



# Structural Screw Design Guide

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# Building Forests in Cities

## MEC Head Office

Vancouver, BC



**MTC Solutions** is a specialty supplier of connection solutions for modern mass timber applications in commercial, industrial and residential projects. We are proud to be working with the most innovative partners on cutting-edge projects across North America. Our goal is to see the wood construction industry thrive and help to maintain a low carbon footprint through education, research, and cost-effective approaches.



### WE SUPPLY

MTC Solutions stocks more than 450 mass timber connection solutions ready for delivery throughout North America.



### WE FUND

We do extensive research with leading North American universities to innovate Mass Timber Connections Solutions, reduce costs and extend the reach of mass timber in the market.



### WE GUIDE

We offer free educational sessions on mass timber solutions in forms of webinars, technical learning sessions and event participation throughout North America.



### WE EDUCATE

We provide the support needed to design efficient connection solutions. Our North American Support team is available to answer any design questions.



# FASTENER LINE

MTC Solutions is the only official North American distributor of SWG ASSY® structural screws. All our fasteners are self-tapping, of the highest quality and engineered to fit the special needs of the North American market.

Our fasteners come in a great variety of sizes and shapes. They provide viable timber connection solutions for many structural applications. We are ready to supply what you need for your small and large projects.

We understand that specifying the right structural screw in your connections will significantly contribute to the overall success of a project. Together with leading North American universities, we fund well-researched applications to simplify connections and optimise efficiency.

Code-approved reliability. The ASSY® fasteners are approved by North American bodies and were awarded with ICC-ESR in the US, the Canadian Construction Materials Centre Reports (CCMC) in Canada, and most recently achieved LARR certification in Los Angeles. Our suppliers follow the strictest manufacturing processes and are under observation by North American authorities. With our high-quality product comes a commitment to high-quality service through our team of product consultants and technical support engineers.



## CERTIFICATIONS

### ICC-ESR-3178



DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES  
SECTION: 06 05 23—WOOD, PLASTIC, AND COMPOSITE FASTENINGS

REPORT HOLDER:  
SCHRAUBENWERK GAISBACH GMBH (SWG)  
AM BAHNHOF 50  
D-74638 WALDENBURG  
GERMANY  
EVALUATION SUBJECT:  
SWG ASSY VG PLUS WOOD-DRILLING SCREWS



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### ICC-ESR-3179



DIVISION: 06 00 00—WOOD, PLASTICS, AND COMPOSITES  
SECTION: 06 05 23—WOOD, PLASTIC, AND COMPOSITE FASTENINGS

REPORT HOLDER:  
SCHRAUBENWERK GAISBACH GMBH (SWG)  
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GERMANY  
EVALUATION SUBJECT:  
SWG ASSY 3.0 WOOD SCREWS



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### LARR 26072 & 26073



MyTiCon Timber Connectors, Inc.  
8287 124th Street, Unit 3  
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(866) 899-4090 ext.101

RESEARCH REPORT: RR 26072  
(CSIF 06 05 23)  
BASED UPON ICC-ES EVALUATION  
REPORT NO. ESR-3178  
REEVALUATION DUE  
DATE: January 1, 2018  
Issued Date: January 1, 2017  
Code: 2014 LABC

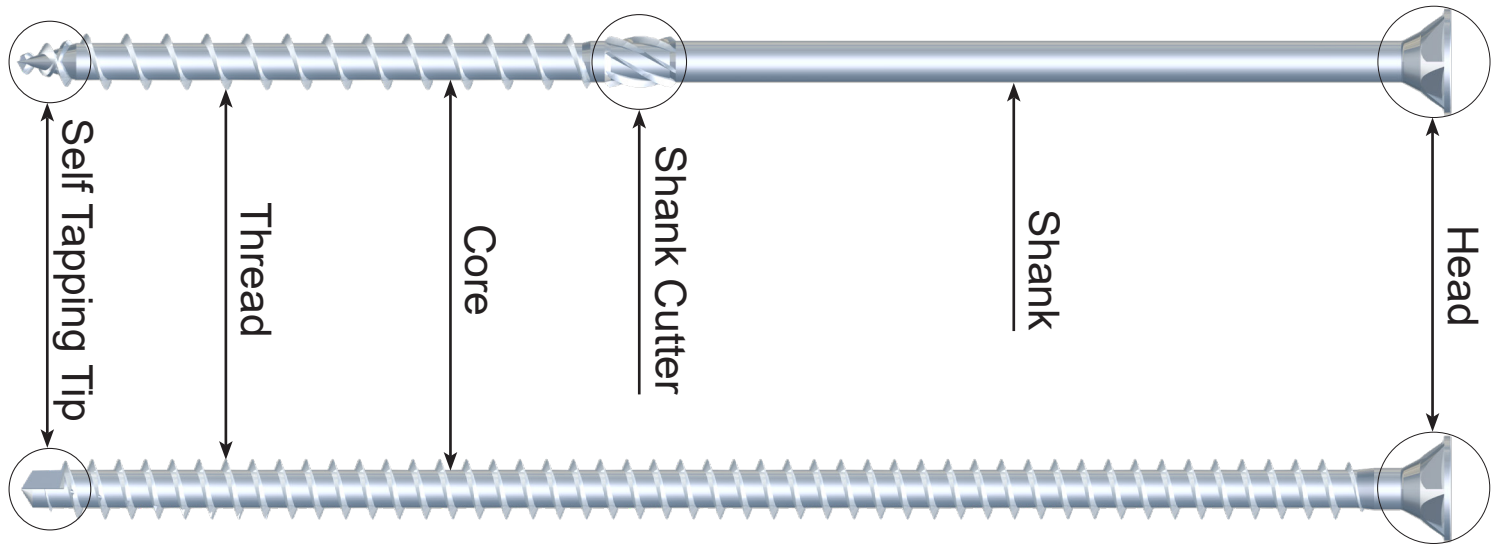


MyTiCon Timber Connectors, Inc.  
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RESEARCH REPORT: RR 26073  
(CSIF 06 05 23)  
BASED UPON ICC-ES EVALUATION  
REPORT NO. ESR-3179  
REEVALUATION DUE  
DATE: January 1, 2018  
Issued Date: January 1, 2017  
Code: 2014 LABC

# FASTENER TERMINOLOGY

In our fastener product line, there are two main categories, the fully threaded and partially threaded screws. Both are engineered to be used in different applications.



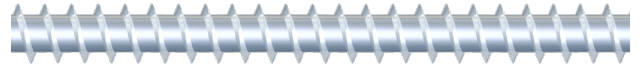
## Partially Threaded Screws



Partially threaded screws are designed to pull members tightly together, and are often utilized in situations where head pull-through or lateral loading are critical design considerations. The shank cutter clears a hole slightly larger than the shank, reducing torque during installation and allowing the wood to settle freely as required.

ASSY® carbon steel partially threaded screws are equipped with a 34° counterthread tip, while ASSY A2® stainless steel screws are equipped with a ring thread tip. Both tips ensure a swift and precise bite and reduce splitting forces during installation.

## Fully Threaded Screws



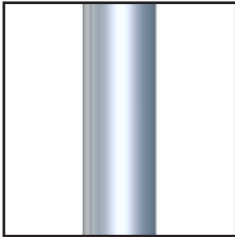
Fully threaded screws are designed to hold wood members firmly in place. Long, fully threaded ASSY® screws are often utilized to take advantage of their high withdrawal capacities through axial loading using installation angles other than 90°. Fully threaded screws are also specially suited for reinforcement applications that utilize the high withdrawal and bearing capacity of the screws along the axial direction.

All ASSY® self tapping fully threaded screws are equipped with a more aggressive drilling point tip to displace wood and reduce torque during installation.

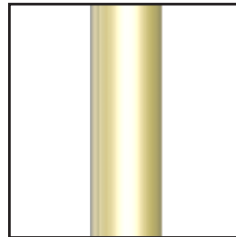
# STEEL AND COATING

ASSY® screws are available in two different types of steel: high performance carbon steel (with one of two types of surface coatings) and stainless steel.

## Carbon Steel



Zinc and Blue Passivated  
Surface Coating



Yellow Chromate Surface  
Coating

## Stainless Steel



Carbon steel ASSY® screws with yellow chromate or blue passivated zinc coatings are intended for dry service conditions only where the moisture content of the wood members does not exceed 19%.

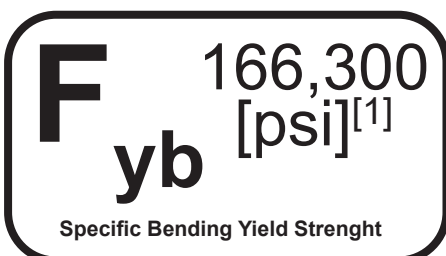
For wet service conditions, select ASSY® screws are available in stainless steel as an alternative to carbon steel. Since stainless steel is a softer metal than carbon steel, ASSY A2® screws exhibit lower fastener strengths compared to regular carbon steel screws, which must be accounted for in design. Pre-drilling may also be a requirement for longer stainless steel screws.

In addition, all ASSY® screws feature a friction-reducing coating to lower torque during installation.

## Hardening

ASSY® carbon steel screws are double heat treated to achieve specific mechanical properties. The screws first undergo a case hardening procedure to ensure reliable thread performance. Afterward, the screws are subjected to a tempering and annealing process to improve ductility and toughness. ASSY® screws can bend 45° without fracturing, and feature high tensile and torsional strength compared to conventional wood fasteners.

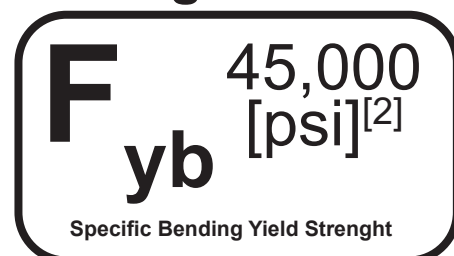
### ASSY® Fasteners



<sup>[1]</sup> for D= 1/2", according to ICC: ESR-3178

VS

### Lag Screw



<sup>[2]</sup> for D= 1/2", according to NDS 2015



## HEAD TYPE



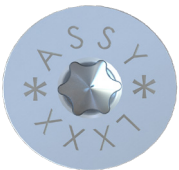
### Countersunk Head

The countersunk head is engineered for connections where the screw head is required to be flush with the surface. Optional milling pockets on the underside of the head ensure clean countersinking action.



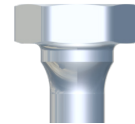
### Washer Head

The washer head screw is engineered to pull connection members tight. The broad washer head supplies maximum pull-through capacity to a connection without using a separate washer.



### Flat Washer Head

The flat washer head combines the high pulling power of the washer head with the clean finish of the countersunk head.



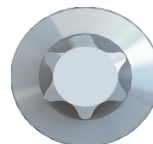
### Kombi Hex Head

The combination hex head can be driven by proprietary AW® bits or by regular metric hex sockets. The diameter of the tapered shoulder is equal to the thread diameter, making it ideal for tight fitting steel-to-wood connections.



### Cylinder Head

The small cylinder head can be driven below the surface of the wood where it remains inconspicuous. Fully threaded cylinder head screws are ideal for reinforcing applications where an unobstructed wood surface is important to the final result.



### Reverse Head

The reverse head screw is quite simply the longest fully threaded self-tapping screw in the world. The reverse head is engineered specifically to handle the high torque generated during installation. The reverse head also makes it easier to install screws up to 59" in length while avoiding slippage between the bit driver and the screw.

# SELF-TAPPING TIP

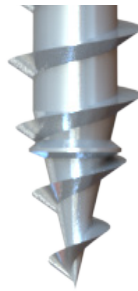
All SWG ASSY® screws are equipped with a self-tapping tip, which enables fast and simple installation. The various self-tapping tips are engineered to reduce the splitting force in the wood during installation and reduce drive-in torque. Most importantly, the self-tapping function eliminates the need for pre-drilling with most timber species. This feature is especially advantageous when installing very long screws driven into large wood members.

Since pre-drilling can reduce the withdrawal capacity of the screws if the holes are drilled too large, the self-tapping feature also contributes to greater connection consistency and reliability.



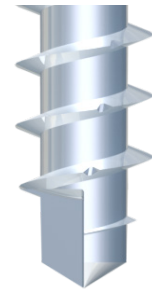
## Counter Thread Tip

- Fastest wood engagement
- Cuts the wood and reduces the wood splitting tendency
- Reduced torque
- No material removal
- No predrilling needed



## Ring Thread Tip

- Reduced splitting in applications close to edge
- Reduces the blow-outs hazards
- No material removal
- No predrilling needed



## Drilling Tip

- Smallest spacing requirements
- Displaces wood and reduces the wood splitting tendency
- Drills the right diameter for the maximal withdrawal capacity
- No material removal
- No predrilling needed

### Did you know?

The shank cutter serves an important function on SWG ASSY® partially threaded screws. During installation, the shank cutter clears a hole slightly larger than the shank, reducing torque and allowing the wood to settle freely as required.



# ASSY® Ecofast



The ASSY® Ecofast screw is a partially threaded (PT) screw with a countersunk head engineered to offer a flush, clean finish for both wood-to-wood and steel-to-wood connections. Its aggressive thread and self-tapping tip bite into the wood rapidly and assure quick and easy installation. The Ecofast can be used with the 90° cup and 45° wedge washer.

Countersunk Head

Counter Thread Tip

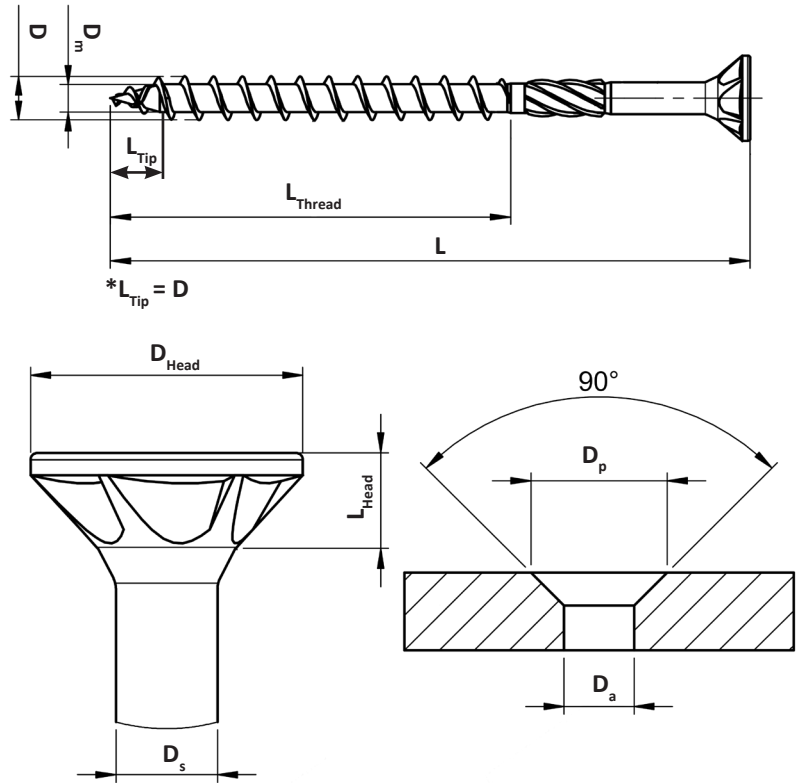
Self-tapping

Partially Threaded

Diameters: 1/4", 5/16", 3/8"

Wood/Wood, Wood/Steel

Code Approved: ICC, CCMC  
& LARR



Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	D <sub>p</sub>	D <sub>a</sub>	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
11060060000	200	1/4 [6]	2-3/8 [60]	1-1/2 [37]	0.472 [12]	0.157 [3.9]	0.173 [4.4]	0.570 [14.5]	0.278 [7]	0.165 [4.2]	AW 30
11060070000	200		2-3/4 [70]	1-5/8 [42]							
11060080000	100		3-1/8 [80]	2 [50]							
11060090000	100		3-1/2 [90]	2 [50]							
11060100000	100		4 [100]	2-3/8 [60]							
11060120000	100		4-3/4 [120]	2-3/4 [70]							
11060140000	100		5-1/2 [140]	2-3/4 [70]							
11060160000	100		6-1/4 [160]	2-3/4 [70]							
11060180000	100		7-1/8 [180]	2-3/4 [70]							
11060200000	100		7-7/8 [200]	2-3/4 [70]							
11060220000	100		8-5/8 [220]	2-3/4 [70]							
11060240000	100		9-1/2 [240]	2-3/4 [70]							
11060260000	100		10-1/4 [260]	2-3/4 [70]							
11060280000	100		11 [280]	2-3/4 [70]							
11060300000	100		11-7/8 [300]	2 3/4 [70]							



Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	D <sub>p</sub>	D <sub>a</sub>	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
11080080000	75	5/16 [ 8 ]	3-1/8 [80]	2 [50]	0.591 [ 15 ]	0.209 [ 5.3 ]	0.228 [ 5.8 ]	0.748 [ 19 ]	0.354 [ 9 ]	0.181 [ 4.6 ]	AW 40
11080090000	75		3-1/2 [90]	2-3/8 [60]							
11080100000	75		4 [100]	2-3/8 [60]							
11080120000	75		4-3/4 [120]	3-1/8 [80]							
11080140000	75		5-1/2 [140]	3-1/8 [80]							
11080160000	75		6-1/4 [160]	3-1/8 [80]							
11080180000	75		7-1/8 [180]	3-1/8 [80]							
11080200000	75		7-7/8 [200]	3-1/8 [80]							
11080220000	75		8-5/8 [220]	4 [100]							
11080240000	75		9-1/2 [240]	4 [100]							
11080260000	75		10-1/4 [260]	4 [100]							
11080280000	75		11 [280]	4 [100]							
11080300000	75		11-7/8 [300]	4 [100]							
11080320000	100		12-5/8 [320]	4 [100]							
11080340000	100		13-3/8 [340]	4 [100]							
11080360000	100		14-1/4 [360]	4 [100]							
11080380000	100		15 [380]	4 [100]							
11080400000	100		15-3/4 [400]	4 [100]							

Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	D <sub>p</sub>	D <sub>a</sub>	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
11100080000	50	3/8 [ 10 ]	3-1/8 [80]	2 [50]	0.728 [ 18.5 ]	0.248 [ 6.3 ]	0.283 [ 7.2 ]	0.905 [ 23 ]	0.433 [ 11 ]	0.216 [ 5.5 ]	AW 40
11100100000	50		4 [100]	2-3/8 [60]							
11100120000	50		4-3/4 [120]	3-1/8 [80]							
11100140000	50		5-1/2 [140]	3-1/8 [80]							
11100160000	50		6-1/4 [160]	4 [100]							
11100180000	50		7-1/8 [180]	4 [100]							
11100200000	50		7-7/8 [200]	4 [100]							
11100220000	50		8-5/8 [220]	4 [100]							
11100240000	50		9-1/2 [240]	4 [100]							
11100260000	50		10-1/4 [260]	4 [100]							
11100280000	50		11 [280]	4 [100]							
11100300000	50		11-7/8 [300]	4 [100]							
11100320000	50		12-5/8 [320]	4-3/4 [120]							
11100340000	50		13-3/8 [340]	4-3/4 [120]							
11100360000	50		14-1/4 [360]	4-3/4 [120]							
11100380000	50		15 [380]	4-3/4 [120]							
11100400000	50		15-3/4 [400]	4-3/4 [120]							

# ASSY® SK

The ASSY® SK with its large washer head offers the highest head pull-through resistance of all ASSY® screws. The SK will pull together and hold your timber work tightly in place, making it the perfect choice for many wood-to-wood assembly applications. The aggressive thread and self-tapping tip make for easy and fast installation in mass timber, heavy timber, or log home construction.

