

# Glued joint behavior of ribs for wood-based composite plates



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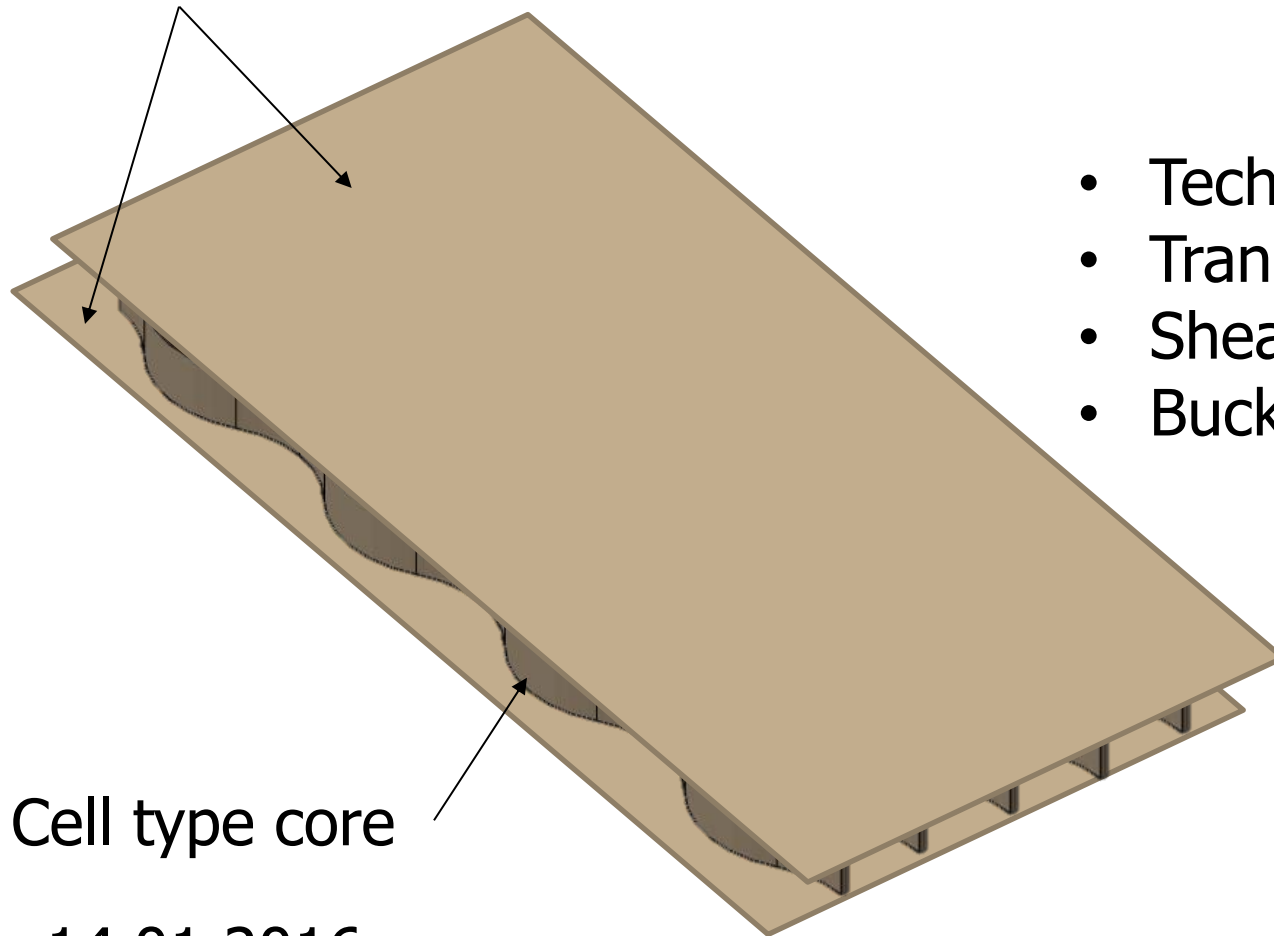
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# Content

- **Description of Plates with cell type core**
- **Specimen for Shear tests**
- **Results**
- **Conclusions**

## Plate with cell type core

Plate's faces



Cell type core

### Advantages

- Technological
- Transversal direction
- Shear properties
- Buckling improvement

