



Title: Dimensional stability of Accoya™ wood under different moisture conditions

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SHR Timber Research
"Het Cambium"
Nieuwe Kanaal 9b
PO Box 497
6700 AL Wageningen

Tel: + 31 317 467366

Fax: + 31 317 467399

E-mail: b.tjeerdsma@shr.nl

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Principal: Titan Wood B.V.
PO Box 2147
6802 CC ARNHEM

Appendices: 10

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Authors:

A handwritten signature in blue ink, appearing to read 'B.F. Tjeerdsma', is written over a horizontal line.

Ir. B.F. Tjeerdsma
Project manager

A handwritten signature in blue ink, appearing to read 'E. Pfeiffer', is written over a horizontal line.

Mr. E. Pfeiffer
Research Assistant

Entries: Dimensional stability, ASE, adsorption, desorption, shrinking, swelling, moisture conditions, Accoya™ wood, Radiata Pine, KOMO certification, BRL 0605

Summary

Titan Wood B.V. appointed SHR Timber Research to examine the dimensional stability of Accoya™ wood under different moisture conditions. The technology behind Accoya™ wood is based on wood acetylation. In this investigation Accoya™ wood and the untreated original wood species, Radiata Pine, were tested as part of the research scheme for KOMO certification BRL 0605 "Modified Timber".

Equilibrium Moisture Content, density and dimensional stability of Accoya™ wood

In the table below, the characteristics of Accoya™ wood (originating from New Zealand), acetylated in three separate batches, are summarised.

Aspect	Avg.	Stdev.	Min.	Max.
Equilibrium Moisture Content (at 65% RH, 20°C) [%]	3.3	0.15	3.0	3.8
Density (at 65% RH, 20°C) [kg/m ³]	510	36	438	599
Swelling (oven dry – water saturated)				
- radial [%]	0.69	0.13	0.49	0.99
- tangential [%]	1.47	0.24	0.91	2.34

Uniformity and variation

On basis of the results it can be concluded that there is a low variation in results between the different acetylation batches compared to the overall variation. It can be concluded that as regards the Equilibrium Moisture Content and dimensional stability, the acetylation process is uniform (within a batch) and reproducible (between batches).

Comparison between Accoya™ wood originating from New Zealand and Chile

The Accoya™ wood samples originating from Chile showed similar values for the hygroscopicity (equilibrium moisture content) and dimensional stability (swelling and shrinking) as the Accoya™ wood samples originating from New Zealand. The average density, however, is slightly higher for the Accoya™ wood samples originating from Chile, as well as the variation between samples.

Comparison between Accoya™ wood and (untreated) Radiata Pine

The results show a substantial reduction of the hygroscopicity (Equilibrium Moisture Content) for the Accoya™ wood compared to the untreated Radiata Pine under the same moisture conditions (relative humidity). The dimensional stability (swelling and shrinking) of Accoya™ wood is considerably improved (by approximately 80%) compared to the (untreated) Radiata Pine.

Aspect	Accoya™ wood	Radiata Pine	Improvement
Equilibrium Moisture Content (at 65% RH, 20°C) [%]	3.3	9.8	66%
Density (at 65% RH, 20°C) [kg/m ³]	510	466	-
Swelling (oven dry – water saturated)			
- radial [%]	0.69	3.40	80%
- tangential [%]	1.47	7.89	81%

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1 Assignment

Titan Wood B.V. appointed SHR Timber Research to examine the dimensional stability of Accoya™ wood under different moisture conditions. The technology behind Accoya™ wood is based on wood acetylation, a chemical modification process that improves the dimensional stability, UV-stability and durability of wood. The process modifies the wood without the addition of toxic chemicals. Accoya™ wood's durability and dimensional stability can be determined after the acetylation process has taken place by analysing the wood's acetyl content.

In co-operation with a Dutch certification body, SKH, and research institute, SHR Timber Research, Titan Wood has established a research scheme to independently prove the quality of Accoya™ wood. This scheme consists of:

1. KOMO certificate BRL 0605 "Modified Timber". Here the emphasis is on the uniformity and reproducibility of the production process, as well as on Titan Wood's quality system.
2. Fulfilment of the (material) requirements as listed for in use of certified Dutch joinery (SKH Publication 97-04). Emphasis is on material properties, such as durability, dimensional stability and paintability.

In this research, the Equilibrium Moisture Content (EMC), the adsorption and desorption behaviour and the shrinking and swelling behaviour (dimensional stability) of Accoya™ wood (originating from New Zealand) under different moisture conditions are determined and compared to the untreated (original) wood species, Radiata Pine. These tests are part of the research scheme described above. In addition to the main research programme, samples of Accoya™ wood from Radiata pine grown in Chile were tested to investigate whether the origin of wood had any impact on the results. Although the results are incorporated, this report mainly presents and discusses the results of the Accoya™ wood originating from New Zealand.

2 Execution of the test

2.1 Identification and description of the samples

Sampling was performed according to BRL 0605 “Modified Timber” by Titan Wood. Accoya™ wood samples (originating from New Zealand) were taken from 3 batches produced in Titan Wood’s pilot plant (15 samples per batch), originating from different boards. In addition 10 Accoya™ wood samples from Radiata pine grown in Chile were used for the test. The Accoya™ wood samples and 10 samples of (untreated) Radiata Pine (from New Zealand) were used for the test, each with a dimension of 40 x 40 x 10 mm (radial x tangential x longitudinal). The codes of the samples and the correlating batch numbers can be found in appendix 1.

2.2 Procedure

The dimensional stability of Accoya™ wood was extensively investigated by establishing a so-called hysteresis curve, conforming to Standard Operation Procedures of SHR Timber Research, the Netherlands (WVS-SHR-047, WVS-SHR-048 and WVS-SHR-049). Samples were conditioned at the following climates: oven dry, 25, 35, 50, 65, 80, 95% relative humidity and water saturated (all at a temperature of 20 °C). In this order (adsorption sequence), as well as in the reverse order (desorption sequence). The weight and dimensions (radial and tangential) of the samples were determined for each of the conditions. Based on the weight measurements, the relation between the relative humidity (of the air) and the corresponding Equilibrium Moisture Content (EMC) of the wood was determined for both the adsorption and desorption sequence. The corresponding shrinking and swelling was measured in the radial and tangential orientations of the wood structure.

Calculation of swelling

Using the measurements of the dimensions, the swelling was calculated both for the radial and the tangential directions by:

$$S_{swell, j} = \frac{d_j - d_{od}}{d_{od}}$$

with:

- $S_{swell, j}$: swelling of the wood at equilibrium moisture content (EMC) j. This value is often represented as a percentage and is also called swelling coefficient.
- d_j : dimension of the wood at EMC j (in radial or in tangential direction).
- d_{od} : dimension of the wood after oven drying.

This calculation was executed for each sample separately. Thereafter the mean and the standard deviations for all samples were calculated.

Calculation of shrinking

Using the measurements of the dimensions, the shrinking was calculated both for the radial and the tangential directions by:

$$S_{shrink, j} = \frac{d_{sat} - d_j}{d_{sat}}$$

with:

- $S_{shrink, j}$: shrinking of the wood at equilibrium moisture content (EMC) j. This value is often represented as a percentage and is also called shrinking coefficient.
 d_j : dimension of the wood at EMC j (in radial or in tangential direction).
 d_{sat} : dimension of the wood after water saturation.

This calculation was executed for each sample separately. Thereafter the mean and the standard deviations for all samples were calculated.

Calculation of the linear ASE

The Anti Shrinking (or Swelling) Efficiency (ASE) of the acetylation treatment is calculated by comparing the shrinking and swelling behaviour of the Accoya™ wood to that of the untreated Radiata Pine. With the above mentioned averages of swelling and shrinking, the linear ASE for swelling or shrinking was calculated as follows:

$$ASE_{lin, i-j} = \frac{S_{lin,ref, i-j} - S_{lin,beh, i-j}}{S_{lin,ref, i-j}}$$

With:

- $ASE_{lin, i-j}$: Linear anti swelling or shrinking efficiency, expressed as a percentage in the RH trajectory i% tot j%.
 $S_{lin,ref, i-j}$: Average linear swelling or shrinking coefficient of the reference (untreated) samples in RH trajectory i% to j%.
 $S_{lin,beh, i-j}$: Average linear swelling or shrinking coefficient of the treated samples in RH trajectory i% to j%.

ASE_{rad} or ASE_{tan} shall be used as the symbol instead of ASE_{lin} , depending on the direction for which the assessment was done (resp. radial or tangential).

The density of all samples and the deviation in density were determined.

3 Results and discussion

3.1 Equilibrium Moisture Content (EMC)

The averaged Equilibrium Moisture Content (EMC) of Accoya™ wood and untreated Radiata Pine, under different moisture conditions during the adsorption sequence and desorption sequence, are shown in table 1 and 2. In figure 1, a graphical overview of the averaged results of the Accoya™ wood samples originating from New Zealand is given. All individual values can be found in appendix 2 and 3.

Table 1. The average EMC under different moisture conditions during the adsorption sequence of Accoya™ wood and untreated Radiata Pine.

Species	Batch		Oven dry	Relative Humidity						Water saturated
				adsorption →						
				25%	35%	50%	65%	80%	95%	
Accoya™ wood (New Zealand)	LG118	EMC [%]	0	1.3	1.7	2.5	3.4	4.1	7.8	118
		stdev	0	0.07	0.09	0.11	0.16	0.19	0.32	12
	LG122	EMC [%]	0	1.3	1.7	2.5	3.3	4.0	7.4	119
		stdev	0	0.05	0.08	0.09	0.12	0.14	0.32	14
	LG123	EMC [%]	0	1.3	1.7	2.5	3.3	4.0	7.4	127
stdev		0	0.09	0.11	0.12	0.16	0.19	0.35	15	
average		EMC [%]	0	1.3	1.7	2.5	3.3	4.1	7.5	121
		stdev	0	0.07	0.10	0.11	0.15	0.17	0.33	14
Accoya™ wood (Chile)	LG135	EMC [%]	0	1.2	1.4	2.2	2.9	3.5	6.5	100
		stdev	0	0.17	0.24	0.29	0.39	0.44	0.81	15
Radiata Pine (New Zealand)	Ref-LG122	EMC [%]	0	4.6	5.6	7.2	9.8	11.8	23.2	158
		stdev	0	0.10	0.17	0.14	0.14	0.14	0.56	14

Table 2. The average EMC under different moisture conditions during the desorption sequence of Accoya™ wood and untreated Radiata Pine.