Largest Washer Head

Counter Thread Tip

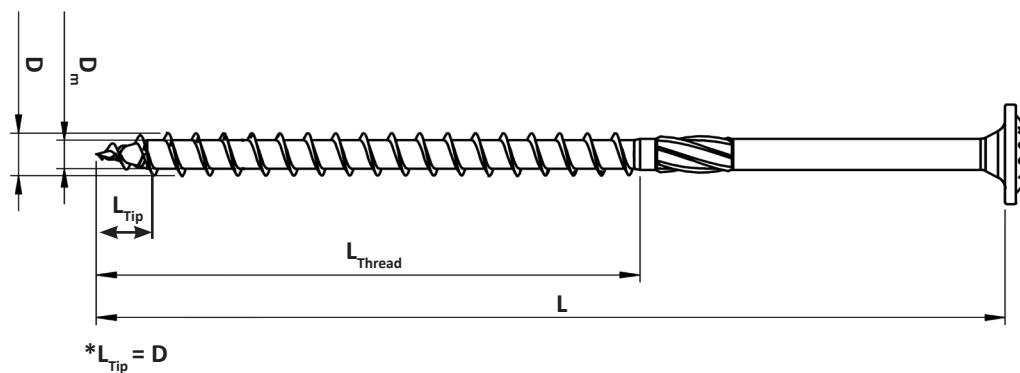
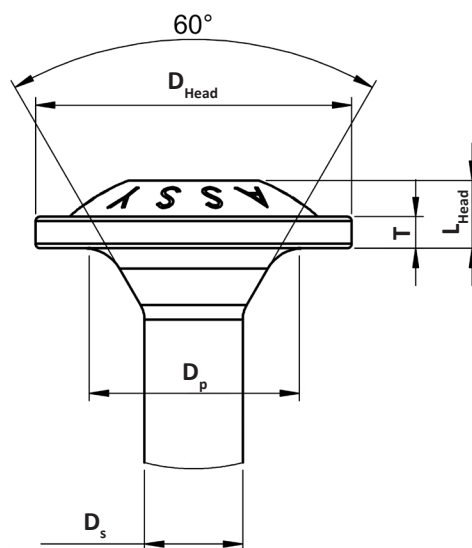
Self-tapping

Partially Threaded

Diameters: 1/4", 5/16", 3/8", 1/2"

Wood/Wood, Wood/Concrete

Code Approved: ICC, CCMC  
& LARR



## Did you know?

Partially threaded screws are designed to pull timber members tightly together.

Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	D <sub>p</sub>	T	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
12060050000	500	<b>1/4</b> [ 6 ]	<b>2</b> [50]	<b>1-3/4</b> [45]	<b>0.551</b> [14]	<b>0.157</b> [3.9]	<b>0.173</b> [4.4]	<b>0.315</b> [8]	<b>0.047</b> [1.2]	<b>0.118</b> [3.0]	<b>AW 30</b>
12060060000	100		<b>2-3/8</b> [60]	<b>1-1/2</b> [37]							
12060070000	100		<b>2-3/4</b> [70]	<b>1-5/8</b> [42]							
12060080000	100		<b>3-1/8</b> [80]	<b>2</b> [50]							
12060090000	100		<b>3-1/2</b> [90]	<b>2</b> [50]							
12060100000	100		<b>4</b> [100]	<b>2-3/8</b> [60]							
12060120000	100		<b>4-3/4</b> [120]	<b>2-3/4</b> [70]							
12060140000	100		<b>5-1/2</b> [140]	<b>2-3/4</b> [70]							
12060160000	100		<b>6-1/4</b> [160]	<b>2-3/4</b> [70]							
12060180000	100		<b>7-1/8</b> [180]	<b>2-3/4</b> [70]							
12060200000	100		<b>7-7/8</b> [200]	<b>2-3/4</b> [70]							
12060220000	100		<b>8-5/8</b> [220]	<b>2-3/4</b> [70]							
12060240000	100		<b>9-1/2</b> [240]	<b>2-3/4</b> [70]							
12060260000	100		<b>10-1/4</b> [260]	<b>2-3/4</b> [70]							
12060280000	100		<b>11</b> [280]	<b>2-3/4</b> [70]							
12060300000	100		<b>11-7/8</b> [300]	<b>2-3/4</b> [70]							

Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	D <sub>p</sub>	T	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
12080060000	50	<b>5/16</b> [ 8 ]	<b>2-3/8</b> [60]	<b>2</b> [50]	<b>0.870</b> [22.1]	<b>0.209</b> [5.3]	<b>0.228</b> [5.8]	<b>0.394</b> [10]	<b>0.071</b> [1.8]	<b>0.149</b> [3.8]	<b>AW 40</b>
12080080000	50		<b>3-1/8</b> [80]	<b>2</b> [50]							
12080100000	50		<b>4</b> [100]	<b>2-3/8</b> [60]							
12080120000	50		<b>4-3/4</b> [120]	<b>3-1/8</b> [80]							
12080140000	50		<b>5-1/2</b> [140]	<b>3-1/8</b> [80]							
12080160000	50		<b>6-1/4</b> [160]	<b>3-1/8</b> [80]							
12080180000	50		<b>7-1/8</b> [180]	<b>3-1/8</b> [80]							
12080200000	50		<b>7-7/8</b> [200]	<b>3-1/8</b> [80]							
12080220000	50		<b>8-5/8</b> [220]	<b>4</b> [100]							
12080240000	50		<b>9-1/2</b> [240]	<b>4</b> [100]							
12080260000	50		<b>10-1/4</b> [260]	<b>4</b> [100]							
12080280000	50		<b>11</b> [280]	<b>4</b> [100]							
12080300000	50		<b>11-7/8</b> [300]	<b>4</b> [100]							
12080320000	50		<b>12-5/8</b> [320]	<b>4</b> [100]							
12080340000	50		<b>13-3/8</b> [340]	<b>4</b> [100]							
12080360000	50		<b>14-1/4</b> [360]	<b>4</b> [100]							
12080380000	50		<b>15</b> [380]	<b>4</b> [100]							
12080400000	50		<b>15-3/4</b> [400]	<b>4</b> [100]							
12080420000	50		<b>16-1/2</b> [420]	<b>4</b> [100]							
12080440000	50		<b>17-1/4</b> [440]	<b>4</b> [100]							
12080480000	25		<b>19</b> [480]	<b>4</b> [100]							
12080520000	25		<b>20-1/2</b> [520]	<b>4</b> [100]							



Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	D <sub>p</sub>	T	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
12100100000	50	<b>3/8</b> [ 10 ]	<b>4</b> [100]	<b>2-3/8</b> [60]	<b>0.992</b> [25.2]	<b>0.248</b> [6.3]	<b>0.283</b> [7.2]	<b>0.531</b> [13.5]	<b>0.087</b> [2.2]	<b>0.181</b> [4.6]	<b>AW 50</b>
12100120000	50		<b>4-3/4</b> [120]	<b>3-1/8</b> [80]							
12100140000	50		<b>5-1/2</b> [140]	<b>3-1/8</b> [80]							
12100160000	50		<b>6-1/4</b> [160]	<b>4</b> [100]							
12100180000	50		<b>7-1/8</b> [180]	<b>4</b> [100]							
12100200000	50		<b>7-7/8</b> [200]	<b>4</b> [100]							
12100220000	50		<b>8-5/8</b> [220]	<b>4</b> [100]							
12100240000	50		<b>9-1/2</b> [240]	<b>4</b> [100]							
12100260000	50		<b>10-1/4</b> [260]	<b>4</b> [100]							
12100280000	50		<b>11</b> [280]	<b>4</b> [100]							
12100300000	50		<b>11-7/8</b> [300]	<b>4</b> [100]							
12100320000	50		<b>12-5/8</b> [320]	<b>4-3/4</b> [120]							
12100340000	50		<b>13-3/8</b> [340]	<b>4-3/4</b> [120]							
12100360000	50		<b>14-1/4</b> [360]	<b>4-3/4</b> [120]							
12100380000	50		<b>15</b> [380]	<b>4-3/4</b> [120]							
12100400000	50		<b>15-3/4</b> [400]	<b>4-3/4</b> [120]							
12100460000	25		<b>18-1/8</b> [460]	<b>4-3/4</b> [120]							

Item#	Box size	D	L	L <sub>thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	D <sub>p</sub>	T	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
12120200000	25	<b>1/2</b> [ 12 ]	<b>7-7/8</b> [200]	<b>4</b> [100]	<b>1.157</b> [29.4]	<b>0.283</b> [7.2]	<b>0.323</b> [8.2]	<b>0.552</b> [14]	<b>0.102</b> [2.6]	<b>0.196</b> [5.0]	<b>AW 50</b>
12120220000	25		<b>8-5/8</b> [220]	<b>4-3/4</b> [120]							
12120240000	25		<b>9-1/2</b> [240]	<b>4-3/4</b> [120]							
12120260000	25		<b>10-1/4</b> [260]	<b>4-3/4</b> [120]							
12120280000	25		<b>11</b> [280]	<b>4-3/4</b> [120]							
12120300000	25		<b>11-7/8</b> [300]	<b>4-3/4</b> [120]							
12120320000	25		<b>12-5/8</b> [320]	<b>4-3/4</b> [120]							
12120340000	25		<b>13-3/8</b> [340]	<b>4-3/4</b> [120]							
12120360000	25		<b>14-1/4</b> [360]	<b>4-3/4</b> [120]							
12120380000	25		<b>15</b> [380]	<b>5-3/4</b> [145]							
12120400000	25		<b>15-3/4</b> [400]	<b>5-3/4</b> [145]							
12120440000	25		<b>17-1/4</b> [440]	<b>5-3/4</b> [145]							
12120480000	25		<b>19</b> [480]	<b>5-3/4</b> [145]							
12120520000	25		<b>20-1/2</b> [520]	<b>5-3/4</b> [145]							
12121000000	25		<b>39-3/8</b> [1000]	<b>4-3/4</b> [120]							

# ASSY® F.W.H.

The ASSY® FWH is a two-in-one engineered screw that combines the pulling power of a washer-head screw with the clean finish of a countersunk head screw. The FWH, like the other ASSY® screws, is a structural, self-tapping screw with a counter thread tip for reduced wood splitting and precise setting. This new fastener is only available in 5/16" diameter and offers the high quality and maximum performance expected from an ASSY® screw, at the most competitive price on the market.

Flat Washer Head

Counter Thread Tip

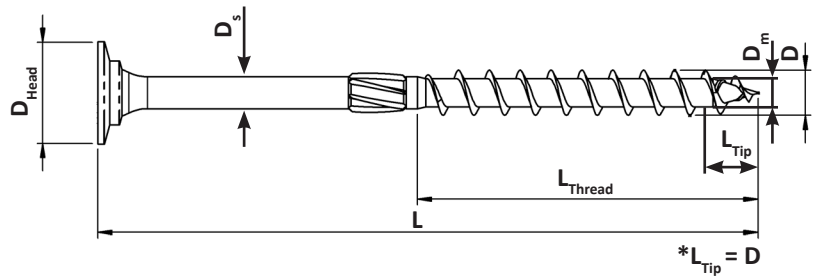
Self-tapping

Partially Threaded

Diameters: 5/16"

Wood/Wood, Wood/Steel

Code Approved: ETA



Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
10080160000	50	5/16 [ 8 ]	6-1/4 [160]	3-1/8 [80]	0.709 [18]	0.209 [5.3]	0.228 [5.8]	AW 40
10080200000	50		7-7/8 [200]	3-1/8 [80]				
10080240000	50		9-1/2 [240]	4 [100]				
10080300000	50		11-7/8 [300]	4 [100]				
10080360000	50		14-1/4 [360]	4 [100]				
10080400000	50		15-3/4 [400]	4 [100]				

## Did you know?

All ASSY® fasteners are self-tapping screws and therefore do not require any predrilling to be installed.

A common lag screw, for example, will require up to three predrilled holes, each in a different diameter.

# ASSY® Kombi

The ASSY® Kombi screw, with its convenient combination hex head, is the multipurpose workhorse among engineered screws, suitable for wood-to-wood and steel-to-wood connections. Kombi screws are also used extensively as anchors in material handling and panel handling systems for CLT, logs, and heavy timber. The combination hex head can be driven by proprietary AW® bits or by regular metric hex sockets, including the magnetic SW® sockets from SWG.

HEX Head

Counter Thread Tip

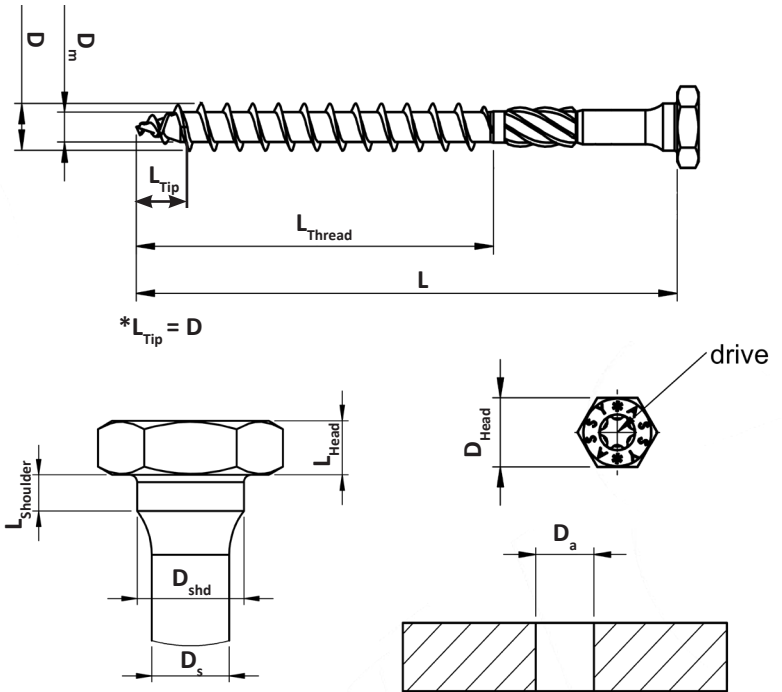
Self-tapping

Partially Threaded

Diameters: 5/16", 3/8", 1/2"

Wood/Wood, Wood/Steel,  
Material handling systems

Code Approved: ICC, CCMC  
& LARR



Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	D <sub>a</sub>	D <sub>shd</sub>	L <sub>Head</sub>	L <sub>Shoulder</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
13080060000	75	5/16 [ 8 ]	2-3/8 [60]	1 1/2 [40]	0.472 [12]	0.209 [5.3]	0.228 [5.8]	0.354 [9.0]	0.315 [8.0]	0.177 [4.5]	0.110 [2.8]	AW 40 or 1/2" socket
13080080000	75		3-1/8 [80]	2 [50]								
13080100000	75		4 [100]	2-3/8 [60]								
13080120000	75		4-3/4 [120]	3-1/8 [80]								
13080140000	75		5-1/2 [140]	3-1/8 [80]								
13080160000	75		6-1/4 [160]	3-1/8 [80]								
13080180000	75		7-1/8 [180]	3-1/8 [80]								
13080200000	75		7-7/8 [200]	3-1/8 [80]								
13080220000	75		8-5/8 [220]	4 [100]								
13080240000	75		9-1/2 [240]	4 [100]								
13080260000	75		10-1/4 [260]	4 [100]								
13080280000	75		11 [280]	4 [100]								
13080300000	75		11-7/8 [300]	4 [100]								

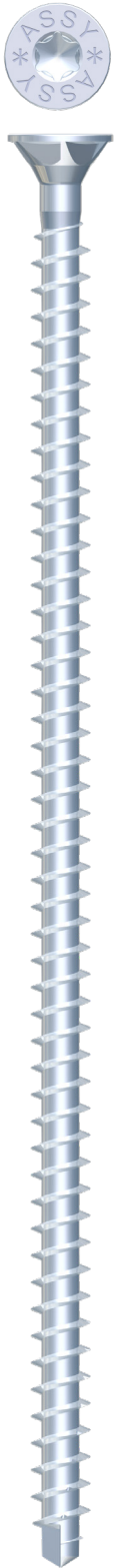


Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	D <sub>a</sub>	D <sub>shd</sub>	L <sub>Head</sub>	L <sub>Shoulder</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
13100060000	50	<b>3/8</b> [10]	<b>2-3/8</b> [60]	<b>2</b> [50]	<b>0.591</b> [15]	<b>0.248</b> [6.3]	<b>0.283</b> [7.2]	<b>0.433</b> [11]	<b>0.394</b> [10]	<b>0.196</b> [5]	<b>0.118</b> [3]	<b>AW 40</b> or <b>19/32"</b> socket
13100080000	50		<b>3-1/8</b> [80]	<b>2</b> [50]								
13100100000	50		<b>4</b> [100]	<b>2-3/8</b> [60]								
13100120000	50		<b>4-3/4</b> [120]	<b>3-1/8</b> [80]								
13100140000	50		<b>5-1/2</b> [140]	<b>3-1/8</b> [80]								
13100160000	50		<b>6-1/4</b> [160]	<b>4</b> [100]								
13100180000	50		<b>7-1/8</b> [180]	<b>4</b> [100]								
13100200000	50		<b>7-7/8</b> [200]	<b>4</b> [100]								
13100220000	50		<b>8-5/8</b> [220]	<b>4</b> [100]								
13100240000	50		<b>9-1/2</b> [240]	<b>4</b> [100]								
13100260000	50		<b>10-1/4</b> [260]	<b>4</b> [100]								
13100280000	50		<b>11</b> [280]	<b>4</b> [100]								
13100300000	50		<b>11-7/8</b> [300]	<b>4</b> [100]								
13100320000	50		<b>12-5/8</b> [320]	<b>4-3/4</b> [120]								
13100340000	50		<b>13-3/8</b> [340]	<b>4-3/4</b> [120]								
13100360000	50		<b>14-1/4</b> [360]	<b>4-3/4</b> [120]								
13100380000	50		<b>15</b> [380]	<b>4-3/4</b> [120]								
13100400000	50		<b>15-3/4</b> [400]	<b>4-3/4</b> [120]								
13100440000	25		<b>17-1/4</b> [440]	<b>4-3/4</b> [120]								
13100480000	25		<b>19</b> [480]	<b>4-3/4</b> [120]								

Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	D <sub>a</sub>	D <sub>shd</sub>	L <sub>Head</sub>	L <sub>Shoulder</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
13120100000	50	<b>1/2</b> [12]	<b>4</b> [100]	<b>2-3/8</b> [60]	<b>0.669</b> [17]	<b>0.283</b> [7.2]	<b>0.323</b> [8.2]	<b>0.511</b> [13]	<b>0.472</b> [12]	<b>0.216</b> [5.5]	<b>0.126</b> [3.2]	<b>AW 40</b> or <b>11/16"</b> socket
13120120000	50		<b>4-3/4</b> [120]	<b>3-1/8</b> [80]								
13120140000	50		<b>5-1/2</b> [140]	<b>3-1/8</b> [80]								
13120160000	50		<b>6-1/4</b> <sup>[1]</sup> [160] <sup>[1]</sup>	<b>5-3/4</b> <sup>[1]</sup> [145] <sup>[1]</sup>								
13120180000	50		<b>7-1/8</b> [180]	<b>4</b> [100]								
13120200000	50		<b>7-7/8</b> [200]	<b>4</b> [100]								
13120220000	50		<b>8-5/8</b> [220]	<b>4-3/4</b> [120]								
13120240000	50		<b>9-1/2</b> [240]	<b>4-3/4</b> [120]								
13120260000	50		<b>10-1/4</b> [260]	<b>4-3/4</b> [120]								
13120280000	50		<b>11</b> [280]	<b>4-3/4</b> [120]								
13120300000	50		<b>11-7/8</b> [300]	<b>4-3/4</b> [120]								
13120320000	50		<b>12-5/8</b> [320]	<b>4-3/4</b> [120]								
13120340000	50		<b>13-3/8</b> [340]	<b>4-3/4</b> [120]								
13120360000	50		<b>14-1/4</b> [360]	<b>4-3/4</b> [120]								
13120380000	50		<b>15</b> [380]	<b>5-3/4</b> [145]								
13120400000	25		<b>15-3/4</b> [400]	<b>5-3/4</b> [145]								
13120440000	25		<b>17-1/4</b> [440]	<b>5-3/4</b> [145]								
13120480000	25		<b>19</b> [480]	<b>5-3/4</b> [145]								

<sup>[1]</sup> Fully threaded, design for lifting

# ASSY® VG CSK



The ASSY® VG Countersunk head (CSK) screw is the multipurpose fully threaded screw used in wood-to-wood, wood-to-steel and wood-to-concrete applications. All fully threaded screws are suitable for timber reinforcements. With the long threaded shank, high withdrawal capacities are achieved. Its self-tapping tip allows for more effective penetration and reduced spacing. Closer end- and edge-distances are possible, reducing the timber sizes required. The VG CSK screw is also suitable for use with the 90° cup and 45° wedge washer.

