



# Self-Drilling Dowel Design Guide



**MyTiCon Timber Connectors**

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January 25, 2019



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# “Build Strong, Build Sustainable, Build the Future”

MyTiCon is a specialty supplier of connection systems for modern wood and 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 our support, our innovative research and cost-effective approaches.



## **WE ARE A DISTRIBUTOR, WE SUPPLY**

Our warehouse is strategically located to allow economical shipping throughout North America. More than 450 timber connection systems are stocked for fast delivery to your projects.



## **WE ARE CURIOUS, WE FUND**

We do extensive research with leading North American universities to innovate ways to connect wood, reduce costs and extend the reach of mass timber into the market.



## **WE ARE SUPPORTIVE, WE EDUCATE**

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**[support@my-ti-con.com](mailto:support@my-ti-con.com)**

# “Engineered Solutions”

The SDD Self-Drilling Dowel is a dowel designed for timber connections with knife plates.

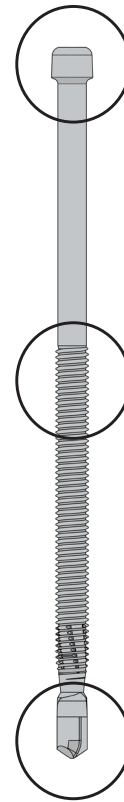
It features:

**Drilling tip** eliminates the need for pre-drilling in wood, aluminum, and thin (1/8”) steel plates.

**Hardened steel** resulting in higher shear resistance compared to non-hardened dowels.

**Low installation torque** allows it to be easily installed with cordless drills without the need for additional equipment.

**Tight fit** for reduced slip in the steel plate in all critical connections.



## Concealable Head

Designed to be used with AW 40 Bits, for exceptional fit and durability. Easily plugged with wooden dowel.

## Continuous Thread

Helps avoid slippage of the dowel out of the knife plate when loaded (cyclic or vibration).

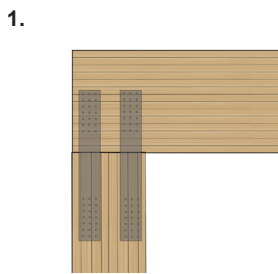
Helps drive the dowel forward which reduces the amount of force needed to install.

## Self-Drilling Tip

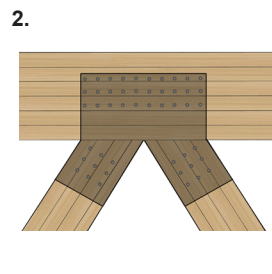
Enables fast and simple installation.

## Application Examples

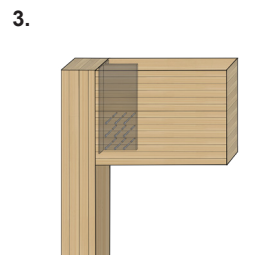
The SDD Self-Drilling Dowel can be used in multiple connection scenarios where internal steel plates are used for load transmission. Examples are shown below such as timber moment connections, custom beam hangers and hold down connections.