Species	Batch		Oven dry	Relative Humidity						Water saturated
				← desorption						
				25%	35%	50%	65%	80%	95%	
Accoya™ wood (New Zealand)	LG118	EMC [%]	0	1.8	2.5	3.7	4.6	5.4	7.5	117
		stdev	0	0.13	0.17	0.22	0.28	0.34	0.44	12
	LG122	EMC [%]	0	1.8	2.5	3.7	4.5	5.3	7.5	118
		stdev	0	0.08	0.11	0.15	0.19	0.23	0.30	13
	LG123	EMC [%]	0	1.9	2.5	3.7	4.5	5.3	7.5	124
stdev		0	0.12	0.15	0.19	0.23	0.27	0.40	13	
average		EMC [%]	0	1.8	2.5	3.7	4.5	5.3	7.5	120
		stdev	0	0.11	0.14	0.19	0.23	0.28	0.38	13
Accoya™ wood (Chile)	LG135	EMC [%]	0	1.5	2.0	3.1	3.8	4.4	6.2	105
		stdev	0	0.28	0.36	0.46	0.56	0.65	1.00	16
Radiata Pine (New Zealand)	Ref-LG122	EMC [%]	0	6.7	8.5	11.5	14.0	16.1	23.9	178
		stdev	0	0.17	0.19	0.21	0.21	0.24	0.57	14

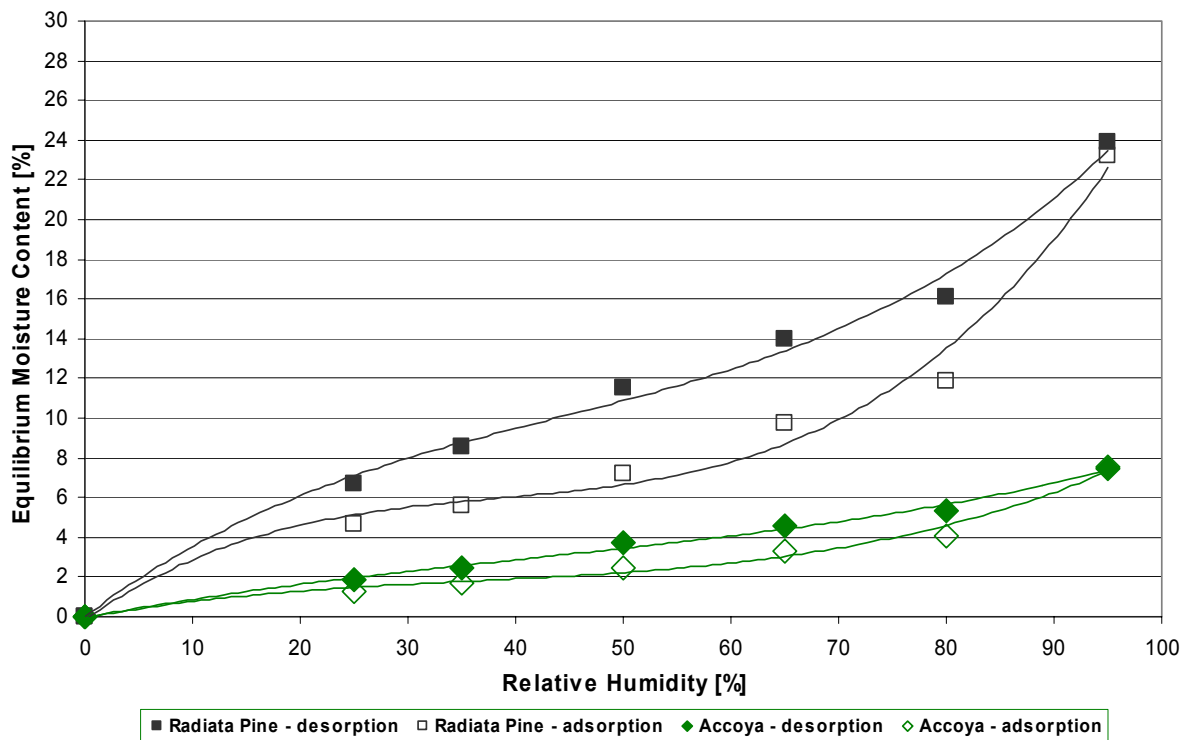


Figure 1. Averaged EMC of Accoya™ wood (originating from New Zealand) and untreated Radiata Pine under different moisture conditions.

Figure 1 demonstrates the substantial reduction of the hygroscopicity of the Accoya™ wood compared to the untreated Radiata Pine. The reduction of EMC (average reduction for all individual conditions) of Accoya™ wood (originating from New Zealand) compared to (untreated) Radiata Pine was 69%. The results per moisture condition are ranked in the same order as the overall average reduction, as can be seen in appendix 4.

Table 1 and 2 show a low variation in EMC between the different batches of Accoya™ wood, in comparison to the overall variation in EMC results. The standard deviation of the measured EMC of the Accoya wood™ was found to be slightly lower than the untreated reference (Radiata Pine).

The Accoya™ wood samples originating from Chile showed similar values to the Accoya™ wood samples from New Zealand.

3.2 Dimensional stability

Table 3 and 4 show the averaged (percentages of) swelling and shrinking in the radial and tangential directions of Accoya™ wood and untreated Radiata Pine, under different moisture conditions. In figure 2 (shrinking) and 3 (swelling) a graphical overview of the averaged results of the Accoya™ wood samples originating from New Zealand is given. All individual values can be found in appendix 5, 6, 7 and 8.

Table 3. The average swelling in the radial (rad.) and tangential (tang.) directions under different moisture conditions of Accoya™ wood and untreated Radiata Pine.

Species	Batch		Oven dry	Relative Humidity adsorption →						Water saturated
				25%	35%	50%	65%	80%	95%	
Accoya™ wood (New Zealand)	LG118	rad. swell. [%]	0	0.10	0.11	0.16	0.28	0.34	0.60	0.67
		<i>stdev</i>	0	0.03	0.03	0.03	0.05	0.05	0.12	0.12
	LG122	rad. swell. [%]	0	0.09	0.13	0.16	0.29	0.35	0.65	0.73
		<i>stdev</i>	0	0.02	0.02	0.02	0.03	0.04	0.11	0.13
	LG123	rad. swell. [%]	0	0.10	0.13	0.15	0.27	0.32	0.61	0.68
		<i>stdev</i>	0	0.02	0.03	0.03	0.05	0.05	0.11	0.13
	average	rad. swell. [%]	0	0.10	0.12	0.16	0.28	0.34	0.62	0.69
	<i>stdev</i>	0	0.02	0.03	0.03	0.04	0.05	0.11	0.13	
Accoya™ wood (Chile)	LG135	rad. swell. [%]	0	0.11	0.13	0.17	0.29	0.35	0.66	0.74
		<i>stdev</i>	0	0.04	0.05	0.06	0.09	0.10	0.22	0.25
Radiata Pine (New Zealand)	Ref-LG122	rad. swell. [%]	0	0.55	0.67	0.86	1.23	1.50	2.95	3.40
		<i>stdev</i>	0	0.09	0.11	0.14	0.19	0.23	0.54	0.63

Species	Batch		Oven dry	Relative Humidity adsorption →						Water saturated
				25%	35%	50%	65%	80%	95%	
Accoya™ wood (New Zealand)	LG118	tang. swell. [%]	0	0.12	0.17	0.27	0.45	0.58	1.26	1.46
		<i>stdev</i>	0	0.03	0.04	0.05	0.07	0.10	0.26	0.31
	LG122	tang. swell. [%]	0	0.12	0.18	0.28	0.47	0.60	1.30	1.51
		<i>stdev</i>	0	0.03	0.03	0.04	0.07	0.08	0.20	0.24
	LG123	tang. swell. [%]	0	0.12	0.17	0.26	0.44	0.56	1.23	1.43
		<i>stdev</i>	0	0.03	0.04	0.04	0.06	0.07	0.15	0.17
	average	tang. swell. [%]	0	0.12	0.17	0.27	0.45	0.58	1.26	1.47
	<i>stdev</i>	0	0.03	0.04	0.04	0.06	0.08	0.20	0.24	
Accoya™ wood (Chile)	LG135	tang. swell. [%]	0	0.14	0.16	0.25	0.42	0.52	1.12	1.30
		<i>stdev</i>	0	0.06	0.08	0.11	0.17	0.21	0.45	0.56
Radiata Pine (New Zealand)	Ref-LG122	tang. swell. [%]	0	0.91	1.12	1.50	2.19	2.73	5.92	7.89
		<i>stdev</i>	0	0.12	0.12	0.13	0.15	0.17	0.42	0.76

The results show that the dimensional stability of the Accoya™ wood (originating from New Zealand) was substantially improved compared to that of untreated Radiata Pine. There is a low variation in average shrinking and swelling values of Accoya™ wood (originating from New Zealand) treated in different batches of Accoya™ wood, in comparison to the overall variation. The averaged overall standard deviation of the shrinking and swelling values of Accoya™ wood was lower compared to that of untreated Radiata Pine.

The Accoya™ wood samples originating from Chile showed similar values as the Accoya™ wood samples originating from New Zealand.

The average maximum swelling (from oven dry to water saturated) in the radial direction for Accoya™ wood was 0.7% (for both wood sources; New Zealand as well as Chile), whereas the corresponding average maximum swelling for the untreated Radiata Pine was 3.4%. The largest (individual) maximum swelling (and shrinking) in the radial direction for Accoya™ wood was 1.2% (see appendix 5 and 7).

The average maximum swelling (from oven dry to water saturated) in the tangential direction for Accoya™ wood was 1.5% (New Zealand) and 1.3% (Chile), whereas the corresponding average maximum swelling for the untreated Radiata Pine was 7.9%. The largest (individual) maximum swelling (and shrinking) in the tangential direction for Accoya™ was 2.7% (see appendix 6 and 8).

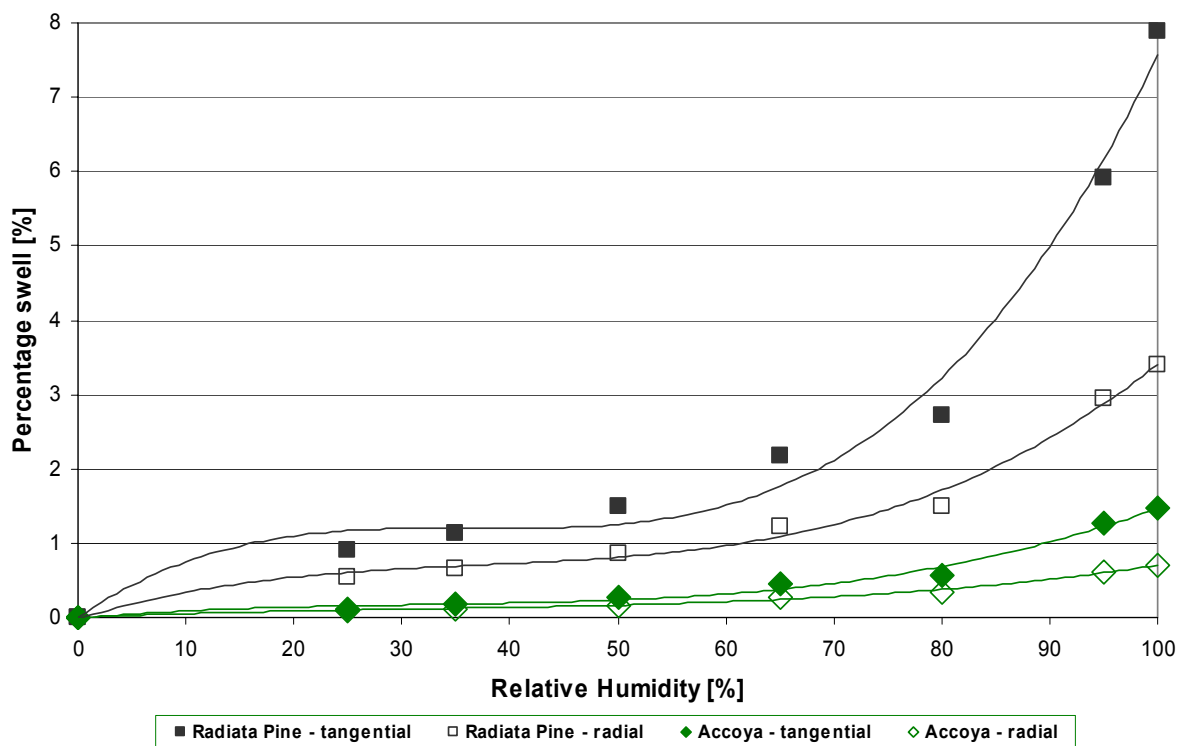


Figure 2. Swelling in the radial and tangential directions as a function of the relative humidity of the (conditioned) air of Accoya™ wood (originating from New Zealand) and Radiata Pine.

Table 4. The average shrinking in the radial (rad.) and tangential (tang.) directions under different moisture conditions of Accoya™ wood and untreated Radiata Pine.