## Countersunk Head

Drill bit tip

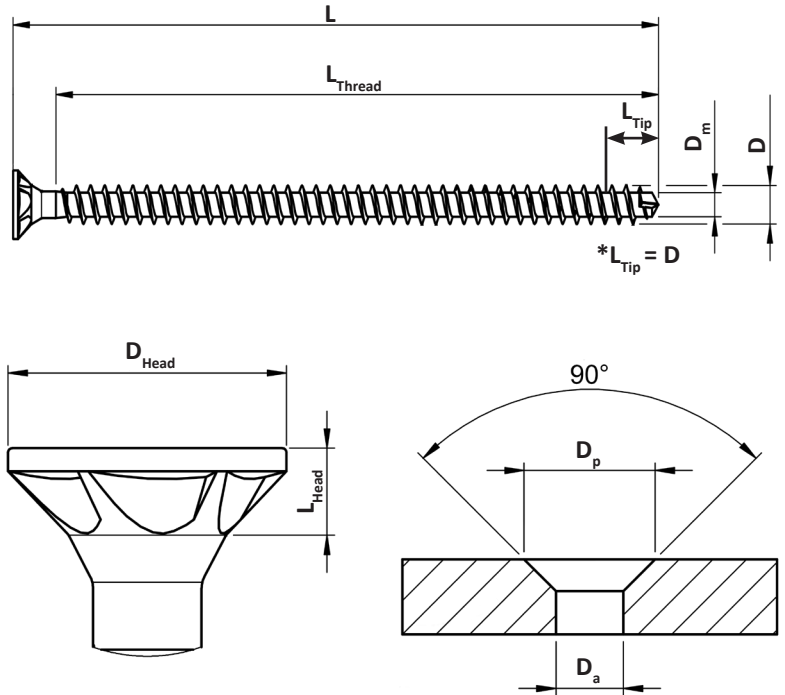
Self-tapping

Fully Threaded

Diameters: 5/16", 3/8", 1/2"

Wood/Wood, Wood/Steel,  
Wood/Concrete

Code Approved: ICC, CCMC  
& LARR



Item#	Box size	D	L	L <sub>Th</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>p</sub>	D <sub>a</sub>	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
14080080000	75	5/16 [ 8 ]	3-1/8 [80]	2-1/2 [61]	0.591 [15]	0.196 [5]	0.748 [19]	0.354 [9]	0.181 [4.6]	AW 40
14080120000	75		4-3/4 [120]	4 [103]						
14080140000	75		5-1/2 [140]	4-7/8 [123]						
14080160000	75		6-1/4 [160]	5-5/8 [143]						
14080180000	75		7-1/8 [180]	6-3/8 [163]						
14080200000	75		7-7/8 [200]	7-1/4 [183]						
14080220000	75		8-5/8 [220]	8 [203]						
14080240000	75		9-1/2 [240]	8-3/4 [223]						
14080260000	75		10-1/4 [260]	9-5/8 [243]						
14080280000	75		11 [280]	10-3/8 [263]						
14080300000	75		11-7/8 [300]	11-1/8 [283]						

Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>p</sub>	D <sub>a</sub>	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
14100100000	50	<b>3/8</b> [ 10 ]	<b>4</b> [100]	<b>3</b> [77]	<b>0.728</b> [18.5]	<b>0.244</b> [6.2]	<b>0.944</b> [24]	<b>0.433</b> [11]	<b>0.255</b> [6.5]	<b>AW 50</b>
14100140000	50		<b>5-1/2</b> [140]	<b>4-7/8</b> [125]						
14100160000	50		<b>6-1/4</b> [160]	<b>5-3/4</b> [145]						
14100180000	50		<b>7-1/8</b> [180]	<b>6-1/2</b> [165]						
14100200000	50		<b>7-7/8</b> [200]	<b>7-1/4</b> [185]						
14100220000	50		<b>8-5/8</b> [220]	<b>8-1/8</b> [205]						
14100240000	50		<b>9-1/2</b> [240]	<b>8-7/8</b> [225]						
14100260000	50		<b>10-1/4</b> [260]	<b>9-5/8</b> [245]						
14100280000	50		<b>11</b> [280]	<b>10-3/8</b> [265]						
14100300000	50		<b>11-7/8</b> [300]	<b>11-1/4</b> [285]						
14100320000	50		<b>12-5/8</b> [320]	<b>12</b> [305]						
14100340000	50		<b>13-3/8</b> [340]	<b>12-3/4</b> [325]						
14100360000	50		<b>14-1/4</b> [360]	<b>13-5/8</b> [345]						
14100380000	50		<b>15</b> [380]	<b>14-3/8</b> [365]						
14100400000	50		<b>15-3/4</b> [400]	<b>15-1/8</b> [385]						
14100430000	25		<b>16-7/8</b> [430]	<b>16-3/8</b> [415]						
14100480000	25		<b>19</b> [480]	<b>18-1/4</b> [465]						
14100530000	25		<b>20-7/8</b> [530]	<b>20-1/8</b> [512]						
14100580000	25		<b>22-7/8</b> [580]	<b>22-1/8</b> [562]						
14100650000	25		<b>25-5/8</b> [650]	<b>24-7/8</b> [632]						
14100700000	25		<b>27-5/8</b> [700]	<b>26-7/8</b> [682]						
14100750000	25		<b>29-1/2</b> [750]	<b>28-7/8</b> [732]						
14100800000	25		<b>31-1/2</b> [800]	<b>30-3/4</b> [782]						

Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>p</sub>	D <sub>a</sub>	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
14120120000	50	<b>1/2</b> [ 12 ]	<b>4-3/4</b> [120]	<b>4-1/8</b> [105]	<b>0.885</b> [22.5]	<b>0.280</b> [7.1]	<b>1.024</b> [26]	<b>0.512</b> [13]	<b>0.264</b> [6.7]	<b>AW 50</b>
14120140000	50		<b>5-1/2</b> [140]	<b>4-7/8</b> [125]						
14120160000	50		<b>6-1/4</b> [160]	<b>5-3/4</b> [145]						
14120180000	50		<b>7-1/8</b> [180]	<b>6-1/2</b> [165]						
14120200000	50		<b>7-7/8</b> [200]	<b>7-1/4</b> [185]						
14120220000	50		<b>8-5/8</b> [220]	<b>8-1/8</b> [205]						
14120240000	50		<b>9-1/2</b> [240]	<b>8-7/8</b> [225]						
14120260000	50		<b>10-1/4</b> [260]	<b>9-5/8</b> [245]						
14120280000	50		<b>11</b> [280]	<b>10-3/8</b> [265]						
14120300000	50		<b>11-7/8</b> [300]	<b>11-1/4</b> [285]						
14120380000	50		<b>15</b> [380]	<b>14-3/8</b> [365]						
14120480000	25		<b>19</b> [480]	<b>18-1/4</b> [465]						
14120600000	25		<b>23-5/8</b> [600]	<b>23</b> [585]						

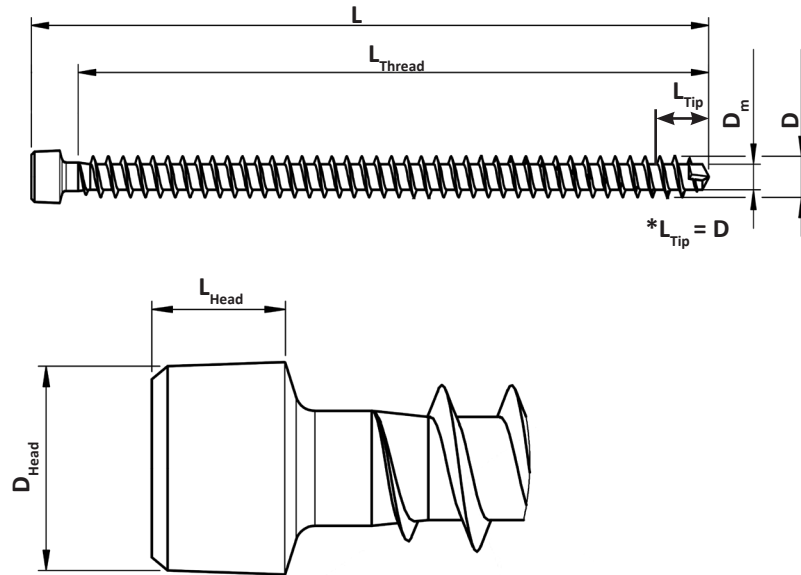
# ASSY® VG Cyl

The ASSY® VG Cylinder head (CYL) screw is engineered for timber reinforcements, beam repair and connections where a small screw head is required for a clean, concealed architectural finish. The head diameter is reduced to a minimum and can easily be concealed by a wooden plug if required. Typical reinforcing applications are in checked or cracked members, which can be restored to nearly their original strength through a fully threaded wood screw. Its self-tapping tip allows for more effective penetration, and reduced spacing and end- and edge-distances are possible.

Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
15060080000	100	1/4 [ 6 ]	3-1/8 [80]	2-7/8 [73]	0.323 [8.2]	0.150 [3.8]	0.185 [4.7]	AW 30
15060100000	100		4 [100]	3-5/8 [93]				
15060120000	100		4-3/4 [120]	4-1/2 [113]				
15060140000	100		5-1/2 [140]	5-1/4 [133]				
15060160000	100		6-1/4 [160]	6 [153]				
15060180000	100		7-1/8 [180]	6-3/4 [173]				
15060200000	100		7-7/8 [200]	7-5/8 [193]				

Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
15080120000	50	5/16 [ 8 ]	4-3/4 [120]	4 [104]	0.394 [10]	0.196 [5]	0.295 [7.5]	AW 40
15080140000	50		5-1/2 [140]	4-7/8 [124]				
15080160000	50		6-1/4 [160]	5-5/8 [144]				
15080180000	50		7-1/8 [180]	6-1/2 [164]				
15080200000	75		7-7/8 [200]	7-1/4 [184]				
15080220000	75		8-5/8 [220]	8 [204]				
15080240000	75		9-1/2 [240]	8-7/8 [224]				
15080260000	75		10-1/4 [260]	9-5/8 [244]				
15080280000	75		11 [280]	10-3/8 [264]				
15080300000	75		11-7/8 [300]	11-1/8 [284]				
15080330000	50		13 [330]	12-3/8 [314]				
15080360000	50		14-1/4 [360]	13-1/2 [344]				
15080380000	50		15 [380]	14-3/8 [364]				
15080430000	25		17 [430]	16-1/4 [414]				
15080480000	25		19 [480]	18-1/4 [464]				
15080530000	25		20-7/8 [530]	20-1/4 [514]				
15080580000	25		22-7/8 [580]	22-1/4 [564]				

# ASSY® VG Cyl



Cylinder Head

Self-tapping

Fully Threaded

Diameter: 1/4", 5/16", 3/8"

Wood/Wood, Wood/Concrete,  
Wood Reinforcement

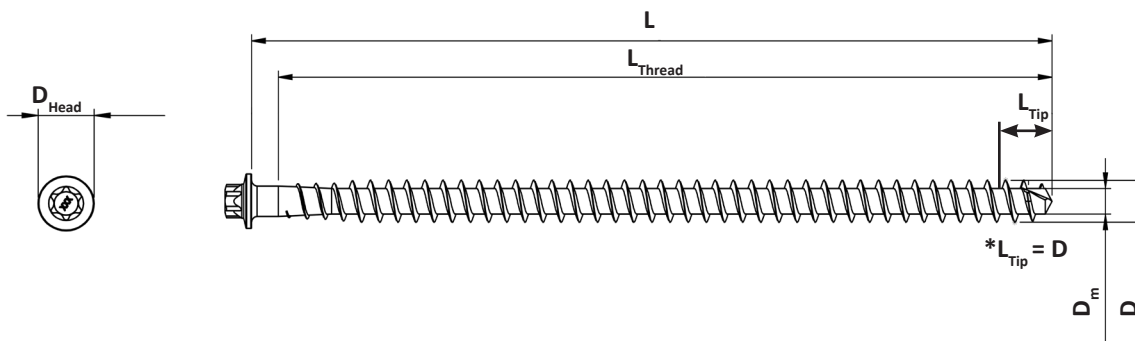
Code Approved: ICC, CCMC  
& LARR

Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	L <sub>Head</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
15100120000	50	3/8 [10]	4-3/4 [120]	4-1/8 [105]	0.528 [13.4]	0.244 [6.2]	0.314 [8]	AW 50
15100140000	50		5-1/2 [140]	4-7/8 [125]				
15100160000	50		6-1/4 [160]	5-3/4 [145]				
15100180000	50		7-1/8 [180]	6-1/2 [165]				
15100200000	50		7-7/8 [200]	7-1/4 [185]				
15100220000	50		8-5/8 [220]	8-1/8 [205]				
15100240000	50		9-1/2 [240]	8-7/8 [225]				
15100260000	50		10-1/4 [260]	9-5/8 [245]				
15100280000	50		11 [280]	10-3/8 [265]				
15100300000	50		11-7/8 [300]	11-1/4 [285]				
15100320000	50		12-5/8 [320]	12 [305]				
15100340000	50		13-3/8 [340]	12-3/4 [325]				
15100360000	50		14-1/4 [360]	13-5/8 [345]				
15100380000	50		15 [380]	14-3/8 [365]				
15100400000	50		15-3/4 [400]	15-1/8 [385]				
15100430000	25		17 [430]	16-3/8 [415]				
15100480000	25		19 [480]	18 [456]				
15100530000	25		20-7/8 [530]	19-7/8 [506]				
15100580000	25		22-7/8 [580]	21-7/8 [556]				
15100650000	25		25-5/8 [650]	24-5/8 [626]				
15100700000	25		27-5/8 [700]	26-5/8 [676]				
15100750000	25		29-1/2 [750]	28-5/8 [726]				
15100800000	25		31-1/2 [800]	30-1/2 [776]				



# ASSY® VG RH

The ASSY® VG RH (Reverse Head) is the longest fully threaded wood screw in the world. Similar to the VG CYL, its head is engineered to the smallest diameter possible, maintaining a clean look on large-scale reinforcing projects, wood-to-wood and steel-to-wood connections. The fastener is driven with a specialty socket drive that safely secures the bit to the screw head and avoids stripping bits.



Item#	Box size	D	L	L <sub>Thred</sub>	D <sub>Head</sub>	D <sub>m</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
35140800000	15	<b>9/16</b> [14]	<b>31-1/2</b> [800]	<b>30-3/4</b> [780]	<b>0.709</b> [18]	<b>0.335</b> [8.5]	Star drive socket
35140850000	15		<b>33-1/2</b> [850]	<b>32-5/8</b> [830]			
15140900000	15		<b>35-3/8</b> [900]	<b>34-5/8</b> [880]			
15140950000	15		<b>37-3/8</b> [950]	<b>36-5/8</b> [930]			
15141000000	15		<b>39-3/8</b> [1000]	<b>38-5/8</b> [980]			
35141050000	15		<b>41-3/8</b> [1050]	<b>40-1/2</b> [1030]			
15141100000	15		<b>43-1/4</b> [1100]	<b>42-1/2</b> [1080]			
35141200000	15		<b>47-1/4</b> [1200]	<b>46-1/2</b> [1180]			
35141300000	15		<b>51-1/8</b> [1300]	<b>50-3/8</b> [1280]			
15141400000	15		<b>55-1/8</b> [1400]	<b>54-3/8</b> [1380]			
15141500000	15		<b>59</b> [1500]	<b>58-1/4</b> [1480]			

## Did you know?

**VG** is short for “Vollgewinde”, a German word that means fully threaded. Or, if you dare, you can say “Selbstbohrende Vollgewindeschraube”, the translation for self-tapping fully threaded wood screw.

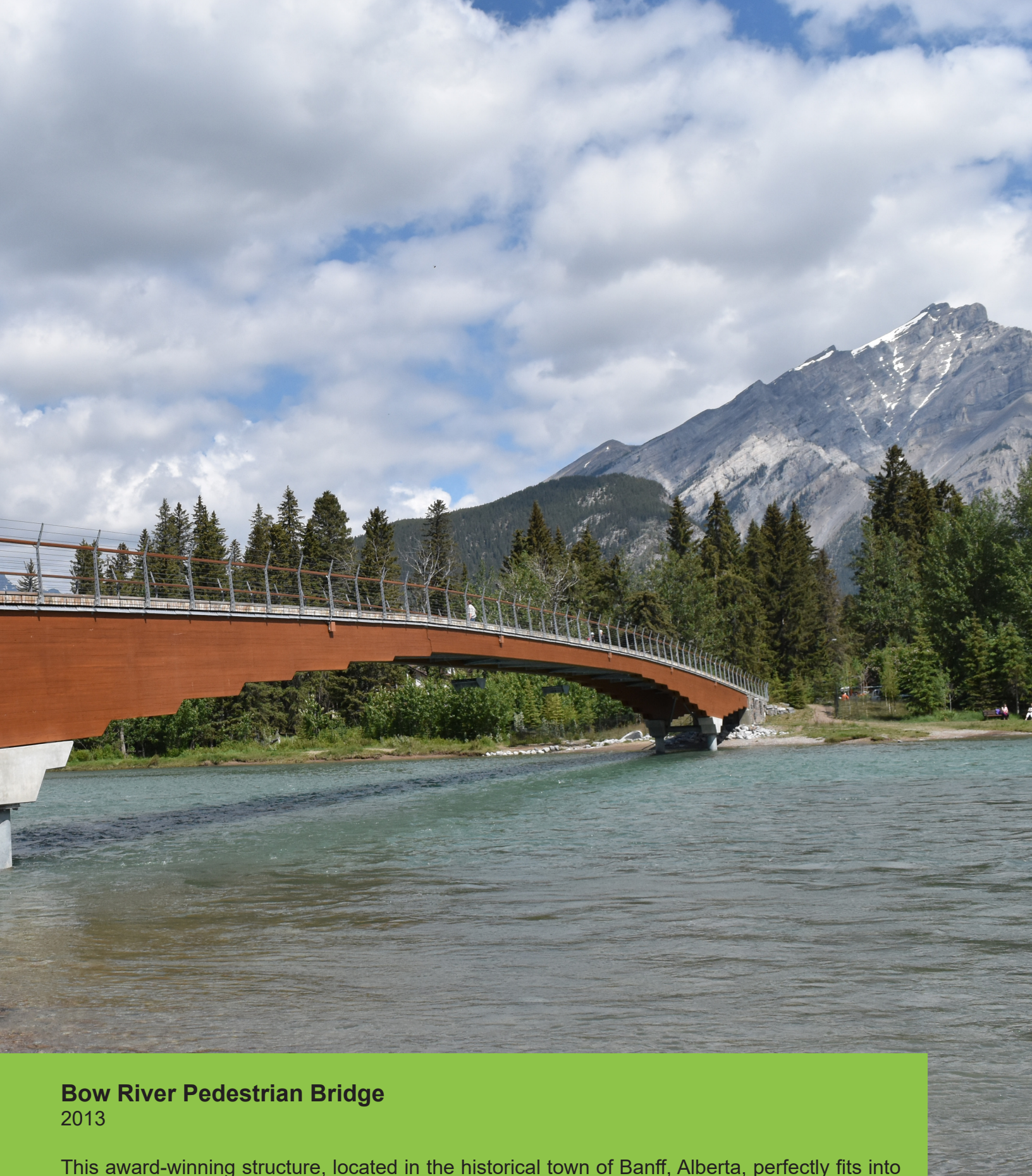


## **Harry Rowlinson Community Natatorium**

Renovated in 2013

The community center located in Plano, Texas, has a 25 yard indoor swimming pool facility, which had to go under renovation in 2013. The glulam roof structure was reinforced through a framing repair project, extending the lifespan of the structure.





