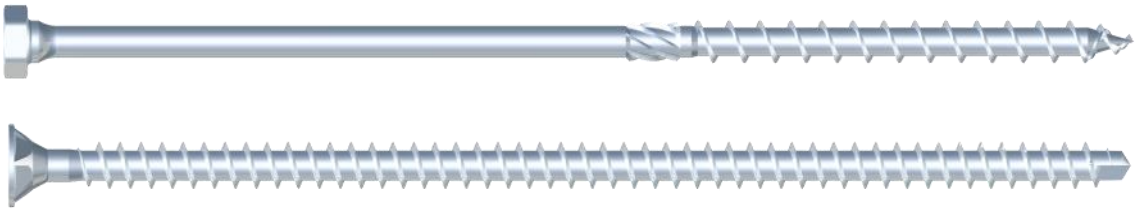
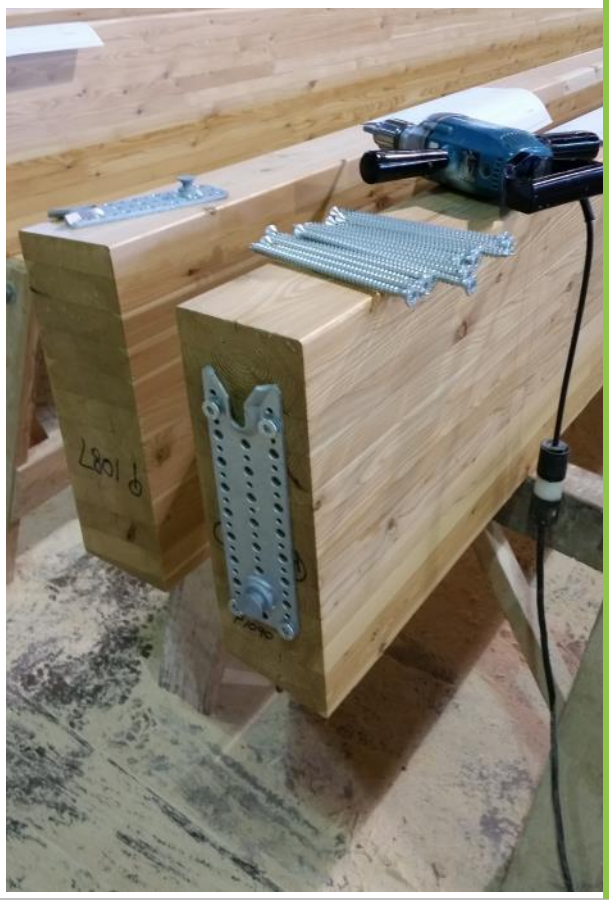
UPDATE: Testing of ASSY screws in End-Grain

This white paper summarizes the on-going testing campaign being performed at the University of British Columbia on the pull-out resistance of ASSY screws when applied in end-grain. Of particular interest, this research will investigate the possible influence on withdrawal capacity that variations in the moisture content of the timber specimen can have in addition to applying these in end-grain. As most pre-engineered connection systems that utilize ASSY screws utilize end-grain application, the results obtained during this test campaign are of significant relevance. They will not only provide a broader look into the behaviour of screws applied in end-grain, but the possible influence that variations of moisture content can have on their withdrawal capacity.



Furthermore, North American and European Standards mostly due to lack of verification testing specific to long-term behaviour of self-tapping wood screws, penalize heavily such applications. The intent of this testing campaign is to validate the current design approach specifically pertaining to ASSY Fully threaded screws in combination with Ricon® connectors, as well as gauge the possible effect that varying moisture content levels can have on the withdrawal capacity of ASSY® screws.



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Campaign #2: Testing of ASSY VG screws in end-grain

Withdrawal Capacity of ASSY VG (fully threaded) screws applied in end-grain

The primary goal of this ongoing testing campaign is to validate the capacity of ASSY fully threaded screws when applied in end-grain. Furthermore, the results will be utilized to determine what the actual reduction, to the factored withdrawal capacity should be most appropriate. Conservatively, North American Codes penalize severely the application of screws in end-grain. More specifically, the testing campaign being carried out at the University of British Columbia aims to gauge the influence that an increment in the moisture content (MC) of the timber host specimen (up to 24%) and subsequent drying of such specimen prior to testing, can have on the Withdrawal capacity of the screws. Ultimately, the results can also be utilize to gauge the potential influence that varying the MC can have on the capacity of Ricon® connectors.