Species	Batch		Oven dry	← desorption					Water saturated	
				25%	35%	50%	65%	80%		95%
Accoya™ wood (New Zealand)	LG118	rad. shrink. [%]	0.64	0.57	0.50	0.39	0.36	0.24	0.09	0
		stdev	0.12	0.10	0.09	0.07	0.06	0.05	0.03	0
	LG122	rad. shrink. [%]	0.73	0.65	0.56	0.47	0.42	0.30	0.12	0
		stdev	0.18	0.13	0.15	0.10	0.10	0.08	0.06	0
	LG123	rad. shrink. [%]	0.67	0.59	0.53	0.41	0.37	0.27	0.11	0
		stdev	0.13	0.11	0.10	0.10	0.08	0.07	0.05	0
average	rad. shrink. [%]	0.68	0.60	0.53	0.42	0.38	0.27	0.11	0	
stdev	0.14	0.12	0.11	0.09	0.08	0.07	0.05	0		
Accoya™ wood (Chile)	LG135	rad. shrink. [%]	0.73	0.62	0.55	0.43	0.39	0.28	0.09	0
stdev	0.26	0.22	0.20	0.16	0.13	0.10	0.05	0		
Radiata Pine (New Zealand)	Ref-LG122	rad. shrink. [%]	3.33	2.48	2.22	1.80	1.50	1.20	0.36	0
stdev	0.66	0.54	0.50	0.43	0.39	0.31	0.11	0		

Species	Batch		Oven dry	← desorption					Water saturated	
				25%	35%	50%	65%	80%		95%
Accoya™ wood (New Zealand)	LG118	tang. shrink. [%]	1.49	1.27	1.15	0.93	0.78	0.58	0.19	0
		stdev	0.34	0.28	0.25	0.22	0.18	0.15	0.07	0
	LG122	tang. shrink. [%]	1.53	1.31	1.19	0.97	0.81	0.61	0.20	0
		stdev	0.25	0.21	0.19	0.16	0.15	0.10	0.04	0
	LG123	tang. shrink. [%]	1.45	1.24	1.12	0.91	0.77	0.57	0.18	0
		stdev	0.18	0.15	0.14	0.12	0.10	0.08	0.04	0
average	tang. shrink. [%]	1.49	1.27	1.15	0.94	0.79	0.58	0.19	0	
stdev	0.26	0.22	0.20	0.16	0.14	0.11	0.05	0		
Accoya™ wood (Chile)	LG135	tang. shrink. [%]	1.32	1.13	1.03	0.83	0.69	0.53	0.18	0
stdev	0.55	0.47	0.43	0.35	0.29	0.23	0.09	0		
Radiata Pine (New Zealand)	Ref-LG122	tang. shrink. [%]	7.17	5.75	5.30	4.56	3.96	3.38	1.46	0
stdev	0.76	0.71	0.71	0.68	0.65	0.62	0.36	0		

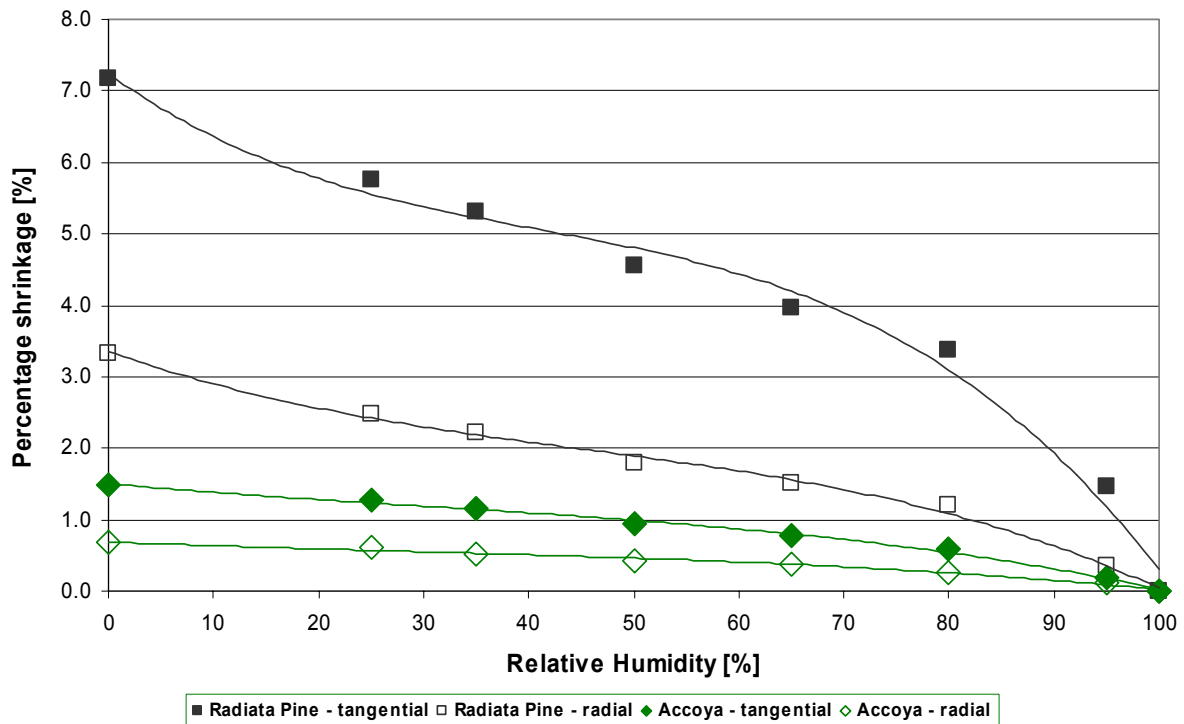


Figure 3. Shrinking in the radial and tangential directions as a function of the relative humidity of the (conditioned) air of Accoya™ wood (originating from New Zealand) and Radiata Pine.

In the figure below, the hygroscopic behaviour (water vapour desorption and adsorption) of Accoya™ wood is shown in changing relative humidities (of the surrounding air). The corresponding (percentage of) swelling or shrinking due to moisture uptake or loss is shown in the right part of the graphic.

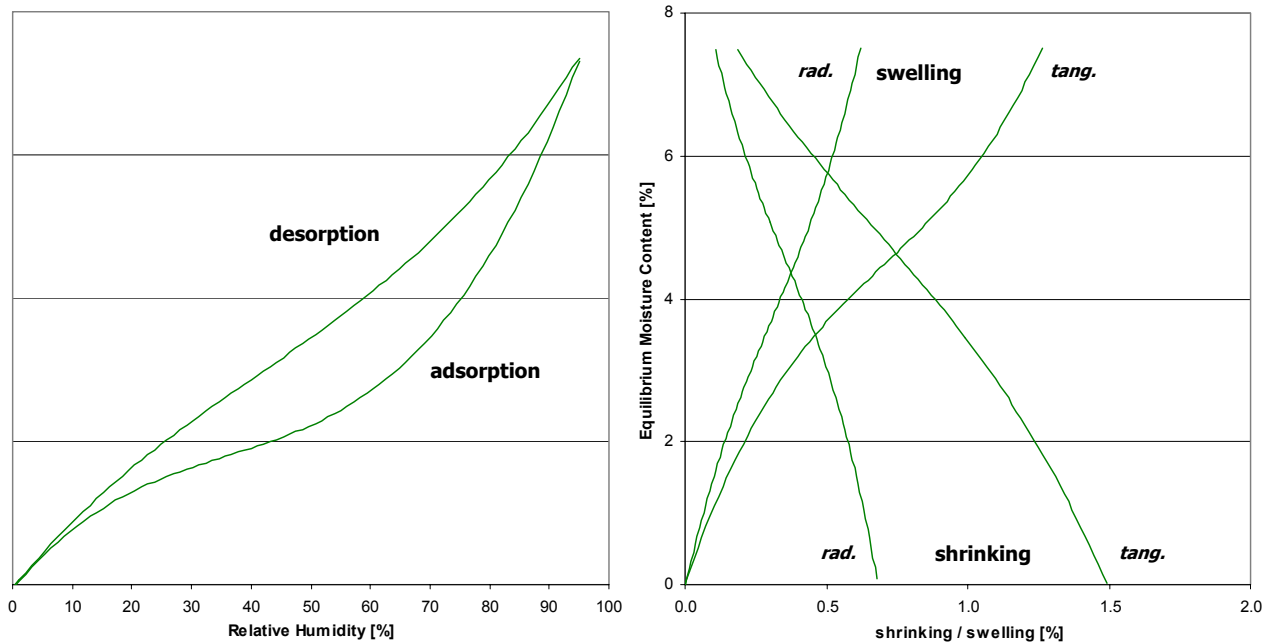


Figure 4. Hygroscopic behaviour (left) of Accoya™ wood under different moisture conditions and the corresponding swelling and shrinking behaviour.

3.3 Anti-Swelling (Shrinking)-Efficiency (ASE)

The impact of the treatment on the reduction of swelling and shrinking compared to the untreated wood can be expressed in the so-called Anti-Swelling-Efficiency or Anti-Shrinking-Efficiency; both referred to as ASE. The average overall ASE in the radial direction was 78% and in the tangential direction 81%. The values for ASE are comparable for the whole range of air humidity tested, as can be seen in appendix 9.

In the figure below the hygroscopic behaviour (water vapour desorption and adsorption) of Accoya™ wood and (untreated) Radiata pine is shown in changing relative humidities (of the surrounding air). The corresponding (percentage of) swelling or shrinking due to moisture uptake or loss is shown in the right part of the graphic.

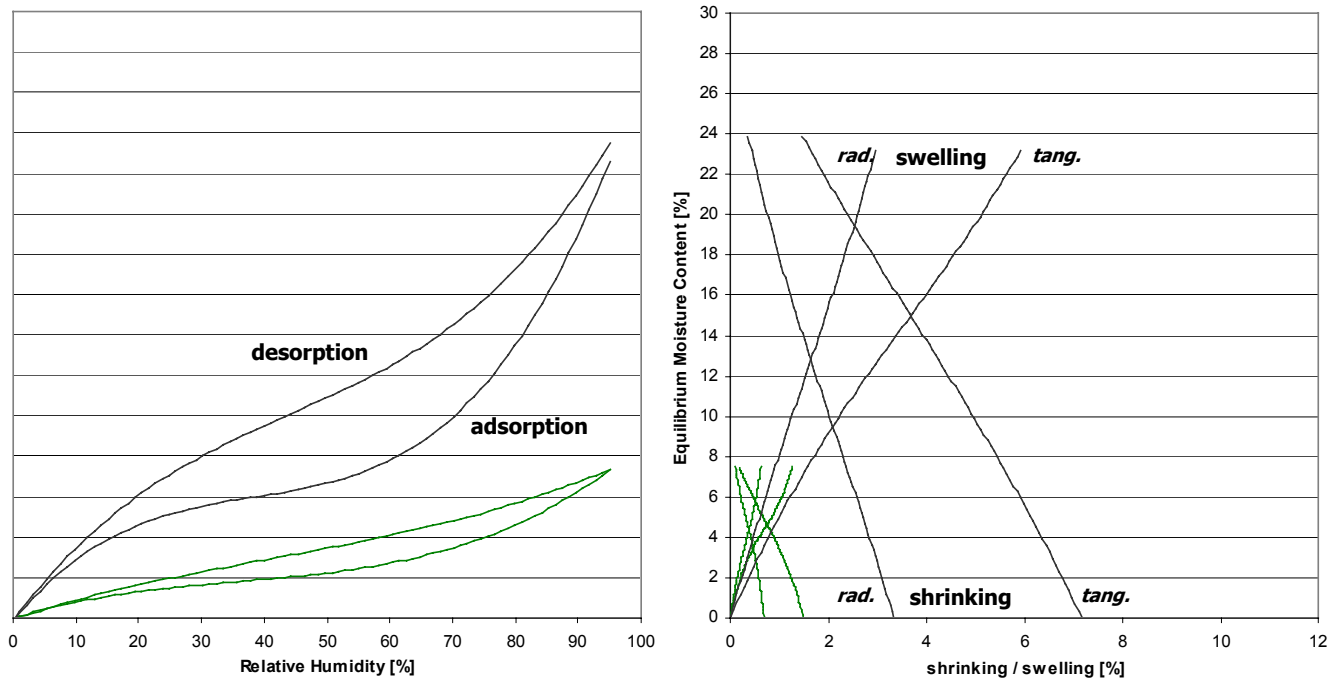


Figure 5. Hygroscopic behaviour (left) of Accoya™ wood (green line) and (untreated) Radiata Pine (grey line) under different moisture conditions and the corresponding swelling and shrinking behaviour.