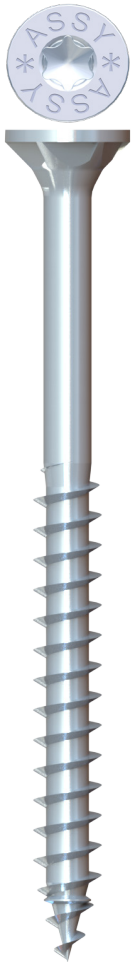
## **Bow River Pedestrian Bridge**

2013

This award-winning structure, located in the historical town of Banff, Alberta, perfectly fits into the postcard scenery of the nearby Rocky Mountains. The 370 ft (113m) structure achieves an incredible clear span of 262 ft (80m) over the magnificent Bow River using twinned sets of glulam girders which range in depth from 8.5 ft (2.6m) at the piers to 3 ft (0.9m) at centre span.

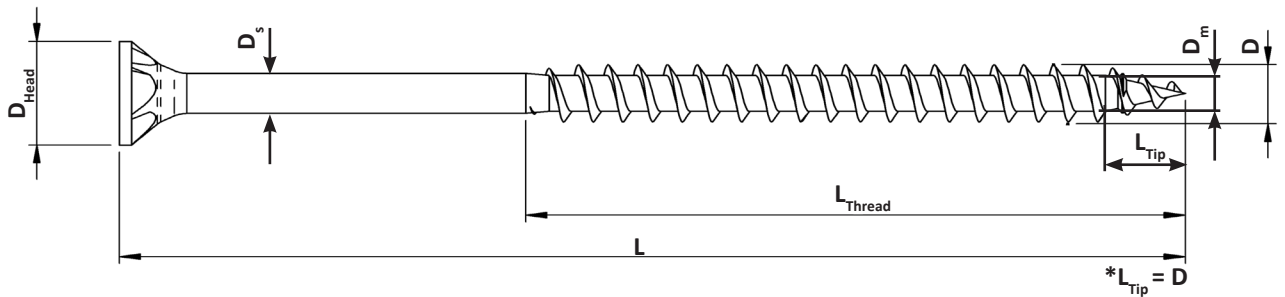


# ASSY A2® Ecofast



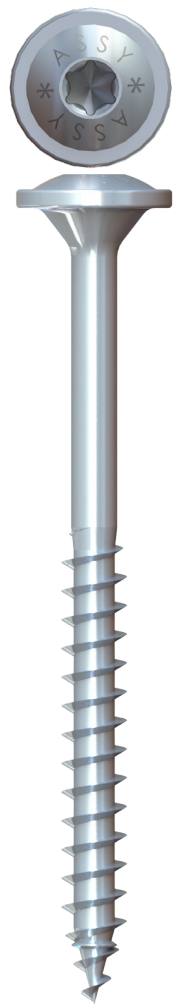
The ASSY A2® Stainless Steel Ecofast is a structural, corrosion-free, self-tapping screw. The ring-thread tip reduces wood splitting and promotes precise setting. The countersunk head with milling pockets is engineered for a clean, flush architectural finish.

Applications include outdoor fencing, rails, solar panels, cladding, fascia board, strapping and decking.



Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
21060060000	200	<b>1/4</b> [ 6 ]	<b>2-3/8</b> [60]	<b>1-1/2</b> [37]	<b>0.472</b> [12]	<b>0.157</b> [ 3.9 ]	<b>0.173</b> [4.4]	<b>AW 30</b>
21060080000	100		<b>3-1/8</b> [80]	<b>2</b> [50]				
21060100000	100		<b>4</b> [100]	<b>2-3/8</b> [60]				
21060120000	100		<b>4-3/4</b> [120]	<b>2-3/4</b> [70]				
21060140000	100		<b>5-1/2</b> [140]	<b>2-3/4</b> [70]				

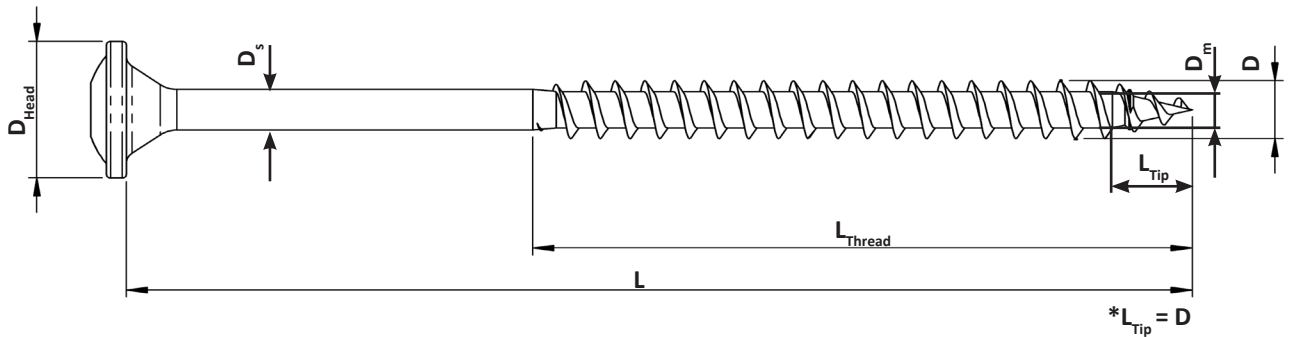
Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
21080080000	75	<b>5/16</b> [ 8 ]	<b>3-1/8</b> [80]	<b>2</b> [50]	<b>0.591</b> [15]	<b>0.197</b> [ 5 ]	<b>0.234</b> [5.95]	<b>AW 40</b>
21080100000	75		<b>4</b> [100]	<b>2-3/8</b> [60]				
21080120000	75		<b>4-3/4</b> [120]	<b>3-1/8</b> [80]				
21080140000	75		<b>5-1/2</b> [140]	<b>3-1/8</b> [80]				
21080160000	75		<b>6-1/4</b> [160]	<b>3-1/8</b> [80]				
21080180000	75		<b>7-1/8</b> [180]	<b>3-1/8</b> [80]				
21080200000	75		<b>7-7/8</b> [200]	<b>3-1/8</b> [80]				
21080220000	75		<b>8-5/8</b> [220]	<b>4</b> [100]				
21080240000	75		<b>9-1/2</b> [240]	<b>4</b> [100]				
21080260000	75		<b>10-1/4</b> [260]	<b>4</b> [100]				
21080280000	75		<b>11</b> [280]	<b>4</b> [100]				
21080300000	75		<b>11-7/8</b> [300]	<b>4</b> [100]				



# ASSY A2® SK

The ASSY A2® Stainless Steel SK is a structural, corrosion-free, self-tapping screw. The ring thread tip reduces wood splitting and promotes precise setting. The large washer head provides high pulling power and head pull-in resistance.

Applications include exposed timber frame structures, carpentry and boardwalks.

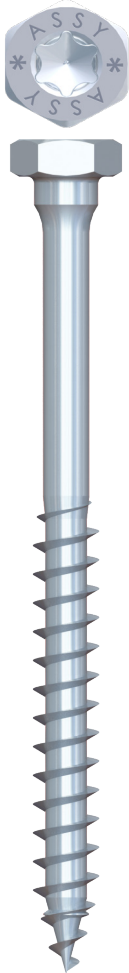


Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
22060080000	100	<b>1/4</b> [ 6 ]	<b>3-1/8</b> [80]	<b>2</b> [50]	<b>0.551</b> [14]	<b>0.157</b> [3.9]	<b>0.173</b> [4.4]	<b>AW 30</b>
22060090000	100		<b>3-1/2</b> [90]	<b>2</b> [50]				
22060100000	100		<b>4</b> [100]	<b>2-3/8</b> [60]				
22060120000	100		<b>4-3/4</b> [120]	<b>2-3/4</b> [70]				
22060140000	100		<b>5-1/2</b> [140]	<b>2-3/4</b> [70]				

Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
22080080000	50	<b>5/16</b> [ 8 ]	<b>3-1/8</b> [80]	<b>2</b> [50]	<b>0.744</b> [18.9]	<b>0.197</b> [5]	<b>0.234</b> [5.95]	<b>AW 40</b>
22080100000	50		<b>4</b> [100]	<b>2-3/8</b> [60]				
22080120000	50		<b>4-3/4</b> [120]	<b>3-1/8</b> [80]				
22080140000	50		<b>5-1/2</b> [140]	<b>3-1/8</b> [80]				
22080160000	50		<b>6-1/4</b> [160]	<b>3-1/8</b> [80]				
22080180000	50		<b>7-1/8</b> [180]	<b>3-1/8</b> [80]				
22080200000	50		<b>7-7/8</b> [200]	<b>3-1/8</b> [80]				
22080220000	50		<b>8-5/8</b> [220]	<b>3-1/8</b> [80]				
22080260000	50		<b>10-1/4</b> [260]	<b>4</b> [100]				
22080300000	50		<b>11-7/8</b> [300]	<b>4</b> [100]				
22080360000	50		<b>14-1/4</b> [360]	<b>4</b> [100]				

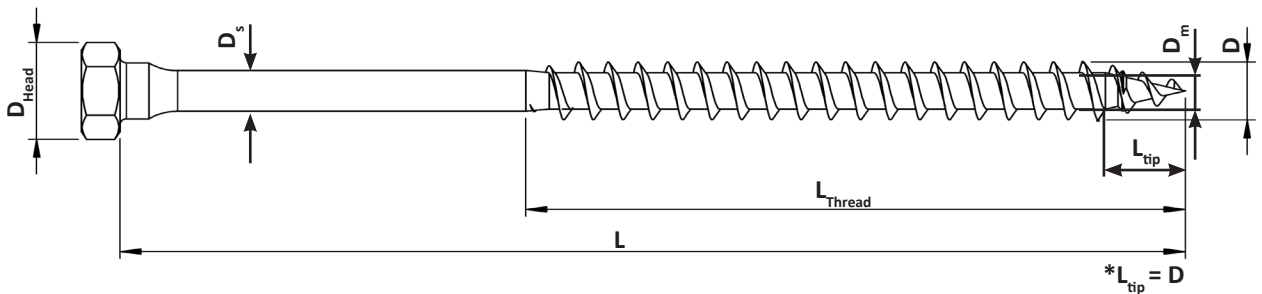


# ASSY A2® Kombi



The ASSY A2® Stainless Steel Kombi is a multipurpose structural, corrosion-free, self-tapping screw. Its head is engineered for installation by a socket or a bit.

Applications include exposed steel-to-wood connections, timber framing and log work.

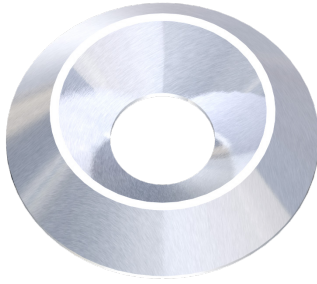


Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
23080080000	75	5/16 [8]	3-1/8 [80]	2 [50]	0.472 [12]	0.197 [5]	0.234 [5.95]	AW 40 or 1/2" socket
23080100000	75		4 [100]	2-3/8 [60]				
23080120000	75		4-3/4 [120]	3-1/8 [80]				
23080140000	75		5-1/2 [140]	3-1/8 [80]				
23080160000	75		6-1/4 [160]	3-1/8 [80]				
23080180000	75		7-1/8 [180]	3-1/8 [80]				
23080200000	75		7-7/8 [200]	3-1/8 [80]				

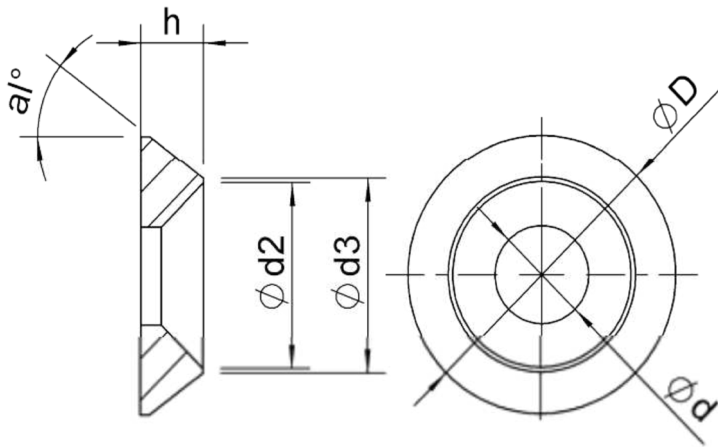
Item#	Box size	D	L	L <sub>Thread</sub>	D <sub>Head</sub>	D <sub>m</sub>	D <sub>s</sub>	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
23100100000	50	3/8 [10]	4 [100]	2 3/8 [60]	0.591 [15]	0.236 [6]	0.283 [7.2]	AW 40 or 19/32" socket
23100120000	50		4-3/4 [120]	3-1/8 [80]				
23100140000	50		5-1/2 [140]	3-1/8 [80]				
23100160000	50		6-1/4 [160]	3-1/8 [80]				
23100180000	50		7-1/8 [180]	3-1/8 [80]				
23100200000	50		7-7/8 [200]	3-1/8 [80]				

# WASHER

## 90° washer

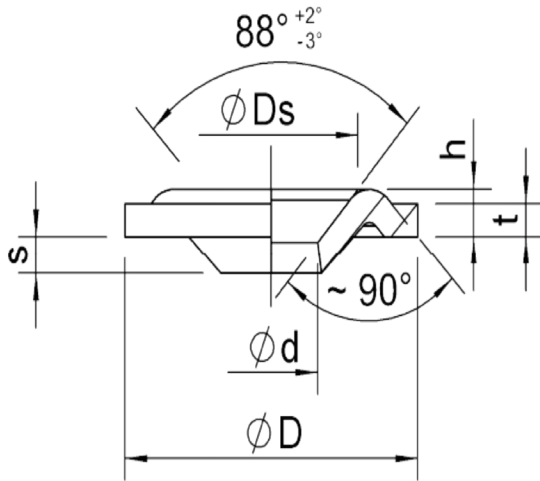


The 90° cup washer is a machined steel part suitable for use with all ASSY® countersunk head screw types. The washer provides proper bearing for the screw head in steel-to-wood connections without the need to ream out the steel plate to receive the countersunk head.



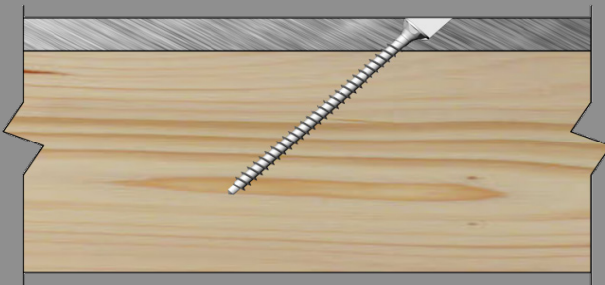
**Table W.1.1, 1/4", 5/16" and 3/8" Cup Washer**

Screw Diameter	Ø d	Ø D	h	al	Ø d2	Ø d3
in. [mm]	in. [mm]	in. [mm]	in. [mm]	degree	in. [mm]	in. [mm]
<b>1/4</b> [6]	<b>0.252</b> [6.4]	<b>0.866</b> [22]	<b>0.177</b> [4.5]	<b>[45°]</b>	<b>0.551</b> [14]	<b>0.591</b> [15]
<b>5/16</b> [8]	<b>0.331</b> [8.4]	<b>0.984</b> [25]	<b>0.197</b> [5]	<b>[41°]</b>	<b>0.669</b> [17]	<b>0.709</b> [18]
<b>3/8</b> [10]	<b>0.409</b> [10.4]	<b>1.181</b> [30]	<b>0.276</b> [7]	<b>[37°]</b>	<b>0.787</b> [20]	<b>0.827</b> [21]



**Table W.1.2, 1/2" Cup Washer**

Screw Diameter	Ø d	Ø D	h	t	Ø Ds	s
in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]
<b>1/2</b> [12]	<b>0.492</b> [12.5]	<b>1.654</b> [42]	<b>0.197</b> [5.0]	<b>0.157</b> [4.0]	<b>0.906</b> [23]	<b>0.118</b> [3.0]



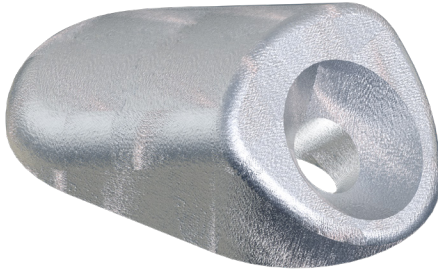
### Did you know?

With the 45° washer you can significantly reduce the cost of steel plate machining. The washer only requires a milled elliptical shape slotted hole rather than a 45° machined hole. This significantly reduces the minimum thickness requirements for the screw head housing.

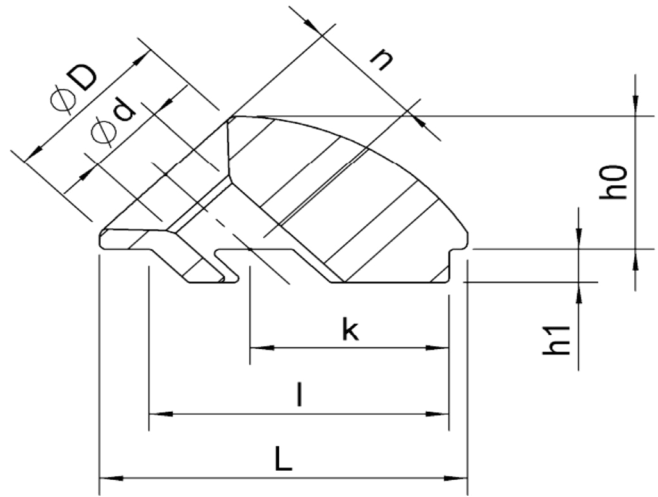
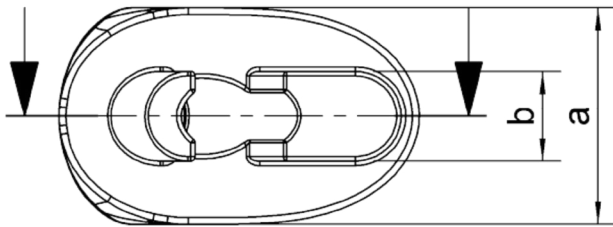


# WASHER

## 45° washer



The 45° cup washer is a cast-iron part suitable for use with all ASSY® Countersunk head screw types. Use of the washer eliminates the need for inclined predrilled countersunk holes in steel plates and thus offers cost reductions by using standard machined elliptical holes. The possibility of setting a wood screw with its washer at a 45° angle enables engineers and designers to achieve high-performance connection systems.