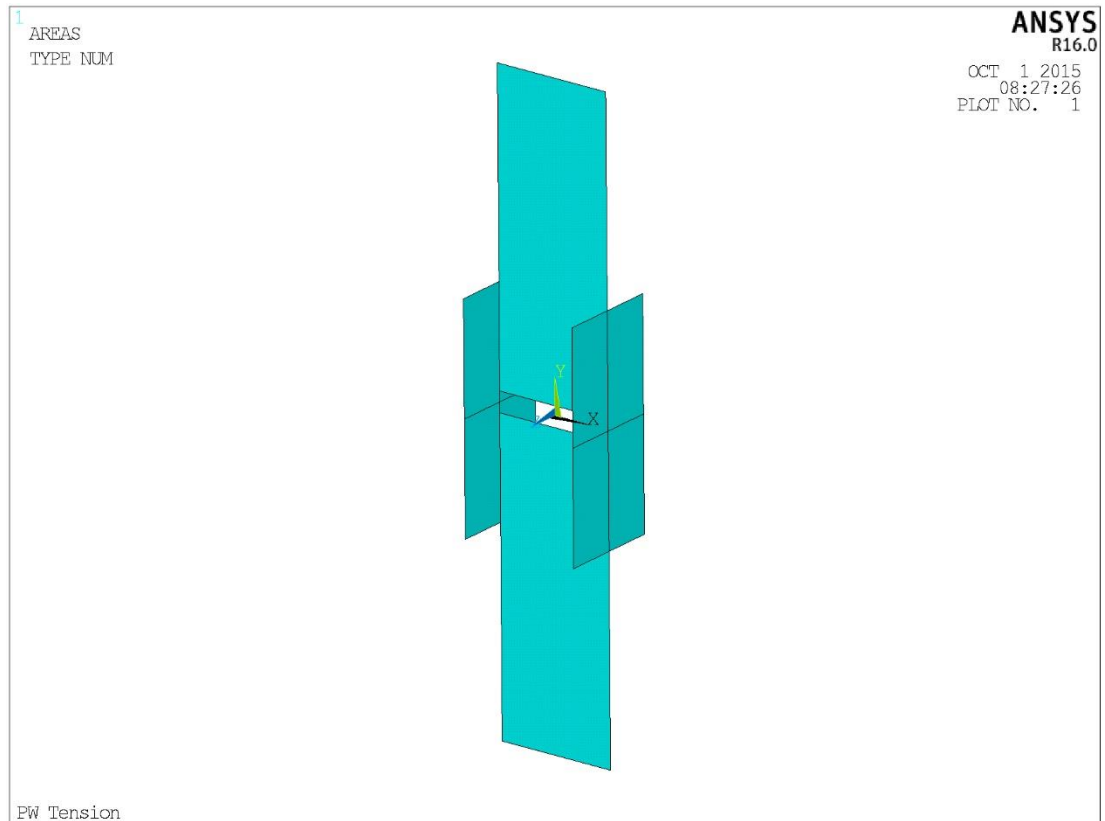
14.01.2016.

For surface-to-  
surface

ASTM D2528-96

Standard Test Method for Strength  
Properties of Double Lap Shear  
Adhesive Joints by Tension Loading

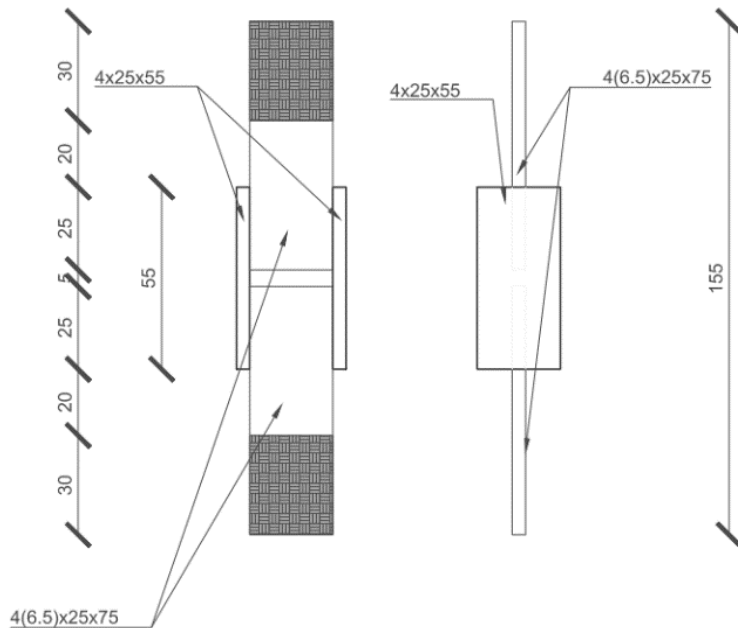
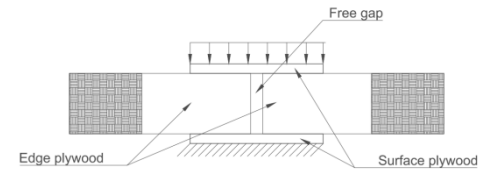
# Modified Shear joint



