Formosan Subterranean Termite Resistance Study of Qora Cladding Panel, Untreated Southern Pine Control, and Treated Reference Control

Report #: WDL-2020-08a
ICC NTA Project No. AL060920-39

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Submitted By:

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Background

The Wood Durability Laboratory (WDL) at the LSU AgCenter became an ISO 17025 accredited laboratory through the International Accreditation Services (IAS) accreditation system on March 1, 2008. Additional test standards were added by IAS to the WDL approved scope of services on July 24, 2008, November 20, 2009, May 31, 2012, January 24, 2014, March 31, 2016, July 26th, 2016, and June 6th, 2018 (Table 1). The lab has been operating under ISO 17025 Guidelines for over ten years. This report is compliant with ICC-ES AC85. This report has not been reviewed by a licensed professional engineer nor a third party skilled in the art. Samples and information sheets on traceability of samples were provided by the sponsor and verified at the time of sample creation. The results from this test only relate to the items tested.

Table 1. Current scope and WDL test methods accredited by IAS.

IAS Accreditation Number:	**TL-350**
Accredited Entity:	Wood Durability Laboratory
Address:	227 Renewable Natural Resources Louisiana State University Baton Rouge, Louisiana 70803
Contact Name:	Dr. Qinglin Wu, Director
Telephone:	(225) 578-8369
Effective Date of Scope of Accreditation:	April 28th, 2020
Accreditation Standard:	ISO/IEC Standard 17025:2017

Fields of Testing	**Accredited Test Methods**
Wood testing	ASTM Standards D143[2], D1037[2] (Compression Parallel to surface, section 12 excluded), D2395[8], D3043[5] (Methods A & D only), D4442[8], and D5456[5] (Test methods referenced in Annex A3 & A4); AC257[3] test methods referenced in Section 4.0, excluding 4.3.1.1, 4.3.1.2, 4.3.1.4, & 4.3.2.2)
Wood preservatives	ASTM Standards D2481[3], D3273[5], D3345[1], D4442[8], D4445[3], & D5516[4] AWPA Standards E1[1], E5[3], E7[1], E9[3], E10[1], E11[1], E12[1], E16[3], E18[3], E20[6], E21[4], E22[2], E23[2], E24[1], E26[4] and E29[5] WDMA Standards TM-1[1] and TM-2[1] WDL-SOP-25[6] – Field Evaluation of Termiticide against Subterranean Termites AC380[7] test methods referenced in Sections 3, 4.1, 4.2 and 4.3, excluding 4.4.1 through 4.4.9)

Approved: [1]March 1, 2008, [2]July 24, 2008, [3]November 20, 2009, [4]May 31, 2012, [5]January 24, 2014, [6]March 31, 2016, [7]July 26, 2016, [8]June 6, 2018, & [9]April 28, 2020

OBJECTIVES

The objective of this study was to evaluate one Qora Cladding Panel, untreated southern pine control, and treated reference control for prevention of Formosan subterranean termite (*Coptotermes formosanus*) feeding in an AWPA E1-17 no-choice test. Representative material was sampled by ICC NTA personnel on September 17, 2020 at the client's manufacturing facility located in Sugarcreek, Ohio. This report describes testing conducted for ICC NTA, LLC on behalf of Arcitell, LLC.

Table 2. Summary data of Qora Cladding Panel plus control samples.

Intertek WDL-2020-13 15 Jar Test		
Treatment	**Sample ID**	**MC Sample ID**
Qora cladding panel	1-5	1-5mc
Untreated pine control	6-10	6-10mc
Treated reference control	16-20	16-20mc

MATERIALS AND METHODS

Procedure

The test was performed in accordance with American Wood Protection Association (AWPA) E1-17 Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites (AWPA 2020). The no-choice method was used. The test was started on 11/20/20 and was completed on 12/18/20. The experiment consisted of 5 Qora Cladding Panel samples, 5 southern pine sapwood untreated controls, and 5 treated reference controls. All samples were precisely machined into 1 x 1 x ¼ in. test specimens in the correct grain orientation containing 4-6 rings per inch.

Each test jar contained 150 grams of autoclaved sand and 30 milliliters of distilled water. A sample was placed in each jar on top of the sand with an aluminum barrier to prevent chemical leaching into the sand. Four hundred termites were introduced to each jar on the side opposite to the sample. Termites were obtained from Brechtel State Park (Algiers, LA) on 11/10/20 and added to the E1-17 test on 11/20/20. Samples of termites were taken, weighed and the average weight per termite was determined to be 0.00465 grams per termite. Therefore, each jar contained 1.86 grams of termites determined by weight.

After 28 days of exposure, the samples were removed and cleaned with distilled water. The following AWPA E-1 Rating Scale was used to visually rate each sample.