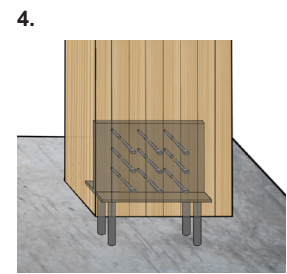
Moment Connection



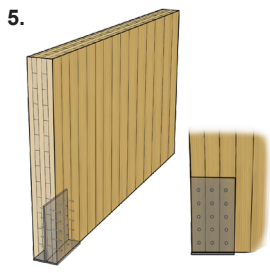
Brace Connection



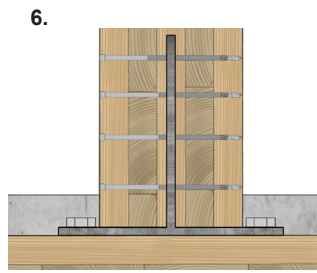
Beam Hanger Connection



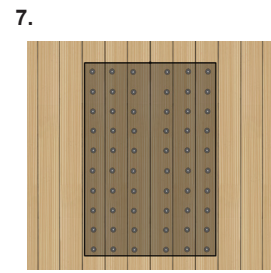
Column Base Connection



CLT Hold Down Connection



CLT Hold Down or Base Shear Connection



CLT Shear or Tension Internal Splice Plate Connection

# Notes to The Designer

1. Values given in the design tables are only valid for Allowable Stress Design and need to be adjusted in accordance with NDS-2018. The Adjusted Lateral Design Value Calculation is presented below.
2. Lateral values given in the design tables are only valid for listed SDD Self-Drilling Dowels.
3. SSD Self-Drilling Dowels are only suitable for use in dry service conditions.
4. Load directions are listed as following:  
 $Z_{||}$  - Parallel-to-grain loading  
 $Z_{\perp}$  - Perpendicular-to-grain loading
5. If splitting of the wood, wood-based material or fastener damage is observed, a design professional must be contacted immediately.
6. Listed allowable lateral loads apply to different timber species according to their respective specific gravities (G) as per NDS-2018.



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



**Douglas Fir**  
G = 0.49

## Adjusted Lateral Design Value Calculation

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

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

$Z$  Reference lateral design value ( $Z_{||}$ ,  $Z_{||,CLT}$  or  $Z_{\perp}$ ) given in the provided design tables

$n_F$  Number of effective fasteners in a connection:  $n_F = 0.9 \cdot n$

$n$  Number of fasteners acting together in a connection

$C'$  The adjustment factors for the connection, composed of:

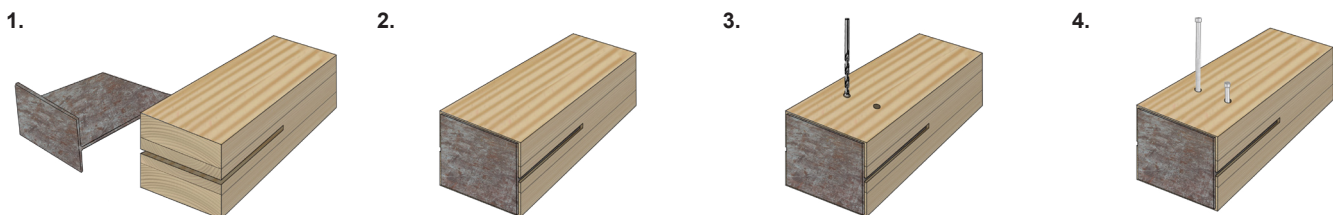
$C_D ; C_M ; C_t ; C_{\Delta} ; C_{eg} ; C_{di} ; C_{tn}$

$C_M$  is to equal 1, for dry service conditions

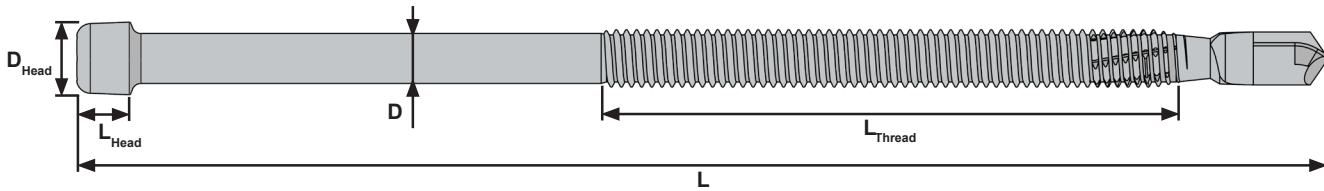
$C_g$  may be ignored when calculating with  $n_F$

## Pre-Drilling Recommendation

To facilitate the installation of the SDD Self-Drilling Dowels with thicker ( $>1/8"$ ) knife plates or with multiple knife plates in a single connection, it is recommended to pre-drill the steel and wood with a  $1/4"$  diameter drill bit for the full length of the dowel.



