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Dresden, 29.08.2017

Test Report

Order no. 2216073-A2

Client: Jartek Invest Oy
PL 14, 15101 Lahti,
Finland


on behalf of:
Abodo Wood Ltd
62 Ascot Rd
Mangere, Auckland
New Zealand

Date of order: 21.12.2016

Order: Laboratory test of the durability of thermally modified timber against wood decaying basidiomycetes according to EN 350 and CEN/TS-15083-1

Contractor: Entwicklungs- und Prüflabor Holztechnologie GmbH
Laboratory Unit Biological Testing
Zellescher Weg 24
01217 Dresden
Germany

Engineer in charge: Dipl.-Ing. Kordula Jacobs


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Dr. Wolfram Scheiding
Head of Laboratory Unit Biological Testing

The test report contains 3 pages and 1 annex with 5 pages. Any duplication, even in part, requires written permission of EPH. These test results are exclusively related to the tested material.

1 Service

Subject of the contract was a durability test of two variants of thermally modified Radiata pine against wood decay basidiomycetes according to the laboratory test DIN CEN/TS 15083-1:2005.

2 Test material

Two variants of thermally modified Radiata pine with the following treatment specifications were tested:

TMT 1: 220°C, 2 hours, (200 x 22 x 494) mm³

TMT 2: 230°C, 2 hours, (200 x 25 x 500) mm³

For each variant 12 boards from 3 batches were delivered by the client. Specimens were taken from each 3 boards per batch.

3 Test performance

Test procedure:	Durability test according to CEN/TS 15083-1:2005
Test fungi:	<i>Coniophora puteana</i> BAM Ebw. 15 (DSM 3085) <i>Poria placenta</i> BAM FPRL 280
Reference wood:	<i>Pinus sylvestris</i> L. (Scots pine), mean raw density after kiln drying: 462 kg/m ³
Replicates:	30 specimens for each test fungus
Dimension of specimens:	(50 × 25 × 15) mm ³
Accelerated aging procedure:	Water leaching according to DIN EN 84:1997-05
Sterilisation:	Water damp
Duration of the test (fungal attack):	16 weeks (09.03.17 – 29.06.17)

4 Validity of the test

Table 1 shows the mean dry mass losses of the reference specimens with the two test fungi. The corresponding single values are given in the annex, table A5 and A6.

Table 1: Virulence values

Test fungus	Mean mass loss (n=20)	Demanded mass loss according to DIN CEN/TS 15083-1:2005
<i>Coniophora puteana</i> on Scots pine	32.1 %	≥ 30 %
<i>Poria placenta</i> on Scots pine	26.4 %	≥ 20 %

The test was valid, because the demanded values of the average mass losses were exceeded by all test fungi.

5 Results

The mean mass losses, caused by fungal attack, as well as the corresponding durability classes (DC) are given in table 2. Single values are listed in the annex, tables A1 to A4. The durability class was determined according to table 3.

Table 2: Mass losses and corresponding durability classes of thermally modified Radiata pine


Prüfmaterial	Results with <i>Coniophora puteana</i>			Results with <i>Poria placenta</i>		
	Mean dry mass loss [%]	Median value of dry mass loss [%]	Durability class	Mean dry mass loss [%]	Median value of dry mass loss [%]	Durability class
TMT 1: 220°C	2.54 (n=30)	1.84 (n=30)	1	12.39 (n=30)	12.27 (n=30)	3
TMT 2: 230°C	0.04 (n=30)	0.00 (n=30)	1	2.48 (n=30)	2.98 (n=30)	1
reference wood (Scots pine)	32.12 (n=20)	30.70 (n=20)	5	26.44 (n=20)	25.06 (n=20)	4

Table 3: Classification of durability based on laboratory tests

DC	Description	Median dry mass loss [%] according to DIN CEN/TS 15083-1
1	very durable	≤ 5
2	durable	> 5 bis ≤ 10
3	moderately durable	> 10 bis ≤ 15
4	slightly durable	> 15 bis ≤ 30
5	not durable	> 30

Durability classification is based on the results with the fungus, which caused the highest mass loss. Due to the results listed in table 2, the material "TMT 1: 220°C" is classified as DC 3 (moderately durable) and material "TMT 2: 230°C" achieved DC 1 (very durable).

