51 3,55	3,65	4,69 3,73	5,05	5,04 4,08	5,47	5,14 4,18	6,45	5,39 4,43	7,16	5,56 4,61	7,86	5,74 4,78	10,66	6,44 5,48
SDCFC10X600	576	1,68	4,19 3,24	2,95	4,51 3,55	3,65	4,69 3,73	5,05	5,04 4,08	5,47	5,14 4,18	6,45	5,39 4,43	7,16	5,56 4,61	7,86	5,74 4,78	10,66	6,44 5,48
SDCFC10X800	776	1,68	4,19 3,24	2,95	4,51 3,55	3,65	4,69 3,73	5,05	5,04 4,08	5,47	5,14 4,18	6,45	5,39 4,43	7,16	5,56 4,61	7,86	5,74 4,78	10,66	6,44 5,48
SDCFC10X1000	976	1,68	4,19 3,24	2,95	4,51 3,55	3,65	4,69 3,73	5,05	5,04 4,08	5,47	5,14 4,18	6,45	5,39 4,43	7,16	5,56 4,61	7,86	5,74 4,78	10,66	6,44 5,48

For dimensions and calculation parameters see p. 58.



For pre-drilling recommendations see page 21.

3.2.1 Glulam Fastening

SDCFC - Minimum distances for Screws in Shear or Combined Loads¹⁾ Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
8.0	With pre-drill	40	24	96	56	24	24	32	32	56	56	56	24
	Without pre-drill	96	40	120	80	40	40	40	40	80	80	80	40
10.0	With pre-drill	50	30	120	70	30	30	40	40	70	70	70	30
	Without pre-drill	120	50	150	100	50	50	50	50	100	100	100	50

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA-13/0796

²⁾ Values given in the table are based on the $\rho_k \leq 385 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

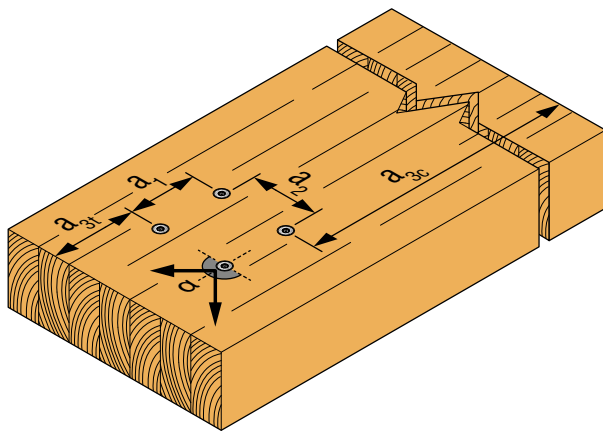


Illustration above shows angle between load direction and grain = 0°

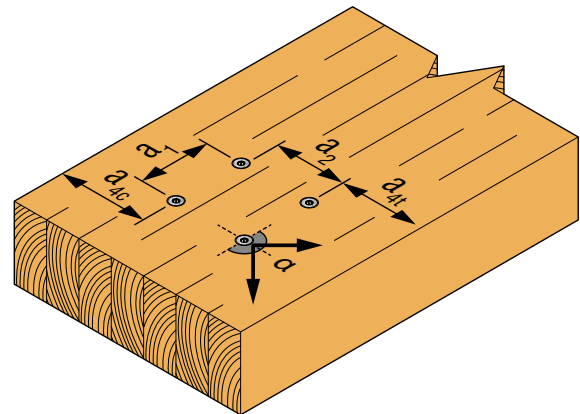


Illustration above shows angle between load direction and grain = 90°

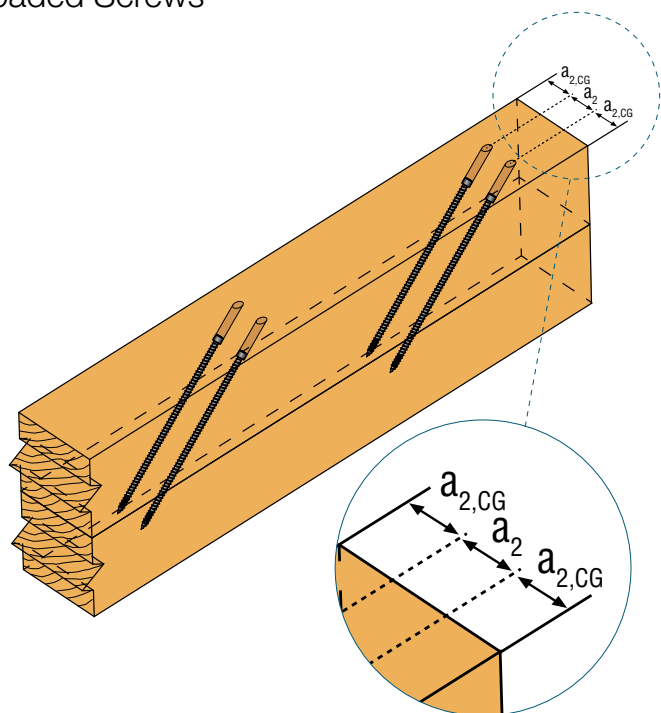
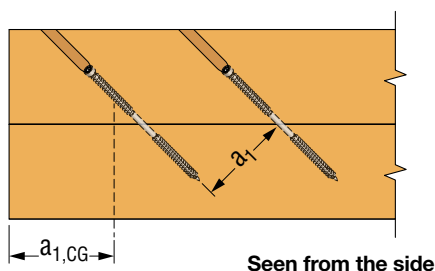
See explanation of α in General Introduction page 23.

SDCFC - Minimum distances for Axially Loaded Screws Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{1,cg}	a _{2,cg}
8.0	80	24	64	24
10.0	100	30	80	30

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.



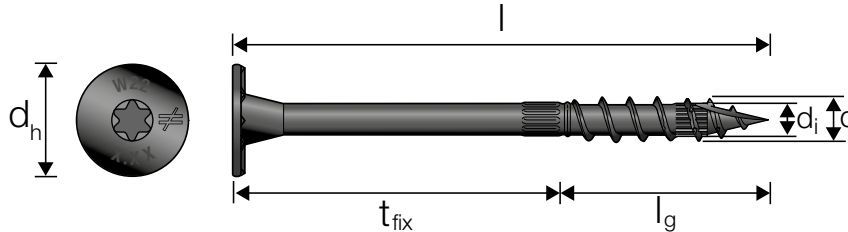
3.2.1 Glulam Fastening

Solid-Drive™ SDW Structural WOOD Screw for Glulam

Black E-Coat
C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

UK
CA

EN14592



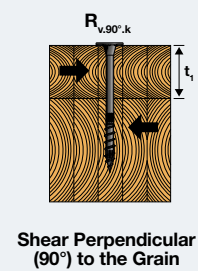
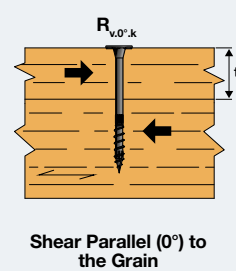
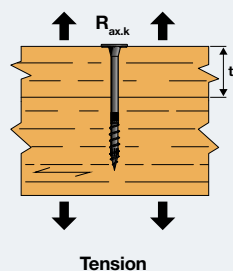
SDW - Characteristic Tension and Shear Capacities Glulam to Glulam GL24h

Product Reference	Thread Length L_g [mm]	Max. Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]									
			Wood Thickness t_l [mm]									
			42	48	56	60	66	80	90	100	115	
SDW22300(8.0x76)	36	40	3,87	3,56 2,73	-	-	-	-	-	-	-	-
SDW22338(8.0x86)	40	46	4,56	3,94 3,05	4,33	3,86 3,01	-	-	-	-	-	-
SDW22438(8.0x111)	37	74	4,22	3,85 3,04	4,22	3,85 3,21	4,22	3,85 3,27	4,22	3,85 3,12	-	-
SDW22458(8.0x118)	36	82	4,10	3,82 3,01	4,10	3,82 3,19	4,10	3,82 3,24	4,10	3,82 3,24	4,10	3,75 2,89
SDW22500(8.0x127)	40	87	4,56	3,94 3,12	4,56	3,94 3,30	4,56	3,94 3,36	4,56	3,94 3,36	4,56	3,94 3,27
SDW22600(8.0x152)	37	115	4,22	3,85 3,04	4,22	3,85 3,21	4,22	3,85 3,27	4,22	3,85 3,27	4,22	3,85 3,27
SDW22638(8.0x162)	36	126	4,10	3,82 3,01	4,10	3,82 3,19	4,10	3,82 3,24	4,10	3,82 3,24	4,10	3,82 3,24
SDW22634(8.0x171)	40	131	4,56	3,94 3,12	4,56	3,94 3,30	4,56	3,94 3,36	4,56	3,94 3,36	4,56	3,94 3,36

For dimensions and calculation parameters see p. 76.

Tension capacity $R_{ax,k}$		
Characteristic capacities		
4,56	3,94	With pre-drill
3,30	3,30	Without pre-drill
Shear capacity $R_{v,k}$		

For pre-drilling recommendations see page 21.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the full-threaded screws.

For additional values in other configurations use Fastener Designer - online dimensioning tool. Go to strongtie.eu/fastener-designer.

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Fastener Designer to determine the capacity of the screw.

3.2.1 Glulam Fastening

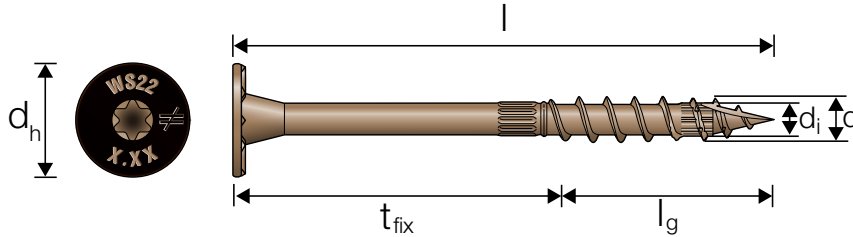
Solid-Drive™ SDWS Structural WOOD Screw for Glulam

Double Barrier
C3 acc. to EN ISO 12944-2
SC3 - 50 years acc. to EC5

UK
CA

CE

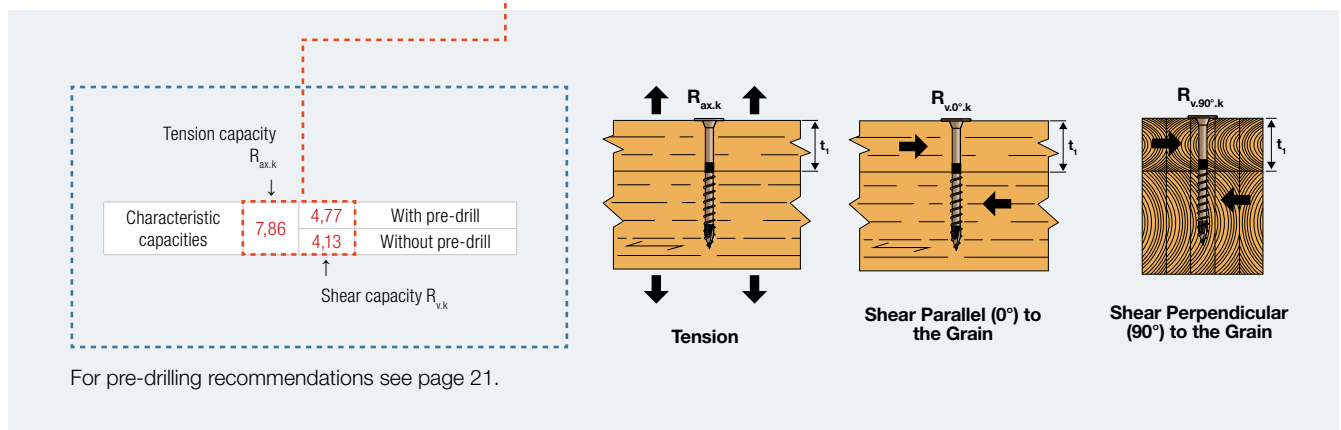
EN14592



SDWS - Characteristic Tension and Shear Capacities Glulam to Glulam GL24h

Product Reference	Thread Length L_g [mm]	Max. Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ and Shear Capacity $R_{v,k}$ Depending on t_l [kN]									
			Wood Thickness t_l [mm]									
			42	48	56	60	66	80	90	100	115	
SDWS08X75DB	36	40	3,87	3,56 2,73	-	-	-	-	-	-	-	-
SDWS08X100DB	58	43	6,61	4,45 3,63	6,04	4,45 3,81	-	-	-	-	-	-
SDWS08X126DB	69	57	7,86	4,77 3,95	7,86	4,77 4,13	7,86	4,77 4,19	7,52	4,77 4,19	-	-
SDWS08X151DB	69	83	7,86	4,77 3,95	7,86	4,77 4,13	7,86	4,77 4,19	7,86	4,77 4,19	-	-
SDWS08X202DB	69	135	7,86	4,77 3,95	7,86	4,77 4,13	7,86	4,77 4,19	7,86	4,77 4,19	7,86	4,77 4,19
SDWS08X252DB	69	184	7,86	4,77 3,95	7,86	4,77 4,13	7,86	4,77 4,19	7,86	4,77 4,19	7,86	4,77 4,19

For dimensions and calculation parameters see p. 76.



To ensure that the values in this catalog are valid, check that max. 5 mm of the thread is in the first element for partially threaded screws or that max. half the thread +/- 5 mm is in each element for the full-threaded screws.

For additional values in other configurations use Fastener Designer - online dimensioning tool. Go to strongtie.eu/fastener-designer.

If the screw you are looking for is not shown in this table, it is because the screw cannot fulfil the requirements stated above. In this case, use Fastener Designer to determine the capacity of the screw.

3.2.1 Glulam Fastening

SDW/SDWS - Minimum distances for Screws in Shear or Combined Loads¹⁾ Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
8.0	With pre-drill	39	24	54	93	24	24	31	31	54	39	24	54
	Without pre-drill	93	39	77	116	39	39	39	39	77	77	39	77

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5)

²⁾ Values given in the table are based on the $\rho_k \leq 385 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

SDW/SDWS - Minimum distances for Axially Loaded Screws Glulam to Glulam GL24h

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
8.0	54	39	77	31

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

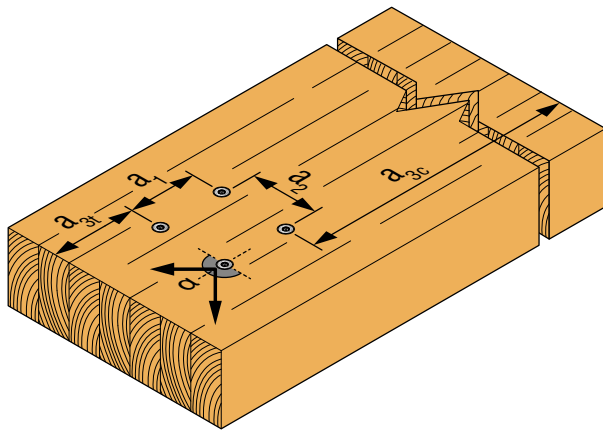


Illustration above shows angle between load direction and grain = 0°

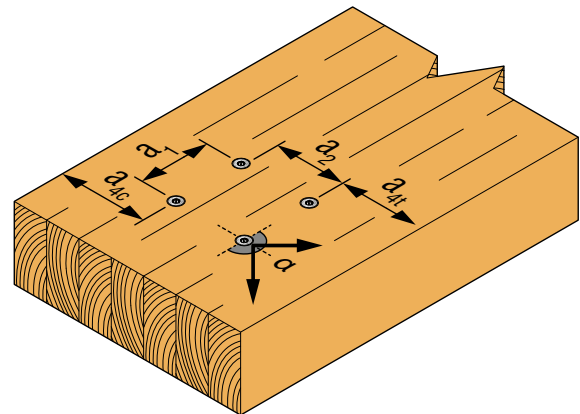


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.



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3.2.2 Glulam Inclined Installations

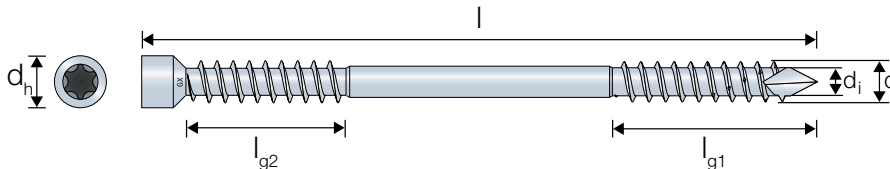
Solid-Drive™

SWD Double-Threaded **WOOD** Screw for Inclined Installations

Protec® +

C3 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5UK
CA

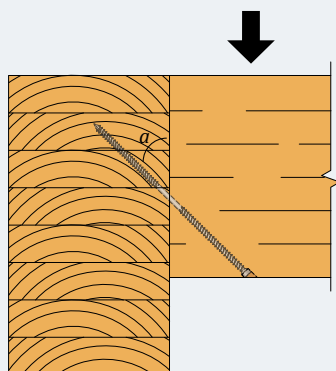
ETA-21/0670



SWD - Inclined Installations Glulam to Glulam GL24h

Product Reference	Header			Characteristic Capacity - GL24h		
	Min. Width [mm]			Vertical Load $F_{v,Rk}$		
	30°	45°	60°	30°	45°	60°
SWD6.5X90	23	32	39	2,1	2,3	1,6
SWD6.5X130	33	46	57	2,1	2,3	1,6
SWD6.5X160	40	57	70	3,7	4,0	2,8
SWD6.5X190	48	68	83	4,7	5,0	3,5
SWD6.5X220	55	78	96	5,6	6,0	4,3
SWD8.0X90	23	32	39	2,4	2,5	1,8
SWD8.0X130	33	46	57	2,4	2,5	1,8
SWD8.0X160	40	57	70	4,2	4,5	3,2
SWD8.0X190	48	68	83	5,4	5,7	4,0
SWD8.0X220	55	78	96	6,5	6,9	4,9
SWD8.0X245	62	87	107	7,4	7,9	5,6
SWD8.0X275	69	98	120	7,4	7,9	5,6
SWD8.0X300	75	107	130	9,5	10,1	7,2
SWD8.0X330	83	117	143	9,5	10,1	7,2

Values in the table are valid for predrilled and non predrilled installation.

**Vertical Load**

Note: Gap between the members are not allowed

3.2.2 Glulam Inclined Installations

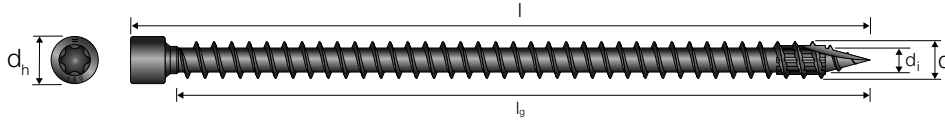
Solid-Drive™

SDCFC Fully Threaded WOOD Screw for Inclined Installations

Black E-Coat

 C2 acc. to EN ISO 12944-2
 SC2 - 50 years acc. to EC5

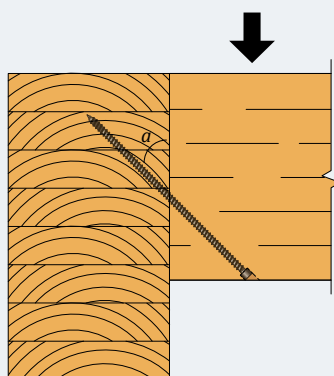

ETA-21/0670



SDCFC - Inclined Installations Glulam to Glulam GL24h

Product Reference	Header			Characteristic Capacity - GL24h		
	Min. width [mm]			Vertical Load $F_{v,Rk}$		
	30°	45°	60°	30°	45°	60°
SDCFC8X120	30	43	52	5,5	4,5	3,2
SDCFC8X160	40	57	70	7,5	6,1	4,3
SDCFC8X200	50	71	87	9,5	7,8	5,5
SDCFC8X240	60	85	104	11,5	9,4	6,7
SDCFC8X280	70	99	122	13,5	11,0	7,8
SDCFC8X330	83	117	143	16,0	13,1	9,3
SDCFC8X350	88	124	152	17,0	13,9	9,8
SDCFC10X240	60	85	104	13,9	11,3	8,0
SDCFC10X300	75	107	130	17,5	14,3	10,1
SDCFC10X380	95	135	165	22,4	18,3	12,9
SDCFC10X500	125	177	217	28,5	23,3	16,5
SDCFC10X600	150	213	260	28,5	23,3	16,5
SDCFC10X800	200	283	347	28,5	23,3	16,5
SDCFC10X1000	250	354	434	28,5	23,3	16,5

Values in the table are valid for predrilled and non predrilled installation.


Vertical Load

Note: Gap between the members are not allowed

3.2.2 Glulam Inclined Installations

Minimum distances for Inclined Screws

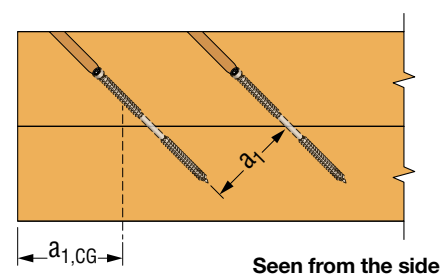
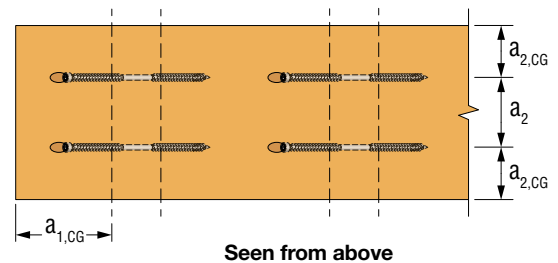
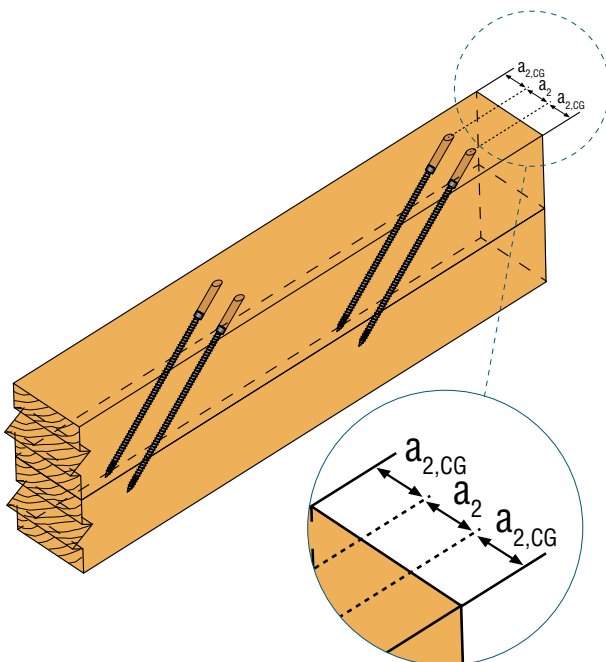
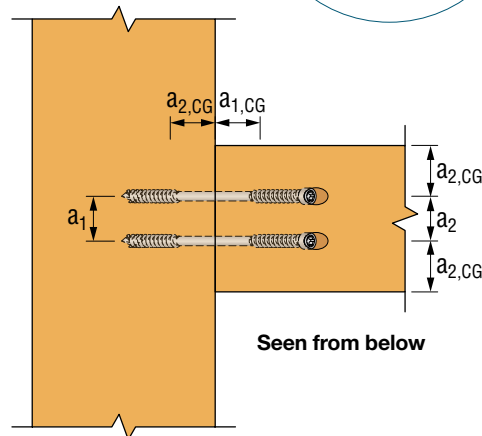
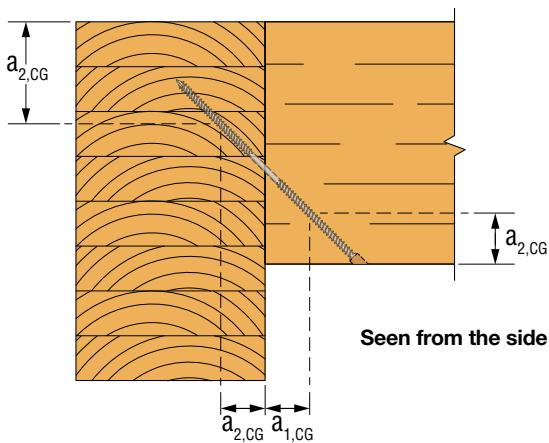
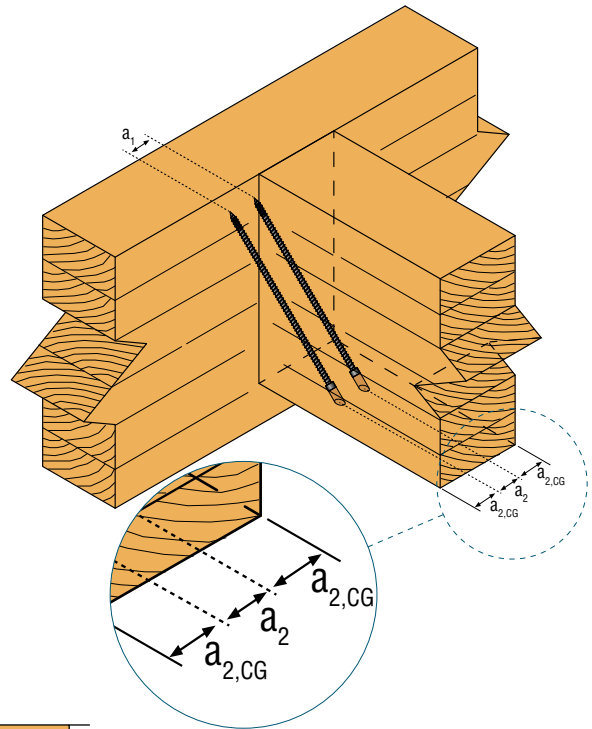
SWD

Product Reference	a_1	a_2	$a_{1,CG}$	$a_{2,CG}$
6,5	65	20	52	20
8,0	80	24	40	24

SDCFC

Product Reference	a_1	a_2	$a_{1,CG}$	$a_{2,CG}$
8,0	80	24	64	24
10,0	100	30	80	30

a_1 is taken in the header when the screws are distributed along the grain
 a_2 in the joist where the screw are distributed perpendicularly to the grain.



3.2.3 Glulam Cross Pairs

Calculation Example - Glulam Cross Pairs

Timber Properties

Timber strength class GL24h Characteristic density: $\rho_k = 385 \text{ kg/m}^3$

Header Height: $h_h = 300 \text{ mm}$ Width: $B_h = 100 \text{ mm}$

Joist Height: $h_j = 250 \text{ mm}$ Width: $B_j = 100 \text{ mm}$

Loads

Vertical load on support (acc. To EN1991-1-1)

$$F_{Ed} = 5,00 \text{ kN}$$

$$k_{mod} = 0,8$$

$$\gamma_m = 1,3$$

$$\gamma_{m1} = 1,1$$

Screw Choice & Properties

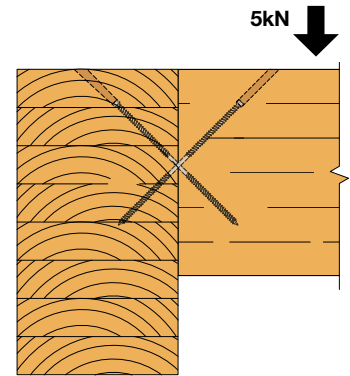
SWD8.0x160

n = 1 Pair

$L = 160 \text{ mm}$

$l_{ef} = 56,5 \text{ mm}$

The pair is center in the middle of the joist height and the screws are inserted with an angle



Axial Resistance of the Screw

Characteristic axial capacity of the screw according to ETA

$$F_{ax,90,k} = f_{ax,calc,k} \times d \times l_{ef} = 14,1 \times 8 \text{ mm} \times 56,5 \text{ mm} = 6,39 \text{ kN}$$

with: l_{ef} thread length

d screw thread diameter

$f_{ax,calc,k}$ characteristic withdrawal parameter in GL24h

$$f_{ax,calc,k} = f_{ax,k} \times (\rho_k/350)^{0,8} = 13,1 \times (385/350)^{0,8} = 14,1 \text{ N/mm}^2$$

Characteristic capacity when the load is at 45°

$$F_{ax,45,k} = F_{ax,90,k} \times \cos \alpha = 4,51 \text{ kN}$$

Characteristic axial resistance of the pair of screw

$$F_{v,pair,k} = F_{ax,45,k} \times 2^{0,9} = 8,43 \text{ kN}$$

Compression Resistance of the Screw

Characteristic compression capacity of the screw according to ETA

$$F_{Rki,45,k} = \kappa_c \times N_{pl,k} \times \frac{\gamma_m}{\gamma_{m1}} \times \cos \alpha = 11,4 \text{ kN}$$

with: κ_c see definition in the ETA $\kappa_c = 0,6$

$N_{pl,k}$ characterisic value of the plastic normal force load bearing capacity of the net cross section

$$N_{pl,k} = \frac{\pi \times d_i^2}{4} \times f_{y,k} = 22,9 \text{ kN}$$

$$F_{buck,pair,k} = \frac{F_{ax,45,k}}{2} \times 2^{0,9} + \frac{F_{Rki,45,k}}{2} \times \frac{2^{0,9}}{k_{mod}} = 4,21 + 10,46/k_{mod}$$

Design Capacity of the Connection

The design connection capacity is equal to:

$$F_{v,d} = \min \left(F_{v,pair,k} \times \frac{k_{mod}}{\gamma_m}; F_{buck,pair,k} \times \frac{k_{mod}}{\gamma_m} \right) = 5,18 \text{ kN}$$

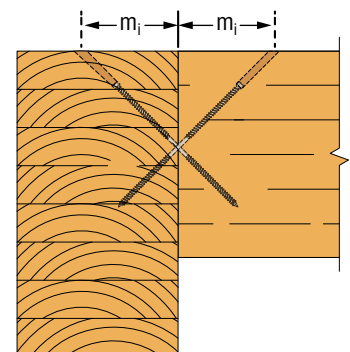
$$F_{v,d} = 5,18 \text{ kN} > 5 \text{ kN}$$

Connection is Ok

Notes:

The screws must be placed so each thread is in one timber element.

The distance to the insertion point is: $m_i = h_j/2 \times \tan \alpha = 250/2 \times \tan 45 = 125 \text{ mm}$



3.2.3 Glulam Cross Pairs

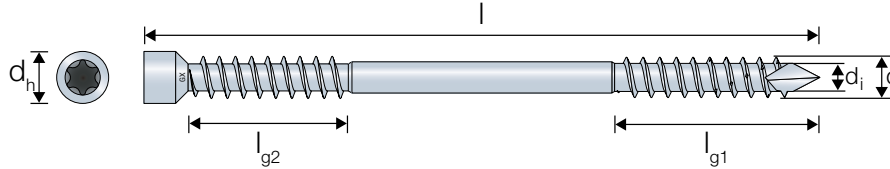
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SWD Double-Threaded WOOD Screw for Cross Pairs

Protec® +

C3 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

ETA-21/0670

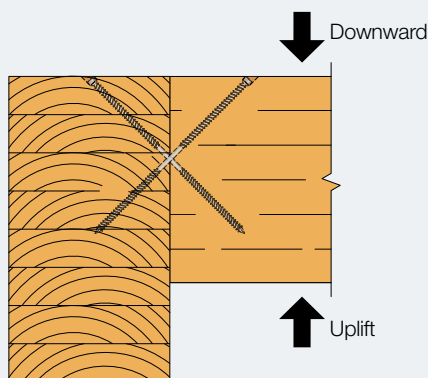


SWD - 45° Cross Pairs
Glulam to Glulam GL24h

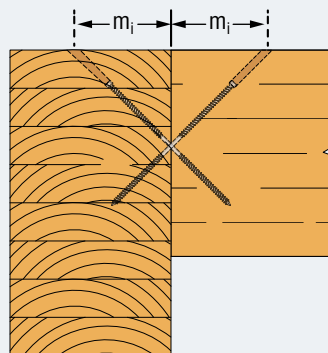
Product Reference	Header		Joist		Characteristic Vertical Capacity (Downward or Uplift) - GL24h			
	Min. width [mm]	Min. height [mm]	Min. width [mm]		$R_{v,k, pair} [kN] = \text{Min.}(R_{ax,k} ; R_{buck,k})$			
					1 pair		2 pairs	
			1 pair	2 pairs	$R_{ax,k}$	$R_{buck,k}$	$R_{ax,k}$	$R_{buck,k}$
SWD6.5X90	42	78	49	114	4,25	$2.12 + 5.65 / k_{mod}$	7,93	$4.24 + 11.3 / k_{mod}$
SWD6.5X130	56	104	49	114	4,25	$2.12 + 5.65 / k_{mod}$	7,93	$4.24 + 11.3 / k_{mod}$
SWD6.5X160	67	126	49	114	7,42	$3.7 + 5.65 / k_{mod}$	13,84	$7.41 + 11.3 / k_{mod}$
SWD6.5X190	78	147	49	114	9,32	$4.66 + 5.65 / k_{mod}$	17,39	$9.32 + 11.3 / k_{mod}$
SWD6.5X220	88	168	49	114	11,22	$5.61 + 5.65 / k_{mod}$	20,94	$11.22 + 11.3 / k_{mod}$
SWD8.0X90	48	96	60	140	4,70	$2.35 + 10.46 / k_{mod}$	8,77	$4.7 + 20.92 / k_{mod}$
SWD8.0X130	56	104	60	140	4,70	$2.35 + 10.46 / k_{mod}$	8,77	$4.7 + 20.92 / k_{mod}$
SWD8.0X160	67	126	60	140	8,43	$4.21 + 10.46 / k_{mod}$	15,73	$8.43 + 20.92 / k_{mod}$
SWD8.0X190	78	147	60	140	10,67	$5.33 + 10.46 / k_{mod}$	19,91	$10.67 + 20.92 / k_{mod}$
SWD8.0X220	88	168	60	140	12,91	$6.45 + 10.46 / k_{mod}$	24,09	$12.9 + 20.92 / k_{mod}$
SWD8.0X245	97	186	60	140	14,77	$7.38 + 10.46 / k_{mod}$	27,57	$14.77 + 20.92 / k_{mod}$
SWD8.0X275	108	207	60	140	14,77	$7.38 + 10.46 / k_{mod}$	27,57	$14.77 + 20.92 / k_{mod}$
SWD8.0X300	117	225	60	140	18,88	$9.43 + 10.46 / k_{mod}$	35,23	$18.87 + 20.92 / k_{mod}$
SWD8.0X330	127	246	60	140	18,88	$9.43 + 10.46 / k_{mod}$	35,23	$18.87 + 20.92 / k_{mod}$

Min. between $R_{w,k, pair}$ and $R_{buck,k, pair}$

Values in the table are valid for predrilled and non predrilled installation.



Vertical Load

For explanation of m_i see page 26.

3.2.3 Glulam Cross Pairs

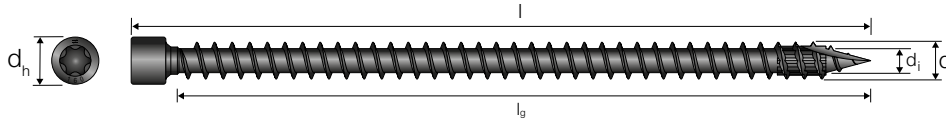
Solid-Drive™

SDCFC Fully Threaded WOOD Screw for Cross Pairs

Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

ETA-21/0670

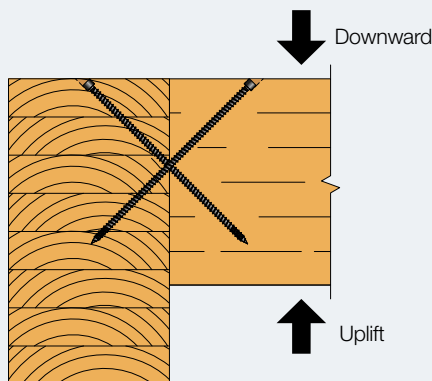


SDCFC - 45° Cross Pairs Glulam to Glulam GL24h

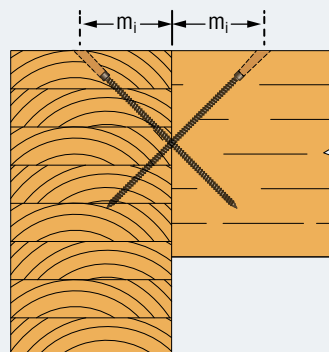
Product Reference	Header Min. width [mm]	Joist Min. height [mm]	Min. width [mm]		Characteristic Vertical Capacity (Downward or Uplift) - GL24h			
					$R_{v,k,pair} [kN] = \text{Min.}(R_{ax,k} ; R_{buck,k})$			
			1 pair	2 pairs	1 pair		2 pairs	
					$R_{ax,k}$	$R_{buck,k}$	$R_{ax,k}$	$R_{buck,k}$
SDCFC8X120	53	97	60	140	8,40	$4,2 + 10,35 / k_{mod}$	15,67	$8,39 + 19,32 / k_{mod}$
SDCFC8X160	67	126	60	140	11,45	$5,72 + 10,35 / k_{mod}$	21,37	$11,44 + 19,32 / k_{mod}$
SDCFC8X200	81	154	60	140	14,50	$7,25 + 10,35 / k_{mod}$	27,06	$14,5 + 19,32 / k_{mod}$
SDCFC8X240	95	182	60	140	17,56	$8,78 + 10,35 / k_{mod}$	32,76	$17,55 + 19,32 / k_{mod}$
SDCFC8X280	109	210	60	140	20,61	$10,3 + 10,35 / k_{mod}$	38,46	$20,6 + 19,32 / k_{mod}$
SDCFC8X330	127	246	60	140	24,43	$12,21 + 10,35 / k_{mod}$	45,58	$24,42 + 19,32 / k_{mod}$
SDCFC8X350	134	260	60	140	25,95	$12,98 + 10,35 / k_{mod}$	48,43	$25,95 + 19,32 / k_{mod}$
SDCFC10X240	95	182	75	175	21,10	$10,55 + 14,97 / k_{mod}$	39,38	$21,1 + 27,94 / k_{mod}$
SDCFC10X300	117	225	75	175	26,66	$13,33 + 14,97 / k_{mod}$	49,75	$26,65 + 27,94 / k_{mod}$
SDCFC10X380	145	281	75	175	34,06	$17,03 + 14,97 / k_{mod}$	63,56	$34,06 + 27,94 / k_{mod}$
SDCFC10X500	187	366	75	175	43,41	$21,71 + 14,97 / k_{mod}$	81,01	$43,41 + 27,94 / k_{mod}$
SDCFC10X600	223	437	75	175	43,41	$21,71 + 14,97 / k_{mod}$	81,01	$43,41 + 27,94 / k_{mod}$
SDCFC10X800	293	578	75	175	43,41	$21,71 + 14,97 / k_{mod}$	81,01	$43,41 + 27,94 / k_{mod}$
SDCFC10X1000	364	720	75	175	43,41	$21,71 + 14,97 / k_{mod}$	81,01	$43,41 + 27,94 / k_{mod}$

Min. between $R_{w,k,pair}$ and $R_{buck,k,pair}$

Values in the table are valid for predrilled and non predrilled installation.



Vertical Load

For explanation of m_i see page 26.

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Timber Drive™

Structural Screw Fastening System

Timber Drive is a revolutionary tool for stand-up operation while driving large structural screws. It's ideal for heavy-duty jobs that require repetitive fastening, such as decks, docks, boardwalks, piers and flooring, as well as metal straps to wood, engineered wood, or mass timber panels. The ergonomic design of Timber Drive makes it a faster, easier way to work — with less fatigue on knees, back and shoulders. It offers more ease of movement and helps to reduce jobsite hazards.

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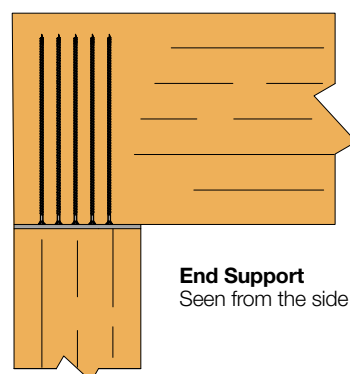
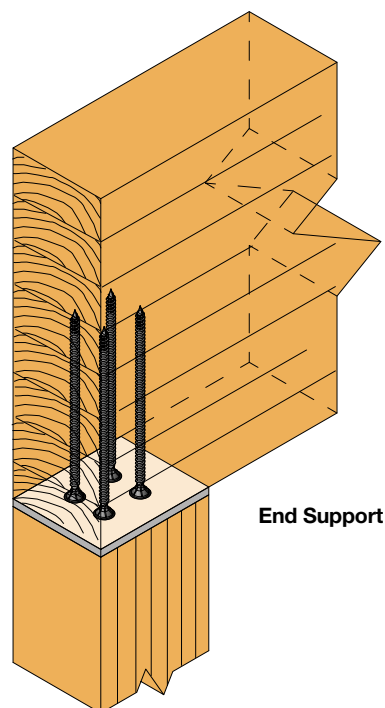
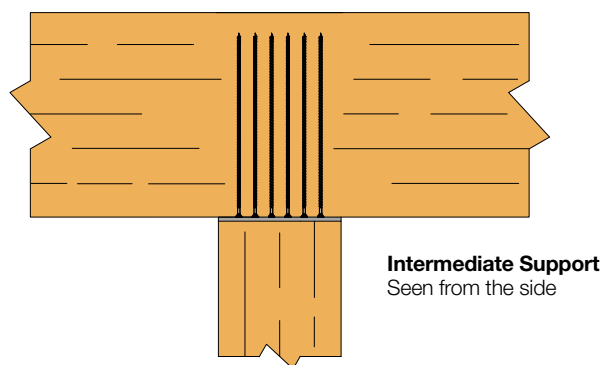
3.2.4 Glulam Reinforcement

Glulam Seat Reinforcement

Glulam elements can transfer large vertical loads on bearings. In many situations the support element might have a much higher compression resistance than the glulam element. This is the case for concrete or steel supports. This might even happen for glulam post supports as the timber compression resistance parallel to the grain is much higher than it is perpendicular to the grain.

Normally designers might increase the width of the glulam element to create a bigger area of contact. However, an efficient alternative solution to this is to reinforce the seat area with fully threaded screws, that can take over the compression forces. A steel plate is needed to distribute the forces from screws onto the bearing. SDCF screws are highly suitable for reinforcing glulam and the values for this screw will be presented on the following pages.

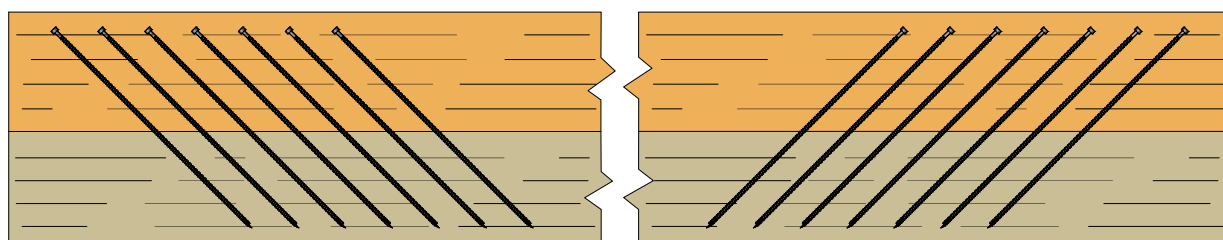
See calculation example on page 176.



Other Types of Timber Reinforcement

Beam Reinforcement

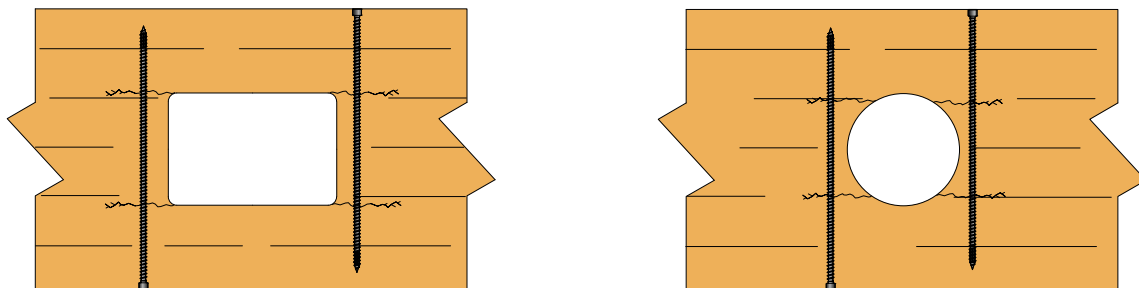
Fully threaded screw can be used to reinforce an old beam by applying a new beam on top and simply installing the screws through both beams with a 45° angle.



3.2.4 Glulam Reinforcement

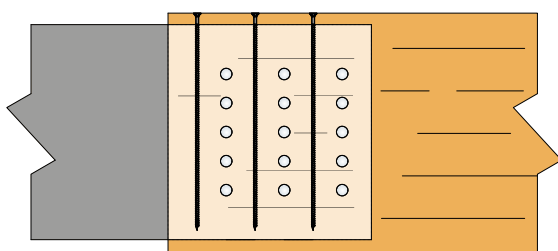
Hole Reinforcement

When a hole is made in a beam, in case of shear load, some cracks may appear. To prevent that, fully threaded screws may be used.



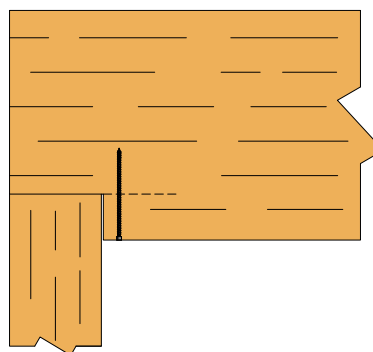
Dowel Reinforcement

In a steel-to-wood connection made with dowels, fully threaded screws can be used to reinforce the glulam beam in order to avoid splitting.



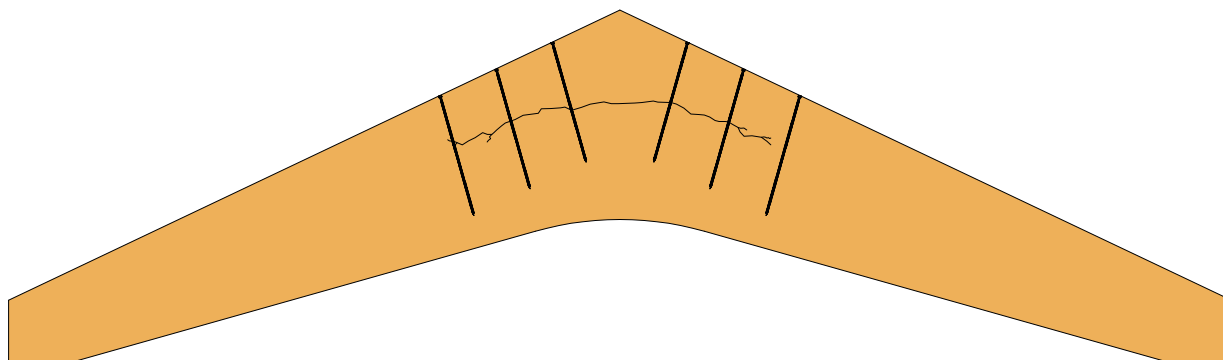
Notch Reinforcement

To avoid splitting of the joist it can be reinforced. For that the principle is to have screws with the same length of thread on each side of the notch.



Glulam Arcs Apex Reinforcement

In large glulam arcs under vertical load delamination of lamellas may appear. This is subject of p 6.4.3. of Eurocode 5. Structural calculation might often require to increase the width of the whole element. An alternative solution is to reinforce the apex area with fully threaded screws. This solution is much more cost effective compared to the increasing the width of the element.



3.2.4 Glulam Reinforcement

Calculation Example - Seat Reinforcement

Timber Properties

Timber strength class GL24h

Height: $h=450$ mm Width: $B=130$ mm Support section length: $l=160$ mm

Characteristic compressive strength perpendicular to grain acc. to EN14080: $f_{c,90,k} = 2,50$ N/mm²

Characteristic density: $\rho_k=385$ kg/m³

Loads

Combined vertical load on support (acc. To EN1991-1-1) $F_{c,90,d} = 60,00$ kN $k_{mod} = 0,8$ $\gamma_m = 1,25$

with: $l_{ef,1}=l+30$ mm effective contact length according to EN 1995-1-1, 6.1.5

Timber capacity checking

Compressive stress perpendicular to grain checking according to 1995-1-1:2004+A2:2014:

Timber design compressive capacity perpendicular to grain $f_{c,90,d} = f_{c,90,k} \times k_{mod} / \gamma_m = 1,60$ N/mm²

$$R_{timber,c,90,d} = B \times l_{ef,1} \times f_{c,90,d} = 130 \text{ mm} \times 160 + 30 \text{ mm} \times 1,6 \text{ kN/mm}^2 = 39,52 \text{ kN} < 60 \text{ kN}$$

Timber support section is insufficient, **reinforcement needed**.

Screw choice & properties

SDCF10.0x240 n = 4 Units L=240 mm $l_{base}=100$ mm

Screw head shall be flush with timber surface, and fulfill min. spacing and edge distances

Screw design thread axial capacity per screw according to ETA section:

$$F_{ax,90,d} = f_{ax,calc,k} \times d \times l_{ef} \times \frac{k_{mod}}{\gamma_{m,f}} = 13 \text{ N/mm}^2 \times 10 \text{ mm} \times 228 \text{ mm} \times \frac{0,8}{1,3} = 18,24 \text{ kN}$$

with: l_{ef} thread length $\gamma_{m,f}$ partial safety factor for fasteners d screw thread diameter

$f_{ax,calc,k}$ char. withdrawal parameter in GL24h

Characteristic value of the plastic normal force load bearing capacity of the diam 10 screw net crosssection acc. to ETA section A.7.1.5

$$N_{pl,k} = \frac{\pi \times d_i^2}{4} \times f_{y,k} = \frac{\pi \times 6,2^2 \text{ mm}^2}{4} \times 1000 \text{ N/mm}^2 = 30,19 \text{ kN}$$

with: d_i screw inner diameter $f_{y,k}$ screw characteristic yield strength

Reinforced timber capacity checking

Design resistance of reinforced contact area according to ETA-13/0796 section A.9.1

$$R_{c,90,d} = \min \left(k_{c,90} \times B \times l_{eff,1} \times f_{c,90,d} + n \times \min \left(F_{ax,90,d}; \frac{K_c \times N_{pl,k}}{\gamma_{m1}} \right); B \times l_{eff,2} \times f_{c,90,d} \right)$$

with:

$l_{eff,2}=l_{base}+L$ effective contact length in the plane of the screw tips

γ_{m1} partial safety factor according to EN 1993-1-1

K_c slenderness ratio

$$R_{c,90,d} = \min \left(1,75 \times 130 \text{ mm} \times 190 \text{ mm} \times 1,60 \text{ N/mm}^2 + 4 \times \min \left(18,24 \text{ kN}; \frac{0,6 \times 30,19 \text{ kN}}{1} \right); 130 \text{ mm} \times 340 \text{ mm} \times 1,60 \text{ N/mm}^2 \right)$$

$R_{c,90,d} = 70,72 \text{ kN} > 60 \text{ kN}$ **Reinforcement is ok**

Steel plate

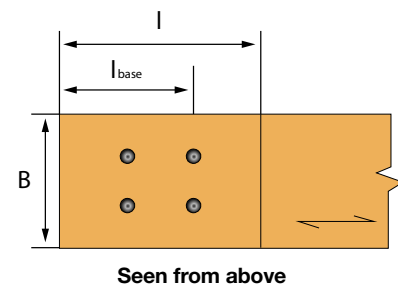
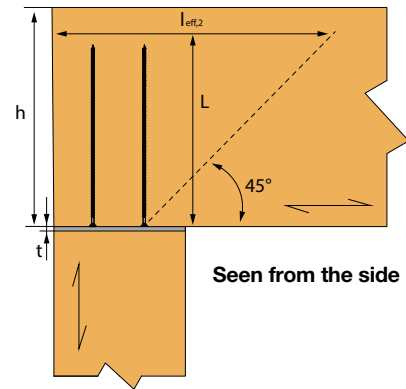
Grade S235 $f_{y,steel,k} = 235$ N/mm²

Minimum steel plate thickness according to EN1993:

$$t_{min} = \sqrt{\frac{3 \times \gamma_{m1} \times R_{c,90,d}}{\pi \times f_{y,steel,k}}} = \sqrt{\frac{3 \times 1 \times 17540}{\pi \times 235}} = 8,44 \approx 9 \text{ mm}$$

Notes:

Support length and width correspond to dimensions of the plate in contact with solid timber or glulam and includes minimum distance from screw to steel plate edge or to timber end and edge. For CLT or other screw configurations, please refer to ETA provisions or tables.



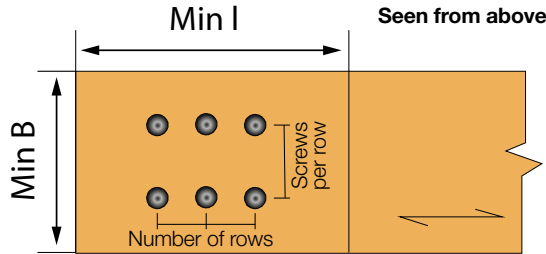
3.2.4 Glulam Reinforcement

Solid-Drive™SDCF Fully Threaded **WOOD** Screw
for Seat Reinforcement

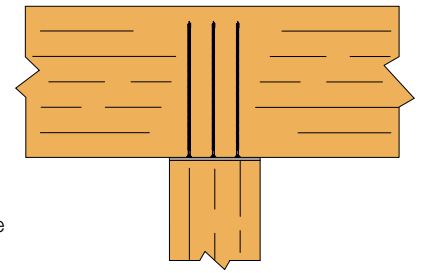
Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

ETA-21/0670



Note: In the above example, the reinforcement has 3 rows with 2 screws per row.