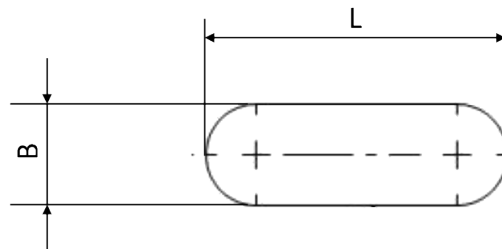


**Table W.2.1, 45° Washer**

Screw Diameter	$\phi d$	$\phi D$	L	a	h <sub>0</sub>	h <sub>1</sub>	b	l	k	n	Steel plate thickness	
											min.	max.
in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]
<b>5/16</b> [8]	<b>0.335</b> [8.5]	<b>0.748</b> [19]	<b>1.535</b> [39]	<b>0.945</b> [24]	<b>0.630</b> [16]	<b>0.142</b> [3.6]	<b>0.390</b> [9.9]	<b>1.248</b> [31.7]	<b>0.827</b> [21]	<b>0.500</b> [12.7]	<b>0.157</b> [4]	<b>0.591</b> [15]
<b>3/8</b> [10]	<b>0.421</b> [10.7]	<b>0.945</b> [24]	<b>2.047</b> [52]	<b>1.142</b> [29]	<b>0.843</b> [21.4]	<b>0.185</b> [4.7]	<b>0.425</b> [10.8]	<b>1.720</b> [43.7]	<b>1.130</b> [28.7]	<b>0.724</b> [18.4]	<b>0.197</b> [5]	<b>0.787</b> [20]
<b>1/2</b> [12]	<b>0.500</b> [12.7]	<b>1.024</b> [26]	<b>2.323</b> [59]	<b>1.181</b> [30]	<b>0.925</b> [23.5]	<b>0.220</b> [5.6]	<b>0.504</b> [12.8]	<b>1.957</b> [49.7]	<b>1.339</b> [34]	<b>0.780</b> [19.8]	<b>0.236</b> [6]	<b>0.984</b> [25]

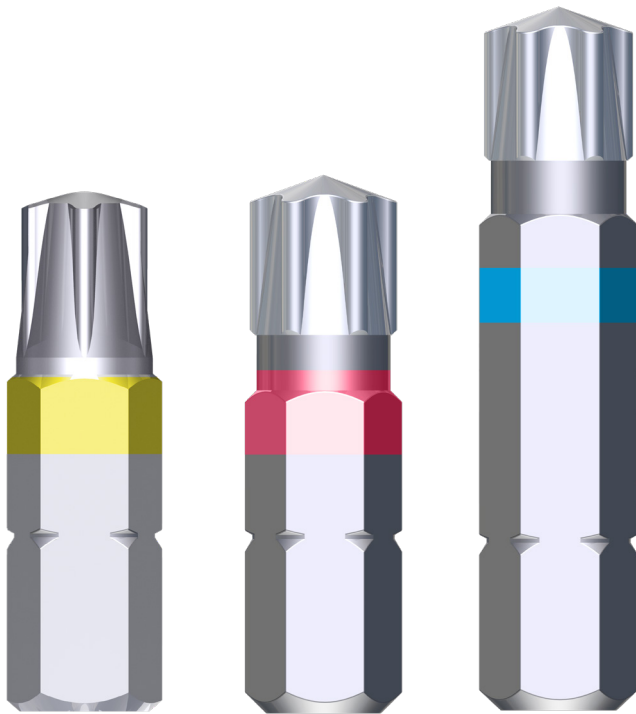
**Table W.2.2, 45° Washer Steel Plate Hole**

Screw Diameter	B		L	
	min	max	min	max
inch [mm]	inch [mm]			
<b>5/16"</b> [8]	<b>0.394</b> [10]	<b>0.433</b> [11]	<b>1.260</b> [32]	<b>1.299</b> [33]
<b>3/8"</b> [10]	<b>0.433</b> [11]	<b>0.472</b> [12]	<b>1.732</b> [44]	<b>1.772</b> [45]
<b>1/2"</b> [12]	<b>0.512</b> [13]	<b>0.551</b> [14]	<b>1.969</b> [50]	<b>2.008</b> [51]



**Note:** For coated steel plates the hole size needs to be oversized taking the thickness of the coating into account. Test fitting of wedge washers into steel plate holes is required to assure required tolerances are in place.

# AW<sup>®</sup> Drive Bits



AW<sup>®</sup> 30

AW<sup>®</sup> 40

AW<sup>®</sup> 50

The AW<sup>®</sup> Bits are engineered and patented for proper installation of all ASSY<sup>®</sup> screws and offer exceptional fit and durability. They are available in three standard sizes.

The AW<sup>®</sup> Bit series is engineered for:

- Optimum torque transfer
- Snug fit
- Self centering
- Reduced wobbling

Our bits are hardened to assure long life with low-rpm, high- torque drills.

## Drill recommendation

Use low rpm drill with high torque

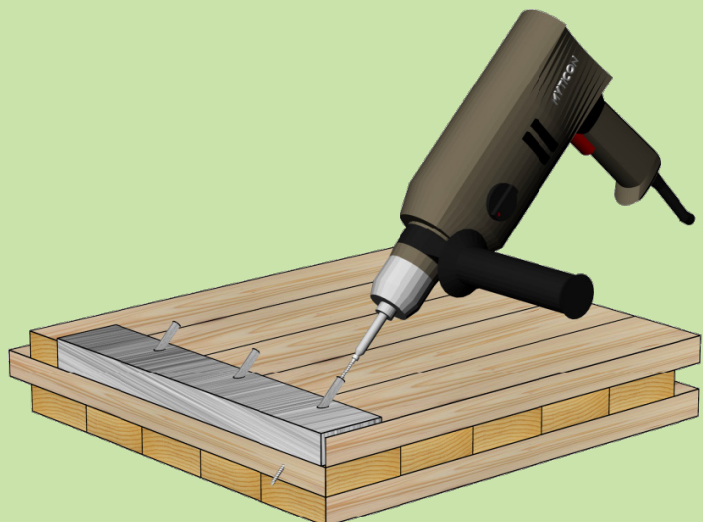
- ½" drill for 6mm and 8mm screws
- ¾" drill for 10mm and 12mm screws

Avoid use of impact drills, do not over-torque.

Use AW drive bits for all ASSY<sup>®</sup> screws.

## During installation

- Do not stop drill during installation. ASSY<sup>®</sup> screws shall be installed without stopping in one run
- Use safety gear as required.
- Use drill with torque clutch when installing screws in steel-to-wood connections.





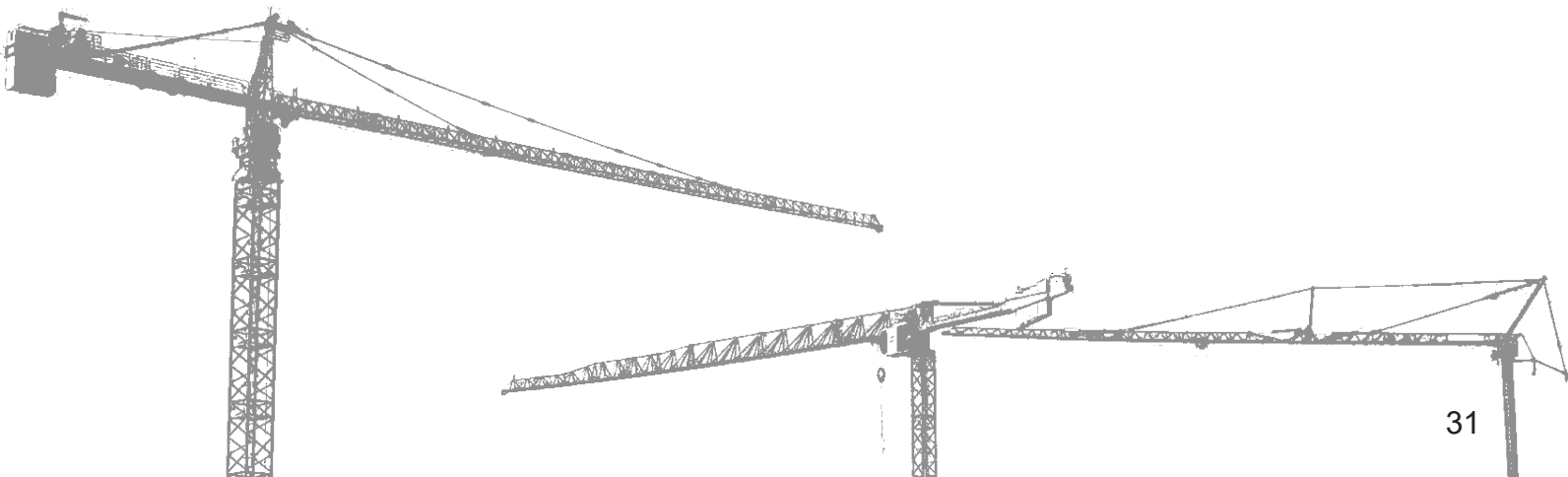
## YOKE 1T

The Yoke 1T is a system designed and tested for the material- handling needs of mass timber projects. All Yoke 1T anchors are screwed onto panel materials such as CLT using ½" Kombi screws. Through a variety of screw lengths available, light- and medium-weight CLT panels of up to 7,000lbf can be lifted into place quickly and efficiently.



## YOKE 5T

The Yoke 5T is a system designed and tested for the material- handling needs of mass timber projects. All Yoke 5T anchors are screwed onto panel materials such as CLT using ½" Kombi screws. Through a variety of screw lengths available, even the heaviest CLT panels of up to 20,000lbf can be lifted into place quickly and efficiently.







## CARBON 12

2017

Carbon 12 is a cutting edge mass timber structure located in Portland, Oregon, providing 2,700 sq ft of commercial retail space and 21,000 sq ft of residential area. All major beam-to-column connections utilize modern, pre-engineered, concealed connection systems that achieve high load carrying capacity with ease of installation, all while maintaining a clean appearance with the exposed mass timber elements.



# NOTES TO THE DESIGNER

1. Reference lateral design values (Z) are based on NDS 2015, 12.3; ICC-ESR 3178; ICC-ESR 3179; and boundary conditions outlined in ETA-11/0190 unless noted otherwise. SWG ASSY® screws may be used alone or with other timber connectors when approved by a qualified designer.
2. All suggestions and details shown are to be treated as general and can not be assumed to be valid for all construction requirements & specific site conditions.
3. For standard term loading, load duration factor  $C_D=1$ . For short term loading,  $C_D=1.6$  as per NDS 2015, 11.3.2. All reference lateral design values must be multiplied by all applicable adjustment factors for wood screws in accordance with the NDS.
4. Carbon steel SWG ASSY® screws are intended to be used in untreated wood under dry service conditions and temperatures below 100°F such that  $C_M=1.0$ ,  $C_T=1.0$ .
5. Some screw connection details shown may exceed the shear capacity of the wooden members and/or the rolling shear capacity of the Cross-Laminated Timber (CLT) or the shear capacity of the structural composite lumber (SCL) or other material properties. The specifying designer must verify the capacity of all members of the connection accordingly.
6. In all connections where perpendicular to grain splitting or longitudinal to grain shear failure may occur, reinforcement must be provided by at least two fully threaded SWG ASSY® screws. One reinforcing screw may be sufficient as long as the screw is embedded at least  $20 \cdot D$  on either side of the assumed crack location. A detailed design is required.
7. Listed reference lateral design values (Z) apply to different timber species according to their respective specific gravities (G). Resistances shown are derived on the assumption of permanently dry conditions throughout the service life of the structural element ( $C_M=1$ ). If the fastener is used in other than “dry” service condition resistance reduction factors as listed in respective design codes must be applied and additional fastener corrosion protection may be required.
8. If splitting of the wood or wood-based material is observed during installation or prior to installation of the fastener, a design professional must be contacted immediately and appropriate measures must be taken. In case of fastener damage or breakage, a design professional must also be notified.
9. Pre-drilling may be required in cases involving unusually dry wood, aged timbers, installation close to the edges of the wood members, or other special conditions. If pre-drilling is required, the hole diameter must not exceed the respective sizes specified for each fastener diameter in the instructions given in Table S.2.1.
10. A pilot hole may be used to facilitate the installation of long self-tapping screws for the sake of greater precision. A pilot hole may also be used when screws are installed near the edge of the wood member or in the end grain. Pilot holes of at least 3” (76mm) in depth shall be provided in such cases.
11. A load bearing connection shall consist of at least two (2) SWG ASSY® screws.
12. Minimum member thicknesses according to the nominal fastener diameter (D) are:
  - For lumber and timber member:

for screws with $D = 1/4"$ :	$t = 15/16"$
for screws with $D = 5/16"$ :	$t = 1-3/16"$
for screws with $D = 3/8"$ :	$t = 1-9/16"$
for screws with $D = 1/2"$ :	$t = 3-3/16"$
  - For Structural Wood Based members of  $ESG = 0.42$  such as Plywood or OSB:

for screws with $D = 1/4"$ :	$t = 1/2"$
for screws with $D = 5/16"$ :	$t = 3/4"$
  - For CLT, member thickness shall be at least  $10 \cdot D$

13. The dowel bearing strength ( $F_e$ ) of CLT (S-P-F,  $G=0.42$ ) without edge gluing and with a moisture content of  $\geq 19\%$  throughout the intended service life is calculated as follows:

- Bearing strength for screws with shank diameter  $D_s < 1/4"$ :  
 $F_e = 16,600 \cdot G^{1.84}$  [psi]
- Bearing strength for screws loaded parallel to the major span wood grain direction with shank diameter  $D_s \geq 1/4"$ :  
 $F_{e//} = 11,200 \cdot G$  [psi]
- Bearing strength for screws loaded perpendicular to the major wood grain direction with shank diameter  $D_s \geq 1/4"$ :  
 $F_{e\perp} = 6,100 \cdot G^{1.45} / \sqrt{D_s}$  [psi]
- Bearing strength for screws driven in the narrow side of the panel with shank diameter  $D_s < 1/4"$ :  
 $F_e = F_e$  [psi]
- Bearing strength for screws driven in the narrow side of the panel with shank diameter  $D_s \geq 1/4"$ :  
 $F_e = F_{e\perp}$  [psi]
- Bearing strength for screws in ASTM A36 steel side plate:  
 $F_e = 87,000$  [psi]

14. The minimum penetration depth for lateral connection design using conventional lumber is  $6 \cdot D$  (including the tip). For withdrawal connection design, minimum penetration depth is  $8 \cdot D$ . To ensure full connection capacities, fasteners should penetrate all panel plies to the largest extent possible.

15. Structural steel to be of grade ASTM A36 with  $F_u \geq 58,020$  psi

16. ASSY® carbon steel screws and ASSY A2® stainless steel screws have different allowable tensile strengths, shear strengths, and bending yield strengths ( $F_{yb}$ ). These different fastener strengths must be taken into account in the design, as they can influence lateral load carrying capacities ( $Z$ ) and withdrawal capacities ( $W$ ) of a fastener in a connection.

17. Adjusted lateral design value calculation ( $Z'$ ):

$$Z' = Z \cdot n_F \cdot n_R \cdot C'$$

$Z$	Reference lateral design value given in the provided design tables or calculated according to NDS 2015,
12.3.1.	
$n_F$	Number of effective fasteners in a row ( $n_F = n_{ef}$ ) <ul style="list-style-type: none"> <li>Axially loaded screws: <math>n_F = \max \{n^{0.9}; 0.9 \cdot n\}</math></li> <li>Laterally loaded screws: <math>n_F = n^{0.9}</math></li> <li>For screws as compression reinforcement or inclined screws as fasteners in mechanically jointed beams or columns or for the fixing of thermal insulation material, <math>n_F = n</math>.</li> </ul>
$n$	Number of screws acting together in a row.
$n_R$	Number of rows in a connection.
$C'$	The adjustment factors for the connection, composed of: $C_D; C_M; C_t; C_{\Delta}; C_{eg}; C_{di}; C_{tn}$ $C_g$ may be ignored when calculating with $n_F$

18. Adjusted withdrawal design value calculation ( $W'$ ):

$$W' = W_{90} \cdot R_{\alpha} \cdot l_{ef} \cdot n_F \cdot C'$$

$W_{90}$	Perpendicular to grain reference withdrawal design value given in the provided design tables.
$R_{\alpha}$	Angle to grain reduction factor for withdrawal, given in table RDV.1.2. <ul style="list-style-type: none"> <li>Angle to grain (<math>\alpha</math>) between <math>90^\circ</math> and <math>30^\circ</math>: Can be subjected to long term loading; <math>C_{eg} = 1.0</math></li> <li>Angle to grain (<math>\alpha</math>) between <math>30^\circ</math> and <math>15^\circ</math>: Can be subjected to short term loading only; <math>C_{eg} = 0.75</math></li> <li>Angle to grain (<math>\alpha</math>) between <math>15^\circ</math> and <math>0^\circ</math>: shall not be loaded</li> </ul>
$l_{ef}$	Effective length of embedment: $l_{ef} = L_{Thread} - L_{Tip}$
$n_F$	Number of effective fasteners ( $n_F = n_{ef}$ ) <ul style="list-style-type: none"> <li>Axially loaded screws: <math>n_F = \max \{n^{0.9}; 0.9 \cdot n\}</math></li> <li>For screws as compression reinforcement or inclined screws as fasteners in mechanically jointed beams or columns or for the fixing of thermal insulation material, <math>n_F = n</math>.</li> </ul>
$n$	Number of screws acting together in a connection.
$C'$	Adjustment factors for the connection: $C_D; C_M; C_t; C_{eg}; C_{tn}$

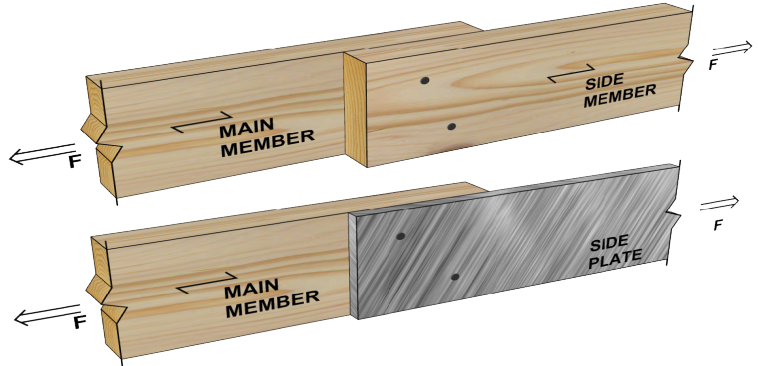
# Lateral Connection Design

Reference lateral strength resistances listed for Douglas Fir, Spruce-Pine-Fir, Western Cedar and Southern Pine refer to connections where main and side members are made from equivalent density species. Reference lateral strength resistances listed for plywood and Engineered Wood Product (EWP) refer to connections where the side member is made from plywood with  $G = 0.42$  or EWP with  $G = 0.5$  respectively and the main member is made from S-P-F with  $G = 0.42$ .

$$Z_{\parallel}$$

( $\theta = 0^\circ$ )

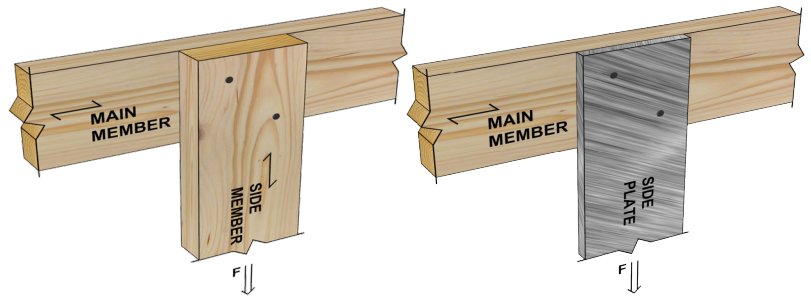
Lateral strength resistance  $Z_{\parallel}$ :  
Loading main member parallel and  
side member parallel to grain.



$$Z_{m\perp}$$

( $\theta = 90^\circ$ )

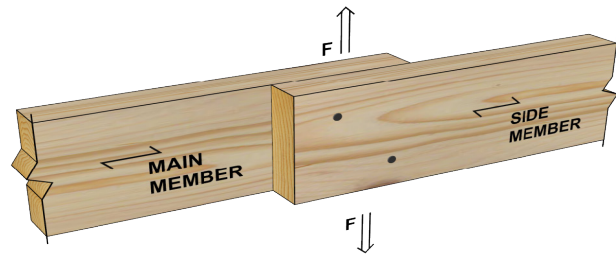
Lateral strength resistance  $Z_{m\perp}$ :  
Loading main member perpendicular  
and side member parallel to grain.



$$Z_{\perp}$$

( $\theta = 90^\circ$ )

Lateral strength resistance  $Z_{\perp}$ :  
Loading main member perpendicular  
and side member perpendicular to  
grain.