10 Sound
9.5 Trace, surface nibbles permitted
9 Slight attack, up to 3% of cross sectional area affected
8 Moderate attack, 3-10% of cross sectional area affected
7 Moderate/severe attack, penetration, 10-30% of cross sectional area affected
6 Severe attack, 30-50% of cross sectional area affected
4 Very severe attack, 50-75% of cross sectional area affected
0 Failure

Results

The data obtained were analyzed for termite resistance with means and standard deviations (SPSS 2020). The Least Significant Difference (LSD) mean separation test procedure was used (Steel and Torrie 1980). Different capital letters following each data value within columns indicate that significant differences were found at the significance level $\alpha = 0.05$. Significant differences were not found among treatments when means shared the same letters within columns. All data and records collected during the tests are maintained and are available upon request per ISO 17025 Lab Guidelines.

Table 3 provides a summary of the means (Avg.) for the primary data of interest (i.e., percent mortality, percent weight loss, and treatment ratings). Table 4 provides the statistical data for termite mortality, sample weight loss, and sample rating in a descending order using the Least Significant Difference (LSD) mean separation test procedure.

Percent Termite Mortality. All live termites were counted after the 28 day exposure period. Percent mortality was obtained with this calculation: ((initial termites – live termites) / initial termites)*100. As shown in Table 4, mean percent termite mortality for the pine controls resulted in the lowest mortality at 6.75%. The treated reference control had 16.90% termite mortality, while the Qora Cladding Panel group had 15.95% termite mortality. The untreated pine controls were significantly different from the groups at $\alpha = 0.05$ significance level.

Percent Sample Weight Loss. Percent weight loss was based on the original oven dry weight using this formula: ((calculated ODWt – final ODWt)/calculated ODWt)*100. The test sample oven dry weight is determined by measuring the moisture content of the matched sample and using it to calculate the sample oven dry weight. The final oven dry weight was determined by oven drying the sample after the test. As shown in Table 4, weight loss for the untreated controls was highest at 33.33%. The treated reference control had 3.94% sample weight loss, while the Qora Cladding Panel group had 0.06% sample weight loss. All groups were significantly different from one another at $\alpha = 0.05$ significance level.

Sample Rating. Trained and experienced scientists estimated the extent of damage by visually sample rating each sample. The rating scale used was 0 to 10. The mean rating value of the untreated pine controls were 0, indicating failures. The treated reference control had 9.3 average ratings, while the Qora Cladding Panel had 10 ratings. All groups were significantly different from one another at $\alpha = 0.05$ significance level.

CONCLUSIONS

The Qora Cladding Panel had complete resistance to the termite attack. The treated reference control had slight termite attack. The untreated control mortality, sample weight loss, and sample ratings were consistent with previous test results. The results from the untreated control samples indicate strong termite vigor and performance, and hence the test data are valid.

REFERENCES CITED

American Wood Protection Association (AWPA). 2020. Standard method for laboratory evaluation to determine resistance to subterranean termites (E1-17). 2020 book of standards. Birmingham, AL.

American Society for Testing and Materials (ASTM). 2020. Standard test method for laboratory evaluation of solid wood for resistance to termites (D3345-17).

SPSS 25 for Windows. 2020. Chicago, IL.

Steel, R.G.D. and J.H. Torrie. 1980. Principle and procedures of statistics – A biometrical approach. 2nd edition. McGraw Hill. New York. 633 p.

Table 3. Summary data for termite mortality, sample weight loss, and sample rating.

WDL-2020-08 Qora Cladding Panel 15 Jar Test										
ID	**Treatment**	**Mortality (%)**	**mean**	**Std. Error**	**Wt. Loss (%)**	**mean**	**Std. Error**	**Ratings (0-10)**	**mean**	**Std. Error**
1	Untreated pine control	7.50	6.75%	1	31.47	33.26%	2	0	0	0
2		7.25			36.18			0		
3		5.25			32.87			0		
4		6.50			32.17			0		
5		7.25			33.63			0		
6	Qora cladding panel	18.25	15.95%	2	0.11	0.06%	0	10	10	0
7		16.00			0.05			10		
8		13.25			0.11			10		
9		17.50			0.02			10		
10		14.75			0.03			10		
16	Treated reference control	18.25	16.90%	1	4.59	3.94%	0	9	9.3	0
17		15.25			3.58			10		
18		17.50			3.56			10		
19		17.50			4.02			9		
20		16.00			3.97			9		

Table 4. Termite mortality, weight loss, and sample rating and statistics*.