Intermediate Support
Seen from the side

SDCF - Seat Reinforcement

Glulam to Glulam GL24h - $k_{mod}=0.6$

Product Reference	Intermediate Support R _{c,d.90} [kN]							End Support R _{c,d.90} [kN]							Min. Thickness t of the Steel Plate [mm]
	Min. l [mm]	Number of Rows	Min. B [mm]					Min. l [mm]	Number of Rows	Min. B [mm]					
			48	72	96	120	144			48	72	96	120	144	
			Screw Qty per Row							Screw Qty per Row					
			1	2	3	4	5				1	2	3	4	5
SDCF8X120	23	1	11,5	18,4	23,0	27,6	32,3	70	1	10,6	15,2	19,8	24,4	29,0	5,0
	103	2	19,9	27,6	34,6	41,5	48,4	163	2	15,9	22,8	29,7	36,6	43,5	5,0
	183	3	27,6	36,9	46,1	55,3	64,5	243	3	21,2	30,4	39,6	48,8	58,1	5,0
	263	4	34,6	46,1	57,6	69,1	80,6	323	4	26,5	38,0	49,5	61,1	72,6	5,0
	343	5	41,5	55,3	69,1	82,9	96,8	403	5	31,8	45,6	59,4	73,3	87,1	5,0
SDCF8X140	28	1	13,7	20,7	25,3	30,0	34,6	84	1	11,8	16,4	21,0	25,6	30,2	6,0
	108	2	23,7	31,1	38,0	44,9	51,8	168	2	17,6	24,5	31,4	38,4	45,3	6,0
	188	3	32,3	41,5	50,7	59,9	69,1	248	3	23,5	32,7	41,9	51,1	60,4	6,0
	268	4	40,3	51,8	63,4	74,9	86,4	328	4	29,4	40,9	52,4	63,9	75,5	6,0
	348	5	48,4	62,2	76,0	89,9	103,7	408	5	35,3	49,1	62,9	76,7	90,5	6,0
SDCF8X160	28	1	14,6	23,0	27,6	32,3	36,9	84	1	12,9	17,5	22,1	26,7	31,3	6,0
	108	2	25,7	34,6	41,5	48,4	55,3	168	2	19,4	26,3	33,2	40,1	47,0	6,0
	188	3	36,7	46,1	55,3	64,5	73,7	248	3	25,8	35,0	44,2	53,5	62,7	6,0
	268	4	46,1	57,6	69,1	80,6	92,2	328	4	32,3	43,8	55,3	66,8	78,3	6,0
	348	5	55,3	69,1	82,9	96,8	110,6	408	5	38,7	52,5	66,4	80,2	94,0	6,0
SDCF8X180	28	1	15,6	25,3	30,0	34,6	39,2	84	1	14,1	18,7	23,3	27,9	32,5	6,0
	108	2	27,7	38,0	44,9	51,8	58,8	168	2	21,1	28,0	34,9	41,8	48,7	6,0
	188	3	39,7	50,7	59,9	69,1	78,3	248	3	28,1	37,3	46,5	55,8	65,0	6,0
	268	4	51,7	63,4	74,9	86,4	97,9	328	4	35,1	46,7	58,2	69,7	81,2	6,0
	348	5	62,2	76,0	89,9	103,7	117,5	408	5	42,2	56,0	69,8	83,6	97,5	6,0
SDCF8X200	32	1	17,4	27,6	32,3	36,9	41,5	92	1	15,2	19,8	24,4	29,0	33,6	7,0
	112	2	30,8	41,5	48,4	55,3	62,2	172	2	22,8	29,7	36,6	43,5	50,5	7,0
	192	3	44,2	55,3	64,5	73,7	82,9	252	3	30,4	39,6	48,8	58,1	67,3	7,0
	272	4	57,6	69,1	80,6	92,2	103,7	332	4	38,0	49,5	61,1	72,6	84,1	7,0
	352	5	69,1	82,9	96,8	110,6	124,4	412	5	45,6	59,4	73,3	87,1	100,9	7,0

This table continues on next page.
Values in the table are valid for predrilled and non predrilled installation.

3.2.4 Glulam Reinforcement

SDCF - Seat Reinforcement

Glulam to Glulam GL24h - $k_{mod}=0.6$ (continued)

Product Reference	Intermediate Support R _{c,d,90} [kN]							End Support R _{c,d,90} [kN]							Min. Thickness t of the Steel Plate [mm]
	Min. l [mm]	Number of Rows	Min. B [mm]					Min. l [mm]	Number of Rows	Min. B [mm]					
			48	72	96	120	144			48	72	96	120	144	
			Screw Qty per Row							Screw Qty per Row					
			1	2	3	4	5				1	2	3	4	5
SDCF8X220	32	1	18,0	30,0	34,6	39,2	43,8	92	1	16,4	21,0	25,6	30,2	34,8	7,0
	112	2	32,0	44,9	51,8	58,8	65,7	172	2	24,5	31,4	38,4	45,3	52,2	7,0
	192	3	46,0	59,9	69,1	78,3	87,6	252	3	32,7	41,9	51,1	60,4	69,6	7,0
	272	4	60,0	74,9	86,4	97,9	109,4	332	4	40,9	52,4	63,9	75,5	87,0	7,0
	352	5	74,1	89,9	103,7	117,5	131,3	412	5	49,1	62,9	76,7	90,5	104,4	7,0
SDCF8X240	32	1	18,0	32,3	36,9	41,5	46,1	92	1	17,5	22,1	26,7	31,3	35,9	7,0
	112	2	32,0	48,4	55,3	62,2	69,1	172	2	26,3	33,2	40,1	47,0	53,9	7,0
	192	3	46,0	64,5	73,7	82,9	92,2	252	3	35,0	44,2	53,5	62,7	71,9	7,0
	272	4	60,0	80,6	92,2	103,7	115,2	332	4	43,8	55,3	66,8	78,3	89,9	7,0
	352	5	74,1	96,8	110,6	124,4	138,2	412	5	52,5	66,4	80,2	94,0	107,8	7,0
SDCF8X260	32	1	18,0	34,6	39,2	43,8	48,4	92	1	18,7	23,3	27,9	32,5	37,1	7,0
	112	2	32,0	51,8	58,8	65,7	72,6	172	2	28,0	34,9	41,8	48,7	55,6	7,0
	192	3	46,0	69,1	78,3	87,6	96,8	252	3	37,3	46,5	55,8	65,0	74,2	7,0
	272	4	60,0	86,4	97,9	109,4	121,0	332	4	46,7	58,2	69,7	81,2	92,7	7,0
	352	5	74,1	103,7	117,5	131,3	145,2	412	5	56,0	69,8	83,6	97,5	111,3	7,0
SDCF8X300	32	1	18,0	34,9	43,8	48,4	53,0	92	1	19,5	25,6	30,2	34,8	39,4	7,0
	112	2	32,0	58,8	65,7	72,6	79,5	172	2	31,4	38,4	45,3	52,2	59,1	7,0
	192	3	46,0	78,3	87,6	96,8	106,0	252	3	41,9	51,1	60,4	69,6	78,8	7,0
	272	4	60,0	97,9	109,4	121,0	132,5	332	4	52,4	63,9	75,5	87,0	98,5	7,0
	352	5	74,1	117,5	131,3	145,2	159,0	412	5	62,9	76,7	90,5	104,4	118,2	7,0
SDCF8X350	32	1	18,0	34,9	49,5	54,1	58,8	92	1	19,5	28,5	33,1	37,7	42,3	7,0
	112	2	32,0	62,4	74,3	81,2	88,1	172	2	34,3	42,7	49,6	56,5	63,4	7,0
	192	3	46,0	89,9	99,1	108,3	117,5	252	3	47,7	56,9	66,1	75,3	84,6	7,0
	272	4	60,0	112,3	123,8	135,4	146,9	332	4	59,6	71,1	82,7	94,2	105,7	7,0
	352	5	74,1	134,8	148,6	162,4	176,3	412	5	71,5	85,4	99,2	113,0	126,8	7,0
SDCF10X160	32	1	18,9	30,2	37,4	44,6	51,8	92	1	17,3	24,5	31,7	38,9	46,1	7,0
	132	2	32,7	45,4	56,2	67,0	77,8	192	2	25,9	36,7	47,5	58,3	69,1	7,0
	232	3	46,1	60,5	74,9	89,3	103,7	292	3	34,6	49,0	63,4	77,8	92,2	7,0
	332	4	57,6	75,6	93,6	111,6	129,6	392	4	43,2	61,2	79,2	97,2	115,2	7,0
	432	5	69,1	90,7	112,3	133,9	155,5	492	5	51,8	73,4	95,0	116,6	138,2	7,0
SDCF10X200	32	1	21,3	36,0	43,2	50,4	57,6	92	1	20,2	27,4	34,6	41,8	49,0	7,0
	132	2	37,5	54,0	64,8	75,6	86,4	192	2	30,2	41,0	51,8	62,6	73,4	7,0
	232	3	53,8	72,0	86,4	100,8	115,2	292	3	40,3	54,7	69,1	83,5	97,9	7,0
	332	4	70,1	90,0	108,0	126,0	144,0	392	4	50,4	68,4	86,4	104,4	122,4	7,0
	432	5	86,4	108,0	129,6	151,2	172,8	492	5	60,5	82,1	103,7	125,3	146,9	7,0
SDCF10X240	37	1	24,2	41,8	49,0	56,2	63,4	97	1	23,0	30,2	37,4	44,6	51,8	8,0
	137	2	43,1	62,6	73,4	84,2	95,0	197	2	34,6	45,4	56,2	67,0	77,8	8,0
	237	3	62,0	83,5	97,9	112,3	126,7	297	3	46,1	60,5	74,9	89,3	103,7	8,0
	337	4	80,9	104,4	122,4	140,4	158,4	397	4	57,6	75,6	93,6	111,6	129,6	8,0
	437	5	99,9	125,3	146,9	168,5	190,1	497	5	69,1	90,7	112,3	133,9	155,5	8,0

This table continues on next page.
Values in the table are valid for predrilled and non predrilled installation.

3.2.4 Glulam Reinforcement

SDCF - Seat Reinforcement

Glulam to Glulam GL24h - $k_{mod}=0.6$ (continued)

Product Reference	Intermediate Support R _{c,d,90} [kN]							End Support R _{c,d,90} [kN]							Min. Thickness t of the Steel Plate [mm]
	Min. l [mm]	Number of Rows	Min. B [mm]					Min. l [mm]	Number of Rows	Min. B [mm]					
			48	72	96	120	144			48	72	96	120	144	
			Screw Qty per Row							Screw Qty per Row					
			1	2	3	4	5			1	2	3	4	5	
SDCF10X280	37	1	25,7	47,5	54,7	61,9	69,1	97	1	25,9	33,1	40,3	47,5	54,7	8,0
	137	2	46,1	71,3	82,1	92,9	103,7	197	2	38,9	49,7	60,5	71,3	82,1	8,0
	237	3	66,5	95,0	109,4	123,8	138,2	297	3	51,8	66,2	80,6	95,0	109,4	8,0
	337	4	87,0	118,8	136,8	154,8	172,8	397	4	64,8	82,8	100,8	118,8	136,8	8,0
	437	5	107,4	142,6	164,2	185,8	207,4	497	5	77,8	99,4	121,0	142,6	164,2	8,0
SDCF10X360	37	1	25,7	51,7	66,2	73,4	80,6	97	1	29,1	38,9	46,1	53,3	60,5	8,0
	137	2	46,1	88,6	99,4	110,2	121,0	197	2	47,5	58,3	69,1	79,9	90,7	8,0
	237	3	66,5	118,1	132,5	146,9	161,3	297	3	63,4	77,8	92,2	106,6	121,0	8,0
	337	4	87,0	147,6	165,6	183,6	201,6	397	4	79,2	97,2	115,2	133,2	151,2	8,0
	437	5	107,4	177,1	198,7	220,3	241,9	497	5	95,0	116,6	138,2	159,8	181,4	8,0
SDCF10X400	37	1	25,7	51,7	72,0	79,2	86,4	97	1	29,1	41,8	49,0	56,2	63,4	8,0
	137	2	46,1	92,7	108,0	118,8	129,6	197	2	51,2	62,6	73,4	84,2	95,0	8,0
	237	3	66,5	129,6	144,0	158,4	172,8	297	3	69,1	83,5	97,9	112,3	126,7	8,0
	337	4	87,0	162,0	180,0	198,0	216,0	397	4	86,4	104,4	122,4	140,4	158,4	8,0
	437	5	107,4	194,4	216,0	237,6	259,2	497	5	103,7	125,3	146,9	168,5	190,1	8,0
SDCF10X450	37	1	25,7	51,7	77,6	86,4	93,6	97	1	29,1	45,4	52,6	59,8	67,0	8,0
	137	2	46,1	92,7	118,8	129,6	140,4	197	2	51,2	68,0	78,8	89,6	100,4	8,0
	237	3	66,5	133,7	158,4	172,8	187,2	297	3	73,3	90,7	105,1	119,5	133,9	8,0
	337	4	87,0	174,7	198,0	216,0	234,0	397	4	95,4	113,4	131,4	149,4	167,4	8,0
	437	5	107,4	215,7	237,6	259,2	280,8	497	5	114,5	136,1	157,7	179,3	200,9	8,0
SDCF12X200	32	1	22,3	44,9	55,3	65,7	76,0	92	1	25,6	35,9	46,3	56,7	67,0	7,0
	152	2	38,5	67,4	82,9	98,5	114,0	212	2	38,4	53,9	69,5	85,0	100,6	7,0
	272	3	54,8	89,9	110,6	131,3	152,1	332	3	51,1	71,9	92,6	113,4	134,1	7,0
	392	4	71,0	112,3	138,2	164,2	190,1	452	4	63,9	89,9	115,8	141,7	167,6	7,0
	512	5	87,3	134,8	165,9	197,0	228,1	572	5	76,7	107,8	138,9	170,0	201,1	7,0
SDCF12X240	37	1	25,1	51,8	62,2	72,6	82,9	97	1	29,0	39,4	49,8	60,1	70,5	8,0
	157	2	44,0	77,8	93,3	108,9	124,4	217	2	43,5	59,1	74,6	90,2	105,8	8,0
	277	3	62,8	103,7	124,4	145,2	165,9	337	3	58,1	78,8	99,5	120,3	141,0	8,0
	397	4	81,7	129,6	155,5	181,4	207,4	457	4	72,6	98,5	124,4	150,3	176,3	8,0
	517	5	100,5	155,5	186,6	217,7	248,8	577	5	87,1	118,2	149,3	180,4	211,5	8,0
SDCF12X280	37	1	27,4	57,8	69,1	79,5	89,9	97	1	32,5	42,9	53,2	63,6	74,0	8,0
	157	2	48,5	88,1	103,7	119,2	134,8	217	2	48,7	64,3	79,8	95,4	110,9	8,0
	277	3	69,7	117,5	138,2	159,0	179,7	337	3	65,0	85,7	106,4	127,2	147,9	8,0
	397	4	90,8	146,9	172,8	198,7	224,6	457	4	81,2	107,1	133,1	159,0	184,9	8,0
	517	5	111,9	176,3	207,4	238,5	269,6	577	5	97,5	128,6	159,7	190,8	221,9	8,0
SDCF12X350	42	1	30,9	64,1	81,2	91,6	102,0	102	1	36,7	48,9	59,3	69,6	80,0	9,0
	162	2	55,1	106,3	121,8	137,4	152,9	222	2	57,8	73,4	88,9	104,5	120,0	9,0
	282	3	79,4	141,7	162,4	183,2	203,9	342	3	77,1	97,8	118,5	139,3	160,0	9,0
	402	4	103,7	177,1	203,0	229,0	254,9	462	4	96,3	122,3	148,2	174,1	200,0	9,0
	522	5	128,0	212,5	243,6	274,8	305,9	582	5	115,6	146,7	177,8	208,9	240,0	9,0

For dimensions and calculation parameters see p. 56.
Values in the table are valid for predrilled and non predrilled installation.

3.2.4 Glulam Reinforcement

SDCF - Seat Reinforcement

Glulam to Glulam GL24h - $k_{mod}=0.6$ (continued)

Product Reference	Intermediate Support R _{c,d,90} [kN]							End Support R _{c,d,90} [kN]							Min. Thickness t of the Steel Plate [mm]
	Min. l [mm]	Number of Rows	Min. B [mm]					Min. l [mm]	Number of Rows	Min. B [mm]					
			48	72	96	120	144			48	72	96	120	144	
			Screw Qty per Row							Screw Qty per Row					
			1	2	3	4	5			1	2	3	4	5	
SDCF12X450	40	1	40,3	84,1	127,8	145,2	159,0	100	1	48,3	76,7	90,5	104,4	118,2	10,0
	160	2	72,0	149,1	197,0	217,7	238,5	220	2	83,9	115,1	135,8	156,6	177,3	10,0
	280	3	103,6	214,1	262,7	290,3	318,0	340	3	119,5	153,4	181,1	208,7	236,4	10,0
	400	4	135,3	279,2	328,3	362,9	397,4	460	4	155,1	191,8	226,4	260,9	295,5	10,0
	520	5	167,0	344,2	394,0	435,5	476,9	580	5	188,7	230,2	271,6	313,1	354,6	10,0
SDCF12X600	40	1	40,3	84,1	127,8	171,5	193,5	100	1	48,3	92,0	107,8	121,7	135,5	10,0
	160	2	72,0	149,1	226,2	269,6	290,3	220	2	83,9	141,0	161,7	182,5	203,2	10,0
	280	3	103,6	214,1	324,6	359,4	387,1	340	3	119,5	188,0	215,7	243,3	271,0	10,0
	400	4	135,3	279,2	414,7	449,3	483,8	460	4	155,1	235,0	269,6	304,1	338,7	10,0
	520	5	167,0	344,2	497,7	539,1	580,6	580	5	190,8	282,0	323,5	365,0	406,4	10,0

For dimensions and calculation parameters see p. 56.
Values in the table are valid for predrilled and non predrilled installation.

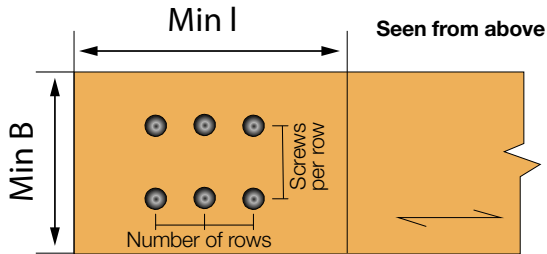
3.2.4 Glulam Reinforcement

Solid-Drive™SDCF Fully Threaded **WOOD** Screw
for Seat Reinforcement

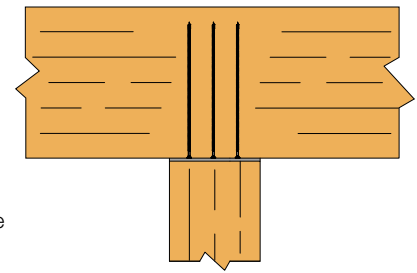
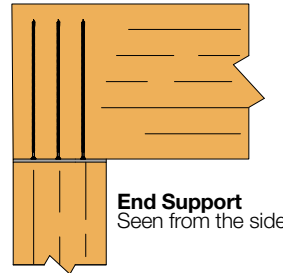
Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

ETA-21/0670



Note: In the above example, the reinforcement has 3 rows with 2 screws per row.



Intermediate Support
Seen from the side

SDCF - Seat Reinforcement

Glulam to Glulam GL24h - $k_{mod}=0.8$

Product Reference	Intermediate Support R _{c.d.90} [kN]							End Support R _{c.d.90} [kN]							Min. Thickness t of the Steel Plate [mm]
	Min. I [mm]	Number of Rows	Min. B [mm]					Min. I [mm]	Number of Rows	Min. B [mm]					
			48	72	96	120	144			48	72	96	120	144	
			Screw Qty per Row							Screw Qty per Row					
			1	2	3	4	5			1	2	3	4	5	
SDCF8X120	24	1	15,6	24,6	30,7	36,9	43,0	72	1	14,1	20,3	26,4	32,6	38,7	6,0
	104	2	27,0	36,9	46,1	55,3	64,5	164	2	21,2	30,4	39,6	48,8	58,1	6,0
	184	3	36,9	49,2	61,4	73,7	86,0	244	3	28,3	40,6	52,8	65,1	77,4	6,0
	264	4	46,1	61,4	76,8	92,2	107,5	324	4	35,3	50,7	66,0	81,4	96,8	6,0
	344	5	55,3	73,7	92,2	110,6	129,0	404	5	42,4	60,8	79,3	97,7	116,1	6,0
SDCF8X140	24	1	16,9	27,6	33,8	39,9	46,1	72	1	15,7	21,8	28,0	34,1	40,2	6,0
	104	2	29,7	41,5	50,7	59,9	69,1	164	2	23,5	32,7	41,9	51,1	60,4	6,0
	184	3	42,4	55,3	67,6	79,9	92,2	244	3	31,3	43,6	55,9	68,2	80,5	6,0
	264	4	53,8	69,1	84,5	99,8	115,2	324	4	39,2	54,5	69,9	85,2	100,6	6,0
	344	5	64,5	82,9	101,4	119,8	138,2	404	5	47,0	65,4	83,9	102,3	120,7	6,0
SDCF8X160	28	1	19,6	30,7	36,9	43,0	49,2	84	1	17,2	23,3	29,5	35,6	41,8	7,0
	108	2	34,4	46,1	55,3	64,5	73,7	168	2	25,8	35,0	44,2	53,5	62,7	7,0
	188	3	49,1	61,4	73,7	86,0	98,3	248	3	34,4	46,7	59,0	71,3	83,6	7,0
	268	4	61,4	76,8	92,2	107,5	122,9	328	4	43,0	58,4	73,7	89,1	104,4	7,0
	348	5	73,7	92,2	110,6	129,0	147,5	408	5	51,6	70,0	88,5	106,9	125,3	7,0
SDCF8X180	28	1	20,9	33,8	39,9	46,1	52,2	84	1	18,7	24,9	31,0	37,2	43,3	7,0
	108	2	37,0	50,7	59,9	69,1	78,3	168	2	28,1	37,3	46,5	55,8	65,0	7,0
	188	3	53,1	67,6	79,9	92,2	104,4	248	3	37,5	49,8	62,1	74,3	86,6	7,0
	268	4	69,1	84,5	99,8	115,2	130,6	328	4	46,8	62,2	77,6	92,9	108,3	7,0
	348	5	82,9	101,4	119,8	138,2	156,7	408	5	56,2	74,6	93,1	111,5	129,9	7,0
SDCF8X200	32	1	23,2	36,9	43,0	49,2	55,3	92	1	20,3	26,4	32,6	38,7	44,9	8,0
	112	2	41,0	55,3	64,5	73,7	82,9	172	2	30,4	39,6	48,8	58,1	67,3	8,0
	192	3	58,8	73,7	86,0	98,3	110,6	252	3	40,6	52,8	65,1	77,4	89,7	8,0
	272	4	76,7	92,2	107,5	122,9	138,2	332	4	50,7	66,0	81,4	96,8	112,1	8,0
	352	5	92,2	110,6	129,0	147,5	165,9	412	5	60,8	79,3	97,7	116,1	134,6	8,0

This table continues on next page.
Values in the table are valid for predrilled and non predrilled installation.

3.2.4 Glulam Reinforcement

SDCF - Seat Reinforcement

Glulam to Glulam GL24h - $k_{mod}=0.8$ (continued)

Product Reference	Intermediate Support R _{c,d,90} [kN]							End Support R _{c,d,90} [kN]							Min. Thickness t of the Steel Plate [mm]
	Min. l [mm]	Number of Rows	Min. B [mm]					Min. l [mm]	Number of Rows	Min. B [mm]					
			48	72	96	120	144			48	72	96	120	144	
			Screw Qty per Row							Screw Qty per Row					
			1	2	3	4	5			1	2	3	4	5	
SDCF8X220	32	1	23,6	39,9	46,1	52,2	58,4	92	1	21,8	28,0	34,1	40,2	46,4	8,0
	112	2	41,9	59,9	69,1	78,3	87,6	172	2	32,7	41,9	51,1	60,4	69,6	8,0
	192	3	60,3	79,9	92,2	104,4	116,7	252	3	43,6	55,9	68,2	80,5	92,8	8,0
	272	4	78,6	99,8	115,2	130,6	145,9	332	4	54,5	69,9	85,2	100,6	116,0	8,0
	352	5	96,9	119,8	138,2	156,7	175,1	412	5	65,4	83,9	102,3	120,7	139,2	8,0
SDCF8X240	32	1	23,6	43,0	49,2	55,3	61,4	92	1	23,3	29,5	35,6	41,8	47,9	8,0
	112	2	41,9	64,5	73,7	82,9	92,2	172	2	35,0	44,2	53,5	62,7	71,9	8,0
	192	3	60,3	86,0	98,3	110,6	122,9	252	3	46,7	59,0	71,3	83,6	95,8	8,0
	272	4	78,6	107,5	122,9	138,2	153,6	332	4	58,4	73,7	89,1	104,4	119,8	8,0
	352	5	96,9	129,0	147,5	165,9	184,3	412	5	70,0	88,5	106,9	125,3	143,8	8,0
SDCF8X260	32	1	23,6	45,9	52,2	58,4	64,5	92	1	24,9	31,0	37,2	43,3	49,5	8,0
	112	2	41,9	69,1	78,3	87,6	96,8	172	2	37,3	46,5	55,8	65,0	74,2	8,0
	192	3	60,3	92,2	104,4	116,7	129,0	252	3	49,8	62,1	74,3	86,6	98,9	8,0
	272	4	78,6	115,2	130,6	145,9	161,3	332	4	62,2	77,6	92,9	108,3	123,6	8,0
	352	5	96,9	138,2	156,7	175,1	193,5	412	5	74,6	93,1	111,5	129,9	148,4	8,0
SDCF8X300	32	1	23,6	45,9	58,4	64,5	70,7	92	1	25,7	34,1	40,2	46,4	52,5	8,0
	112	2	41,9	78,3	87,6	96,8	106,0	172	2	41,9	51,1	60,4	69,6	78,8	8,0
	192	3	60,3	104,4	116,7	129,0	141,3	252	3	55,9	68,2	80,5	92,8	105,1	8,0
	272	4	78,6	130,6	145,9	161,3	176,6	332	4	69,9	85,2	100,6	116,0	131,3	8,0
	352	5	96,9	156,7	175,1	193,5	212,0	412	5	83,9	102,3	120,7	139,2	157,6	8,0
SDCF8X350	32	1	23,6	45,9	66,0	72,2	78,3	92	1	25,7	37,9	44,1	50,2	56,4	8,0
	112	2	41,9	81,8	99,1	108,3	117,5	172	2	45,0	56,9	66,1	75,3	84,6	8,0
	192	3	60,3	117,7	132,1	144,4	156,7	252	3	63,6	75,9	88,2	100,5	112,7	8,0
	272	4	78,6	149,8	165,1	180,5	195,8	332	4	79,5	94,8	110,2	125,6	140,9	8,0
	352	5	96,9	179,7	198,1	216,6	235,0	412	5	95,4	113,8	132,2	150,7	169,1	8,0
SDCF10X160	28	1	24,0	40,3	49,9	59,5	69,1	84	1	23,0	32,6	42,2	51,8	61,4	7,0
	128	2	41,9	60,5	74,9	89,3	103,7	188	2	34,6	49,0	63,4	77,8	92,2	7,0
	228	3	59,8	80,6	99,8	119,0	138,2	288	3	46,1	65,3	84,5	103,7	122,9	7,0
	328	4	76,8	100,8	124,8	148,8	172,8	388	4	57,6	81,6	105,6	129,6	153,6	7,0
	428	5	92,2	121,0	149,8	178,6	207,4	488	5	69,1	97,9	126,7	155,5	184,3	7,0
SDCF10X200	32	1	28,3	48,0	57,6	67,2	76,8	92	1	26,9	36,5	46,1	55,7	65,3	8,0
	132	2	50,0	72,0	86,4	100,8	115,2	192	2	40,3	54,7	69,1	83,5	97,9	8,0
	232	3	71,7	96,0	115,2	134,4	153,6	292	3	53,8	73,0	92,2	111,4	130,6	8,0
	332	4	93,3	120,0	144,0	168,0	192,0	392	4	67,2	91,2	115,2	139,2	163,2	8,0
	432	5	115,0	144,0	172,8	201,6	230,4	492	5	80,6	109,4	138,2	167,0	195,8	8,0
SDCF10X240	36	1	32,1	55,7	65,3	74,9	84,5	96	1	30,7	40,3	49,9	59,5	69,1	9,0
	136	2	57,3	83,5	97,9	112,3	126,7	196	2	46,1	60,5	74,9	89,3	103,7	9,0
	236	3	82,4	111,4	130,6	149,8	169,0	296	3	61,4	80,6	99,8	119,0	138,2	9,0
	336	4	107,6	139,2	163,2	187,2	211,2	396	4	76,8	100,8	124,8	148,8	172,8	9,0
	436	5	132,8	167,0	195,8	224,6	253,4	496	5	92,2	121,0	149,8	178,6	207,4	9,0

This table continues on next page.
Values in the table are valid for predrilled and non predrilled installation.

3.2.4 Glulam Reinforcement

SDCF - Seat Reinforcement

Glulam to Glulam GL24h - $k_{mod}=0.8$ (continued)

Product Reference	Intermediate Support R _{c,d,90} [kN]							End Support R _{c,d,90} [kN]							Min. Thickness t of the Steel Plate [mm]
	Min. l [mm]	Number of Rows	Min. B [mm]					Min. l [mm]	Number of Rows	Min. B [mm]					
			48	72	96	120	144			48	72	96	120	144	
			Screw Qty per Row							Screw Qty per Row					
			1	2	3	4	5			1	2	3	4	5	
SDCF10X280	36	1	32,7	63,4	73,0	82,6	92,2	96	1	34,6	44,2	53,8	63,4	73,0	9,0
	136	2	58,4	95,0	109,4	123,8	138,2	196	2	51,8	66,2	80,6	95,0	109,4	9,0
	236	3	84,2	126,7	145,9	165,1	184,3	296	3	69,1	88,3	107,5	126,7	145,9	9,0
	336	4	109,9	158,4	182,4	206,4	230,4	396	4	86,4	110,4	134,4	158,4	182,4	9,0
	436	5	135,7	190,1	218,9	247,7	276,5	496	5	103,7	132,5	161,3	190,1	218,9	9,0
SDCF10X360	36	1	32,7	65,9	88,3	97,9	107,5	96	1	37,3	51,8	61,4	71,0	80,6	9,0
	136	2	58,4	117,7	132,5	146,9	161,3	196	2	63,4	77,8	92,2	106,6	121,0	9,0
	236	3	84,2	157,4	176,6	195,8	215,0	296	3	84,5	103,7	122,9	142,1	161,3	9,0
	336	4	109,9	196,8	220,8	244,8	268,8	396	4	105,6	129,6	153,6	177,6	201,6	9,0
	436	5	135,7	236,2	265,0	293,8	322,6	496	5	126,7	155,5	184,3	213,1	241,9	9,0
SDCF10X400	36	1	32,7	65,9	96,0	105,6	115,2	96	1	37,3	55,7	65,3	74,9	84,5	9,0
	136	2	58,4	117,7	144,0	158,4	172,8	196	2	65,3	83,5	97,9	112,3	126,7	9,0
	236	3	84,2	169,4	192,0	211,2	230,4	296	3	92,2	111,4	130,6	149,8	169,0	9,0
	336	4	109,9	216,0	240,0	264,0	288,0	396	4	115,2	139,2	163,2	187,2	211,2	9,0
	436	5	135,7	259,2	288,0	316,8	345,6	496	5	138,2	167,0	195,8	224,6	253,4	9,0
SDCF10X450	36	1	32,7	65,9	99,1	115,2	124,8	96	1	37,3	60,5	70,1	79,7	89,3	9,0
	136	2	58,4	117,7	158,4	172,8	187,2	196	2	65,3	90,7	105,1	119,5	133,9	9,0
	236	3	84,2	169,4	211,2	230,4	249,6	296	3	93,4	121,0	140,2	159,4	178,6	9,0
	336	4	109,9	221,2	264,0	288,0	312,0	396	4	121,4	151,2	175,2	199,2	223,2	9,0
	436	5	135,7	273,0	316,8	345,6	374,4	496	5	149,5	181,4	210,2	239,0	267,8	9,0
SDCF12X200	32	1	29,6	59,9	73,7	87,6	101,4	92	1	34,1	47,9	61,7	75,6	89,4	8,0
	152	2	51,3	89,9	110,6	131,3	152,1	212	2	51,1	71,9	92,6	113,4	134,1	8,0
	272	3	72,9	119,8	147,5	175,1	202,8	332	3	68,2	95,8	123,5	151,1	178,8	8,0
	392	4	94,6	149,8	184,3	218,9	253,4	452	4	85,2	119,8	154,4	188,9	223,5	8,0
	512	5	116,2	179,7	221,2	262,7	304,1	572	5	102,3	143,8	185,2	226,7	268,2	8,0
SDCF12X240	36	1	33,4	69,1	82,9	96,8	110,6	96	1	38,7	52,5	66,4	80,2	94,0	9,0
	156	2	58,4	103,7	124,4	145,2	165,9	216	2	58,1	78,8	99,5	120,3	141,0	9,0
	276	3	83,4	138,2	165,9	193,5	221,2	336	3	77,4	105,1	132,7	160,4	188,0	9,0
	396	4	108,5	172,8	207,4	241,9	276,5	456	4	96,8	131,3	165,9	200,4	235,0	9,0
	516	5	133,5	207,4	248,8	290,3	331,8	576	5	116,1	157,6	199,1	240,5	282,0	9,0
SDCF12X280	36	1	36,4	76,9	92,2	106,0	119,8	96	1	43,3	57,1	71,0	84,8	98,6	9,0
	156	2	64,5	117,5	138,2	159,0	179,7	216	2	65,0	85,7	106,4	127,2	147,9	9,0
	276	3	92,6	156,7	184,3	212,0	239,6	336	3	86,6	114,3	141,9	169,6	197,2	9,0
	396	4	120,7	195,8	230,4	265,0	299,5	456	4	108,3	142,8	177,4	212,0	246,5	9,0
	516	5	148,7	235,0	276,5	318,0	359,4	576	5	129,9	171,4	212,9	254,4	295,8	9,0
SDCF12X350	40	1	40,3	84,1	108,3	122,1	135,9	100	1	48,3	65,2	79,0	92,9	106,7	10,0
	160	2	72,0	141,7	162,4	183,2	203,9	220	2	77,1	97,8	118,5	139,3	160,0	10,0
	280	3	103,6	188,9	216,6	244,2	271,9	340	3	102,8	130,4	158,1	185,7	213,4	10,0
	400	4	135,3	236,2	270,7	305,3	339,8	460	4	128,4	163,0	197,6	232,1	266,7	10,0
	520	5	167,0	283,4	324,9	366,3	407,8	580	5	154,1	195,6	237,1	278,6	320,0	10,0

For dimensions and calculation parameters see p. 56.
Values in the table are valid for predrilled and non predrilled installation.

3.2.4 Glulam Reinforcement

SDCF - Seat Reinforcement

Glulam to Glulam GL24h - $k_{mod}=0.8$ (continued)

Product Reference	Intermediate Support R _{c,d,90} [kN]							End Support R _{c,d,90} [kN]							Min. Thickness t of the Steel Plate [mm]
	Min. I [mm]	Number of Rows	Min. B [mm]					Min. I [mm]	Number of Rows	Min. B [mm]					
			48	72	96	120	144			48	72	96	120	144	
			Screw Qty per Row							Screw Qty per Row					
			1	2	3	4	5			1	2	3	4	5	
SDCF12X450	40	1	40,3	84,1	127,8	145,2	159,0	100	1	48,3	76,7	90,5	104,4	118,2	10,0
	160	2	72,0	149,1	197,0	217,7	238,5	220	2	83,9	115,1	135,8	156,6	177,3	10,0
	280	3	103,6	214,1	262,7	290,3	318,0	340	3	119,5	153,4	181,1	208,7	236,4	10,0
	400	4	135,3	279,2	328,3	362,9	397,4	460	4	155,1	191,8	226,4	260,9	295,5	10,0
	520	5	167,0	344,2	394,0	435,5	476,9	580	5	188,7	230,2	271,6	313,1	354,6	10,0
SDCF12X600	40	1	40,3	84,1	127,8	171,5	193,5	100	1	48,3	92,0	107,8	121,7	135,5	10,0
	160	2	72,0	149,1	226,2	269,6	290,3	220	2	83,9	141,0	161,7	182,5	203,2	10,0
	280	3	103,6	214,1	324,6	359,4	387,1	340	3	119,5	188,0	215,7	243,3	271,0	10,0
	400	4	135,3	279,2	414,7	449,3	483,8	460	4	155,1	235,0	269,6	304,1	338,7	10,0
	520	5	167,0	344,2	497,7	539,1	580,6	580	5	190,8	282,0	323,5	365,0	406,4	10,0

For dimensions and calculation parameters see p. 56.
Values in the table are valid for predrilled and non predrilled installation.

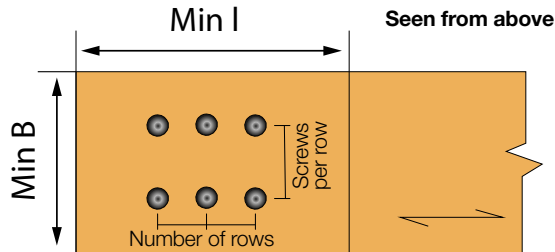
3.2.4 Glulam Reinforcement

Solid-Drive™SDCF Fully Threaded **WOOD** Screw
for Seat Reinforcement

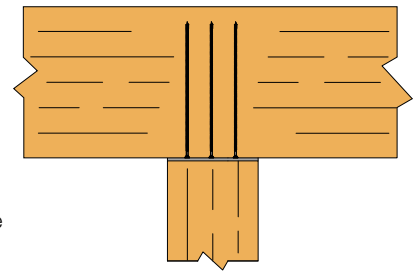
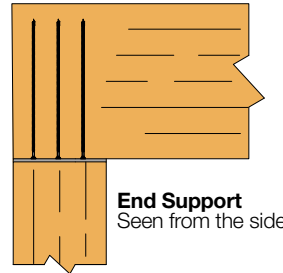
Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

ETA-21/0670



Note: In the above example, the reinforcement has 3 rows with 2 screws per row.



SDCF - Seat Reinforcement

Glulam to Glulam GL24h - $k_{mod}=0.9$

Product Reference	Intermediate Support R _{c.d.90} [kN]							End Support R _{c.d.90} [kN]							Min. Thickness t of the Steel Plate [mm]
	Min. I [mm]	Number of Rows	Min. B [mm]					Min. I [mm]	Number of Rows	Min. B [mm]					
			48	72	96	120	144			48	72	96	120	144	
1	2	3	4	5	1	2	3	4	5						
SDCF8X120	23	1	17,0	27,6	34,6	41,5	48,4	68	1	15,9	22,8	29,7	36,6	43,5	6,0
	103	2	29,6	41,5	51,8	62,2	72,6	163	2	23,8	34,2	44,6	55,0	65,3	6,0
	183	3	41,5	55,3	69,1	82,9	96,8	243	3	31,8	45,6	59,4	73,3	87,1	6,0
	263	4	51,8	69,1	86,4	103,7	121,0	323	4	39,7	57,0	74,3	91,6	108,9	6,0
	343	5	62,2	82,9	103,7	124,4	145,2	403	5	47,7	68,4	89,2	109,9	130,6	6,0
SDCF8X140	27	1	20,0	31,1	38,0	44,9	51,8	80	1	17,6	24,5	31,4	38,4	45,3	7,0
	107	2	34,8	46,7	57,0	67,4	77,8	167	2	26,4	36,8	47,2	57,5	67,9	7,0
	187	3	48,4	62,2	76,0	89,9	103,7	247	3	35,3	49,1	62,9	76,7	90,5	7,0
	267	4	60,5	77,8	95,0	112,3	129,6	327	4	44,1	61,3	78,6	95,9	113,2	7,0
	347	5	72,6	93,3	114,0	134,8	155,5	407	5	52,9	73,6	94,3	115,1	135,8	7,0
SDCF8X160	27	1	21,4	34,6	41,5	48,4	55,3	80	1	19,4	26,3	33,2	40,1	47,0	7,0
	107	2	37,7	51,8	62,2	72,6	82,9	167	2	29,0	39,4	49,8	60,1	70,5	7,0
	187	3	54,0	69,1	82,9	96,8	110,6	247	3	38,7	52,5	66,4	80,2	94,0	7,0
	267	4	69,1	86,4	103,7	121,0	138,2	327	4	48,4	65,7	82,9	100,2	117,5	7,0
	347	5	82,9	103,7	124,4	145,2	165,9	407	5	58,1	78,8	99,5	120,3	141,0	7,0
SDCF8X180	30	1	24,3	38,0	44,9	51,8	58,8	90	1	21,1	28,0	34,9	41,8	48,7	8,0
	110	2	42,8	57,0	67,4	77,8	88,1	170	2	31,6	42,0	52,4	62,7	73,1	8,0
	190	3	61,3	76,0	89,9	103,7	117,5	250	3	42,2	56,0	69,8	83,6	97,5	8,0
	270	4	77,8	95,0	112,3	129,6	146,9	330	4	52,7	70,0	87,3	104,5	121,8	8,0
	350	5	93,3	114,0	134,8	155,5	176,3	410	5	63,2	84,0	104,7	125,5	146,2	8,0
SDCF8X200	30	1	24,7	41,5	48,4	55,3	62,2	90	1	22,8	29,7	36,6	43,5	50,5	8,0
	110	2	43,6	62,2	72,6	82,9	93,3	170	2	34,2	44,6	55,0	65,3	75,7	8,0
	190	3	62,4	82,9	96,8	110,6	124,4	250	3	45,6	59,4	73,3	87,1	100,9	8,0
	270	4	81,3	103,7	121,0	138,2	155,5	330	4	57,0	74,3	91,6	108,9	126,1	8,0
	350	5	100,2	124,4	145,2	165,9	186,6	410	5	68,4	89,2	109,9	130,6	151,4	8,0

This table continues on next page.
Values in the table are valid for predrilled and non predrilled installation.

3.2.4 Glulam Reinforcement

SDCF - Seat Reinforcement

Glulam to Glulam GL24h - $k_{mod}=0.9$ (continued)

Product Reference	Intermediate Support R _{c,d,90} [kN]							End Support R _{c,d,90} [kN]							Min. Thickness t of the Steel Plate [mm]
	Min. l [mm]	Number of Rows	Min. B [mm]					Min. l [mm]	Number of Rows	Min. B [mm]					
			48	72	96	120	144			48	72	96	120	144	
			Screw Qty per Row							Screw Qty per Row					
			1	2	3	4	5			1	2	3	4	5	
SDCF8X220	30	1	24,7	44,9	51,8	58,8	65,7	90	1	24,5	31,4	38,4	45,3	52,2	8,0
	110	2	43,6	67,4	77,8	88,1	98,5	170	2	36,8	47,2	57,5	67,9	78,3	8,0
	190	3	62,4	89,9	103,7	117,5	131,3	250	3	49,1	62,9	76,7	90,5	104,4	8,0
	270	4	81,3	112,3	129,6	146,9	164,2	330	4	61,3	78,6	95,9	113,2	130,5	8,0
	350	5	100,2	134,8	155,5	176,3	197,0	410	5	73,6	94,3	115,1	135,8	156,6	8,0
SDCF8X240	30	1	24,7	48,1	55,3	62,2	69,1	90	1	26,3	33,2	40,1	47,0	53,9	8,0
	110	2	43,6	72,6	82,9	93,3	103,7	170	2	39,4	49,8	60,1	70,5	80,9	8,0
	190	3	62,4	96,8	110,6	124,4	138,2	250	3	52,5	66,4	80,2	94,0	107,8	8,0
	270	4	81,3	121,0	138,2	155,5	172,8	330	4	65,7	82,9	100,2	117,5	134,8	8,0
	350	5	100,2	145,2	165,9	186,6	207,4	410	5	78,8	99,5	120,3	141,0	161,7	8,0
SDCF8X260	30	1	24,7	48,1	58,8	65,7	72,6	90	1	27,2	34,9	41,8	48,7	55,6	8,0
	110	2	43,6	77,8	88,1	98,5	108,9	170	2	42,0	52,4	62,7	73,1	83,5	8,0
	190	3	62,4	103,7	117,5	131,3	145,2	250	3	56,0	69,8	83,6	97,5	111,3	8,0
	270	4	81,3	129,6	146,9	164,2	181,4	330	4	70,0	87,3	104,5	121,8	139,1	8,0
	350	5	100,2	155,5	176,3	197,0	217,7	410	5	84,0	104,7	125,5	146,2	166,9	8,0
SDCF8X300	30	1	24,7	48,1	65,7	72,6	79,5	90	1	27,2	38,4	45,3	52,2	59,1	8,0
	110	2	43,6	85,2	98,5	108,9	119,2	170	2	47,2	57,5	67,9	78,3	88,6	8,0
	190	3	62,4	117,5	131,3	145,2	159,0	250	3	62,9	76,7	90,5	104,4	118,2	8,0
	270	4	81,3	146,9	164,2	181,4	198,7	330	4	78,6	95,9	113,2	130,5	147,7	8,0
	350	5	100,2	176,3	197,0	217,7	238,5	410	5	94,3	115,1	135,8	156,6	177,3	8,0
SDCF8X350	30	1	24,7	48,1	71,5	81,2	88,1	90	1	27,2	42,7	49,6	56,5	63,4	8,0
	110	2	43,6	85,2	111,5	121,8	132,2	170	2	47,2	64,0	74,4	84,8	95,1	8,0
	190	3	62,4	122,2	148,6	162,4	176,3	250	3	67,3	85,4	99,2	113,0	126,8	8,0
	270	4	81,3	159,3	185,8	203,0	220,3	330	4	87,4	106,7	124,0	141,3	158,5	8,0
	350	5	100,2	196,3	222,9	243,6	264,4	410	5	107,3	128,0	148,8	169,5	190,3	8,0
SDCF10X160	30	1	28,0	45,4	56,2	67,0	77,8	90	1	25,9	36,7	47,5	58,3	69,1	8,0
	130	2	48,6	68,0	84,2	100,4	116,6	190	2	38,9	55,1	71,3	87,5	103,7	8,0
	230	3	69,1	90,7	112,3	133,9	155,5	290	3	51,8	73,4	95,0	116,6	138,2	8,0
	330	4	86,4	113,4	140,4	167,4	194,4	390	4	64,8	91,8	118,8	145,8	172,8	8,0
	430	5	103,7	136,1	168,5	200,9	233,3	490	5	77,8	110,2	142,6	175,0	207,4	8,0
SDCF10X200	34	1	32,2	54,0	64,8	75,6	86,4	94	1	30,2	41,0	51,8	62,6	73,4	9,0
	134	2	56,7	81,0	97,2	113,4	129,6	194	2	45,4	61,6	77,8	94,0	110,2	9,0
	234	3	81,3	108,0	129,6	151,2	172,8	294	3	60,5	82,1	103,7	125,3	146,9	9,0
	334	4	105,8	135,0	162,0	189,0	216,0	394	4	75,6	102,6	129,6	156,6	183,6	9,0
	434	5	129,6	162,0	194,4	226,8	259,2	494	5	90,7	123,1	155,5	187,9	220,3	9,0
SDCF10X240	34	1	34,1	62,6	73,4	84,2	95,0	94	1	34,6	45,4	56,2	67,0	77,8	9,0
	134	2	60,5	94,0	110,2	126,4	142,6	194	2	51,8	68,0	84,2	100,4	116,6	9,0
	234	3	87,0	125,3	146,9	168,5	190,1	294	3	69,1	90,7	112,3	133,9	155,5	9,0
	334	4	113,4	156,6	183,6	210,6	237,6	394	4	86,4	113,4	140,4	167,4	194,4	9,0
	434	5	139,9	187,9	220,3	252,7	285,1	494	5	103,7	136,1	168,5	200,9	233,3	9,0

This table continues on next page.
Values in the table are valid for predrilled and non predrilled installation.

3.2.4 Glulam Reinforcement

SDCF - Seat Reinforcement

Glulam to Glulam GL24h - $k_{mod}=0.9$ (continued)

Product Reference	Intermediate Support R _{c,d,90} [kN]							End Support R _{c,d,90} [kN]							Min. Thickness t of the Steel Plate [mm]
	Min. l [mm]	Number of Rows	Min. B [mm]					Min. l [mm]	Number of Rows	Min. B [mm]					
			48	72	96	120	144			48	72	96	120	144	
			Screw Qty per Row							Screw Qty per Row					
			1	2	3	4	5				1	2	3	4	5
SDCF10X280	34	1	34,1	69,1	82,1	92,9	103,7	94	1	38,9	49,7	60,5	71,3	82,1	9,0
	134	2	60,5	106,9	123,1	139,3	155,5	194	2	58,3	74,5	90,7	106,9	123,1	9,0
	234	3	87,0	142,6	164,2	185,8	207,4	294	3	77,8	99,4	121,0	142,6	164,2	9,0
	334	4	113,4	178,2	205,2	232,2	259,2	394	4	97,2	124,2	151,2	178,2	205,2	9,0
	434	5	139,9	213,8	246,2	278,6	311,0	494	5	116,6	149,0	181,4	213,8	246,2	9,0
SDCF10X360	34	1	34,1	69,1	99,4	110,2	121,0	94	1	39,4	58,3	69,1	79,9	90,7	9,0
	134	2	60,5	122,5	149,0	165,2	181,4	194	2	68,5	87,5	103,7	119,9	136,1	9,0
	234	3	87,0	175,8	198,7	220,3	241,9	294	3	95,0	116,6	138,2	159,8	181,4	9,0
	334	4	113,4	221,4	248,4	275,4	302,4	394	4	118,8	145,8	172,8	199,8	226,8	9,0
	434	5	139,9	265,7	298,1	330,5	362,9	494	5	142,6	175,0	207,4	239,8	272,2	9,0
SDCF10X400	34	1	34,1	69,1	104,1	118,8	129,6	94	1	39,4	62,6	73,4	84,2	95,0	9,0
	134	2	60,5	122,5	162,0	178,2	194,4	194	2	68,5	94,0	110,2	126,4	142,6	9,0
	234	3	87,0	175,8	216,0	237,6	259,2	294	3	97,6	125,3	146,9	168,5	190,1	9,0
	334	4	113,4	229,2	270,0	297,0	324,0	394	4	126,8	156,6	183,6	210,6	237,6	9,0
	434	5	139,9	282,6	324,0	356,4	388,8	494	5	155,5	187,9	220,3	252,7	285,1	9,0
SDCF10X450	34	1	34,1	69,1	104,1	129,6	140,4	94	1	39,4	68,0	78,8	89,6	100,4	9,0
	134	2	60,5	122,5	178,2	194,4	210,6	194	2	68,5	102,1	118,3	134,5	150,7	9,0
	234	3	87,0	175,8	237,6	259,2	280,8	294	3	97,6	136,1	157,7	179,3	200,9	9,0
	334	4	113,4	229,2	297,0	324,0	351,0	394	4	126,8	170,1	197,1	224,1	251,1	9,0
	434	5	139,9	282,6	356,4	388,8	421,2	494	5	155,9	204,1	236,5	268,9	301,3	9,0
SDCF12X200	30	1	33,0	67,4	82,9	98,5	114,0	90	1	38,4	53,9	69,5	85,0	100,6	8,0
	150	2	57,1	101,1	124,4	147,7	171,1	210	2	57,5	80,9	104,2	127,5	150,9	8,0
	270	3	81,3	134,8	165,9	197,0	228,1	330	3	76,7	107,8	138,9	170,0	201,1	8,0
	390	4	105,5	168,5	207,4	246,2	285,1	450	4	95,9	134,8	173,7	212,5	251,4	8,0
	510	5	129,7	202,2	248,8	295,5	342,1	570	5	115,1	161,7	208,4	255,1	301,7	8,0
SDCF12X240	34	1	37,1	77,8	93,3	108,9	124,4	94	1	43,5	59,1	74,6	90,2	105,8	9,0
	154	2	65,1	116,6	140,0	163,3	186,6	214	2	65,3	88,6	112,0	135,3	158,6	9,0
	274	3	93,1	155,5	186,6	217,7	248,8	334	3	87,1	118,2	149,3	180,4	211,5	9,0
	394	4	121,0	194,4	233,3	272,2	311,0	454	4	108,9	147,7	186,6	225,5	264,4	9,0
	514	5	149,0	233,3	279,9	326,6	373,2	574	5	130,6	177,3	223,9	270,6	317,3	9,0
SDCF12X280	38	1	41,3	86,9	103,7	119,2	134,8	98	1	48,7	64,3	79,8	95,4	110,9	10,0
	158	2	73,0	132,2	155,5	178,8	202,2	218	2	73,1	96,4	119,8	143,1	166,4	10,0
	278	3	104,8	176,3	207,4	238,5	269,6	338	3	97,5	128,6	159,7	190,8	221,9	10,0
	398	4	136,6	220,3	259,2	298,1	337,0	458	4	121,8	160,7	199,6	238,5	277,3	10,0
	518	5	168,3	264,4	311,0	357,7	404,4	578	5	146,2	192,8	239,5	286,2	332,8	10,0
SDCF12X350	38	1	42,0	88,4	121,8	137,4	152,9	98	1	51,2	73,4	88,9	104,5	120,0	10,0
	158	2	74,6	155,6	182,7	206,1	229,4	218	2	86,7	110,0	133,4	156,7	180,0	10,0
	278	3	107,1	212,5	243,6	274,8	305,9	338	3	115,6	146,7	177,8	208,9	240,0	10,0
	398	4	139,6	265,7	304,6	343,4	382,3	458	4	144,5	183,4	222,3	261,1	300,0	10,0
	518	5	172,1	318,8	365,5	412,1	458,8	578	5	173,4	220,1	266,7	313,4	360,0	10,0

For dimensions and calculation parameters see p. 56.
Values in the table are valid for predrilled and non predrilled installation.

3.2.4 Glulam Reinforcement

SDCF - Seat Reinforcement

Glulam to Glulam GL24h - $k_{mod}=0.9$ (continued)

Product Reference	Intermediate Support R _{c,d,90} [kN]							End Support R _{c,d,90} [kN]							Min. Thickness t of the Steel Plate [mm]
	Min. I [mm]	Number of Rows	Min. B [mm]					Min. I [mm]	Number of Rows	Min. B [mm]					
			48	72	96	120	144			48	72	96	120	144	
			Screw Qty per Row							Screw Qty per Row					
			1	2	3	4	5			1	2	3	4	5	
SDCF12X450	38	1	42,0	88,4	134,7	163,3	178,8	98	1	51,2	86,3	101,9	117,4	133,0	10,0
	158	2	74,6	155,6	221,6	244,9	268,3	218	2	88,3	129,5	152,8	176,1	199,5	10,0
	278	3	107,1	222,7	295,5	326,6	357,7	338	3	125,4	172,6	203,7	234,8	265,9	10,0
	398	4	139,6	289,9	369,4	408,2	447,1	458	4	162,5	215,8	254,7	293,5	332,4	10,0
	518	5	172,1	357,1	443,2	489,9	536,5	578	5	199,6	258,9	305,6	352,3	398,9	10,0
SDCF12X600	38	1	42,0	88,4	134,7	181,0	217,7	98	1	51,2	97,5	121,3	136,9	152,4	10,0
	158	2	74,6	155,6	236,6	303,3	326,6	218	2	88,3	158,6	182,0	205,3	228,6	10,0
	278	3	107,1	222,7	338,4	404,4	435,5	338	3	125,4	211,5	242,6	273,7	304,8	10,0
	398	4	139,6	289,9	440,3	505,4	544,3	458	4	162,5	264,4	303,3	342,1	381,0	10,0
	518	5	172,1	357,1	542,1	606,5	653,2	578	5	199,6	317,3	363,9	410,6	457,2	10,0

For dimensions and calculation parameters see p. 56.
Values in the table are valid for predrilled and non predrilled installation.

3.3 CLT to CLT

General Information about CLT Fastening

CLT is an engineered wood-based material that consists of several layers of solid wood glued together. While the flat sides of the boards are always glued together, the narrow sides can also be unglued, depending on the manufacturer. An uneven number of at least three flat layers of solid wood boards are arranged crosswise and glued together.

The odd number of board layers means that the fibres of the grain direction of the two top layers always run in the same direction. The individual board layers can be of different thicknesses, but they must be symmetrical on both sides, starting from the middle layer.

CLT is basically standardised in EN16351, but the individual products can vary in detail depending on the manufacturer. Therefore, each CLT manufacturer has its own ETA that describes their individual product.

