



TEKNOLOGISK
INSTITUT

Gregersensvej
DK-2630 Taastrup
Telefon 72 20 20 00
Telefax 72 20 20 19

info@teknologisk.dk
www.teknologisk.dk

Page 1 af 1
Initials: troj/elm/hbs
Order no.: 681780
Appendices: 2

Test Report

DS/CEN/TS 15083-1 in accordance with EN 84

Report no.: 681780-4

Assignor: WTT Holding ApS
Attn.: Peter Klaas
Jyllandsvej 9
7330 Brande
Denmark

Material: Norway spruce (*Picea abies*, (L.) Karst.) of Norwegian origin.

Method: Test according to DS/CEN/TS 15083-1 2005: *Durability of wood and wood-based products – Determination of the natural durability of solid wood against wood-destroying fungi, test methods - Part 1: Basidiomycetes.*

Period: The test was carried out from 12-12-2016 to 24-07-2017.

Results: Durability class according to DS/EN 350 (2016).

Fungi	Equilibrium moisture content @ 65 % RH		
	Low intensity 7.0 %	Medium intensity 5.9 %	High intensity 4.9 %
<i>Coniophora puteana</i> . BAM Ebw. 15	4	1	1
<i>Poria placenta</i> . FPRL 280	4	1	1
<i>Trametes versicolor</i> . CTB 863 A	2	1	1
Durability class	4	1	1

Detailed results are given in Appendix 2.

Storage: The test material will be destroyed after 3 month, unless otherwise agreed.

Terms: The accredited test was carried out according to DANAK's general conditions see 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: 28-08-2017, Teknologisk Institute, Wood and Biomaterials, Taastrup

Signature: Test-responsible

Co-signatory



Detailed information

Order no.: 681780
Appendix: 1
Side: 1 af 1
Initialer: troj/elm/hbs

- Test-specimens/
treatment:** The wood was modified in a laboratory autoclave resembling the WTT ThermoTreat 2.0 system, however at a lower gas-pressure than can be accomplished in industrial autoclaves. The differences in treatment intensities were accomplished at 4 bar gas pressure above the pressure resulting in water boiling at temperatures of 170, 180 and 190 °C. In industrial scale the modification levels can be reached at lower temperatures if a higher gas pressure is used. The results relate to the specific equilibrium moisture content reached; not the autoclave setting parameters as such.
- Ageing test:** EN 84. 1997: *Wood preservatives. Accelerated ageing of preservative treated wood prior to biological testing. Leaching.*
The ageing was carried out at Technological Institute in the period from 03-01-2017 to 15-02-2017.
- Sterilization:** Ionising radiation (2 × 50 kGy).
- Test-fungi:** *Coniophora puteana*, BAM Ebw 15
Poria placenta, FPRL 280
Trametes versicolor, CTB 863 A
- Exposure to
fungi:** 16 weeks in the period from 10-03-2017 to 19-07-2017.
- Evaluation date:** 24-07-2017.
- Evaluation:** Results are evaluated according to DS/EN 350 (2016): *Durability of wood and wood-based products – Testing and classification of the durability to biological agents of wood and wood-based materials.*

Durability class	Description	Percentage mass loss (ML) according to DS/EN 350 (2016)
1	Very durable	ML ≤ 5
2	Durable	5 < ML ≤ 10
3	Moderately durable	10 < ML ≤ 15
4	Slightly durable	15 < ML ≤ 30
5	Not durable	30 < ML
ML= highest of the median mass losses (in %) determined for test specimens exposed to each of the used fungi		

- Validity:** Accept criteria for mean loss in mass on reference control specimens were fulfilled for all test fungi. The test is valid.

Detailed results

Order no.: 681780
Appendix: 2
Side: 1 af 10
Initialer: troj/elm/hbs

Low intensity

Test-fungus	EMC ₆₅ (%)	Test-specimen	Moisture content after exposure to fungi (%)	Mass loss (%)
<i>Coniophora puteana</i>	7.0	11-1	26	14
		11-2	26	12
		11-3	24	12
		11-4	27	17
		11-5	31	22
		11-6	25	14
		11-7	30	21
		11-8	29	20
		11-9	23	12
		11-10	24	14
		11-11	28	16
		11-12	25	12
		11-13	28	14
		11-14	35	24
		11-15	30	17
		11-16	30	8
		11-17	32	21
		11-18	35	23
		11-19	32	19
		11-20	27	18
		11-21	33	22
		11-22	30	18
		11-23	31	20
		11-24	26	7
		11-25	33	8
		11-26	50	15
		11-27	43	28
		11-28	32	5
		11-29	32	19
		11-30	32	21
Mean			30	
Median				17