# SDD Specifications



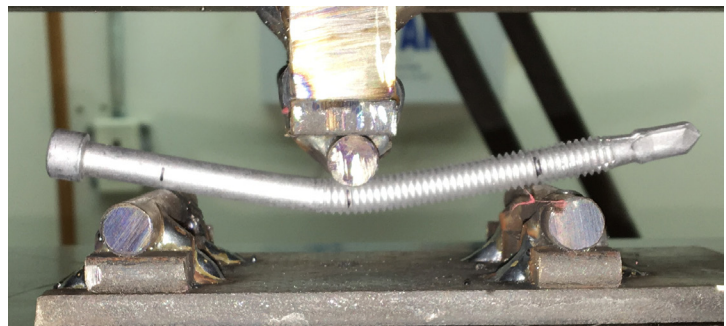
**Table 1.1, Fastener Sizes and Specified Dimensions**

Item#	Box size	D	L	$L_{Thread}$	$D_{Head}$	$L_{Head}$	Bit
#	pieces	in. [mm]	in. [mm]	in. [mm]	in. [mm]	in. [mm]	
360070073000808	50	1/4 (0.273) [6.9]	2-7/8 [73]	1-1/4 [31]	0.394 [10]	0.295 [7.5]	AW 40
360070093000808	50		3-5/8 [93]	1-5/8 [40]			
360070113000808	50		4-1/2 [113]	2 [50]			
360070133000808	50		5-1/4 [133]	2-3/8 [60]			
360070153000808	50		6 [153]	2-3/4 [70]			
360070173000808	50		6-3/4 [173]	3-1/8 [80]			
360070193000808	50		7-5/8 [193]	3-1/2 [90]			
360070213000808	50		8-3/8 [213]	3-7/8 [100]			
360070233000808	50		9-1/8 [233]	4-3/8 [110]			

# Allowable Fastener Strength

**Table 1.2, Allowable Fastener Strength**

Diameter	Allowable Shear Strength	Specified Bending Yield Strength, $F_{yb}$
in. [mm]	lbs.	psi
1/4" [6.9]	1,725	126,200



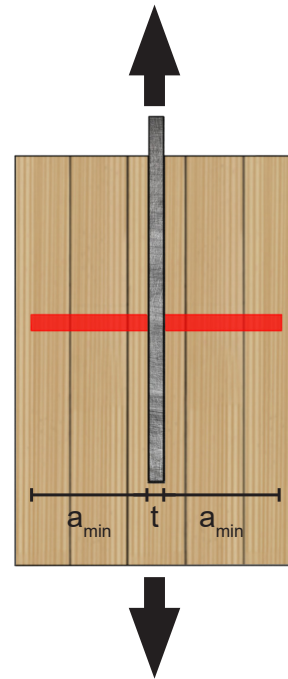
# Reference Lateral Design Value (Z)

Table 2.1, Reference Lateral Design Values for a Single Knife Plate

Specific Gravity G	D in. [mm]	Fastener L		Steel Plate Thickness Range		Minimum Wood Embedment		Reference Lateral Design Values		
		in.	[mm]	t in.	[mm]	$a_{min}$ in.	[mm]	$Z_{  }$ lbs.	$Z_{  ,CLT}^5$ lbs.	$Z_{\perp}$ lbs.
0.42	1/4 [6.9]	2-7/8	[73]	3/16 to 5/16	[4.76] to [7.94]	1-1/4	[31.7]	644	579	420
		3-5/8	[93]			1-5/8	[41.7]	719	647	455
		5-1/4	[133]			2-3/8	[61.7]	844	760	554
		6	[153]			2-7/8	[71.7]	844	760	576
0.49	1/4 [6.9]	2-7/8	[73]	3/16 to 5/16	[4.76] to [7.94]	1-1/4	[31.7]	712	641	481
		3-5/8	[93]			1-5/8	[41.7]	806	725	531
		5-1/4	[133]			2-3/8	[61.7]	908	817	641

Notes:

- Reference lateral design values listed are only valid for Allowable Stress Design.
- Design values listed are only valid using listed SDD Self-Drilling Dowels.
- Fasteners must be used in dry service conditions ( $C_M=1.0$ ).
- Connector placement must respect the Geometry Requirements section.
- The reference lateral design values in Cross Laminated Timber (CLT) are  $Z_{||,CLT}$  with parallel-to-grain loading and  $Z_{\perp}$  with perpendicular-to-grain loading in the shear plane.
- Steel plates must have a A36 steel grade.
- Wood failure modes such as row shear, plug shear, group tear-out and net tension failure are to be verified by the designer.
- For structural applications  $a_{min} > 1-1/2"$  [38 mm].
- All connection design must meet all relevant requirements of the Notes to the Designer section of this guide and the NDS.