The construction of CLT, similar to plywood, offers the advantage that swelling and shrinkage as well as splitting of the individual layers of wood is hindered by the crosswise gluing and is thereby limited to a minimum. Further advantages are the great dimensional stability and the possibility of producing enormous dimensions of a single panel spanning up to over 20 meters in length and 3,5 meters in width.

Entire building walls can be prefabricated in one piece, transported to the construction site and lifted in place with smaller cranes, thanks to the relatively low weight.

CLT can therefore be used to construct a building in a very short time without time-consuming drying or curing phases. CLT is a panel material with excellent structural static properties and allows loads to be applied in different directions. CLT can therefore be used as a wall or floor element. This means that all the advantages that solid wood has to offer can be fully taken advantage of.

These include, among other things, the simple mechanical ease to fasten, simple connection options on the construction site, favourable physical properties such as good thermal insulation, a positive influence on room

humidity and and favourable fire protection behaviour. In addition to this good ecological balance and a high CO₂ storage volume are important arguments for the decision to construct a building with CLT.

During the construction phase, CLT must be protected from excessive moisture penetration. The use of CLT is only approved for use in service classes 1 and 2. In case of risks of long-lasting changes in humidity in ceiling components in service class 2, extreme deformations may occur.

Different visual demands on the CLT surfaces are described by the categories: 'industrial quality' and 'visible quality'. While the industrial quality is used as a standard for many components that are later covered with cladding, the demands on the surface of a visible quality are significantly higher. When specifying, it must be exactly defined which requirements are to be fulfilled. For very high demands for visibility, the elements can be covered with thinner, so-called "3-layer plates" from the interior as a good alternative to a visible element.

In order to mechanically connect individual CLT components with other components, a number of boundary conditions must be followed and suitable connectors and fasteners must be used. On the following pages fasteners suitable for cross laminated timber elements are listed and presented.

Wood is an anisotropic material, meaning that it has different mechanical properties depending on the direction of the fibres. These properties result in the different spacing requirements for the different fasteners.

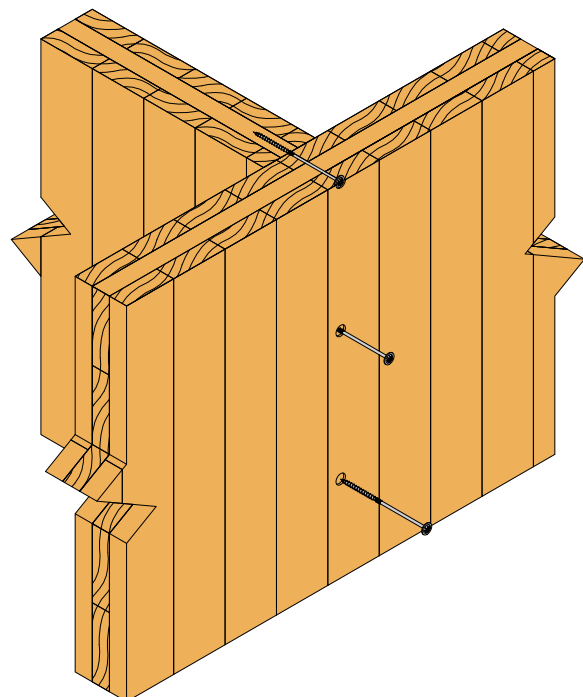
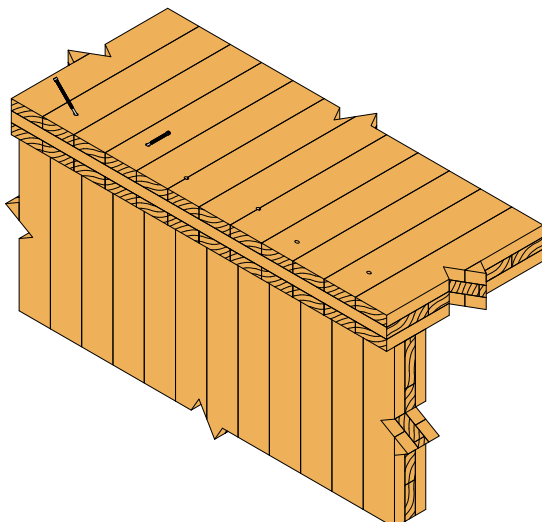
In the case of CLT, the crosswise arrangement of the individual board layers results in a reduction of the the required spacing dimensions compared to solid wood, however it cannot be assumed that a connection that works for solid timber automatically works for CLT connections as well.

90° T-Connections Between CLT Panels

A 90° T-connection between CLT panels is created when two CLT panels need to be fastened with each other, either in a wall-to-wall connection or in a floor-to-wall connection.

In wall-to-wall connections the SWW washer-head screw is recommended due to its extreme pull-through resistance. The washer head simply pulls the wall elements together, creating a firm assembly.

When fastening a floor-to-wall connection, 45° cross screwing with either double- or full-threaded screws is recommended.



3.3 CLT to CLT

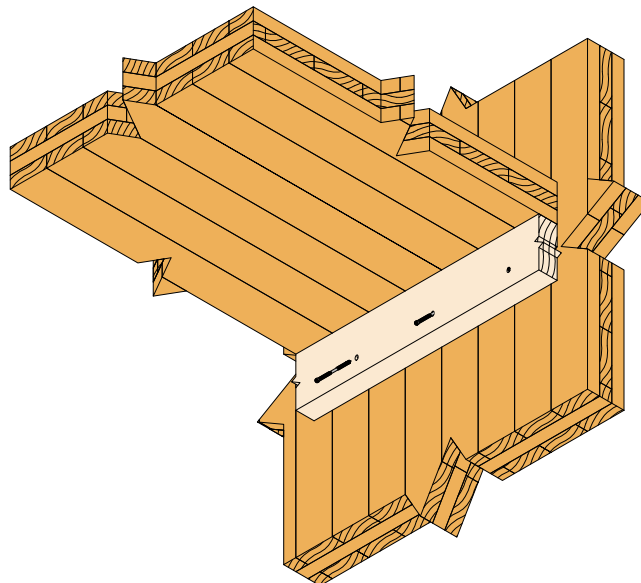
Solid Timber Wall-Plate to CLT Panel

For installing a floor panel on the inside of wall panels, an effective method is to install a wall-plate to hold to floor panel.

The wall-plate can be installed both with screws installed at 90° into the wallplate or it can be installed with a 45° inclined installation.

For 90° installation, countersunk or washer-head partially threaded screws are recommended.

For 45° installation, cylinder-head screws with either double- or fully threaded are recommended.

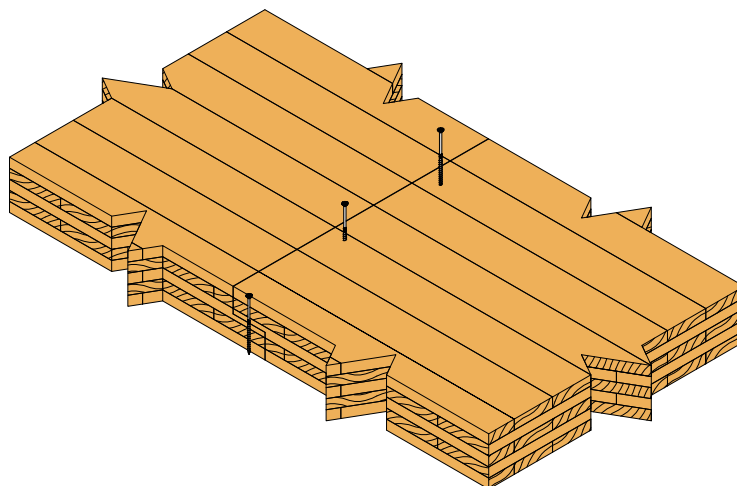


CLT Half-Lap Connection

There are several ways of connecting floor panels that butt up against each other.

CLT panels can be ordered from the manufacturer with a cut-out to create the so-called half-lap connections. A simple method where the panels are overlapping each other and the panels can be connected with screws installed vertically 90° with either countersunk or washer-head screws.

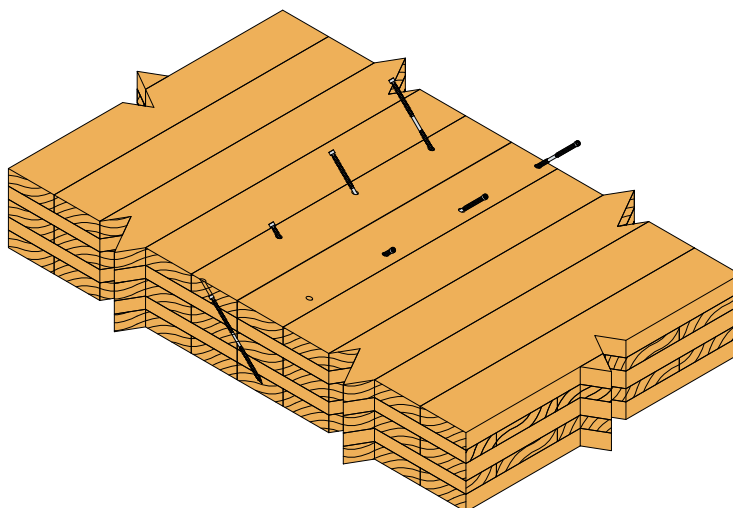
Half-lap connections can also be made with 45° cross pairs using double- or fully threaded screws.



CLT Butt-Joint Connection

Alternatively to half-lap connections, a butt-joint connection can be made. In this case, the panels are not prepared by the CLT manufacturer so the panels simply have to butt up against each other and be connected with 45° cross pairs or with angled 45° cross pairs.

In both cases, cylinder-head double- or fully threaded screws are recommended.



3.3 CLT to CLT

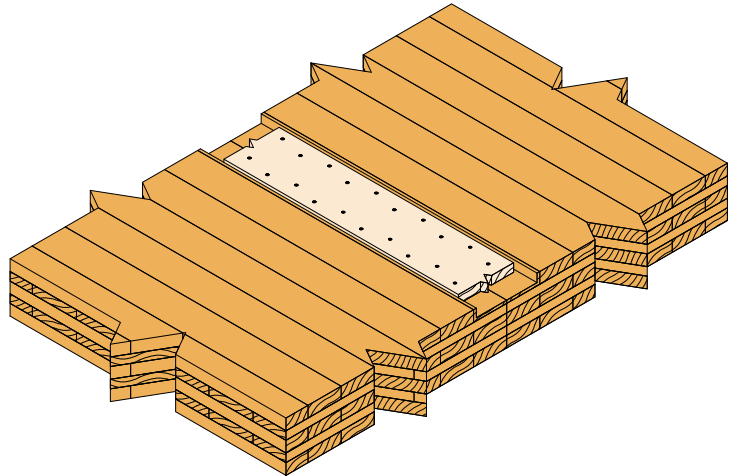
Board Spline to CLT Panels

A third alternative to half-lap and butt joints are to create a spline using either boards or metal plates.

OSB and plywood boards can be used.

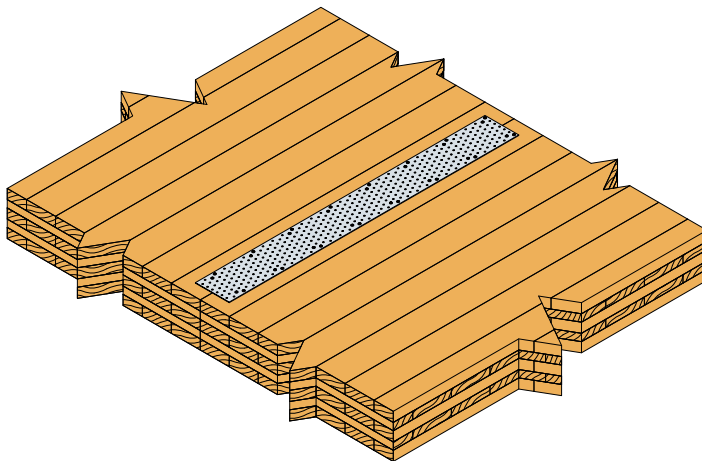
The CLT panels are prepared by the manufacturer with a cut-out making room for the board spline. The boards are fastening countersunk timber screws.

The Quik Drive system is very useful for this purpose as many screws can be installed with precision, in a short amount of time.



CLT Connections Including Metal- See Chapter 'Steel to Timber'

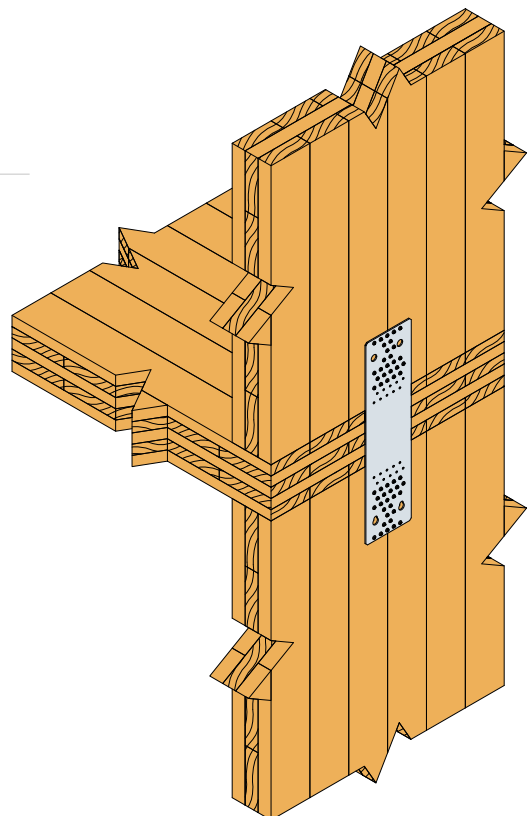
Using steel connectors and metal plates to install CLT panels is also very common and can in many cases be a good and cost-efficient fastening method. In the chapter steel to timber you can find the values for using steel connectors to timber.



Metal Spline to CLT Panels

In the same way as the board spline, a metal plate is used, fastened with CSA connector screws or CNA connector nails.

For CSA screws we recommend the use of the Quik Drive system that considerably eases repetitive fastening.



CLT Connections made with Simpson Strong-Tie Connectors

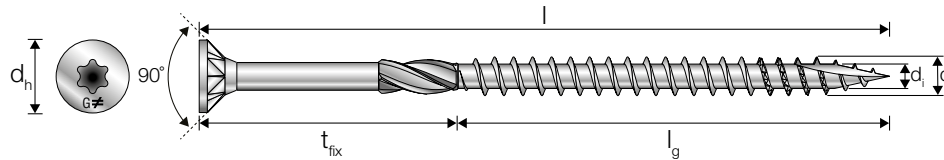
Simpson Strong-Tie offers a range of heavy-duty CLT connectors designed to create strong connections in CLT construction.

Find out more about these applications on our website strongtie.eu or in our CLT catalogue.

3.3.1 90° T-Connections Between CLT Panels

Solid-Drive™TTUFS Countersunk **WOOD** Screw
for T-Connections Between CLT PanelsElectro Galvanised
C1 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5UK
CA

ETA-21/0670

TTUFS - 90° T-Connections Between CLT Panel - Screws at 90°
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

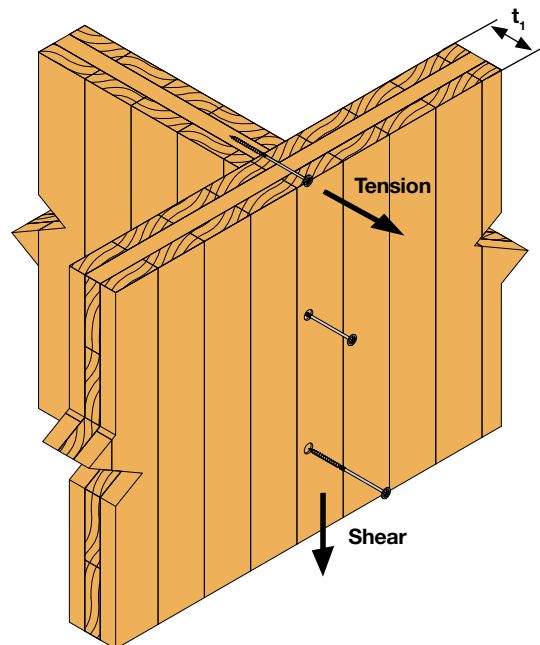
Product Reference	Tension Capacity $R_{ax,k}$ Shear Capacity $R_{v,k}$ Depending on the Thickness of the Panel [kN] - Screws at 90°											
	Head side CLT panel thickness t_{CLT} [mm]											
	80		100		120		140		160		180	
	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$
TTUFS6.0X120	2,23	1,64 1,58	-	-	-	-	-	-	-	-	-	-
TTUFS6.0X140	2,23	1,94 1,73	2,23	1,64 1,58	-	-	-	-	-	-	-	-
TTUFS6.0X160	2,23	1,94 1,77	2,23	1,94 1,84	2,23	1,64 1,58	-	-	-	-	-	-
TTUFS6.0X180	2,23	1,94 1,84	2,23	1,94 1,84	2,23	1,94 1,84	2,23	1,64 1,58	-	-	-	-

For dimensions and calculation parameters see p. 40.

Tension capacity $R_{ax,k}$		
↓		
Characteristic capacities	2,23	1,94
		1,84
		↑
Shear capacity $R_{v,k}$		

With pre-drill
Without pre-drill

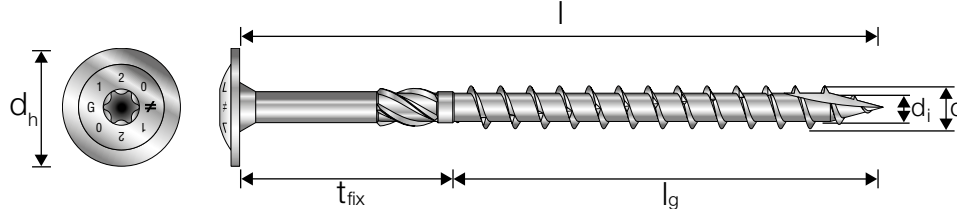
For pre-drilling recommendations see page 21.



3.3.1 90° T-Connections Between CLT Panels

Solid-Drive™SWW Washer-Head **WOOD** Screw
for T-Connections Between CLT PanelsElectro Galvanised*
C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5UK
CA

ETA-21/0670

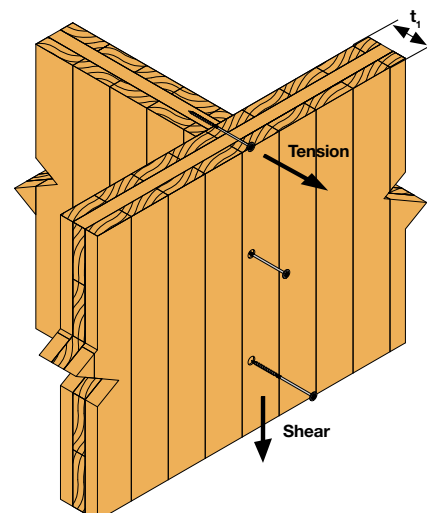
SWW - 90° T-Connection Between CLT Panels - Screws at 90°
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Tension Capacity $R_{ax,k}$ Shear Capacity $R_{v,k}$ Depending on the Thickness of the Panel [kN] - Screws at 90°																							
	Head side CLT panel thickness t_{CLT} [mm]																							
	80	100	120	140	160	180	200	220	240	260	280	300	80	100	120	140	160	180	200	220	240	260	280	300
	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$
SWW6,0X120	2,32	1,69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW6,0X140	3,16	2,20	2,32	1,69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW6,0X160	3,16	2,24	3,16	2,24	2,32	1,69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW6,0X180	3,16	2,24	3,16	2,24	3,16	2,20	2,32	1,69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW6,0X200	3,16	2,24	3,16	2,24	3,16	2,24	2,20	2,32	1,69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW6,0X220	3,16	2,24	3,16	2,24	3,16	2,24	2,24	2,13	1,63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW6,0X240	3,16	2,24	3,16	2,24	3,16	2,24	2,24	2,13	1,63	2,32	1,69	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW6,0X260	3,16	2,24	3,16	2,24	3,16	2,24	2,24	2,13	1,63	2,32	1,69	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW6,0X280	3,16	2,24	3,16	2,24	3,16	2,24	2,24	2,13	1,63	2,32	1,69	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW6,0X300	3,16	2,24	3,16	2,24	3,16	2,24	2,24	2,13	1,63	2,32	1,69	-	-	-	-	-	-	-	-	-	-	-	-	-

Table continues on next page.

Tension capacity $R_{ax,k}$			
Characteristic capacities	3,16	2,24	With pre-drill
		2,14	Without pre-drill
		Shear capacity $R_{v,k}$	

For pre-drilling recommendations see page 21.



*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses. Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

3.3.1 90° T-Connections Between CLT Panels

SWW - 90° T-Connection Between CLT Panels - Screws at 90°
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$ (cont.)

Product Reference	Tension Capacity $R_{ax,k}$ Shear Capacity $R_{v,k}$ Depending on the Thickness of the Panel [kN] - Screws at 90°																							
	Head side CLT panel thickness t_{CLT} [mm]																							
	80	100	120	140	160	180	200	220	240	260	280	300	80	100	120	140	160	180	200	220	240	260	280	300
	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$
SWW8,0X140	4,21	2,97 2,46	2,92	2,26 2,26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW8,0X160	5,08	3,45 2,72	4,21	2,97 2,80	2,26	2,26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW8,0X180	5,08	3,48 2,81	5,08	3,52 3,04	4,21	2,97 2,86	2,26	2,26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW8,0X200	5,08	3,54 2,92	5,08	3,76 3,09	5,08	3,52 3,37	4,21	2,97 2,86	2,26	2,26	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW8,0X220	5,08	3,63 3,05	5,08	3,76 3,17	5,08	3,76 3,40	5,08	3,52 3,41	4,21	2,97 2,86	2,26	2,26	-	-	-	-	-	-	-	-	-	-	-	-
SWW8,0X240	5,08	3,74 3,20	5,08	3,76 3,27	5,08	3,76 3,45	5,08	3,76 3,57	5,08	3,52 3,41	4,21	2,97 2,86	2,26	2,26	-	-	-	-	-	-	-	-	-	-
SWW8,0X260	5,08	3,76 3,52	5,08	3,76 3,40	5,08	3,76 3,53	5,08	3,76 3,57	5,08	3,52 3,41	4,21	2,97 2,86	2,26	2,26	-	-	-	-	-	-	-	-	-	-
SWW8,0X280	5,08	3,76 3,57	5,08	3,76 3,53	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,52 3,41	4,21	2,97 2,86	2,26	2,26	-	-	-	-
SWW8,0X300	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	4,21	2,97 2,86	2,26	2,26	-	-
SWW8,0X320	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,52 3,41	4,21	2,97 2,86	2,26	2,26
SWW8,0X340	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,52 3,41	4,21	2,97 2,86	2,26	2,26
SWW8,0X360	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,52 3,41	4,21	2,97 2,86
SWW8,0X380	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,52 3,41
SWW8,0X400	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,76 3,57	5,08	3,52 3,41

Table continues on next page.

Tension capacity $R_{ax,k}$

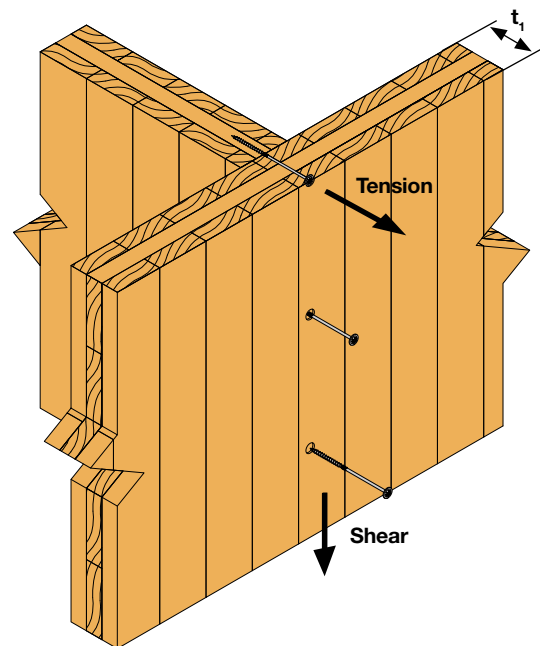
Characteristic capacities

5,08	3,76
5,08	3,57

With pre-drill
Without pre-drill

Shear capacity $R_{v,k}$

For pre-drilling recommendations see page 21.

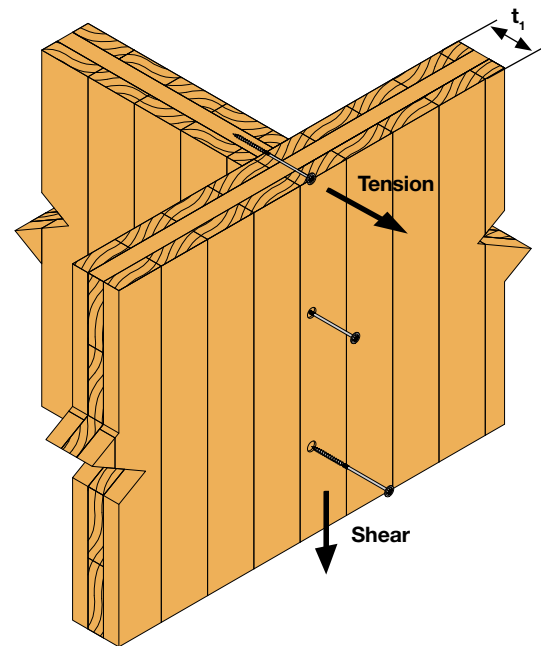
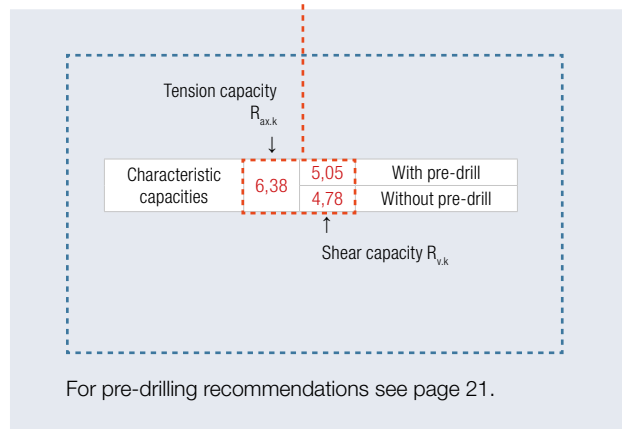


3.3.1 90° T-Connections Between CLT Panels

SWW - 90° T-Connection Between CLT Panels - Screws at 90°
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$ (cont.)

Product Reference	Tension Capacity $R_{ax,k}$ Shear Capacity $R_{v,k}$ Depending on the Thickness of the Panel [kN] - Screws at 90°																							
	Head side CLT panel thickness t_{CLT} [mm]																							
	80		100		120		140		160		180		200		220		240		260		280		300	
	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$
SWW10,0X140	5,03	3,70 2,88	3,49	2,53 2,53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW10,0X160	6,38	4,23 3,27	5,03	3,70 3,28	3,49	2,53 2,53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW10,0X180	6,38	4,24 3,36	6,38	4,36 3,63	5,03	3,70 3,55	3,49	2,53 2,53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW10,0X200	6,38	4,30 3,48	6,38	4,75 3,69	6,38	4,36 4,02	5,03	3,70 3,55	3,49	2,53 2,53	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWW10,0X220	6,38	4,39 3,62	6,38	4,90 3,77	6,38	4,75 4,05	6,38	4,36 4,20	5,03	3,70 3,55	3,49	2,53 2,53	-	-	-	-	-	-	-	-	-	-	-	-
SWW10,0X240	6,38	4,50 3,79	6,38	4,94 3,89	6,38	5,05 4,10	6,38	4,75 4,43	6,38	4,36 4,20	5,03	3,70 3,55	3,49	2,53 2,53	-	-	-	-	-	-	-	-	-	-
SWW10,0X260	6,38	4,63 3,96	6,38	5,01 4,02	6,38	5,05 4,19	6,38	5,05 4,46	6,38	4,75 4,58	6,38	4,36 4,20	5,03	3,70 3,55	3,49	2,53 2,53	-	-	-	-	-	-	-	-
SWW10,0X280	6,38	4,78 4,15	6,38	5,05 4,17	6,38	5,05 4,30	6,38	5,05 4,52	6,38	4,75 4,78	6,38	4,36 4,58	5,03	3,70 3,55	3,49	2,53 2,53	-	-	-	-	-	-	-	-
SWW10,0X300	6,38	4,94 4,34	6,38	5,05 4,33	6,38	5,05 4,42	6,38	5,05 4,61	6,38	5,05 4,78	6,38	4,75 4,78	6,38	4,36 4,58	5,03	3,70 3,55	3,49	2,53 2,53	-	-	-	-	-	-
SWW10,0X320	6,38	5,05 4,54	6,38	5,05 4,51	6,38	5,05 4,56	6,38	5,05 4,71	6,38	5,05 4,78	6,38	4,75 4,78	6,38	4,36 4,58	5,03	3,70 3,55	3,49	2,53 2,53	-	-	-	-	-	-
SWW10,0X340	6,38	5,05 4,75	6,38	5,05 4,69	6,38	5,05 4,72	6,38	5,05 4,78	6,38	5,05 4,78	6,38	4,75 4,78	6,38	4,36 4,58	5,03	3,70 3,55	3,49	2,53 2,53	-	-	-	-	-	-
SWW10,0X360	6,38	5,05 4,78	6,38	5,05 4,78	6,38	5,05 4,78	6,38	5,05 4,78	6,38	5,05 4,78	6,38	4,75 4,78	6,38	4,36 4,58	5,03	3,70 3,55	3,49	2,53 2,53	-	-	-	-	-	-
SWW10,0X380	6,38	5,05 4,78	6,38	5,05 4,78	6,38	5,05 4,78	6,38	5,05 4,78	6,38	5,05 4,78	6,38	4,75 4,78	6,38	4,36 4,58	5,03	3,70 3,55	3,49	2,53 2,53	-	-	-	-	-	-
SWW10,0X400	6,38	5,05 4,78	6,38	5,05 4,78	6,38	5,05 4,78	6,38	5,05 4,78	6,38	5,05 4,78	6,38	4,75 4,78	6,38	4,36 4,58	5,03	3,70 3,55	3,49	2,53 2,53	-	-	-	-	-	-

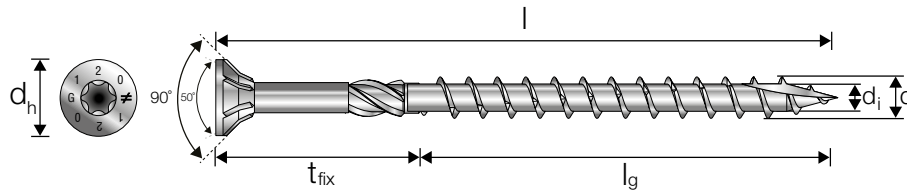
For dimensions and calculation parameters see p. 44.



3.3.1 90° T-Connections Between CLT Panels

Solid-Drive™SWC Countersunk **WOOD** Screw
for T-Connections Between CLT PanelsElectro Galvanised*
C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

ETA-21/0670

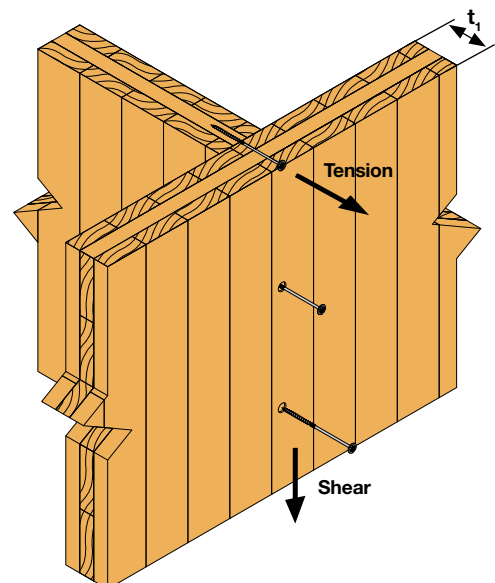
SWC - 90° T-Connection Between CLT Panels - Screws at 90°
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Tension Capacity $R_{ax,k}$ Shear Capacity $R_{v,k}$ Depending on the Thickness of the Panel [kN] - Screws at 90°																							
	Head side CLT panel thickness t_{CLT} [mm]																							
	80		100		120		140		160		180		200		220		240		260		280		300	
	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$
SWC6,0X120	1,66	1,52 1,47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC6,0X140	1,66	1,82 1,58	1,66	1,52 1,47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC6,0X160	1,66	1,86 1,63	1,66	1,82 1,75	1,66	1,52 1,47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC6,0X180	1,66	1,86 1,71	1,66	1,87 1,77	1,66	1,82 1,75	1,66	1,52 1,47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC6,0X200	1,66	1,86 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,82 1,75	1,66	1,52 1,47	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC6,0X220	1,66	1,86 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,82 1,75	1,66	1,52 1,47	-	-	-	-	-	-	-	-	-	-	-	-
SWC6,0X240	1,66	1,86 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,82 1,75	1,66	1,52 1,47	-	-	-	-	-	-	-	-	-	-
SWC6,0X260	1,66	1,86 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,82 1,75	1,66	1,52 1,47	-	-	-	-	-	-	-	-
SWC6,0X280	1,66	1,86 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,82 1,75	1,66	1,52 1,47	-	-	-	-	-	-
SWC6,0X300	1,66	1,86 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,87 1,77	1,66	1,82 1,75	1,66	1,52 1,47	-	-	-	-

Table continues on next page.

Tension capacity $R_{ax,k}$		
Characteristic capacities	1,66	1,87
	1,66	1,77
Shear capacity $R_{v,k}$		
With pre-drill		
Without pre-drill		

For pre-drilling recommendations see page 21.



3.3.1 90° T-Connections Between CLT Panels

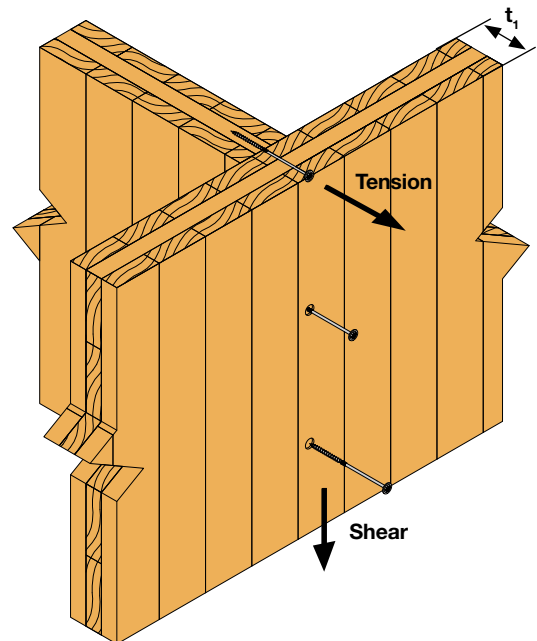
SWC - 90° T-Connection Between CLT Panels - Screws at 90°
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$ (cont.)

Product Reference	Tension Capacity $R_{ax,k}$ Shear Capacity $R_{v,k}$ Depending on the Thickness of the Panel [kN] - Screws at 90°																							
	Head side CLT panel thickness t_{CLT} [mm]																							
	80	100	120	140	160	180	200	220	240	260	280	300	80	100	120	140	160	180	200	220	240	260	280	300
	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$
SWC8,0X140	2,66	2,58 2,07	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC8,0X160	2,66	2,85 2,12	2,66	2,58 2,41	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC8,0X180	2,66	2,88 2,2	2,66	2,92 2,43	2,66	2,58 2,47	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC8,0X200	2,66	2,94 2,32	2,66	3,16 2,48	2,66	2,92 2,76	2,66	2,58 2,47	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC8,0X220	2,66	3,02 2,45	2,66	3,16 2,57	2,66	3,16 2,79	2,66	2,92 2,8	2,66	2,58 2,47	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-	-	-
SWC8,0X240	2,66	3,13 2,59	2,66	3,16 2,67	2,66	3,16 2,85	2,66	3,16 2,97	2,66	2,92 2,8	2,66	2,58 2,47	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-
SWC8,0X260	2,66	3,16 2,75	2,66	3,16 2,79	2,66	3,16 2,93	2,66	3,16 2,97	2,66	2,92 2,8	2,66	2,58 2,47	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-
SWC8,0X280	2,66	3,16 2,92	2,66	3,16 2,93	2,66	3,16 2,97	2,66	3,16 2,97	2,66	2,92 2,8	2,66	2,58 2,47	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-
SWC8,0X300	2,66	3,16 2,97	2,66	3,16 2,97	2,66	3,16 2,97	2,66	3,16 2,97	2,66	2,92 2,8	2,66	2,58 2,47	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-
SWC8,0X320	2,66	3,16 2,97	2,66	3,16 2,97	2,66	3,16 2,97	2,66	3,16 2,97	2,66	2,92 2,8	2,66	2,58 2,47	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-
SWC8,0X340	2,66	3,16 2,97	2,66	3,16 2,97	2,66	3,16 2,97	2,66	3,16 2,97	2,66	2,92 2,8	2,66	2,58 2,47	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-
SWC8,0X360	2,66	3,16 2,97	2,66	3,16 2,97	2,66	3,16 2,97	2,66	3,16 2,97	2,66	2,92 2,8	2,66	2,58 2,47	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-
SWC8,0X380	2,66	3,16 2,97	2,66	3,16 2,97	2,66	3,16 2,97	2,66	3,16 2,97	2,66	2,92 2,8	2,66	2,58 2,47	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-
SWC8,0X400	2,66	3,16 2,97	2,66	3,16 2,97	2,66	3,16 2,97	2,66	3,16 2,97	2,66	2,92 2,8	2,66	2,58 2,47	2,66	2,26 2,23	-	-	-	-	-	-	-	-	-	-

Table continues on next page.

Tension capacity $R_{ax,k}$		
↓		
Characteristic capacities	2,66	3,16
		2,97
		↑
Shear capacity $R_{v,k}$		
With pre-drill		
Without pre-drill		

For pre-drilling recommendations see page 21.



3.3.1 90° T-Connections Between CLT Panels

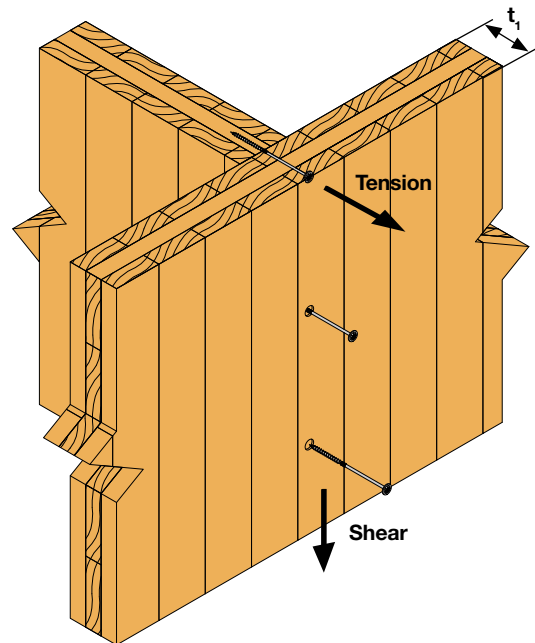
SWC - 90° T-Connection Between CLT Panels - Screws at 90°
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$ (cont.)

Product Reference	Tension Capacity $R_{ax,k}$ Shear Capacity $R_{v,k}$ Depending on the Thickness of the Panel [kN] - Screws at 90°																							
	Head side CLT panel thickness t_{CLT} [mm]																							
	80	100	120	140	160	180	200	220	240	260	280	300	80	100	120	140	160	180	200	220	240	260	280	300
	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$
SWC10,0X140	3,55	3,33 2,51	3,49	2,53 2,53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC10,0X160	3,55	3,52 2,56	3,55	3,33 2,91	3,49	2,53 2,53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC10,0X180	3,55	3,54 2,65	3,55	3,65 2,92	3,55	3,33 3,18	3,49	2,53 2,53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC10,0X200	3,55	3,59 2,77	3,55	4,04 2,98	3,55	3,65 3,31	3,55	3,33 3,18	3,49	2,53 2,53	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC10,0X220	3,55	3,68 2,92	3,55	4,19 3,07	3,55	4,04 3,34	3,55	3,65 3,49	3,55	3,33 3,18	3,49	2,53 2,53	-	-	-	-	-	-	-	-	-	-	-	-
SWC10,0X240	3,55	3,79 3,08	3,55	4,24 3,18	3,55	4,35 3,4	3,55	4,04 3,72	3,55	3,65 3,49	3,55	3,33 3,18	3,49	2,53 2,53	-	-	-	-	-	-	-	-	-	-
SWC10,0X260	3,55	3,92 3,25	3,55	4,31 3,31	3,55	4,35 3,48	3,55	4,35 3,75	3,55	4,04 3,87	3,55	3,65 3,49	3,55	3,33 3,18	3,49	2,53 2,53	-	-	-	-	-	-	-	-
SWC10,0X280	3,55	4,07 3,44	3,55	4,35 3,46	3,55	4,35 3,59	3,55	4,35 3,81	3,55	4,35 4,07	3,55	4,04 3,87	3,55	3,65 3,49	3,55	3,33 3,18	3,49	2,53 2,53	-	-	-	-	-	-
SWC10,0X300	3,55	4,23 3,63	3,55	4,35 3,63	3,55	4,35 3,71	3,55	4,35 3,9	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,04 3,87	3,55	3,65 3,49	3,55	3,33 3,18	3,49	2,53 2,53	-	-	-	-
SWC10,0X320	3,55	4,35 3,83	3,55	4,35 3,8	3,55	4,35 3,86	3,55	4,35 4	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,04 3,87	3,55	3,65 3,49	3,55	3,33 3,18	3,49	2,53 2,53	-	-
SWC10,0X340	3,55	4,35 4,04	3,55	4,35 3,98	3,55	4,35 4,01	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,04 3,87	3,55	3,65 3,49	3,55	3,33 3,18	3,49	2,53 2,53
SWC10,0X360	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,04 3,87	3,55	3,65 3,49	3,55	3,33 3,18
SWC10,0X380	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,04 3,87	3,55	3,65 3,49
SWC10,0X400	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,35 4,07	3,55	4,04 3,87

For dimensions and calculation parameters see p. 48.

Tension capacity $R_{ax,k}$		
Characteristic capacities		
3,55	4,35	With pre-drill
	4,07	Without pre-drill
Shear capacity $R_{v,k}$		

For pre-drilling recommendations see page 21.



3.3.1 90° T-Connections Between CLT Panels

Minimum Distances for Screws
90° Angles Between CLT Panels

TTUFS

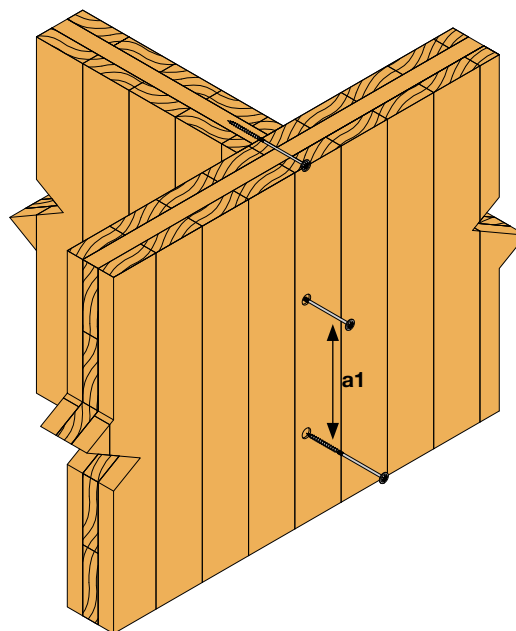
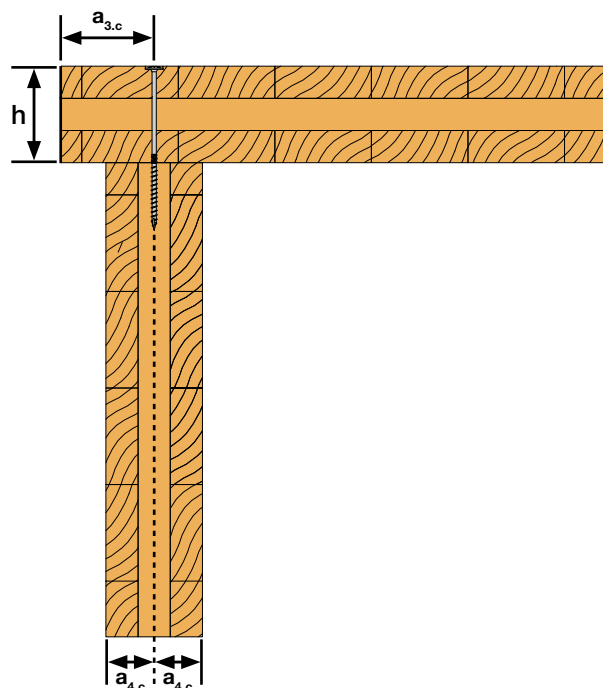
Diameter	a_1	$a_{3,c}$	$a_{4,c}$
6.0	60	36	18

SWW

Diameter	a_1	$a_{3,c}$	$a_{4,c}$
6.0	60	36	18
8.0	80	48	24
10.0	100	60	30

SWC

Diameter	a_1	$a_{3,c}$	$a_{4,c}$
6.0	60	36	18
8.0	80	48	24
10.0	100	60	30



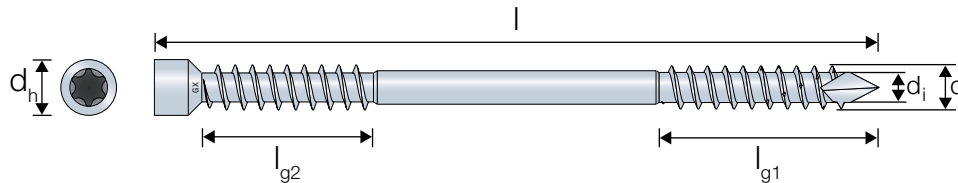
3.3.1 90° T-Connections Between CLT Panels

Solid-Drive™SWD Double Threaded **WOOD** Screw
for T-Connections Between CLT Panels

Protec® +

C3 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5UK
CA

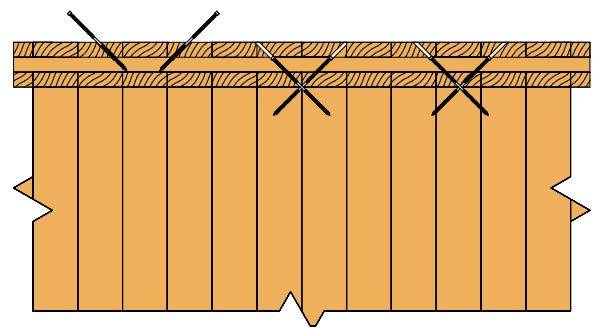
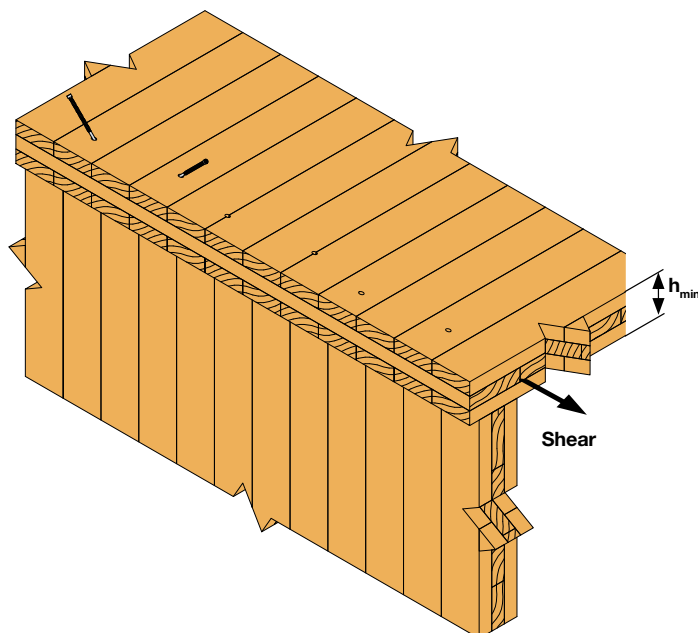
ETA-21/0670



SWD - 90° T-Connection Between CLT Panels -
45° Cross Pairs, CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Minimum thickness $h_{\min}$	Shear capacity $R_{v,k} = \min(R_{w,k,\text{pair}}; R_{\text{buck},k,\text{pair}})$ [kN]
		$R_{v,k}$
SWD6.5X65	65	1,9
SWD6.5X90	65	2,8
SWD6.5X130	65	2,8
SWD6.5X160	67	4,6
SWD6.5X190	78	5,6
SWD6.5X220	88	6,7
SWD8.0X90	80	3,1
SWD8.0X130	80	3,1
SWD8.0X160	80	5,2
SWD8.0X190	80	6,5
SWD8.0X220	88	7,7
SWD8.0X245	97	8,7
SWD8.0X275	108	8,7
SWD8.0X300	117	10,9
SWD8.0X330	127	10,9

For dimensions and calculation parameters see p. 50.



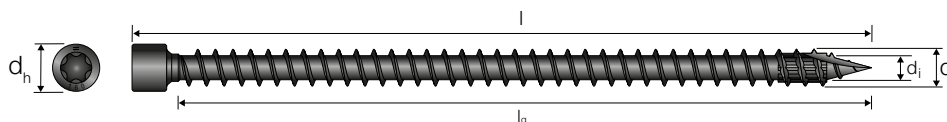
3.3.1 90° T-Connections Between CLT Panels

Solid-Drive™SDCFC Fully Threaded **WOOD** Screw
for T-Connections Between CLT Panels

Black E-Coat

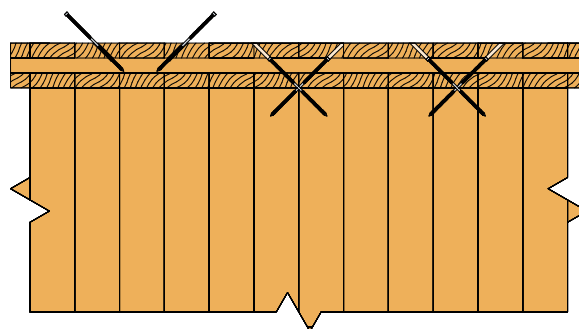
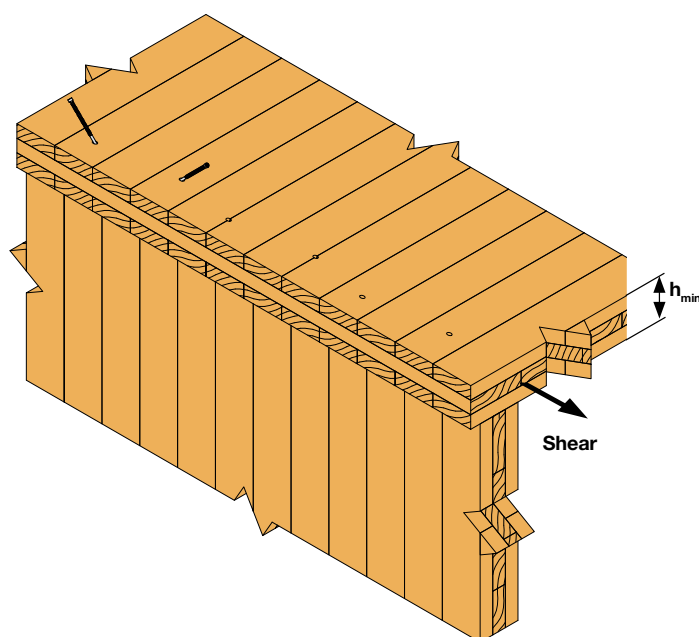
C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

ETA-21/0670

SDCFC - 90° Angles Between CLT Panels -
45° Cross Pairs, CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Minimum thickness $h_{\min}$	Shear capacity $R_{v,k} = \min(R_{w,k,\text{pair}}; R_{\text{buck},k,\text{pair}})$ [kN]
		$R_{v,k}$
SDCFC8X120	80	7,8
SDCFC8X160	80	10,6
SDCFC8X200	81	13,4
SDCFC8X240	95	16,3
SDCFC8X280	109	$\min(19,1; 9,55 + 10,14 / k_{\text{mod}})$
SDCFC8X330	127	$\min(22,6; 11,32 + 10,14 / k_{\text{mod}})$
SDCFC8X350	134	$\min(24; 12,02 + 10,14 / k_{\text{mod}})$
SDCFC10X240	100	19,6
SDCFC10X300	117	24,7
SDCFC10X380	145	$\min(31,6; 15,78 + 14,67 / k_{\text{mod}})$
SDCFC10X500	187	$\min(40,8; 20,41 + 14,67 / k_{\text{mod}})$
SDCFC10X600	223	$\min(43,4; 21,71 + 14,67 / k_{\text{mod}})$
SDCFC10X800	293	$\min(35,6; 17,8 + 13,65 / k_{\text{mod}})$

For dimensions and calculation parameters see p. 58.



3.3.1 90° T-Connections Between CLT Panels

Minimum Distances for Screws

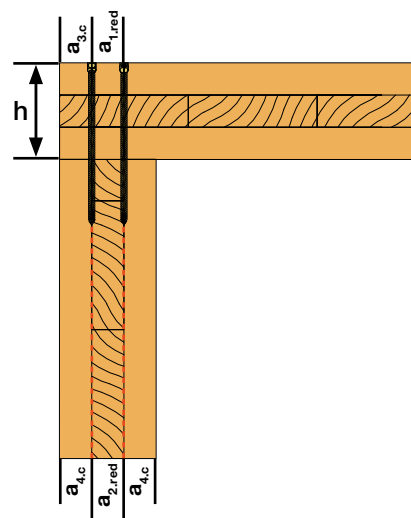
90° Angles Between CLT Panels - 45° Cross Pairs

SWD

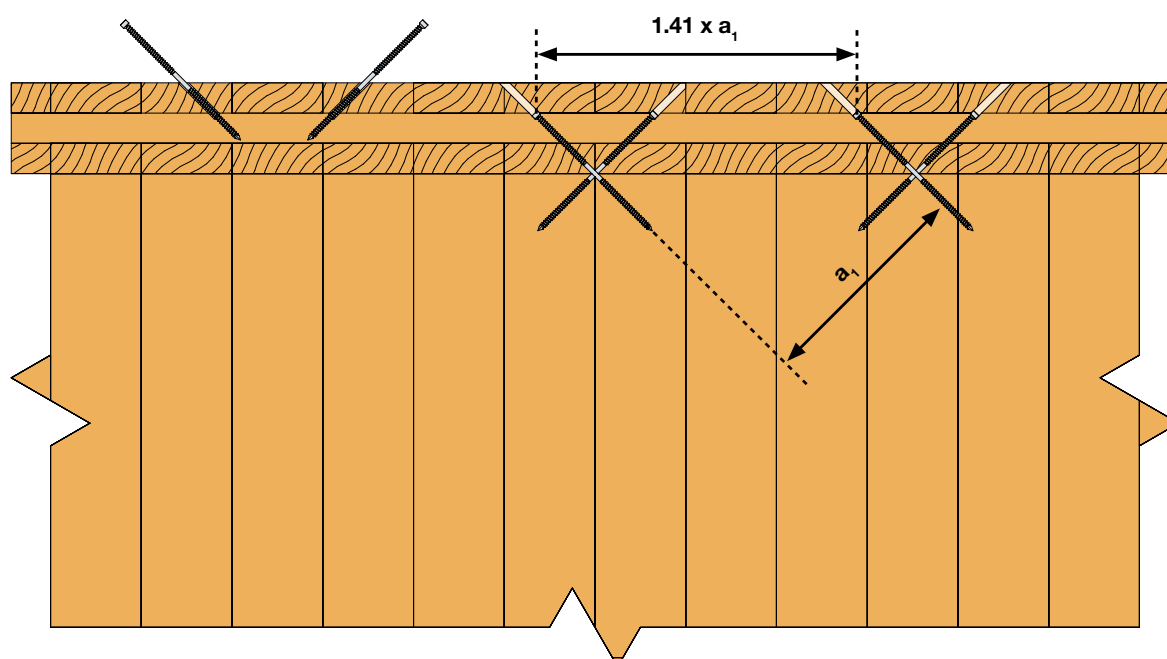
Diameter	a_1	$a_{1,red}$	$a_{2,red}$	$a_{3,c}$	$a_{4,c}$
6.5	26	65	26	39	39
8.0	32	80	32	48	48

SDCFC

Diameter	a_1	$a_{1,red}$	$a_{2,red}$	$a_{3,c}$	$a_{4,c}$
8.0	32	80	32	48	48
10.0	40	100	40	60	60



See General Introduction chapter pages 27-28.