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# Shear joint

Different pressures applied  
 (0.3MPa; 0.5MPa; 1.0 Mpa)



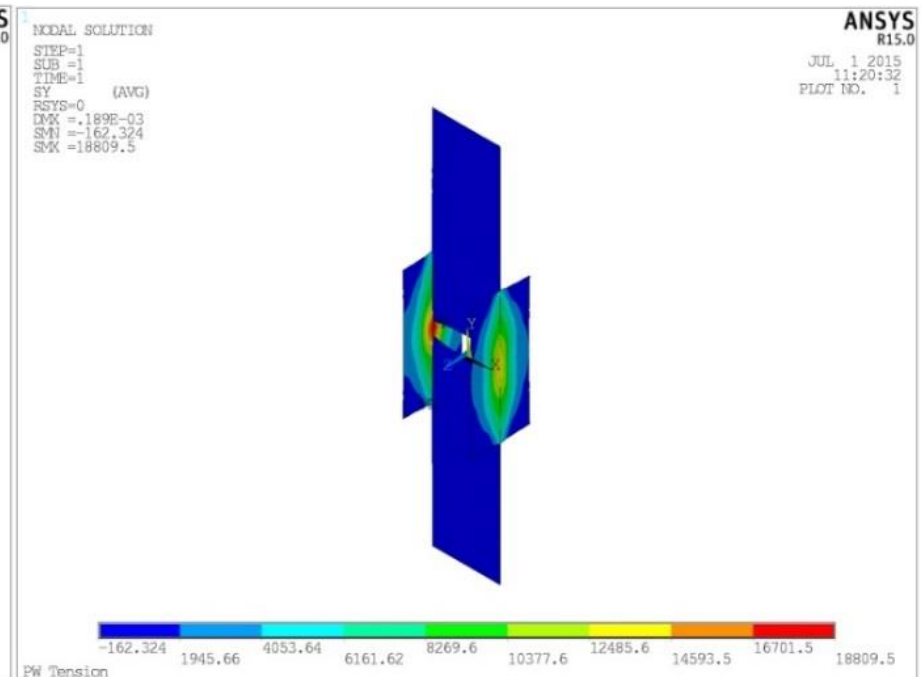
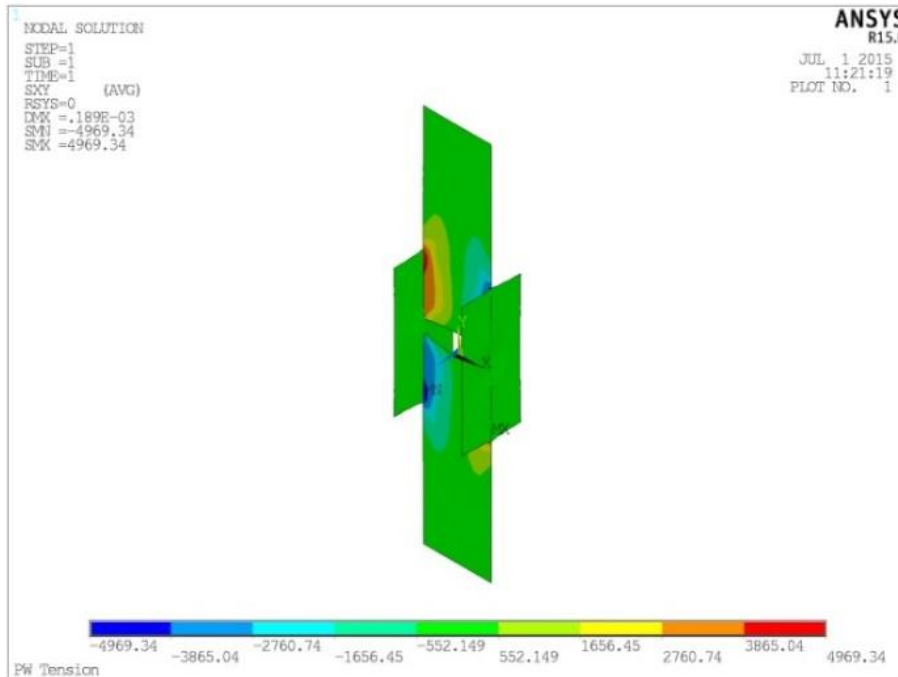
Shear joint specimen with dimensions



