

# Test Report

Report No.: 786590T



**DANISH  
TECHNOLOGICAL  
INSTITUTE**

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Jlj/pfy  
Order no.: 786590  
No. of appendices: 3

**Assignor:** WTT A/S  
Jyllandsvej 9  
7330 Brande

**Subject:** Heat treated Pine see appendix 1.

**Sampling:** The test material was sampled by DTI in November 2017. 20 boards were then handed over to the assignor, who carried out the heat treatment. See more information regarding the material in appendix 1.  
The heat treated samples were delivered by the assignor at the Danish Technological Institute on 6-4-2018.  
No information is given regarding the heat treatment.

**Method:** EN 310:1993 Wood-based panels - Determination of modulus of elasticity in bending and bending strength  
Test pieces were cut to 20 x 20 x 370 mm. 4 specimens from each board.  
The test material was conditioned at 20°C/65 % RH prior to testing.  
Deviations from EN 310: span is set to 15 x thickness instead of 20 x thickness, due to short raw boards. Load is applied via a Ø15 mm instead of a Ø30 mm.  
The number of tested specimens: until the COV is below 25 %, but minimum 10 tests.  
The tests were carried out with horizontal annular rings, and half of the test with the heartwood side in tension, and half of the test with the sapwood side in tension.

**Equipment:** Instron Universal Testing Machine, Load cell: 5 kN Instron, IDD 8079

**Period:** April 2018


**Result:** Appendix 2: Summary of test results, Appendix 3: Individual test results.

**Note:** -


**Storage:** The test material will be destroyed after 1 month, unless otherwise agreed.

**Terms:** The accredited test was carried out according to DANAK's general conditions see [www.danak.dk](http://www.danak.dk) and according to the General Terms and Conditions regarding Commissioned Work Accepted by the Danish Technological Institute, which apply at the time of signing the agreement. The test is only valid for the tested specimen. The test report may only be extracted, if the laboratory has approved the extract.

**Date/place:** 24-04-2018, Danish Technological Institute, Wood and Biomaterials, Taastrup

  
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**Signature:** Test responsible


  
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Co-signatory





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## Materials

Material	:	 <p>Pine boards</p>
Identification No	:	None
Thickness	:	Nominal 25 mm
Width and length	:	125 mm x 760 mm
Marking	:	No marking
Number of boards	:	20 heat treated, marked B1 – B20 by the assignor. 10 reference

## Test specimens

Identification	:	Board No
Cutting	:	<p>Planned to 20 mm thickness, then cut by circular saw. Mid-section of the boards with horizontal annular ring were used.</p>  
Thickness	:	20 mm (planed boards)
Width and Length	:	20 mm 370 mm
Marking	:	Board number
Number of boards	:	20 heat treated, 10 boards were cut to test pieces. 10 reference
Tested number of specimens	:	20 heat treated 20 reference

## Summary of test results

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<b>PINE</b>				
<b>Bending properties</b>				
<b>3-point bending of small clear specimens, 20x20 mm</b>				
	<b>Reference</b>		<b>Heat treated</b>	
	Strength [MPa]	Modulus of Elasticity [MPa]	Strength [MPa]	Modulus of Elasticity [MPa]
Mean value	80,5	10236	67,3 (84 %)	11759 (115 %)
Standard deviation	9,4	1335	14,6	1436
Coefficient of variation	11,6	13	22	12