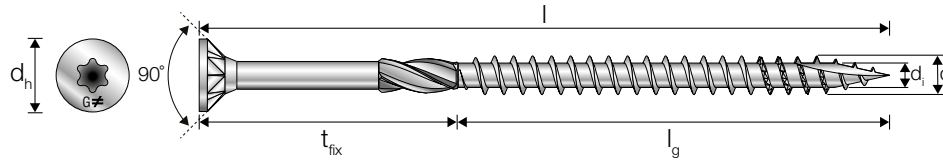
3.3.2 Solid Timber Wall-Plate to CLT Panel

Solid-Drive™TTUFS Countersunk **WOOD** Screw
for Solid-Timber Wall-Plate to CLT Panel

Electro Galvanised

C1 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

ETA-21/0670



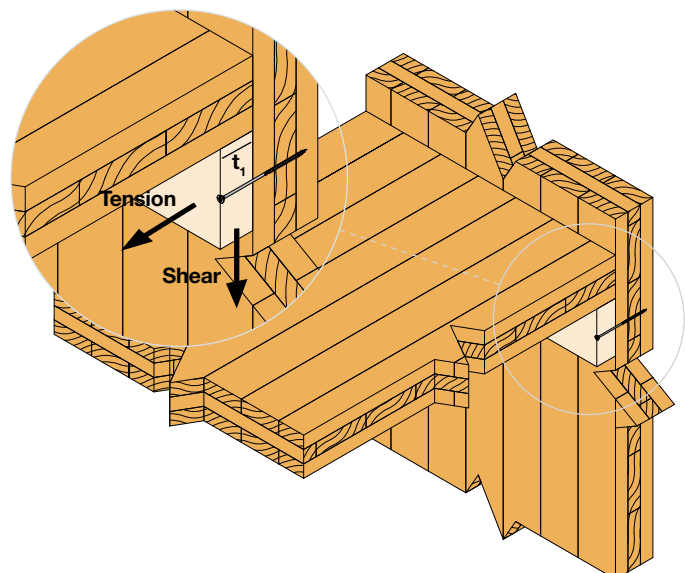
TTUFS - Solid-Timber Wall-Plate to CLT Panel - Screws at 90°
Solid Timber C24 to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Thread Length L_s [mm]	Max Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ Shear Capacity $R_{v,k}$ Depending on the Thickness of the Wall Plate [kN] - Screws at 90°																	
			Wall-Plate Thickness t_{wp} [mm]																	
			36		45		50		60		63		70		75		80		100	
			$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$
TTUFS5.0X80	40	40	1,54	1,86	1,54	1,87	1,54	1,93	1,07	1,65	-	-	-	-	-	-	-	-	-	-
			1,64	1,64	1,64	1,64	1,54	1,54	1,31	1,31	-	-	-	-	-	-	-	-	-	-
TTUFS5.0X90	45	45	1,54	1,94	1,54	1,94	1,54	1,94	1,54	1,94	1,41	1,92	1,07	1,65	-	-	-	-	-	-
			1,64	1,64	1,64	1,64	1,64	1,64	1,54	1,54	1,47	1,47	1,31	1,31	-	-	-	-	-	-
TTUFS5.0X100	60	40	1,54	1,94	1,54	1,94	1,54	1,94	1,54	1,94	1,54	1,94	1,54	1,94	1,31	1,85	1,07	1,65	-	-
			1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,54	1,54	1,42	1,42	1,31	1,31	-	-
TTUFS5.0X120	60	60	1,54	1,94	1,54	1,94	1,54	1,94	1,54	1,94	1,54	1,94	1,54	1,94	1,54	1,94	1,54	1,94	1,07	1,65
			1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,64	1,31	1,31
TTUFS6.0X80	40	40	2,23	2,24	2,06	2,25	1,79	2,31	-	-	-	-	-	-	-	-	-	-	-	-
			2,09	2,09	2,06	2,06	1,92	1,92	-	-	-	-	-	-	-	-	-	-	-	-
TTUFS6.0X90	45	45	2,23	2,5	2,23	2,43	2,23	2,45	1,79	2,57	1,63	2,39	-	-	-	-	-	-	-	-
			2,09	2,09	2,15	2,15	2,15	2,15	1,92	1,92	1,8	1,8	-	-	-	-	-	-	-	-
TTUFS6.0X100	60	40	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,16	2,57	1,79	2,57	1,52	2,26	-	-	-	-
			2,09	2,09	2,15	2,15	2,15	2,15	2,15	2,15	2,12	2,12	1,92	1,92	1,71	1,71	-	-	-	-
TTUFS6.0X120	70	50	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	-	-
			2,09	2,09	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	-	-
TTUFS6.0X140	70	70	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57
			2,09	2,09	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15
TTUFS6.0X160	70	90	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57
			2,09	2,09	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15
TTUFS6.0X180	70	110	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57	2,23	2,57
			2,09	2,09	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15	2,15

For dimensions and calculation parameters see p. 40.

Tension capacity $R_{ax,k}$		
Characteristic capacities	2,23	2,57
	2,15	2,57
Shear capacity $R_{v,k}$		
With pre-drill		
Without pre-drill		

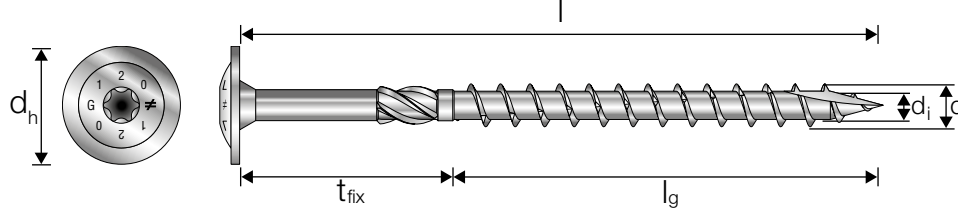
For pre-drilling recommendations see page 21.



3.3.2 Solid Timber Wall-Plate to CLT Panel

Solid-Drive™SWW Washer-Head **WOOD** Screw
for Solid-Timber Wall-Plate to CLT PanelElectro Galvanised*
C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

ETA-21/0670

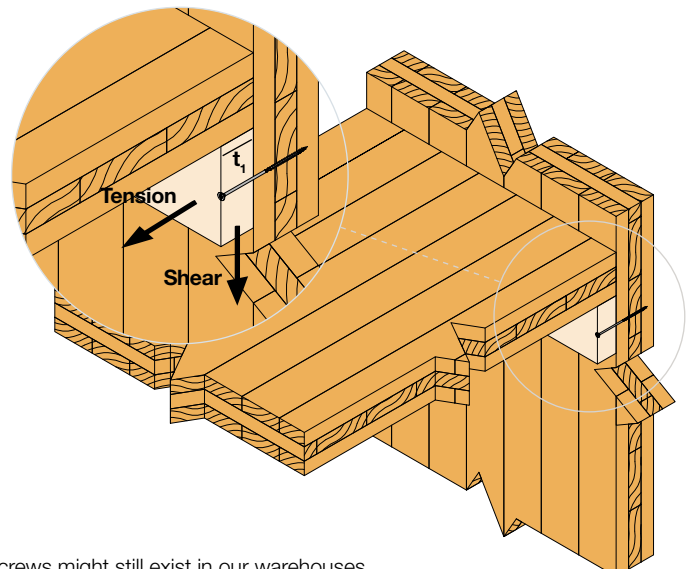
SWW - Solid-Timber Wall-Plate to CLT Panel - Screws at 90°
Solid Timber C24 to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Thread Length L_s [mm]	Max Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ Shear Capacity $R_{v,k}$ Depending on the Thickness of the Wall Plate [kN] - Screws at 90°																	
			Wall-Plate Thickness t_{wp} [mm]																	
			36		45		50		60		63		70		75		80		100	
			$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$
SWW6.0X100	50	50	3,16	2,91 2,35	3,16	2,89 2,46	3,16	2,87 2,46	3,12	2,9 2,45	2,89	2,84 2,31	2,34	2,63 1,98	1,95	2,32 1,76	-	-	-	-
SWW6.0X120	50	70	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,12	2,9 2,45	-	-
SWW6.0X140	70	70	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,12	2,9 2,45
SWW6.0X160	70	90	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X180	70	110	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X200	70	130	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X220	70	150	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X240	70	170	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X260	70	190	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X280	70	210	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46
SWW6.0X300	70	230	3,16	2,91 2,35	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46	3,16	2,91 2,46

Table continues on next page.

Tension capacity $R_{ax,k}$		
Characteristic capacities	3,16	2,14
		2,16
		With pre-drill
		Without pre-drill
Shear capacity $R_{v,k}$		

For pre-drilling recommendations see page 21.



*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses. Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

3.3.2 Solid Timber Wall-Plate to CLT Panel

SWW - Solid-Timber Wall-Plate to CLT Panel - Screws at 90°
Solid Timber C24 to CLT $\rho_k = 350 \text{ kg/m}^3$ (cont.)

Product Reference	Thread Length L_s [mm]	Max Advised Wood Thickness t_{fix} [mm]	Tension Capacity $R_{ax,k}$ Shear Capacity $R_{v,k}$ Depending on the Thickness of the Wall Plate [kN] - Screws at 90°																	
			Wall-Plate Thickness t_{wp} [mm]																	
			36		45		50		60		63		70		75		80		100	
			$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$	$R_{ax,k}$	$R_{v,k}$
SWW8.0X100	50	50	5,04	3,98 3,49	5,04	3,83 3,76	5,04	3,81 3,81	4,03	3,64 3,35	3,73	3,63 3,19	-	-	-	-	-	-	-	-
SWW8.0X120	80	40	5,08	4,64 3,5	5,08	4,49 3,77	4,83	4,4 3,94	5,08	4,33 4,17	5,08	4,33 4,17	5,04	4,39 3,93	4,54	4,35 3,64	4,03	4,35 3,35	-	-
SWW8.0X140	80	60	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	4,9 4,17	5,08	4,87 4,17	5,08	4,84 4,17	5,08	4,85 4,17	5,08	4,9 4,17	4,03	4,61 3,35
SWW8.0X160	80	80	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X180	80	100	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X200	80	120	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X220	80	140	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X240	80	160	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X260	80	180	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X280	80	200	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X300	80	220	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X320	80	240	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X340	80	260	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X360	80	280	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X380	80	300	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW8.0X400	80	320	5,08	4,64 3,5	5,08	5,07 3,77	5,08	5,07 3,94	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17	5,08	5,07 4,17
SWW10.0X100	50	50	6,1	4,7 4,44	6,1	4,53 4,53	6,1	4,5 4,5	4,88	4,3 4,25	-	-	-	-	-	-	-	-	-	-
SWW10.0X120	50	70	6,1	5,58 4,44	6,1	5,29 4,72	6,1	5,18 4,89	6,1	5,1 5,1	6,1	5,11 5,11	6,1	5,18 4,89	5,49	5,14 4,56	4,88	5,13 4,25	-	-
SWW10.0X140	80	60	6,38	6,02 4,51	6,38	6,21 4,79	6,38	6,05 4,96	6,38	5,84 5,34	6,38	5,8 5,46	6,38	5,77 5,67	6,38	5,78 5,54	6,38	5,84 5,34	4,88	5,9 4,25
SWW10.0X160	80	80	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,92 4,96	6,38	6,61 5,34	6,38	6,54 5,46	6,38	6,42 5,67	6,38	6,38 5,67	6,38	6,36 5,67	6,38	6,61 5,34
SWW10.0X180	80	100	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,01 5,67	6,38	7,01 5,67
SWW10.0X200	80	120	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X220	80	140	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X240	80	160	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X260	80	180	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X280	80	200	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X300	80	220	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X320	80	240	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X340	80	260	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X360	80	280	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X380	80	300	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67
SWW10.0X400	80	320	6,38	6,02 4,51	6,38	6,63 4,79	6,38	6,99 4,96	6,38	7,06 5,34	6,38	7,06 5,46	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67	6,38	7,06 5,67

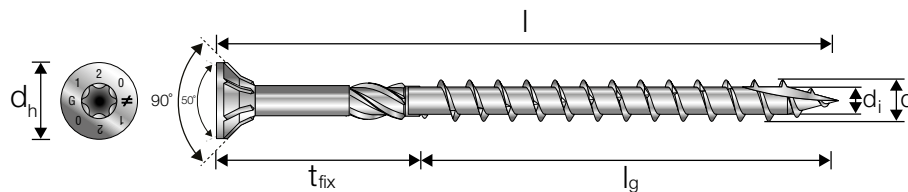
3.3.2 Solid Timber Wall-Plate to CLT Panel

Solid-Drive™

SWC Countersunk WOOD Screw for Solid-Timber Wall-Plate to CLT Panel

Electro Galvanised*
 C2 acc. to EN ISO 12944-2
 SC2 – 50 years acc. to EC5


ETA-21/0670



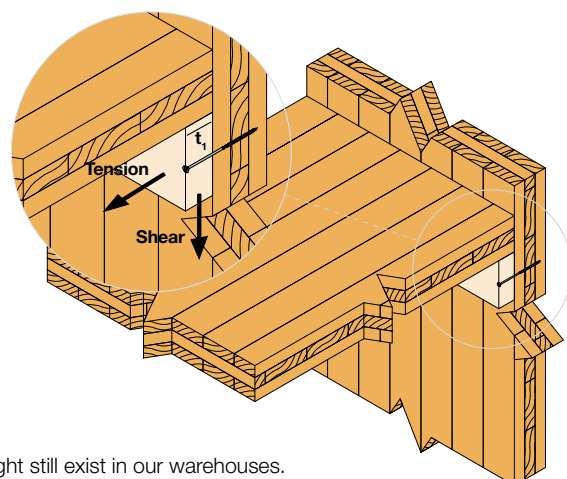
SWC - Solid-Timber Wall-Plate to CLT Panel - Screws at 90°
 Solid Timber C24 to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Thread Length L _g [mm]	Max Advised Wood Thickness t _{fix} [mm]	Tension Capacity R _{ax,k} Shear Capacity R _{v,k} Depending on the Thickness of the Wall Plate [kN] - Screws at 90°																	
			Wall-Plate Thickness t _{wp} [mm]																	
			36		45		50		60		63		70		75		80		100	
			R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}
SWC6.0X80	50	30	1,66	2,1 1,97	1,66	2,1 1,94	1,66	2,17 1,81	-	-	-	-	-	-	-	-	-	-	-	
SWC6.0X100	50	50	1,66	2,54 1,97	1,66	2,52 2,09	1,66	2,5 2,09	1,66	2,54 2,09	1,66	2,54 2	1,66	2,46 1,81	1,52	2,24 1,69	-	-	-	-
SWC6.0X120	50	70	1,66	2,54 1,97	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	-	-
SWC6.0X140	70	70	1,66	2,54 1,97	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09
SWC6.0X160	70	90	1,66	2,54 1,97	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09
SWC6.0X180	70	110	1,66	2,54 1,97	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09
SWC6.0X200	70	130	1,66	2,54 1,97	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09
SWC6.0X220	70	150	1,66	2,54 1,97	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09
SWC6.0X240	70	170	1,66	2,54 1,97	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09
SWC6.0X260	70	190	1,66	2,54 1,97	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09
SWC6.0X280	70	210	1,66	2,54 1,97	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09
SWC6.0X300	70	230	1,66	2,54 1,97	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09	1,66	2,54 2,09

Table continues on next page.

Tension capacity $R_{ax,k}$		
Characteristic capacities	1,66	2,54
		2,09
		↑
Shear capacity $R_{v,k}$		
		With pre-drill
		Without pre-drill

For pre-drilling recommendations see page 21.



*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses. Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

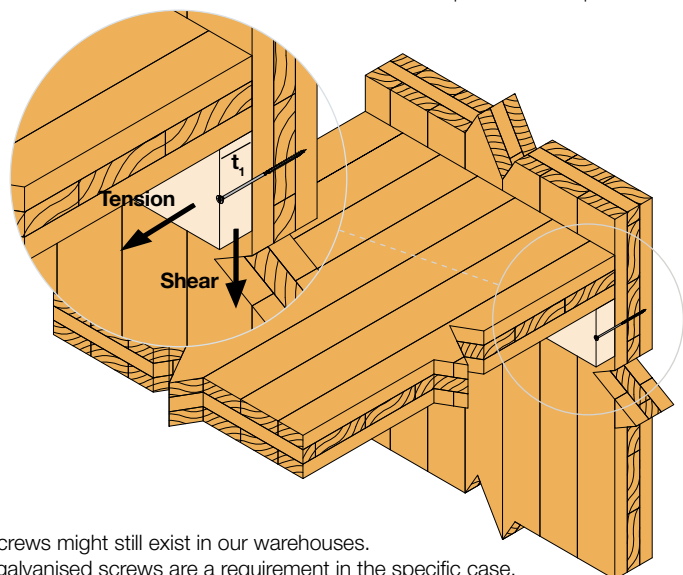
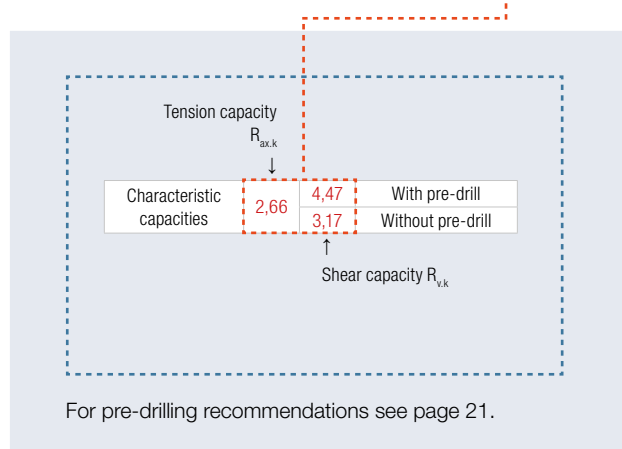
3.3.2 Solid Timber Wall-Plate to CLT Panel

SWC - Solid-Timber Wall-Plate to CLT Panel - Screws at 90°

Solid Timber C24 to CLT $\rho_k = 350 \text{ kg/m}^3$ (cont.)

Product Reference	Thread Length L _g [mm]	Max Advised Wood Thickness t _{fix} [mm]	Tension Capacity R _{ax,k} Shear Capacity R _{v,k} Depending on the Thickness of the Wall Plate [kN] - Screws at 90°																	
			Wall-Plate Thickness t _{wp} [mm]																	
			36		45		50		60		63		70		75		80		100	
			R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}	R _{ax,k}	R _{v,k}
SWC8.0X80	50	30	2,66	2,72 2,72	2,59	2,73 2,73	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SWC8.0X90	50	40	2,66	3,04 2,9	2,66	2,96 2,96	2,66	2,98 2,98	-	-	-	-	-	-	-	-	-	-	-	-
SWC8.0X100	50	50	2,66	3,38 2,9	2,66	3,23 3,17	2,66	3,21 3,21	2,66	3,3 3,01	2,66	3,36 2,92	-	-	-	-	-	-	-	-
SWC8.0X120	80	40	2,66	4,03 2,9	2,66	3,88 3,17	2,66	3,8 3,33	2,66	3,72 3,57	2,66	3,73 3,57	2,66	3,8 3,33	2,66	3,88 3,17	2,66	4,01 3,01	-	-
SWC8.0X140	80	60	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,29 3,57	2,66	4,26 3,57	2,66	4,23 3,57	2,66	4,25 3,57	2,66	4,29 3,57	2,66	4,27 3,01
SWC8.0X160	80	80	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X180	80	100	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X200	80	120	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X220	80	140	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X240	80	160	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X260	80	180	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X280	80	200	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X300	80	220	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X320	80	240	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X340	80	260	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X360	80	280	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X380	80	300	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57
SWC8.0X400	80	320	2,66	4,03 2,9	2,66	4,47 3,17	2,66	4,47 3,33	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57	2,66	4,47 3,57

For dimensions and calculation parameters see p. 48.



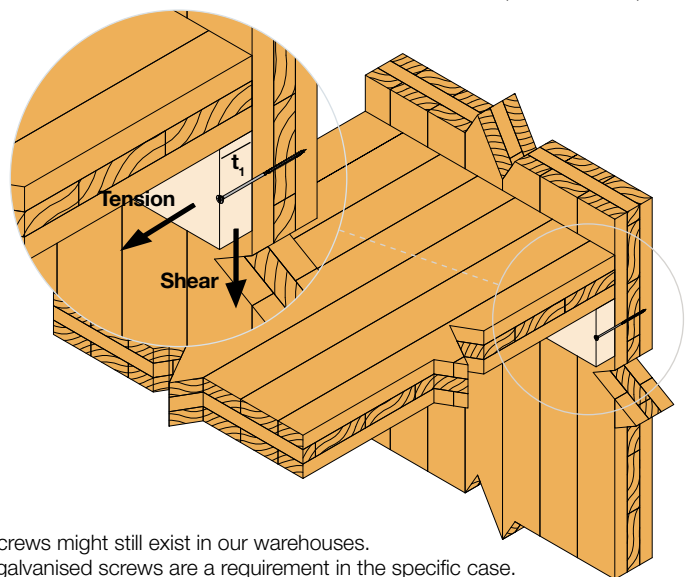
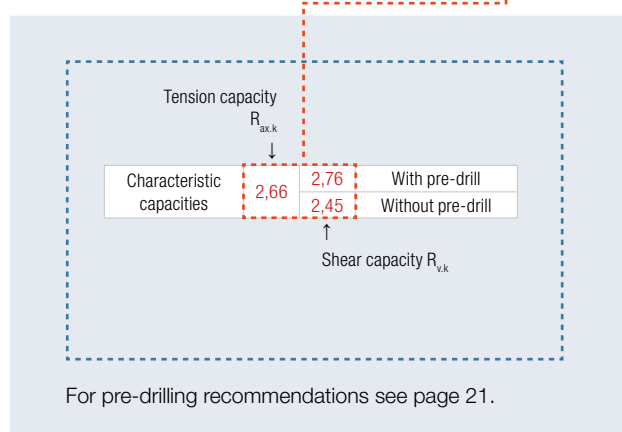
*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses. Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

3.3.2 Solid Timber Wall-Plate to CLT Panel

SWC - Solid-Timber Wall-Plate to CLT Panel - Screws at 90°
Solid Timber C24 to CLT $\rho_k = 350 \text{ kg/m}^3$ (cont.)

Product Reference	Thread Length L _g [mm]	Max Advised Wood Thickness t _{fix} [mm]	Tension Capacity R _{ax,k} Shear Capacity R _{vk} Depending on the Thickness of the Wall Plate [kN] - Screws at 90°																	
			Wall-Plate Thickness t _{wp} [mm]																	
			36		45		50		60		63		70		75		80		100	
R _{ax,k}	R _{vk}	R _{ax,k}	R _{vk}	R _{ax,k}	R _{vk}	R _{ax,k}	R _{vk}	R _{ax,k}	R _{vk}	R _{ax,k}	R _{vk}	R _{ax,k}	R _{vk}	R _{ax,k}	R _{vk}	R _{ax,k}	R _{vk}	R _{ax,k}	R _{vk}	
SWC10.0X100	50	50	3,55	4,06 3,81	3,55	3,89 3,89	3,55	3,87 3,87	3,49	3,97 3,92	-	-	-	-	-	-	-	-	-	
SWC10.0X120	50	70	3,55	4,94 3,81	3,55	4,65 4,08	3,55	4,55 4,25	3,55	4,46 4,46	3,55	4,47 4,47	3,55	4,55 4,25	3,55	4,65 4,08	3,49	4,8 3,92	-	-
SWC10.0X140	80	60	3,55	5,31 3,81	3,55	5,51 4,08	3,55	5,35 4,25	3,55	5,13 4,63	3,55	5,09 4,75	3,55	5,06 4,97	3,55	5,08 4,83	3,55	5,13 4,63	3,49	5,57 3,92
SWC10.0X160	80	80	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,22 4,25	3,55	5,91 4,63	3,55	5,84 4,75	3,55	5,72 4,97	3,55	5,67 4,97	3,55	5,65 4,97	3,55	5,91 4,63
SWC10.0X180	80	100	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,31 4,97	3,55	6,31 4,97
SWC10.0X200	80	120	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97
SWC10.0X220	80	140	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97
SWC10.0X240	80	160	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97
SWC10.0X260	80	180	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97
SWC10.0X280	80	200	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97
SWC10.0X300	80	220	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97
SWC10.0X320	80	240	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97
SWC10.0X340	80	260	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97
SWC10.0X360	80	280	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97
SWC10.0X380	80	300	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97
SWC10.0X400	80	320	3,55	5,31 3,81	3,55	5,92 4,08	3,55	6,28 4,25	3,55	6,35 4,63	3,55	6,35 4,75	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97	3,55	6,35 4,97

For dimensions and calculation parameters see p. 48.



*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses. Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

3.3.2 Solid Timber Wall-Plate to CLT Panel

Minimum Distances for Screws Wall-Plate to CLT Panel

TTUFS

Diameter	Pre-drill*	$a_{4,c}$	$a_{4,t}$
5.0	With pre-drill	15	35
	Without pre-drill	25	35
6.0	With pre-drill	18	42
	Without pre-drill	30	42

*If Pre-drill - just the wall plate

SWW

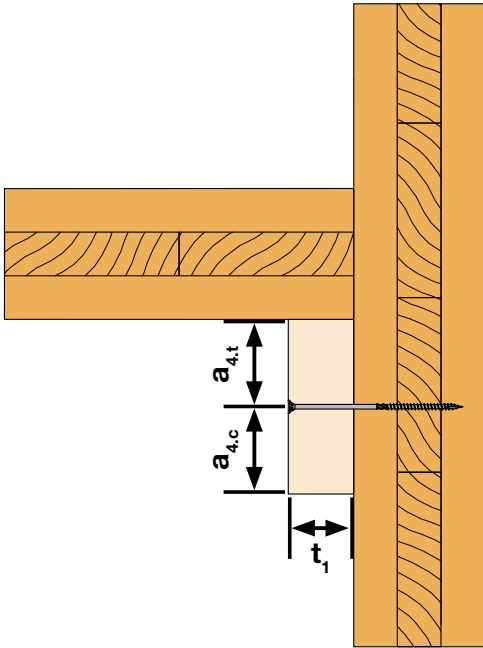
Diameter	Pre-drill*	$a_{4,c}$	$a_{4,t}$
6.0	With pre-drill	18	42
	Without pre-drill	30	42
8.0	With pre-drill	24	56
	Without pre-drill	40	56
10.0	With pre-drill	30	70
	Without pre-drill	50	70

*If Pre-drill - just the wall plate

SWC

Diameter	Pre-drill*	$a_{4,c}$	$a_{4,t}$
6.0	With pre-drill	18	42
	Without pre-drill	30	42
8.0	With pre-drill	24	56
	Without pre-drill	40	56
10.0	With pre-drill	30	70
	Without pre-drill	50	70

*If Pre-drill - just the wall plate



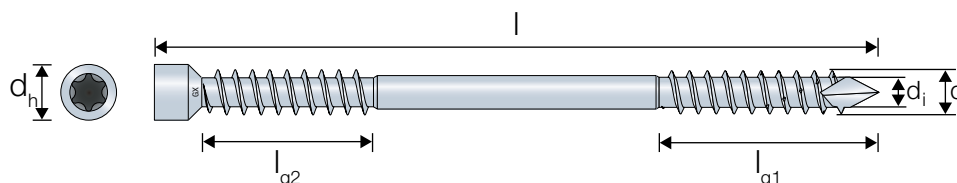
3.3.2 Solid Timber Wall-Plate to CLT Panel

Solid-Drive™SWD Double Threaded **WOOD** Screw
for Solid-Timber Wall-Plate to CLT Panel

Protec® +

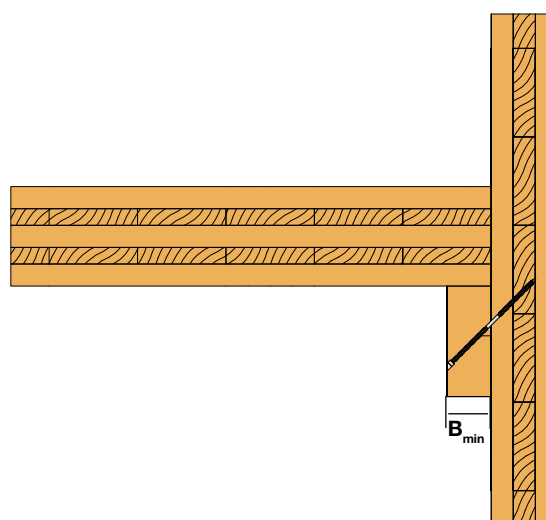
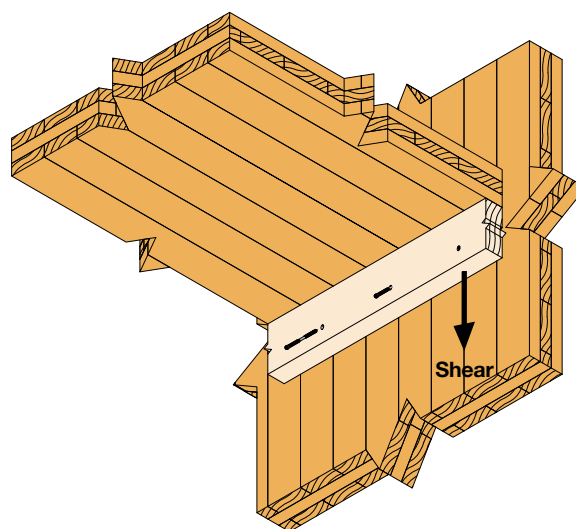
C3 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

ETA-21/0670



SWD - Solid-Timber Wall-Plate to CLT Panel - Screws at 45°
Solid Timber C24 to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Minimum Wall Plate Thickness	Shear Capacity $R_{v,45,k}$ [kN] - Screws at 45°
	B_{min} [mm]	
SWD6.5X65	65	1,8
SWD6.5X90	65	2,5
SWD6.5X130	78	2,5
SWD6.5X160	91	4,1
SWD6.5X190	107	5
SWD6.5X220	122	6
SWD8.0X90	80	3
SWD8.0X130	80	3
SWD8.0X160	91	4,8
SWD8.0X190	107	5,9
SWD8.0X220	122	7
SWD8.0X245	136	7,9
SWD8.0X275	157	7,9
SWD8.0X300	165	10
SWD8.0X330	186	10



For dimensions and calculation parameters see p. 50.

3.3.2 Solid Timber Wall-Plate to CLT Panel

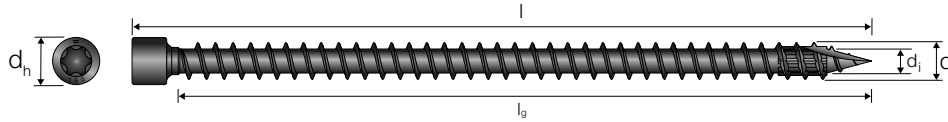
Solid-Drive™

SDCFC Fully Threaded **WOOD** Screw for Solid-Timber Wall-Plate to CLT Panel

Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

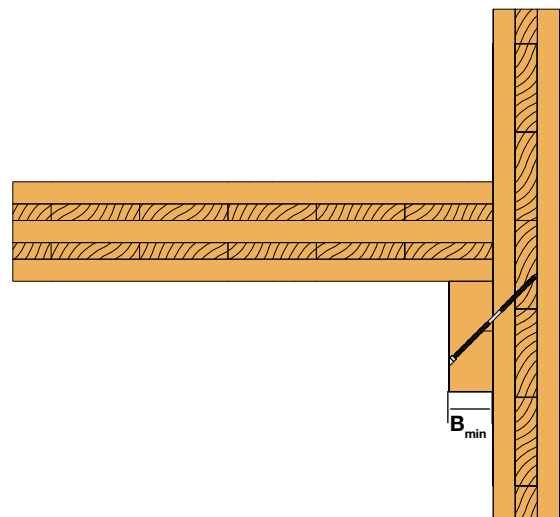
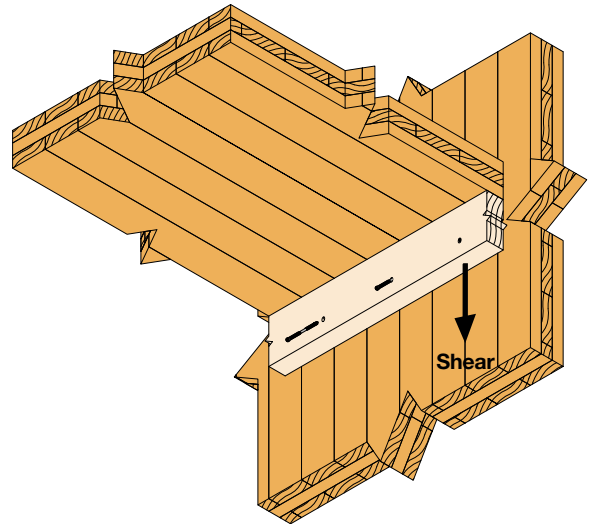
ETA-21/0670



SDCFC- Solid-Timber Wall-Plate to CLT Panel - Screws at 45°
Solid Timber C24 to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Minimum Wall Plate Thickness	Shear Capacity $R_{v,45,k}$ [kN] - Screws at 45°
	B_{min} [mm]	
SDCFC8X120	80	4,2
SDCFC8X160	80	5,7
SDCFC8X200	80	7,2
SDCFC8X240	85	8,7
SDCFC8X280	99	10,2
SDCFC8X330	117	12,1
SDCFC8X350	124	12,9
SDCFC10X240	100	10,5
SDCFC10X300	107	13,2
SDCFC10X380	135	16,9

For dimensions and calculation parameters see p. 58.



3.3.2 Solid Timber Wall-Plate to CLT Panel

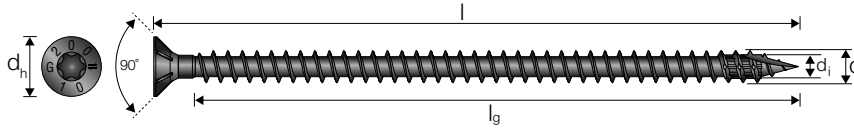
Solid-Drive™

SDCF Fully Threaded **WOOD** Screw for Solid-Timber Wall-Plate to CLT Panel

Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

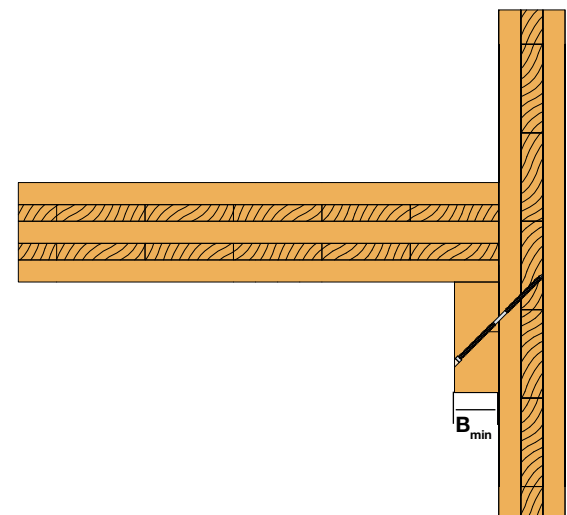
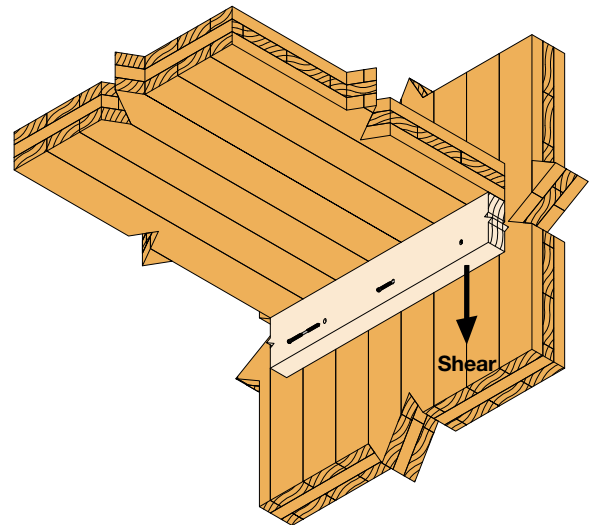
ETA-21/0670



SDCF - Solid-Timber Wall-Plate to CLT Panel - Screws at 45°
Solid Timber C24 to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Minimum Wall Plate Thickness	Shear Capacity $R_{v,45,k}$ [kN] - Screws at 45°
	B_{min} [mm]	
SDCF8X160	80	5,3
SDCF8X180	80	6,1
SDCF8X200	80	6,8
SDCF8X220	80	7,6
SDCF8X240	85	8,3
SDCF8X260	92	9,1
SDCF8X300	107	10,6
SDCF8X350	124	12,5
SDCF10X200	100	8,1
SDCF10X240	100	9,9
SDCF10X280	100	11,8
SDCF10X360	128	15,4
SDCF10X400	142	17,3
SDCF10X450	160	18,5
SDCF12X240	120	8,7
SDCF12X280	120	10,5
SDCF12X350	124	13,5
SDCF12X450	160	17,5
SDCF12X600	213	24,0

For dimensions and calculation parameters see p. 56.



3.3.2 Solid Timber Wall-Plate to CLT Panel

Minimum Distances for Screws

Solid-Timber Wall-Plate to CLT Connection - Screws at 45°

SWD

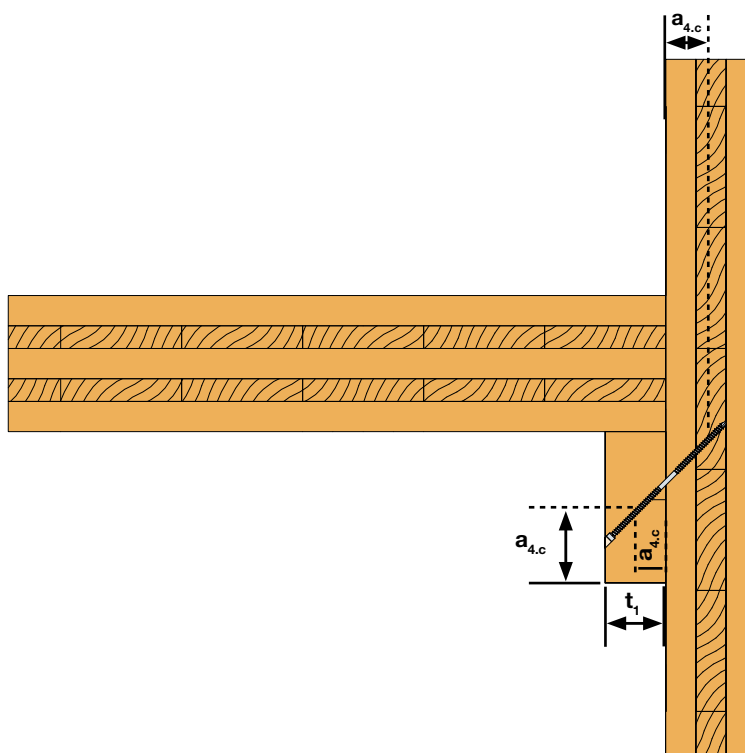
Diameter	$a_{4,c}$
6.5	20
8.0	24

SDCFC

Diameter	$a_{4,c}$
8.0	24
10.0	30

SDCF

Diameter	$a_{4,c}$
8.0	24
10.0	30
12.0	36



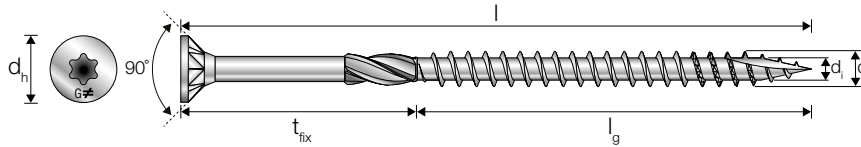
3.3.3.1 CLT Half-Lap Connection

Solid-Drive™TTUFS Countersunk **WOOD** Screw
for Half-Lap CLT Connection

Electro Galvanised

C1 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

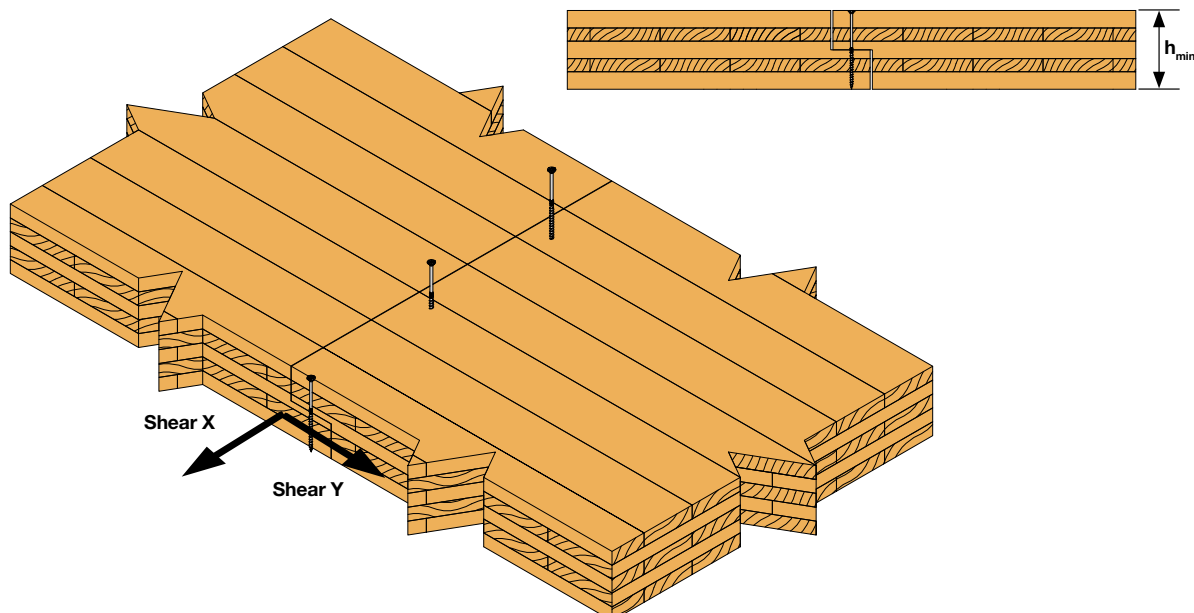
ETA-21/0670



TTUFS - Half-Lap Connection - Screws at 90°
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Predrilling	Minimum Thickness of the Panel	Shear Capacity $R_{v,k} = R_{v,X,k} = R_{v,Y,k}$ [kN] - Screws at 90°
		$t_{CLT,min}$	
TTUFS4.5X70	With predrill	80	1,5
	Without predrill	80	1,3
TTUFS4.5X80	With predrill	90	1,5
	Without predrill	90	1,3
TTUFS5.0X70	With predrill	80	1,9
	Without predrill	80	1,6
TTUFS5.0X80	With predrill	90	1,9
	Without predrill	90	1,6
TTUFS5.0X90	With predrill	100	1,9
	Without predrill	100	1,6
TTUFS5.0X100	With predrill	110	1,9
	Without predrill	110	1,6
TTUFS5.0X120	With predrill	130	1,9
	Without predrill	130	1,6

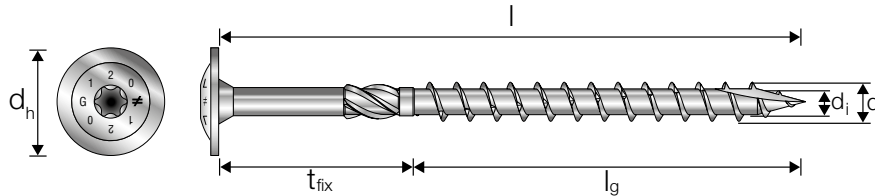
Product Reference	Predrilling	Minimum Thickness of the Panel	Shear Capacity $R_{v,k} = R_{v,X,k} = R_{v,Y,k}$ [kN] - Screws at 90°
		$t_{CLT,min}$	
TTUFS6.0X70	With predrill	80	2,6
	Without predrill	80	2
TTUFS6.0X80	With predrill	90	2,6
	Without predrill	90	2,1
TTUFS6.0X90	With predrill	100	2,6
	Without predrill	100	2,1
TTUFS6.0X100	With predrill	110	2,6
	Without predrill	110	2,1
TTUFS6.0X120	With predrill	130	2,6
	Without predrill	130	2,1
TTUFS6.0X140	With predrill	150	2,6
	Without predrill	150	2,1
TTUFS6.0X160	With predrill	170	2,6
	Without predrill	170	2,1
TTUFS6.0X180	With predrill	190	2,6
	Without predrill	190	2,1



3.3.3.1 CLT Half-Lap Connection

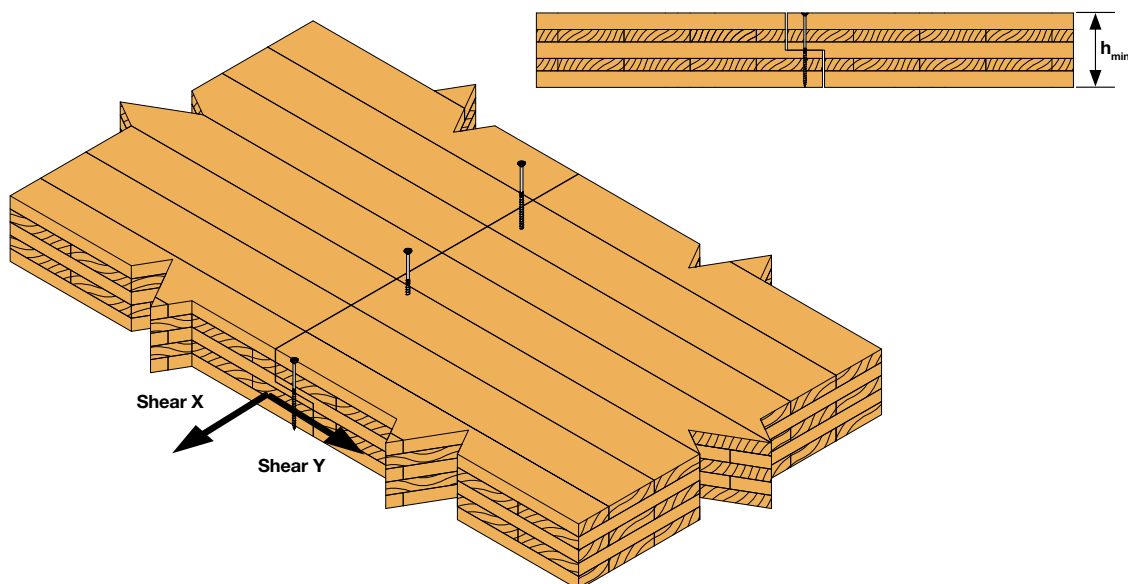
Solid-Drive™SWW Washer-Head **WOOD** Screw
for Half-Lap CLT ConnectionElectro Galvanised*
C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5UK
CA

ETA-21/0670

SWW - Half-Lap Connection - Screws at 90°
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Predrilling	Minimum Thickness of the Panel	Shear Capacity $R_{v,k} = R_{v,X,k} = R_{v,Y,k}$ [kN] - Screws at 90°	Product Reference	Predrilling	Minimum Thickness of the Panel	Shear Capacity $R_{v,k} = R_{v,X,k} = R_{v,Y,k}$ [kN] - Screws at 90°
		$t_{CLT,min}$				$t_{CLT,min}$	
SWW6.0X80	With predrill	90	2,9	SWW6.0X200	With predrill	210	2,9
	Without predrill	90	2,3		Without predrill	210	2,5
SWW6.0X90	With predrill	100	2,9	SWW6.0X220	With predrill	230	2,9
	Without predrill	100	2,5		Without predrill	230	2,5
SWW6.0X100	With predrill	110	2,9	SWW6.0X240	With predrill	250	2,9
	Without predrill	110	2,5		Without predrill	250	2,5
SWW6.0X120	With predrill	130	2,9	SWW6.0X260	With predrill	270	2,9
	Without predrill	130	2,5		Without predrill	270	2,5
SWW6.0X140	With predrill	150	2,9	SWW6.0X280	With predrill	290	2,9
	Without predrill	150	2,5		Without predrill	290	2,5
SWW6.0X160	With predrill	170	2,9	SWW6.0X300	With predrill	310	2,9
	Without predrill	170	2,5		Without predrill	310	2,5
SWW6.0X180	With predrill	190	2,9				
	Without predrill	190	2,5				

Table continues on next page.



*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses.
Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

3.3.3.1 CLT Half-Lap Connection

SWW - Half-Lap Connection - Screws at 90°
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$ (cont.)

Product Reference	Predrilling	Minimum Thickness of the Panel	Shear Capacity R _{v,k} =R _{v,X,k} =R _{v,Y,k} [kN] - Screws at 90°	Product Reference	Predrilling	Minimum Thickness of the Panel	Shear Capacity R _{v,k} =R _{v,X,k} =R _{v,Y,k} [kN] - Screws at 90°
		t _{CLT,min}	t _{CLT,min}				
SWW8.0X80	With predrill	90	4,6	SWW10.0X100	With predrill	110	6,9
	Without predrill	90	3,3		Without predrill	110	4,6
SWW8.0X90	With predrill	100	5,1	SWW10.0X120	With predrill	130	7
	Without predrill	100	3,6		Without predrill	130	5,1
SWW8.0X100	With predrill	110	5,1	SWW10.0X140	With predrill	150	7,1
	Without predrill	110	3,8		Without predrill	150	5,5
SWW8.0X120	With predrill	130	5,1	SWW10.0X160	With predrill	170	7,1
	Without predrill	130	3,8		Without predrill	170	5,7
SWW8.0X140	With predrill	150	5,1	SWW10.0X180	With predrill	190	7,1
	Without predrill	150	4,2		Without predrill	190	5,7
SWW8.0X160	With predrill	170	5,1	SWW10.0X200	With predrill	210	7,1
	Without predrill	170	4,2		Without predrill	210	5,7
SWW8.0X180	With predrill	190	5,1	SWW10.0X220	With predrill	230	7,1
	Without predrill	190	4,2		Without predrill	230	5,7
SWW8.0X200	With predrill	210	5,1	SWW10.0X240	With predrill	250	7,1
	Without predrill	210	4,2		Without predrill	250	5,7
SWW8.0X220	With predrill	230	5,1	SWW10.0X260	With predrill	270	7,1
	Without predrill	230	4,2		Without predrill	270	5,7
SWW8.0X240	With predrill	250	5,1	SWW10.0X280	With predrill	290	7,1
	Without predrill	250	4,2		Without predrill	290	5,7
SWW8.0X260	With predrill	270	5,1	SWW10.0X300	With predrill	310	7,1
	Without predrill	270	4,2		Without predrill	310	5,7
SWW8.0X280	With predrill	290	5,1	SWW10.0X320	With predrill	330	7,1
	Without predrill	290	4,2		Without predrill	330	5,7
SWW8.0X300	With predrill	310	5,1	SWW10.0X340	With predrill	350	7,1
	Without predrill	310	4,2		Without predrill	350	5,7
SWW8.0X320	With predrill	330	5,1	SWW10.0X360	With predrill	370	7,1
	Without predrill	330	4,2		Without predrill	370	5,7
SWW8.0X340	With predrill	350	5,1	SWW10.0X380	With predrill	390	7,1
	Without predrill	350	4,2		Without predrill	390	5,7
SWW8.0X360	With predrill	370	5,1	SWW10.0X400	With predrill	410	7,1
	Without predrill	370	4,2		Without predrill	410	5,7
SWW8.0X380	With predrill	390	5,1				
	Without predrill	390	4,2				
SWW8.0X400	With predrill	410	5,1				
	Without predrill	410	4,2				

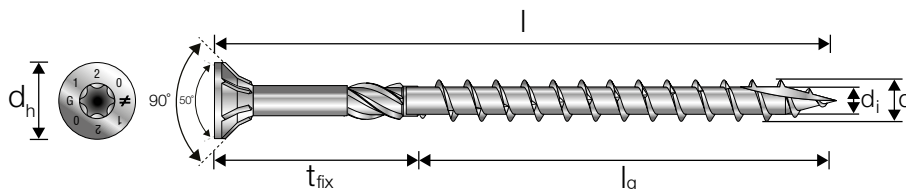
3.3.3.1 CLT Half-Lap Connection

Solid-Drive™SWC Countersunk **WOOD** Screw
for Half-Lap CLT Connection

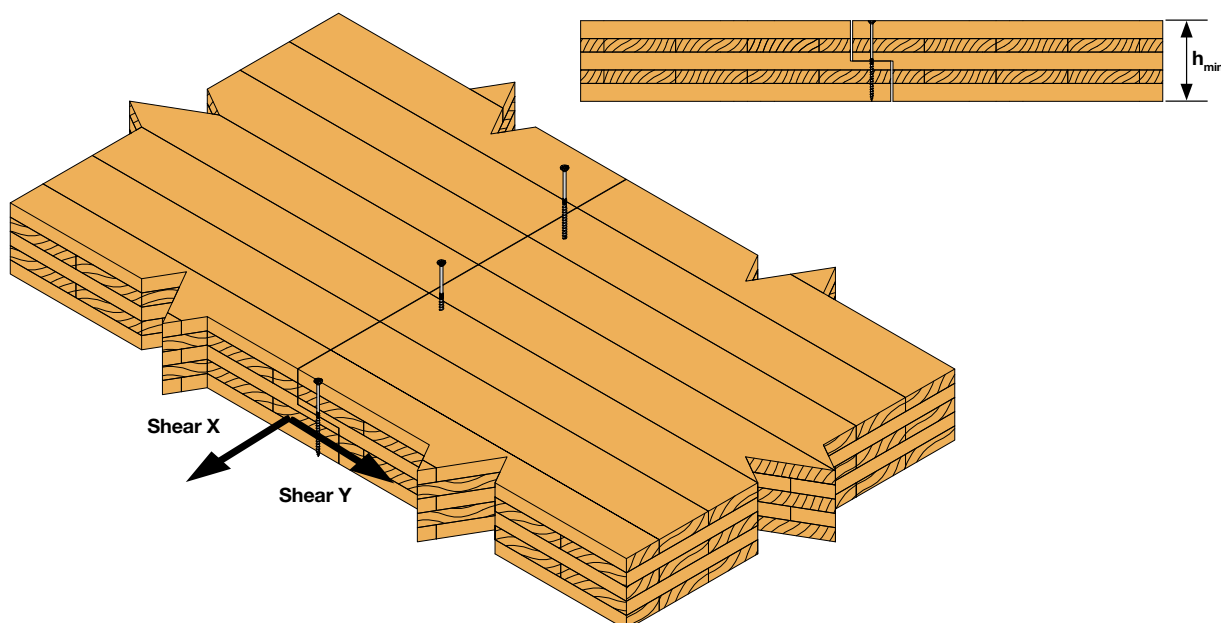
Electro Galvanised*

C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

ETA-21/0670

SWC - Half-Lap Connection - Screws at 90°
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Predrilling	Minimum Thickness of the Panel	Shear Capacity $R_{v,k}=R_v,X,k=R_v,Y,k$ [kN] - Screws at 90°	Product Reference	Predrilling	Minimum Thickness of the Panel	Shear Capacity $R_{v,k}=R_v,X,k=R_v,Y,k$ [kN] - Screws at 90°
		t _{CLT,min}	t _{CLT,min}				
SWC6,0X80	With predrill	90	2,5	SWC6.0X220	With predrill	230	2,5
	Without predrill	90	1,9		Without predrill	230	2,1
SWC6,0X100	With predrill	110	2,5	SWC6.0X240	With predrill	250	2,5
	Without predrill	110	2,1		Without predrill	250	2,1
SWC6,0X120	With predrill	130	2,5	SWC6.0X260	With predrill	270	2,5
	Without predrill	130	2,1		Without predrill	270	2,1
SWC6,0X140	With predrill	150	2,5	SWC6.0X280	With predrill	290	2,5
	Without predrill	150	2,1		Without predrill	290	2,1
SWC6,0X160	With predrill	170	2,5	SWC6.0X300	With predrill	310	2,5
	Without predrill	170	2,1		Without predrill	310	2,1
SWC6,0X180	With predrill	190	2,5	Table continues on next page.			
	Without predrill	190	2,1				
SWC6.0X200	With predrill	210	2,5				
	Without predrill	210	2,1				



*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses. Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

3.3.3.1 CLT Half-Lap Connection

SWC - Half-Lap Connection - Screws at 90°
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$ (cont.)