WDL-2020-08 Qora Cladding Panel 15 Jar Test		
Summary Table		
Treatment	**Mortality**	**LSD Group**
Untreated pine control	6.75%	**A**
Qora cladding panel	15.95%	**B**
Treated reference control	16.90%	**B**

Treatment	**Weight Loss**	**LSD Group**
Untreated pine control	33.26%	**A**
Qora cladding panel	0.06%	**B**
Treated reference control	3.94%	**B**

Treatment	**Ratings**	**LSD Group**
Untreated pine control	0	**A**
Treated reference control	9.3	**B**
Qora cladding panel	10	**B**

*Groups containing the same capital letter are not significantly different at α=0.05.

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CERTIFICATE OF ACCREDITATION

This is to attest that

WOOD DURABILITY LABORATORY

227 RENEWABLE NATURAL RESOURCES, LOUISIANA STATE UNIVERSITY
BATON ROUGE, LOUISIANA 70803, U.S.A.

Testing Laboratory TL-350

has met the requirements of AC89, *IAS Accreditation Criteria for Testing Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories*. This organization is accredited to provide the services specified in the scope of accreditation.

Effective Date July 9, 2020

IAS ACCREDITED

President

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SCOPE OF ACCREDITATION

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WOOD DURABILITY LABORATORY

Contact Name Dr. Qinglin Wu **Contact Phone** +225 578-8369

Accredited to ISO/IEC 17025:2017 *Effective Date July 9, 2020*

Physical	
ASTM D143	Standard test methods for small clear specimens of timber
ASTM D1037	Standard test methods for evaluating properties of wood-base fiber and particle panel materials (compression parallel to surface, section 12, excluded)
ASTM D2395	Standard Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood-Based Materials
ASTM D2481	Standard test method for accelerated evaluation of wood preservatives for marine services by means of small size specimens
ASTM D3043	Standard test methods for structural panels in flexure (methods A and D only)
ASTM D3273	Standard test method for resistance to growth of mold on the surface of interior coatings in an environmental chamber
ASTM D3345	Standard test method for laboratory evaluation of wood and other cellulosic materials for resistance to termites
ASTM D4442	Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials
ASTM D4445	Standard test method for fungicides for controlling sapstain and mold on unseasoned lumber (laboratory method)
ASTM D5456	Standard specification for evaluation of structural composite lumber products (test methods referenced in annex A3 and A4 only)
ASTM D5516	Standard test method for evaluating the flexural properties of fire-retardant treated softwood plywood exposed to elevated temperatures
AWPA E1	Laboratory methods for evaluating the termite resistance of wood-based materials: choice and no-choice tests
AWPA E5	Standard test method for evaluation of wood preservatives to be used in marine applications (UC5A, UC5B, UC5C); panel and block tests
AWPA E7	Standard field test for evaluation of wood preservatives to be used in ground contact (UC4A, UC4B, UC4C); stake test
AWPA E9	Standard field test for the evaluation of wood preservatives to be used above ground (UC3A and UC3B); L-joint test

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SCOPE OF ACCREDITATION

International Accreditation Service, Inc.

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AWPA E10	Laboratory method for evaluating the decay resistance of wood-based materials against pure basidiomycete cultures: soil/block test
AWPA E11	Standard method for accelerated evaluation of preservative leaching
AWPA E12	Standard method of determining corrosion of metal in contact with treated wood
AWPA E16	Standard field test for evaluation of wood preservatives to be used above ground (UC3B); horizontal lap-joint test
AWPA E18	Standard field test for evaluation of wood preservatives to be used above ground (UC3B); ground proximity decay test
AWPA E20	Standard method of determining the depletion of wood preservatives in soil contact
AWPA E21	Standard field test method for the evaluation of wood preservatives to be used for interior applications (UC1 and UC2); full-size commodity termite test
AWPA E22	Laboratory method for rapidly evaluating the decay resistance of wood-based materials against pure basidiomycete cultures using compression strength: soil/water test
AWPA E23	Laboratory method for rapidly evaluating the decay resistance of wood-based materials in ground contact using static bending: soil jar test
AWPA E24	Laboratory method for evaluating the mold resistance of wood-based materials: mold chamber test
AWPA E26	Standard field test for evaluation of wood preservatives intended for interior applications (UC1 and UC2): ground proximity termite test
AWPA E29	Antisapstain field test method for green lumber
ICC ES AC257	Corrosion-resistant fasteners and evaluation of corrosion effects of wood treatment chemicals (test methods referenced in section 4.0, excluding sections 4.3.1.1, 4.3.1.2, 4.3.1.4 and 4.3.2.2)
ICC ES AC380	Termite physical barrier systems (test methods referenced in sections 3, 4.1, 4.2 and 4.3, excluding 4.4.1 through 4.4.9)
WDL-SOP-25	Field evaluation of termiticide against subterranean termites
WDMA T.M. 1	Soil block test method
WDMA T.M. 2	Swellometer test method

AWPA: American Wood Preservers' Association

WDMA: Window and Door Manufacturer Association

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End of report