



CLAYTON HOMES



Construction Testing Laboratories Limited
1585 Britannia Road East, Building D, Unit 11
Mississauga, Ontario L4W 2M4

Telephone: (905) 795-0767

Fax: (905) 795-0767

TEST REPORT

FP97-27

EVALUATION OF
EnerFoam
ADHESIVE

FOR

CA25-4 TEST NO. 1
(Shear Test at 50% R.H. and 73 °F)



PREPARED FOR

FLEXIBLE PRODUCTS COMPANY OF CANADA, INC.
50 MURAL STREET, UNIT 8
RICHMOND HILL, ONTARIO, CANADA
L4B 1E4

DATED

AUGUST 13 1997



HWC
APPROVED
AUG 30 2024
Federal Manufactured
Home Construction
And Safety Standards
APPROVED

C1HBG-PT-20.31



Professional Engineers
Ontario

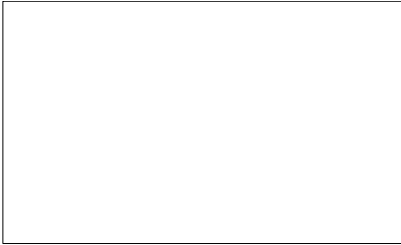


CLAYTON HOMES

August 13, 1997

Report No FP97-27

Flexible Products Company of Canada, Inc.
50 Mural Street, Unit 8
Richmond Hill, Ontario
Canada L9B 1E4



Attention: Dr. Joe Q. X. Zhou, Manager of Research & Development

Subject: Evaluation of EnerFoam Adhesive
To State of California Specification CA 25-4 (revision 1/97or 1/29/73)

Tests Performed: 1) Block Shear (CA 25-4 Test #1)

Reference Standards: 1) Standard for the Evaluation of Adhesives for Structural use in the Manufacture of Mobilhomes and Commercial Coaches. (State of California Specification CA 25-4)
2) Standard Test Method for Strength Properties of Adhesive Bonds in Shear by Compressive Loading (ASTM D 905-94)

Dear Dr. Zhou,

1.0 Introduction

On July 31, 1997, Construction Testing Laboratories Limited was requested to issue a revision of report AB97-01 which is an evaluation of EnerFoam adhesive manufactured by Flexible Products Company of Canada. According to the manufacturer, the current EnerFoam formula is identical to the formula tested in AB97-01, except that 0.5% methylene chloride has been removed from the formula. We were assured by the manufacturer, that this change would not change the performance of EnerFoam as a structural adhesive.

After confirmation of the removal of methylene chloride from the EnerFoam formula by checking the production records, Construction Testing Laboratories suggested that the performance of the new product could be verified by repeating Test #1 of the CA 25-4 test Standard. Based upon our knowledge of polyurethane foam adhesive, Test #1 was selected for the performance verification because of it's high bond strength requirement.



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1.0 Introduction (continued)

The assembly of all of the samples used in this test program was carried out at Flexible Products Company of Canada, Inc. by Dr. Joe Q. X. Zhou and Mr. S. Mangos of the Research and Development Department. The assembly of all of the samples used in this test program was performed under the direction of Construction Testing Laboratories Limited. The curing, exposure conditioning, and testing was carried out at Construction Testing Laboratories by Mr. John Telfer and Mr. Bill Wong, P. Eng.

2.0 Procedures

2.1 Block Shear (ASTM D 905-94)

The wood materials used for the assemblies were purchased and processed by Flexible Products Company of Canada personnel. The test specimens were then also assembled by Flexible Products Company of Canada personnel using a calibrated Instron TTB Universal testing machine for pressure application. The samples were conditioned as required at Construction Testing Laboratories where they were tested using a calibrated M&L 500SP Compression Testing Machine. The shearing tool used is as shown in Figure 1 of ASTM D 905.

For test #1, the specimens were conditioned to 73.4" ± 2" F and 50% ± 2% relative humidity for a period of 8 days and tested under the same conditions.

3.0 Test Results

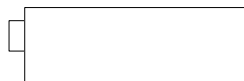
The individual test results are listed on the appended data sheet. A summary of the test results is shown below for convenience.