Specimen placed in the testing machine (Instron 3000).

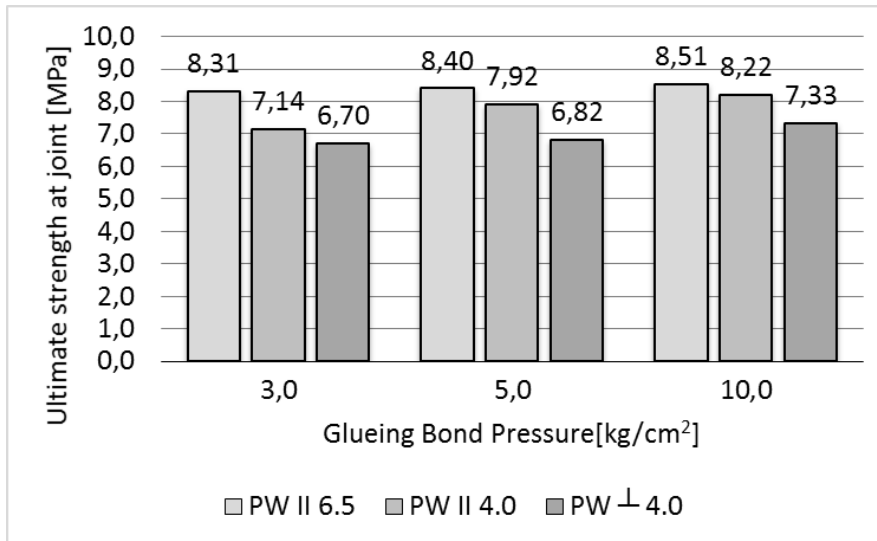
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# Shear stresses in edge plywood and normal stresses in surface plywood

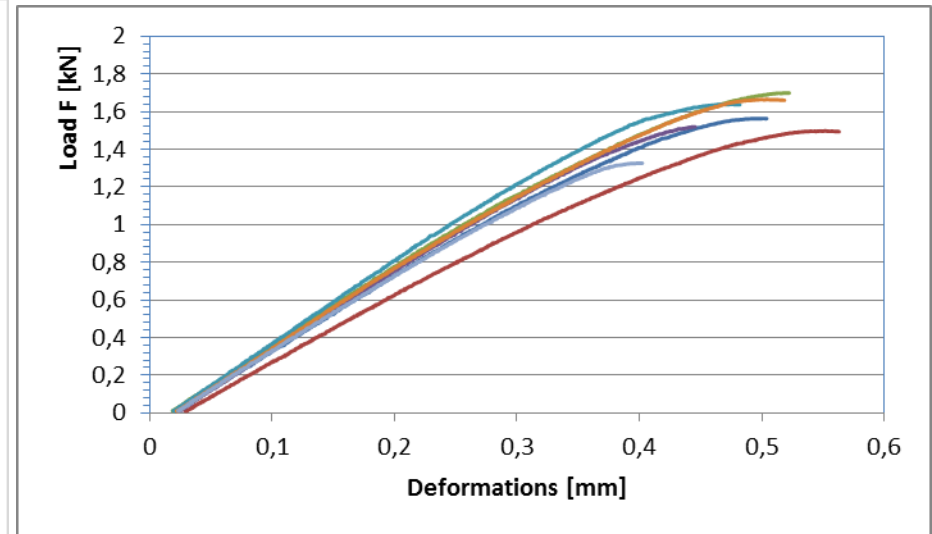


# Experimental investigations

## Ultimate Strength



Ultimate strength for different levels of pressure for all samples.