## Assigned Specific Gravities (G)



**Western Cedar**  
 $G = 0.35$



**S-P-F**  
 $G = 0.42$



**Douglas Fir**  
 $G = 0.49$



**PSL**  
 $G = 0.50$



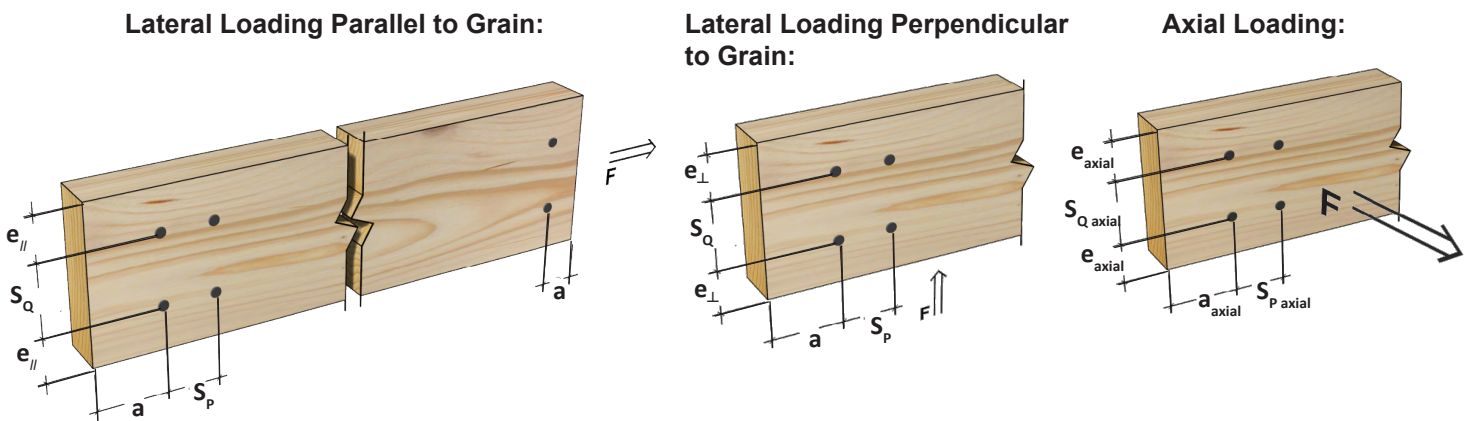
**Southern Pine**  
 $G = 0.55$

Note: As per NDS 2015, section 12; table 12.3.3A. All connection design must meet all the relevant requirements of the Notes to the Designer section.

# SPACING AND EDGE DISTANCE REQUIREMENTS

Fastener spacing and distance requirements ensure that stresses will be transmitted through the wood fiber to the fastener in a safe manner. Self-tapping screws displace wood fiber as the screw is driven into the member, while pre-drilling removes wood fiber. The spacing and edge distance requirements for self-tapping screws, therefore, are larger to prevent any splitting of the load-carrying wood member. If pre-drilling is implemented, the spacing and edge distance requirements as per NDS 2015 may be used instead.

## Timber Requirements for Non Pre-drilled Self-Tapping Fasteners



**Table S.1.1, Timber Connection Geometry Requirements without Pre-drilling**

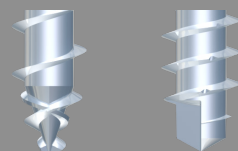
		End Distance		Edge Distance			Spacing Between Fasteners in a Row		Spacing Between Rows	
		$a$	$a_{axial}$	$e_{\parallel}$	$e_{\perp}$	$e_{axial}$	$s_P$	$s_{P axial}$	$s_Q$	$s_{Q axial}$
<b>Partial Thread</b>	$G \leq 0.42$	10 D	10 D	5 D	10 D	5 D	5 D	5 D	5 D	5 D
	$0.42 < G \leq 0.55$	15 D	15 D	7 D	12 D	7 D	7 D	7 D	7 D	7 D
	D-Fir	22.5 D	22.5 D	7 D	12 D	7 D	10.5 D	10.5 D	7 D	7 D
<b>Full Thread</b>	$G \leq 0.42$	7 D	5 D	3 D	7 D	3 D	7 D	5 D	5 D	2.5 D
	$0.42 < G \leq 0.55$	7 D	5 D	3 D	7 D	3 D	7 D	5 D	5 D	2.5 D
	D-Fir	10.5 D	7.5 D	3 D	7 D	3 D	10.5 D	7.5 D	5 D	2.5 D

Notes:

1. According to ICC-ESR-3178 and ICC-EDR-3179
2. Tabulated values listed above must prevent splitting in wood. Shall splitting be observed a design professional must be consulted immediately.
3. Within a row, fasteners may be staggered up to 2-D to further reduce the potential for splitting. "D" is the major diameter of the fastener.
4. All connection design must meet all the relevant requirements of the Notes to the Designer section.

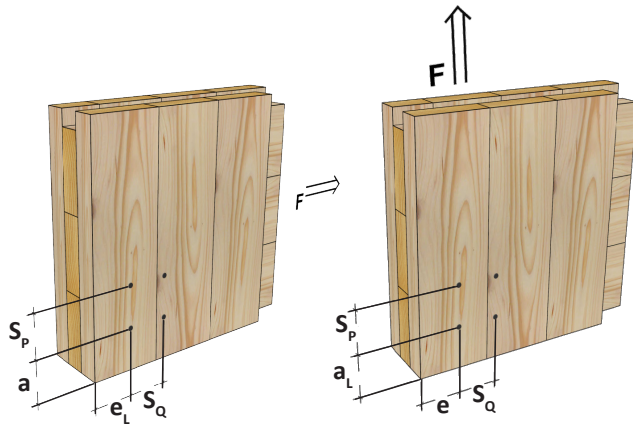
### Did you know?

All ASSY® screws are equipped with self-tapping tips that displace wood fiber as the screws are driven into place. The self-tapping feature of ASSY® screws eliminates the need for pre-drilling before installation.



# CLT Requirements for Non Pre-drilled Self-Tapping Fasteners

Fasteners in Plane Surface



Fasteners in Narrow Edge

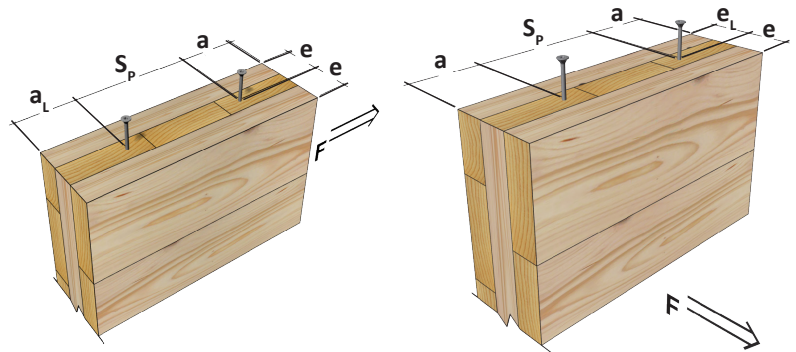


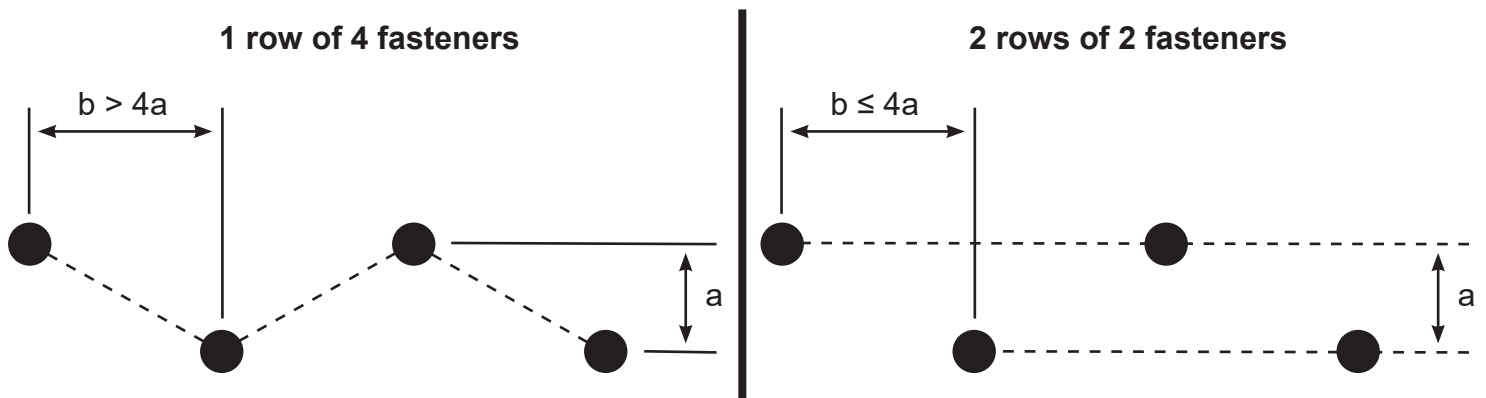
Table S.1.2, CLT Connection Geometry Requirements without Pre-drilling

CLT Plane	End Distance		Edge Distance		Spacing Between Fasteners in a Row	Spacing Between Rows
	$a_L$	$a$	$e_L$	$e$	$S_P$	$S_Q$
Fasteners in Plane Surface	6 D	6 D	6 D	2.5 D	4 D	2.5 D
Fasteners in Narrow Edge	12 D	7 D	6 D	3 D	10 D	4 D

Notes:

1. Spacing, end and edge distance requirements in the above tables were derived according to the methods described in the European Technical Approval ETA-11/0190 for self tapping wood screws.
2. The listed values are applicable when the CLT panel thickness is at least 10·D.
3. The minimum penetration depth of the screw into the narrow face of the panel is at least 10·D. "D" is the major diameter of the fastener.
4. All connection design must meet all the relevant requirements of the Notes to the Designer section.

## Group Action for Staggered Fasteners



Note: According to NDS 2015, clause 11.3.6.2



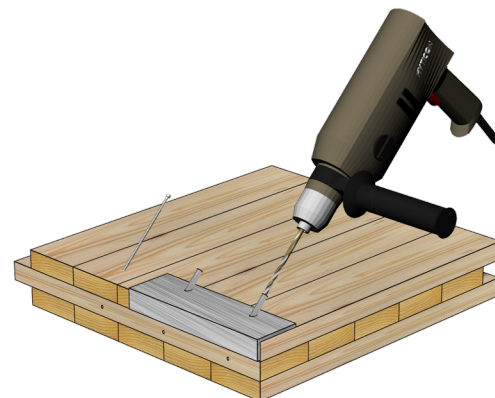
# Pre-drilling Recommendations

**Table S.2.1, Pre-drilling hole diameter**

Major Diameter (D)	Softwood	Hardwood	Steel Plate
in. [mm]	in. [mm]	in. [mm]	in. [mm]
<b>1/4</b> [6]	<b>5/32</b> [4]	<b>5/32</b> [4]	<b>9/32</b> [7]
<b>5/16</b> [8]	<b>3/16</b> [5]	<b>15/64</b> [6]	<b>23/64</b> [9]
<b>3/8</b> [10]	<b>15/64</b> [6]	<b>17/64</b> [7]	<b>7/16</b> [11]
<b>1/2</b> [12]	<b>17/64</b> [7]	<b>5/16</b> [8]	<b>33/64</b> [13]

Notes:

1. Consult a qualified design professional before pre-drilling.
2. Pre-drilled holes that exceed the diameters listed above may reduce the capacity of the screws.
3. Recommendations only applicable to SWG ASSY® screws.
4. Connection design must meet all the relevant requirements outlined in the Notes to the Designer section.



## Pilot Hole Recommendations

**Table S.2.2, ASSY® Pilot Hole Length Recommendation**

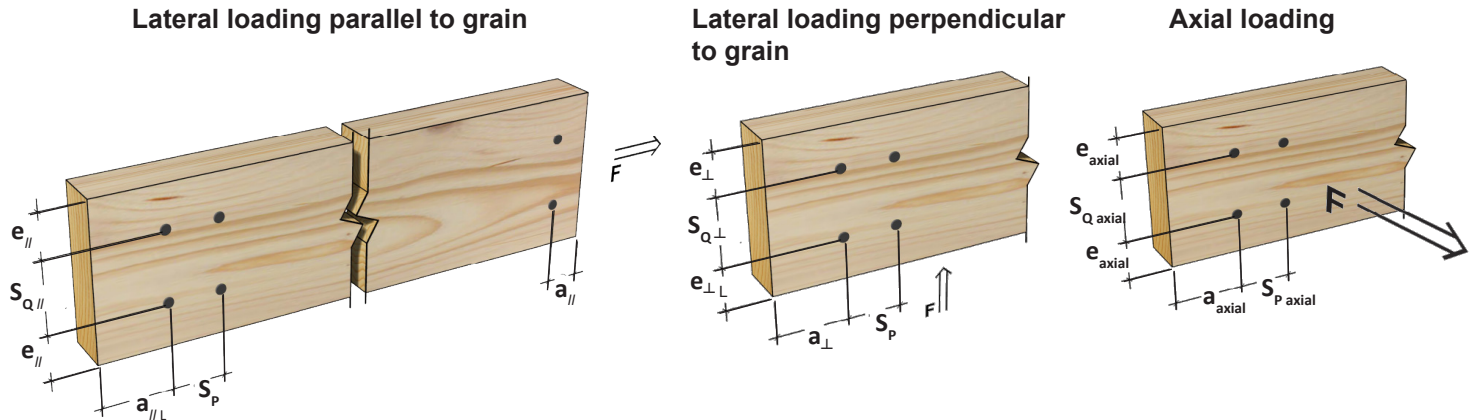
ASSY Pilot Hole Length Recommendation									
% of the fastener length									
Wood Fiber Type	Fastener Type	Fastener Major Diameter							
		1/4" [6 mm]	5/16" [8 mm]			3/8" [10 mm]			1/2" [12 mm]
		N/A	Fastener Length			Fastener Length			Fastener Length
			≥ 13-3/8" [≥ 340 mm]	≥ 19" [≥ 480 mm]	≥ 20-1/2" [≥ 520 mm]	≥ 13-3/8" [≥ 340 mm]	≥ 19" [≥ 480 mm]	≥ 20-1/2" [≥ 520 mm]	≥ 15" [≥ 380 mm]
Low density species	Partially Threaded	-	-	-	-	-	-	-	-
	Fully Threaded	-	-	-	-	-	-	-	-
High density species	Partially Threaded	-	-	-	-	-	-	-	-
	Fully Threaded	-	-	15%	15%	-	15%	15%	25%
Old growth and aged wood	Partially Threaded	-	-	-	-	-	-	-	20%
	Fully Threaded	-	20%	25%	25%	20%	25%	25%	30%
Engineered wood product	Partially Threaded	-	-	-	50%	-	-	50%	50%
	Fully Threaded	-	25%	25%	50%	30%	30%	50%	50%

Notes:

1. Consult a qualified design professional before pre-drilling or drilling a pilot hole.
2. Other pilot hole requirement may apply depending on site conditions.
3. An oversized pilot hole may reduce the capacity of screws.
4. Pilot holes recommendations only applicable to SWG ASSY fasteners.
5. All connection design must meet all the relevant requirements of the Notes to the Designer section.
6. Wood fiber type may be considered as:
  - Low density species: S-P-F, Western red cedar, northern species, etc.
  - High density species: Hem-Fir, Douglas Fir, Black Spruce, etc.
  - Engineered wood product: LVL, PSL, etc.
  - Old growth and aged wood: Old growth, wood in existing structures, etc.



# Timber Requirements with Pre-drilled Holes



**Table S.3.1, Timber Connection Geometry Requirements with a Pre-drilled Holes,  $C_{\Delta}=1.0$**

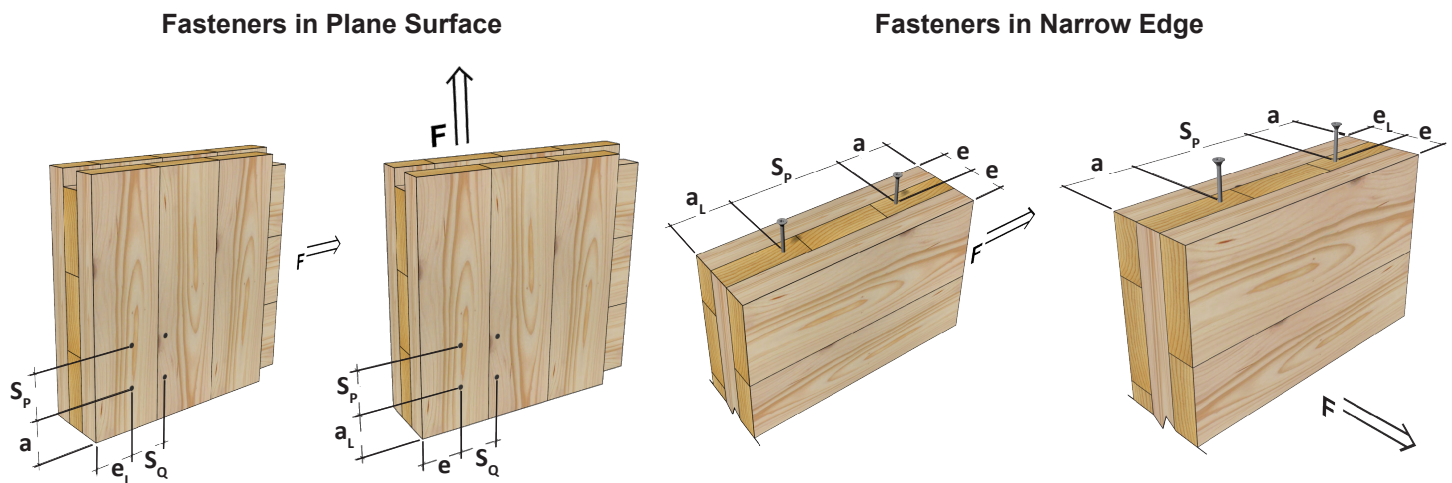
End Distance				Edge Distance				Spacing Between Fasteners in a Row		Spacing Between Rows		
$a_{//}$	$a_{//L}$	$a_{\perp}$	$a_{axial}$	$e_{//}$	$e_{\perp}$	$e_{\perp L}$	$e_{axial}$	$S_P$	$S_{Paxial}$	$S_{Q//}$	$S_{Q\perp}$	$S_{Qaxial}$
4 D	7 D*	4 D	4 D	3 D	4 D	4 D	3 D	4 D	4 D	3 D	5 D	4 D

Notes:

1. As per NDS 2015, section 12; table 12.5.1A, table 12.5.1B, table 12.5.1C, table 12.5.1D and table 12.5.1E.
2. Minimum fastener penetration 6·D.
3. Full penetration length must be pre-drilled with a hole diameter according to the pre-drilling recommendations.
4. All connection design must meet all the relevant requirements of the Notes to the Designer section.

\* for softwood only

# CLT Requirements with Pre-Drilled Holes



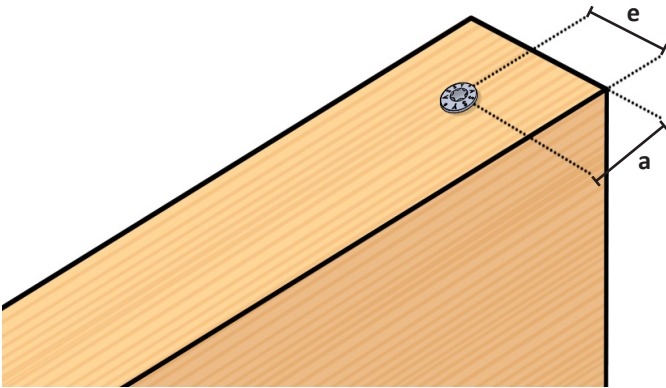
**Table S.3.2, CLT Connection Geometry Requirements with a Pre-drilled Holes,  $C_{\Delta}=1.0$**

CLT Plane	End Distance		Edge Distance		Spacing Between Fasteners in a Row	Spacing Between Rows
	$a_L$	$a$	$e_L$	$e$	$S_P$	$S_Q$
Fasteners in Plane Surface	7 D	4 D	4 D	3 D	4 D	4 D
Fasteners in Narrow Edge	7 D	4 D	3 D	3 D	4 D	4 D

Notes:

1. As per NDS 2015, table 12.5.1 G.
2. Geometry requirements in the plane surface of the CLT panel are derived from lumber requirements.
3. Full penetration length must be pre-drilled with a hole diameter according to the pre-drilling recommendations.
4. All connection design must meet all the relevant requirements of the Notes to the Designer section.

