



INSTITUT PENYELIDIKAN PERHUTANAN MALAYSIA

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Our Ref: FRIM394/490/5/13/Klt. 2(26)
Your Ref: 001/Nov/2012

Date: 26th March 2013

TPN Composite Wood Sdn. Bhd.
38, Jalan MJ 15
Taman Medeka Jaya
Batu Berendam
75350 Melaka

(Attn.: Mr. Teo Pea Ngo - Director)

Dear Sir,

**REPORT ON DURABILITY OF GRM/BIOWOOD SAMPLES AGAINST
SUBTERRANEAN TERMITE (REF WEL/CLS01/11/12)**

In reference of your request dated 19th November 2012, requesting for laboratory test for your wood panel samples against subterranean termite, I herewith attached a report on the result of the test.

Please fill in the Customer's Questionnaire form (attached) and return to us either by hand, mail or fax (03-62804620).

Thank you.

"BERKHIDMAT UNTUK NEGARA"

Yours sincerely,

(DR. ROSZAINI KADIR)
Senior Research Officer
For Director General FRIM

cc. Dr. Zaihan Jalaluddin
Head of Biocomposite and Wood Protection Programme

No Kotak: No Dokumen: 10131478



JOB NO.: WEL/CLP02/06/12

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Our Ref : FRIM394/490/5/13/Klt.2 (26)

Issued by : Wood Entomology Laboratory (WEL)

Title : REPORT ON DURABILITY OF GRM / BIOWOOD
AGAINST SUBTERRANEAN TERMITE

Applicant & Sponsor by : TPN Composite Wood Sdn. Bhd.
38, Jalan MJ 15
Taman Medeka Jaya
Batu Berendam
75350 Melaka
(Attn.: Mr. Teo Pea Ngo - Director)

**Reference Standard /
Test Method** : ASTM D3345-08 (result interpretation using
AWPA E1-09)

**Specification of
Test Item** : GRM / Biowood
(converted to 25 x 25 mm test block)

Product : GRM / Biowood
Untreated rubberwood (as comparison & part of
standard requirement)

Job No. : WEL/CLS01/11/12

Test Dates : 6/2/2013 - 5/3/2013

Issued Date : 21th March 2013

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REPORT ON DURABILITY OF GRM / BIOWOOD AGAINST SUBTERRANEAN TERMITE

1.0 RESULTS AND OBSERVATION

Result of the accelerated laboratory test for durability of GRM / Biowood against subterranean termite (*Coptotermes curvignathus*) compared to rubberwood (untreated) in accordance to ASTM D3345-08 standard (with slightly modification) are shown in Table 1 and Figures 1-3.

Table 1 Durability assessment of GRM / Biowood against subterranean termite compared to rubberwood (untreated) in accelerated laboratory test

Sample	Termite bioassay				
	Weight loss (g)	Percentage of weight loss (%)	Density (g/cm ³)	Average visual rating ²	Termite mortality ³ (%)
GRM / Biowood 1	0.01 ^b (0.07)	0.24 ^b (0.07)	0.78 (0.01)	9.2	100; Complete
GRM / Biowood 2	0.02 ^b (0.05)	0.19 ^b (0.42)	1.01 (0.02)	9.8	100; Complete
Rubberwood	0.17 ^a (0.04)	7.23 ^a (1.68)	0.66 (0.03)	8.6	100; Complete

¹Each value represents the means of 5 replicates except for visual rating. Values in parentheses are standard deviations.

²Termite attack visual rating scale: 0, failure; 4, very severe attack, 50-75% of cross sectional area affected; 6, severe attack, 30-50% of cross sectional area affected; 7, moderate/severe attack, penetration, 10-30% of cross sectional area affected; 8, moderate attack, 3-10% of cross sectional area affected; 9, slight attack, up to 3% of cross sectional area affected; 9.5, Trace, surface nibbles permitted; and 10, sound.

³Termite mortality is based on mean number of termite died (out of 400 termites in the jar) after four weeks. Rating: 100%, complete; 67-99%, heavy; 34-66%, moderate; 0-33%, slight.

Mean value for percentage of weight loss (%) by the same letter are not significantly ($P < 0.05$) different following ANOVA

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Untreated rubberwood samples showed highly significantly ($P < 0.05$) different in weight loss with 7.23% compared to GRM / Biowood 1 & 2 (0.24% and 0.19%, respectively) ($F = 117.51$, $p = 3.65E-05$ and $F = 114.20$, $p = 3.96E-05$, respectively) samples. Termite mortality was completed (100% died) within 2 to 3 weeks of the test.