Detailed results

Order no.: 681780
Appendix: 2
Side: 2 af 10
Initialer: troj/elm/hbs

Low intensity

Test-fungus	EMC ₆₅ (%)	Test-specimen	Moisture content after exposure to fungi (%)	Mass loss (%)
<i>Poria placenta</i>	7.0	12-1	48	29
		12-2	57	24
		12-3	35	22
		12-4	50	31
		12-5	33	17
		12-6	41	27
		12-7	50	21
		12-8	27	9
		12-9	42	17
		12-10	68	22
		12-11	59	26
		12-12	78	15
		12-13	54	27
		12-14	28	18
		12-15	28	12
		12-16	44	19
		12-17	34	21
		12-18	33	16
		12-19	46	23
		12-20	43	25
		12-21	62	24
		12-22	36	14
		12-23	28	14
		12-24	29	13
		12-25	62	23
		12-26	31	13
		12-27	32	18
		12-28	70	20
		12-29	44	17
		12-30	34	17
Mean			44	
Median				20

Detailed results

Order no.: 681780
Appendix: 2
Side: 3 af 10
Initialer: troj/elm/hbs

Low intensity

Test-fungus	EMC ₆₅ (%)	Test-specimen	Moisture content after exposure to fungi (%)	Mass loss (%)
<i>Trametes versicolor</i>	7.0	13-1	41	4
		13-2	40	7
		13-3	45	7
		13-4	43	10
		13-5	42	6
		13-6	46	9
		13-7	45	4
		13-8	43	9
		13-9	53	14
		13-10	51	6
		13-11	42	4
		13-12	38	6
		13-13	43	12
		13-14	52	10
		13-15	43	3
		13-16	37	7
		13-17	26	7
		13-18	32	5
		13-19	50	7
		13-20	39	6
		13-21	34	8
		13-22	34	6
		13-23	46	3
		13-24	31	10
		13-25	41	5
		13-26	40	2
		13-27	39	12
		13-28	39	6
		13-29	73	5
		13-30	39	11
Mean			42	
Median				6

Detailed results

Order no.: 681780
Appendix: 2
Side: 4 af 10
Initialer: troj/elm/hbs

Medium intensity

Test-fungius	EMC ₆₅ (%)	Test-specimen	Moisture content after exposure to fungi (%)	Mass loss (%)
<i>Coniophora puteana</i>	5.9	11-1	27	0
		11-2	31	1
		11-3	23	3
		11-4	23	0
		11-5	27	1
		11-6	23	1
		11-7	29	1
		11-8	32	2
		11-9	24	8
		11-10	22	4
		11-11	34	2
		11-12	27	0
		11-13	26	2
		11-14	27	2
		11-15	34	3
		11-16	39	2
		11-17	20	2
		11-18	15	2
		11-19	26	2
		11-20	29	2
		11-21	23	12
		11-22	22	1
		11-23	18	2
		11-24	21	0
		11-25	26	2
		11-26	29	0
		11-27	23	0
		11-28	25	4
		11-29	22	3
		11-30	23	0
Mean			26	
Median				2

Detailed results

Order no.: 681780
Appendix: 2
Side: 5 af 10
Initialer: troj/elm/hbs

Medium intensity

Test-fungus	EMC ₆₅ (%)	Test-specimen	Moisture content after exposure to fungi (%)	Mass loss (%)
<i>Poria placenta</i>	5.9	12-1	20	0
		12-2	50	16
		12-3	32	3
		12-4	22	1
		12-5	14	1
		12-6	17	2
		12-7	24	1
		12-8	28	3
		12-9	24	8
		12-10	25	9
		12-11	24	4
		12-12	26	3
		12-13	22	1
		12-14	22	3
		12-15	36	2
		12-16	28	1
		12-17	33	2
		12-18	31	2
		12-19	26	4
		12-20	25	2
		12-21	23	9
		12-22	32	17
		12-23	27	2
		12-24	23	2
		12-25	26	8
		12-26	21	3
		12-27	18	2
		12-28	19	3
		12-29	23	4
		12-30	26	15
Mean			26	
Median				3