# Special Considerations for Spacing, End & Edge Distance Requirements

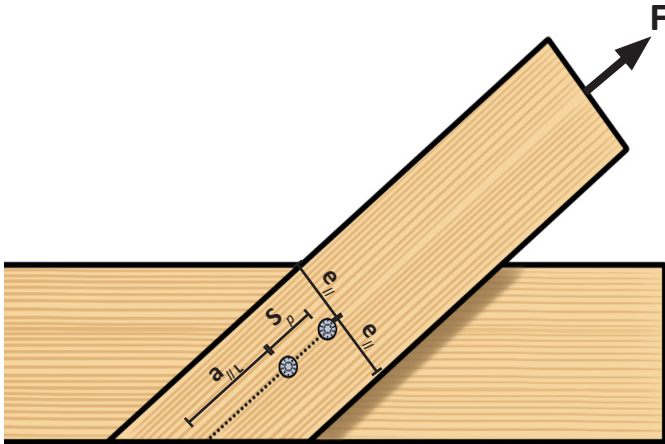
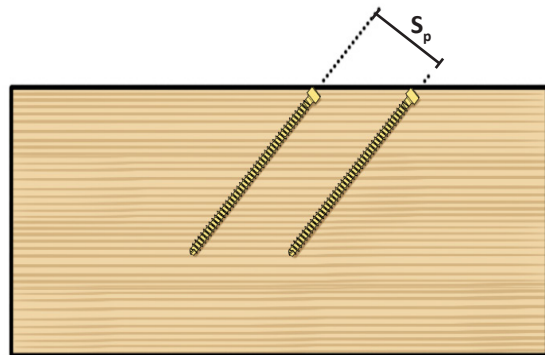


## Screws in narrow edge of lumber

For connections in the narrow edge of regular “2x” lumber, screw selection is often limited by edge distance requirements. Fasteners with  $D > 5/16"$  cannot be installed without pre-drilling.

## Spacing requirement for inclined screws

For fasteners installed at an angle, the distance prescribed by screw spacing requirements ( $S_p$ ) refers to the distance between fasteners as measured perpendicular to the fastener axes.

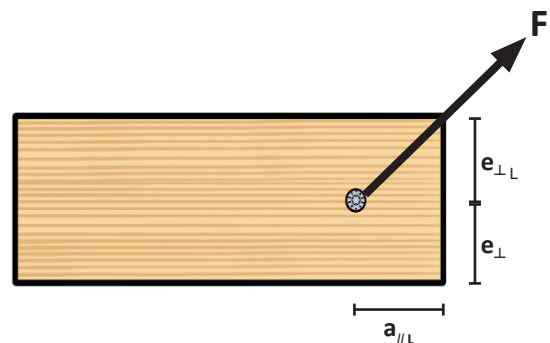


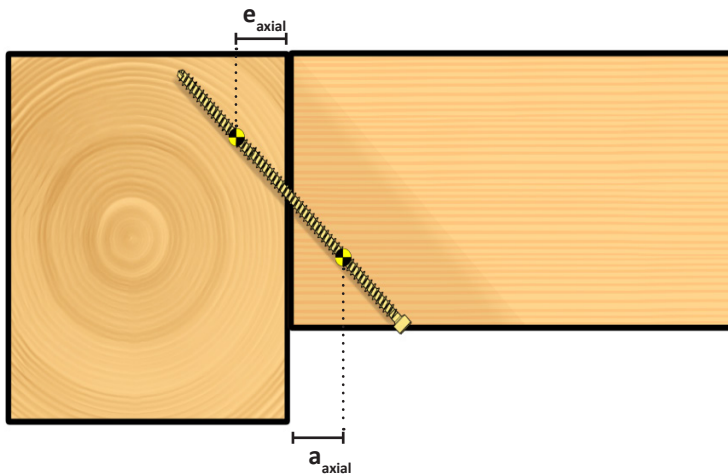
## Wood members at an angle

Where fasteners are installed in members with miter cuts, the corresponding end and edge distances are measured along the grain, and across the grain, respectively

## Forces at an angle

The direction of the fastener force must be considered when identifying loaded end and loaded edges.



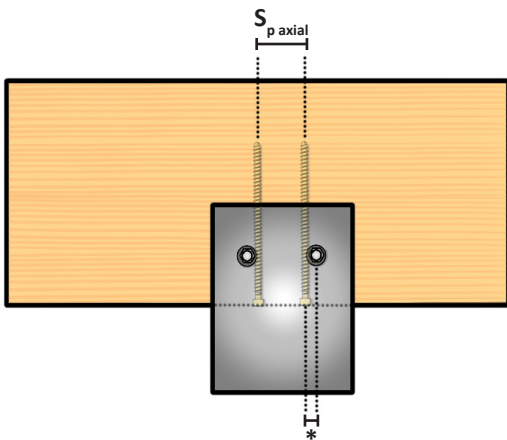
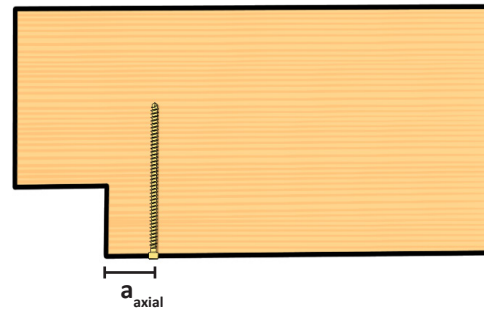


### End and edge distance requirements for inclined screws

For toe screw or inclined screw connections, the center of gravity of the portion of the screw in each member is used when applying end and edge distance requirements.

### End and edge distance requirements for reinforcing screws

Reinforcing screws should be placed as close to the expected force as possible. Minimum end and edge distances, however, still apply.

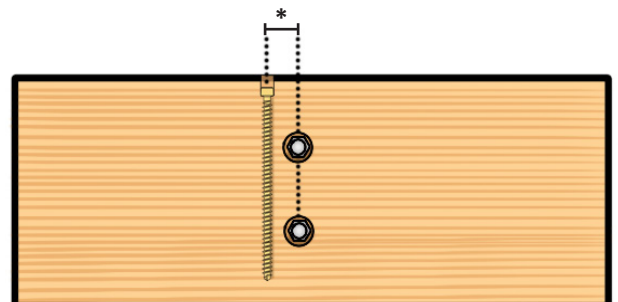


### Spacing requirements for screws reinforcing bolt connections loaded perpendicular to grain

No minimum distance is required between the reinforcing screws and the bolts, as long as the screw and bolt axes are oriented perpendicular to one another. The spacing between the screws follows the usual spacing requirements for axially loaded fasteners.

### Spacing requirements for screws reinforcing bolt connections loaded parallel to grain

No minimum distance is required between the reinforcing screws and the bolts, as long as the respective axes are oriented perpendicular to each other. Reinforcing screws must be placed on the same side of the bolt that bears against the wood member (as shown) to resist splitting along the grain.



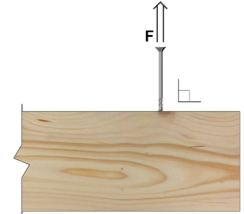
## ASSY® REFERENCE DESIGN VALUES

### ASSY® Withdrawal Design (W)

**Table RDV.1.1, ASSY® Reference Withdrawal Design Values with Angle to Grain of 90° ( $W_{90}$ )**

Major Diameter (D)	Reference Withdrawal Design Values with Angle to Grain of 90° ( $W_{90}$ ) lbs/in.				
	G = 0.35	G = 0.42	G = 0.49	PSL (G ≥ 0.50)	G = 0.55
1/4"	137	169	202	156	230
5/16"	176	212	248	179	279
3/8"	190	237	280	211	317
1/2"	211	254	297	223	334

Note: see notes under the table RDV.1.2.



**Table RDV.1.2, ASSY® Angle to Grain Reduction Factor for Withdrawal at an angle of  $\alpha^\circ$  ( $R_\alpha$ )**

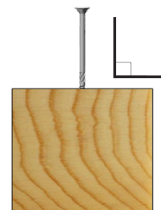
tens	ones									
	9°	8°	7°	6°	5°	4°	3°	2°	1°	0°
9°	N/A									1.000
8°	1.000	1.000	0.999	0.998	0.997	0.996	0.995	0.994	0.992	0.990
7°	0.988	0.986	0.983	0.981	0.978	0.975	0.972	0.969	0.966	0.962
6°	0.959	0.955	0.952	0.948	0.944	0.940	0.936	0.932	0.927	0.923
5°	0.919	0.914	0.910	0.906	0.901	0.897	0.892	0.888	0.883	0.879
4°	0.875	0.870	0.866	0.861	0.857	0.853	0.849	0.845	0.840	0.836
3°	0.832	0.829	0.825	0.821	0.817	0.814	0.810	0.807	0.803	0.800

- Notes:
1. Tabulated reference withdrawal design values ( $W_{90}$ ) apply to screws installed perpendicular to the grain of the wood member. For screws installed at an angle to the wood grain in the range between 90° and 30°,  $W_{90}$  shall be reduced by the appropriate angle to grain reduction factor ( $R_\alpha$ ) to obtain the applicable angle to grain withdrawal design value ( $W_\alpha$ ).
  2. Values must be multiplied by all applicable adjustment factors, as specified for dowel-type fasteners, in accordance with the NDS. Values apply to dry service conditions only.
  3. Values listed are to be multiplied by the effective thread length embedded in the wood member.
  4. A minimum thread penetration of 8-D (D = nominal screw diameter) must be applied.
  5. G refers to the specific gravity assigned to the wood species. ESG must be the equivalent specific gravity given in the ICC-ESR evaluation report of PSL.
  6. Connection design must meet all relevant requirements of the Notes to the Designer section.
  7. The allowable load for a single screw subject to tension shall not exceed the lesser of the adjusted withdrawal design value, the adjusted head pull-through design value, or the allowable tensile strength of the screw specified in Table RDV 3.1, as applicable to connection design.

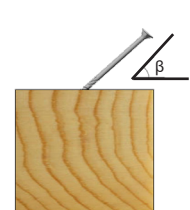
#### Fastener loaded in withdrawal: view from end grain

The angle  $\alpha$  represents the relative angle between the fastener axis and the grain orientation, **not** necessarily the lowest angle ( $\beta$ ) to the surface of the member.

Withdrawal angle to the grain is 90°



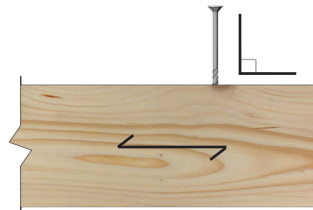
Withdrawal angle to the grain is 90°



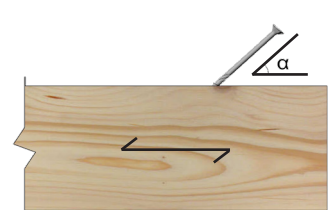
#### Fastener loaded in withdrawal: view from side grain

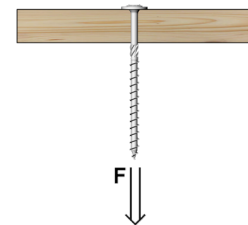
The angle  $\alpha$  can easily be identified by establishing the intersection of the line along the fastener axis with the line along the grain orientation.

Withdrawal angle to the grain is 90°



Withdrawal angle to the grain is  $\alpha^\circ$





## ASSY® Head Pull-Through Design (P)

**Table RDV.2.1, ASSY® Ecofast Reference Head Pull-Through Design Values (P)**



Major Diameter (D)	ASSY Ecofast Reference Head Pull-Through Design Values (P)				
	lbs.				
	G = 0.35	G = 0.42	G = 0.49	PSL (G ≥ 0.50)	G = 0.55
1/4"	133	163	194	262	221
5/16"	187	232	277	327	318
3/8"	246	319	385	509	445

Note: see notes under the table RDV.2.4.

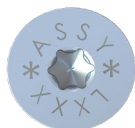
**Table RDV.2.2, ASSY® SK Reference Head Pull-Through Design Values (P)**



Major Diameter (D)	ASSY SK Reference Head Pull-Through Design Values (P)				
	lbs.				
	G = 0.35	G = 0.42	G = 0.49	PSL (G ≥ 0.50)	G = 0.55
1/4"	244	299	350	440	407
5/16"	410	510	604	732	685
3/8"	513	593	660	797	710
1/2"	517	627	738	939	834

Note: see notes under the table RDV.2.4.

**Table RDV.2.3, ASSY® F.W.H. Reference Head Pull-Through Design Values (P)**



Major Diameter (D)	ASSY F.W.H. Reference Head Pull-Through Design Values (P)	
	lbs.	
	G = 0.42	G = 0.49
5/16"	402	480

Note: see notes under the table RDV.2.4.

**Table RDV.2.4, ASSY® Kombi Reference Head Pull-Through Design Values (P)**



Major Diameter (D)	ASSY Kombi Reference Head Pull-Through Design Values (P)				
	lbs.				
	G = 0.35	G = 0.42	G = 0.49	PSL (G ≥ 0.50)	G = 0.55
5/16"	146	188	233	326	275
3/8"	225	278	327	420	369
1/2"	257	305	351	474	390

Notes:

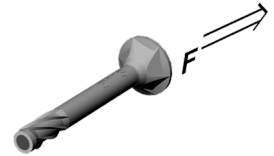
1. Tabulated reference head pull-through values (P) must be multiplied by all applicable adjustment factors as specified for dowel-type fasteners in the NDS. Design values apply to connections with minimum side member thickness ( $t_s$ ). Values apply to dry service conditions only.
2. G refers to the specific gravity assigned to the wood species. ESG must be the equivalent specific gravity given in the ICC-ES evaluation report of PSL.
3. The head pull-through resistance of SWG ASSY VG CSK screws and SWG ASSY VG CYL screws can also be determined based on the thread embedded in each individual member using the reference withdrawal design values.
4. Minimum side member thicknesses are given in the Notes to the Designer section under the point 12.
5. Connection design must meet all relevant requirements of the Notes to the Designer section.
6. The allowable load for a single screw subject to tension shall not exceed the lesser of the adjusted withdrawal design value, the adjusted head pull-through design value, or the allowable tensile strength of the screw specified in Table RDV 3.1, as applicable to connection design.

### Did you know?

Head pull-through resistance generally applies only to partially threaded screws. For fully threaded screws, the withdrawal resistance of the screw in the side member must be considered.



## ASSY® Allowable Fastener Tensile Strength

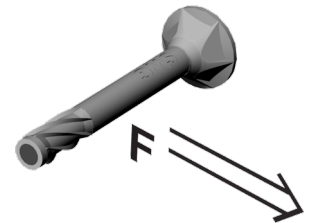


**Table RDV.3.1, ASSY® Allowable Tensile Strength**

Major Diameter (D)	ASSY Partial Thread lbs.	ASSY Full Thread (VG) lbs.
1/4"	1,150	1,165
5/16"	1,950	1,775
3/8"	2,780	2,550
1/2"	3,070	3,470

Note: Connection design must meet all the relevant requirements outlined in the Notes to the Designer section.

## ASSY® Allowable Fastener Shear Strength



**Table RDV.3.2, ASSY® Allowable Shear Strength**

Major Diameter (D)	ASSY Partial Thread		ASSY Full Thread (VG)	
	Shear lbs.	Specified Bending Yield Strength $F_{yb}$ psi	Shear lbs.	Specified Bending Yield Strength $F_{yb}$ psi
1/4"	685	169,500	590	129,200
5/16"	1,320	150,200	1,105	132,500
3/8"	1,725	136,600	1,835	136,600
1/2"	2,095	166,300	2,095	166,300

Note: Connection design must meet all the relevant requirements outlined in the Notes to the Designer section.

## ASSY® Adjusted Fastener Torsional Strength

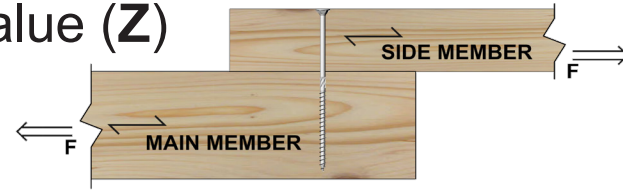
**Table RDV.3.3, ASSY® Adjusted Torsional Strength**

Screw Type	Adjusted Torsional Strength lbs·ft				
	Diameter				
	1/4"	5/16"	3/8"	1/2"	9/16"
Partially Threaded	5.90	13.57	26.55	38.50	N/A
Fully Threaded	5.90	13.57	26.55	44.25	67.85

Note: All connection design must meet all the relevant requirements of the Notes to the Designer section.



## ASSY® Reference Lateral Design Value (Z)



**Table RDV.4.1, Reference Lateral Design Values (Z) for Partially Threaded Fasteners with Wood Side Member**

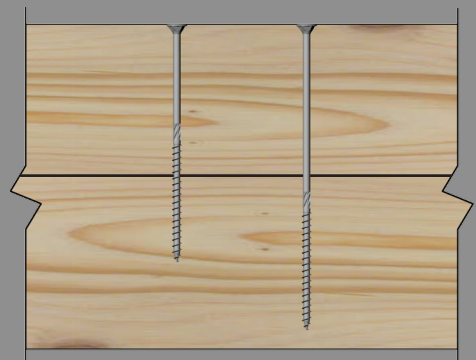
Fastener in.	Side Member Thickness in.	Minimum Fastener Penetration into Main Member in.	Reference Lateral Design Values (Z) for Specific Gravities (G) of:											
			lbs.											
			G = 0.33			G = 0.42			G = 0.49			G = 0.55		
			Z <sub>  </sub>	Z <sub>m⊥</sub>	Z <sub>⊥</sub>	Z <sub>  </sub>	Z <sub>m⊥</sub>	Z <sub>⊥</sub>	Z <sub>  </sub>	Z <sub>m⊥</sub>	Z <sub>⊥</sub>	Z <sub>  </sub>	Z <sub>m⊥</sub>	Z <sub>⊥</sub>
1/4 x 4	2	1-3/4	131	131	131	185	185	185	213	213	213	237	237	237
1/4 x 4-3/4	2	2-1/2	142	142	142	185	185	185	213	213	213	237	237	237
1/4 x 5-1/2	2-3/4	2-1/2	148	148	148	185	185	185	213	213	213	237	237	237
5/16 x 4-3/4	2	2-7/16	164	131	131	234	187	187	280	224	224	311	249	249
5/16 x 5-1/2	2-3/4	2-7/16	185	148	148	243	194	194	280	224	224	311	249	249
5/16 x 6-1/4	2-3/4	3-3/16	194	156	156	243	194	194	280	224	224	311	249	249
3/8 x 5-1/2	2-3/4	2-3/8	310	193	154	366	248	219	396	292	273	419	314	297
3/8 x 6-1/4	2-3/4	3-1/8	325	225	179	366	265	244	396	292	273	419	314	297
3/8 x 6-1/4	3-1/2	2-3/8	323	193	178	366	248	233	396	292	273	419	314	297
3/8 x 7-1/8	3-1/2	3-1/4	325	227	202	366	265	244	396	292	273	419	314	297
3/8 x 7-1/8	4	2-3/4	325	208	193	366	265	244	396	292	273	419	314	297
3/8 x 7-7/8	4	3-1/2	325	227	205	366	265	244	396	292	273	419	314	297
3/8 x 8-5/8	5-1/2	2-3/4	325	208	193	366	265	244	396	292	273	419	314	297
3/8 x 9-1/2	5-1/2	3-5/8	325	227	205	366	265	244	396	292	273	419	314	297
1/2 x 7-1/8	3-1/2	3-1/8	456	273	212	526	351	301	569	412	377	602	443	412
1/2 x 7-7/8	3-1/2	3-7/8	467	306	236	526	374	335	569	412	379	602	443	412
1/2 x 7-7/8	4	3-3/8	467	283	237	526	368	337	569	412	379	602	443	412
1/2 x 9-1/2	5-1/2	3-1/2	467	289	265	526	374	339	569	412	379	602	443	412
1/2 x 10-1/4	5-1/2	4-1/4	467	320	285	526	374	339	569	412	379	602	443	412

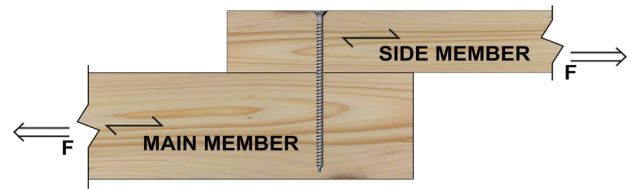
Note: see notes under the table RDV.4.2.