At least minor evidence (weight loss) of termite feeding was noted on all test samples except rubberwood samples. GRM / Biowood samples only showed a minimal weight loss ranging from 0.10% to 0.44% as compared to rubberwood (5.03% to 9.59%). Mass losses of less than 3% would indicate cosmetic damage only, caused by exploratory browsing of termites and the timber could be considered as resistant to termites attack (Grace and Yamamoto, 1993, Kennedy et al., 1994).

Traces of termite feeding were almost undetectable on samples of GRM / Biowood which is partly due to the existence of rough edges formed during cutting procedure. The assessment was also harder as samples can easily disintegrate upon contact especially when dried. Average visual rating on GRM / Biowood samples was 9.5 which are sound, surface nibbles permitted (Figures 1 and 2). Meanwhile, untreated rubberwood was rated 8.6 [between moderate attack, 3-10% of cross sectional area affected to slight attack, up to 3% of cross sectional area affected] (Figure 3).

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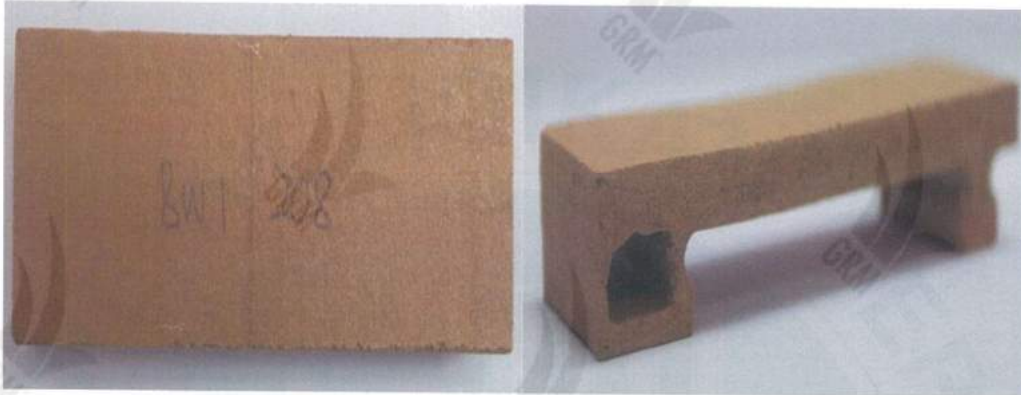


Figure 1 GRM / Biowood 1 samples after 4 weeks of termite test. (Left) Top view. (Right) Side view. Rough edges are due to damage during the cutting process.



Figure 2 GRM / Biowood 2 samples after 4 weeks of termite test. (Left) Top view. (Right) Side view. Rough edges are due to damage during the cutting process.

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Figure 3 Rubberwood samples after 4 weeks of termite test. (Left) Top view. (Right) Side view.

2.0 CONCLUSION

The GRM / Biowood was highly durable against the subterranean termites, *C. curvignathus*.

NOTES

The test is not comply with the ASTM D3345-08 / AWP A E1-09) as the size of GRM / Biowood samples does not reach the standard size (thickness = 6.0 mm).

LIMITATION

The test results only related to the behavior of the specimen tested under the stated condition.

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REFERENCES

- ASTM (American Society for Testing and Materials). (1988) Standard test method of laboratory evaluation of wood and other cellulosic materials for resistance to termites (D3345-74). In: ASTM Annual Book of Standards. Wood. West Conshohocken, PA, 1988; Vol. 4.10, pp. 430-432.
- AWPA (American Wood Preservation Association). 2009. Standard method for laboratory evaluation to determine resistance to subterranean termites (AWPA E1-09). 4 pp.
- Grace, J. K. and Yamamoto, R. T. 1994. Natural resistance of Alaska-cedar, redwood and teak to Formosan subterranean termites. Forest Products Journal 44(3): 41-45.
- Kennedy, M. J., Dixon, L. L. and Peters, B. C. 1994. Susceptibility of heartwood of three species to attack by the subterranean termite *Coptotermes acinaciformis* (Froggatt). IRG Document, IRG/WP94-20026. 10pp.

Prepared by

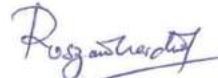


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Wood Entomology Laboratory

Date: 21/3/2013

Approved by



DR. ROSZAINI KADIR

Senior Research Officer
Wood Entomology Laboratory

Date: 21/3/2013