Dresden, 29.08.2017



 Dipl.-Ing. Kordula Jacobs
 Person in charge

Annex: Tables with single values

Annex to test report 2216073-A2**Table A1:** Results with *Coniophora puteana* on "TMT 1: 220°C" (single values)

Specimen- No.	Board- No.	Raw density [kg/m ³]	Dry mass before fungal test [g]	Dry mass after fungal attack [g]	Dry mass loss [%]*	Wood moisture after fungal attack [%]
1	1	483.2	9.06	8.20	9.49	31.1
2	1	445.3	8.35	7.75	7.19	31.9
3	1	482.7	9.05	8.78	2.98	24.0
7	1	494.4	9.27	8.45	8.85	30.2
8	2	457.6	8.58	8.42	1.86	29.5
9	2	447.5	8.39	7.98	4.89	26.4
4	2	445.9	8.36	8.26	1.20	28.5
5	2	447.5	8.39	7.96	5.13	27.9
6	3	378.1	7.09	6.96	1.83	23.7
10	3	455.5	8.54	8.52	0.23	23.6
11	3	412.8	7.74	7.78	-0.52	27.0
12	3	382.9	7.18	7.17	0.14	31.5
13	4	444.3	8.33	8.19	1.68	27.8
14	4	434.1	8.14	8.07	0.86	28.9
15	4	460.8	8.64	8.58	0.69	27.6
16	5	390.4	7.32	7.27	0.68	32.7
17	5	406.9	7.63	7.56	0.92	28.0
18	5	395.2	7.41	7.10	4.18	28.0
19	6	385.1	7.22	7.17	0.69	27.5
20	6	377.1	7.07	6.92	2.12	25.6
21	6	376.5	7.06	6.93	1.84	22.4
22	7	464.0	8.70	8.69	0.11	32.1
23	7	481.1	9.02	9.01	0.11	22.1
24	7	499.2	9.36	9.33	0.32	27.0
25	8	449.6	8.43	8.15	3.32	33.9
26	8	444.3	8.33	8.00	3.96	25.3
27	8	442.1	8.29	8.32	-0.36	65.4
28	9	426.7	8.00	7.71	3.63	29.2
29	9	427.7	8.02	7.80	2.74	24.2
30	9	414.4	7.77	7.42	4.50	26.3
Mittelwert		435.1			2.54	29.0
Medianwert					1.84	

* A negative mass loss is considered to be zero in the mean value calculation.

Table A2: Results with *Poria placenta* on "TMT 1: 220°C" (single values)

Specimen- No.	Board- No.	Raw density [kg/m ³]	Dry mass before fungal test [g]	Dry mass after fungal attack [g]	Dry mass loss [%]	Wood moisture after fungal attack [%]
31	1	452.8	8.49	6.97	17.90	33.0
32	1	484.3	9.08	7.44	18.06	33.6
33	1	468.3	8.78	7.57	13.78	39.0
34	2	457.6	8.58	7.43	13.40	31.8
35	2	459.2	8.61	6.88	20.09	34.4
36	2	441.6	8.28	6.54	21.01	35.6
37	3	376.5	7.06	6.26	11.33	29.1
38	3	351.5	6.59	5.87	10.93	35.8
39	3	357.3	6.70	5.91	11.79	29.6
40	4	421.3	7.90	7.05	10.76	30.6
41	4	427.2	8.01	7.31	8.74	25.2
42	4	417.6	7.83	7.16	8.56	27.0
43	4	425.1	7.97	7.10	10.92	27.0
44	5	422.4	7.92	6.97	11.99	27.8
45	5	428.3	8.03	7.29	9.22	30.2
46	5	418.7	7.85	7.15	8.92	26.9
47	5	393.1	7.37	6.69	9.23	31.8
48	6	405.3	7.60	6.63	12.76	35.7
49	6	362.7	6.80	6.04	11.18	27.5
50	6	359.5	6.74	5.64	16.32	34.2
51	6	368.5	6.91	5.87	15.05	34.4
52	7	461.9	8.66	8.49	1.96	20.5
53	7	481.6	9.03	8.82	2.33	19.0
54	7	480.5	9.01	8.25	8.44	25.5
55	8	452.8	8.49	7.14	15.90	34.2
56	8	443.2	8.31	7.12	14.32	30.5
57	8	450.7	8.45	7.39	12.54	32.5
58	9	426.7	8.00	6.94	13.25	38.9
59	9	428.3	8.03	6.85	14.69	36.6
60	9	423.5	7.94	6.64	16.37	36.4
Mittelwert		424.9			12.39	31.1
Medianwert					12.27	