Detailed results

Order no.: 681780
Appendix: 2
Side: 6 af 10
Initialer: troj/elm/hbs

Medium intensity

Test-fungus	EMC ₆₅ (%)	Test-specimen	Moisture content after exposure to fungi (%)	Mass loss (%)
<i>Trametes versicolor</i>	5.9	13-1	20	0
		13-2	34	1
		13-3	48	1
		13-4	40	1
		13-5	43	1
		13-6	46	6
		13-7	60	2
		13-8	43	1
		13-9	42	2
		13-10	49	1
		13-11	51	3
		13-12	65	2
		13-13	44	3
		13-14	54	3
		13-15	49	2
		13-16	38	1
		13-17	41	1
		13-18	45	1
		13-19	41	1
		13-20	37	1
		13-21	30	2
		13-22	43	2
		13-23	45	2
		13-24	46	4
		13-25	48	3
		13-26	42	1
		13-27	28	2
		13-28	27	1
		13-29	45	1
		13-30	40	3
Mean			43	
Median				2

Detailed results

Order no.: 681780
Appendix: 2
Side: 7 af 10
Initialer: troj/elm/hbs

High intensity

Test-fungus	EMC ₆₅ (%)	Test-specimen	Moisture content after exposure to fungi (%)	Mass loss (%)
<i>Coniophora puteana</i>	4.9	11-1	25	2
		11-2	21	2
		11-3	24	3
		11-4	24	3
		11-5	24	2
		11-6	29	5
		11-7	39	2
		11-8	28	4
		11-9	27	4
		11-10	28	4
		11-11	79	7
		11-12	88	2
		11-13	31	4
		11-14	39	6
		11-15	40	5
		11-16	37	11
		11-17	23	2
		11-18	25	2
		11-19	34	4
		11-20	38	2
		11-21	31	9
		11-22	23	1
		11-23	17	0
		11-24	19	2
		11-25	30	2
		11-26	30	3
		11-27	37	8
		11-28	32	3
		11-29	15	6
		11-30	21	2
Mean			32	
Median				3

Detailed results

Order no.: 681780
Appendix: 2
Side: 8 af 10
Initialer: troj/elm/hbs

High intensity

Test-fungus	EMC ₆₅ (%)	Test-specimen	Moisture content after exposure to fungi (%)	Mass loss (%)
<i>Poria placenta</i>	4.9	12-1	34	4
		12-2	32	4
		12-3	14	3
		12-4	15	4
		12-5	34	2
		12-6	53	3
		12-7	23	5
		12-8	28	11
		12-9	41	4
		12-10	25	6
		12-11	20	3
		12-12	26	3
		12-13	28	2
		12-14	32	2
		12-15	29	2
		12-16	34	3
		12-17	20	2
		12-18	20	3
		12-19	29	2
		12-20	34	2
		12-21	26	3
		12-22	23	3
		12-23	34	2
		12-24	41	3
		12-25	49	4
		12-26	19	3
		12-27	31	3
		12-28	31	3
		12-29	28	8
		12-30	26	3
Mean			29	
Median				3

Detailed results

Order no.: 681780
Appendix: 2
Side: 9 af 10
Initialer: troj/elm/hbs

High intensity

Test-fungus	EMC ₆₅ (%)	Test-specimen	Moisture content after exposure to fungi (%)	Mass loss (%)
<i>Trametes versicolor</i>	4.9	13-1	49	4
		13-2	33	5
		13-3	31	5
		13-4	32	3
		13-5	40	5
		13-6	43	3
		13-7	47	4
		13-8	61	2
		13-9	28	3
		13-10	32	3
		13-11	46	3
		13-12	45	5
		13-13	44	2
		13-14	29	7
		13-15	38	3
		13-16	36	5
		13-17	31	2
		13-18	35	8
		13-19	44	3
		13-20	54	4
		13-21	37	8
		13-22	37	12
		13-23	51	11
		13-24	53	3
		13-25	45	8
		13-26	50	3
		13-27	62	4
		13-28	45	6
		13-29	35	3
		13-30	36	3
Mean			42	
Median				4

Detailed results

Order no.: 681780
Appendix: 2
Side: 10 af 10
Initialer: troj/elm/hbs

Reference specimens		
Fungus	Specimen	Mass loss (%)
<i>Coniophora puteana</i>	1	34
	2	29
	3	21
	4	22
	5	29
	6	35
	7	27
	8	30
	9	31
	10	29
Mean		29
<i>Poria placenta</i>	11	37
	12	32
	13	43
	14	33
	15	25
	16	41
	17	31
	18	40
	19	32
	20	40
Mean		36
<i>Trametes versicolor</i>	21	23
	22	22
	23	22
	24	16
	25	19
	26	21
	27	20
	28	17
	29	14
	30	21
Mean		20