3.4 Density

In table 5 an overview of the variation in density of Accoya™ wood and Radiata Pine is shown for three specific climates / conditions. (The complete data for density under different moisture conditions of Accoya™ wood and untreated Radiata Pine can be found in appendix 10). At the standard climate condition, 20 °C and 65% relative humidity, the average density of Accoya™ wood (New Zealand) was 510 kg/m³, whereas the average density of the untreated Radiata Pine was 466 kg/m³ under the same condition. The average increase of the density of Accoya™ wood compared to the untreated wood was 14% based on (oven) dry material. The Accoya™ wood samples originating from Chile had in general a higher average density and a larger variation compared to the Accoya™ wood samples originating from New Zealand.

Table 5. Density and EMC under different moisture conditions of Accoya™ wood and untreated Radiata Pine.

Species	Condition	EMC [%] avg.	Density [kg/m ³]			
			avg.	stdev	min.	max.
Accoya™ wood (New Zealand)	oven dry	0	497	35	427	585
	65% RH, 20 °C	3.3	510	36	438	599
	95% RH, 20 °C	7.5	525	36	451	613
Accoya™ wood (Chile)	oven dry	0	543	57	429	649
	65% RH, 20 °C	2.9	555	58	439	663
	95% RH, 20 °C	6.5	568	59	453	677
Radiata Pine (New Zealand)	oven dry	0	440	29	402	497
	65% RH, 20 °C	9.8	466	30	427	526
	95% RH, 20 °C	23.2	496	31	454	558

4 Conclusions

4.1 Equilibrium Moisture Content, density and dimensional stability of Accoya™ wood

The table below summarises the characteristics of Accoya™ wood (originating from New Zealand) that was acetylated in three separate batches. On the basis of the results, it can be concluded that there is a low variation between the different acetylation batches compared to the overall variation. It can be concluded that in respect to the Equilibrium Moisture Content and dimensional stability the acetylation process is uniform (within a batch) and reproducible (between batches).

Table 6. Density, Equilibrium Moisture Content, and radial and tangential swelling of Accoya™ wood (adsorption sequence).

Aspect	Avg.	Stdev.	Min.	Max.
Equilibrium Moisture Content (at 65% RH, 20°C) [%]	3.3	0.15	3.0	3.8
Density (at 65% RH, 20°C) [kg/m ³]	510	36	438	599
Swelling (oven dry – water saturated)				
- radial [%]	0.69	0.13	0.49	0.99
- tangential [%]	1.47	0.24	0.91	2.34

4.2 Comparison between Accoya™ wood originating from New Zealand and Chile

The Accoya™ wood samples originating from Chile showed similar values for the hygroscopicity (equilibrium moisture content) and dimensional stability (swelling and shrinking) as the Accoya™ wood samples from New Zealand. The average density, however, was higher for the Accoya™ wood samples originating from Chile, as well as the variation between samples.

Table 7. Average density, Equilibrium Moisture Content, and radial and tangential swelling (adsorption sequence) of Accoya™ wood originating from New Zealand (NZ) and Chile (CL).

Aspect	Accoya™ wood (NZ)	Accoya™ wood (CL)
Equilibrium Moisture Content (at 65% RH, 20°C) [%]	3.3	2.9
Density (at 65% RH, 20°C) [kg/m ³]	510	555
Swelling (oven dry – water saturated)		
- radial [%]	0.69	0.74
- tangential [%]	1.47	1.30

4.3 Comparison between Accoya™ wood and (untreated) Radiata Pine

The results show a substantial reduction of the hygroscopicity (Equilibrium Moisture Content) of the Accoya™ wood compared to the untreated Radiata Pine under the same moisture conditions (relative humidity). The dimensional stability (swelling and shrinking) of Accoya™ wood is considerably improved (by approximately 80%) compared to the (untreated) Radiata Pine.

Table 8. Average density, Equilibrium Moisture Content, and radial and tangential swelling of Accoya™ wood and untreated Radiata Pine (adsorption sequence).

Aspect	Accoya™ wood	Radiata Pine	Improvement
Equilibrium Moisture Content (at 65% RH, 20°C) [%]	3.3	9.8	66%
Density (at 65% RH, 20°C) [kg/m ³]	510	466	-
Swelling (oven dry – water saturated)			
- radial [%]	0.69	3.40	80%
- tangential [%]	1.47	7.89	81%

References

WVS-SHR-047 (2002). Bepaling van het evenwichtsvochtgehalte van massief hout. SHR Hout Research, Wageningen.

WVS-SHR-048 (2002). Bepaling van ASE uit krimp- en zwellgegevens. SHR Hout Research, Wageningen.

WVS-SHR-049 (2002). Bepaling van krimp en zwellung van massief hout. SHR Hout Research, Wageningen.

Appendix 1 Sampling, codes and batch numbers

Accoya™ wood (New Zealand)			Accoya™ wood (Chile)	Reference (Radiata Pine - NZ)
Batch LG118	Batch LG122	Batch LG123	Batch LG135	References
LG118 RP2	LG122 RP1	LG123 RP2	LG135 RP1	REF - LG118 RP2
LG118 RP3	LG122 RP5	LG123 RP3	LG135 RP3	REF - LG118 RP3
LG118 RP5	LG122 RP6	LG123 RP4	LG135 RP5a	REF - LG118 RP7
LG118 RP7	LG122 RP8	LG123 RP5	LG135 RP5b	REF - LG118 RP9
LG118 RP8	LG122 RP9	LG123 RP6	LG135 RP7	REF - LG118 RP11
LG118 RP9	LG122 RP10	LG123 RP8	LG135 RP8	REF - LG118 RP14
LG118 RP11	LG122 RP11	LG123 RP9	LG135 RP9	REF - LG118 RP15
LG118 RP14	LG122 RP13	LG123 RP10	LG135 RP11	REF - LG118 RP16
LG118 RP15	LG122 RP14	LG123 RP11	LG135 RP12	REF - LG118 RP21
LG118 RP16	LG122 RP15	LG123 RP12	LG135 RP100	REF - LG118 RP23
LG118 RP17	LG122 RP16	LG123 RP14		
LG118 RP21	LG122 RP17	LG123 RP15		
LG118 RP22	LG122 RP20	LG123 RP16		
LG118 RP23	LG122 RP21	LG123 RP18		
LG118 RP24	LG122 RP22	LG123 RP19		

Appendix 2 EMC adsorption

Accoya™ wood (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG118 RP2	0	1.3	1.6	2.4	3.2	4.0	7.3	122
LG118 RP3	0	1.3	1.6	2.4	3.2	3.9	7.5	141
LG118 RP5	0	1.3	1.7	2.5	3.3	4.0	7.4	114
LG118 RP7	0	1.3	1.7	2.4	3.3	4.0	7.5	112
LG118 RP8	0	1.5	2.0	2.8	3.8	4.7	8.6	113
LG118 RP9	0	1.3	1.8	2.5	3.4	4.2	7.8	131
LG118 RP11	0	1.3	1.8	2.5	3.4	4.2	7.8	112
LG118 RP14	0	1.2	1.6	2.4	3.2	3.9	7.5	134
LG118 RP15	0	1.3	1.8	2.6	3.5	4.2	7.9	100
LG118 RP16	0	1.3	1.7	2.5	3.4	4.1	7.9	105
LG118 RP17	0	1.3	1.8	2.5	3.4	4.2	7.9	110
LG118 RP21	0	1.3	1.7	2.4	3.3	4.0	7.6	103
LG118 RP22	0	1.2	1.7	2.4	3.3	4.0	7.7	124
LG118 RP23	0	1.3	1.7	2.5	3.4	4.2	8.1	126
LG118 RP24	0	1.4	1.7	2.6	3.5	4.3	8.0	118
Avg	0	1.3	1.7	2.5	3.4	4.1	7.8	118
Stdev	0	0.1	0.1	0.1	0.2	0.2	0.3	11.8

Accoya™ wood (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG122 RP1	0	1.2	1.6	2.3	3.1	3.8	6.9	130
LG122 RP5	0	1.3	1.8	2.5	3.5	4.2	7.6	126
LG122 RP6	0	1.2	1.7	2.4	3.2	3.9	7.1	94
LG122 RP8	0	1.3	1.7	2.4	3.3	4.0	7.4	128
LG122 RP9	0	1.3	1.8	2.5	3.4	4.1	7.4	122
LG122 RP10	0	1.3	1.8	2.5	3.4	4.1	7.4	104
LG122 RP11	0	1.3	1.7	2.4	3.3	4.0	7.4	139
LG122 RP13	0	1.3	1.7	2.4	3.3	4.0	7.5	129
LG122 RP14	0	1.3	1.7	2.5	3.4	4.1	7.4	107
LG122 RP15	0	1.3	1.7	2.5	3.4	4.1	7.6	112
LG122 RP16	0	1.3	1.7	2.5	3.4	4.1	7.5	108
LG122 RP17	0	1.3	1.7	2.5	3.4	4.2	7.9	120
LG122 RP20	0	1.3	1.7	2.5	3.3	4.1	7.8	134
LG122 RP21	0	1.1	1.5	2.2	3.0	3.7	6.6	98
LG122 RP22	0	1.3	1.6	2.5	3.3	4.1	7.6	136
Avg	0	1.3	1.7	2.5	3.3	4.0	7.4	119
Stdev	0	0.1	0.1	0.1	0.1	0.1	0.3	14.4



Accoya™ wood (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG123 RP2	0	1.1	1.5	2.3	3.1	3.8	7.0	159
LG123 RP3	0	1.3	1.7	2.5	3.4	4.1	7.7	125
LG123 RP4	0	1.3	1.7	2.5	3.4	4.0	7.3	143
LG123 RP5	0	1.2	1.7	2.4	3.3	4.0	7.1	136
LG123 RP6	0	1.3	1.7	2.5	3.4	4.0	7.2	111
LG123 RP8	0	1.2	1.6	2.4	3.2	3.8	6.8	105
LG123 RP9	0	1.3	1.7	2.5	3.3	4.0	7.3	123
LG123 RP10	0	1.3	1.7	2.5	3.3	4.0	7.4	126
LG123 RP11	0	1.3	1.6	2.4	3.3	3.9	7.2	127
LG123 RP12	0	1.3	1.6	2.4	3.2	3.9	7.2	149
LG123 RP14	0	1.4	1.8	2.6	3.6	4.3	7.9	115
LG123 RP15	0	1.5	1.9	2.8	3.7	4.5	8.2	114
LG123 RP16	0	1.3	1.7	2.5	3.4	4.1	7.6	113
LG123 RP18	0	1.2	1.6	2.4	3.2	3.9	7.2	141
LG123 RP19	0	1.2	1.5	2.3	3.2	3.9	7.2	121
Avg	0	1.3	1.7	2.5	3.3	4.0	7.4	127
Stdev	0	0.1	0.1	0.1	0.2	0.2	0.4	15.4

Accoya™ wood (CL) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG135 RP1	0	1.0	1.3	2.1	2.7	3.3	6.1	105
LG135 RP3	0	1.1	1.5	2.2	3.0	3.6	6.6	91
LG135 RP5a	0	1.0	1.4	2.1	2.8	3.4	5.9	101
LG135 RP5b	0	1.1	1.4	2.1	2.8	3.4	6.1	102
LG135 RP7	0	1.2	1.6	2.3	3.1	3.8	6.8	78
LG135 RP8	0	1.6	2.0	2.9	3.9	4.7	8.7	89
LG135 RP9	0	1.1	1.4	2.1	2.9	3.5	6.2	93
LG135 RP11	0	1.1	1.3	2.0	2.7	3.2	6.5	133
LG135 RP12	0	1.2	1.4	2.1	2.9	3.4	6.3	97
LG135 RP100	0	1.1	1.2	1.9	2.6	3.1	6.0	114
Avg	0	1.2	1.4	2.2	2.9	3.5	6.5	100
Stdev	0	0.2	0.2	0.3	0.4	0.4	0.8	15.1

