

Investigations of the Strength and Resistance of Glued Pine Wood from Tuchola Region

Tomasz Krystofiak – Barbara Lis – Radosław Mirski
Poznan University of Life Sciences, Department of Wood Based Materials

History of wooden buildings



Adhesives

- MUF – 100 b.w. adhesive + 10 b.w. hardener (formic acid)
- MUF – 100 b.w. adhesive + 20 b.w. hardener (formic acid)



Experiments

For the experiments pine wood from Tuchola region and melamine-urea-formaldehyde resins (commercial product) were used. Samples prepared from bigger glued laminated timber and prepared in the laboratory conditions for the investigations were used. The glue mixtures have been prepared accordingly to the adhesive producer requirements (in relation 100:10 and 100:20 p.b.w. resin/hardener). Samples for the shearing strength and compression strength accordingly to the standards were prepared. The shearing strength by the loading speed 50 mm/min was estimated, while compression strength by the loading speed 20 mm/min.

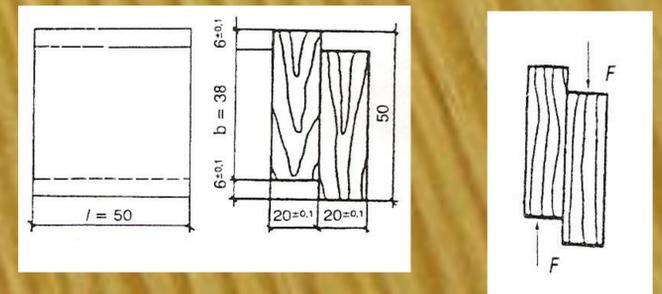
Samples for experiments
(acc. to PN-B-03156 standard)

Various wooden buildings

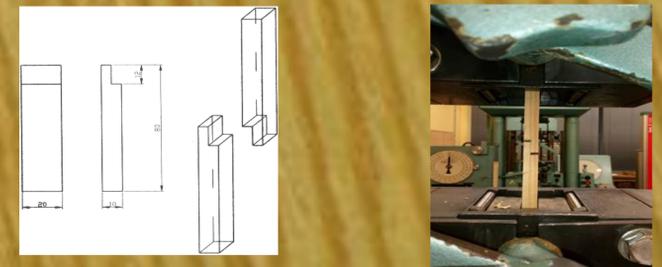


Procedures of water- and thermoresistance of glue lines:

- D4 tests (No. 1, 3 and 5) acc. to PN-EN 204 modified with requirements (appropriate 9.0; 3.5; 2.5 MPa) for pine wood acc. to Technical Approval of Building Research Institute in Warsaw.
- WATT'91 procedure described in PN-EN 14257 standard and modified in Technical Approval of Building Research Institute in Warsaw –3h in 80°C (requirements 5.5 MPa)



TGL samples



Results of the bending strength

Results

No.	System	Dimensions of glue line		Glue line surface	Loading	Strength
		length	width			
		[cm]	[cm]	[cm ²]	[daN]	[MPa]
1	1	1,03	2,01	2,07	3,33	6,53
2	1	1,07	1,96	2,11	4,52	9,88
3	1	1,05	1,99	2,08	3,54	7,26
4	1	1,06	2,00	2,11	5,13	10,62
5	2	1,07	1,99	2,14	5,92	12,80
6	2	1,10	2,00	2,20	4,73	10,92
7	2	1,09	1,99	2,16	4,78	10,62
8	3	1,09	1,99	2,16	5,23	11,54
9	3	1,11	2,00	2,22	4,93	11,25
10	3	1,09	1,99	2,18	3,74	8,46
11	3	1,11	1,99	2,21	4,93	10,98
12	4	1,08	1,99	2,14	3,65	7,83
13	4	1,11	1,98	2,20	5,39	12,34
14	4	1,09	1,99	2,16	4,78	10,60
15	4	1,09	1,96	2,14	5,00	11,42
Average value					[MPa]	10,20
Maximum value					[MPa]	12,80
Minimal value					[MPa]	6,53
Coefficient of correlation					[%]	1,82

Conclusions

- It was stated that tested connections with the good resistance were characterized.
- Results depends on the properties of wood.
- With the increasing of wood density higher WFP values were observed.

Acknowledgements

This research was funded by the National Centre for Research and Development, BIOSTRATEG3/ 344303/14/NCBR/2018.