Summary of Test Results (EnerFoam)

CA25-4 TEST #	DESCRIPTION OF TEST	MINIMUM REQUIREMENTS	EnerFoam AVERAGE RESULTS
1	Block Shear : 7- day cure	2800 psi	2894 psi



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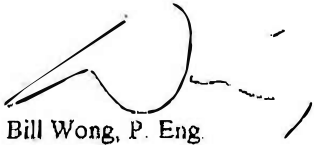
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4.0 Conclusions

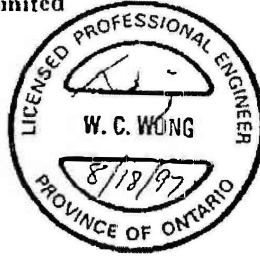
Our test results conclude that EnerFoam adhesive manufactured by the Flexible Products Company of Canada, Inc. meets with the specified requirements of Test #1 of CA 25-4 (revision 1/97 or 1/29/73), a test Standard of the State of California, and therefore exhibits unchanged performance as a structural adhesive. Since the new formulation of EnerFoam (without 0.5% methylene chloride) has been shown to be able to attain shear bond strengths similar to the previous formulation tested in report AB97-01, we believe that the new formulation of EnerFoam will be able to meet with the other requirements of CA 25-4 (revision 1/29/73)*.

We trust that this will meet with your requirements. If additional information is necessary, please do not hesitate to contact the undersigned.

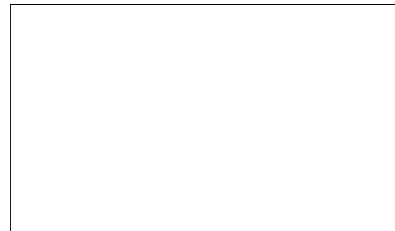
Respectfully submitted
Construction Testing Laboratories Limited



Bill Wong, P. Eng
Manager

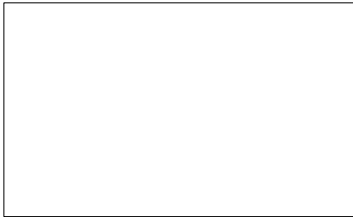


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* Note that the CA 25-4 specification has been revised for 1997 and has been issued as revision 1/97 with changes to Test #3 and Test #6.

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The EVALUATION of ADHESIVES
 to STATE OF CALIFORNIA SPECIFICATION CA 25-4
 using ASTM : D 905 - 94 Standard Test Method for
 Strength Properties of Adhesive Bonds in Shear by Compression Loading
 CA-25-4 BLOCK SHEAR TEST No. 1

Adhesive Manufacturer :		Abisko Manufacturing Inc. Richmond Hill, Ontario, Canada	
Product Name :		EnerFoam ENER42 US	Product Code JY 98 JU
Wood Species Used:	Maple	Average Moisture Content :	*** 6.6 %
condition :	surface planed	Average Specific Gravity :	*** 0.58
Assembly Conditions:	Humidity(%) 41	Open Time	0.5 min.
Date July 31 1997	Temp. (F) 71	** Initial Clamping Pressure of 80 psi.	
Curing Conditions :	Humidity(%) 50 ± 2%	Cure Time (days)	8
Date 07/31/97 to 08/08/97	Temp. (F) 73 ± 2°F		
Testing Conditions :	Humidity(%) 55	Rate of Loading	0.200 in./min.
Date Aug 08 1997	Temp. (F) 73		

Test Results :

Specimen number	Dimensions (in.)		Area (in.)	Load (lbs.)	Shear * Strength (psi)	Wood Failure (%)
	length	width				
1	1.496	2.008	3.004	8215	2735	100
2	1.500	2.014	3.021	8968	2969	80
3	1.507	2.013	3.034	8863	2922	100
4	1.499	2.003	3.002	8420	2804	100
5	1.507	2.016	3.038	9213	3032	90
6	1.494	2.023	3.022	8990	2974	100
7	1.484	2.009	2.981	8415	2823	100
8	1.491	2.016	3.006	8395	2793	100
9	1.502	2.022	3.037	8990	2960	80
10	1.502	2.024	3.040	8895	2926	100
Average					2894	95
Operator's Signature: <i>A. Telford</i>					CA-25-4	2800 minimum

- Notes: * The 7.5 lb. surcharge mass was added
 ** The clamping pressure started to drop below 80 psi after 10 min.
 *** Both the specific gravity and moisture content are below specified.