Radiata pine (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
REF - LG118 RP2	0	4.5	5.4	7.1	9.6	11.7	22.2	161
REF - LG118 RP3	0	4.6	5.5	7.2	9.8	11.9	23.2	169
REF - LG118 RP7	0	4.6	5.6	7.2	9.7	11.7	22.7	146
REF - LG118 RP9	0	4.6	5.6	7.3	9.8	11.9	23.4	154
REF - LG118 RP11	0	4.7	5.7	7.3	9.8	11.8	22.9	155
REF - LG118 RP14	0	4.8	5.7	7.4	9.9	11.9	23.9	168
REF - LG118 RP15	0	4.7	5.6	7.3	9.7	11.7	22.8	146
REF - LG118 RP16	0	4.8	5.7	7.4	9.9	12.0	24.1	139
REF - LG118 RP21	0	4.7	5.6	7.2	9.8	12.0	23.5	158
REF - LG118 RP23	0	4.5	5.2	6.9	9.4	11.6	23.2	185
Avg	0	4.6	5.6	7.2	9.8	11.8	23.2	158
Stdev	0	0.1	0.2	0.1	0.1	0.1	0.6	13.5

Appendix 3 EMC desorption

Accoya™ wood (NZ) Board	Oven dry	← desorption Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG118 RP2	0	1.7	2.3	3.5	4.2	4.8	7.1	117
LG118 RP3	0	1.7	2.3	3.5	4.2	5.0	6.9	142
LG118 RP5	0	1.8	2.4	3.7	4.5	5.3	7.4	108
LG118 RP7	0	1.8	2.4	3.6	4.4	5.2	7.5	117
LG118 RP8	0	2.2	3.0	4.4	5.4	6.3	8.9	110
LG118 RP9	0	1.8	2.4	3.7	4.5	5.3	7.4	133
LG118 RP11	0	1.8	2.5	3.7	4.6	5.4	7.5	112
LG118 RP14	0	1.8	2.4	3.6	4.4	5.2	7.2	140
LG118 RP15	0	1.9	2.6	3.8	4.7	5.5	7.7	103
LG118 RP16	0	1.9	2.5	3.7	4.5	5.3	7.5	107
LG118 RP17	0	1.9	2.6	3.8	4.7	5.4	7.5	108
LG118 RP21	0	1.8	2.4	3.7	4.5	5.2	7.3	108
LG118 RP22	0	1.8	2.4	3.7	4.5	5.3	7.2	117
LG118 RP23	0	1.8	2.5	3.8	4.7	5.5	7.6	119
LG118 RP24	0	1.9	2.6	3.9	4.8	5.6	7.7	112
Avg	0	1.8	2.5	3.7	4.6	5.4	7.5	117
Stdev	0	0.1	0.2	0.2	0.3	0.3	0.4	12.2

Accoya™ wood (NZ) Board	Oven dry	← desorption Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG122 RP1	0	1.7	2.3	3.5	4.2	5.0	6.9	129
LG122 RP5	0	1.9	2.5	3.9	4.7	5.6	7.9	126
LG122 RP6	0	1.8	2.3	3.6	4.4	5.1	7.2	95
LG122 RP8	0	1.8	2.4	3.6	4.5	5.2	7.3	124
LG122 RP9	0	1.8	2.4	3.7	4.5	5.3	7.4	123
LG122 RP10	0	1.9	2.5	3.8	4.6	5.4	7.5	103
LG122 RP11	0	1.9	2.5	3.7	4.5	5.3	7.5	136
LG122 RP13	0	1.8	2.4	3.7	4.5	5.3	7.4	130
LG122 RP14	0	1.9	2.5	3.8	4.6	5.4	7.6	107
LG122 RP15	0	1.9	2.5	3.8	4.6	5.4	7.6	111
LG122 RP16	0	1.9	2.5	3.7	4.6	5.4	7.6	109
LG122 RP17	0	2.0	2.6	3.8	4.7	5.6	7.8	120
LG122 RP20	0	1.9	2.5	3.7	4.6	5.4	7.6	128
LG122 RP21	0	1.7	2.2	3.3	4.1	4.7	6.9	96
LG122 RP22	0	2.0	2.6	3.9	4.8	5.6	7.9	131
Avg	0	1.8	2.5	3.7	4.5	5.3	7.5	118
Stdev	0	0.1	0.1	0.2	0.2	0.2	0.3	13.3



Accoya™ wood (NZ) Board	Oven dry	← desorption Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG123 RP2	0	1.7	2.3	3.4	4.3	5.0	6.9	147
LG123 RP3	0	1.9	2.5	3.8	4.7	5.5	7.7	118
LG123 RP4	0	1.8	2.4	3.7	4.5	5.3	7.4	137
LG123 RP5	0	1.8	2.4	3.6	4.4	5.2	7.2	136
LG123 RP6	0	1.8	2.4	3.7	4.5	5.3	7.4	114
LG123 RP8	0	1.8	2.4	3.6	4.4	5.2	7.3	103
LG123 RP9	0	1.8	2.4	3.6	4.4	5.2	7.3	121
LG123 RP10	0	1.8	2.4	3.6	4.5	5.3	7.4	125
LG123 RP11	0	1.8	2.4	3.6	4.4	5.1	7.3	125
LG123 RP12	0	1.8	2.4	3.5	4.3	5.1	7.1	147
LG123 RP14	0	2.1	2.8	4.0	5.0	5.8	8.1	112
LG123 RP15	0	2.1	2.8	4.2	5.1	6.0	8.5	112
LG123 RP16	0	1.9	2.6	3.8	4.7	5.4	7.7	109
LG123 RP18	0	1.8	2.4	3.6	4.5	5.2	7.4	122
LG123 RP19	0	1.8	2.4	3.6	4.5	5.2	7.3	131
Avg	0	1.9	2.5	3.7	4.5	5.3	7.5	124
<i>Stdev</i>	<i>0</i>	<i>0.1</i>	<i>0.1</i>	<i>0.2</i>	<i>0.2</i>	<i>0.3</i>	<i>0.4</i>	<i>13.5</i>

Accoya™ wood (CL) Board	Oven dry	← desorption Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG135 RP1	0	1.2	1.7	2.7	3.4	4.0	5.5	118
LG135 RP3	0	1.4	2.0	3.1	3.8	4.5	6.2	106
LG135 RP5a	0	1.4	1.9	2.9	3.6	4.1	5.7	113
LG135 RP5b	0	1.4	1.9	3.0	3.6	4.2	5.8	112
LG135 RP7	0	1.6	2.2	3.3	4.1	4.7	6.6	83
LG135 RP8	0	2.2	2.9	4.3	5.3	6.1	8.9	74
LG135 RP9	0	1.4	1.8	2.9	3.6	4.1	5.9	100
LG135 RP11	0	1.4	1.9	2.8	3.5	4.0	6.4	122
LG135 RP12	0	1.4	1.9	2.9	3.6	4.2	5.9	100
LG135 RP100	0	1.3	1.7	2.7	3.4	3.9	5.5	123
Avg	0	1.5	2.0	3.1	3.8	4.4	6.2	105
<i>Stdev</i>	<i>0</i>	<i>0.3</i>	<i>0.4</i>	<i>0.5</i>	<i>0.6</i>	<i>0.7</i>	<i>1.0</i>	<i>16.3</i>

Radiata pine (NZ) Board	Oven dry	← desorption Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
REF - LG118 RP2	0	6.7	8.5	11.5	14.0	16.1	22.8	185
REF - LG118 RP3	0	6.7	8.5	11.5	14.0	16.2	24.1	192
REF - LG118 RP7	0	6.6	8.4	11.3	13.7	15.9	23.5	167
REF - LG118 RP9	0	6.7	8.5	11.5	13.9	16.1	24.1	180
REF - LG118 RP11	0	6.9	8.7	11.7	14.2	16.3	23.7	167
REF - LG118 RP14	0	6.9	8.7	11.7	14.2	16.3	24.5	188
REF - LG118 RP15	0	6.8	8.6	11.6	14.0	16.1	23.6	169
REF - LG118 RP16	0	6.9	8.7	11.7	14.2	16.4	24.9	153
REF - LG118 RP21	0	6.7	8.5	11.5	13.9	16.1	24.1	175
REF - LG118 RP23	0	6.3	8.1	11.0	13.5	15.6	23.6	199
Avg	0	6.7	8.5	11.5	14.0	16.1	23.9	178
<i>Stdev</i>	<i>0</i>	<i>0.2</i>	<i>0.2</i>	<i>0.2</i>	<i>0.2</i>	<i>0.2</i>	<i>0.6</i>	<i>13.9</i>

Appendix 4 Percentage of reduction of the adsorption and desorption of Accoya™ (relative to the untreated Radiata Pine)

Adsorption

Species	Batch		Oven dry	Relative Humidity						Water saturated
				adsorption →						
		red. EMC [%]		25%	35%	50%	65%	80%	95%	
Accoya™ wood (New Zealand)	LG118	red. EMC [%]	0	72	69	66	65	65	66	25
	LG122	red. EMC [%]	0	72	69	66	66	66	68	25
	LG123	red. EMC [%]	0	73	70	66	66	66	68	20
	average	red. EMC [%]	0	72	69	66	66	66	68	23
Accoya™ wood (Chile)	LG135	red. EMC [%]	0	75	74	70	70	70	72	37

Desorption

Species	Batch		Oven dry	Relative Humidity						Water saturated
				← desorption						
		red. EMC [%]		25%	35%	50%	65%	80%	95%	
Accoya™ wood (New Zealand)	LG118	red. EMC [%]	0	72	71	68	67	67	69	34
	LG122	red. EMC [%]	0	73	71	68	68	67	69	34
	LG123	red. EMC [%]	0	72	71	68	67	67	69	30
	average	red. EMC [%]	0	72	71	68	67	67	69	33
Accoya™ wood (Chile)	LG135	red. EMC [%]	0	78	77	73	73	73	74	0



Appendix 5 Radial swelling - adsorption

Accoya™ wood (NZ) Board	Oven dry	Relative Humidity						Water saturated
		adsorption →						
		25%	35%	50%	65%	80%	95%	
LG118 RP2	0	0.08	0.09	0.16	0.23	0.28	0.41	0.50
LG118 RP3	0	0.08	0.09	0.11	0.21	0.25	0.45	0.52
LG118 RP5	0	0.07	0.09	0.11	0.22	0.26	0.44	0.50
LG118 RP7	0	0.11	0.14	0.18	0.32	0.39	0.71	0.81
LG118 RP8	0	0.12	0.15	0.21	0.35	0.44	0.78	0.87
LG118 RP9	0	0.11	0.15	0.20	0.34	0.41	0.75	0.82
LG118 RP11	0	0.14	0.12	0.19	0.28	0.33	0.61	0.66
LG118 RP14	0	0.07	0.10	0.15	0.26	0.33	0.59	0.65
LG118 RP15	0	0.11	0.12	0.14	0.35	0.34	0.66	0.73
LG118 RP16	0	0.03	0.04	0.10	0.25	0.29	0.61	0.68
LG118 RP17	0	0.12	0.14	0.18	0.30	0.37	0.65	0.71
LG118 RP21	0	0.08	0.11	0.13	0.27	0.32	0.59	0.65
LG118 RP22	0	0.11	0.12	0.14	0.27	0.31	0.53	0.57
LG118 RP23	0	0.11	0.13	0.16	0.27	0.32	0.51	0.56
LG118 RP24	0	0.09	0.11	0.16	0.31	0.39	0.75	0.82
Avg	0	0.10	0.11	0.16	0.28	0.34	0.60	0.67
Stdev	0	0.03	0.03	0.03	0.05	0.05	0.12	0.12