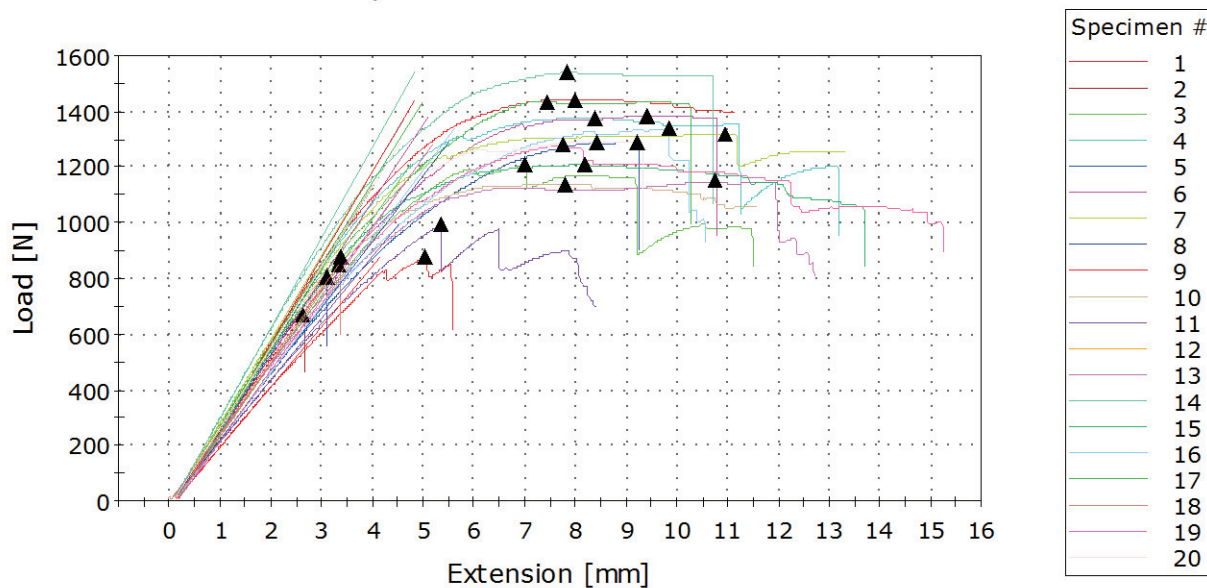
Numbers in ( ) are values relative to reference values.

## Individual test results

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EN 310 Heat treated specimens

Specimen 1 to 20



	Specimen label	Thickness [mm]	Width [mm]	Maximum Load [N]	Modulus of Elasticity [MPa]	Bending strength [MPa]	Time at Maximum Load [s]
	1 Heartwood in tension	20,07	19,82	880	9127	49,63	30,4
	2 Heartwood in tension	20,10	18,82	667	11923	39,48	15,9
	3 Heartwood in tension	20,08	19,63	1210	11040	68,77	42,2
	4 Heartwood in tension	20,08	19,59	1376	12822	78,39	50,4
	6 Heartwood in tension	20,05	19,73	1290	10078	73,20	55,3
	5 Heartwood in tension	19,55	19,74	1386	12691	82,64	56,4
	7 Heartwood in tension	19,51	19,76	1320	13830	78,96	65,7

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## Individual test results

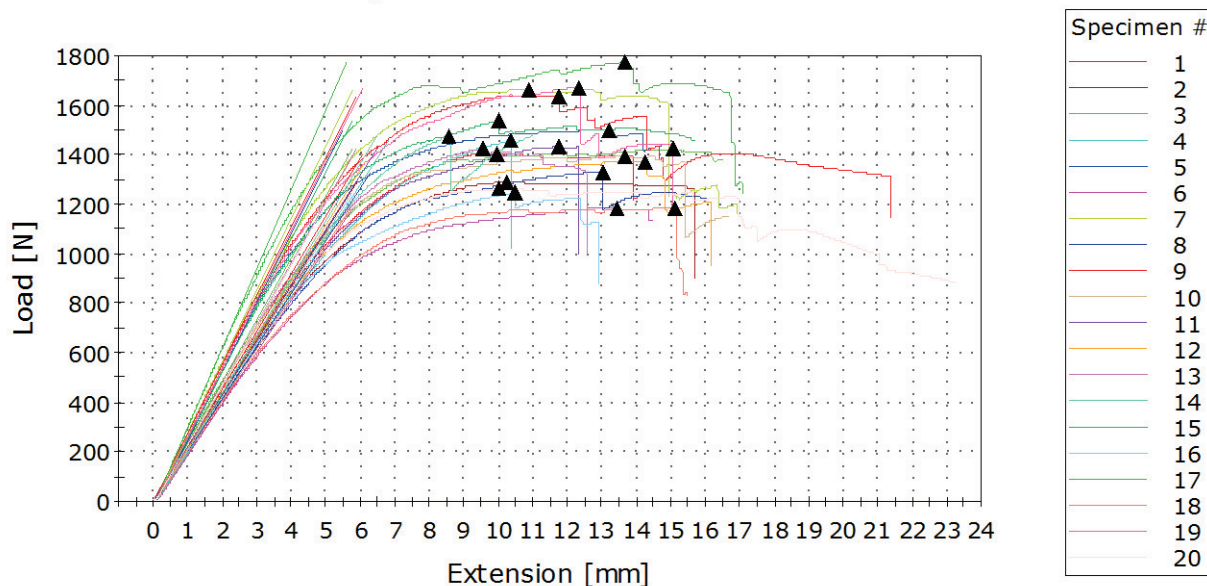
	Specimen label	Thickness [mm]	Width [mm]	Maximum Load [N]	Modulus of Elasticity [MPa]	Bending strength [MPa]	Time at Maximum Load [s]
	8 Heartwood in tension	20,10	19,83	808	12210	45,36	18,6
	9 Heartwood in tension	20,17	19,72	1442	12818	80,89	47,9
	10 Heartwood in tension	20,08	19,83	1142	12362	64,29	46,8
	1 Sapwood in tension	20,08	19,71	996	9465	56,40	32,2
	2 Sapwood in tension	20,13	20,03	882	11735	48,90	20,3
	3 Sapwood in tension	20,14	19,72	1151	10351	64,73	64,5
	4 Sapwood in tension	20,06	19,59	1540	13831	87,90	47,1
	5 Sapwood in tension	19,54	19,89	1208	13228	71,59	49,2
	6 Sapwood in tension	20,08	19,86	1337	10199	75,14	59,1
	7 Sapwood in tension	19,51	19,65	1436	13478	86,39	44,6
	8 Sapwood in tension	20,14	19,75	852	11042	47,86	20,2
	9 Sapwood in tension	20,17	19,60	1281	10720	72,28	46,6
	10 Sapwood in tension	20,02	19,81	1293	12230	73,29	50,7
Mean		19,98	19,70	1175	11759	67,30	43,2
Standard deviation		0,24	0,24	246	1436	14,62	15,3
Coefficient of variation		1,19	1,20	21	12	21,73	35,3