Load-deformation plot for specimens with bond pressure 5.0 kg/cm<sup>2</sup> and outer layer fibers of the middle layer (4.0 mm) in longitudinal direction. PWII4.0

# Experimental investigations

## Ultimate Load

	Length of a glued joint	Thickness of a PW T	Pressure at joint	Ultimate strength	$F_{max}$	$\frac{F_{max}}{F_{max,teor}}$	$\frac{F_{max}}{F_{max3.0}}$
	mm	mm	kg/cm <sup>2</sup>	N/mm <sup>2</sup>	kN		
PW II 4.0	25	4,0	3,0	7,14	1,43	-11%	
PW II 4.0	25	4,0	5,0	7,92	1,58	-1%	11%
PW II 4.0	25	4,0	10,0	8,22	1,64	3%	15%
PW II 6.5	25	6,5	3,0	8,31	2,70	4%	
PW II 6.5	25	6,5	5,0	8,40	2,73	5%	1%
PW II 6.5	25	6,5	10,0	8,51	2,77	6%	2%
PW ⊥ 4.0	25	4,0	3,0	6,70	1,34	-16%	
PW ⊥ 4.0	25	4,0	5,0	6,82	1,36	-15%	2%
PW ⊥ 4.0	25	4,0	10,0	7,33	1,47	-8%	9%



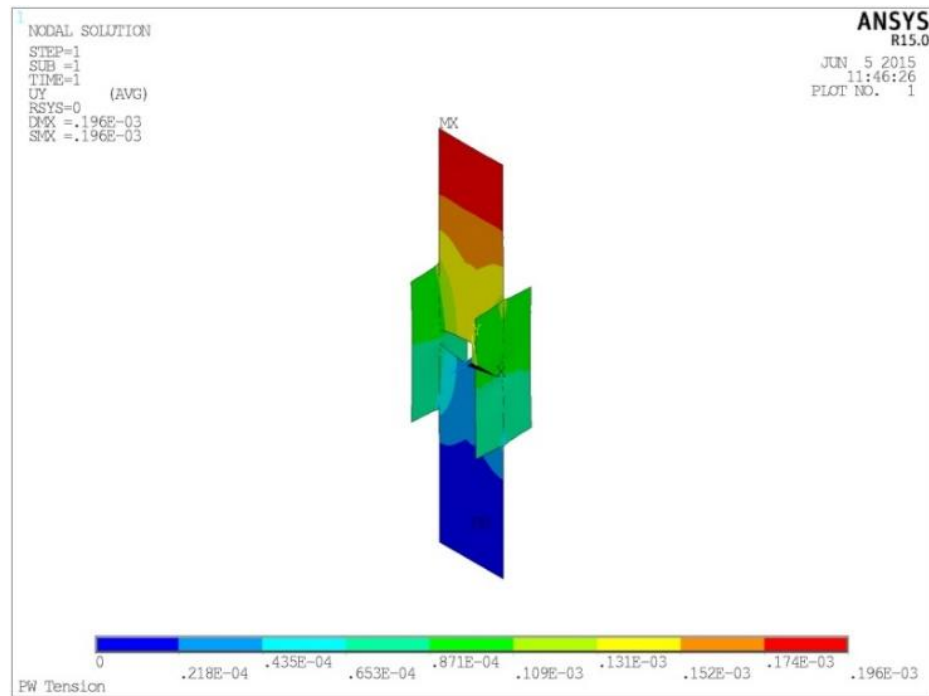
# Experimental investigations



Different cases of failure mode.