Accoya™ wood (NZ) Board	Oven dry	Relative Humidity						Water saturated
		adsorption →						
		25%	35%	50%	65%	80%	95%	
LG122 RP1	0	0.11	0.13	0.16	0.29	0.36	0.68	0.78
LG122 RP5	0	0.11	0.15	0.19	0.31	0.43	0.75	0.89
LG122 RP6	0	0.08	0.13	0.19	0.30	0.38	0.76	0.86
LG122 RP8	0	0.07	0.12	0.15	0.26	0.32	0.57	0.64
LG122 RP9	0	0.10	0.12	0.16	0.27	0.31	0.53	0.58
LG122 RP10	0	0.11	0.15	0.19	0.34	0.42	0.81	0.93
LG122 RP11	0	0.08	0.11	0.15	0.29	0.30	0.53	0.57
LG122 RP13	0	0.09	0.13	0.16	0.29	0.35	0.66	0.73
LG122 RP14	0	0.08	0.11	0.16	0.27	0.32	0.58	0.64
LG122 RP15	0	0.09	0.14	0.17	0.32	0.39	0.79	0.83
LG122 RP16	0	0.11	0.15	0.18	0.33	0.41	0.81	0.91
LG122 RP17	0	0.10	0.13	0.16	0.28	0.34	0.60	0.69
LG122 RP20	0	0.10	0.14	0.16	0.28	0.33	0.56	0.61
LG122 RP21	0	0.10	0.14	0.15	0.25	0.30	0.53	0.56
LG122 RP22	0	0.04	0.06	0.12	0.26	0.31	0.66	0.75
Avg	0	0.09	0.13	0.16	0.29	0.35	0.65	0.73
Stdev	0	0.02	0.02	0.02	0.03	0.04	0.11	0.13



Accoya™ wood (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG123 RP2	0	0.08	0.10	0.13	0.26	0.32	0.61	0.72
LG123 RP3	0	0.09	0.10	0.10	0.21	0.23	0.50	0.54
LG123 RP4	0	0.10	0.13	0.15	0.28	0.34	0.67	0.71
LG123 RP5	0	0.12	0.14	0.17	0.30	0.34	0.55	0.63
LG123 RP6	0	0.09	0.15	0.16	0.29	0.36	0.66	0.81
LG123 RP8	0	0.13	0.16	0.16	0.30	0.33	0.56	0.61
LG123 RP9	0	0.12	0.14	0.16	0.27	0.32	0.57	0.62
LG123 RP10	0	0.10	0.15	0.14	0.25	0.31	0.54	0.61
LG123 RP11	0	0.09	0.13	0.13	0.26	0.31	0.53	0.62
LG123 RP12	0	0.12	0.13	0.14	0.26	0.30	0.51	0.57
LG123 RP14	0	0.10	0.15	0.14	0.27	0.33	0.61	0.67
LG123 RP15	0	0.12	0.15	0.20	0.36	0.44	0.87	0.99
LG123 RP16	0	0.11	0.15	0.21	0.36	0.41	0.76	0.83
LG123 RP18	0	0.06	0.08	0.09	0.20	0.24	0.43	0.49
LG123 RP19	0	0.07	0.08	0.13	0.25	0.31	0.71	0.74
Avg	0	0.10	0.13	0.15	0.27	0.32	0.61	0.68
Stdev	0	0.02	0.03	0.03	0.05	0.05	0.11	0.13

Accoya™ wood (CL) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG135 RP1	0	0.14	0.14	0.18	0.27	0.32	0.55	0.63
LG135 RP3	0	0.11	0.12	0.18	0.32	0.35	0.65	0.75
LG135 RP5a	0	0.07	0.09	0.14	0.24	0.28	0.53	0.60
LG135 RP5b	0	0.13	0.14	0.18	0.29	0.35	0.60	0.67
LG135 RP7	0	0.11	0.16	0.23	0.38	0.48	0.97	1.10
LG135 RP8	0	0.20	0.26	0.31	0.47	0.55	1.03	1.16
LG135 RP9	0	0.14	0.15	0.14	0.26	0.28	0.47	0.53
LG135 RP11	0	0.08	0.09	0.08	0.17	0.20	0.33	0.36
LG135 RP12	0	0.09	0.08	0.15	0.30	0.37	0.83	0.93
LG135 RP100	0	0.06	0.08	0.13	0.23	0.29	0.63	0.71
Avg	0	0.11	0.13	0.17	0.29	0.35	0.66	0.74
Stdev	0	0.04	0.05	0.06	0.09	0.10	0.22	0.25

Radiata pine (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
REF - LG118 RP2	0	0.42	0.48	0.60	0.83	0.97	1.59	1.82
REF - LG118 RP3	0	0.53	0.61	0.81	1.15	1.42	2.77	3.25
REF - LG118 RP7	0	0.63	0.77	1.02	1.41	1.73	3.43	3.97
REF - LG118 RP9	0	0.68	0.81	1.04	1.48	1.77	3.51	4.01
REF - LG118 RP11	0	0.57	0.72	0.91	1.29	1.55	2.88	3.31
REF - LG118 RP14	0	0.48	0.61	0.76	1.15	1.40	2.91	3.35
REF - LG118 RP15	0	0.62	0.73	0.93	1.29	1.54	2.94	3.26
REF - LG118 RP16	0	0.56	0.70	0.91	1.33	1.63	3.33	3.88
REF - LG118 RP21	0	0.60	0.73	0.95	1.34	1.63	3.23	3.74
REF - LG118 RP23	0	0.43	0.49	0.70	1.08	1.38	2.94	3.41
Avg	0	0.55	0.67	0.86	1.23	1.50	2.95	3.40
Stdev	0	0.09	0.11	0.14	0.19	0.23	0.54	0.63

Appendix 6 Tangential swelling – adsorption

Accoya™ wood (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG118 RP2	0	0.10	0.16	0.24	0.38	0.50	1.03	1.24
LG118 RP3	0	0.13	0.15	0.25	0.40	0.56	1.18	1.39
LG118 RP5	0	0.12	0.17	0.25	0.43	0.53	1.09	1.27
LG118 RP7	0	0.08	0.11	0.20	0.37	0.48	1.08	1.27
LG118 RP8	0	0.15	0.24	0.39	0.65	0.84	1.97	2.34
LG118 RP9	0	0.14	0.19	0.31	0.48	0.61	1.36	1.52
LG118 RP11	0	0.12	0.20	0.28	0.48	0.62	1.34	1.52
LG118 RP14	0	0.10	0.15	0.26	0.42	0.54	1.20	1.39
LG118 RP15	0	0.14	0.20	0.28	0.48	0.61	1.37	1.60
LG118 RP16	0	0.15	0.23	0.32	0.55	0.68	1.52	1.69
LG118 RP17	0	0.09	0.17	0.22	0.42	0.53	1.19	1.37
LG118 RP21	0	0.12	0.19	0.25	0.40	0.52	1.06	1.20
LG118 RP22	0	0.11	0.13	0.21	0.37	0.46	0.98	1.12
LG118 RP23	0	0.14	0.20	0.27	0.42	0.54	1.08	1.21
LG118 RP24	0	0.04	0.10	0.25	0.45	0.61	1.50	1.77
Avg	0	0.12	0.17	0.27	0.45	0.58	1.26	1.46
Stdev	0	0.03	0.04	0.05	0.07	0.10	0.26	0.31

Accoya™ wood (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG122 RP1	0	0.13	0.18	0.26	0.39	0.51	1.09	1.34
LG122 RP5	0	0.13	0.22	0.29	0.47	0.61	1.28	1.50
LG122 RP6	0	0.13	0.21	0.30	0.51	0.67	1.49	1.72
LG122 RP8	0	0.11	0.18	0.26	0.45	0.58	1.25	1.45
LG122 RP9	0	0.15	0.23	0.33	0.54	0.69	1.47	1.73
LG122 RP10	0	0.12	0.21	0.28	0.46	0.59	1.25	1.45
LG122 RP11	0	0.09	0.16	0.26	0.42	0.55	1.18	1.35
LG122 RP13	0	0.13	0.18	0.26	0.45	0.57	1.24	1.43
LG122 RP14	0	0.13	0.18	0.29	0.52	0.64	1.41	1.64
LG122 RP15	0	0.19	0.22	0.34	0.59	0.73	1.67	1.96
LG122 RP16	0	0.15	0.20	0.31	0.51	0.66	1.45	1.69
LG122 RP17	0	0.14	0.20	0.30	0.51	0.66	1.44	1.67
LG122 RP20	0	0.13	0.18	0.26	0.45	0.56	1.19	1.38
LG122 RP21	0	0.08	0.14	0.19	0.32	0.42	0.82	0.91
LG122 RP22	0	0.07	0.10	0.23	0.41	0.52	1.25	1.49
Avg	0	0.12	0.18	0.28	0.47	0.60	1.30	1.51
Stdev	0	0.03	0.03	0.04	0.07	0.08	0.20	0.24



Accoya™ wood (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG123 RP2	0	0.10	0.16	0.22	0.37	0.47	1.08	1.29
LG123 RP3	0	0.13	0.17	0.23	0.42	0.54	1.23	1.44
LG123 RP4	0	0.13	0.18	0.27	0.46	0.59	1.23	1.43
LG123 RP5	0	0.14	0.20	0.30	0.47	0.59	1.24	1.42
LG123 RP6	0	0.13	0.18	0.27	0.46	0.60	1.27	1.49
LG123 RP8	0	0.11	0.13	0.21	0.34	0.41	0.89	1.06
LG123 RP9	0	0.13	0.20	0.29	0.48	0.62	1.33	1.56
LG123 RP10	0	0.09	0.13	0.24	0.42	0.55	1.26	1.46
LG123 RP11	0	0.13	0.18	0.28	0.46	0.59	1.26	1.47
LG123 RP12	0	0.11	0.16	0.24	0.43	0.53	1.12	1.31
LG123 RP14	0	0.17	0.17	0.25	0.47	0.58	1.32	1.49
LG123 RP15	0	0.14	0.19	0.30	0.51	0.66	1.48	1.71
LG123 RP16	0	0.14	0.22	0.33	0.54	0.70	1.48	1.71
LG123 RP18	0	0.11	0.13	0.22	0.41	0.49	1.07	1.26
LG123 RP19	0	0.05	0.07	0.18	0.37	0.49	1.18	1.40
Avg	0	0.12	0.17	0.26	0.44	0.56	1.23	1.43
Stdev	0	0.03	0.04	0.04	0.06	0.07	0.15	0.17

Accoya™ wood (CL) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG135 RP1	0	0.09	0.13	0.18	0.30	0.36	0.88	0.91
LG135 RP3	0	0.10	0.10	0.27	0.45	0.54	1.20	1.45
LG135 RP5a	0	0.16	0.17	0.26	0.42	0.48	0.95	1.13
LG135 RP5b	0	0.09	0.15	0.25	0.39	0.48	1.05	1.22
LG135 RP7	0	0.18	0.21	0.32	0.54	0.67	1.42	1.68
LG135 RP8	0	0.27	0.36	0.53	0.84	1.05	2.23	2.67
LG135 RP9	0	0.11	0.14	0.18	0.32	0.38	0.72	0.82
LG135 RP11	0	0.09	0.10	0.14	0.26	0.31	0.64	0.71
LG135 RP12	0	0.21	0.14	0.24	0.42	0.52	1.17	1.32
LG135 RP100	0	0.07	0.06	0.16	0.31	0.40	0.97	1.14
Avg	0	0.14	0.16	0.25	0.42	0.52	1.12	1.30
Stdev	0	0.06	0.08	0.11	0.17	0.21	0.45	0.56

Radiata pine (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
REF - LG118 RP2	0	0.81	1.06	1.39	2.03	2.51	5.29	6.78
REF - LG118 RP3	0	0.83	1.01	1.37	2.06	2.57	5.66	7.67
REF - LG118 RP7	0	0.96	1.16	1.51	2.16	2.68	5.63	7.42
REF - LG118 RP9	0	0.93	1.14	1.51	2.17	2.71	5.76	7.77
REF - LG118 RP11	0	0.92	1.14	1.53	2.23	2.77	5.83	7.37
REF - LG118 RP14	0	0.97	1.17	1.54	2.22	2.77	6.14	8.55
REF - LG118 RP15	0	1.05	1.27	1.68	2.39	2.93	6.24	7.79
REF - LG118 RP16	0	1.06	1.28	1.68	2.47	3.05	6.85	9.59
REF - LG118 RP21	0	0.92	1.13	1.51	2.18	2.74	5.96	8.08
REF - LG118 RP23	0	0.65	0.86	1.25	1.97	2.51	5.82	7.92
Avg	0	0.91	1.12	1.50	2.19	2.73	5.92	7.89
Stdev	0	0.12	0.12	0.13	0.15	0.17	0.42	0.76