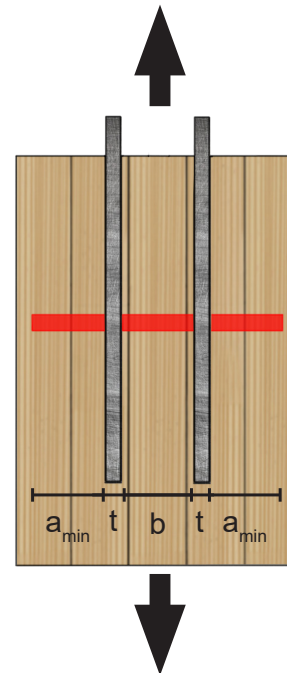


**Table 2.2, Reference Lateral Design Values for Double Knife Plate**

Specific Gravity G	Fastener		Steel Plate Thickness Range		Minimum Wood Embedment				Reference Lateral Design Values		
	D	L	t		$a_{min}$		b		$Z_{  }$	$Z_{  ,CLT}^5$	$Z_{\perp}$
	in. [mm]	in. [mm]	in. [mm]	[mm]	in. [mm]	[mm]	in. [mm]	[mm]	lbs.	lbs.	lbs.
0.42	1/4 [6.9]	5-1/4 [133]	1/8 [3.18] to 5/16 [7.94]		1 [25.4]	3 [76.2]	1215	1093	708		
					1-1/4 [31.7]	2-1/2 [63.5]	1276	1148	836		
		6 [153]			1-1/4 [31.7]	2-1/2 [63.5]	1278	1150	837		
					1-1/2 [38.1]	3 [76.2]	1323	1191	856		
		7-5/8 [193]			1-1/2 [38.1]	3 [76.2]	1366	1229	875		
					1-3/4 [44.5]	3-1/2 [88.9]	1445	1323	926		
		8-3/8 [213]			1-3/4 [44.5]	3-1/2 [88.9]	1445	1323	926		
					2 [50.8]	4 [101.6]	1445	1428	985		
		9-1/8 [233]			2 [50.8]	4 [101.6]	1445	1428	985		
					2-1/4 [57.2]	4-1/2 [114.3]	1445	1445	1040		
0.49	1/4 [6.9]	5-1/4 [133]	1/8 [3.18] to 5/16 [7.94]		1-1/4 [31.7]	2-1/2 [63.5]	1408	1267	954		
					1 [25.4]	3 [76.2]	1324	1192	885		
		6 [153]			1-1/4 [31.7]	2-1/2 [63.5]	1411	1270	956		
					1-1/2 [38.1]	3 [76.2]	1469	1322	986		
		7-5/8 [193]			1-1/2 [38.1]	3 [76.2]	1523	1370	1014		
					1-3/4 [44.5]	3-1/2 [88.9]	1590	1487	1086		
		8-3/8 [213]			1-3/4 [44.5]	3-1/2 [88.9]	1590	1487	1086		
					2 [50.8]	4 [101.6]	1590	1590	1166		
		9-1/8 [233]			2 [50.8]	4 [101.6]	1590	1590	1166		
					2-1/4 [57.2]	4-1/2 [114.3]	1590	1590	1240		