Product Reference	Predrilling	Minimum Thickness of the Panel	Shear Capacity R _{v,k} =R _{v,X,k} =R _{v,Y,k} [kN] - Screws at 90°	Product Reference	Predrilling	Minimum Thickness of the Panel	Shear Capacity R _{v,k} =R _{v,X,k} =R _{v,Y,k} [kN] - Screws at 90°
		t _{CLT,min}				t _{CLT,min}	
SWC8.0X80	With predrill	90	4	SWC10.0X100	With predrill	110	6,2
	Without predrill	90	2,7		Without predrill	110	3,9
SWC8.0X90	With predrill	100	4,5	SWC10.0X120	With predrill	130	6,4
	Without predrill	100	3		Without predrill	130	4,5
SWC8.0X100	With predrill	110	4,5	SWC10.0X140	With predrill	150	6,4
	Without predrill	110	3,2		Without predrill	150	4,7
SWC8.0X120	With predrill	130	4,5	SWC10.0X160	With predrill	170	6,4
	Without predrill	130	3,2		Without predrill	170	5
SWC8.0X140	With predrill	150	4,5	SWC10.0X180	With predrill	190	6,4
	Without predrill	150	3,6		Without predrill	190	5
SWC8.0X160	With predrill	170	4,5	SWC10.0X200	With predrill	210	6,4
	Without predrill	170	3,6		Without predrill	210	5
SWC8.0X180	With predrill	190	4,5	SWC10.0X220	With predrill	230	6,4
	Without predrill	190	3,6		Without predrill	230	5
SWC8.0X200	With predrill	210	4,5	SWC10.0X240	With predrill	250	6,4
	Without predrill	210	3,6		Without predrill	250	5
SWC8.0X220	With predrill	230	4,5	SWC10.0X260	With predrill	270	6,4
	Without predrill	230	3,6		Without predrill	270	5
SWC8.0X240	With predrill	250	4,5	SWC10.0X280	With predrill	290	6,4
	Without predrill	250	3,6		Without predrill	290	5
SWC8.0X260	With predrill	270	4,5	SWC10.0X300	With predrill	310	6,4
	Without predrill	270	3,6		Without predrill	310	5
SWC8.0X280	With predrill	290	4,5	SWC10.0X320	With predrill	330	6,4
	Without predrill	290	3,6		Without predrill	330	5
SWC8.0X300	With predrill	310	4,5	SWC10.0X340	With predrill	350	6,4
	Without predrill	310	3,6		Without predrill	350	5
SWC8.0X320	With predrill	330	4,5	SWC10.0X360	With predrill	370	6,4
	Without predrill	330	3,6		Without predrill	370	5
SWC8.0X340	With predrill	350	4,5	SWC10.0X380	With predrill	390	6,4
	Without predrill	350	3,6		Without predrill	390	5
SWC8.0X360	With predrill	370	4,5	SWC10.0X400	With predrill	410	6,4
	Without predrill	370	3,6		Without predrill	410	5
SWC8.0X380	With predrill	390	4,5				
	Without predrill	390	3,6				
SWC8.0X400	With predrill	410	4,5				
	Without predrill	410	3,6				

3.3.3.1 CLT Half-Lap Connection

Minimum Distances for Screws CLT Half-Lap Connection

TTUFS

Diameter	$a_{3,c}$
4.5	27
5.0	30
6.0	36

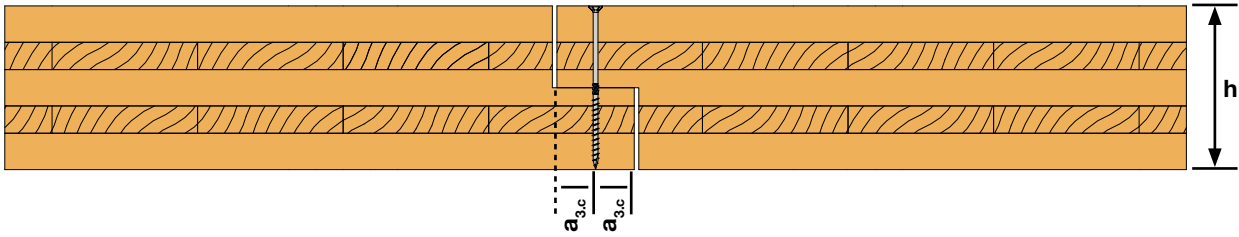
SWW

Diameter	$a_{3,c}$
6.0	36
8.0	48
10.0	60

SWC

Diameter	$a_{3,c}$
6.0	36
8.0	48
10.0	60

Valid for both pre-drilled and non pre-drilled



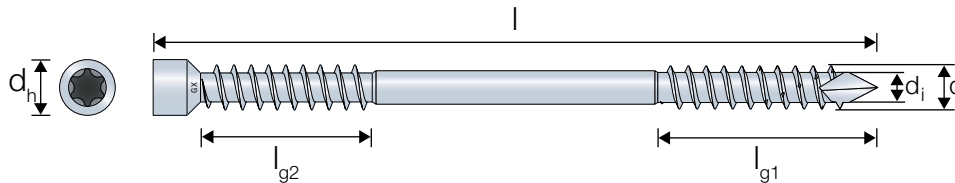
3.3.3.1 CLT Half-Lap Connection

Solid-Drive™SWD Double Threaded **WOOD** Screw
for Half-Lap CLT Connection

Protec® +

C3 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5UK
CA

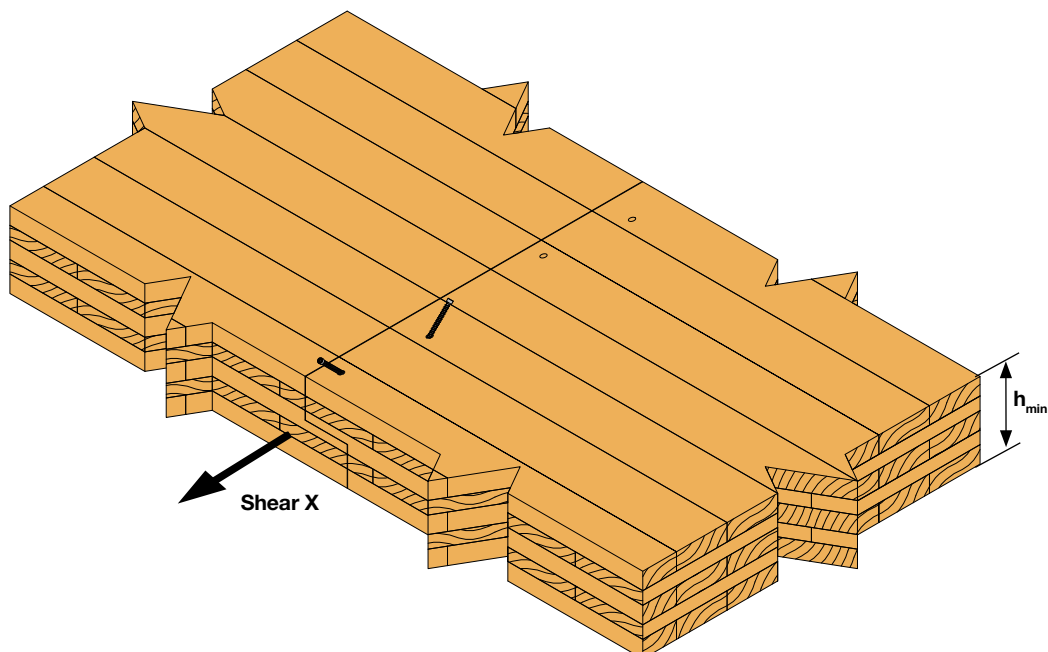
ETA-21/0670



SWD - Half-Lap Connection - Per Pair $R_{v,k}$ [kN] = $\min(R_{w,k, \text{pair}}; R_{\text{buck}, k, \text{pair}})$ - 45° Cross Pairs
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Minimum Thickness of the Panel	Shear (X) Characteristic Capacity per Pair $R_{v,k}$ [kN] - Cross Pairs of Screws
	$h_{\min}$	$R_{v,k} = \min(R_{w,k, \text{pair}}; R_{\text{buck}, k, \text{pair}})$ [kN]
SWD6.5x65	65	3,5
SWD6.5x90	69	5
SWD6.5x130	97	5
SWD6.5x160	118	8,2
SWD6.5x190	139	10,1
SWD6.5x220	161	12
SWD8x90	80	5,9
SWD8x130	97	5,9
SWD8x160	118	9,6
SWD8x190	139	11,9
SWD8x220	161	14,1
SWD8x245	178	15,9
SWD8x275	199	15,9
SWD8x300	217	20
SWD8x330	238	20

For dimensions and calculation parameters see p. 50.



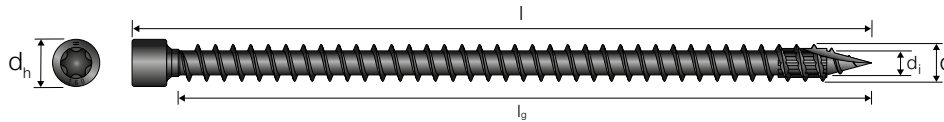
3.3.3.1 CLT Half-Lap Connection

Solid-Drive™SDCFC Fully Threaded **WOOD** Screw
for Half-Lap CLT Connection

Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

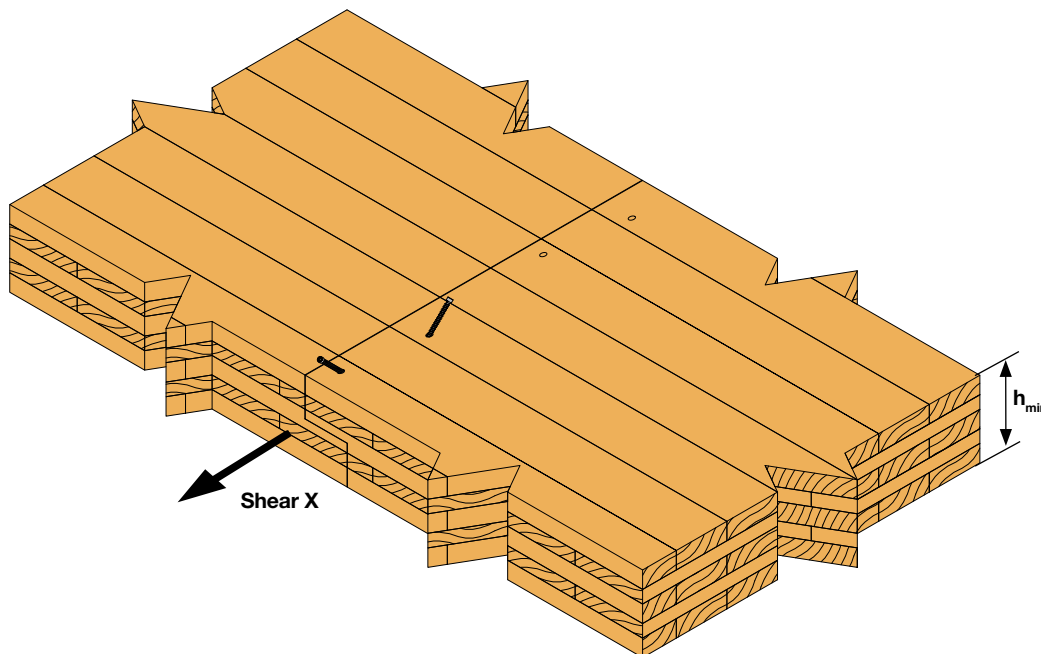
ETA-21/0670



SWD - Half-Lap Connection - Per Pair $R_{v,k} [\text{kN}] = \min (R_{w,k,\text{pair}}; R_{\text{buck},k,\text{pair}})$ - 45° Cross Pairs
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Minimum Thickness of the Panel	Shear (X) Characteristic Capacity per Pair $R_{v,k} [\text{kN}]$ - Cross Pairs of Screws
	$h_{\min}$	$R_{v,k} = \min(R_{w,k,\text{pair}}; R_{\text{buck},k,\text{pair}}) [\text{kN}]$
SDCFC8X120	90	7,8
SDCFC8X160	118	10,6
SDCFC8X200	146	13,4
SDCFC8X240	175	16,3
SDCFC8X280	203	$\min(19,1; 9,55 + 10,14 / k_{\text{mod}})$
SDCFC8X330	238	$\min(22,6; 11,32 + 10,14 / k_{\text{mod}})$
SDCFC8X350	252	$\min(24; 12,02 + 10,14 / k_{\text{mod}})$
SDCFC10X240	175	19,6
SDCFC10X300	217	24,7
SDCFC10X380	274	$\min(31,6; 15,78 + 14,67 / k_{\text{mod}})$

For dimensions and calculation parameters see p. 58.



3.3.3.1 CLT Half-Lap Connection

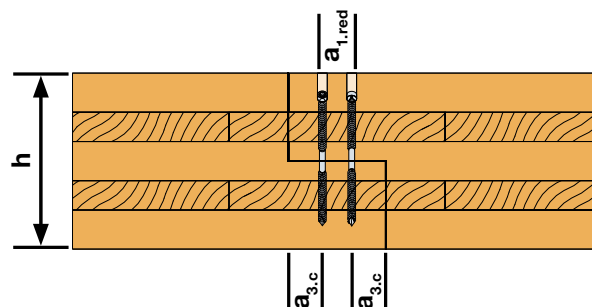
Minimum Distances for Screws Half-Lap Connection - 45° Cross Pairs

SWD

Diameter	$a_{1,red}$	$a_{3,c}$
6.5	10	39
8.0	12	48

SDCFC

Diameter	$a_{1,red}$	$a_{3,c}$
8.0	12	48
10.0	15	60



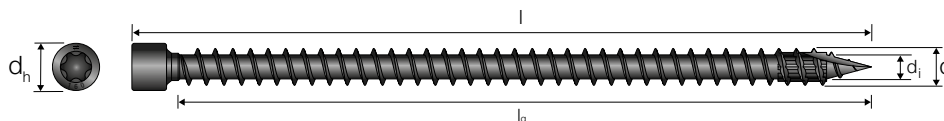
3.3.3.2 CLT Half-Lap Joint Notch Reinforcement

Solid-Drive™SDCFC Fully Threaded **WOOD** Screw
for Half-Lap Joint Notch CLT Reinforcement

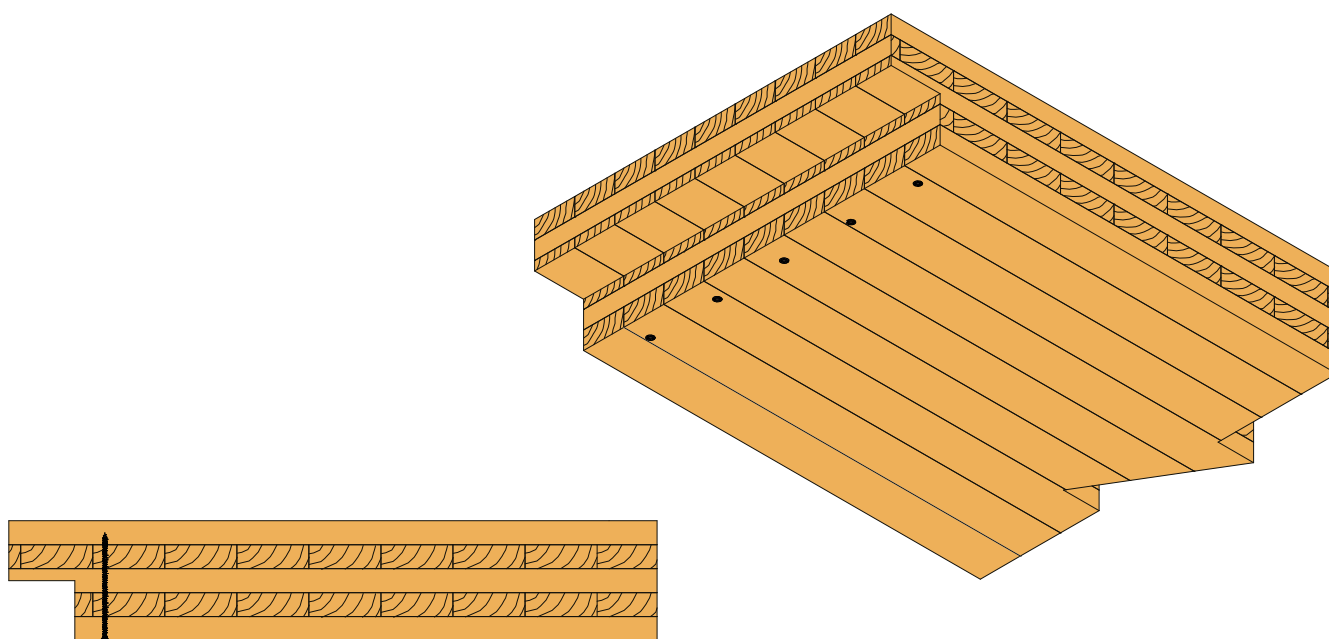
Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

ETA-21/0670

SDCFC - Tension Reinforcement for CLT Half-Lap Joint Notch - $k_{mod} = 0,6$

Product Reference	Minimum Thickness of the Panel	Tension reinforcement $R_{t,90,d}$ for CLT half-lap joint notch $k_{mod} = 0,6$											
		Panel thickness [mm]											
		130	140	150	160	170	180	200	220	240	260	300	320
SDCFC8X120	130	4,19	4,19	4,19	4,19	4,19	4,19	4,19	4,19	4,19	4,19	4,19	4,19
SDCFC8X160	170	-	-	-	-	5,71	5,71	5,71	5,71	5,71	5,71	5,71	5,71
SDCFC8X200	210	-	-	-	-	-	-	-	7,23	7,23	7,23	7,23	7,23
SDCFC8X240	250	-	-	-	-	-	-	-	-	-	8,75	8,75	8,75
SDCFC8X280	290	-	-	-	-	-	-	-	-	-	-	10,28	10,28
SDCFC10X240	250	-	-	-	-	-	-	-	-	-	10,52	10,52	10,52
SDCFC10X300	310	-	-	-	-	-	-	-	-	-	-	-	13,29



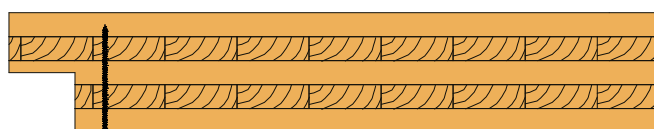
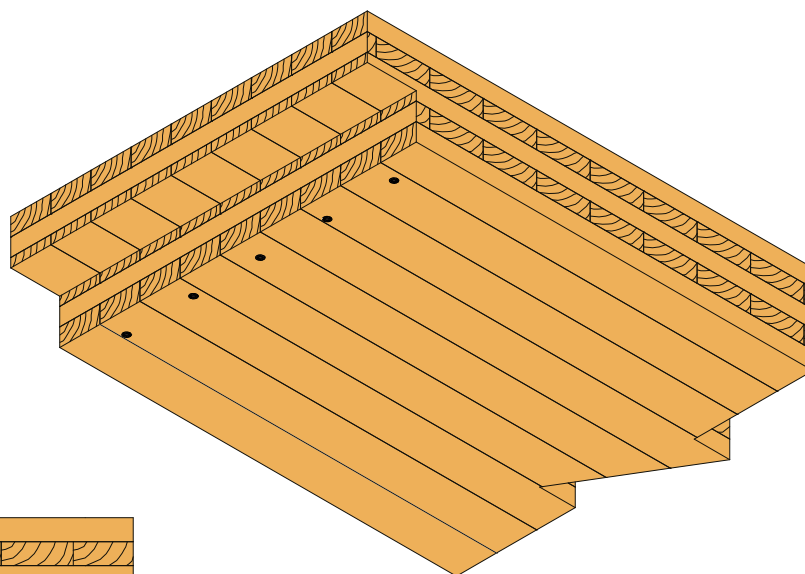
3.3.3.2 CLT Half-Lap Joint Notch Reinforcement

SDCFC - Tension Reinforcement for CLT Half-Lap Joint Notch - $k_{mod} = 0,8$

Product Reference	Minimum Thickness of the Panel	Tension reinforcement $R_{t,90,d}$ for CLT half-lap joint notch $k_{mod} = 0,8$											
		Panel thickness [mm]											
		130	140	150	160	170	180	200	220	240	260	300	320
SDCFC8X120	130	5,58	5,58	5,58	5,58	5,58	5,58	5,58	5,58	5,58	5,58	5,58	5,58
SDCFC8X160	170	-	-	-	-	7,61	7,61	7,61	7,61	7,61	7,61	7,61	7,61
SDCFC8X200	210	-	-	-	-	-	-	-	9,64	9,64	9,64	9,64	9,64
SDCFC8X240	250	-	-	-	-	-	-	-	-	-	11,67	11,67	11,67
SDCFC8X280	290	-	-	-	-	-	-	-	-	-	-	13,7	13,7
SDCFC10X240	250	-	-	-	-	-	-	-	-	-	14,03	14,03	14,03
SDCFC10X300	310	-	-	-	-	-	-	-	-	-	-	-	17,72

SDCFC - Tension Reinforcement for CLT Half-Lap Joint Notch - $k_{mod} = 0,9$

Product Reference	Minimum Thickness of the Panel	Tension reinforcement $R_{t,90,d}$ for CLT half-lap joint notch $k_{mod} = 0,9$											
		Panel thickness [mm]											
		130	140	150	160	170	180	200	220	240	260	300	320
SDCFC8X120	130	6,28	6,28	6,28	6,28	6,28	6,28	6,28	6,28	6,28	6,28	6,28	6,28
SDCFC8X160	170	-	-	-	-	8,56	8,56	8,56	8,56	8,56	8,56	8,56	8,56
SDCFC8X200	210	-	-	-	-	-	-	-	10,85	10,85	10,85	10,85	10,85
SDCFC8X240	250	-	-	-	-	-	-	-	-	-	13,13	13,13	13,13
SDCFC8X280	290	-	-	-	-	-	-	-	-	-	-	15,41	15,41
SDCFC10X240	250	-	-	-	-	-	-	-	-	-	15,78	15,78	15,78
SDCFC10X300	310	-	-	-	-	-	-	-	-	-	-	-	19,94



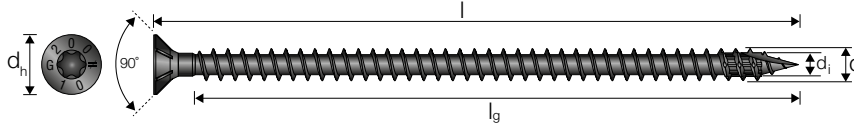
3.3.3.2 CLT Half-Lap Joint Notch Reinforcement

Solid-Drive™SDCF Fully Threaded **WOOD** Screw
for Half-Lap Joint Notch CLT Reinforcement

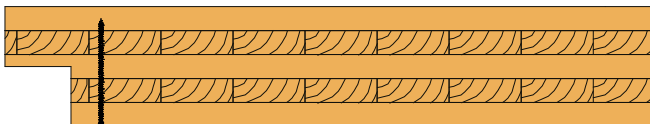
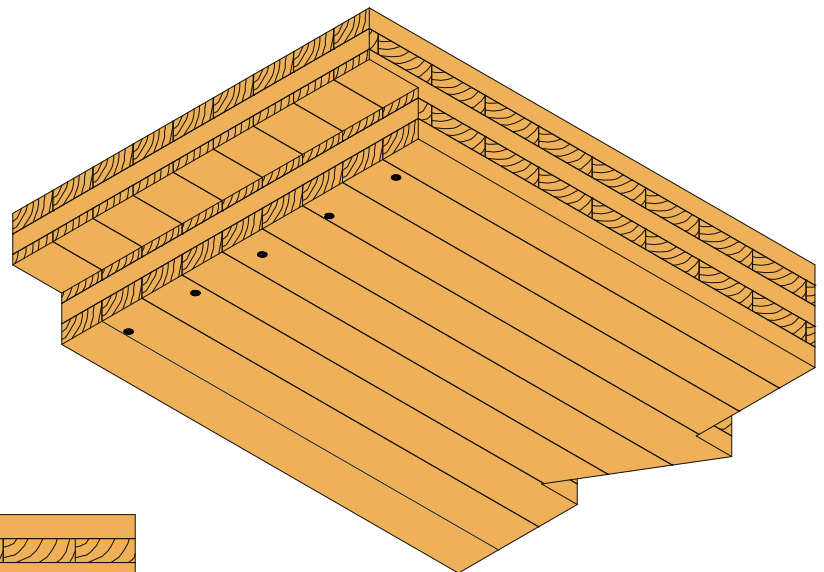
Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

ETA-21/0670

SDCF - Tension Reinforcement for CLT Half-Lap Joint Notch - $k_{mod} = 0,6$

Product Reference	Minimum Thickness of the Panel	Tension reinforcement $R_{t,90,d}$ for CLT half-lap joint notch $k_{mod} = 0,6$											
		Panel thickness [mm]											
		130	140	150	160	170	180	200	220	240	260	300	320
SDCF8X120	130	4,19	3,81	3,43	3,04	2,66	-	-	-	-	-	-	-
SDCF8X140	150	-	-	4,95	4,57	4,19	3,81	3,04	-	-	-	-	-
SDCF8X160	170	-	-	-	-	5,71	5,33	4,57	3,81	3,04	-	-	-
SDCF8X180	190	-	-	-	-	-	-	6,09	5,33	4,57	3,81	-	-
SDCF8X200	210	-	-	-	-	-	-	-	6,85	6,09	5,33	3,81	3,04
SDCF8X220	230	-	-	-	-	-	-	-	-	7,61	6,85	5,33	4,57
SDCF8X240	250	-	-	-	-	-	-	-	-	-	8,37	6,85	6,09
SDCF8X260	270	-	-	-	-	-	-	-	-	-	-	8,37	7,61
SDCF8X300	310	-	-	-	-	-	-	-	-	-	-	-	10,66
SDCF10X160	170	-	-	-	-	6,74	6,46	5,54	4,62	-	-	-	-
SDCF10X200	210	-	-	-	-	-	-	-	8,31	7,38	6,46	4,62	-
SDCF10X240	250	-	-	-	-	-	-	-	-	-	10,15	8,31	7,38
SDCF10X280	290	-	-	-	-	-	-	-	-	-	-	12	11,08
SDCF12X200	210	-	-	-	-	-	-	-	7,9	7,02	6,14	4,39	-
SDCF12X240	250	-	-	-	-	-	-	-	-	-	9,65	7,9	7,02
SDCF12X280	290	-	-	-	-	-	-	-	-	-	-	11,41	10,53



3.3.3.2 CLT Half-Lap Joint Notch Reinforcement

SDCF - Tension Reinforcement for CLT Half-Lap Joint Notch - $k_{mod} = 0,8$

Product Reference	Minimum Thickness of the Panel	Tension reinforcement $R_{t,90,d}$ for CLT half-lap joint notch $k_{mod} = 0,8$											
		Panel thickness [mm]											
		130	140	150	160	170	180	200	220	240	260	300	320
SDCF8X120	130	5,58	5,07	4,57	4,06	3,55	-	-	-	-	-	-	-
SDCF8X140	150	-	-	6,6	6,09	5,58	5,07	4,06	-	-	-	-	-
SDCF8X160	170	-	-	-	-	7,61	7,1	6,09	5,07	4,06	-	-	-
SDCF8X180	190	-	-	-	-	-	-	8,12	7,1	6,09	5,07	-	-
SDCF8X200	210	-	-	-	-	-	-	-	9,13	8,12	7,1	5,07	4,06
SDCF8X220	230	-	-	-	-	-	-	-	-	10,15	9,13	7,1	6,09
SDCF8X240	250	-	-	-	-	-	-	-	-	-	11,16	9,13	8,12
SDCF8X260	270	-	-	-	-	-	-	-	-	-	-	11,16	10,15
SDCF8X300	310	-	-	-	-	-	-	-	-	-	-	-	14,21
SDCF10X160	170	-	-	-	-	8,98	8,62	7,38	6,15	-	-	-	-
SDCF10X200	210	-	-	-	-	-	-	-	11,08	9,85	8,62	6,15	-
SDCF10X240	250	-	-	-	-	-	-	-	-	-	13,54	11,08	9,85
SDCF10X280	290	-	-	-	-	-	-	-	-	-	-	16	14,77
SDCF12X200	210	-	-	-	-	-	-	-	10,53	9,36	8,19	5,85	-
SDCF12X240	250	-	-	-	-	-	-	-	-	-	12,87	10,53	9,36
SDCF12X280	290	-	-	-	-	-	-	-	-	-	-	15,21	14,04

SDCF - Tension Reinforcement for CLT Half-Lap Joint Notch - $k_{mod} = 0,9$

Product Reference	Minimum Thickness of the Panel	Tension reinforcement $R_{t,90,d}$ for CLT half-lap joint notch $k_{mod} = 0,9$											
		Panel thickness [mm]											
		130	140	150	160	170	180	200	220	240	260	300	320
SDCF8X120	130	6,28	5,71	5,14	4,57	4	-	-	-	-	-	-	-
SDCF8X140	150	-	-	7,42	6,85	6,28	5,71	4,57	-	-	-	-	-
SDCF8X160	170	-	-	-	-	8,56	7,99	6,85	5,71	4,57	-	-	-
SDCF8X180	190	-	-	-	-	-	-	9,13	7,99	6,85	5,71	-	-
SDCF8X200	210	-	-	-	-	-	-	-	10,28	9,13	7,99	5,71	4,57
SDCF8X220	230	-	-	-	-	-	-	-	-	11,42	10,28	7,99	6,85
SDCF8X240	250	-	-	-	-	-	-	-	-	-	12,56	10,28	9,13
SDCF8X260	270	-	-	-	-	-	-	-	-	-	-	12,56	11,42
SDCF8X300	310	-	-	-	-	-	-	-	-	-	-	-	15,98
SDCF10X160	170	-	-	-	-	10,11	9,69	8,31	6,92	-	-	-	-
SDCF10X200	210	-	-	-	-	-	-	-	12,46	11,08	9,69	6,92	-
SDCF10X240	250	-	-	-	-	-	-	-	-	-	15,23	12,46	11,08
SDCF10X280	290	-	-	-	-	-	-	-	-	-	-	18	16,62
SDCF12X200	210	-	-	-	-	-	-	-	11,85	10,53	9,22	6,58	-
SDCF12X240	250	-	-	-	-	-	-	-	-	-	14,48	11,85	10,53
SDCF12X280	290	-	-	-	-	-	-	-	-	-	-	17,11	15,8

For dimensions and calculation parameters see p. 56.

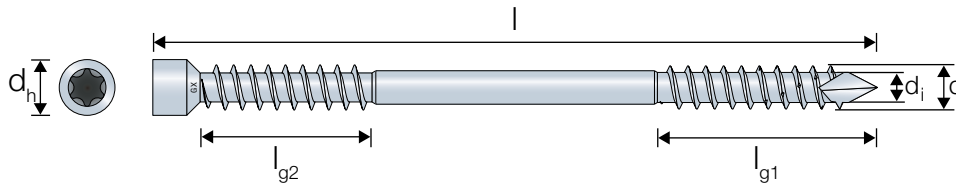
3.3.4 CLT Butt-Joint Connection

Solid-Drive™SWD Double Threaded **WOOD** Screw
for Butt-Joint CLT Connection

Protec® +

C3 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5UK
CA

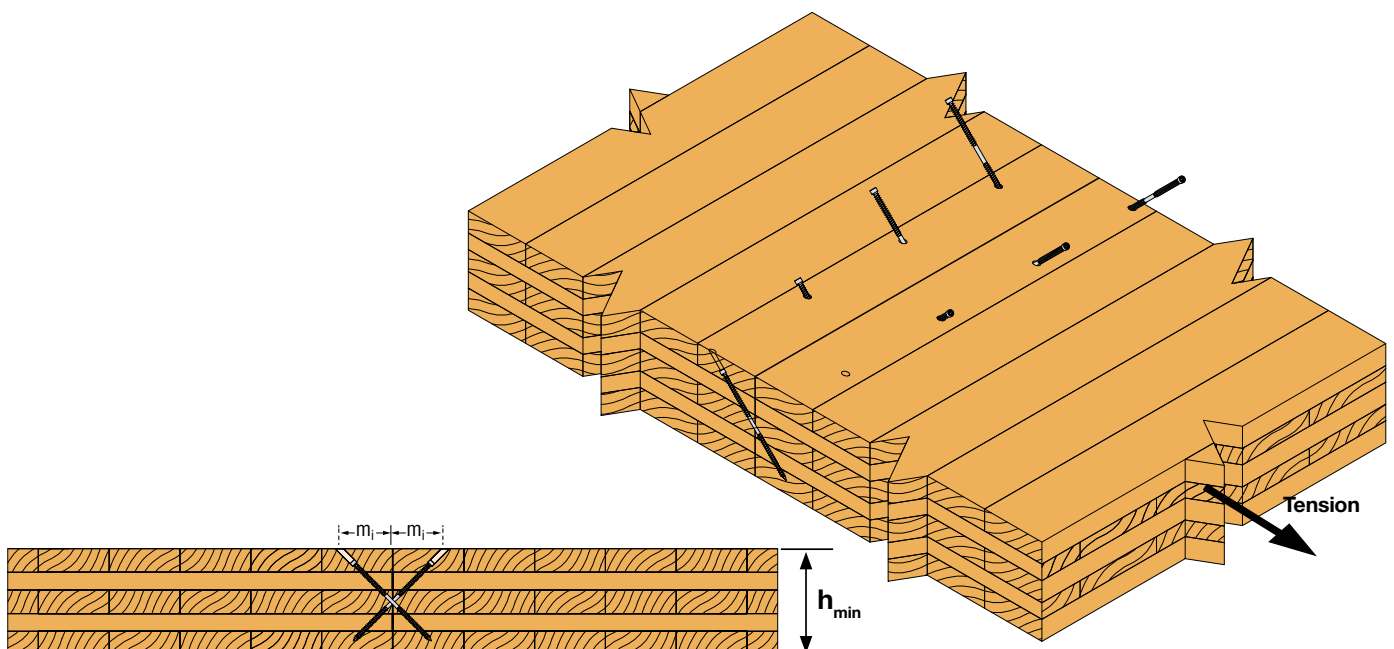
ETA-21/0670



SWD - Butt-Joint Connection - Per Pair $R_{v,k}$ [kN] = $\min (R_{w,k, \text{pair}}; R_{\text{buck},k, \text{pair}})$ - 45° Cross Pair
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Panel Thickness Min. Height $h_{\min}$ [mm]	Shear Characteristic Capacity per Pair $R_{v,k}$ [kN] - Cross Pairs of Screws	
		$R_{w,k, \text{pair}}$	
SWD6.5x90	69	2,8	
SWD6.5x130	97	2,8	
SWD6.5x160	118	4,9	
SWD6.5x190	139	6,1	
SWD6.5x220	161	7,4	
SWD8x90	80	3,1	
SWD8x130	97	3,1	
SWD8x160	118	5,5	
SWD8x190	139	7	
SWD8x220	161	8,5	
SWD8x245	178	9,7	
SWD8x275	199	9,7	
SWD8x300	217	12,4	
SWD8x330	238	12,4	

For dimensions and calculation parameters see p. 50.

For explanation of m_1 see page 26.

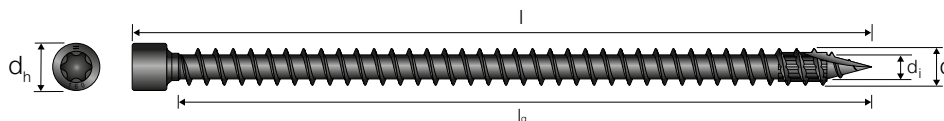
3.3.4 CLT Butt-Joint Connection

Solid-Drive™SDCFC Fully Threaded **WOOD** Screw
for Butt-Joint CLT Connection

Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

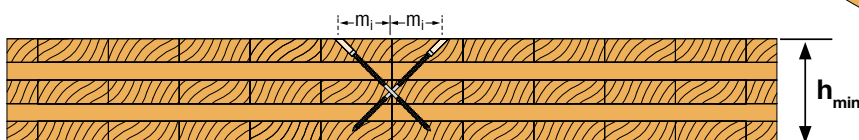
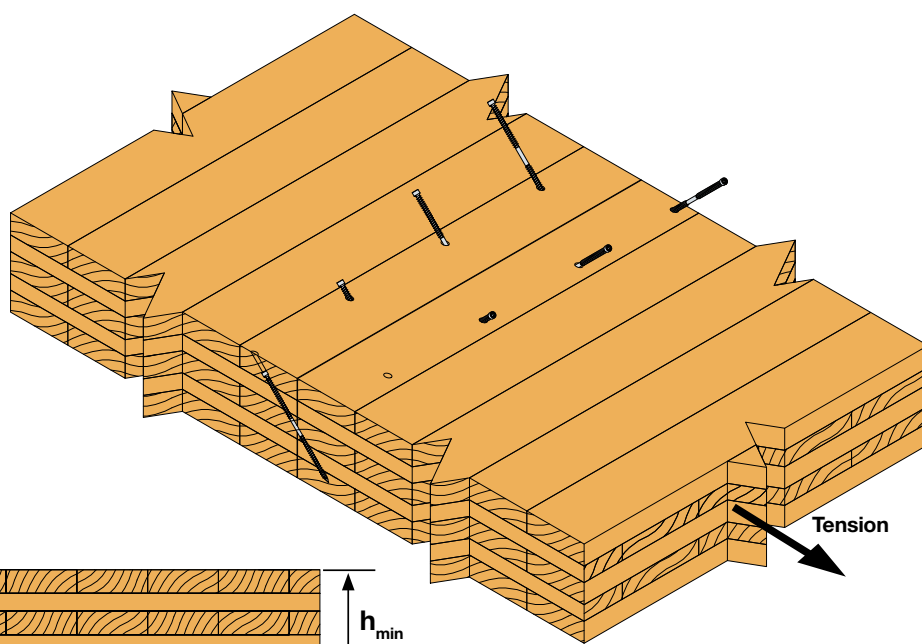
ETA-21/0670



SDCFC - Butt-Joint Connection - Per Pair $R_{v,k}$ [kN] = $\min (R_{w,k, \text{pair}}; R_{\text{buck}, k, \text{pair}})$ - 45° Cross Pair
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Panel Thickness Min. Height $h_{\min}$ [mm]	Shear Characteristic Capacity per Pair $R_{v,k}$ [kN] - Cross Pairs of Screws
		$R_{w,k, \text{pair}}$
SDCFC8X120	90	5,1
SDCFC8X160	118	6,8
SDCFC8X200	146	8,4
SDCFC8X240	175	10
SDCFC8X280	203	11,5
SDCFC8X330	238	13,4
SDCFC8X350	252	14,2
SDCFC10X240	175	11,8
SDCFC10X300	217	14,6
SDCFC10X380	274	18,2
SDCFC10X500	359	22,9

For dimensions and calculation parameters see p. 58.

For explanation of m_1 see page 26.

3.3.4 CLT Butt-Joint Connection

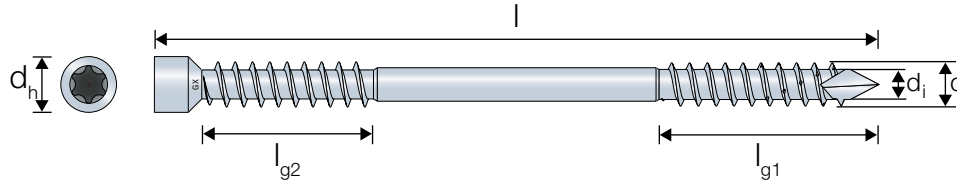
Solid-Drive™

SWD Double Threaded **WOOD** Screw for Butt-Joint CLT Connection

Protec® +

C3 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5UK
CA

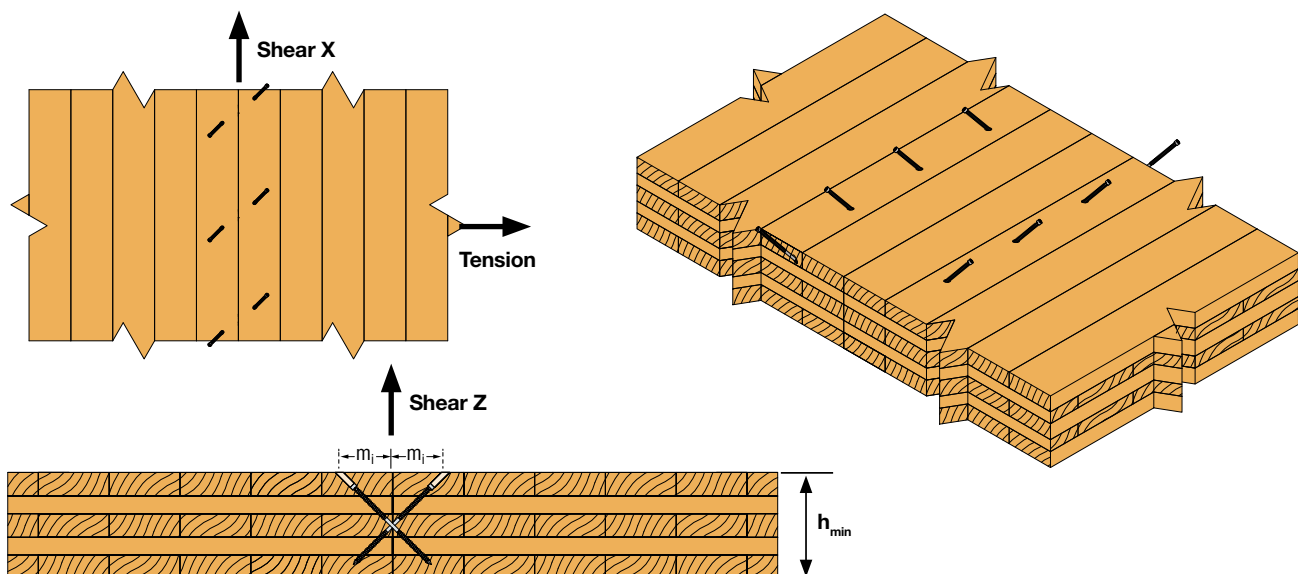
ETA-21/0670



SWD - Butt-Joint Connection - Per Pair $R_{v,k}$ [kN] = $\min (R_{w,k,pair}; R_{buck,k,pair})$ - 45° Cross Pair
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Panel Thickness Min. Height h_{min} [mm]	Shear Characteristic Capacity per Pair $R_{v,k}$ [kN] - Cross Pairs of Screws
		$R_{w,k,pair}$
SWD6.5x90	104	1,98
SWD6.5x130	104	1,98
SWD6.5x160	126	3,46
SWD6.5x190	147	4,3
SWD6.5x220	168	5,2
SWD8x90	128	2,2
SWD8x130	128	2,2
SWD8x160	128	3,9
SWD8x190	147	4,95
SWD8x220	168	6
SWD8x245	186	6,86
SWD8x275	207	6,86
SWD8x300	225	8,77
SWD8x330	246	8,77

For dimensions and calculation parameters see p. 50.



For explanation of m_i see page 26.

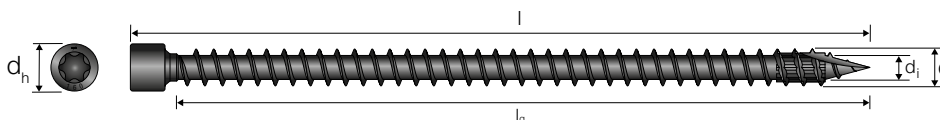
3.3.4 CLT Butt-Joint Connection

Solid-Drive™SDCFC Fully Threaded **WOOD** Screw
for Butt-Joint CLT Connection

Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

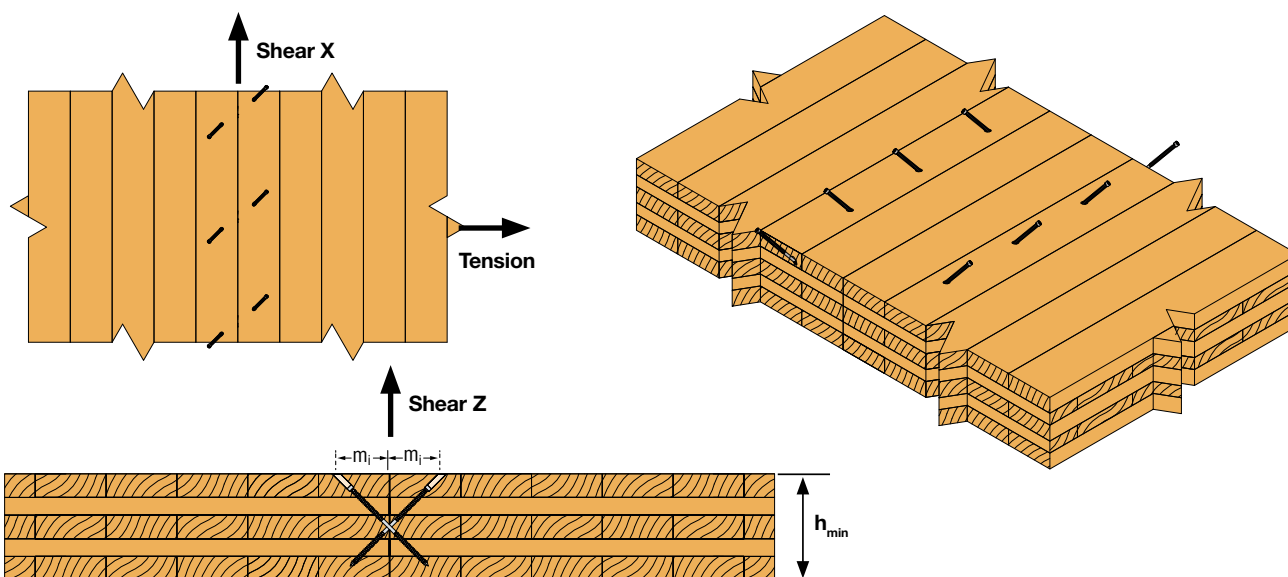
ETA-21/0670



SWD - Butt-Joint Connection - Per Pair $R_{v,k}$ [kN] = $\min (R_{w,k, \text{pair}}; R_{\text{buck}, k, \text{pair}})$ - 45° Cross Pair
CLT to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Panel Thickness Min. Height $h_{\min}$ [mm]	Shear Characteristic Capacity per Pair $R_{v,k}$ [kN] - Cross Pairs of Screws
		$R_{w,k, \text{pair}}$
SDCFC8X120	90	3,6
SDCFC8X160	118	4,8
SDCFC8X200	146	5,9
SDCFC8X240	175	7,1
SDCFC8X280	203	8,1
SDCFC8X330	238	9,5
SDCFC8X350	252	10
SDCFC10X240	175	8,34
SDCFC10X300	217	10,3
SDCFC10X380	274	12,9
SDCFC10X500	359	16,2

For dimensions and calculation parameters see p. 58.

For explanation of m_i see page 26.

3.3.5 CLT Spline Connection

Solid-Drive™

TTUFS Structural Countersunk WOOD Screw for CLT Spline Connection

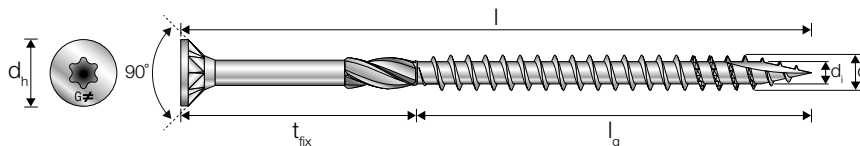
Electro Galvanised

C1 acc. to EN ISO 12944-2

SC2 - 50 years acc. to EC5

UK
CA

ETA-21/0670

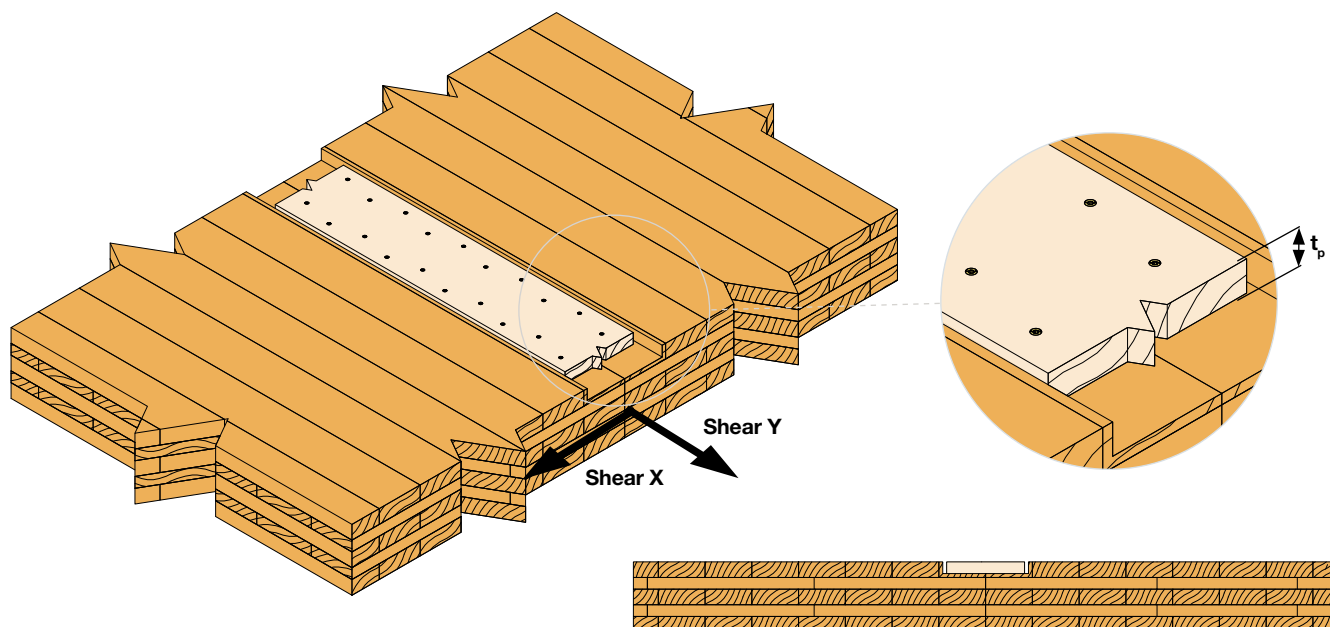


TTUFS - CLT Spline Connection

Plywood Board $\rho_k = 490 \text{ kg/m}^3$ to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Characteristic Shear (X or Y) Capacity for Plywood ($\rho_k \geq 490 \text{ kg/m}^3$) to CLT ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p				
	15	18	22	25	30
	$R_{v,90,k,15}$	$R_{v,90,k,18}$	$R_{v,90,k,22}$	$R_{v,90,k,25}$	$R_{v,90,k,30}$
TTUFS4.5X40	0,97	-	-	-	-
TTUFS4.5X45	1,01	1,07	-	-	-
TTUFS4.5X50	1,01	1,08	1,41	1,37	-
TTUFS4.5X60	1,01	1,08	1,44	1,44	1,44
TTUFS4.5X70	1,01	1,08	1,44	1,46	1,46
TTUFS4.5X80	1,01	1,08	1,44	1,51	1,51
TTUFS5.0X40	1,08	-	-	-	-
TTUFS5.0X50	1,20	1,28	1,59	1,56	-
TTUFS5.0X60	1,20	1,28	1,69	1,78	1,74
TTUFS5.0X70	1,20	1,28	1,69	1,78	1,93
TTUFS5.0X80	1,20	1,28	1,69	1,78	1,93
TTUFS5.0X90	1,20	1,28	1,69	1,78	1,95
TTUFS5.0X100	1,20	1,28	1,69	1,78	1,95
TTUFS5.0X120	1,20	1,28	1,69	1,78	1,95

Table continues on next page.