Testing Campaign

14 replicates for each type of series (10 series) will be tested for an overall total of 140 replicates. Of those 10 series, 3 will focus on the effect that moisture content variation has on the withdrawal capacity of ASSY screws when applied in side-grain. The other 7 series will focus on this same effect but with screws applied in end-grain. Additionally, these series will vary the screw diameter, length and timber host species (D.Fir Glulam and Western Red Cedar).

Phase #1: ASSY screws Withdrawal Test under varying timber Moisture Conditions

No.	No. Replicates	ASSY ® screw			Specimen MC Conditions	Wood Species	Test Type (Withdrawal)	Testing Reference Standard
		Type	d	L				
1	14	VG CSK	8	80	WD	D.Fir-L	Side Grain	ASTM D1761
2	14	VG CSK	10	100	WD	D.Fir-L	Side Grain	
3	14	VG CSK	8	160	WD	D.Fir-L	End Grain	
4	14	VG CSK	10	200	WD	D.Fir-L	End Grain	
5	14	VG CSK	8	80	Wet	D.Fir-L	Side Grain	
6	14	VG CSK	8	160	Wet	D.Fir-L	End Grain	
7	14	Kombi	12	160	Wet	D.Fir-L	End Grain	
8	14	Kombi	12	160	Wet	WRC	End Grain	
9	14	VG CSK	8	160	Dry	D.Fir-L	End Grain	
10	14	VG CSK	10	200	Dry	D.Fir-L	End Grain	
	140							

Notes:

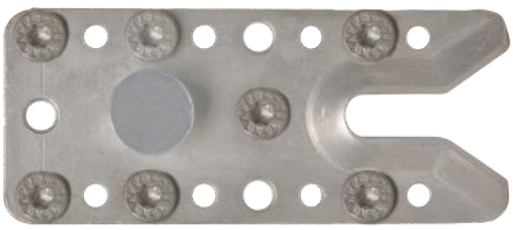
*Wet Conditions = MC >19%

* WD = Indicates that screws will be installed on specimen in dry conditions, then specimen will be "wetted" in order to increase MC. Finally, specimen will be dried back for testing.

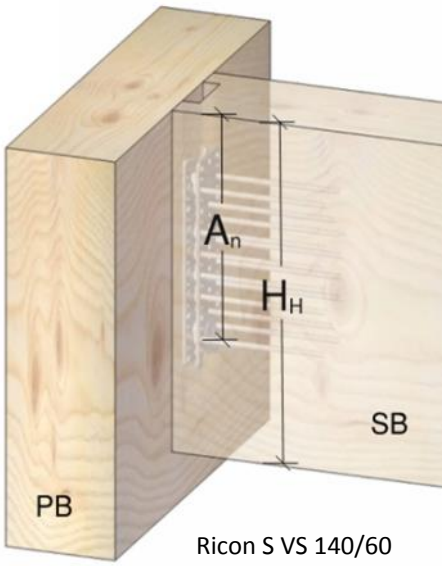
* DD = Indicates that specimen moisture content will always be controlled to remain in "dry" conditions.

* Wet = Indicates that specimens will be "wet" all throughout testing campaign. Meaning, screws will be driven in into "Green" wood and testing in that same condition.

This is considered *Phase 1* of this test campaign, which will lead to *Phase 2* which will focus on determining the capacity and design values of various Ricon® S VS pre-engineered connectors in D.Fir-L Glulam. Specifically, this phase will also focus on the influence that varying the moisture content of the timber host may have on the shear capacity of these connection systems. This will be achieved by elevating the moisture content of the timber member, after the connect has been installed, to 24%. Following this, subsequent drying will follow prior to testing.



Ricon S VS 140/60



Ricon S VS 140/60

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