



Test Report

Report No.: 262505-5

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Initials: JOSC/JLJ
Order no: 262505
No of appendices: 2

Item: Southern yellow pine (SYP) 180 °C, red oak 170 °C
Hardness test

Sampling: The test material was treated and then sampled by Danish Technological Institute on 17-06-2024.

Method: ASTM D 143 – 1994: Standard Methods of Testing Small Clear Specimens of Timber – section 13 Hardness

The samples were conditioned at 65 % relative humidity and 20 °C prior to testing.

Period: August 2024

Equipment: Test machine: Instron 5982, IID 80577
Load cell: 5 kN, IID 80579 (for radial and tangential specimens) and 100kN, IID 80578 (for longitudinal specimens)
Dimensions: Mitutoyo 0-150mm, IID 216568 and Mitutoyo CD-60 0-600mm, IID 8243 (for dimensions longer than 150mm)
Scale: VWR LPG-1502, IID120892

Result:

Specimen	Max. Force [N] (mean)		
	Tangential	Radial	Longitudinal
SYP 180 °C	3146	3463	5345
Red Oak 170 °C	2773	3062	4570

The material and methods are described in appendix 1, the results in appendix 2.

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

Terms: This test was conducted in accordance with the General Terms and Conditions of Danish Technological Institute. The test results solely apply to the tested item. This test report may be quoted in extract only if Danish Technological Institute has granted its written consent.

Signature: This document is only valid with a digital signature from Danish Technological Institute. The date of issue appears from the digital signature.

Joanna Schalnat
Consultant





DIGITALLY SIGNED DOCUMENT

16 August 2024

Materials & Methods

Materials & Methods

Material	:	Southern Yellow Pine, heat treated at 180°C
Identification No TI internal	:	14, 15, 18, 20, 23, 24
Thickness	:	Nominal 21 mm
Width and length	:	96 mm x 760 mm
Edges	:	Square
Image	:	
Number of panels	:	6

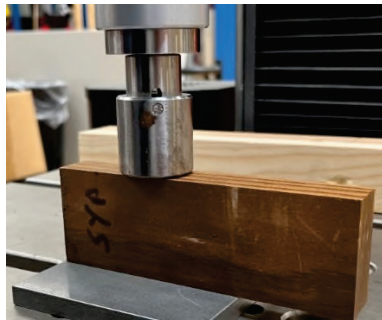
Material	:	Red oak, heat treated at 170°C
Identification No TI internal	:	60, 61, 66, 72, 73, 85
Thickness	:	Nominal 21 mm
Width and length	:	96 mm x 760 mm
Edges	:	Square
Image	:	
Number of panels	:	6

One clear specimen of each was cut to the size of 50mm x 50mm x 150mm for the hardness test. For failed longitudinal tests, another specimen in dimensions diverting from the standard was taken. The moisture content of adjacent wood pieces was determined in report 262505-2.

Materials & Methods

Ball diameter	11,3mm
Penetration depth	5,64 mm

Test setup



Standard test setup



Modified test setup for longitudinal direction to prevent cracking

Testing directions of the wood



Tangential



Radial



Longitudinal

Results

Results

Southern Yellow Pine 180 °C

	Specimen label	Surface	Maximum Force [N]	Length wood [mm]	Width wood [mm]	Thickness wood [mm]	Weight wood [g]	Density [kg/m ³]
1	SYP 180°C	Tangential 1	3015	148,17	49,78	21,61	95,35	598
2	SYP 180°C	Tangential 2	3277	148,17	49,78	21,61	95,35	598
3	SYP 180°C	Radial 1	3688	148,17	49,78	21,61	95,35	598
4	SYP 180°C	Radial 2	3237	148,17	49,78	21,61	95,35	598
5	SYP 180°C	Longitudi- nal 1	5346	175,1	97,14	21,66	170,98	464
6	SYP 180°C	Longitudi- nal 2	5343	175,1	97,14	21,66	170,98	464

Results

Red oak, 170 °C

	Specimen label	Surface	Maximum Force	Length wood	Width wood	Thickness wood	Weight wood
			[N]	[mm]	[mm]	[mm]	[g]
1	Red Oak 170°C	Tangential 1	2758	143,16	50,23	21,4	94,32
2	Red Oak 170°C	Tangential 2	2788	143,16	50,23	21,4	94,32
3	Red Oak 170°C	Radial 1	3003	143,16	50,23	21,4	94,32
4	Red Oak 170°C	Radial 2	3121	143,16	50,23	21,4	94,32
5	Red Oak 170°C	Longitudinal 1	4894	175,03	98,64	21,96	173,54
6	Red Oak 170°C	Longitudinal 2	4245	175,03	98,64	21,96	173,54