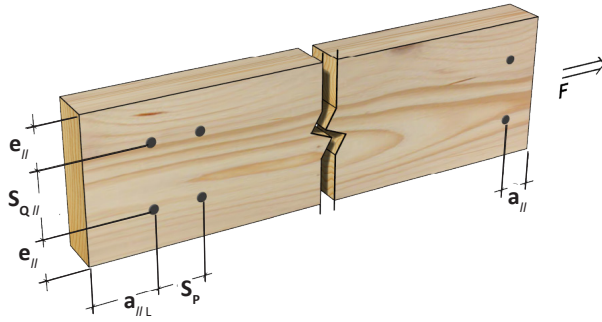
Notes:

1. Reference lateral design values listed are only valid for Allowable Stress Design.
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4. Connector placement must respect the Geometry Requirements section.
5. The reference lateral design values in Cross Laminated Timber (CLT) are  $Z_{||,CLT}$  with parallel-to-grain loading and  $Z_{\perp}$  with perpendicular-to-grain loading in the shear plane.
6. Steel plates must have a A36 steel grade.
7. Wood failure modes such as row shear, plug shear, group tear-out and net tension failure are to be verified by the designer.
8. For structural applications  $a_{min} > 1-1/2"$  [38 mm].
9. All connection design must meet all relevant requirements of the Notes to the Designer section of this guide and the NDS.

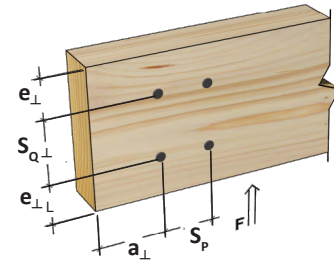




# Geometry Requirements



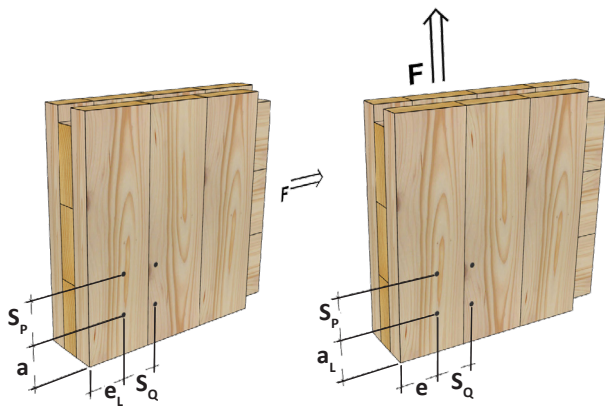
Lateral Loading Parallel-to-Grain



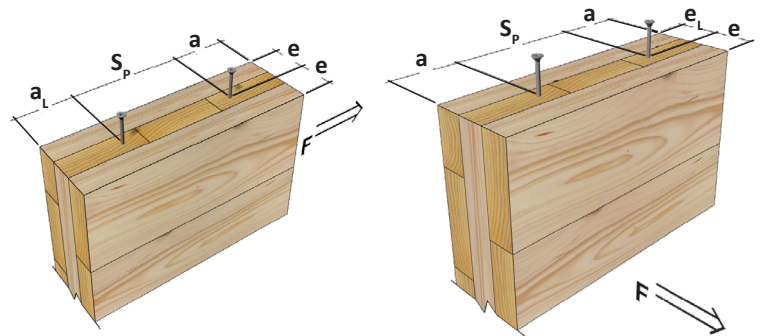
Lateral Loading Perpendicular-to-Grain

Table 3.1, Min Geometry Requirements with Pre-drilled Holes

End Distance			Edge Distance			Spacing Between Fasteners in a Row	Spacing Between Rows	
$a_{  }$	$a_{  L}$	$a_{\perp}$	$e_{  }$	$e_{\perp}$	$e_{\perp L}$	$S_p$	$S_{Q  }$	$S_{Q\perp}$
1-1/8"	3-1/4"	2-1/8"	1"	1-1/8"	1-3/4"	1-3/8"	1"	1-3/8"



Fasteners in Plane Surface



Fasteners in Narrow Edge

Table 3.2, Min CLT Geometry Requirements with 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	1-7/8"	1-1/8"	1-1/8"	1"	1-1/8"	1-1/8"
Fasteners in Narrow Edge	1-7/8"	1-1/8"	7/8"	1"	1-1/8"	1-1/8"

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