Appendix 7 Radial shrinking - desorption

Accoya™ wood (NZ) Board	Oven dry	← desorption Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG118 RP2	0.56	0.52	0.46	0.38	0.36	0.29	0.18	0
LG118 RP3	0.49	0.43	0.35	0.28	0.25	0.17	0.05	0
LG118 RP5	0.46	0.40	0.35	0.29	0.26	0.18	0.08	0
LG118 RP7	0.73	0.64	0.56	0.44	0.39	0.26	0.09	0
LG118 RP8	0.84	0.72	0.63	0.50	0.43	0.30	0.10	0
LG118 RP9	0.68	0.68	0.59	0.41	0.42	0.27	0.07	0
LG118 RP11	0.62	0.52	0.48	0.36	0.31	0.23	0.07	0
LG118 RP14	0.63	0.56	0.48	0.38	0.35	0.23	0.07	0
LG118 RP15	0.70	0.62	0.54	0.43	0.40	0.28	0.09	0
LG118 RP16	0.74	0.65	0.58	0.46	0.41	0.29	0.12	0
LG118 RP17	0.67	0.58	0.52	0.39	0.37	0.26	0.11	0
LG118 RP21	0.65	0.58	0.51	0.41	0.38	0.25	0.11	0
LG118 RP22	0.53	0.47	0.42	0.32	0.31	0.15	0.07	0
LG118 RP23	0.50	0.44	0.39	0.29	0.28	0.17	0.08	0
LG118 RP24	0.81	0.70	0.62	0.48	0.42	0.31	0.08	0
Avg	0.64	0.57	0.50	0.39	0.36	0.24	0.09	0
Stdev	0.12	0.10	0.09	0.07	0.06	0.05	0.03	0

Accoya™ wood (NZ) Board	Oven dry	← desorption Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG122 RP1	0.80	0.70	0.61	0.51	0.45	0.34	0.18	0
LG122 RP5	0.90	0.78	0.71	0.55	0.51	0.35	0.16	0
LG122 RP6	0.89	0.76	0.71	0.56	0.50	0.37	0.07	0
LG122 RP8	0.65	0.56	0.52	0.41	0.39	0.27	0.11	0
LG122 RP9	0.55	0.48	0.43	0.34	0.31	0.19	0.02	0
LG122 RP10	0.93	0.83	0.75	0.60	0.52	0.36	0.13	0
LG122 RP11	0.51	0.47	0.42	0.32	0.30	0.20	0.09	0
LG122 RP13	0.69	0.60	0.55	0.42	0.38	0.25	0.09	0
LG122 RP14	0.72	0.68	0.61	0.51	0.48	0.37	0.20	0
LG122 RP15	0.86	0.76	0.66	0.55	0.49	0.36	0.11	0
LG122 RP16	0.88	0.74	0.26	0.53	0.47	0.36	0.14	0
LG122 RP17	0.62	0.57	0.52	0.41	0.36	0.27	0.14	0
LG122 RP20	0.54	0.49	0.45	0.36	0.25	0.20	0.09	0
LG122 RP21	0.41	0.47	0.42	0.33	0.30	0.20	0.07	0
LG122 RP22	0.94	0.82	0.76	0.63	0.57	0.42	0.23	0
Avg	0.73	0.65	0.56	0.47	0.42	0.30	0.12	0
Stdev	0.18	0.13	0.15	0.10	0.10	0.08	0.06	0



Accoya™ wood (NZ) Board	Oven dry	← desorption						Water saturated
		Relative Humidity						
		25%	35%	50%	65%	80%	95%	
LG123 RP2	0.88	0.80	0.73	0.62	0.57	0.46	0.28	0
LG123 RP3	0.57	0.50	0.45	0.35	0.32	0.22	0.09	0
LG123 RP4	0.70	0.61	0.54	0.35	0.38	0.28	0.11	0
LG123 RP5	0.58	0.52	0.43	0.33	0.32	0.20	0.06	0
LG123 RP6	0.77	0.68	0.60	0.48	0.42	0.30	0.12	0
LG123 RP8	0.52	0.48	0.42	0.33	0.31	0.21	0.06	0
LG123 RP9	0.61	0.54	0.49	0.38	0.33	0.24	0.10	0
LG123 RP10	0.59	0.52	0.46	0.36	0.31	0.20	0.08	0
LG123 RP11	0.60	0.53	0.48	0.36	0.33	0.23	0.08	0
LG123 RP12	0.56	0.50	0.45	0.35	0.32	0.22	0.09	0
LG123 RP14	0.65	0.57	0.50	0.39	0.34	0.24	0.09	0
LG123 RP15	0.95	0.82	0.73	0.59	0.49	0.36	0.12	0
LG123 RP16	0.79	0.70	0.61	0.49	0.43	0.31	0.09	0
LG123 RP18	0.70	0.62	0.56	0.45	0.41	0.30	0.14	0
LG123 RP19	0.55	0.50	0.45	0.30	0.32	0.23	0.12	0
Avg	0.67	0.59	0.53	0.41	0.37	0.27	0.11	0
Stdev	0.13	0.11	0.10	0.10	0.08	0.07	0.05	0

Accoya™ wood (CL) Board	Oven dry	← desorption						Water saturated
		Relative Humidity						
		25%	35%	50%	65%	80%	95%	
LG135 RP1	0.55	0.50	0.45	0.36	0.29	0.24	-0.03	0
LG135 RP3	0.70	0.61	0.54	0.43	0.39	0.25	0.09	0
LG135 RP5a	0.58	0.49	0.44	0.34	0.33	0.21	0.07	0
LG135 RP5b	0.61	0.52	0.46	0.35	0.34	0.23	0.08	0
LG135 RP7	1.14	1.01	0.89	0.70	0.61	0.46	0.16	0
LG135 RP8	1.07	0.87	0.81	0.63	0.56	0.39	0.13	0
LG135 RP9	0.50	0.42	0.38	0.31	0.27	0.19	0.08	0
LG135 RP11	0.38	0.32	0.28	0.18	0.20	0.14	0.05	0
LG135 RP12	0.97	0.82	0.73	0.59	0.51	0.37	0.11	0
LG135 RP100	0.76	0.65	0.58	0.47	0.43	0.30	0.13	0
Avg	0.73	0.62	0.55	0.43	0.39	0.28	0.09	0
Stdev	0.26	0.22	0.20	0.16	0.13	0.10	0.05	0

Radiata pine (NZ) Board	Oven dry	← desorption						Water saturated
		Relative Humidity						
		25%	35%	50%	65%	80%	95%	
REF - LG118 RP2	1.71	1.17	1.01	0.76	0.60	0.49	0.15	0
REF - LG118 RP3	3.23	2.43	2.17	1.80	1.51	1.20	0.37	0
REF - LG118 RP7	3.93	2.94	2.62	2.14	1.80	1.45	0.38	0
REF - LG118 RP9	3.94	2.96	2.68	2.17	1.82	1.41	0.43	0
REF - LG118 RP11	3.10	2.25	1.95	1.53	1.26	0.95	0.22	0
REF - LG118 RP14	3.24	2.40	2.14	1.75	1.48	1.18	0.36	0
REF - LG118 RP15	3.18	2.31	2.05	1.64	1.24	1.08	0.28	0
REF - LG118 RP16	3.94	2.99	2.69	2.23	1.87	1.51	0.49	0
REF - LG118 RP21	3.73	2.81	2.52	2.09	1.76	1.44	0.45	0
REF - LG118 RP23	3.35	2.54	2.32	1.92	1.65	1.28	0.44	0
Avg	3.33	2.48	2.22	1.80	1.50	1.20	0.36	0
Stdev	0.66	0.54	0.50	0.43	0.39	0.31	0.11	0

Appendix 8 Tangential shrinking - desorption

Accoya™ wood (NZ) Board	Oven dry	← desorption						Water saturated
		Relative Humidity						
		25%	35%	50%	65%	80%	95%	
LG118 RP2	1.22	1.08	0.97	0.79	0.68	0.57	0.19	0
LG118 RP3	1.35	1.17	1.05	0.84	0.69	0.52	0.18	0
LG118 RP5	1.28	1.09	0.99	0.79	0.66	0.46	0.13	0
LG118 RP7	1.34	1.15	1.04	0.83	0.70	0.51	0.17	0
LG118 RP8	2.45	2.07	1.86	1.54	1.29	0.99	0.33	0
LG118 RP9	1.53	1.31	1.18	0.95	0.80	0.59	0.19	0
LG118 RP11	1.49	1.29	1.15	0.93	0.76	0.53	0.15	0
LG118 RP14	1.42	1.21	1.09	0.89	0.75	0.55	0.17	0
LG118 RP15	1.57	1.34	1.20	0.97	0.82	0.57	0.14	0
LG118 RP16	1.70	1.45	1.32	1.05	0.91	0.66	0.24	0
LG118 RP17	1.40	1.19	1.07	0.86	0.72	0.52	0.15	0
LG118 RP21	1.27	1.06	0.96	0.77	0.66	0.49	0.16	0
LG118 RP22	1.16	0.99	0.90	0.72	0.63	0.47	0.15	0
LG118 RP23	1.19	1.02	0.93	0.73	0.65	0.44	0.14	0
LG118 RP24	1.94	1.66	1.50	1.23	1.06	0.80	0.35	0
Avg	1.49	1.27	1.15	0.93	0.78	0.58	0.19	0
Sdev	0.34	0.28	0.25	0.22	0.18	0.15	0.07	0

Accoya™ wood (NZ) Board	Oven dry	← desorption						Water saturated
		Relative Humidity						
		25%	35%	50%	65%	80%	95%	
LG122 RP1	1.30	1.14	1.02	0.85	0.70	0.55	0.17	0
LG122 RP5	1.51	1.22	1.19	0.96	0.81	0.61	0.20	0
LG122 RP6	1.74	1.49	1.35	1.09	0.91	0.67	0.16	0
LG122 RP8	1.43	1.22	1.11	0.90	0.76	0.54	0.16	0
LG122 RP9	1.71	1.46	1.32	1.07	0.90	0.66	0.18	0
LG122 RP10	1.50	1.27	1.16	0.94	0.80	0.59	0.20	0
LG122 RP11	1.37	1.16	1.04	0.84	0.72	0.51	0.16	0
LG122 RP13	1.46	1.23	1.12	0.92	0.77	0.56	0.18	0
LG122 RP14	1.68	1.40	1.26	1.05	0.89	0.66	0.23	0
LG122 RP15	2.04	1.76	1.59	1.31	1.09	0.84	0.28	0
LG122 RP16	1.70	1.48	1.32	1.09	0.93	0.71	0.26	0
LG122 RP17	1.65	1.41	1.27	1.04	0.87	0.65	0.21	0
LG122 RP20	1.45	1.23	1.12	0.90	0.77	0.59	0.21	0
LG122 RP21	0.94	0.80	0.71	0.58	0.42	0.38	0.14	0
LG122 RP22	1.53	1.34	1.23	0.99	0.84	0.61	0.22	0
Avg	1.53	1.31	1.19	0.97	0.81	0.61	0.20	0
Sdev	0.25	0.21	0.19	0.16	0.15	0.10	0.04	0



