SOUTHERN PINE COUNCIL

Southern Pine: Your Best Choice for Furniture and Flooring

Technical Report

Technical Report on Southern Pine: Your Best Choice for Furniture and Flooring

Introduction

American Softwoods, the international representative body of America's Southern Pine Council and Softwood Export Council, commissioned a series of independent tests to determine the benefits of Southern Pine (commonly know as Southern Yellow Pine) as compared with those of other softwoods.

The tests were carried out by the Timber Research and Development Association (TRADA), a globally recognised authority on the specification and use of timber and wood products, based in the United Kingdom. TRADA maintains active programmes of research and information for the benefit of the construction industry.

Objective

Southern Pine is widely acknowledged as a reliable timber for construction use and all external structures. The project's aim was to determine its suitability for internal usage in terms of hardness, impact resistance, and density for furniture, flooring, staircases, skirting boards, architraves, doors and windows.

Summary

Test results in TRADA's 44 page report demonstrate that the performance of Southern Pine in both impact bending and surface hardness clearly surpasses other softwoods tested under the same laboratory conditions. Southern Pine's superior qualities in these key areas make it ideal for furniture, flooring and other domestic applications.

BACKGROUND

1. Southern Pine

America is recognised worldwide as a sustainable source of top quality softwood timber. This particular softwood was first exported from the United States in 1609. Its use in the construction industry has increased steadily throughout Europe in the last 25 years. The many diverse uses include flooring, furniture, decking, bridges, walkways, wood windows and doors and roller coasters.

2. Research Testing Programme

The mechanical testing programme was undertaken by TRADA Technology in July 2000 in accordance with British Standard BS 373: 1986 "Methods of testing small clear specimens." Tests determining density and movement characteristics were carried out on the following softwoods:

- Chilean Radiata Pine *(Pinus radiata, CRP)*
- European Redwood *(Pinus sylvestris, ER)*
- Brazilian Elliotis Pine *(Pinus ellioti, BEP)*
- European Whitewood *(Picea spp, EW)*
- New Zealand Radiata Pine *(Pinus radiata, NZRP)*
- Southern Pine *(Pinus spp, SP)*

3. Findings

Data analysis for the Janka hardness test showed that Southern Pine was **"significantly stronger than the other species under test."** It was also shown to markedly outperform the other softwood species in terms of impact resistance.

As regards density, Southern Pine was shown to be 51% denser than European Whitewood and 14% denser than New Zealand Radiata Pine, its nearest rival softwood species.

Overall Chilean Radiata Pine compared well on the tangential face for hardness rating, but compared with European Whitewood there was no comparison. Southern Pine was proved to be 80.8% harder.

4. Test Conditions

Stable conditions of (20±2)ºC, (65±5)% r.h. were selected and monitored in the Test Hall with thermohygrograph and whirling hygrometer. Also carefully scrutinised were the weights and moisture content of samples. A more detailed description of the test prerequisites is available on request from The Southern Pine Council.

5. Procedures

The different tests carried out on the softwoods were for:

(a) Hardness
Janka test (radial and tangential surfaces)

(b) Impact bending
modified Hatt-Turner test (radial and tangential surfaces)

(c) Density of samples
(mass and volume)

(a) To test the specimens for **hardness**, a vice with five pieces of timber of similar type and cross-section was used. The hardness was defined as the resistance to indentation by a steel ball of 11.3mm diameter, giving a projected area of 100mm^2 at a depth of 5.65mm.

Hardness was measured with a universal testing machine and printer, the load was calibrated and the Janka indentation jig set at a maximum movement of 5.65mm penetration. Growth rings were aligned to give radial and tangential surfaces.

Summary of test data for radial face

Species	Sample population (N)	Minimum Value (Newtons)	Maximum Value (Newtons)	Mean (Newtons)	Standard deviation
CRP	50	1817	4789	2821	639
BEP	28	1311	2965	2007	557
NZRP	50	1720	4262	3098	473
ER	50	1714	2964	2253	345
SP	**50**	**2240**	**5074**	**3160**	**615**
EW	50	1249	2070	1613	208

CRP: Chilean Radiata Pine
NZRP: New Zealand Radiata Pine
SP: Southern Pine
BEP: Brazilian Elliotis Pine
ER: European Redwood
EW: European Whitewood

Summary of test data for tangential face

Species	Sample population (N)	Minimum Value (Newtons)	Maximum Value (Newtons)	Mean (Newtons)	Standard deviation
CRP	50	1942	4899	3208	700
BEP	28	1513	3600	2464	650
NZRP	50	2024	4529	3173	471
ER	50	1679	3470	2549	378
SP	**50**	**2137**	**4742**	**3264**	**574**
EW	50	1347	2690	1805	249

CRP: Chilean Radiata Pine
NZRP: New Zealand Radiata Pine
SP: Southern Pine
BEP: Brazilian Elliotis Pine
ER: European Redwood
EW: European Whitewood

(b) On **impact bending**, specimens were assessed before testing to ensure they were straight-grained, free of defects, with growth rings again aligned to give radial and tangential surfaces.

The specimens were placed in spring-loaded yokes (radial face upwards) with the hammer dropped from increasing heights until failure. The initial drop height was 50.8mm and failure was assessed at the height where complete separation, or a deflection of 60mm or more, occurred.

Summary of Impact Bending Data

Species	Sample population (N)	Minimum Value (Newtons)	Maximum Value (Newtons)	Mean (Newtons)	Standard deviation
CRP	51	0.457	1.422	0.719	0.185
BEP	23	0.457	1.067	0.671	0.163
NZRP	47	0.229	0.914	0.662	0.142
ER	51	0.457	0.864	0.665	0.103
SP	**47**	**0.457**	**1.880**	**0.820**	**0.211**
EW	50	0.127	0.61	0.427	0.104

CRP: Chilean Radiata Pine
NZRP: New Zealand Radiata Pine
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(c) To assess **density** from mass and volume, a standard balance with data acquisition was used, along with digital calliper and calibrated weight. The specimens tested were the same as those used for the hardness test. These were assessed for defects and checked to ensure they were conditioned. Mass was recorded to 0.01g and specimen dimensions to 0.01mm.

Average Density of Samples

Species	Average Density (Kgm^3)
Chilean Radiata Pine	505
Brazilian Elliotis Pine	433
New Zealand Radiata Pine	531
European Redwood	509
Southern Pine	**609**
European Whitewood	403

CONCLUSIONS

Timber used for furniture, flooring and other internal finishings has to withstand life's day-to-day knocks. Floorboards with little resilience to shoe heels will not stand up to daily wear and tear. Similarly, furniture with poor hardness and impact bending will soon lose its looks.

TRADA Technology's testing programme confirms the superiority of Southern Pine's physical properties. Based on all of the test results, it has been shown to be the strongest softwood with excellent resistance to indentation.

The test results give a clear message to furniture and flooring manufacturers who may previously have used other types of timber with a lower impact resistance that Southern Pine is the number one softwood for all applications.

Southern Pine is an all-round timber ideal for both external and internal structures. Furthermore, when pressure treated and kiln-dried, Southern Pine has no rival in terms of strength and durability.




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