# Stiffness

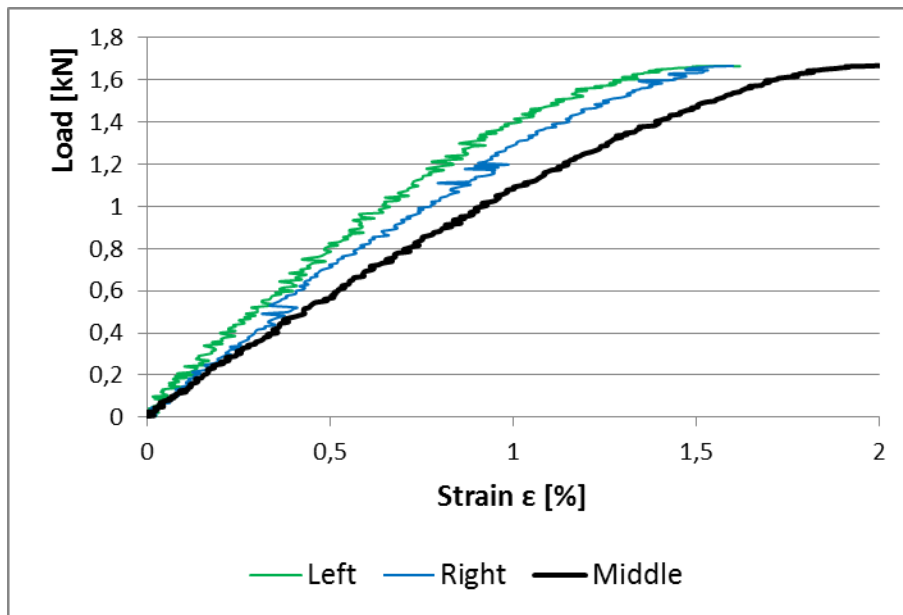


Deformations of shear specimen

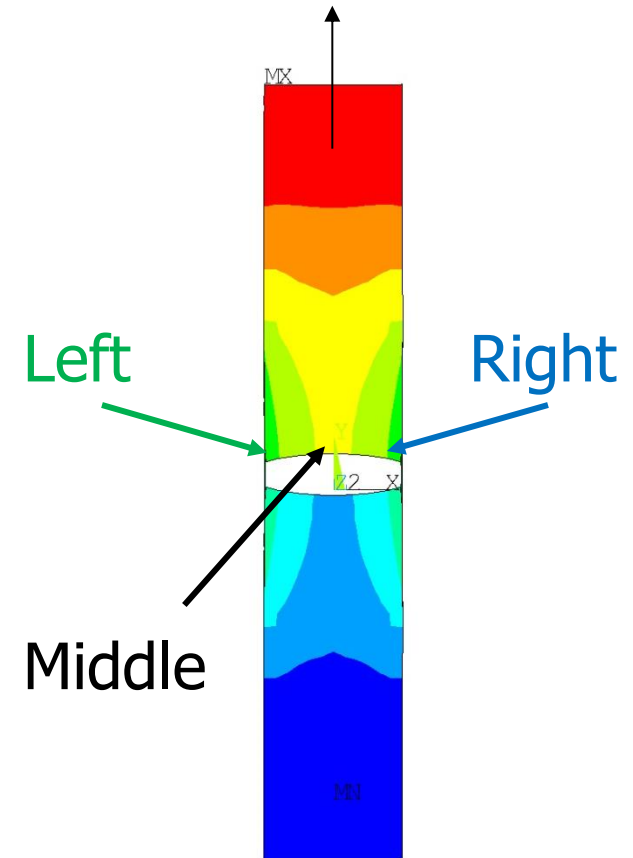
# Stiffness

	Pressure at joint	Joint stiffness	Comparison to 0.3 N/mm <sup>2</sup>
	kg/cm <sup>2</sup>	N/mm <sup>2</sup>	
PW II 4.0	3,0	4.15	
PW II 4.0	5,0	4.19	1%
PW II 4.0	10,0	4.38	5%
PW II 6.5	3,0	3.15	
PW II 6.5	5,0	3.28	4%
PW II 6.5	10,0	3.32	5%
PW ⊥ 4.0	3,0	3.53	
PW ⊥ 4.0	5,0	3.60	2%
PW ⊥ 4.0	10,0	3.65	3%

# Stiffness



Deformations in the middle part of the joint and exactly at joint comparison.



## Conclusions

If most of the layers of edge elements are in longitudinal direction it is practically enough with bond pressure  $5 \text{ kg/cm}^2$  (70 psi)

For cases with more layers of edge elements are in transversal direction it is recommended to increase bond pressure up to  $10 \text{ kg/cm}^2$  (140 psi)

For lower bond pressure (less than  $5 \text{ kg/cm}^2$ ) show approximately similar mean values of ultimate strength, although the dispersion of characteristic values increases.

The results describing stiffness of glued joint showed less influence of bond pressure

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Thank you for attention !

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