3.3.5 CLT Spline Connection

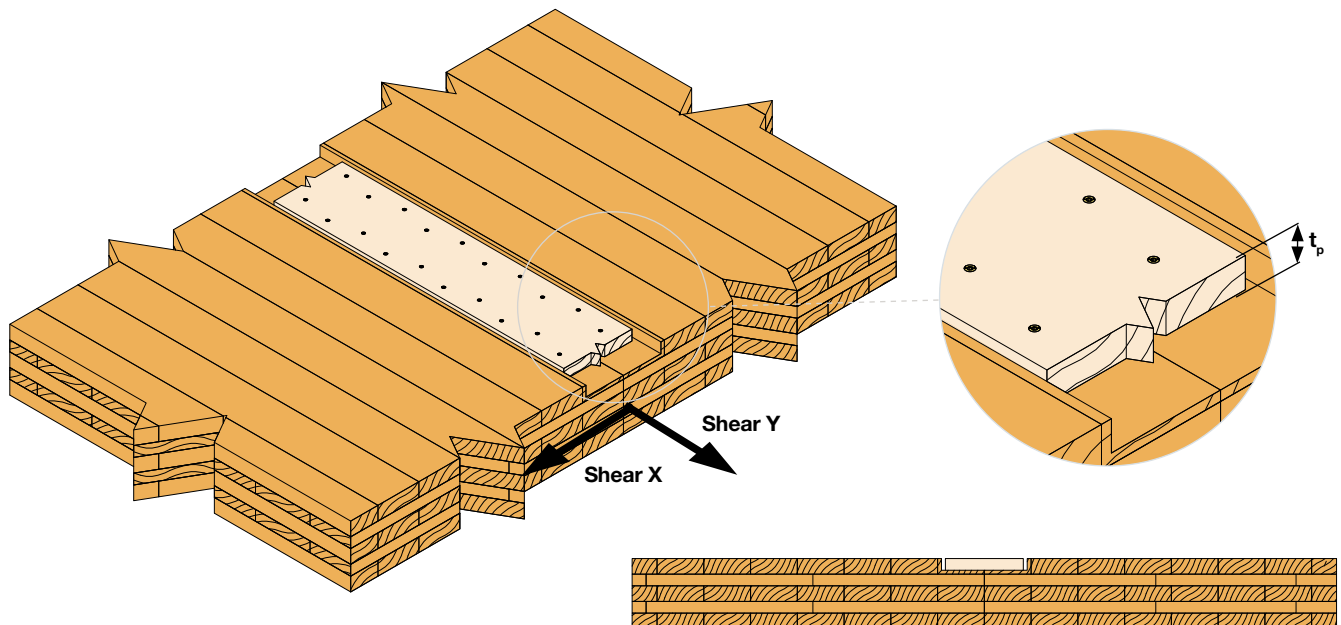
TTUFS - CLT Spline Connection

Plywood Board $\rho_k = 490 \text{ kg/m}^3$ to

CLT $\rho_k = 350 \text{ kg/m}^3$ (cont)

Product Reference	Characteristic Shear (X or Y) Capacity for Plywood ($\rho_k \geq 490 \text{ kg/m}^3$) to CLT ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p				
	15	18	22	25	30
	$R_{v,90,k,15}$	$R_{v,90,k,18}$	$R_{v,90,k,22}$	$R_{v,90,k,25}$	$R_{v,90,k,30}$
TTUFS6.0X40	1,31	-	-	-	-
TTUFS6.0X50	1,53	1,56	1,74	1,71	-
TTUFS6.0X60	1,53	1,61	2,05	2,11	2,01
TTUFS6.0X70	1,53	1,61	2,15	2,25	2,43
TTUFS6.0X80	1,53	1,61	2,15	2,25	2,43
TTUFS6.0X90	1,53	1,61	2,17	2,27	2,45
TTUFS6.0X100	1,53	1,61	2,17	2,27	2,45
TTUFS6.0X120	1,53	1,61	2,17	2,27	2,45
TTUFS6.0X140	1,53	1,61	2,17	2,27	2,45
TTUFS6.0X160	1,53	1,61	2,17	2,27	2,45
TTUFS6.0X180	1,53	1,61	2,17	2,27	2,45

For dimensions and calculation parameters see p. 40.



3.3.5 CLT Spline Connection

Solid-Drive™

WSV Collated Countersunk WOOD Screw for CLT Spline Connection

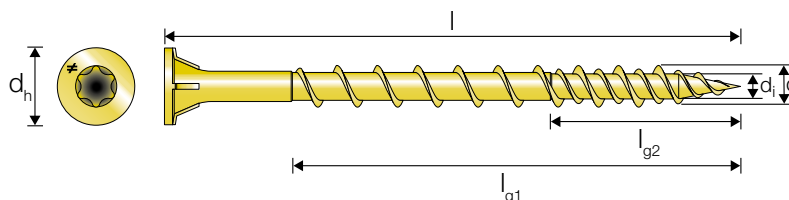
Yellow Zinc Plated

 C2 acc. to EN ISO 12944-2
 SC2 - 50 years acc. to EC5

 UK
 CA

CE

EN14592

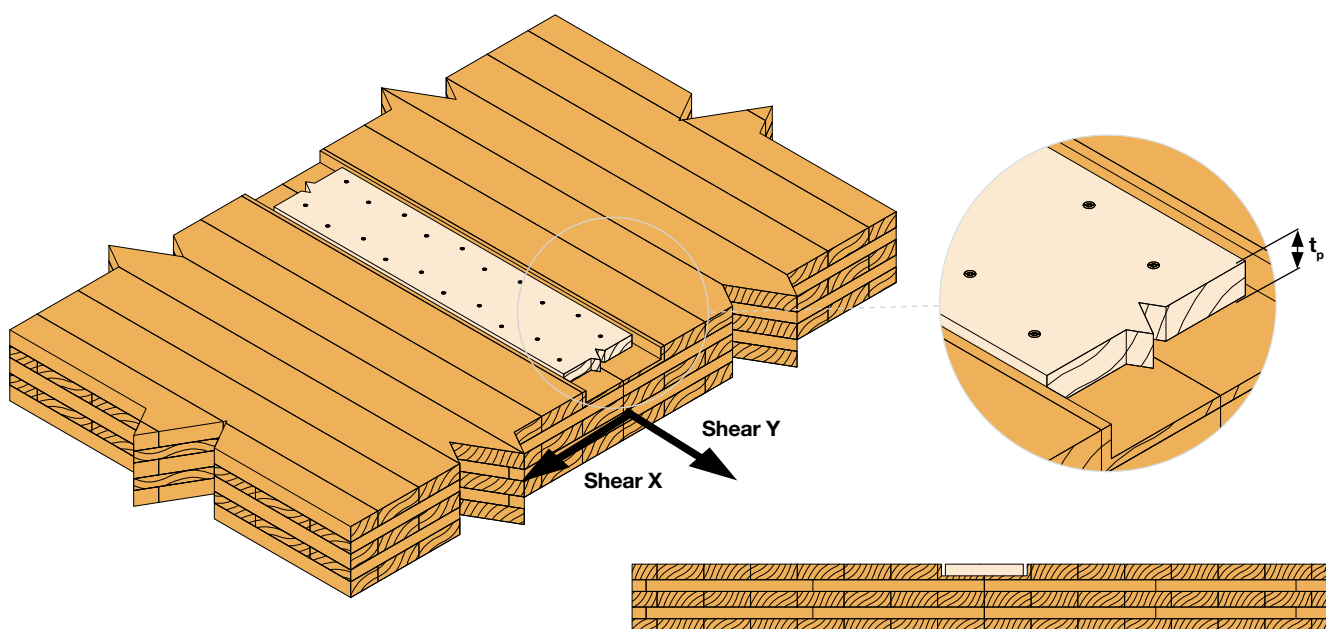


WSV - CLT Spline Connection

 Plywood Board $\rho_k = 490 \text{ kg/m}^3$ to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Characteristic Shear (X or Y) Capacity for Plywood ($\rho_k \geq 490 \text{ kg/m}^3$) to CLT ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p				
	15	18	22	25	30
	$R_{v,90,k,15}$	$R_{v,90,k,18}$	$R_{v,90,k,22}$	$R_{v,90,k,25}$	$R_{v,90,k,30}$
WSV44E (4.6x44)	0,78	0,82	0,75	0,69	-
WSV51E (4.6x51)	0,78	0,87	0,89	0,83	0,73
WSV64E (4.6x64)	1,20	1,20	1,00	1,10	1,00
WSV76E (4.6x76)	1,23	1,23	1,23	1,23	1,23

For dimensions and calculation parameters see p. 72



CLT to CLT

3.3.5 CLT Spline Connection

Solid-Drive™

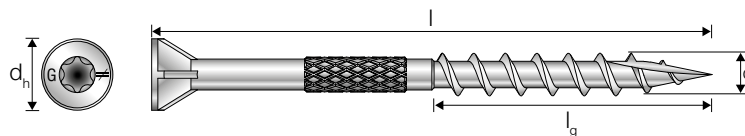
TTF Collated Countersunk WOOD Screw for CLT Spline Connection

Electro Galvanised

C1 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5UK
CA

CE

EN14592

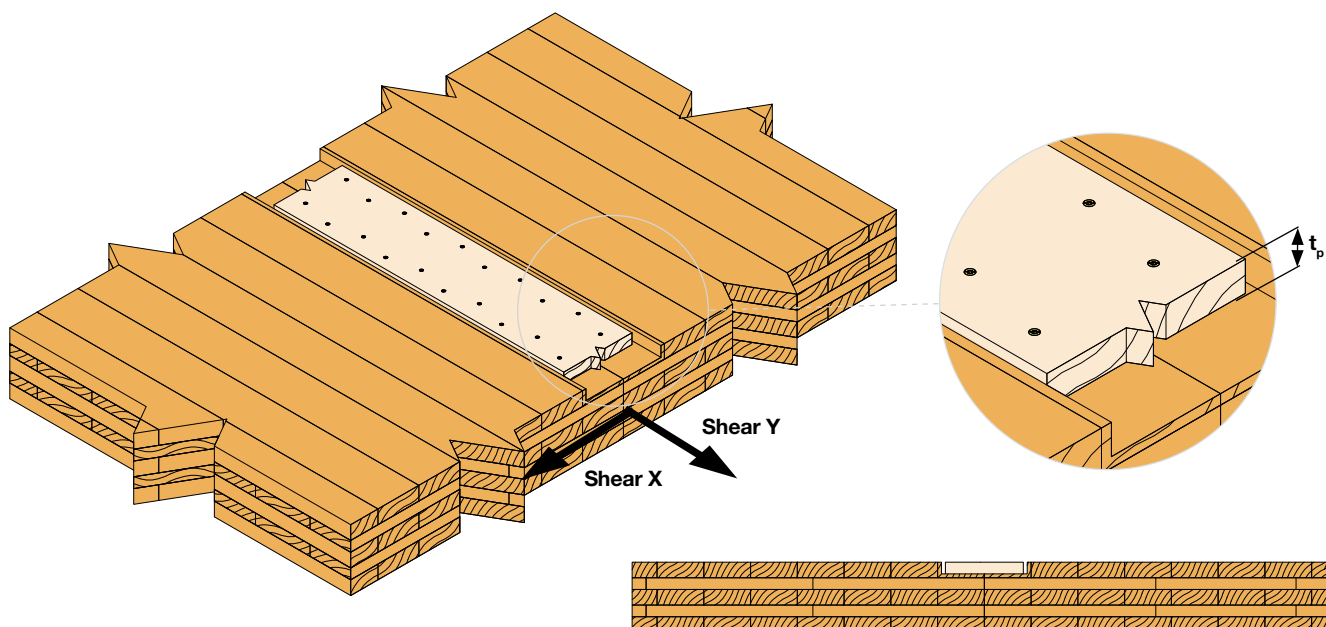


TTF - CLT Spline Connection

Plywood Board $\rho_k = 490 \text{ kg/m}^3$ to CLT $\rho_k = 350 \text{ kg/m}^3$

Product Reference	Characteristic Shear (X or Y) Capacity for Plywood ($\rho_k \geq 490 \text{ kg/m}^3$) to CLT ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p				
	15	18	22	25	30
	$R_{v,90,k,15}$	$R_{v,90,k,18}$	$R_{v,90,k,22}$	$R_{v,90,k,25}$	$R_{v,90,k,30}$
TTF35E	0,87	-	-	-	-
TTF45E	1,06	1,12	1,12	-	-
TTF55E	1,09	1,19	1,25	1,33	1,24
TTF75E	1,22	1,28	1,38	1,46	1,48

For dimensions and calculation parameters see p. 70

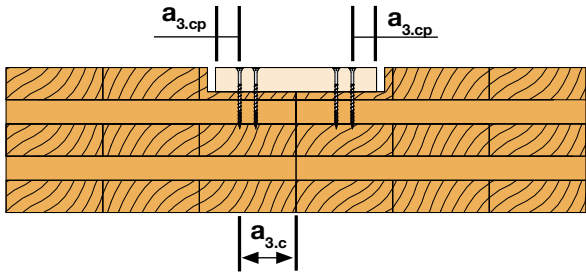


3.3.5 CLT Spline Connection

Minimum Distances for Screws CLT Spline Connection

TTUFS

Diameter	Angle Between the Load and the Grain 0°			
	a_1	a_2	$a_{3,c}$	$a_{3,cp}$
4.5	18	18	28	14
5.0	20	20	30	15
6.0	24	24	36	18



WSV

Diameter	Angle Between the Load and the Grain 0°			
	a_1	a_2	$a_{3,c}$	$a_{3,cp}$
4.6	18	18	28	14

TTF

Diameter	Angle Between the Load and the Grain 0°			
	a_1	a_2	$a_{3,c}$	$a_{3,cp}$
4.2	17	17	26	13

**We help you build safer,
stronger structures.**

Solid-Drive™ SSF Connector Screw



The background of the cover is a photograph of a modern building's exterior, showing a combination of light-colored wood paneling and grey concrete or stone walls. A large, semi-circular inset on the left side of the cover shows a close-up of a light-colored wood grain.

Steel to Timber Fastening

Steel to Timber Fastening	
SDD	198
SSH	202
SSF	206
CSA	208
CSA-Z	209
CSA-S	209
CNA	211
CNA-G	212
CNA-S	212
CSFT	214
TTUFS	216
TTZNFS	218
TTSFS	220
SWC	222
SDCF	225

4. Steel to Timber Fastening

Solid-Drive™

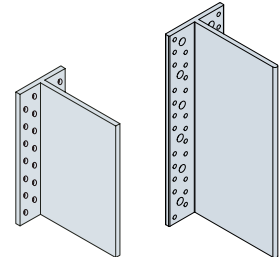
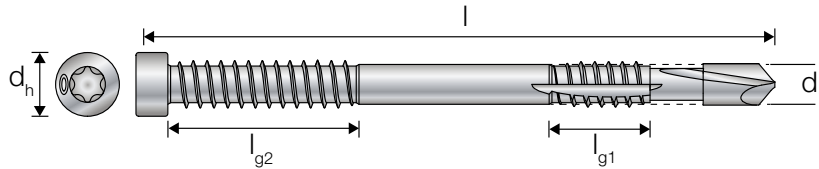
SDD Self-Drilling Dowels for Glulam Beams or CLT to Concealed Aluminium Hangers

Electro Galvanised

C1 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5UK
CA

CE

EN 14592



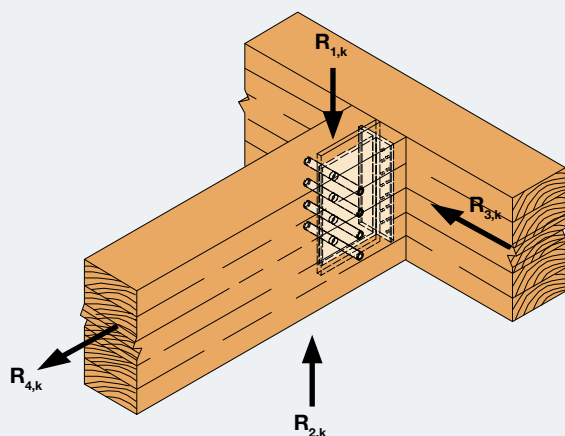
BTALU

BTCALU

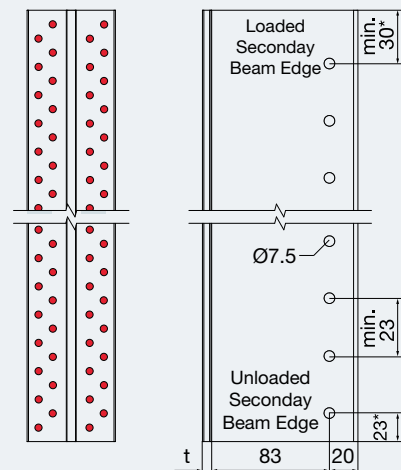
Characteristic Loads - Beam-to-Beam - BTALU Full Nailing

Product Reference	Beam dimensions [mm]		Qty fasteners				Characteristic loads [kN]									
	Min. height (no slope)		Primary beam		Secondary beam		$R_{1,k} = R_{2,k}$					$R_{3,k}$				
							Dowel length SDD [mm]					Dowel length SDD [mm]				
							93	113	133	153	173	93	113	133	153	173
BTALU1200/120	190	125	22	CNA4.0x50	3	SDD7.5	14.4	15.5	15.5	15.5	15.5	2.9	3.5	4.2	4.8	5.6
BTALU1200/160	230	165	30	CNA4.0x50	4	SDD7.5	23.0	24.6	26.4	26.4	26.4	3.6	4.4	5.3	6.2	7.0
BTALU1200/200	270	205	38	CNA4.0x50	5	SDD7.5	32.2	34.3	37.0	39.7	39.7	4.4	5.4	6.4	7.4	8.4
BTALU1200/240	310	245	46	CNA4.0x50	6	SDD7.5	40.4	44.1	47.5	51.4	51.4	5.3	6.4	7.4	8.6	9.8
BTALU1200/280	350	285	54	CNA4.0x50	7	SDD7.5	49.4	53.1	58.2	62.8	65.4	6.1	7.3	8.5	9.9	11.3
BTALU1200/320	390	325	62	CNA4.0x50	8	SDD7.5	57.4	62.5	68.0	74.0	77.7	6.8	8.3	9.7	11.1	12.9
BTALU1200/360	430	365	70	CNA4.0x50	9	SDD7.5	64.6	71.1	78.1	85.0	89.8	7.6	9.2	10.9	12.4	14.4
BTALU1200/400	470	405	78	CNA4.0x50	10	SDD7.5	71.7	79.0	87.5	96.0	101.9	8.3	10.1	12.1	13.8	15.8
BTALU1200/440	510	445	86	CNA4.0x50	11	SDD7.5	78.9	86.9	96.2	106.2	113.9	9.1	11.0	13.2	15.2	17.2
BTALU1200/480	550	485	94	CNA4.0x50	12	SDD7.5	86.1	94.8	105.0	115.9	125.1	9.8	11.9	14.3	16.6	18.7
BTALU1200/520	590	525	104	CNA4.0x50	12	SDD7.5	86.1	94.8	105.0	115.9	125.1	10.6	12.8	15.4	17.8	20.1
BTALU1200/560	630	565	112	CNA4.0x50	12	SDD7.5	86.1	94.8	105.0	115.9	125.1	11.3	13.8	16.5	19.1	21.5
BTALU1200/600	670	605	120	CNA4.0x50	12	SDD7.5	86.1	94.8	105.0	115.9	125.1	12.1	14.7	17.6	20.4	23.0

The beam has to be wider than the length of the dowel. See ETA to optimise the qty of dowels per beam.



Force Directions



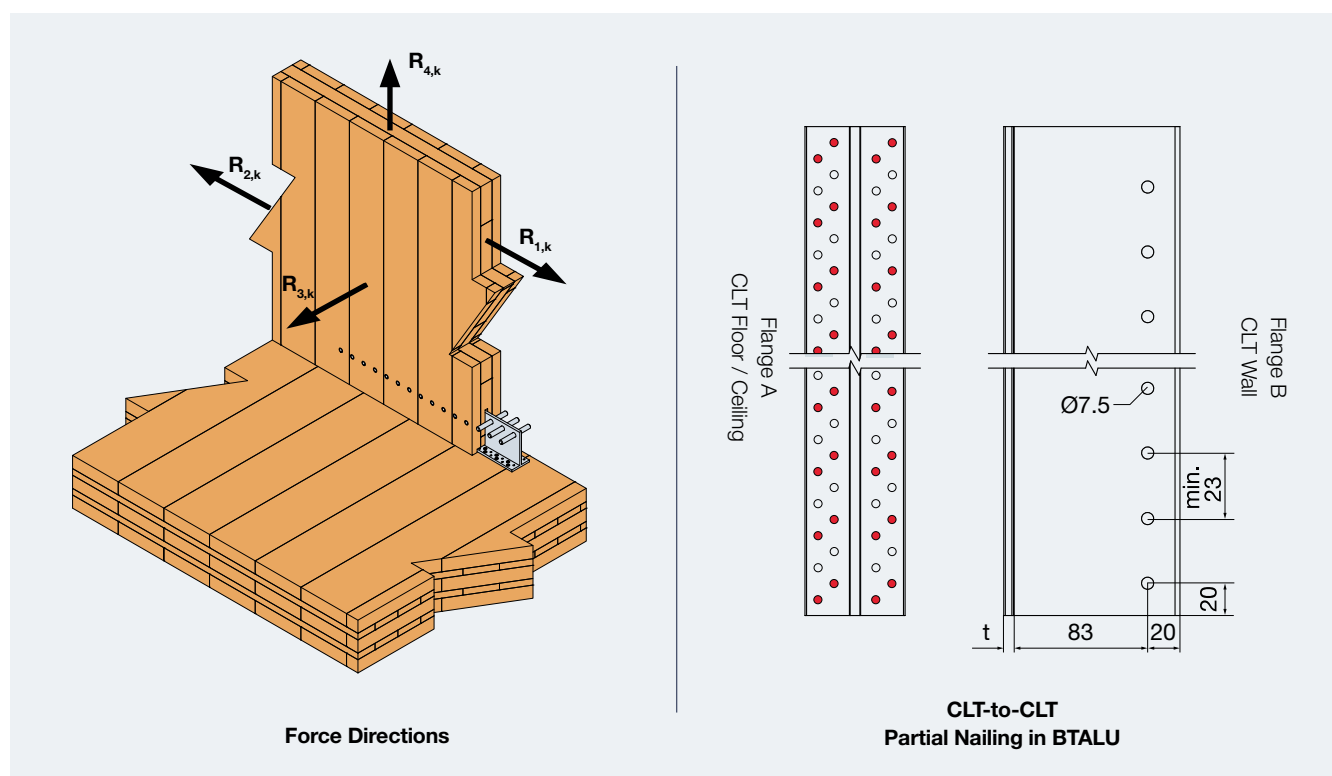
Beam-to-Beam (Full Nailing in BTALU)

4. Steel to Timber Fastening

Characteristic Loads - Beam-to-Post / CLT to CLT - BTALU Partial Nailing

Product Reference	Beam dimensions [mm]		Qty fasteners				Characteristic loads [kN]										
	Min. height (no slope)		Primary beam		Secondary beam		R _{1,k} = R _{2,k}					R _{3,k}					R _{4,k}
							Dowel length SDD [mm]					Dowel length SDD [mm]					
	Primary beam	Secondary beam	Qty	Type	Qty	Type	93	113	133	153	173	93	113	133	153	173	
BTALU1200/120	190	125	12	CNA4.0x50	3	SDD7.5	12.2	13.2	13.5	14.1	14.1	2.9	3.5	4.2	4.8	5.6	8.8
BTALU1200/160	230	165	16	CNA4.0x50	4	SDD7.5	18.7	19.7	21.3	21.3	21.3	3.6	4.4	5.3	6.2	7.0	12.7
BTALU1200/200	270	205	20	CNA4.0x50	5	SDD7.5	25.9	27.7	29.8	29.8	29.8	4.4	5.4	6.4	7.4	8.4	16.7
BTALU1200/240	310	245	24	CNA4.0x50	6	SDD7.5	33.6	36.2	38.9	38.9	38.9	5.3	6.4	7.4	8.6	9.8	20.6
BTALU1200/280	35	285	28	CNA4.0x50	7	SDD7.5	41.5	44.9	48.2	48.2	48.2	5.6	6.7	7.7	8.9	10.1	24.5
BTALU1200/320	390	325	32	CNA4.0x50	8	SDD7.5	49.4	53.6	53.6	53.6	53.6	6.4	7.7	8.8	10.2	11.5	28.4
BTALU1200/360	430	365	36	CNA4.0x50	9	SDD7.5	57.5	62.4	62.4	62.4	62.4	7.2	8.6	9.9	11.5	12.9	32.3
BTALU1200/400	470	405	40	CNA4.0x50	10	SDD7.5	65.5	71.2	76.4	76.4	76.4	8.0	9.6	11.0	12.7	14.4	36.3
BTALU1200/440	510	445	44	CNA4.0x50	11	SDD7.5	73.6	79.3	85.8	91.4	92.5	8.8	10.5	12.1	14.0	15.8	40.2
BTALU1200/480	550	485	48	CNA4.0x50	12	SDD7.5	81.4	87.9	94.5	100.2	101.7	9.5	11.5	13.2	15.3	17.2	44.1
BTALU1200/520	590	525	52	CNA4.0x50	12	SDD7.5	83.6	90.2	97.5	104.1	106.4	10.3	12.4	14.3	16.6	18.7	48.0
BTALU1200/560	630	565	56	CNA4.0x50	12	SDD7.5	85.9	92.5	100.5	107.9	111.2	11.1	13.4	15.4	17.8	20.1	51.9
BTALU1200/600	670	605	60	CNA4.0x50	12	SDD7.5	85.9	94.8	103.5	111.7	115.9	11.9	14.4	16.5	19.1	21.5	55.9

The beam has to be wider than the length of the dowel. See ETA to optimise the qty of dowels per beam.



Fixing situation with a slope :

For beams with a slope β , the values must be multiplied by the following coefficient:

β	0°	15°	30°	45°
Coefficient	1.0	0.95	0.9	0.85

This only applies to assemblies with less than 7 dowels in the beam.

The effective length of the dowels is equal to the total length of the dowels - 13 mm.

This type of assembly must not be used outdoors (in this case stainless dowels are recommended).

4. Steel to Timber Fastening

SDD – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Timber to Timber C24

Outer Thread Diameter d [mm]	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
7.5	37.5	30	80	80	23	23	30	23	80	80	30	23

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA21/0670

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

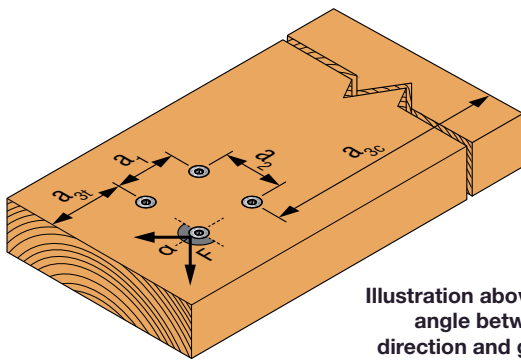


Illustration above shows angle between load direction and grain = 0°

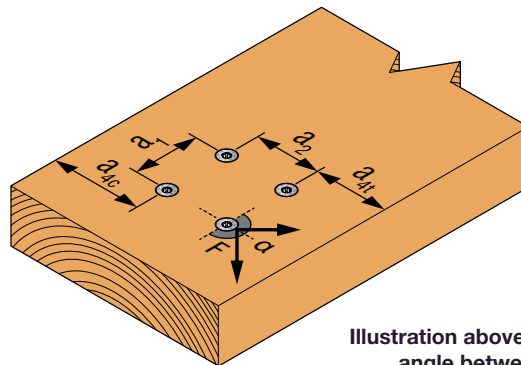


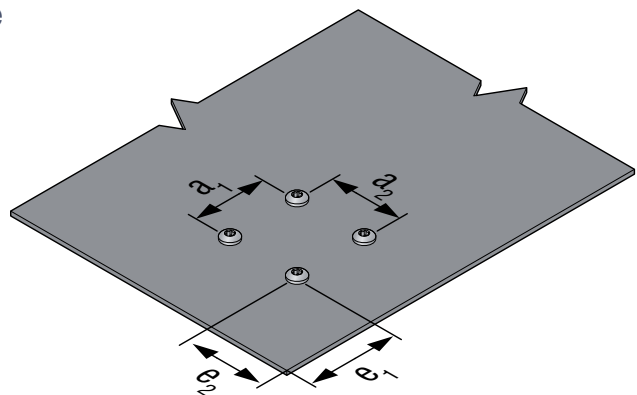
Illustration above shows angle between load direction and grain = 90°

SDD – Minimum Distances in the Steel Plate

Outer Thread Diameter d [mm]	a ₁ *	a ₂ *	e ₁ *	e ₂ *
7.5	16.5	18	9	9

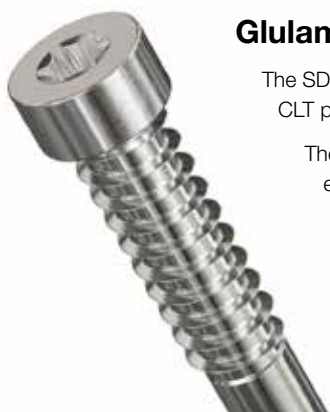
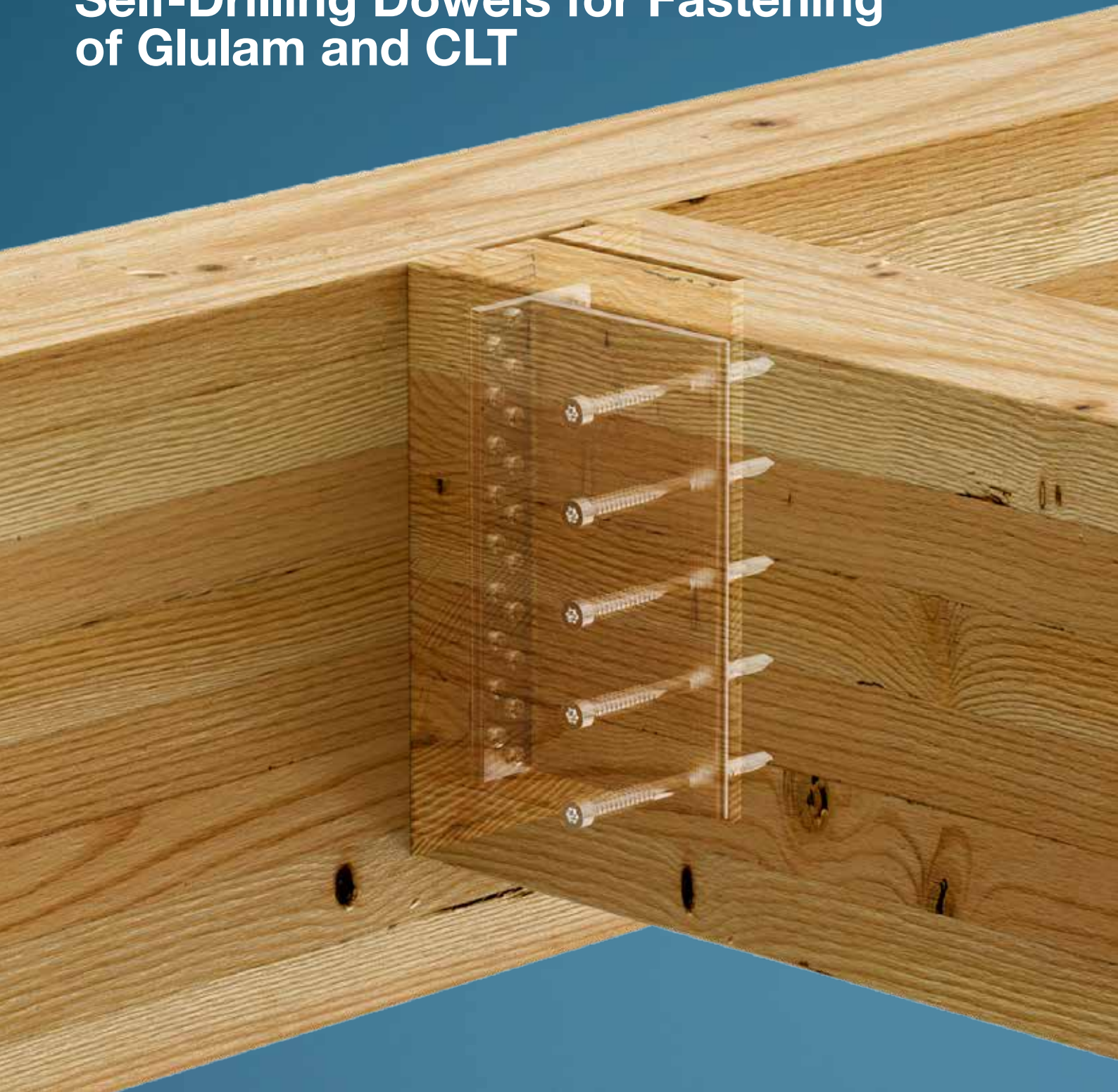
*According to EN 1993-1-8 §3.5

Once you have the spacing and edge distance in steel and timber, you pick the maximum for each dimension between steel and timber.



Solid-Drive™

Self-Drilling Dowels for Fastening of Glulam and CLT



Glulam and CLT fastening without pre-drilling

The SDD self-drilling dowels offer a cost-effective method for installing glulam beams and CLT panels with concealed aluminium brackets.

The innovative arrow drill and chip-removing function ensure that the dowels can be easily screwed into the timber and drill through the aluminium creating a strong assembly.

The heavy-duty thread and shank provides strength and stability and the cylinder head sinks into the wood allowing for hidden assemblies.

SIMPSON
Strong-Tie®

4. Steel to Timber Fastening

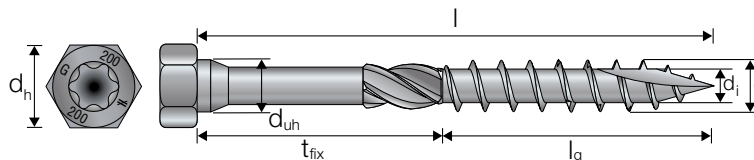
Solid-Drive™

SSH Structural Hex-Head CONNECTOR Screw for Steel to Timber

Impreg®+

C4 – 15 years acc. to EN
ISO 12944-2
SC2 – 50 years acc. to EC5UK
CA

ETA-21/0670



SSH – Characteristic Capacity Steel to Timber C24

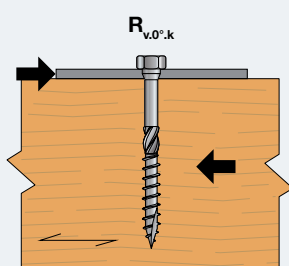
Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
SSH6.0x40 ⁴⁾	1,8	3,0	2,40 1,49	6,0	3,16 2,29
SSH6.0x50 ⁴⁾	2,6	3,0	2,77 1,89	6,0	3,64 2,82
SSH6.0x60 ⁴⁾	3,4	3,0	2,95 2,29	6,0	3,82 3,19
SSH6.0x75 ⁴⁾	3,4	3,0	2,95 2,50	6,0	3,82 3,19
SSH6.0x90 ⁴⁾	3,4	3,0	2,95 2,50	6,0	3,82 3,19
SSH6.0x120 ⁴⁾	6,0	3,0	3,61 3,16	6,0	4,48 3,85

1) For steel thickness $\leq d$ 2) Thin plate: thickness $\leq 0.5xd$ 3) Thick plate: thickness $\geq d$

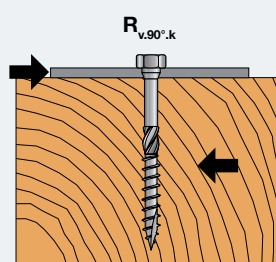
4) 6.0mm screws have a different head design – see page 52.

For intermediate steel thicknesses, the strength can be obtained by interpolation.
For recommended hole diameter in steel see page 29.

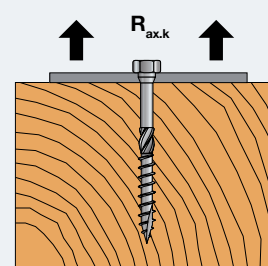
Characteristic capacities	4,48 3,85	With pre-drill Without pre-drill
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Shear Parallel (0°) to
the Grain



Shear Perpendicular (90°)
to the Grain



Tension

4. Steel to Timber Fastening

SSH – Characteristic Capacity Steel to Timber C24 (cont.)

Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
SSH8.0X40	3,6	4,0	3,04 1,77	8,0	4,75 3,54
SSH8.0X50	4,7	4,0	3,89 2,26	8,0	5,67 4,12
SSH8.0x60	4,7	4,0	4,73 2,76	8,0	6,39 4,48
SSH8.0x70	4,7	4,0	4,93 3,25	8,0	6,48 4,89
SSH8.0X80	4,7	4,0	4,93 3,74	8,0	6,48 5,23
SSH8.0X90	4,7	4,0	4,93 4,04	8,0	6,48 5,23
SSH8.0X100	6,1	4,0	5,29 4,40	8,0	6,85 5,59
SSH8.0X120	9,5	4,0	6,12 5,23	8,0	7,68 6,42
SSH8.0X140	9,5	4,0	6,12 5,23	8,0	7,68 6,42
SSH8.0X160	12,2	4,0	6,82 5,74	8,0	8,38 7,12
SSH8.0X180	12,2	4,0	6,82 5,74	8,0	8,38 7,12
SSH8.0X200	12,2	4,0	6,82 5,74	8,0	8,38 7,12
SSH8.0X240	12,2	4,0	6,82 5,74	8,0	8,38 7,12
SSH8.0X260	12,2	4,0	6,82 5,74	8,0	8,38 7,12
SSH8.0X280	12,2	4,0	6,82 5,74	8,0	8,38 7,12
SSH8.0X300	12,2	4,0	6,82 5,74	8,0	8,38 7,12
SSH10.0X50	3,9	5,0	3,62 2,59	10,0	5,87 4,92
SSH10.0X60	5,1	5,0	5,68 3,16	10,0	7,68 5,29
SSH10.0X80	5,1	5,0	6,41 4,32	10,0	8,54 6,20
SSH10.0X90	5,1	5,0	6,41 4,89	10,0	8,54 6,70
SSH10.0X100	6,7	5,0	6,81 5,47	10,0	8,94 7,09
SSH10.0X120	10,3	5,0	7,71 6,41	10,0	9,84 8,00
SSH10.0X140	10,3	5,0	7,71 6,41	10,0	9,84 8,00
SSH10.0X160	13,3	5,0	8,47 7,16	10,0	10,60 8,75
SSH10.0X180	13,3	5,0	8,47 7,16	10,0	10,60 8,75
SSH10.0X200	13,3	5,0	8,47 7,16	10,0	10,60 8,75
SSH10.0X240	15,1	5,0	8,92 7,62	10,0	11,05 9,21
SSH10.0X280	15,1	5,0	8,92 7,62	10,0	11,05 9,21

¹⁾ For steel thickness $\leq d$

²⁾ Thin plate: thickness $\leq 0.5 \times d$

³⁾ Thick plate: thickness $\geq d$

For intermediate steel thicknesses, the strength can be obtained by interpolation.
For recommended hole diameter in steel see page 29.

Characteristic capacities	11,05	With pre-drill
	9,21	Without pre-drill

4. Steel to Timber Fastening

SSH – Characteristic Capacity Steel to Timber C24 (cont.)

Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
SSH12.0X60	7,0	6,0	6,55 3,53	12,0	9,27 6,45
SSH12.0X80	7,0	6,0	8,23 4,84	12,0	10,91 7,41
SSH12.0X90	7,0	6,0	8,23 5,49	12,0	10,91 7,96
SSH12.0X100	8,1	6,0	8,49 6,14	12,0	11,17 8,74
SSH12.0X120	12,4	6,0	9,59 7,45	12,0	12,27 9,84
SSH12.0X140	12,4	6,0	9,59 7,87	12,0	12,27 9,84
SSH12.0X160	16,1	6,0	10,50 8,78	12,0	13,18 10,75
SSH12.0X180	16,1	6,0	10,50 8,78	12,0	13,18 10,75
SSH12.0X200	16,1	6,0	10,50 8,78	12,0	13,18 10,75

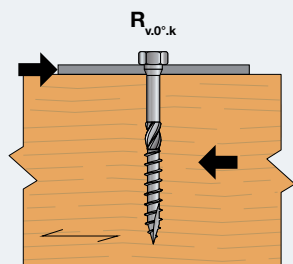
¹⁾ For steel thickness $\leq d$

²⁾ Thin plate: thickness $\leq 0.5xd$

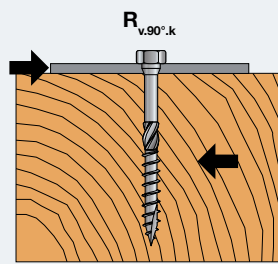
³⁾ Thick plate: thickness $\geq d$

For intermediate steel thicknesses, the strength can be obtained by interpolation.
For recommended hole diameter in steel see page 29.

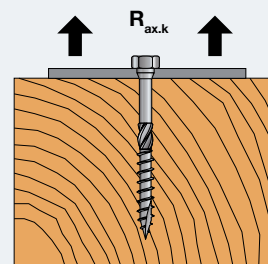
Characteristic capacities	13,18	With pre-drill
	10,75	Without pre-drill



Shear Parallel (0°) to the Grain



Shear Perpendicular (90°) to the Grain



Tension

4. Steel to Timber Fastening

SSH – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Steel to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
6.0	With pre-drill	21	13	42	72	18	18	17	17	42	42	18	42
	Without pre-drill	51	21	60	90	30	30	21	21	60	60	30	60
8.0	With pre-drill	28	17	56	96	24	24	23	23	56	56	24	56
	Without pre-drill	68	28	80	120	40	40	28	28	80	80	40	80
10.0	With pre-drill	35	21	70	120	30	30	28	28	70	70	30	70
	Without pre-drill	84	35	100	150	50	50	35	35	100	100	50	100
12.0	With pre-drill	42	26	84	144	36	36	34	34	84	84	36	84
	Without pre-drill	101	42	120	180	60	60	42	42	120	120	60	120

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA21/0670

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

SSH – Minimum Distances for Axially Loaded Screws Steel to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
6.0	30	21	60	24
8.0	40	28	80	32
10.0	49	35	100	40
12.0	59	42	120	48

*Valid if the applied centre distances comply with $a_1, a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

See explanation of α in General Introduction page 23.

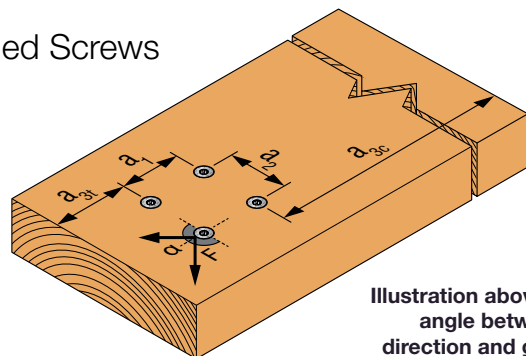


Illustration above shows angle between load direction and grain = 0°

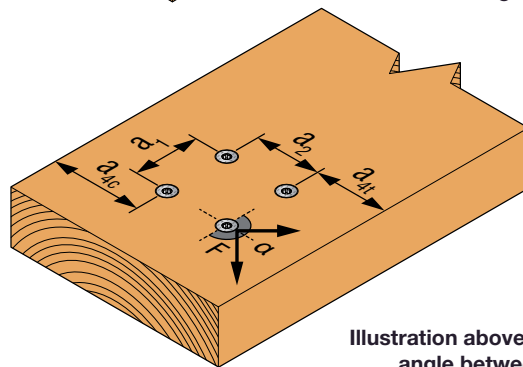


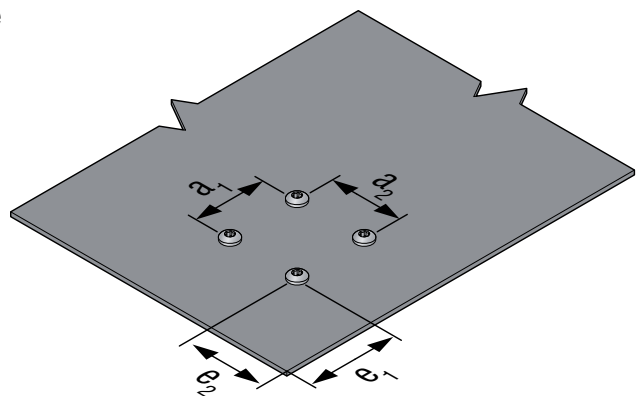
Illustration above shows angle between load direction and grain = 90°

SSH – Minimum Distances in the Steel Plate

Outer Thread Diameter d [mm]	a ₁ *	a ₂ *	e ₁ *	e ₂ *
6.0	14	15	8	8
8.0	18	20	10	10
10.0	22	24	12	12
12.0	27	29	15	15

*According to EN 1993-1-8 §3.5

Once you have the spacing and edge distance in steel and timber, you pick the maximum for each dimension between steel and timber.



4. Steel to Timber Fastening

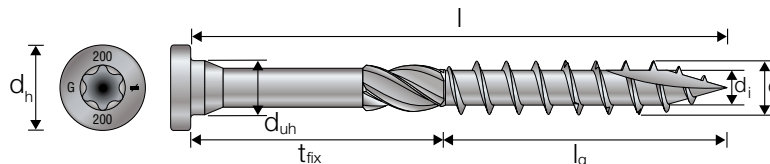
Solid-Drive™

SSF Structural Flat Round Head CONNECTOR Screw for Steel to Timber

Impreg®+

C4 – 15 years acc. to EN
ISO 12944-2
SC2 – 50 years acc. to EC5UK
CA

ETA-21/0670

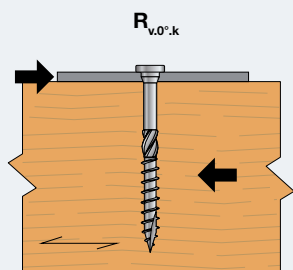


SSF – Characteristic Capacity Steel to Timber C24

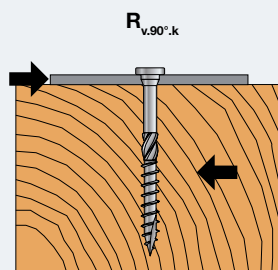
Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
SSF8.0X40	3,6	4,0	3,04 1,77	8,0	4,75 3,54
SSF8.0x60	4,7	4,0	4,73 2,76	8,0	6,39 4,48
SSF8.0X80	4,7	4,0	4,93 3,74	8,0	6,48 5,23
SSF10.0X60	5,1	5,0	5,68 3,16	10,0	7,68 5,29
SSF10.0X80	5,1	5,0	6,41 4,32	10,0	8,54 6,20

¹⁾ For steel thickness $\leq d$ ²⁾ Thin plate thickness $\leq 0.5xd$ ³⁾ Thick plate thickness $\geq d$ For intermediate steel thicknesses, the strength can be obtained by interpolation.
For recommended hole diameter in steel see page 29.

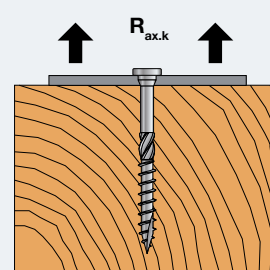
Characteristic capacities	8,54	With pre-drill
	6,20	Without pre-drill



Shear Parallel (0°) to
the Grain



Shear Perpendicular (90°)
to the Grain



Tension

4. Steel to Timber Fastening

SSF – Minimum Distances for Screws in Shear or Combined Loads¹⁾

Steel to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
8.0	With pre-drill	28	17	56	96	24	24	23	23	56	40	24	56
	Without pre-drill	68	28	80	120	40	40	28	28	80	80	40	80
10.0	With pre-drill	35	21	70	120	30	30	28	28	70	50	30	70
	Without pre-drill	84	35	100	150	50	50	35	35	100	100	50	100

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA21/0670

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

SSF – Minimum Distances for Axially Loaded Screws

Steel to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
8.0	40	28	80	32
10.0	49	35	100	40

*Valid if the applied centre distances comply with $a_1, a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

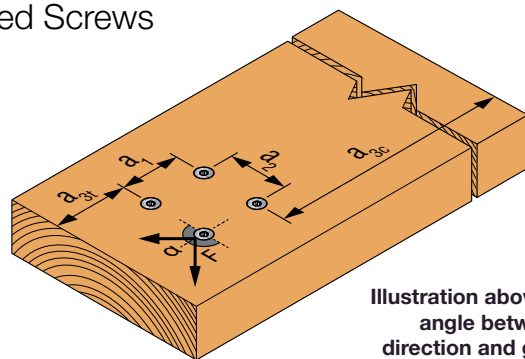


Illustration above shows angle between load direction and grain = 0°

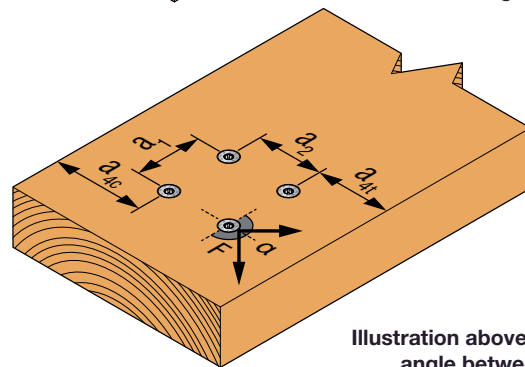


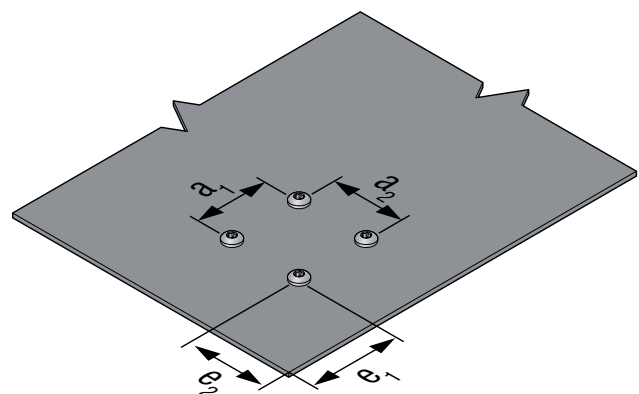
Illustration above shows angle between load direction and grain = 90°

SSF – Minimum Distances in the Steel Plate

Outer Thread Diameter d [mm]	a ₁ *	a ₂ *	e ₁ *	e ₂ *
8.0	18	20	10	10
10.0	22	24	12	12

*According to EN 1993-1-8 §3.5

Once you have the spacing and edge distance in steel and timber, you pick the maximum for each dimension between steel and timber.



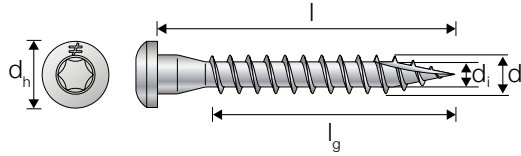
4. Steel to Timber Fastening

Solid-Drive™

CSA/CSA-Z/CSA-S Structural CONNECTOR Screw for Steel to Timber

**UK
CA**


ETA-04/0013

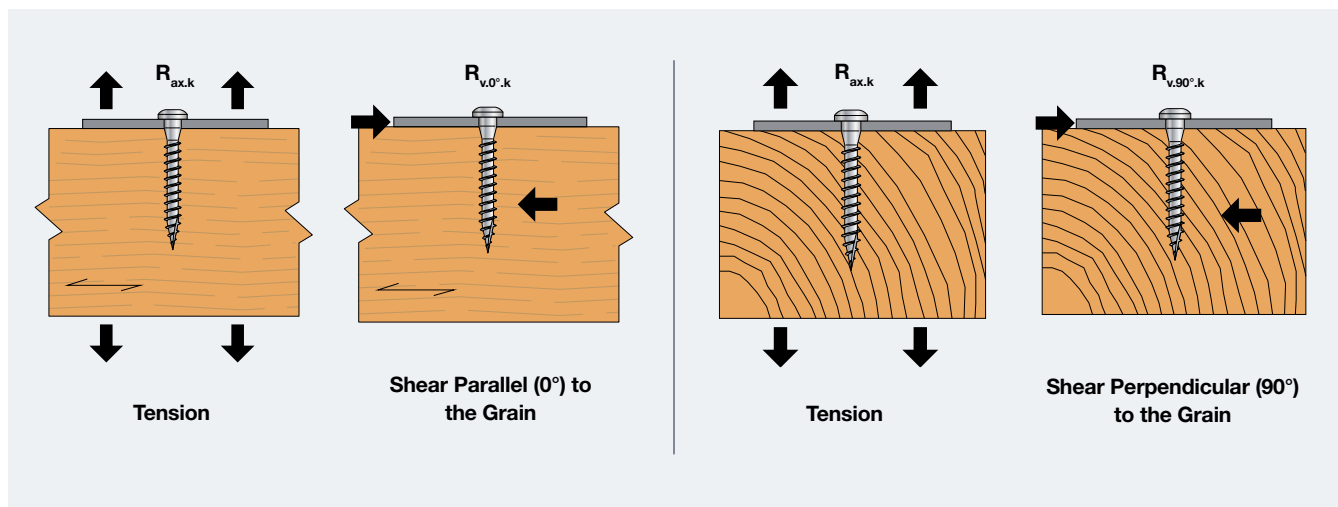

Electro Galvanised

 C2 acc. to EN ISO 12944-2
 SC2 – 50 years acc. to EC5

 CSA – Characteristic Capacity
 1,0-4,0 mm Steel to Timber C24

Product Reference	Characteristic Capacity	
	Tension Capacity – C24 – $R_{ax,k}$ [kN]	Shear Capacity Parallel and Perpendicular to the Grain – C24 – $R_{v,k}$ [kN]
CSA4.0X30	1,28	1,36
CSA5.0X25	1,38	1,49
CSA5.0X35	2,11	1,99
CSA5.0X40	2,47	2,25
CSA5.0X50	3,20	2,63
CSA5.0X80	5,38	3,50

For recommended hole diameter in steel see page 29.



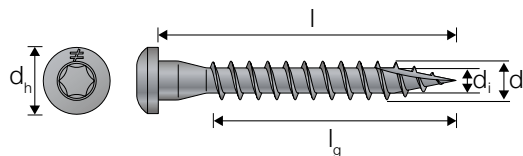
4. Steel to Timber Fastening

Solid-Drive™

CSA/CSA-Z/CSA-S Structural CONNECTOR Screw for Steel to Timber

UK
CA

ETA-04/0013



CSA-Z – Characteristic Capacity 1,0-4,0 mm Steel to Timber C24

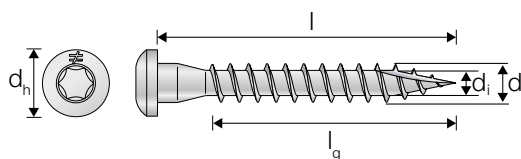
Impreg®+

C4 – 15 years acc. to EN
ISO 12944-2
SC2 – 50 years acc. to EC5



Product Reference	Characteristic Capacity	
	Tension Capacity – C24 – $R_{ax,k}$ [kN]	Shear Capacity Parallel and Perpendicular to the Grain – C24 – $R_{v,k}$ [kN]
CSA5.0X35-Z	2,11	1,99
CSA5.0X40-Z	2,47	2,25
CSA5.0X50-Z	3,20	2,63

For recommended hole diameter in steel see page 29.



CSA-S – Characteristic Capacity 1,0-4,0 mm Steel to Timber C24

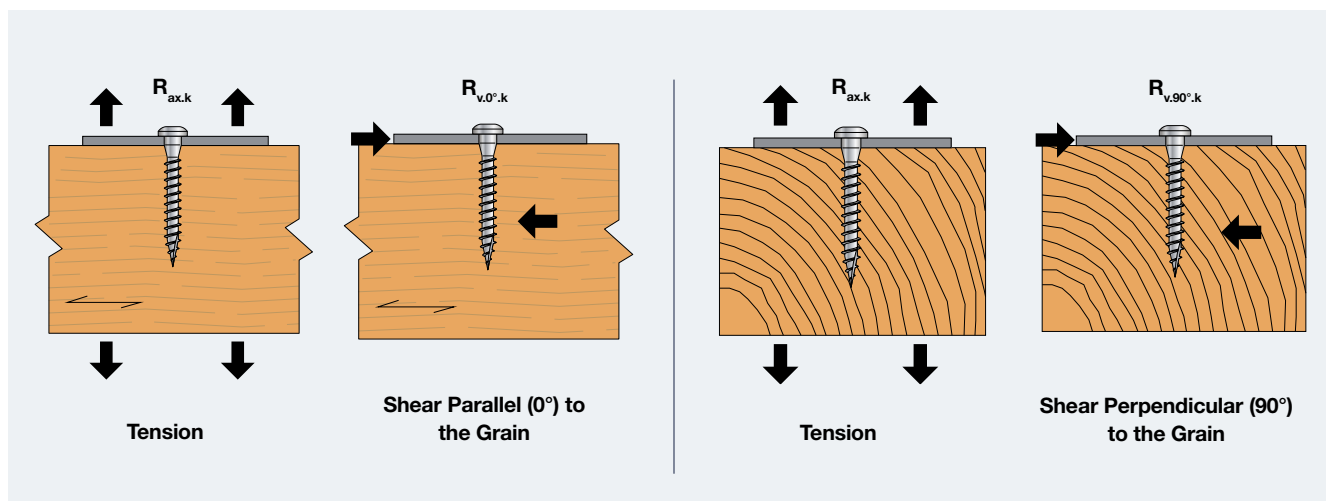
Stainless Steel

CRC III acc. to
EN1993-1-4(A1)
SC3 – 50 years acc. to EC5



Product Reference	Characteristic Capacity	
	Tension Capacity – C24 – $R_{ax,k}$ [kN]	Shear Capacity Parallel and Perpendicular to the Grain – C24 – $R_{v,k}$ [kN]
CSA5.0X25S	1,38	1,49
CSA5.0X35S	2,11	1,99
CSA5.0X40S	2,47	2,25

For recommended hole diameter in steel see page 29.