Table A3: Results with *Coniophora puteana* on "TMT 2: 230°C" (single values)

Specimen- No.	Board- No.	Raw density [kg/m ³]	Dry mass before fungal test [g]	Dry mass after fungal attack [g]	Dry mass loss [%]*	Wood moisture after fungal attack [%]
61	1	366.4	6.87	6.87	0.00	19.5
62	1	364.8	6.84	6.90	-0.88	19.1
63	1	368.5	6.91	6.93	-0.29	22.2
64	1	368.5	6.91	6.91	0.00	18.7
65	2	345.6	6.48	6.47	0.15	21.6
66	2	363.2	6.81	6.84	-0.44	27.9
67	2	346.7	6.50	6.51	-0.15	23.2
68	2	368.5	6.91	6.90	0.14	19.3
69	3	481.1	9.02	9.00	0.22	18.8
70	3	483.7	9.07	9.07	0.00	18.4
71	3	469.9	8.81	8.82	-0.11	25.7
72	3	492.8	9.24	9.23	0.11	21.9
73	4	402.7	7.55	7.54	0.13	23.6
74	4	373.3	7.00	7.02	-0.29	24.9
75	4	366.9	6.88	6.88	0.00	26.3
76	5	350.9	6.58	6.63	-0.76	43.1
77	5	362.1	6.79	6.80	-0.15	22.4
78	5	350.4	6.57	6.57	0.00	27.4
79	6	370.1	6.94	6.94	0.00	24.1
80	6	366.9	6.88	6.87	0.15	23.3
81	6	411.2	7.71	7.72	-0.13	32.6
82	7	380.8	7.14	7.19	-0.70	38.4
83	7	370.1	6.94	6.93	0.14	26.3
84	7	379.7	7.12	7.12	0.00	21.6
85	8	386.1	7.24	7.22	0.28	19.9
86	8	384.0	7.20	7.21	-0.14	20.9
87	8	378.1	7.09	7.09	0.00	22.4
88	9	430.9	8.08	8.11	-0.37	24.5
89	9	418.1	7.84	7.84	0.00	21.4
90	9	416.0	7.80	7.81	-0.13	27.9
Mittelwert		390.6			0.04	24.3
Medianwert					0.00	

* A negative mass loss is considered to be zero in the mean value calculation.

Table A4: Results with *Poria placenta* on "TMT 2: 230°C" (single values)

Specimen- No.	Board- No.	Raw density [kg/m ³]	Dry mass before fungal test [g]	Dry mass after fungal attack [g]	Dry mass loss [%]*	Wood moisture after fungal attack [%]
91	1	360.0	6.75	6.75	0.00	17.0
92	1	390.9	7.33	7.29	0.55	16.3
93	1	384.5	7.21	7.23	-0.28	16.6
94	2	364.3	6.83	6.71	1.76	17.6
95	2	346.1	6.49	6.39	1.54	17.4
96	2	362.1	6.79	6.58	3.09	19.3
97	3	453.3	8.50	8.21	3.41	17.8
98	3	475.2	8.91	8.62	3.25	18.3
99	3	507.7	9.52	9.13	4.10	19.3
100	4	373.3	7.00	6.75	3.57	19.7
101	4	418.1	7.84	7.35	6.25	22.6
102	4	404.3	7.58	7.18	5.28	22.6
103	4	371.7	6.97	6.77	2.87	19.5
104	5	361.1	6.77	6.58	2.81	18.4
105	5	361.1	6.77	6.53	3.55	19.1
106	5	359.5	6.74	6.53	3.12	18.7
107	5	352.0	6.60	6.58	0.30	16.4
108	6	370.7	6.95	6.72	3.31	18.8
109	6	373.9	7.01	6.76	3.57	18.5
110	6	397.3	7.45	7.22	3.09	18.3
111	6	424.0	7.95	7.70	3.14	18.6
112	7	358.9	6.73	6.47	3.86	19.8
113	7	380.3	7.13	6.88	3.51	19.2
114	7	392.5	7.36	7.23	1.77	17.4
115	8	387.7	7.27	7.18	1.24	16.9
116	8	379.2	7.11	7.05	0.84	18.2
117	8	382.9	7.18	7.10	1.11	17.9
118	9	387.2	7.26	7.18	1.10	17.3
119	9	389.9	7.31	7.29	0.27	16.6
120	9	403.2	7.56	7.40	2.12	17.2
Mittelwert		389.1			2.48	18.4
Medianwert					2.98	