Accoya™ wood (NZ) Board	Oven dry	← desorption Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG123 RP2	1.29	1.13	1.00	0.83	0.71	0.55	0.20	0
LG123 RP3	1.53	1.31	1.19	0.98	0.84	0.63	0.22	0
LG123 RP4	1.46	1.24	1.11	0.89	0.73	0.56	0.17	0
LG123 RP5	1.36	1.17	1.04	0.84	0.72	0.52	0.14	0
LG123 RP6	1.52	1.30	1.16	0.95	0.80	0.58	0.20	0
LG123 RP8	1.10	0.96	0.85	0.70	0.56	0.43	0.17	0
LG123 RP9	1.61	1.38	1.24	1.00	0.84	0.62	0.20	0
LG123 RP10	1.51	1.30	1.16	0.95	0.79	0.58	0.18	0
LG123 RP11	1.46	1.23	1.15	0.88	0.75	0.57	0.11	0
LG123 RP12	1.30	1.08	1.00	0.81	0.67	0.50	0.14	0
LG123 RP14	1.56	1.28	1.19	0.98	0.82	0.62	0.14	0
LG123 RP15	1.76	1.51	1.37	1.12	0.95	0.71	0.23	0
LG123 RP16	1.74	1.49	1.35	1.11	0.93	0.70	0.21	0
LG123 RP18	1.36	1.15	1.05	0.85	0.71	0.49	0.17	0
LG123 RP19	1.22	1.07	0.97	0.79	0.67	0.49	0.17	0
Avg	1.45	1.24	1.12	0.91	0.77	0.57	0.18	0
<i>Stdev</i>	<i>0.18</i>	<i>0.15</i>	<i>0.14</i>	<i>0.12</i>	<i>0.10</i>	<i>0.08</i>	<i>0.04</i>	<i>0</i>

Accoya™ wood (CL) Board	Oven dry	← desorption Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG135 RP1	0.92	0.83	0.76	0.63	0.53	0.43	0.19	0
LG135 RP3	1.45	1.26	1.15	0.89	0.77	0.58	0.19	0
LG135 RP5a	1.12	0.95	0.87	0.70	0.59	0.43	0.13	0
LG135 RP5b	1.21	1.02	0.91	0.74	0.57	0.44	0.08	0
LG135 RP7	1.67	1.43	1.31	1.06	0.89	0.67	0.22	0
LG135 RP8	2.65	2.26	2.05	1.68	1.38	1.10	0.37	0
LG135 RP9	0.87	0.74	0.68	0.54	0.47	0.34	0.12	0
LG135 RP11	0.67	0.57	0.52	0.41	0.36	0.24	0.07	0
LG135 RP12	1.35	1.15	1.04	0.86	0.71	0.53	0.18	0
LG135 RP100	1.24	1.08	0.98	0.81	0.67	0.51	0.21	0
Avg	1.32	1.13	1.03	0.83	0.69	0.53	0.18	0
<i>Stdev</i>	<i>0.55</i>	<i>0.47</i>	<i>0.43</i>	<i>0.35</i>	<i>0.29</i>	<i>0.23</i>	<i>0.09</i>	<i>0</i>

Radiata pine (NZ) Board	Oven dry	← desorption Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
REF - LG118 RP2	5.91	4.57	4.09	3.43	2.88	2.40	1.02	0
REF - LG118 RP3	7.09	5.73	5.27	4.59	3.99	3.42	1.50	0
REF - LG118 RP7	6.92	5.52	5.09	4.39	3.78	3.21	1.33	0
REF - LG118 RP9	7.13	5.80	5.33	4.61	4.06	3.49	1.54	0
REF - LG118 RP11	6.79	5.27	4.78	4.00	3.38	2.80	1.05	0
REF - LG118 RP14	7.60	6.14	5.67	4.92	4.27	3.68	1.62	0
REF - LG118 RP15	7.11	5.49	5.09	4.24	3.67	3.04	1.18	0
REF - LG118 RP16	8.95	7.37	6.89	6.08	5.40	4.74	2.25	0
REF - LG118 RP21	7.28	5.88	5.44	4.73	4.14	3.52	1.57	0
REF - LG118 RP23	6.95	5.75	5.35	4.65	4.05	3.50	1.56	0
Avg	7.17	5.75	5.30	4.56	3.96	3.38	1.46	0
<i>Stdev</i>	<i>0.76</i>	<i>0.71</i>	<i>0.71</i>	<i>0.68</i>	<i>0.65</i>	<i>0.62</i>	<i>0.36</i>	<i>0</i>

Appendix 9 Anti-Shrinking (Swelling)-Efficiency

Radial swelling

Species	Batch		Oven dry	Relative Humidity						Water saturated
				adsorption →						
		ASE [%]		25%	35%	50%	65%	80%	95%	
Accoya™ wood (New Zealand)	LG118	ASE [%]	0	83	83	82	77	78	80	80
	LG122	ASE [%]	0	84	81	81	77	77	78	78
	LG123	ASE [%]	0	82	81	83	78	78	80	80
	average	ASE [%]	0	83	81	82	77	78	79	80
Accoya™ wood (Chile)	LG135	ASE [%]	0	80	80	80	76	77	78	78

Tangential swelling

Species	Batch		Oven dry	Relative Humidity						Water saturated
				adsorption →						
		ASE [%]		25%	35%	50%	65%	80%	95%	
Accoya™ wood (New Zealand)	LG118	ASE [%]	0	87	85	82	80	79	79	81
	LG122	ASE [%]	0	86	84	81	79	78	78	81
	LG123	ASE [%]	0	87	85	83	80	79	79	82
	average	ASE [%]	0	87	84	82	79	79	79	81
Accoya™ wood (Chile)	LG135	ASE [%]	0	85	86	83	81	81	81	83

Radial shrinking

Species	Batch		Oven dry	Relative Humidity						Water saturated
				desorption ←						
		ASE [%]		25%	35%	50%	65%	80%	95%	
Accoya™ wood (New Zealand)	LG118	ASE [%]	81	77	77	78	76	80	74	0
	LG122	ASE [%]	78	74	75	74	72	75	66	0
	LG123	ASE [%]	80	76	76	77	75	78	70	0
	average	ASE [%]	80	76	76	77	74	77	70	0
Accoya™ wood (Chile)	LG135	ASE [%]	78	75	75	76	74	77	75	0

Tangential shrinking

Species	Batch		Oven dry	Relative Humidity						Water saturated
				desorption ←						
		ASE [%]		25%	35%	50%	65%	80%	95%	
Accoya™ wood (New Zealand)	LG118	ASE [%]	79	78	78	80	80	83	87	0
	LG122	ASE [%]	79	77	78	79	80	82	87	0
	LG123	ASE [%]	80	78	79	80	81	83	88	0
	average	ASE [%]	79	78	78	80	80	83	87	0
Accoya™ wood (Chile)	LG135	ASE [%]	82	80	81	82	83	84	88	0



Appendix 10 Density

Species	Batch		Oven dry	Relative Humidity						Water saturated
				25%	35%	50%	65%	80%	95%	
Accoya™ wood (New Zealand)	LG118	Density [kg/m ³]	505	511	513	516	519	521	535	1074
		<i>stdev</i>	31	31	32	32	32	32	33	13
	LG122	Density [kg/m ³]	506	511	513	516	519	522	533	1079
		<i>stdev</i>	39	40	40	40	40	40	40	16
	LG123	Density [kg/m ³]	480	485	487	490	493	495	506	1064
<i>stdev</i>		34	34	34	35	35	35	36	16	
	average	Density [kg/m ³]	497	503	504	507	510	513	525	1072
		<i>stdev</i>	35	35	35	36	36	36	36	15
Accoya™ wood (Chile)	LG135	Density [kg/m ³]	543	548	549	553	555	557	568	1059
		<i>stdev</i>	57	58	58	58	58	59	59	50
Radiata Pine (New Zealand)	Ref-LG122	Density [kg/m ³]	440	453	456	460	466	471	496	1014
		<i>stdev</i>	29	29	30	30	30	30	31	19

Accoya™ wood (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG118 RP2	496	502	503	506	509	512	525	1082
LG118 RP3	448	452	454	457	459	461	473	1060
LG118 RP5	515	521	522	526	529	532	545	1082
LG118 RP7	511	517	518	522	524	527	540	1064
LG118 RP8	516	522	524	528	531	533	545	1067
LG118 RP9	473	479	480	483	486	488	500	1067
LG118 RP11	522	527	529	533	536	538	552	1084
LG118 RP14	458	463	464	467	469	471	483	1050
LG118 RP15	562	568	570	574	576	580	594	1099
LG118 RP16	529	535	537	540	543	546	559	1062
LG118 RP17	520	525	527	531	534	536	550	1069
LG118 RP21	545	551	552	556	559	562	577	1084
LG118 RP22	485	490	492	495	498	501	515	1070
LG118 RP23	488	493	495	498	501	504	519	1084
LG118 RP24	512	518	519	523	526	528	541	1086
Avg	505	511	513	516	519	521	535	1074
<i>Stdev</i>	31	31	32	32	32	32	33	13

Accoya™ wood (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG122 RP1	492	497	498	501	504	506	517	1105
LG122 RP5	486	491	493	496	499	501	513	1072
LG122 RP6	585	591	593	596	599	602	613	1104
LG122 RP8	478	484	485	488	491	493	505	1066
LG122 RP9	495	500	502	505	507	510	521	1074
LG122 RP10	543	548	550	554	557	559	571	1080
LG122 RP11	451	456	457	460	463	465	476	1057
LG122 RP13	472	477	479	482	484	487	498	1056
LG122 RP14	536	542	544	547	550	553	565	1084
LG122 RP15	519	524	526	529	532	534	545	1072
LG122 RP16	530	536	537	541	543	546	557	1076
LG122 RP17	499	505	506	510	512	515	528	1075
LG122 RP20	467	472	473	476	479	481	494	1069
LG122 RP21	569	574	576	579	582	585	598	1108
LG122 RP22	469	474	476	479	481	484	495	1084
Avg	506	511	513	516	519	522	533	1079
<i>Stdev</i>	39	40	40	40	40	40	40	16



Accoya™ wood (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG123 RP2	433	437	438	441	443	445	455	1100
LG123 RP3	488	493	495	499	502	504	516	1076
LG123 RP4	447	451	453	456	458	460	470	1062
LG123 RP5	457	461	463	465	468	470	481	1057
LG123 RP6	518	523	525	528	531	533	545	1069
LG123 RP8	529	534	536	540	543	546	557	1068
LG123 RP9	484	489	490	493	496	498	509	1055
LG123 RP10	473	478	479	482	485	487	499	1045
LG123 RP11	468	473	474	478	480	482	493	1041
LG123 RP12	427	432	433	436	438	440	451	1044
LG123 RP14	506	512	514	517	520	523	536	1064
LG123 RP15	514	520	522	525	528	531	543	1069
LG123 RP16	522	527	529	532	535	537	549	1085
LG123 RP18	444	448	450	453	455	458	469	1050
LG123 RP19	498	503	504	508	510	513	524	1079
Avg	480	485	487	490	493	495	506	1064
Stdev	34	34	34	35	35	35	36	16

Accoya™ wood (CL) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
LG135 RP1	515	519	520	524	526	528	539	1042
LG135 RP3	571	576	578	581	584	586	598	1065
LG135 RP5a	543	548	549	553	555	557	567	1076
LG135 RP5b	536	540	542	545	547	549	559	1060
LG135 RP7	649	655	657	660	663	666	677	1125
LG135 RP8	530	536	537	541	544	546	558	962
LG135 RP9	578	583	585	589	591	594	607	1101
LG135 RP11	429	433	434	437	439	441	453	988
LG135 RP12	572	577	578	581	584	586	596	1100
LG135 RP100	507	512	512	515	517	519	529	1066
Avg	543	548	549	553	555	557	568	1059
Stdev	57	58	58	58	58	59	59	50

Radiata pine (NZ) Board	Oven dry	Relative Humidity						Water saturated
		25%	35%	50%	65%	80%	95%	
REF - LG118 RP2	416	429	432	437	443	449	476	998
REF - LG118 RP3	409	422	424	429	435	440	464	987
REF - LG118 RP7	460	473	476	481	487	492	516	1013
REF - LG118 RP9	438	451	454	458	464	469	494	994
REF - LG118 RP11	452	466	469	474	480	485	510	1038
REF - LG118 RP14	420	433	436	440	446	451	476	1001
REF - LG118 RP15	458	472	474	479	485	489	514	1011
REF - LG118 RP16	497	512	515	520	526	531	558	1042
REF - LG118 RP21	445	459	461	466	472	477	502	1024
REF - LG118 RP23	402	415	417	421	427	432	454	1027
Avg	440	453	456	460	466	471	496	1014
Stdev	29	29	30	30	30	30	31	19