4. Steel to Timber Fastening

CSA/CSA-Z/CSA-S – Diameter Selection

Product Reference	Nominal Hole Diameter $d_{f, \text{nom}}$ [mm]
CSA4,0	4,0
CSA5,0	5,0

CSA/CSA-Z/CSA-S – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Steel to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a_1	a_2	$a_{3,c}$	$a_{3,t}$	$a_{4,c}$	$a_{4,t}$	a_1	a_2	$a_{3,c}$	$a_{3,t}$	$a_{4,c}$	$a_{4,t}$
5.0	With pre-drill	13	8	25	42	11	11	10	10	35	25	11	18
	Without pre-drill	25	13	35	52	18	18	13	13	35	35	18	25

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA-04/0013

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

CSA/CSA-Z/CSA-S – Minimum Distances for Axially Loaded Screws Steel to Timber C24

Outer Thread Diameter d [mm]	a_1	a_2	$a_{3,c}$	$a_{4,c}$
5.0	17	13	13	14

*Valid if the applied centre distances comply with $a_1, a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

See explanation of α in General Introduction page 23.

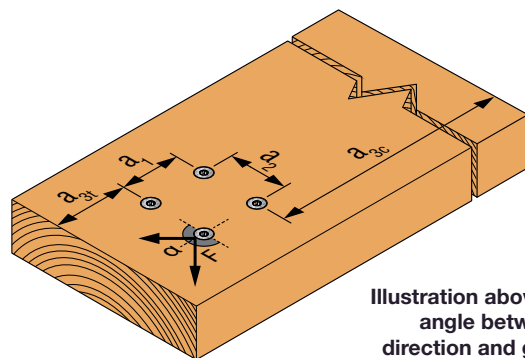


Illustration above shows
angle between load
direction and grain = 0°

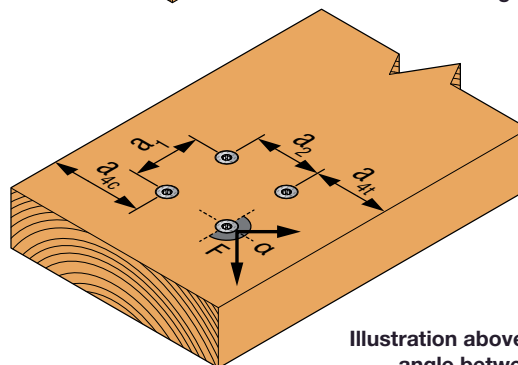


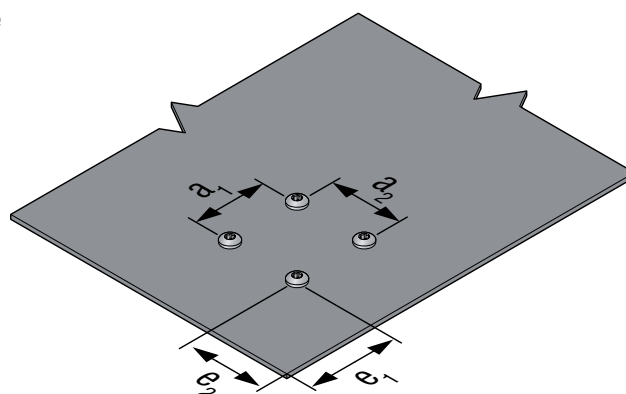
Illustration above shows
angle between load
direction and grain = 90°

CSA – Minimum Distances in the Steel Plate

Outer Thread Diameter d [mm]	a_1^*	a_2^*	e_1^*	e_2^*
5.0	11	12	6	6

*According to EN 1993-1-8 §3.5

Once you have the spacing and edge distance in steel and timber, you pick the maximum for each dimension between steel and timber.



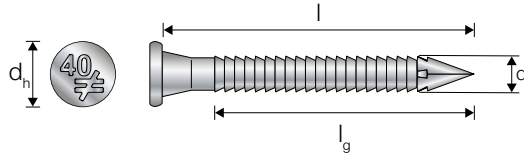
4. Steel to Timber Fastening

Solid-Drive™

CNA/CNA-G/CNA-S Structural CONNECTOR Nail for Steel to Timber

**UK
CA**


ETA-04/0013

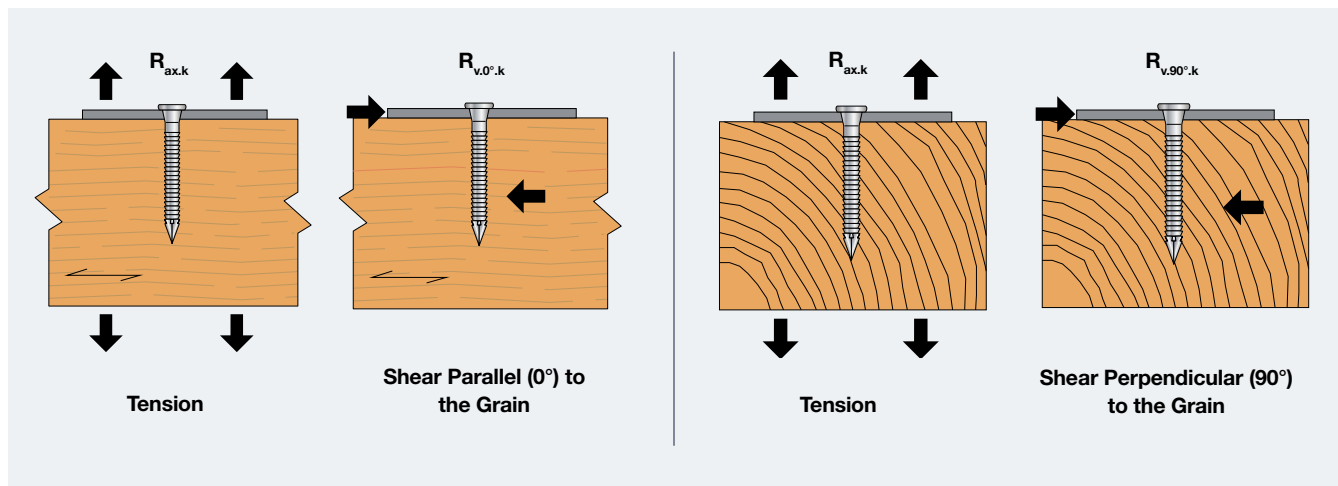

Electro Galvanised

 C2 acc. to EN ISO 12944-2
 SC2 – 50 years acc. to EC5

 CNA – Characteristic Capacity
 1,0-4,0 mm Steel to Timber C24

Product Reference	Characteristic Capacity	
	Tension Capacity – C24 – $R_{ax,k}$ [kN]	Shear Capacity – C24 – $R_{v,k}$ [kN]
CNA4.0X35	0,61	1,66
CNA4.0X40	0,74	1,85
CNA4.0X50	0,98	2,22
CNA4.0X60	1,23	2,36
CNA4.0X75	1,45	2,50
CNA4.0X100	1,43	2,48
CNA6.0X80	2,15	4,47
CNA6.0X100	2,15	4,47

For recommended hole diameter in steel see page 29.



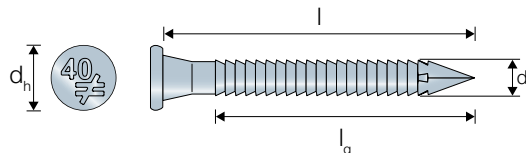
4. Steel to Timber Fastening

Solid-Drive™

CNA/CNA-G/CNA-S Structural CONNECTOR Nail for Steel to Timber



ETA-04/0013



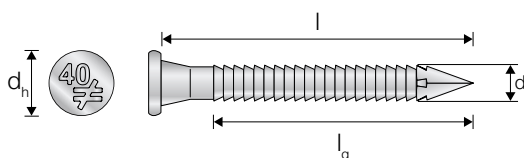
CNA-G – Characteristic Capacity 1,0-4,0 mm Steel to Timber C24

Hot-Dip Galvanised

C4 acc. to EN ISO 12944-2
SC3 – 50 years acc. to EC5

Product Reference	Characteristic Capacity	
	Tension Capacity – C24 – $R_{ax,k}$ [kN]	Shear Capacity – C24 – $R_{v,k}$ [kN]
CNA4.0X40G	0,74	1,86

For recommended hole diameter in steel see page 29.



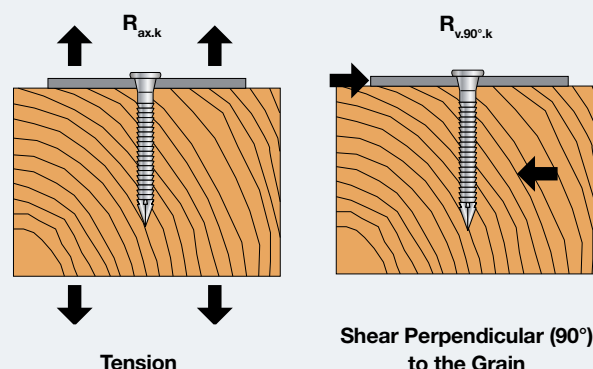
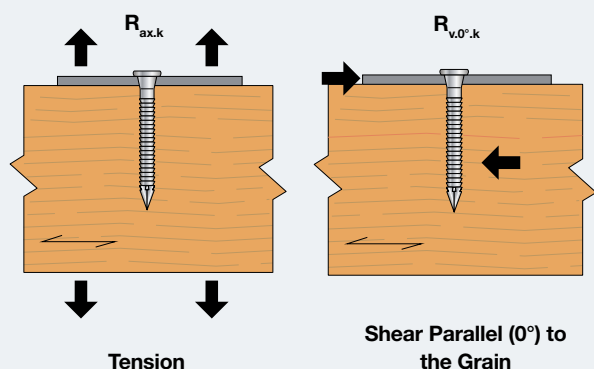
CNA-S – Characteristic Capacity 1,0-4,0 mm Steel to Timber C24

Stainless Steel

CRC III acc. to
EN1993-1-4(A1)
SC3 – 50 years acc. to EC5

Product Reference	Characteristic Capacity	
	Tension Capacity – C24 – $R_{ax,k}$ [kN]	Shear Capacity – C24 – $R_{v,k}$ [kN]
CNA4.0X35S	0,64	1,66
CNA4.0X40S	0,76	1,85
CNA4.0X50S	1,00	2,23
CNA4.0X60S	1,25	2,38

For recommended hole diameter in steel see page 29.



4. Steel to Timber Fastening

CNA – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Steel to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
4.0	With pre-drill	14	9	28	48	12	12	12	12	28	28	12	28
	Without pre-drill	34	14	40	60	20	20	14	14	40	40	20	20

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA-04/0013

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

CNA – Minimum Distances for Axially Loaded Screws Steel to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
4.0	20	14	40	16

*Valid if the applied centre distances comply with $a_1 a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

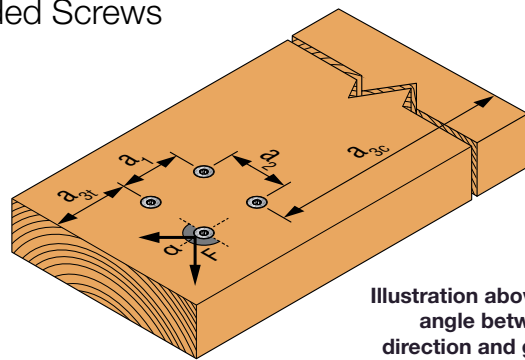


Illustration above shows angle between load direction and grain = 0°

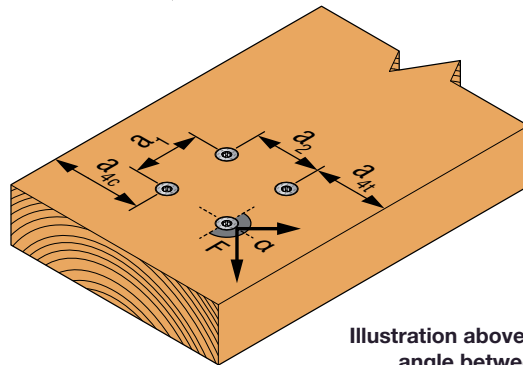


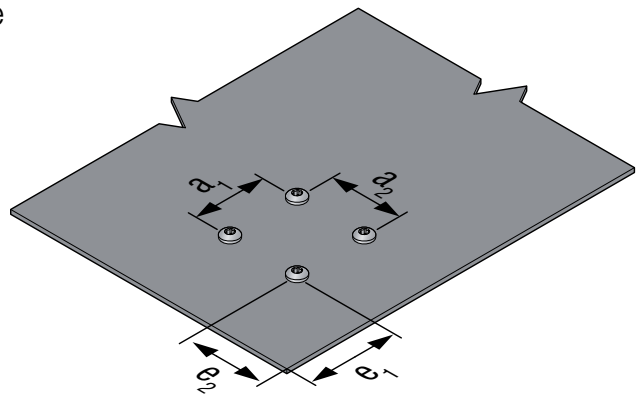
Illustration above shows angle between load direction and grain = 90°

CNA – Minimum Distances in the Steel Plate

Outer Thread Diameter d [mm]	a ₁ *	a ₂ *	e ₁ *	e ₂ *
4.0	9	10	5	5

*According to EN 1993-1-8 §3.5

Once you have the spacing and edge distance in steel and timber, you pick the maximum for each dimension between steel and timber.



4. Steel to Timber Fastening

Solid-Drive™

CSFT Structural Fully Threaded CONNECTOR Screw for Steel to Timber

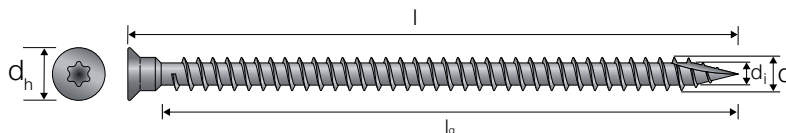
Zinc Flake Coating

C2 acc. to EN ISO 12944-2

SC2 - 50 years acc. to EC5



EN 14592

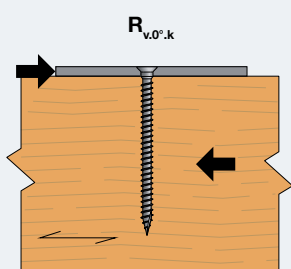


CSFT – Characteristic Capacity Steel to Timber C24

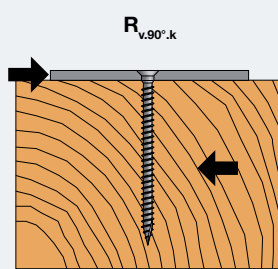
Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
CSFT5.0X70	5,79	2,5	1,16 0,8	5	2,76 1,95
CSFT6.0X85	6,45	3	1,6 1,07	6	3,25 2,61
CSFT6.0X110	8,4	3	2,08 1,4	6	3,74 3,42

¹⁾ For steel thickness $\leq d$ ²⁾ Thin plate thickness $\leq 0.5 \times d$ ³⁾ Thick plate thickness $\geq d$ For intermediate steel thicknesses, the strength can be obtained by interpolation.
For recommended hole diameter in steel see page 29.

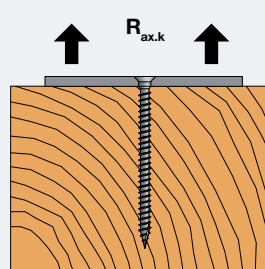
Characteristic capacities	3,74	With pre-drill
	3,42	Without pre-drill



Shear Parallel (0°) to the Grain



Shear Perpendicular (90°) to the Grain



Tension

4. Steel to Timber Fastening

CSFT – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Steel to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
5.0	With pre-drill	18	11	35	60	15	15	14	14	35	35	15	35
	Without pre-drill	42	18	50	75	25	25	18	18	50	50	25	50
6.0	With pre-drill	21	13	42	72	18	18	17	17	42	42	18	42
	Without pre-drill	51	21	60	90	30	30	21	21	60	60	30	60

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA21/0670

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

CSFT – Minimum Distances for Axially Loaded Screws Steel to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
5.0	25	18	50	20
6.0	30	21	60	24

*Valid if the applied centre distances comply with $a_1, a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

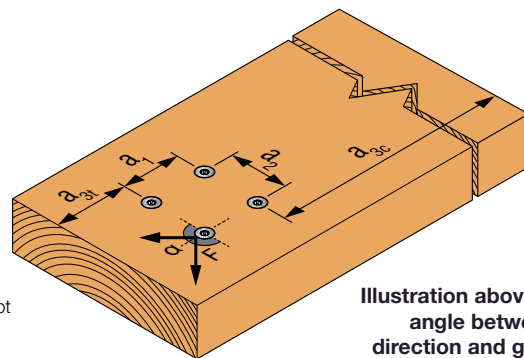


Illustration above shows angle between load direction and grain = 0°

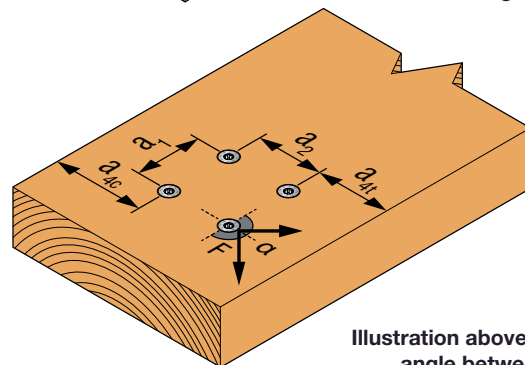


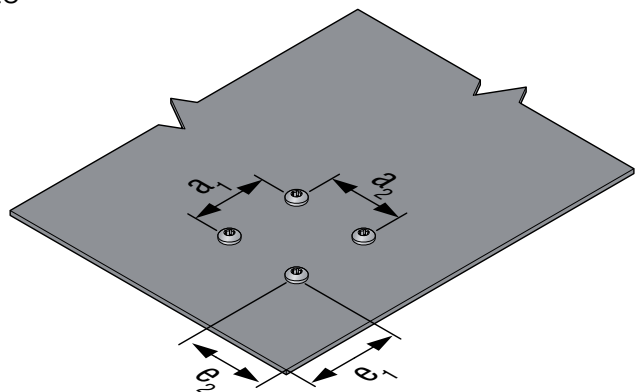
Illustration above shows angle between load direction and grain = 90°

CSFT – Minimum Distances in the Steel Plate

Outer Thread Diameter d [mm]	a ₁ *	a ₂ *	e ₁ *	e ₂ *
5.0	11	12	6	6
6.0	14	15	8	8

*According to EN 1993-1-8 §3.5

Once you have the spacing and edge distance in steel and timber, you pick the maximum for each dimension between steel and timber.



4. Steel to Timber Fastening

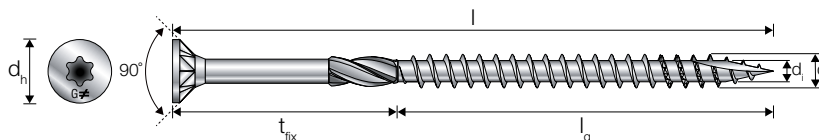
Solid-Drive™

TTUFS Countersunk WOOD Screw for Steel to Timber

Electro Galvanised

C1 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5UK
CA

ETA-21/0670

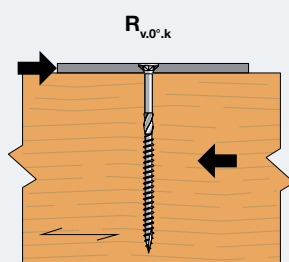


TTUFS – Characteristic Capacity Steel to Timber C24

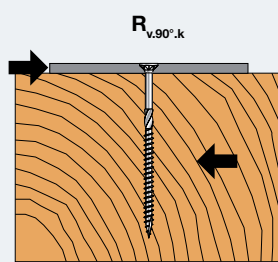
Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
TTUFS4.5X25	1,3	2,25	1,12 0,75	4,5	1,69 1,33
TTUFS4.5X30	1,7	2,25	1,37 0,91	4,5	1,97 1,53
TTUFS4.5X35	2,0	2,25	1,62 1,08	4,5	2,24 1,75
TTUFS4.5X40	2,3	2,25	1,81 1,24	4,5	2,32 1,97
TTUFS4.5X45	1,9	2,25	1,71 1,41	4,5	2,22 1,90
TTUFS4.5X50	2,0	2,25	1,73 1,50	4,5	2,24 1,92
TTUFS4.5X60	2,3	2,25	1,81 1,59	4,5	2,32 2,00
TTUFS4.5X70	2,6	2,25	1,89 1,67	4,5	2,41 2,09
TTUFS4.5X80	3,3	2,25	2,06 1,83	4,5	2,57 2,25

1) For steel thickness $\leq d$ 2) Thin plate thickness $\leq 0.5 \times d$ 3) Thick plate thickness $\geq d$ For intermediate steel thicknesses, the strength can be obtained by interpolation.
For recommended hole diameter in steel see page 29.

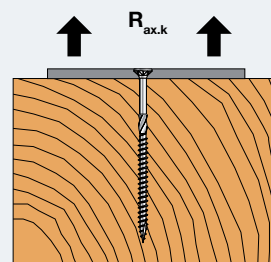
Characteristic capacities	2,57	With pre-drill
	2,25	Without pre-drill



Shear Parallel (0°) to the Grain



Shear Perpendicular (90°) to the Grain



Tension

4. Steel to Timber Fastening

TTUFS – Characteristic Capacity Steel to Timber C24 (cont.)

Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
TTUFS5.0X30	1,9	2,5	1,50 0,97	5	2,25 1,75
TTUFS5.0X40	2,6	2,5	2,04 1,33	5	2,86 2,20
TTUFS5.0X50	2,3	2,5	2,12 1,68	5	2,76 2,34
TTUFS5.0X60	2,6	2,5	2,21 1,91	5	2,86 2,43
TTUFS5.0X70	3,0	2,5	2,31 2,00	5	2,95 2,52
TTUFS5.0X80	3,0	2,5	2,31 2,00	5	2,95 2,52
TTUFS5.0X90	3,4	2,5	2,40 2,10	5	3,05 2,62
TTUFS5.0X100	4,5	2,5	2,68 2,38	5	3,33 2,90
TTUFS5.0X120	4,5	2,5	2,68 2,38	5	3,33 2,90
TTUFS6.0X40	2,6	3	2,40 1,49	6	3,30 2,43
TTUFS6.0X50	2,3	3	2,58 1,89	6	3,41 2,69
TTUFS6.0X60	2,6	3	2,67 2,25	6	3,51 2,90
TTUFS6.0X70	3,0	3	2,77 2,34	6	3,60 3,00
TTUFS6.0X80	3,0	3	2,77 2,34	6	3,60 3,00
TTUFS6.0X90	3,4	3	2,86 2,43	6	3,70 3,09
TTUFS6.0X100	4,5	3	3,14 2,71	6	3,98 3,37
TTUFS6.0X120	5,3	3	3,33 2,90	6	4,16 3,56
TTUFS6.0X140	5,3	3	3,33 2,90	6	4,16 3,56
TTUFS6.0X160	5,3	3	3,33 2,90	6	4,16 3,56
TTUFS6.0X180	5,3	3	3,33 2,90	6	4,16 3,56

¹⁾ For steel thickness $\leq d$

²⁾ Thin plate thickness $\leq 0,5xd$

³⁾ Thick plate thickness $\geq d$

For intermediate steel thicknesses, the strength can be obtained by interpolation.
For recommended hole diameter in steel see page 29.

Characteristic capacities	4,16	With pre-drill
	3,56	Without pre-drill

4. Steel to Timber Fastening

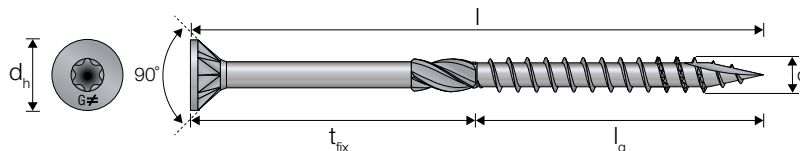
Solid-Drive™

TTZNFS Impreg®+ Coated Countersunk WOOD Screw for Steel to Timber

Impreg®+

C4 – 15 years acc. to EN
ISO 12944-2
SC2 – 50 years acc. to EC5UK
CA

ETA-21/0670

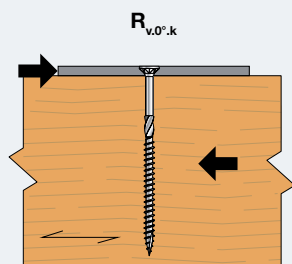


TTZNFS – Characteristic Capacity Steel to Timber C24

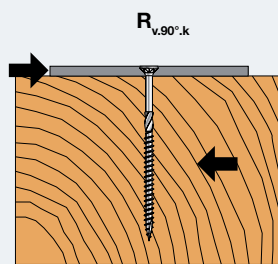
Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
TTZNFS4.5X25	1,3	2,25	1,12 0,75	4,5	1,69 1,33
TTZNFS4.5X30	1,7	2,25	1,37 0,91	4,5	1,97 1,53
TTZNFS4.5X35	2,0	2,25	1,62 1,08	4,5	2,24 1,75
TTZNFS4.5X40	2,3	2,25	1,81 1,24	4,5	2,32 1,97
TTZNFS4.5X45	1,9	2,25	1,71 1,41	4,5	2,22 1,90
TTZNFS4.5X50	2,0	2,25	1,73 1,50	4,5	2,24 1,92
TTZNFS4.5X60	2,3	2,25	1,81 1,59	4,5	2,32 2,00
TTZNFS4.5X70	2,6	2,25	1,89 1,67	4,5	2,41 2,09
TTZNFS4.5X80	3,3	2,25	2,06 1,83	4,5	2,57 2,25

¹⁾ For steel thickness $\leq d$ ²⁾ Thin plate thickness $\leq 0.5xd$ ³⁾ Thick plate thickness $\geq d$ For intermediate steel thicknesses, the strength can be obtained by interpolation.
For recommended hole diameter in steel see page 29.

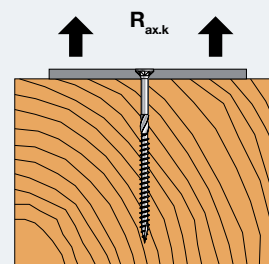
Characteristic capacities	2,57	With pre-drill
	2,25	Without pre-drill



Shear Parallel (0°) to the Grain



Shear Perpendicular (90°) to the Grain



Tension

4. Steel to Timber Fastening

TTZNFS – Characteristic Capacity Steel to Timber C24 (cont.)

Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
TTZNFS5.0X30	1,9	2,5	1,50 0,97	5	2,25 1,75
TTZNFS5.0X40	2,6	2,5	2,04 1,33	5	2,86 2,20
TTZNFS5.0X50	2,3	2,5	2,12 1,68	5	2,76 2,34
TTZNFS5.0X60	2,6	2,5	2,21 1,91	5	2,86 2,43
TTZNFS5.0X70	3,0	2,5	2,31 2,00	5	2,95 2,52
TTZNFS5.0X80	3,0	2,5	2,31 2,00	5	2,95 2,52
TTZNFS5.0X90	3,4	2,5	2,40 2,10	5	3,05 2,62
TTZNFS5.0X100	4,5	2,5	2,68 2,38	5	3,33 2,90
TTZNFS5.0X120	4,5	2,5	2,68 2,38	5	3,33 2,90
TTZNFS6.0X40	2,6	3	2,40 1,49	6	3,30 2,43
TTZNFS6.0X50	2,3	3	2,58 1,89	6	3,41 2,69
TTZNFS6.0X60	2,6	3	2,67 2,25	6	3,51 2,90
TTZNFS6.0X70	3,0	3	2,77 2,34	6	3,60 3,00
TTZNFS6.0X80	3,0	3	2,77 2,34	6	3,60 3,00
TTZNFS6.0X90	3,4	3	2,86 2,43	6	3,70 3,09
TTZNFS6.0X100	4,5	3	3,14 2,71	6	3,98 3,37
TTZNFS6.0X120	5,3	3	3,33 2,90	6	4,16 3,56
TTZNFS6.0X140	5,3	3	3,33 2,90	6	4,16 3,56
TTZNFS6.0X160	5,3	3	3,33 2,90	6	4,16 3,56
TTZNFS6.0X180	5,3	3	3,33 2,90	6	4,16 3,56

¹⁾ For steel thickness $\leq d$

²⁾ Thin plate thickness $\leq 0,5xd$

³⁾ Thick plate thickness $\geq d$

For intermediate steel thicknesses, the strength can be obtained by interpolation.
For recommended hole diameter in steel see page 29.

Characteristic capacities	4,16	With pre-drill
	3,56	Without pre-drill

4. Steel to Timber Fastening

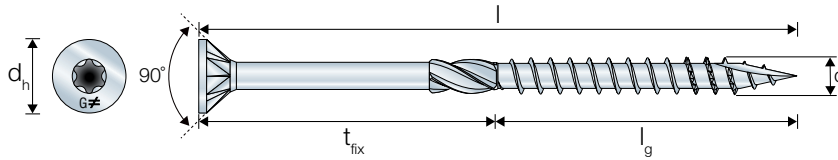
Solid-Drive™

TTSFS Stainless Steel A4 Countersunk WOOD Screw for Steel to Timber

Stainless Steel
CRC III acc. to
EN1993-1-4(A1)
SC3 - 50 years acc. to EC5



ETA-21/0670



TTSFS – Characteristic Capacity Steel to Timber C24

Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
TTSFS5.0x60	2,4	2,5	1,90 1,65	5	2,44 2,08
TTSFS5.0x70	2,6	2,5	1,96 1,70	5	2,49 2,14
TTSFS5.0x80	3,0	2,5	2,05 1,80	5	2,59 2,23
TTSFS5.0x90	3,4	2,5	2,14 1,89	5	2,68 2,32
TTSFS5.0x100	4,1	2,5	2,33 2,07	5	2,87 2,51
TTSFS5.0x120	4,5	2,5	2,42 2,10	5	2,96 2,60
TTSFS6.0x70	2,9	3	2,63 2,22	6	3,42 2,85
TTSFS6.0x80	3,3	3	2,73 2,33	6	3,52 2,95
TTSFS6.0x90	3,7	3	2,83 2,43	6	3,63 3,05
TTSFS6.0x100	4,5	3	3,04 2,63	6	3,83 3,26
TTSFS6.0x120	4,9	3	3,14 2,73	6	3,93 3,36
TTSFS6.0x140	5,3	3	3,24 2,84	6	4,03 3,46

¹⁾ For steel thickness $\leq d$

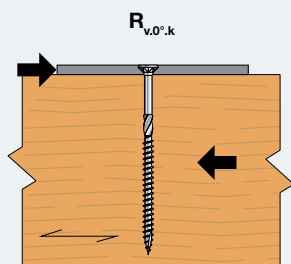
²⁾ Thin plate thickness $\leq 0.5xd$

³⁾ Thick plate thickness $\geq d$

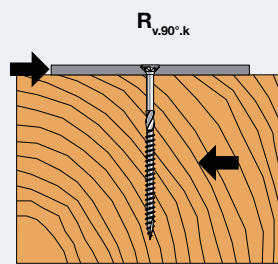
For intermediate steel thicknesses, the strength can be obtained by interpolation.

For recommended hole diameter in steel see page 29.

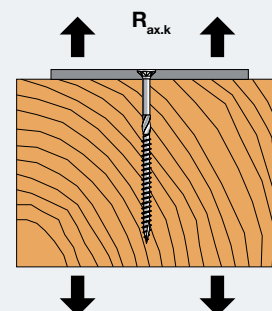
Characteristic capacities	4,03 3,46	With pre-drill Without pre-drill
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Shear Parallel (0°) to the Grain



Shear Perpendicular (90°) to the Grain



Tension

4. Steel to Timber Fastening

TTUFS/TTZNFS/TTSFS – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Steel to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
4.5	With pre-drill	16	10	32	54	14	14	13	13	32	32	14	23
	Without pre-drill	32	16	45	68	23	23	16	16	45	45	23	32
5.0	With pre-drill	18	11	35	60	15	15	14	14	35	35	15	35
	Without pre-drill	42	18	50	75	25	25	18	18	50	50	25	50
6.0	With pre-drill	21	13	42	72	18	18	17	17	42	42	18	42
	Without pre-drill	51	21	60	90	30	30	21	21	60	60	30	60

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA21/0670

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

TTUFS/TTZNFS/TTSFS – Minimum Distances for Axially Loaded Screws Steel to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
4.5	23	16	45	18
5.0	25	18	50	20
6.0	30	21	60	24

*Valid if the applied centre distances comply with $a_1 a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

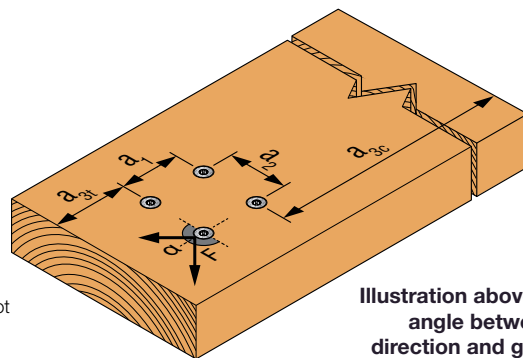


Illustration above shows angle between load direction and grain = 0°

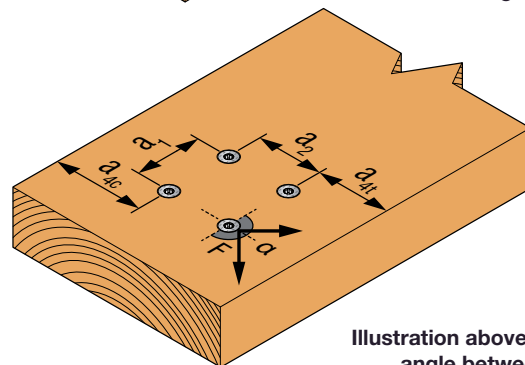


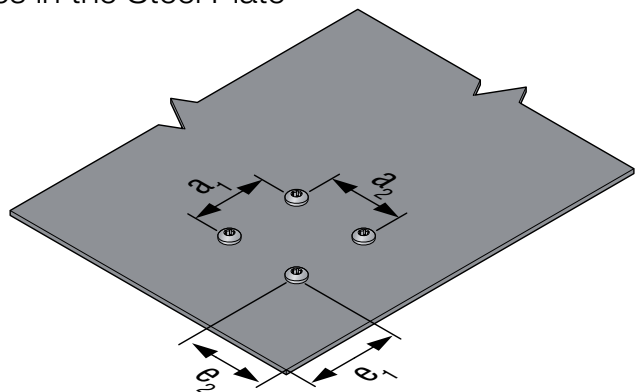
Illustration above shows angle between load direction and grain = 90°

TTUFS/TTZNFS/TTSFS – Minimum Distances in the Steel Plate

Outer Thread Diameter d [mm]	a ₁ *	a ₂ *	e ₁ *	e ₂ *
4.5	10	11	6	6
5.0	11	12	6	6
6.0	14	15	8	8

*According to EN 1993-1-8 §3.5

Once you have the spacing and edge distance in steel and timber, you pick the maximum for each dimension between steel and timber.



4. Steel to Timber Fastening

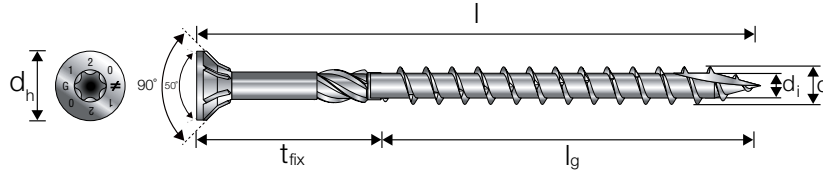
Solid-Drive™

SWC Structural Countersunk WOOD Screw for Steel to Timber

Electro Galvanised*

C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5UK
CA

ETA-21/0670

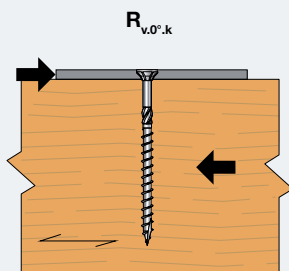


SWC – Characteristic Capacity Steel to Timber C24

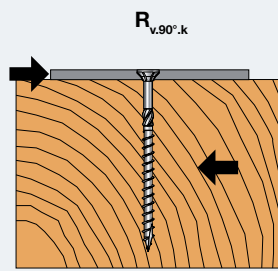
Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
SWC6.0X200	5,5	3	3,49 3,04	6	4,36 3,73
SWC6.0X220	5,5	3	3,49 3,04	6	4,36 3,73
SWC6.0X240	5,5	3	3,49 3,04	6	4,36 3,73
SWC6.0X260	5,5	3	3,49 3,04	6	4,36 3,73
SWC6.0X280	5,5	3	3,49 3,04	6	4,36 3,73
SWC6.0X300	5,5	3	3,49 3,04	6	4,36 3,73

¹⁾ For steel thickness $\leq d$ ²⁾ Thin plate thickness $\leq 0.5 \times d$ ³⁾ Thick plate thickness $\geq d$ For intermediate steel thicknesses, the strength can be obtained by interpolation.
For recommended hole diameter in steel see page 29.

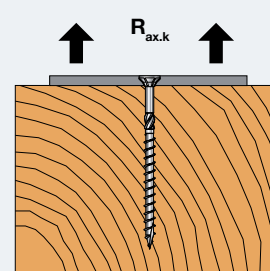
Characteristic capacities	4,36	With pre-drill
	3,73	Without pre-drill



Shear Parallel (0°) to the Grain



Shear Perpendicular (90°) to the Grain



Tension

*Due to a recent change of coating, stock of yellow zinc plated SWC screws might still exist in our warehouses.
Please consult with your local contact at Simpson Strong-Tie if electro galvanised screws are a requirement in the specific case.

4. Steel to Timber Fastening

SWC – Characteristic Capacity Steel to Timber C24 (cont.)

Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
SWC8.0X80	5,0	4	5,06 3,74	8	6,64 5,37
SWC8.0X100	5,0	4	5,06 4,16	8	6,64 5,37
SWC8.0X120	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X140	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X160	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X180	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X200	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X220	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X240	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X260	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X280	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X300	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X320	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X340	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X360	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X380	8,1	4	5,82 4,92	8	7,40 6,12
SWC8.0X400	8,1	4	5,82 4,92	8	7,40 6,12
SWC10.0X100	6,1	5	6,99 5,47	10	9,25 7,29
SWC10.0X120	6,1	5	6,99 5,60	10	9,25 7,29
SWC10.0X140	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X160	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X180	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X200	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X220	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X240	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X260	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X280	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X300	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X320	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X340	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X360	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X380	9,8	5	7,90 6,52	10	10,17 8,21
SWC10.0X400	9,8	5	7,90 6,52	10	10,17 8,21

¹⁾ For steel thickness $\leq d$

²⁾ Thin plate thickness $\leq 0.5d$

³⁾ Thick plate thickness $\geq d$

For intermediate steel thicknesses, the strength can be obtained by interpolation.

For recommended hole diameter in steel see page 29.

4. Steel to Timber Fastening

SWC – Minimum Distances for Screws in Shear or Combined Loads¹⁾

Steel to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
6.0	With pre-drill	21	13	42	72	18	18	17	17	42	42	18	42
	Without pre-drill	51	21	60	90	30	30	21	21	60	60	30	60
8.0	With pre-drill	28	17	56	96	24	24	23	23	56	56	24	56
	Without pre-drill	68	28	80	120	40	40	28	28	80	80	40	80
10.0	With pre-drill	35	21	70	120	30	30	28	28	70	70	30	70
	Without pre-drill	84	35	100	150	50	50	35	35	100	100	50	100

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA21/0670

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

SWC – Minimum Distances for Axially Loaded Screws

Steel to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3c}	a _{4c}
6.0	30	21	60	24
8.0	40	28	80	32
10.0	49	35	100	40

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant.
For more info see General Introduction page 24.

See explanation of α in General Introduction page 23.

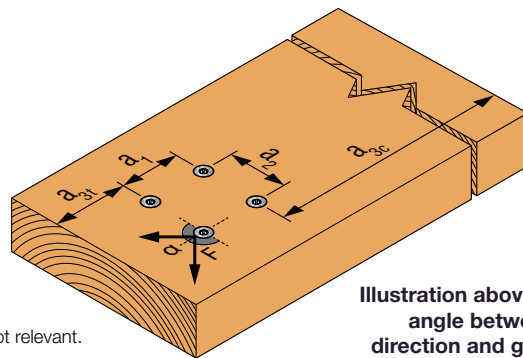


Illustration above shows angle between load direction and grain = 0°

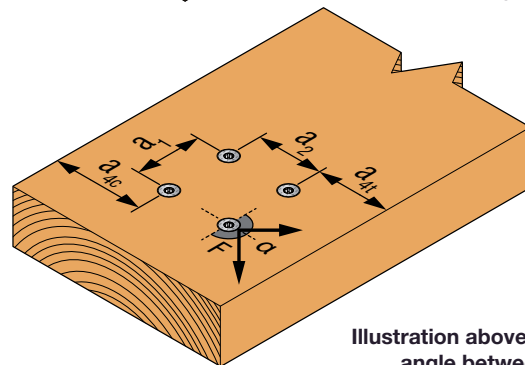


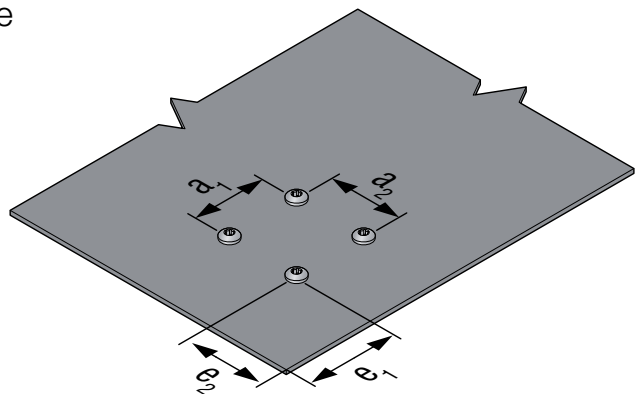
Illustration above shows angle between load direction and grain = 90°

SWC – Minimum Distances in the Steel Plate

Outer Thread Diameter d [mm]	a ₁ *	a ₂ *	e ₁ *	e ₂ *
6.0	14	15	8	8
8.0	18	20	10	10
10.0	22	24	12	12

*According to EN 1993-1-8 §3.5

Once you have the spacing and edge distance in steel and timber, you pick the maximum for each dimension between steel and timber.



4. Steel to Timber Fastening

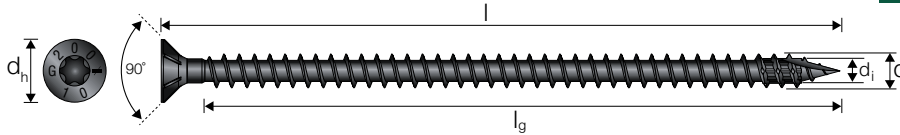
Solid-Drive™

SDCF Fully Threaded **WOOD** Screw for Steel to Timber

Black E-Coat

C2 acc. to EN ISO 12944-2
SC2 – 50 years acc. to EC5

ETA-21/0670

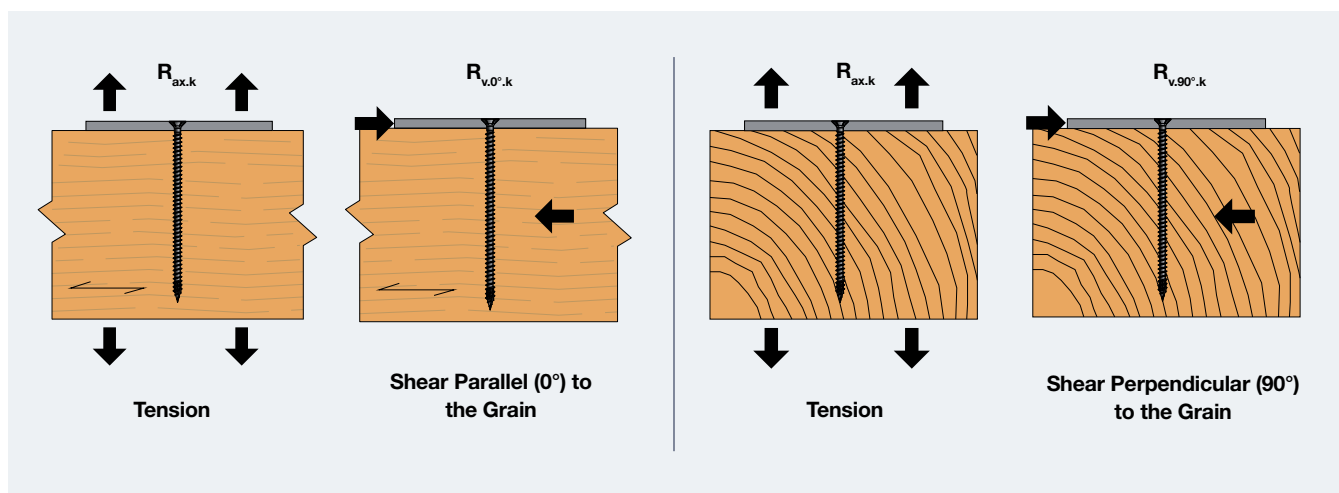


SDCF – Characteristic Capacity Steel to Timber C24

Product Reference	Tension Capacity - C24 - [kN] $R_{ax,k}^{1)}$	Shear Capacity – C24 – [kN]			
		Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
SDCF8X120	11,8	4	6,45 5,62	8	7,89 6,72
SDCF8X140	13,9	4	6,98 6,15	8	8,43 7,26
SDCF8X160	16,1	4	7,52 6,69	8	8,97 7,80
SDCF8X180	18,2	4	8,05 7,23	8	9,50 8,33
SDCF8X200	20,4	4	8,59 7,76	8	10,04 8,87
SDCF8X220	20,5	4	8,63 7,80	8	10,08 8,90
SDCF8X240	20,5	4	8,63 7,80	8	10,08 8,90
SDCF8X260	20,5	4	8,63 7,80	8	10,08 8,90
SDCF8X300	20,5	4	8,63 7,80	8	10,08 8,90
SDCF8X350	20,5	4	8,63 7,80	8	10,08 8,90
SDCF10X160	19,2	5	9,90 8,61	10	12,01 10,18
SDCF10X200	24,4	5	11,20 9,91	10	13,31 11,48
SDCF10X240	29,6	5	12,50 11,21	10	14,61 12,78

¹⁾ For steel thickness $\leq d$ ²⁾ Thin plate thickness $\leq 0.5xd$ ³⁾ Thick plate thickness $\geq d$ For intermediate steel thicknesses, the strength can be obtained by interpolation.
For recommended hole diameter in steel see page 29.

Characteristic capacities	14,61	With pre-drill
	12,78	Without pre-drill



4. Steel to Timber Fastening

SDCF – Characteristic Capacity Steel to Timber C24 (cont.)

Product Reference	Tension Capacity - C24 - [kN]	Shear Capacity – C24 – [kN]			
	$R_{ax,k}^{1)}$	Thin Steel ²⁾		Thick Steel ³⁾	
		Maximum Thickness [mm]	$R_{v,k}$	Minimum Thickness [mm]	$R_{v,k}$
SDCF10X280	31,1	5	12,86 11,57	10	14,97 13,15
SDCF10X360	31,1	5	12,86 11,57	10	14,97 13,15
SDCF10X400	31,1	5	12,86 11,57	10	14,97 13,15
SDCF10X450	31,1	5	12,86 11,57	10	14,97 13,15
SDCF12X200	22,3	6	11,52 9,94	12	13,99 11,75
SDCF12X240	27,2	6	12,76 11,17	12	15,23 12,99
SDCF12X280	32,1	6	13,99 12,41	12	16,46 14,22
SDCF12X350	36,2	6	15,01 13,43	12	17,48 15,24
SDCF12X450	36,2	6	15,01 13,43	12	17,48 15,24
SDCF12X600	36,2	6	15,01 13,43	12	17,48 15,24

¹⁾ For steel thickness $\leq d$

²⁾ Thin plate thickness $\leq 0.5xd$

³⁾ Thick plate thickness $\geq d$

For intermediate steel thicknesses, the strength can be obtained by interpolation.

For recommended hole diameter in steel see page 29.

4. Steel to Timber Fastening

SDCF – Minimum Distances for Screws in Shear or Combined Loads¹⁾ Steel to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
8.0	With pre-drill	28	17	96	56	24	24	23	23	56	56	56	24
	Without pre-drill	68	28	120	80	40	40	28	28	80	80	80	40
10.0	With pre-drill	35	21	120	70	30	30	28	28	70	70	70	30
	Without pre-drill	84	35	150	100	50	50	35	35	100	100	100	50
12.0	With pre-drill	42	26	144	84	36	36	34	34	84	84	84	36
	Without pre-drill	101	42	180	120	60	60	42	42	120	120	120	60

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA-13/0796

²⁾ Values given in the table is based on the $\rho_k \leq 350 \text{ kg/m}^3$

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

SDCF – Minimum Distances for Axially Loaded Screws Steel to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
8.0	56	17	64	24
10.0	70	21	80	30
12.0	84	26	96	36

*Valid if the applied centre distances comply with $a_1 a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

For axially loaded screws installed perpendicular to the surface $a_{3,t}$ and $a_{4,t}$ are not relevant. For more info see General Introduction page 24.

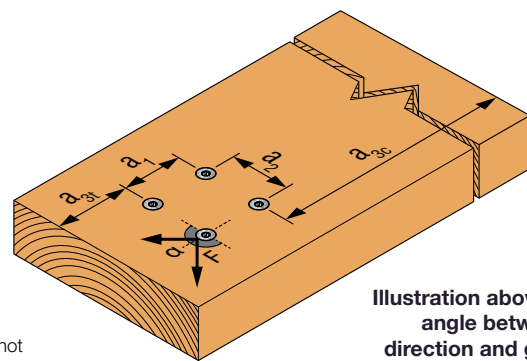


Illustration above shows angle between load direction and grain = 0°

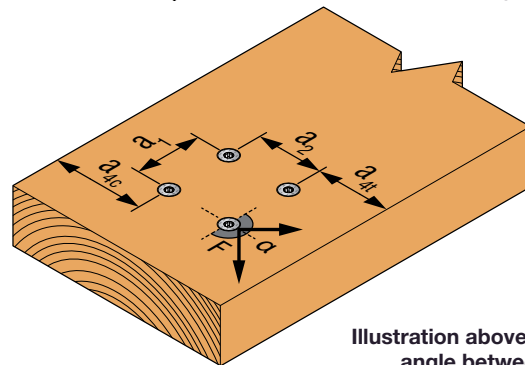


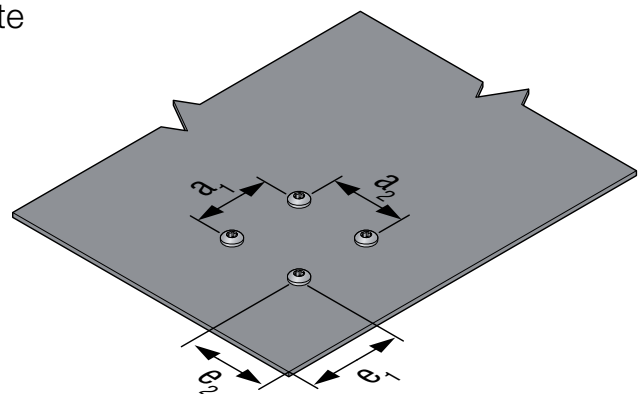
Illustration above shows angle between load direction and grain = 90°

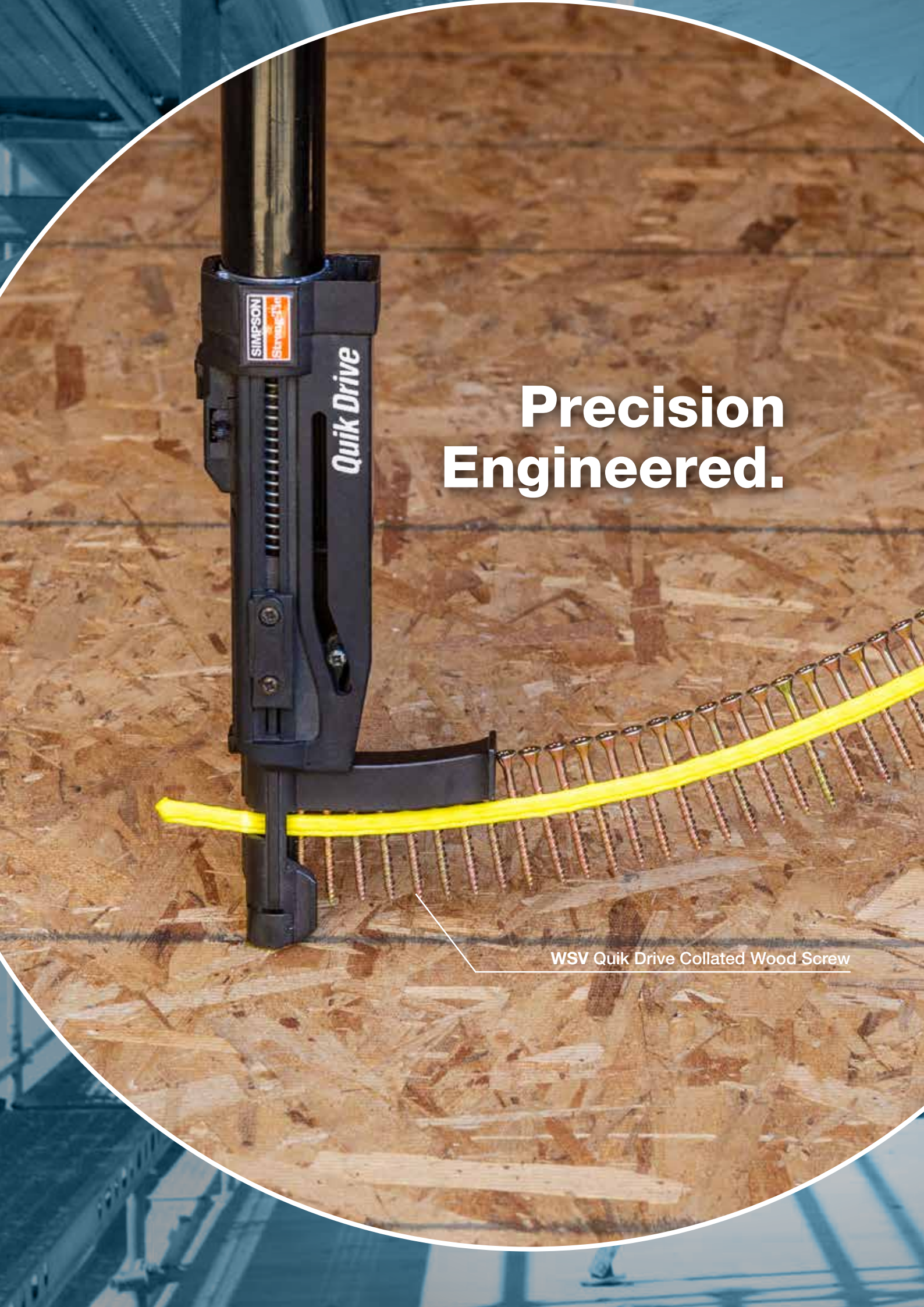
SDCF – Minimum Distances in the Steel Plate

Outer Thread Diameter d [mm]	a ₁ *	a ₂ *	e ₁ *	e ₂ *
8.0	18	20	10	10
10.0	22	24	12	12
12.0	27	29	15	15

*According to EN 1993-1-8 §3.5

Once you have the spacing and edge distance in steel and timber, you pick the maximum for each dimension between steel and timber.