## Individual test results

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EN 310 Reference specimens

Specimen 1 to 20



	Specimen label	Thickness [mm]	Width [mm]	Maximum Load [N]	Modulus of Elasticity [MPa]	Bending strength [MPa]	Time at Maximum Load [s]
	1 Sapwood in tension	20,11	19,90	1406	9725	78,64	59,9
	2 Sapwood in tension	20,11	19,92	1288	9124	71,92	61,4
	3 Sapwood in tension	20,13	19,88	1423	10282	79,49	90,6
	4 Sapwood in tension	20,07	19,96	1461	9132	81,75	62,3
	5 Sapwood in tension	20,16	19,78	1499	11552	83,94	79,5
	6 Sapwood in tension	20,09	19,84	1185	8717	66,60	80,7
	7 Sapwood in tension	20,11	19,65	1663	12215	94,15	65,5
	8 Sapwood in tension	19,99	19,89	1333	9018	75,48	78,3

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## Individual test results

	Specimen label	Thickness [mm]	Width [mm]	Maximum Load [N]	Modulus of Elasticity [MPa]	Bending strength [MPa]	Time at Maximum Load [s]
	9 Sapwood in tension	20,14	19,74	1640	11610	92,15	70,5
	10 Sapwood in tension	20,12	19,73	1393	10308	78,50	82,1
	1 Heartwood in tension	20,16	19,90	1435	9065	79,82	70,7
	2 Heartwood in tension	20,02	19,88	1372	9619	77,47	85,7
	3 Heartwood in tension	20,10	19,99	1424	10091	79,33	57,2
	4 Heartwood in tension	20,12	19,98	1476	9605	82,13	51,6
	5 Heartwood in tension	20,17	19,85	1539	11105	85,76	60,1
	6 Heartwood in tension	20,04	19,84	1247	9232	70,40	62,9
	7 Heartwood in tension	20,06	19,57	1773	13718	101,34	82,0
	8 Heartwood in tension	20,04	19,87	1182	8803	66,64	90,8
	9 Heartwood in tension	20,25	19,55	1673	11541	93,89	74,2
	10 Heartwood in tension	20,07	19,74	1262	10252	71,41	60,2
Mean		20,10	19,82	1434	10236	80,54	71,3
Standard deviation		0,06	0,13	164	1335	9,37	11,8
Coefficient of variation		0,30	0,63	11	13	11,63	16,6