### Did you know?

Shear connections are commonly designed using partially threaded fasteners, as they allow the side member to be pulled tightly against the main member.

It is generally advisable to select the proper fastener size so that the threaded portion of the fastener is fully embedded into the main member, with the smooth shank portion intersecting the shear plane.





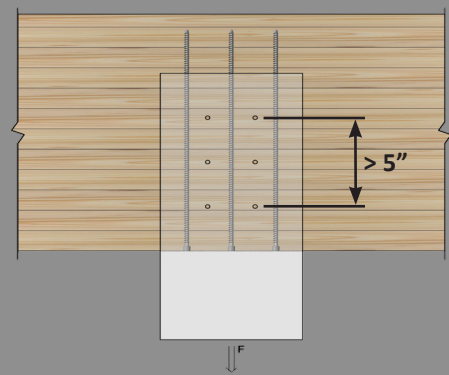
**Table RDV.4.2, Reference Lateral Design Values (Z) for Fully Threaded Fasteners with Wood Side Member**

Fastener  in.	Side Member Thickness  in.	Minimum Fastener Penetration into Main Member  in.	Reference Lateral Design Values (Z) for Specific Gravities of:											
			lbs.											
			G = 0.33			G = 0.42			G = 0.49			G = 0.55		
			Z <sub>  </sub>	Z <sub>m⊥</sub>	Z <sub>⊥</sub>	Z <sub>  </sub>	Z <sub>m⊥</sub>	Z <sub>⊥</sub>	Z <sub>  </sub>	Z <sub>m⊥</sub>	Z <sub>⊥</sub>	Z <sub>  </sub>	Z <sub>m⊥</sub>	Z <sub>⊥</sub>
1/4 x 4	2	1-3/4	99	99	99	123	123	123	142	142	142	158	158	158
5/16 x 4-3/4	2	2-7/16	146	117	117	190	152	152	219	175	175	244	195	195
5/16 x 5-1/2	2-3/4	2-7/16	152	122	122	190	152	152	219	175	175	244	195	192
3/8 x 5-1/2	2-3/4	2-3/8	186	149	149	251	201	201	289	231	231	321	257	257
3/8 x 6-1/4	2-3/4	3-1/8	201	161	161	251	201	201	289	231	231	321	257	257
1/2 x 7-1/8	3-1/2	3-1/8	351	231	198	396	287	264	427	316	295	453	340	321
1/2 x 7-7/8	3-1/2	3-7/8	351	246	220	396	287	264	427	316	295	453	340	321
1/2 x 7-7/8	4	3-3/8	351	242	221	396	287	264	427	316	295	453	340	321
1/2 x 9-1/2	5-1/2	3-1/2	351	246	222	396	287	264	427	316	295	453	340	321

- Note:
- Values are only applicable for ASSY® fasteners (not applicable to stainless steel ASSY A2®).
  - Fiber orientation ( $Z_{||}$ ,  $Z_{m\perp}$  and  $Z_{\perp}$ ) of the main member versus the side member according to the Lateral Design Considerations.
  - All values listed in table above shall be multiplied by all applicable adjustment factors as specified for dowel-type fasteners in accordance with the NDS. Fasteners are only to be used in dry service condition where the wood moisture content does not exceed 19% during the service life of the structure.
  - The fastener lengths shown per lateral capacity are a minimum. Tabulated values may be applied to longer fasteners with greater penetration into the main member.
  - Minimum side member thicknesses are provided in the Notes to the Designer section under the point 12. Pre-drilling may be required to reduce splitting.
  - Reference lateral design values listed for  $G = 0.33$ ,  $0.42$ ,  $0.49$  and  $0.55$  refer to connections where main and side members are made from equivalent density species.
  - $G$  is equal to the assigned specific gravity used for design purpose in lumber per NDS. ESG must be the equivalent specific gravity given in the ICC-ESR evaluation report of PSL.
  - For connections with steel side plate(s), ASTM A36 steel is used as side member and pre-drilling of the side plate is required.
  - All connection design must meet all the relevant requirements of the Notes to the Designer section.

## Did you know?

You can reinforce a connection where the perpendicular to grain distance between the outermost fasteners exceeds 5". A fully threaded ASSY VG screw may reduce splitting through moisture changes in the member. This is considered as special detailing to accommodate gross-grain shrinkage as per clause 12.5.1.3 NDS 2015



**Table RDV.4.3, Reference Lateral Design Values (Z) for Partially Threaded Fasteners with Steel Side Member**

Fastener  in.	Steel Side Plate Thickness  in.	Minimum Fastener Penetration into Main Member  in.	Reference Lateral Design Values (Z) for Specific Gravities (G) of:					
			lbs.					
			G = 0.33		G = 0.42		G = 0.49	
			Z <sub>  </sub>	Z <sub>⊥</sub>	Z <sub>  </sub>	Z <sub>⊥</sub>	Z <sub>  </sub>	Z <sub>⊥</sub>
1/4 x 2-3/8	5/32	2	158	158	215	215	244	244
1/4 x 2-3/8	1/4	1-7/8	175	175	247	247	294	294
1/4 x 2-3/4	5/16	2-3/16	191	191	257	257	294	294
1/4 x 2-3/4	3/8	2-1/8	188	188	257	257	294	294
1/4 x 2-3/4	1/2	2	181	181	257	257	294	294
5/16 x 3-1/8	5/32	2-11/16	210	168	265	212	301	241
5/16 x 3-1/8	1/4	2-9/16	231	185	312	249	353	282
5/16 x 3-1/8	5/16	2-1/2	239	191	337	269	386	309
5/16 x 3-1/8	3/8	2-7/16	236	189	334	267	386	309
5/16 x 3-1/8	1/2	2-5/16	229	184	323	259	386	309
3/8 x 4	5/32	3-1/2	341	215	380	257	407	285
3/8 x 4	1/4	3-3/8	386	225	430	292	459	323
3/8 x 4	5/16	3-5/16	425	237	472	315	504	355
3/8 x 4	3/8	3-1/4	450	254	505	329	543	377
3/8 x 4	1/2	3-1/8	450	264	505	339	543	377
1/2 x 4	5/32	3-3/8	465	224	530	310	569	384
1/2 x 4	1/4	3-1/4	471	236	575	318	615	387
1/2 x 4-3/4	5/16	3-15/16	554	288	616	388	658	449
1/2 x 4-3/4	3/8	3-7/8	587	304	664	401	709	483
1/2 x 4-3/4	1/2	3-3/4	631	346	725	439	780	517

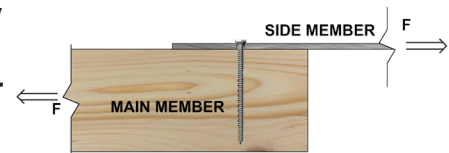
Note: see notes under the table RDV.4.2.



**Table RDV.4.4, Reference Lateral Design Values (Z) for Fully Threaded Fasteners with Steel Side Plate**

Fastener  in.	Steel Side Plate Thickness  in.	Minimum Fastener Penetration into Main Member  in.	Reference Lateral Design Values (Z) for Specific Gravities (G) of:					
			lbs.					
			G = 0.33		G = 0.42		G = 0.49	
			Z <sub>  </sub>	Z <sub>⊥</sub>	Z <sub>  </sub>	Z <sub>⊥</sub>	Z <sub>  </sub>	Z <sub>⊥</sub>
5/16 x 3-1/8	5/32	2-11/16	180	144	221	177	250	200
5/16 x 3-1/8	1/4	2-9/16	213	170	264	211	303	242
3/8 x 4	5/32	3-1/2	222	178	272	218	309	248
3/8 x 4	1/4	3-3/8	261	209	319	255	361	289
3/8 x 4	5/16	3-5/16	280	224	348	278	398	319
1/2 x 4	5/32	3-3/8	363	207	405	275	434	305
1/2 x 4	1/4	3-1/4	405	217	450	293	481	339
1/2 x 4-3/4	5/16	3-15/16	441	265	490	335	523	369
1/2 x 4-3/4	3/8	3-7/8	482	278	535	366	571	404
1/2 x 4-3/4	1/2	3-3/4	486	304	545	367	586	408

Note: see notes under the table RDV.4.2.

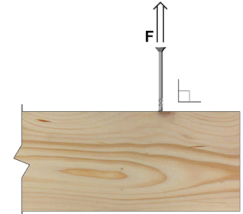


## ASSY A2<sup>®</sup> REFERENCE DESIGN VALUES

### ASSY A2<sup>®</sup> Withdrawal Design (W)

Table RDV.5.1, ASSY A2<sup>®</sup> Reference Withdrawal Design Values ( $W_{90}$ )

Major Diameter (D)	Reference Withdrawal Design Values ( $W_{90}$ ) notes below lbs/in.	
	G = 0.42	G = 0.49
1/4"	143	162
5/16"	169	211
3/8"	180	211

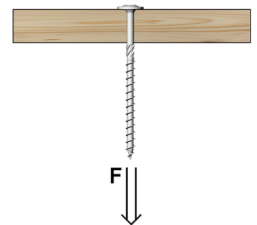


- Notes:
1. Tabulated reference withdrawal design values ( $W_{90}$ ) apply to screws installed perpendicular to the grain of the wood member. For screws installed at an angle to the wood grain in the range between 90° and 30°,  $W_{90}$  shall be reduced by the appropriate angle to grain reduction factor ( $R_g$ ) to obtain the applicable angle to grain withdrawal design value ( $W_a$ ).
  2. Values must be multiplied by all applicable adjustment factors, as specified for dowel-type fasteners, in accordance with the NDS 2015. Values apply to dry service conditions only.
  3. Values listed are to be multiplied by the effective thread length embedded in the wood member.
  4. A minimum thread penetration of 6-D (D = nominal screw diameter) must be applied.
  5. G refers to the specific gravity assigned to the wood species. ESG must be the equivalent specific gravity given in the ICC-ESR evaluation report of PSL.
  6. Connection design must meet all relevant requirements of the Notes to the Designer section.
  7. The allowable load for a single screw subject to tension shall not exceed the lesser of the adjusted withdrawal design value, the adjusted head pull-through design value, or the allowable tensile strength of the screw specified in Table RDV 6.1, as applicable to connection design.

### ASSY A2<sup>®</sup> Head Pull-Through design (P)

Table RDV.5.2, ASSY A2<sup>®</sup> Reference Head Pull-Through Design Values (P)

Major Diameter (D)	ASSY A2 Reference Head Pull-Through Design Values (P) notes below lbs.					
	Ecofast		SK		Kombi	
	G = 0.42	G = 0.49	G = 0.42	G = 0.49	G = 0.42	G = 0.49
1/4"	163	194	299	356	N/A	N/A
5/16"	445	524	510	604	219	420
3/8"	N/A	N/A	N/A	N/A	278	327



- Notes:
1. Tabulated reference head pull-through values (P) must be multiplied by all applicable adjustment factors as specified for dowel-type fasteners in the NDS. Design values apply to connections satisfying minimum side member thickness requirements. Values apply to dry service conditions only.
  2. G refers to the specific gravity assigned to the wood species. ESG must be the equivalent specific gravity given in the ICC-ES evaluation report of PSL.
  3. Minimum side member thicknesses are given in the Notes to the Designer section under the point 12.
  4. Connection design must meet all relevant requirements of the Notes to the Designer section.
  5. The allowable load for a single screw subject to tension shall not exceed the lesser of the adjusted withdrawal design value, the adjusted head pull-through design value, or the allowable tensile strength of the screw specified in Table RDV 6.1, as applicable to connection design.

### ASSY A2<sup>®</sup> Allowable Fastener Tensile and Shear Strength

Table RDV.6.1, ASSY A2<sup>®</sup> Tensile, Shear, and Bending Yield Strength

Major Diameter (D)	Allowable Tensile Strength lbs.	Allowable Shear Strength lbs.	Specified Bending Yield Strength $F_{yb}$ psi
1/4"	600	450	99,900
5/16"	1,170	915	99,400
3/8"	1,725	1,230	103,500

Note: All connection design must meet all the relevant requirements of the Notes to the Designer section.

## ASSY A2® Adjusted Fastener Torsional Strength

Table RDV.6.2, ASSY A2® Adjusted Torsional Strength

Screw Type	Adjusted Torsional Strength		
	lbs·ft		
	Diameter		
	1/4"	5/16"	3/8"
Partially Threaded	3.78	9.44	17.70

Note: All connection design must meet all the relevant requirements of the Notes to the Designer section.

## ASSY A2® Reference Lateral Design Values (Z)

Table RDV.7.1, Reference Lateral Design Values (Z) for ASSY A2® Partially Threaded Fasteners with Wood Side Member

Fastener in.	Side Member Thickness in.	Minimum Fastener Penetration into Main Member in.	Reference Lateral Design Values (Z) for Specific Gravities of:					
			lbs.					
			G = 0.42			G = 0.49		
			Z <sub>  </sub>	Z <sub>m⊥</sub>	Z <sub>⊥</sub>	Z <sub>  </sub>	Z <sub>m⊥</sub>	Z <sub>⊥</sub>
1/4 x 4	2	1-3/4	142	142	142	164	164	164
5/16 x 4-3/4	2	2-7/16	204	163	163	235	188	188
5/16 x 5-1/2	2-3/4	2-7/16	204	163	163	235	188	188
5/16 x 10-1/4	7	2-15/16	204	163	163	235	188	188
3/8 x 5-1/2	2-3/4	2-3/8	319	231	212	344	254	237

Note: see notes under the table RDV.7.2.

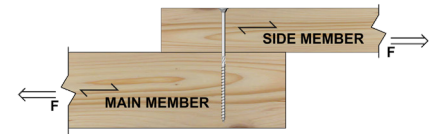
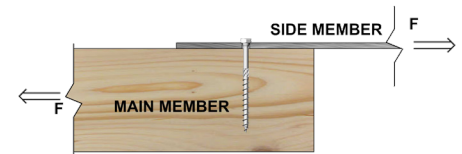


Table RDV.7.2, Reference Lateral Design Values (Z) for ASSY A2® Partially Threaded Fasteners with Steel Side Plate

Fastener in.	Steel Side Plate Thickness in.	Minimum Fastener Penetration into Main Member in.	Reference Lateral Design Values (Z) for Specific Gravities of:			
			lbs.			
			G = 0.42		G = 0.49	
			Z <sub>  </sub>	Z <sub>⊥</sub>	Z <sub>  </sub>	Z <sub>⊥</sub>
1/4 x 2-3/8	5/32	2	183	183	207	207
1/4 x 2-3/8	1/4	1-7/8	197	197	226	226
5/16 x 3-1/8	5/32	2-11/16	234	187	265	212
5/16 x 3-1/8	1/4	2-9/16	282	226	324	259
3/8 x 4	5/32	3-1/2	340	230	364	255
3/8 x 4	1/4	3-3/8	395	269	422	297
3/8 x 4	5/16	3-5/16	439	295	472	328



Notes:

- Fiber orientation (Z<sub>||</sub>, Z<sub>m⊥</sub>, and Z<sub>⊥</sub>) of the main member versus the side member are according to the Lateral Design Considerations section.
- All values listed in table above shall be multiplied by all applicable adjustment factors as specified for dowel-type fasteners in accordance with the NDS.
- Tabulated fastener sizes represent, in many cases, the minimum lengths available that achieve 6-D penetration into the main member for the given side member thickness. Keeping all other parameters consistent, tabulated design values can be conservatively applied to longer fastener lengths with greater penetration into the main member.
- Minimum side member thicknesses are provided in the Notes to the Designer section under point 12. pre-drilling may be required in some cases to reduce splitting.
- Reference lateral design value listed for G = 0.42 and 0.49 refer to connections where main and side members are made from equivalent density species.
- G refers to the specific gravity assigned to the wood species. ESG must be the equivalent specific gravity given in the ICC-ESR evaluation report of PSL.
- Steel side plates are assumed to be grade ASTM A36 for calculation purposes. Holes must be formed in the steel plate prior to installation of ASSY® self-tapping screws.
- Connection design must meet all relevant requirements of the Notes to the Designer section.



# Check List

## For All Connections

- ☐ Check the Geometry Requirements:
  - ☐ End Distances (a)
  - ☐ Edge Distance (e)
  - ☐ Spacing Between Fasteners in a Row ( $S_p$ )
  - ☐ Spacing Between Rows ( $S_o$ )
- ☐ Check the wood species for all members (G)
- ☐ Check the Fiber orientation:
  - ☐ Screw axis angle to the grain ( $\alpha$ )
  - ☐ Is the screw in end grain
- ☐ Check the minimum penetration length
- ☐ Check the minimum member thicknesses
- ☐ Check the local stresses in fastener groups (non-mandatory as per NDS 2015):
  - ☐ Net section tensile capacity
  - ☐ Row tear-out capacity
  - ☐ Group tear-out capacity
- ☐ Check for condition adjustment factors for dowel-type fasteners:
  - ☐ Load duration factor ( $C_D$ )
  - ☐ Wet service factor ( $C_M$ )
  - ☐ Temperature factor ( $C_t$ )
  - ☐ Geometry factor ( $C_\Delta$ )
  - ☐ End grain factor ( $C_{eg}$ )

## For Laterally Loaded Fasteners

- ☐ Check the reference lateral design value (Z)
- ☐ Check the allowable fastener shear strength
- ☐ Check the number of effective fasteners:  $n_F = n^{0.9}$

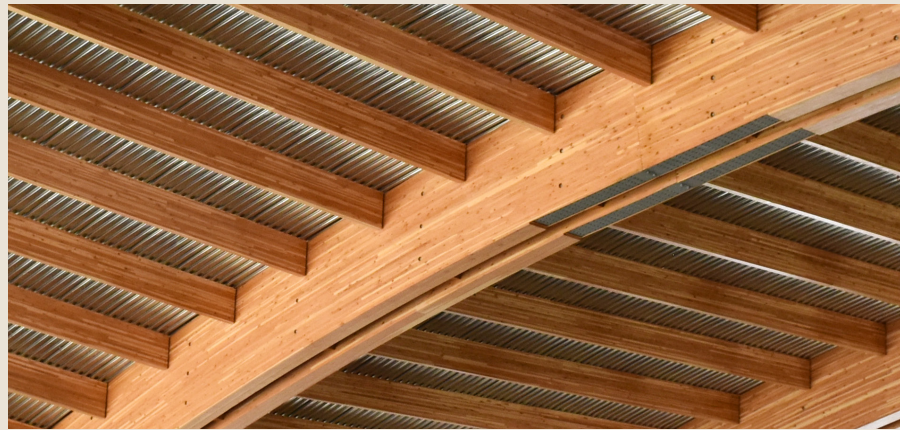
## For Axially Loaded Fasteners

- ☐ Check the reference withdrawal design value (W)
- ☐ If applicable, check the reference head pull-through design value (P)
- ☐ Check the allowable fastener tensile strength
- ☐ Check the number of effective fasteners:  $n_F = \max \{ n^{0.9}; 0.9 \cdot n \}$

## For combined lateral and withdrawal loads

- ☐ Check the combined resistance:  $Z_\alpha' = \frac{W' \cdot Z'}{W' \cdot \cos^2 \alpha + Z' \sin^2 \alpha}$
- ☐ Check the combined load criteria:  $\left( \frac{V}{Z'} \right) + \left( \frac{T}{W'} \right) \leq 1$  [C12.4.2-2; NDS-2015]





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