* A negative mass loss is considered to be zero in the mean value calculation.

Table A5: Results with *Coniophora puteana* on the reference wood Scots pine (single values)

Specimen- No.	Raw density [kg/m ³]	Dry mass before fungal test [g]	Dry mass after fungal attack [g]	Dry mass loss [%]	Wood moisture after fungal attack [%]
V1	456.0	8.55	5.78	32.40	56.9
V2	453.3	8.50	5.66	33.41	62.7
V3	456.5	8.56	6.02	29.67	54.7
V4	462.4	8.67	6.30	27.34	52.1
V5	454.4	8.52	5.52	35.21	62.1
V6	453.3	8.50	4.59	46.00	60.6
V7	457.1	8.57	6.16	28.12	50.8
V8	459.2	8.61	6.14	28.69	53.1
V9	466.7	8.75	6.00	31.43	53.2
V10	461.9	8.66	6.06	30.02	56.4
V11	461.9	8.66	5.72	33.95	60.5
V12	457.6	8.58	6.13	28.55	55.8
V13	467.2	8.76	5.48	37.44	58.4
V14	458.7	8.60	5.22	39.30	59.0
V15	466.7	8.75	5.89	32.69	59.1
V16	465.6	8.73	6.03	30.93	55.4
V17	454.9	8.53	5.93	30.48	58.5
V18	449.6	8.43	5.95	29.42	53.9
V19	460.8	8.64	6.31	26.97	60.9
V20	466.7	8.75	6.09	30.40	54.8
Mittelwert	459.5			32.12	56.9
Medianwert				30.70	

Table A6: Results with *Poria placenta* on the reference wood Scots pine (single values)

Specimen- No.	Raw density [kg/m ³]	Dry mass before fungal test [g]	Dry mass after fungal attack [g]	Dry mass loss [%]	Wood moisture after fungal attack [%]
V21	469.3	8.80	6.99	20.57	52.9
V22	467.2	8.76	6.92	21.00	59.4
V23	468.8	8.79	6.63	24.57	49.0
V24	467.7	8.77	6.72	23.38	46.9
V25	467.7	8.77	6.32	27.94	52.2
V26	465.6	8.73	6.40	26.69	53.0
V27	457.1	8.57	6.60	22.99	50.9
V28	458.1	8.59	6.45	24.91	54.3
V29	464.5	8.71	5.65	35.13	61.4
V30	466.7	8.75	6.55	25.14	63.4
V31	472.0	8.85	7.03	20.56	60.5
V32	470.4	8.82	6.90	21.77	53.6
V33	456.0	8.55	5.80	32.16	51.7
V34	458.1	8.59	6.65	22.58	53.4
V35	457.6	8.58	5.60	34.73	55.4
V36	461.3	8.65	6.13	29.13	56.3
V37	465.1	8.72	6.02	30.96	56.8
V38	461.3	8.65	5.85	32.37	57.3
V39	462.4	8.67	6.24	28.03	47.1
V40	458.1	8.59	6.51	24.21	47.6
Mittelwert	463.8			26.44	54.1
Medianwert				25.03	