A close-up photograph of a black Simpson Strong-Tie Quik Drive screwdriver positioned vertically on a sheet of oriented strand board (OSB). The tool's handle features the brand name 'SIMPSON Strong-Tie' in a small orange and white logo, and 'Quik Drive' in white text. A yellow strap is wrapped around the handle. The tip of the tool is pressing down on a row of numerous copper-colored, collated wood screws that are embedded in the OSB. The background shows the textured surface of the OSB and a blurred view of a construction site with blue structural elements.

Precision Engineered.

WSV Quik Drive Collated Wood Screw



Boards to Timber Fastening

Boards to Timber	
TTF	230
WSV	232
TTUFS	234
TTZNFS	236
TTSFS	238

5. Boards to Timber

Solid-Drive™

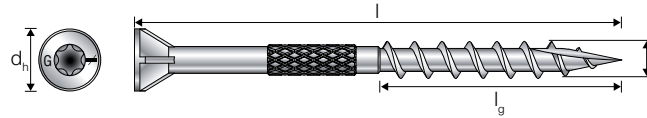
TTF Countersunk WOOD Screw for Boards to Timber

Electro Galvanised

C1 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5UK
CA

CE

EN14592



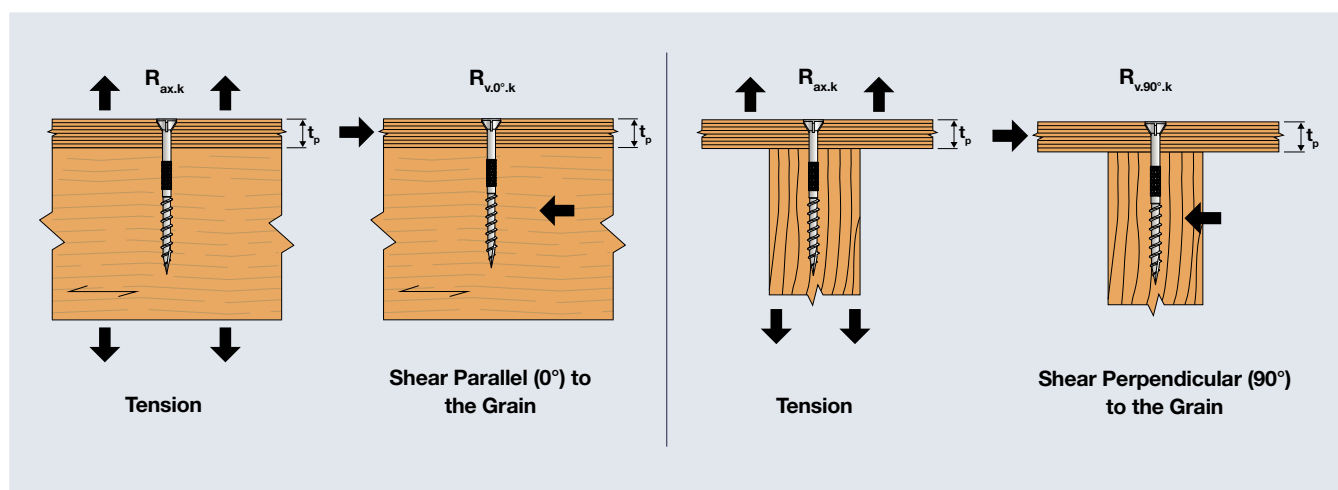
TTF - Characteristic Capacities OSB Board to Timber C24

Product Reference	Characteristic Capacity for Panel (OSB, Particle Board $\rho_k \geq 380 \text{ kg/m}^3$) to Timber C24 ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p																	
	$t_p = 12$			$t_p = 13$			$t_p = 15$			$t_p = 18$			$t_p = 22$			$t_p = 25$		
	$R_{ax,k,12}$	$R_{v,0^\circ,k,12}$	$R_{v,90^\circ,k,12}$	$R_{ax,k,13}$	$R_{v,0^\circ,k,13}$	$R_{v,90^\circ,k,13}$	$R_{ax,k,15}$	$R_{v,0^\circ,k,15}$	$R_{v,90^\circ,k,15}$	$R_{ax,k,18}$	$R_{v,0^\circ,k,18}$	$R_{v,90^\circ,k,18}$	$R_{ax,k,22}$	$R_{v,0^\circ,k,22}$	$R_{v,90^\circ,k,22}$	$R_{ax,k,25}$	$R_{v,0^\circ,k,25}$	$R_{v,90^\circ,k,25}$
TTF4,2X35	0,9	0,57	0,87	0,9	0,58	0,85	0	0,61	0,84	-	-	-	-	-	-	-	-	-
TTF4,2X45	1,16	0,73	0,97	1,16	0,73	0,98	1,16	0,74	1,02	1,16	0,77	1,08	0	0,73	1,09	-	-	-
TTF4,2X55	1,29	0,85	1	1,29	0,86	1,02	1,29	0,86	1,05	1,29	0,87	1,11	1,29	0,91	1,21	1,29	0,88	1,29
TTF4,2X75	1,8	0,98	1,05	1,8	0,99	1,14	1,8	1,02	1,18	1,8	1,08	1,24	1,8	1,16	1,34	1,8	1,2	1,42

TTF - Characteristic Capacities Plywood Board to Timber C24

Product Reference	Characteristic Capacity for Plywood ($\rho_k \geq 490 \text{ kg/m}^3$) to Timber C24 ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p																	
	$t_p = 12$			$t_p = 15$			$t_p = 18$			$t_p = 22$			$t_p = 25$			$t_p = 30$		
	$R_{ax,k,12}$	$R_{v,0^\circ,k,12}$	$R_{v,90^\circ,k,12}$	$R_{ax,k,15}$	$R_{v,0^\circ,k,15}$	$R_{v,90^\circ,k,15}$	$R_{ax,k,18}$	$R_{v,0^\circ,k,18}$	$R_{v,90^\circ,k,18}$	$R_{ax,k,22}$	$R_{v,0^\circ,k,22}$	$R_{v,90^\circ,k,22}$	$R_{ax,k,25}$	$R_{v,0^\circ,k,25}$	$R_{v,90^\circ,k,25}$	$R_{ax,k,30}$	$R_{v,0^\circ,k,30}$	$R_{v,90^\circ,k,30}$
TTF4,2X35	0,9	0,59	0,89	0,9	0,63	0,87	-	-	-	-	-	-	-	-	-	-	-	-
TTF4,2X45	1,16	0,74	1,01	1,16	0,76	1,06	1,16	0,79	1,12	0	0,73	1,12	-	-	-	-	-	-
TTF4,2X55	1,29	0,87	1,04	1,29	0,88	1,09	1,29	0,89	1,19	1,29	0,91	1,25	1,29	0,89	1,33	0	0,8	1,24
TTF4,2X75	1,8	1	1,17	1,8	1,05	1,22	1,8	1,1	1,28	1,8	1,19	1,38	1,8	1,2	1,46	1,8	1,15	1,48

For dimensions and characteristic parameters see p. 72.



5. Boards to Timber

TTF - Minimum Distances for Screws in Shear or Combined Loads¹⁾ OSB or Plywood Board to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
4.2	With pre-drill	21	13	51	30	13	13	17	17	30	30	21	13
	Without pre-drill	42	21	63	42	21	21	21	21	42	42	30	21

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5)

²⁾ Values given in the table is based on the $\rho_k \leq 380 \text{ kg/m}^3$ for OSB and $\rho_k \leq 490 \text{ kg/m}^3$ for plywood

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,v}$) is at least $25 \times d$.

TTF - Minimum Distances for Axially Loaded Screws OSB or Plywood Board to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
4.2	30	21	42	17

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.
 Calculation according to EN1995-1-1:2004+A2:2014.

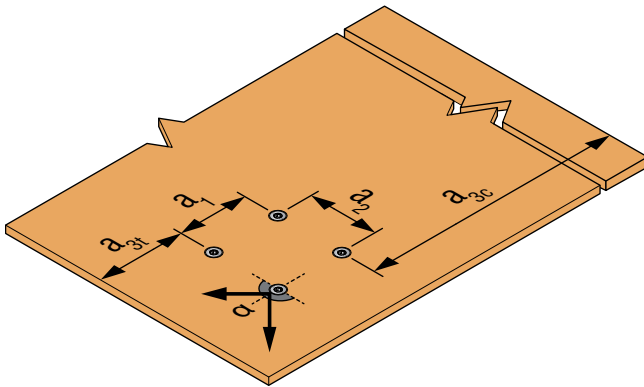


Illustration above shows angle between load direction and grain = 0°

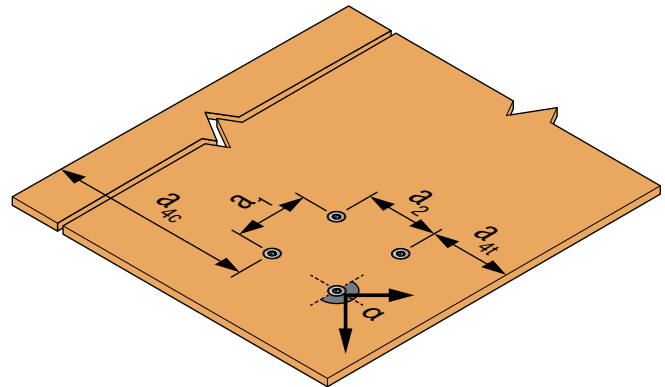


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.



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5. Boards to Timber

Solid-Drive™

WSV Countersunk WOOD Screw for Boards to Timber

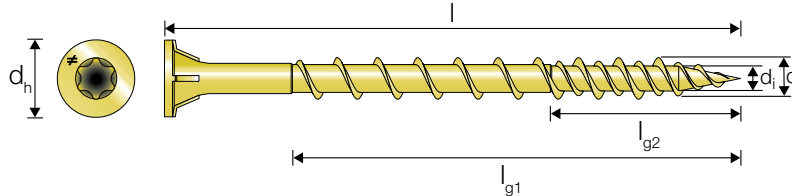
Yellow Zinc Plated

 C2 acc. to EN ISO 12944-2
 SC2 - 50 years acc. to EC5

 UK
 CA

CE

EN14592



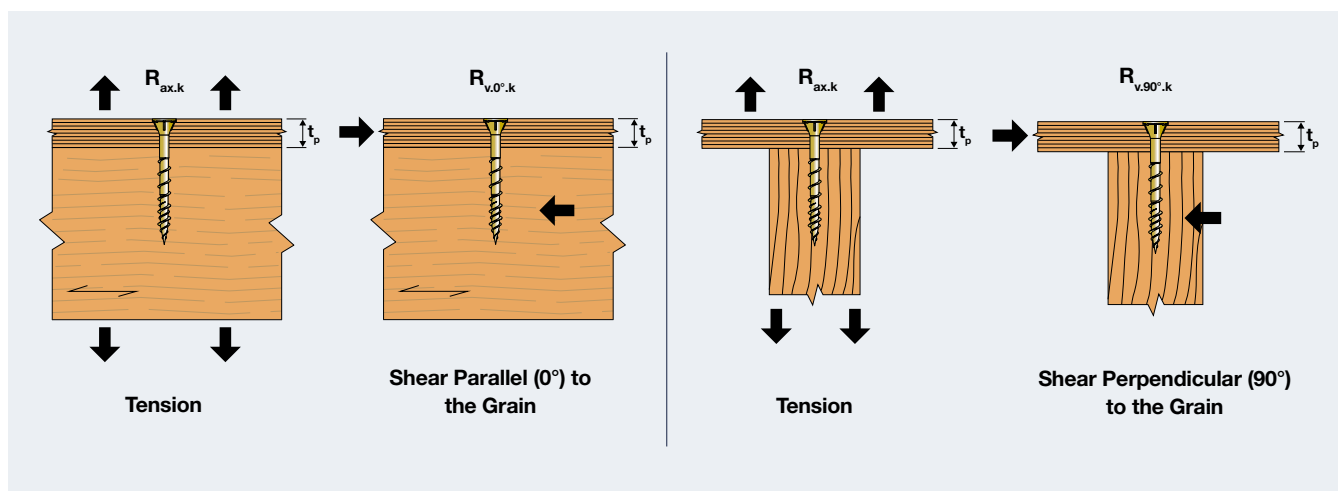
WSV - Characteristic Capacities OSB Board to Timber C24

Product Reference	Characteristic Capacity for Panel (OSB, Particle Board $\rho_k \geq 380 \text{ kg/m}^3$) to Timber C24 ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p																	
	$t_p = 12$			$t_p = 13$			$t_p = 15$			$t_p = 18$			$t_p = 22$			$t_p = 25$		
	$R_{ax,k,12}$	$R_{v,0^\circ,k,12}$	$R_{v,90^\circ,k,12}$	$R_{ax,k,13}$	$R_{v,0^\circ,k,13}$	$R_{v,90^\circ,k,13}$	$R_{ax,k,15}$	$R_{v,0^\circ,k,15}$	$R_{v,90^\circ,k,15}$	$R_{ax,k,18}$	$R_{v,0^\circ,k,18}$	$R_{v,90^\circ,k,18}$	$R_{ax,k,22}$	$R_{v,0^\circ,k,22}$	$R_{v,90^\circ,k,22}$	$R_{ax,k,25}$	$R_{v,0^\circ,k,25}$	$R_{v,90^\circ,k,25}$
WSV44E	2,03	1,19	1,19	2,03	1,21	1,21	0,00	0,76	0,76	0,00	0,81	0,81	0,00	0,75	0,75	0,00	0,70	0,70
WSV51E	2,42	1,28	1,28	2,42	1,31	1,31	2,42	1,37	1,37	2,23	1,42	1,42	0,00	0,89	0,89	0,00	0,83	0,83
WSV64E	2,42	1,28	1,28	2,42	1,31	1,31	2,42	1,37	1,37	2,42	1,46	1,46	2,42	1,51	1,51	0,00	0,91	0,91
WSV76E	2,42	1,28	1,28	2,42	1,31	1,31	2,42	1,37	1,37	2,42	1,46	1,46	2,42	1,51	1,51	2,42	1,51	1,51

WSV - Characteristic Capacities Plywood Board to Timber C24

Product Reference	Characteristic Capacity for Plywood ($\rho_k \geq 490 \text{ kg/m}^3$) to Timber C24 ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p																	
	$t_p = 12$			$t_p = 15$			$t_p = 18$			$t_p = 22$			$t_p = 25$			$t_p = 30$		
	$R_{ax,k,12}$	$R_{v,0^\circ,k,12}$	$R_{v,90^\circ,k,12}$	$R_{ax,k,15}$	$R_{v,0^\circ,k,15}$	$R_{v,90^\circ,k,15}$	$R_{ax,k,18}$	$R_{v,0^\circ,k,18}$	$R_{v,90^\circ,k,18}$	$R_{ax,k,22}$	$R_{v,0^\circ,k,22}$	$R_{v,90^\circ,k,22}$	$R_{ax,k,25}$	$R_{v,0^\circ,k,25}$	$R_{v,90^\circ,k,25}$	$R_{ax,k,30}$	$R_{v,0^\circ,k,30}$	$R_{v,90^\circ,k,30}$
WSV44E	0,00	0,70	0,70	0,00	0,78	0,78	0,00	0,82	0,82	0,00	0,75	0,75	0,00	0,69	0,69	0,00	-	-
WSV51E	2,50	1,32	1,14	0,00	0,78	0,78	0,00	0,87	0,87	0,00	0,89	0,89	0,00	0,83	0,83	0,00	0,73	0,73
WSV64E	2,77	1,39	1,20	2,77	1,47	1,20	2,77	1,56	1,20	0,00	0,90	1,00	0,00	0,90	1,10	0,00	0,90	1,00
WSV76E	2,77	1,39	1,23	2,77	1,47	1,23	2,77	1,56	1,23	2,77	1,60	1,23	2,77	1,60	1,23	2,77	1,60	1,23

For dimensions and characteristic parameters see p. 74.



5. Boards to Timber

WSV - Minimum Distances for Screws in Shear or Combined Loads¹⁾ OSB or Plywood Board to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
4.6	With pre-drill	20	12	33	56	14	14	16	16	33	23	14	33
	Without pre-drill	40	20	46	69	23	23	20	20	46	46	23	33

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5)

²⁾ Values given in the table is based on the $\rho_k \leq 380 \text{ kg/m}^3$ for OSB and $\rho_k \leq 490 \text{ kg/m}^3$ for plywood

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

WSV - Minimum Distances for Axially Loaded Screws OSB or Plywood Board to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
4.6	28	20	46	19

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

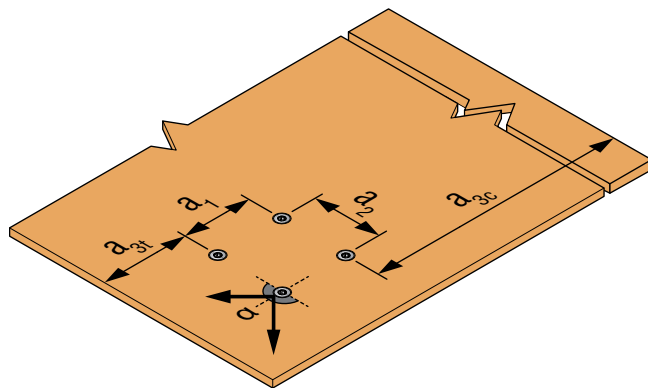


Illustration above shows angle between load direction and grain = 0°

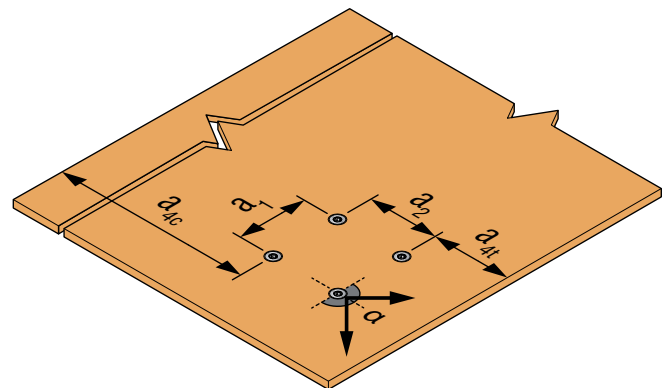


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.



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5. Boards to Timber

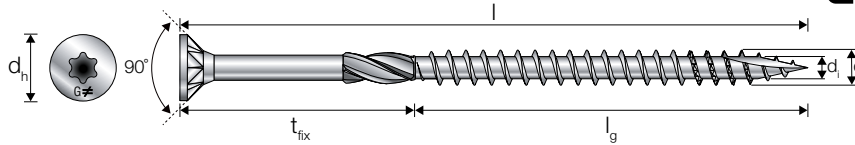
Solid-Drive™

TTUFS Structural Countersunk WOOD Screw for Boards to Timber

Electro Galvanised

C1 acc. to EN ISO 12944-2
SC2 - 50 years acc. to EC5

ETA-21/0670



TTUFS - Characteristic Capacities OSB Board to Timber C24

Product Reference	Characteristic Capacity for Panel (OSB, Particle Board $\rho_k \geq 380 \text{ kg/m}^3$) to Timber C24 ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p														
	$t_p = 12$			$t_p = 15$			$t_p = 18$			$t_p = 22$			$t_p = 25$		
	$R_{ax,k,12}$	$R_{v,0^\circ,k,12}$	$R_{v,90^\circ,k,12}$	$R_{ax,k,15}$	$R_{v,0^\circ,k,15}$	$R_{v,90^\circ,k,15}$	$R_{ax,k,18}$	$R_{v,0^\circ,k,18}$	$R_{v,90^\circ,k,18}$	$R_{ax,k,22}$	$R_{v,0^\circ,k,22}$	$R_{v,90^\circ,k,22}$	$R_{ax,k,25}$	$R_{v,0^\circ,k,25}$	$R_{v,90^\circ,k,25}$
TTUFS4.5X25	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTUFS4.5X30	0,56	-	-	0,56	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTUFS4.5X35	0,56	-	-	0,56	-	-	0,56	-	-	0,00	-	-	0,00	-	-
TTUFS4.5X40	0,56	0,84	0,84	0,56	0,88	0,88	0,56	-	-	0,71	-	-	0,71	-	-
TTUFS4.5X45	0,56	0,84	0,84	0,56	0,88	0,88	0,56	0,94	0,94	0,71	-	-	0,71	-	-
TTUFS4.5X50	0,56	0,84	0,84	0,56	0,88	0,88	0,56	0,94	0,94	0,71	1,06	1,06	0,71	1,06	1,06
TTUFS4.5X60	0,56	0,84	0,84	0,56	0,88	0,88	0,56	0,94	0,94	0,71	1,06	1,06	0,71	1,13	1,13
TTUFS4.5X70	0,56	0,84	0,84	0,56	0,88	0,88	0,56	0,94	0,94	0,71	1,06	1,06	0,71	1,13	1,13
TTUFS4.5X80	0,56	0,84	0,84	0,56	0,88	0,88	0,56	0,94	0,94	0,71	1,06	1,06	0,71	1,13	1,13
TTUFS5.0X30	0,72	-	-	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTUFS5.0X40	0,72	1,03	1,03	0,72	0,97	0,97	0,72	-	-	0,90	-	-	0,00	-	-
TTUFS5.0X50	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,19	1,19	0,90	1,18	1,18
TTUFS5.0X60	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,24	1,24	0,90	1,31	1,31
TTUFS5.0X70	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,24	1,24	0,90	1,31	1,31
TTUFS5.0X80	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,24	1,24	0,90	1,31	1,31
TTUFS5.0X90	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,24	1,24	0,90	1,31	1,31
TTUFS5.0X100	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,24	1,24	0,90	1,31	1,31
TTUFS5.0X120	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,24	1,24	0,90	1,31	1,31
TTUFS6.0X40	1,08	1,23	1,23	1,08	1,17	1,17	1,08	-	-	0,00	-	-	0,00	-	-
TTUFS6.0X50	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,43	1,43	1,35	1,42	1,42
TTUFS6.0X60	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTUFS6.0X70	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTUFS6.0X80	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTUFS6.0X90	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTUFS6.0X100	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTUFS6.0X120	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTUFS6.0X140	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTUFS6.0X160	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTUFS6.0X180	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64

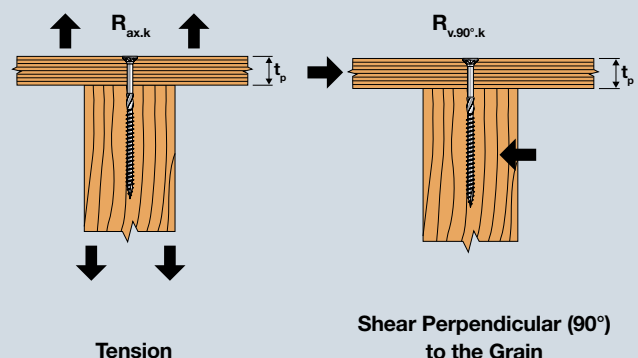
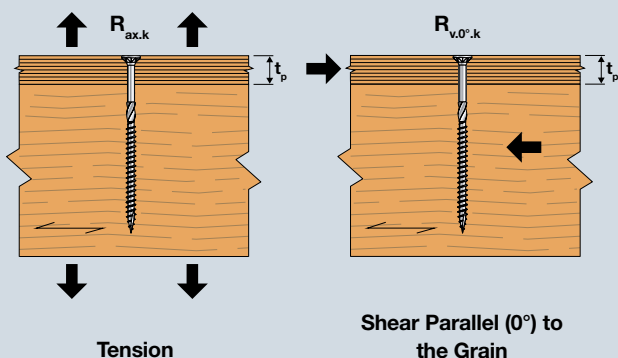
For dimensions and characteristic parameters see p. 40.

5. Boards to Timber

TTUFS - Characteristic Capacities Plywood Board to Timber C24



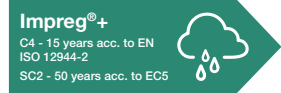
Product Reference	Characteristic Capacity for Plywood ($\rho_k \geq 490 \text{ kg/m}^3$) to Timber C24 ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p														
	$t_p = 12$			$t_p = 15$			$t_p = 18$			$t_p = 22$			$t_p = 25$		
	$R_{ax,k,12}$	$R_{v,0^\circ,k,12}$	$R_{v,90^\circ,k,12}$	$R_{ax,k,15}$	$R_{v,0^\circ,k,15}$	$R_{v,90^\circ,k,15}$	$R_{ax,k,18}$	$R_{v,0^\circ,k,18}$	$R_{v,90^\circ,k,18}$	$R_{ax,k,22}$	$R_{v,0^\circ,k,22}$	$R_{v,90^\circ,k,22}$	$R_{ax,k,25}$	$R_{v,0^\circ,k,25}$	$R_{v,90^\circ,k,25}$
TTUFS4.5X25	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTUFS4.5X30	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTUFS4.5X35	0,69	-	-	0,69	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTUFS4.5X40	0,69	0,94	0,94	0,69	0,97	0,97	0,69	-	-	0,00	-	-	0,00	-	-
TTUFS4.5X45	0,69	0,94	0,94	0,69	1,01	1,01	0,69	1,07	1,07	1,52	-	-	1,32	-	-
TTUFS4.5X50	0,69	0,94	0,94	0,69	1,01	1,01	0,69	1,08	1,08	1,64	1,41	1,41	1,64	1,37	1,37
TTUFS4.5X60	0,69	0,94	0,94	0,69	1,01	1,01	0,69	1,08	1,08	1,64	1,44	1,44	1,64	1,50	1,44
TTUFS4.5X70	0,69	0,94	0,94	0,69	1,01	1,01	0,69	1,08	1,08	1,64	1,44	1,44	1,64	1,50	1,46
TTUFS4.5X80	0,69	0,94	0,94	0,69	1,01	1,01	0,69	1,08	1,08	1,64	1,44	1,44	1,64	1,50	1,51
TTUFS5.0X30	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTUFS5.0X40	0,88	1,12	1,12	0,88	1,08	1,08	0,88	-	-	0,00	-	-	0,00	-	-
TTUFS5.0X50	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,59	1,59	1,88	1,56	1,56
TTUFS5.0X60	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,69	1,69	2,07	1,78	1,78
TTUFS5.0X70	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,69	1,69	2,07	1,78	1,78
TTUFS5.0X80	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,69	1,69	2,07	1,78	1,78
TTUFS5.0X90	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,69	1,69	2,07	1,78	1,78
TTUFS5.0X100	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,69	1,69	2,07	1,78	1,78
TTUFS5.0X120	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,69	1,69	2,07	1,78	1,78
TTUFS6.0X40	1,32	1,35	1,35	1,32	1,31	1,31	0,00	-	-	0,00	-	-	0,00	-	-
TTUFS6.0X50	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,56	1,56	2,10	1,74	1,74	1,88	1,71	1,71
TTUFS6.0X60	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	2,63	2,05	2,05	2,63	2,11	2,11
TTUFS6.0X70	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,00	2,15	2,15	3,00	2,25	2,25
TTUFS6.0X80	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,00	2,15	2,15	3,00	2,25	2,25
TTUFS6.0X90	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,10	2,17	2,17	3,10	2,27	2,27
TTUFS6.0X100	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,10	2,17	2,17	3,10	2,27	2,27
TTUFS6.0X120	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,10	2,17	2,17	3,10	2,27	2,27
TTUFS6.0X140	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,10	2,17	2,17	3,10	2,27	2,27
TTUFS6.0X160	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,10	2,17	2,17	3,10	2,27	2,27
TTUFS6.0X180	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,10	2,17	2,17	3,10	2,27	2,27



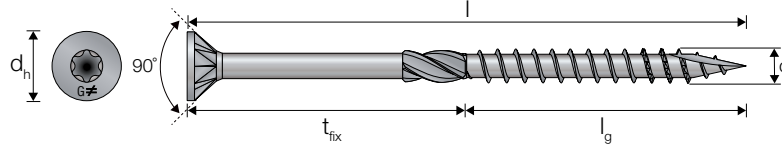
5. Boards to Timber

Solid-Drive™

TTZNFS Structural Countersunk WOOD Screw for Boards to Timber



ETA-21/0670



TTZNFS - Characteristic Capacities OSB Board to Timber C24

Product Reference	Characteristic Capacity for Panel (OSB, Particle Board $\rho_k \geq 380 \text{ kg/m}^3$) to Timber C24 ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p														
	$t_p = 12$			$t_p = 15$			$t_p = 18$			$t_p = 22$			$t_p = 25$		
	$R_{ax,k,12}$	$R_{v,0^\circ,k,12}$	$R_{v,90^\circ,k,12}$	$R_{ax,k,15}$	$R_{v,0^\circ,k,15}$	$R_{v,90^\circ,k,15}$	$R_{ax,k,18}$	$R_{v,0^\circ,k,18}$	$R_{v,90^\circ,k,18}$	$R_{ax,k,22}$	$R_{v,0^\circ,k,22}$	$R_{v,90^\circ,k,22}$	$R_{ax,k,25}$	$R_{v,0^\circ,k,25}$	$R_{v,90^\circ,k,25}$
TTZNFS4.5X25	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTZNFS4.5X30	0,56	-	-	0,56	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTZNFS4.5X35	0,56	-	-	0,56	-	-	0,56	-	-	0,00	-	-	0,00	-	-
TTZNFS4.5X40	0,56	0,84	0,84	0,56	0,88	0,88	0,56	-	-	0,71	-	-	0,71	-	-
TTZNFS4.5X45	0,56	0,84	0,84	0,56	0,88	0,88	0,56	0,94	0,94	0,71	-	-	0,71	-	-
TTZNFS4.5X50	0,56	0,84	0,84	0,56	0,88	0,88	0,56	0,94	0,94	0,71	1,06	1,06	0,71	1,06	1,06
TTZNFS4.5X60	0,56	0,84	0,84	0,56	0,88	0,88	0,56	0,94	0,94	0,71	1,06	1,06	0,71	1,13	1,13
TTZNFS4.5X70	0,56	0,84	0,84	0,56	0,88	0,88	0,56	0,94	0,94	0,71	1,06	1,06	0,71	1,13	1,13
TTZNFS4.5X80	0,56	0,84	0,84	0,56	0,88	0,88	0,56	0,94	0,94	0,71	1,06	1,06	0,71	1,13	1,13
TTZNFS5.0X30	0,72	-	-	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTZNFS5.0X40	0,72	1,03	1,03	0,72	0,97	0,97	0,72	-	-	0,90	-	-	0,00	-	-
TTZNFS5.0X50	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,19	1,19	0,90	1,18	1,18
TTZNFS5.0X60	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,24	1,24	0,90	1,31	1,31
TTZNFS5.0X70	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,24	1,24	0,90	1,31	1,31
TTZNFS5.0X80	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,24	1,24	0,90	1,31	1,31
TTZNFS5.0X90	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,24	1,24	0,90	1,31	1,31
TTZNFS5.0X100	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,24	1,24	0,90	1,31	1,31
TTZNFS5.0X120	0,72	1,03	1,03	0,72	1,06	1,06	0,72	1,11	1,11	0,90	1,24	1,24	0,90	1,31	1,31
TTZNFS6.0X40	1,08	1,23	1,23	1,08	1,17	1,17	1,08	-	-	0,00	-	-	0,00	-	-
TTZNFS6.0X50	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,43	1,43	1,35	1,42	1,42
TTZNFS6.0X60	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTZNFS6.0X70	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTZNFS6.0X80	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTZNFS6.0X90	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTZNFS6.0X100	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTZNFS6.0X120	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTZNFS6.0X140	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTZNFS6.0X160	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64
TTZNFS6.0X180	1,08	1,31	1,31	1,08	1,36	1,36	1,08	1,41	1,41	1,35	1,56	1,56	1,35	1,64	1,64

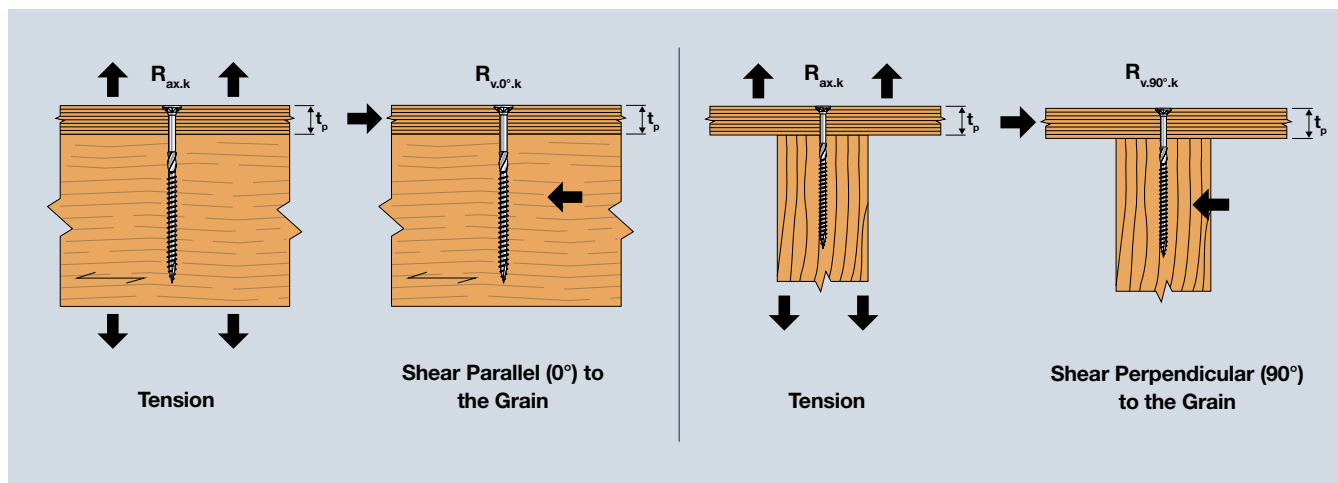
5. Boards to Timber

TTZNFS - Characteristic Capacities Plywood Board to Timber C24



Product Reference	Characteristic Capacity for Plywood ($\rho_k \geq 490 \text{ kg/m}^3$) to Timber C24 ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p														
	$t_p = 12$			$t_p = 15$			$t_p = 18$			$t_p = 22$			$t_p = 25$		
	$R_{ax,k,12}$	$R_{v,0^\circ,k,12}$	$R_{v,90^\circ,k,12}$	$R_{ax,k,15}$	$R_{v,0^\circ,k,15}$	$R_{v,90^\circ,k,15}$	$R_{ax,k,18}$	$R_{v,0^\circ,k,18}$	$R_{v,90^\circ,k,18}$	$R_{ax,k,22}$	$R_{v,0^\circ,k,22}$	$R_{v,90^\circ,k,22}$	$R_{ax,k,25}$	$R_{v,0^\circ,k,25}$	$R_{v,90^\circ,k,25}$
TTZNFS4.5X25	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTZNFS4.5X30	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTZNFS4.5X35	0,69	-	-	0,69	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTZNFS4.5X40	0,69	0,94	0,94	0,69	0,97	0,97	0,69	-	-	0,00	-	-	0,00	-	-
TTZNFS4.5X45	0,69	0,94	0,94	0,69	1,01	1,01	0,69	1,07	1,07	1,52	-	-	1,32	-	-
TTZNFS4.5X50	0,69	0,94	0,94	0,69	1,01	1,01	0,69	1,08	1,08	1,64	1,41	1,41	1,64	1,37	1,37
TTZNFS4.5X60	0,69	0,94	0,94	0,69	1,01	1,01	0,69	1,08	1,08	1,64	1,44	1,44	1,64	1,50	1,44
TTZNFS4.5X70	0,69	0,94	0,94	0,69	1,01	1,01	0,69	1,08	1,08	1,64	1,44	1,44	1,64	1,50	1,46
TTZNFS4.5X80	0,69	0,94	0,94	0,69	1,01	1,01	0,69	1,08	1,08	1,64	1,44	1,44	1,64	1,50	1,51
TTZNFS5.0X30	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-	0,00	-	-
TTZNFS5.0X40	0,88	1,12	1,12	0,88	1,08	1,08	0,88	-	-	0,00	-	-	0,00	-	-
TTZNFS5.0X50	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,59	1,59	1,88	1,56	1,56
TTZNFS5.0X60	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,69	1,69	2,07	1,78	1,78
TTZNFS5.0X70	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,69	1,69	2,07	1,78	1,78
TTZNFS5.0X80	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,69	1,69	2,07	1,78	1,78
TTZNFS5.0X90	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,69	1,69	2,07	1,78	1,78
TTZNFS5.0X100	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,69	1,69	2,07	1,78	1,78
TTZNFS5.0X120	0,88	1,14	1,14	0,88	1,20	1,20	0,88	1,28	1,28	2,07	1,69	1,69	2,07	1,78	1,78
TTZNFS6.0X40	1,32	1,35	1,35	1,32	1,31	1,31	0,00	-	-	0,00	-	-	0,00	-	-
TTZNFS6.0X50	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,56	1,56	2,10	1,74	1,74	1,88	1,71	1,71
TTZNFS6.0X60	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	2,63	2,05	2,05	2,63	2,11	2,11
TTZNFS6.0X70	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,00	2,15	2,15	3,00	2,25	2,25
TTZNFS6.0X80	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,00	2,15	2,15	3,00	2,25	2,25
TTZNFS6.0X90	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,10	2,17	2,17	3,10	2,27	2,27
TTZNFS6.0X100	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,10	2,17	2,17	3,10	2,27	2,27
TTZNFS6.0X120	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,10	2,17	2,17	3,10	2,27	2,27
TTZNFS6.0X140	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,10	2,17	2,17	3,10	2,27	2,27
TTZNFS6.0X160	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,10	2,17	2,17	3,10	2,27	2,27
TTZNFS6.0X180	1,32	1,48	1,48	1,32	1,53	1,53	1,32	1,61	1,61	3,10	2,17	2,17	3,10	2,27	2,27

For dimensions and characteristic parameters see p. 40.



5. Boards to Timber

Solid-Drive™

TTSFS Structural Countersunk WOOD Screw for Boards to Timber

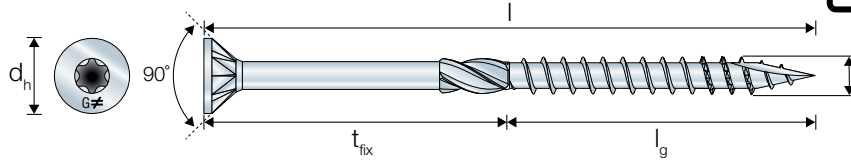
Stainless Steel
CRC III acc. to
EN1993-1-4(A1)
SC3 - 50 years acc. to EC5

A4
INOX

UK
CA



ETA-21/0670



TTSFS - Characteristic Capacities OSB Board to Timber C24

Product Reference	Characteristic Capacity for Panel (OSB, Particle Board $\rho_k \geq 380 \text{ kg/m}^3$) to Timber C24 ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p														
	$t_p = 12$			$t_p = 15$			$t_p = 18$			$t_p = 22$			$t_p = 25$		
	$R_{ax,k,12}$	$R_{v,0^\circ,k,12}$	$R_{v,90^\circ,k,12}$	$R_{ax,k,15}$	$R_{v,0^\circ,k,15}$	$R_{v,90^\circ,k,15}$	$R_{ax,k,18}$	$R_{v,0^\circ,k,18}$	$R_{v,90^\circ,k,18}$	$R_{ax,k,22}$	$R_{v,0^\circ,k,22}$	$R_{v,90^\circ,k,22}$	$R_{ax,k,25}$	$R_{v,0^\circ,k,25}$	$R_{v,90^\circ,k,25}$
TTSFS5.0X60	0,72	0,91	0,91	0,72	0,96	0,96	0,72	1,02	1,02	0,90	1,16	1,16	0,90	1,24	1,24
TTSFS5.0X70	0,72	0,91	0,91	0,72	0,96	0,96	0,72	1,02	1,02	0,90	1,16	1,16	0,90	1,24	1,24
TTSFS5.0X80	0,72	0,91	0,91	0,72	0,96	0,96	0,72	1,02	1,02	0,90	1,16	1,16	0,90	1,24	1,24
TTSFS5.0X90	0,72	0,91	0,91	0,72	0,96	0,96	0,72	1,02	1,02	0,90	1,16	1,16	0,90	1,24	1,24
TTSFS5.0X100	0,72	0,91	0,91	0,72	0,96	0,96	0,72	1,02	1,02	0,90	1,16	1,16	0,90	1,24	1,24
TTSFS5.0X120	0,72	0,91	0,91	0,72	0,96	0,96	0,72	1,02	1,02	0,90	1,16	1,16	0,90	1,24	1,24
TTSFS6.0X70	1,08	1,28	1,28	1,08	1,32	1,32	1,08	1,37	1,37	1,35	1,53	1,53	1,35	1,60	1,60
TTSFS6.0X80	1,08	1,28	1,28	1,08	1,32	1,32	1,08	1,37	1,37	1,35	1,53	1,53	1,35	1,60	1,60
TTSFS6.0X90	1,08	1,28	1,28	1,08	1,32	1,32	1,08	1,37	1,37	1,35	1,53	1,53	1,35	1,60	1,60
TTSFS6.0X100	1,08	1,28	1,28	1,08	1,32	1,32	1,08	1,37	1,37	1,35	1,53	1,53	1,35	1,60	1,60
TTSFS6.0X120	1,08	1,28	1,28	1,08	1,32	1,32	1,08	1,37	1,37	1,35	1,53	1,53	1,35	1,60	1,60
TTSFS6.0X140	1,08	1,28	1,28	1,08	1,32	1,32	1,08	1,37	1,37	1,35	1,53	1,53	1,35	1,60	1,60

TTSFS - Characteristic Capacities Plywood Board to Timber C24

Product Reference	Characteristic Capacity for Plywood ($\rho_k \geq 490 \text{ kg/m}^3$) to Timber C24 ($\rho_k \geq 350 \text{ kg/m}^3$) Connection Depending of the Thickness of the Panel t_p														
	$t_p = 12$			$t_p = 15$			$t_p = 18$			$t_p = 22$			$t_p = 25$		
	$R_{ax,k,12}$	$R_{v,0^\circ,k,12}$	$R_{v,90^\circ,k,12}$	$R_{ax,k,15}$	$R_{v,0^\circ,k,15}$	$R_{v,90^\circ,k,15}$	$R_{ax,k,18}$	$R_{v,0^\circ,k,18}$	$R_{v,90^\circ,k,18}$	$R_{ax,k,22}$	$R_{v,0^\circ,k,22}$	$R_{v,90^\circ,k,22}$	$R_{ax,k,25}$	$R_{v,0^\circ,k,25}$	$R_{v,90^\circ,k,25}$
TTSFS5.0X60	0,88	1,03	1,03	0,88	1,10	1,10	0,88	1,19	1,19	1,97	1,58	1,58	1,97	1,63	1,67
TTSFS5.0X70	0,88	1,03	1,03	0,88	1,10	1,10	0,88	1,19	1,19	1,97	1,58	1,58	1,97	1,63	1,68
TTSFS5.0X80	0,88	1,03	1,03	0,88	1,10	1,10	0,88	1,19	1,19	1,97	1,58	1,58	1,97	1,63	1,68
TTSFS5.0X90	0,88	1,03	1,03	0,88	1,10	1,10	0,88	1,19	1,19	1,97	1,58	1,58	1,97	1,63	1,68
TTSFS5.0X100	0,88	1,03	1,03	0,88	1,10	1,10	0,88	1,19	1,19	1,97	1,58	1,58	1,97	1,63	1,68
TTSFS5.0X120	0,88	1,03	1,03	0,88	1,10	1,10	0,88	1,19	1,19	1,97	1,58	1,58	1,97	1,63	1,68
TTSFS6.0X70	1,32	1,43	1,43	1,32	1,49	1,49	1,32	1,57	1,57	2,75	2,05	2,05	2,75	2,15	2,15
TTSFS6.0X80	1,32	1,43	1,43	1,32	1,49	1,49	1,32	1,57	1,57	2,75	2,05	2,05	2,75	2,15	2,15
TTSFS6.0X90	1,32	1,43	1,43	1,32	1,49	1,49	1,32	1,57	1,57	2,75	2,05	2,05	2,75	2,15	2,15
TTSFS6.0X100	1,32	1,43	1,43	1,32	1,49	1,49	1,32	1,57	1,57	2,75	2,05	2,05	2,75	2,15	2,15
TTSFS6.0X120	1,32	1,43	1,43	1,32	1,49	1,49	1,32	1,57	1,57	2,75	2,05	2,05	2,75	2,15	2,15
TTSFS6.0X140	1,32	1,43	1,43	1,32	1,49	1,49	1,32	1,57	1,57	2,75	2,05	2,05	2,75	2,15	2,15

For dimensions and characteristic parameters see p. 40.

5. Boards to Timber

TTUFS/TTZNFS/TTSFS - Minimum Distances for Screws in Shear or Combined Loads¹⁾ OSB or Plywood Board to Timber C24

Outer Thread Diameter d [mm]	Pre-drill	Angle Between Load Direction and Grain = 0°						Angle Between Load Direction and Grain = 90°					
		a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}	a ₁	a ₂	a _{3,c}	a _{3,t}	a _{4,c}	a _{4,t}
4.5	With pre-drill	20	12	32	54	14	14	16	16	32	23	14	32
	Without pre-drill	39	20	45	68	23	23	20	20	45	45	23	32
5.0	With pre-drill	22	13	35	60	15	15	17	17	35	25	15	35
	Without pre-drill	51	22	50	75	25	25	22	22	50	50	25	35
6.0	With pre-drill	26	16	42	72	18	18	21	21	42	30	18	42
	Without pre-drill	62	26	60	90	30	30	26	26	60	60	30	42

¹⁾ Minimum distances comply with EN 1995-1-1 (Eurocode 5) and ETA 21/0670

²⁾ Values given in the table is based on the $\rho_k \leq 380 \text{ kg/m}^3$ for OSB and $\rho_k \leq 490 \text{ kg/m}^3$ for plywood

³⁾ Minimum distances from the unloaded edge perpendicular to the grain may be reduced to $a_{4,c} = 3 \times d$ if the spacing parallel to the grain (a_1) and the end distance ($a_{3,t}$) is at least $25 \times d$.

TTUFS/TTZNFS/TTSFS - Minimum Distances for Axially Loaded Screws OSB or Plywood Board to Timber C24

Outer Thread Diameter d [mm]	a ₁	a ₂	a _{3,c}	a _{4,c}
4.5	27	20	45	18
5.0	30	22	50	20
6.0	36	26	60	24

*Valid if the applied centre distances comply with $a_1 \times a_2 \geq 25d^2$.
Calculation according to EN1995-1-1:2004+A2:2014.

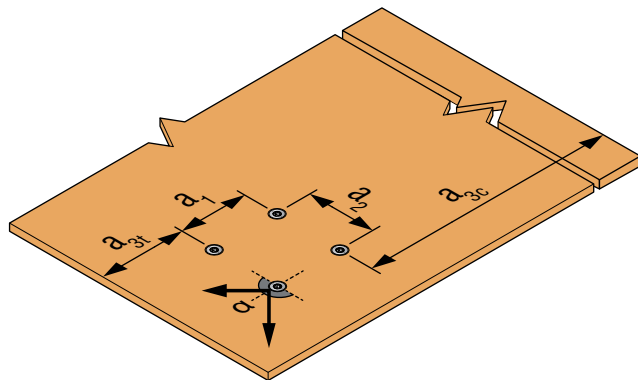


Illustration above shows angle between load direction and grain = 0°

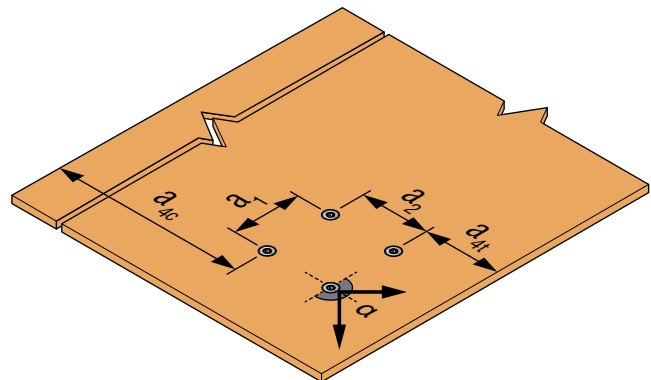


Illustration above shows angle between load direction and grain = 90°

See explanation of α in General Introduction page 23.



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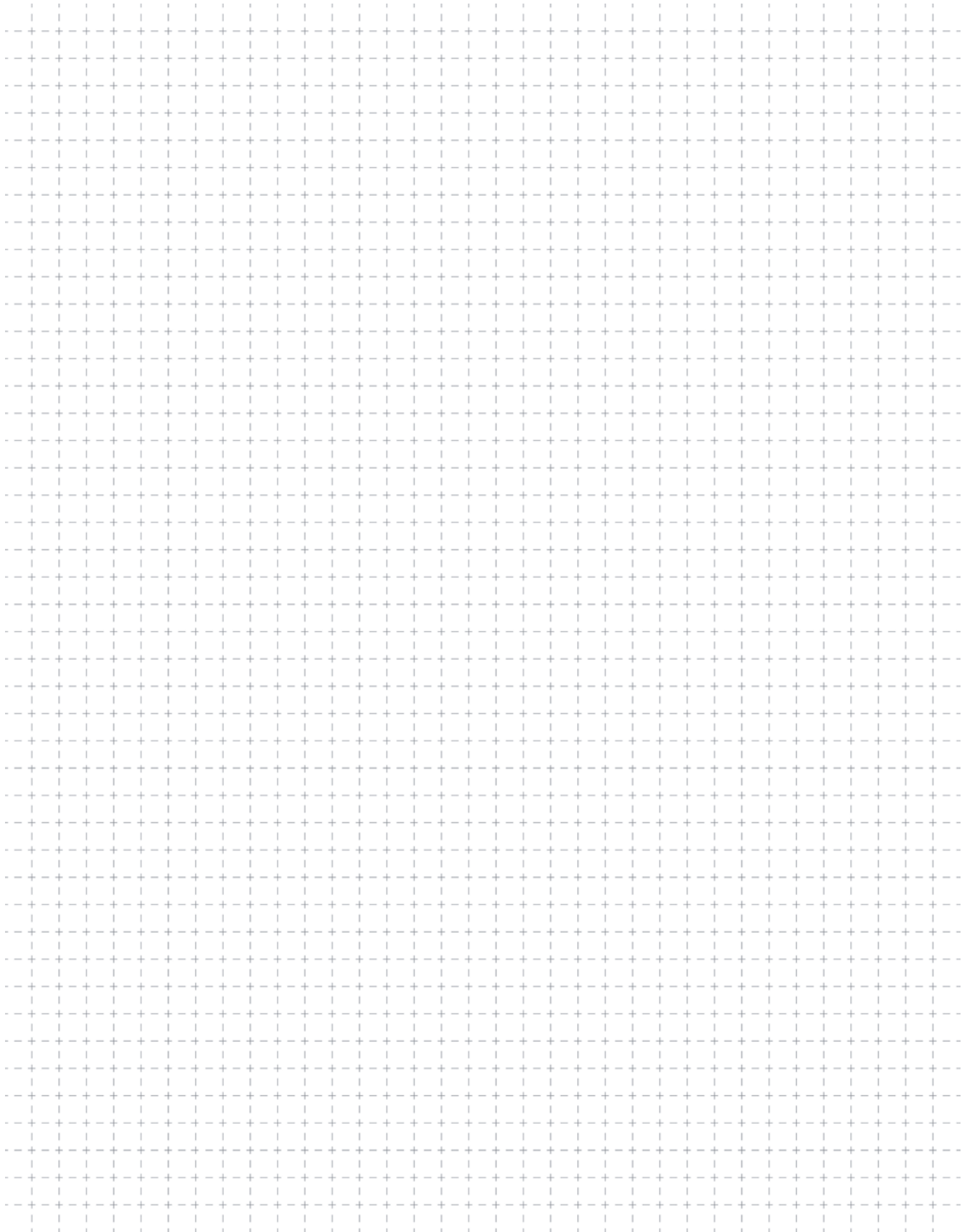


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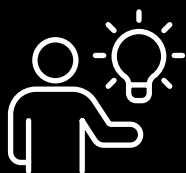
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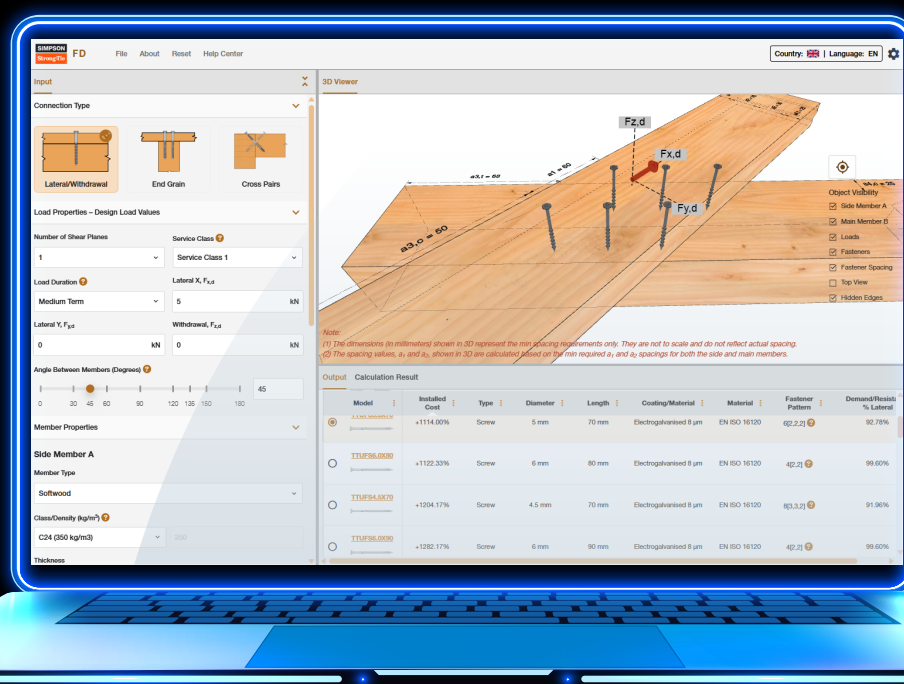
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