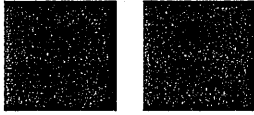


# PE

PROGRESSIVE ENGINEERING, INC.  
Architectural -- Engineering -- Review Agency -- Surveying -- Testing

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58640 STATE ROAD 15  
GOSHEN, INDIANA 46528  
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## ALPHA SYSTEMS

### Small Scale Shear Comparison Strength Tests

5/5/99  
Revised 5/19/99

This test report contains twelve (12) pages, including the cover sheet. Any additions to, alterations of, or unauthorized use of excerpts from this report are expressly forbidden.

99-1208

## ADHESIVE TEST

### 1. TITLE

PEI Standard No. 99-23.  
Small scale shear strength test procedure.

### 2. TEST OBJECTIVE

To test a two-part polyurethane adhesive intended for the comparison of shear strength values when using a variety of substrates.

### 3. ADHESIVE MANUFACTURER

Alpha Systems, Inc.  
5120 Beck Drive  
Elkhart, IN 46516

### 4. TESTING ORGANIZATION

Progressive Engineering, Inc.  
58640 State Road 15  
Goshen, IN 46528

### 5. TESTING PERSONNEL

Director of Testing - Greg A. Weeden  
Technician - Jason Holdeman

### 6. ADHESIVE MATERIAL

Alphaseal 5200 two-part polyurethane adhesive  
5/16" Gold Bond gypsum board  
1/2" particle board  
1/2" plywood  
1/2" OSB  
2" x 2" SPF lumber

## 7. TEST CONSTRUCTION

The test samples shall be constructed in eight foot sections with gypsum board, particle board, plywood and OSB attached to a 2 x 2 x 8' piece of SPF. The substrate and 2 x 2s shall be pre-conditioned at 73°F.  $\pm 2^\circ\text{F}$ . and 50%  $\pm 5\%$  relative humidity for a minimum of 24 hours before applying the adhesive to them. The grain on the substrate shall be parallel with the 8" dimension. To ensure test samples are prepared with no gap between the substrate and 2 x 2, screws were placed every 6". After the test samples are sprayed, condition them at 73°F.  $\pm 2^\circ\text{F}$ . and 50%  $\pm 5\%$  relative humidity for 24 hours. Care should be taken to ensure that the 2 x 2s are square with the substrate and that the 2 x 2s have square cut ends. Care should also be taken to use good materials without major defects that could effect the test results.

## 8. TEST PROCEDURE

Each substrate test sample was cut into five (5) 10" x 8" sections. See the attached drawings. After carefully trimming off excess adhesive and removing temporary fasteners, clamp the test sample in a shear fixture as shown on drawing No. 5. Be sure that the sample is square with the load table and that the load is parallel with the 2 x 2. Apply load to the 2 x 2 at a rate of .5 in./min. until an ultimate load is reached. Examine the test sample and record the ultimate load reached and the mode of failure.

## 9. TEST RESULTS

Alphaseal on gypsum	1319.0 PLF
Alphaseal on particle board	1599.6 PLF
Alphaseal on plywood	1895.5 PLF
Alphaseal on OSB	2465.0 PLF

## 10. TEST CONCLUSION

The results of the small scale comparison tests show that Alphaseal 5200 applied to gypsum yielded the lowest shear value.

**PROGRESSIVE ENGINEERING Inc.**

**SMALL SCALE SHEAR TEST**

Date: 5/5/99

24 Hr with Gypsum

Temp. : 74 deg.F.

Client: Alpha Systems

Humidity : 57%

Adhesive: ALPHASEAL 5200

Description:

- \* Foam from 2x2 failure.
- \*\* 50% Foam from 2x2 50% from gypsum failure.
- \*\*\* Foam from gypsum failure.

SAMPLE NO.	BEAD LENGTH	AVE. BEAD SIZE		MAX. LOAD (LBS.)	P.L.F.
		WOOD	GYP SUM		
1	10.000 in.	.750 in.	1.125 in.	1062 Lbs.***	1274.4 plf
2	10.000 in.	.625 in.	1.125 in.	1078 Lbs.***	1293.6 plf
3	10.000 in.	.750 in.	1.375 in.	1166 Lbs.***	1399.2 plf
4	10.000 in.	.625 in.	1.188 in.	1086 Lbs.***	1303.2 plf
5	10.000 in.	.750 in.	1.375 in.	1104 Lbs.***	1324.8 plf

<b>AVERAGE P.L.F.</b>
1319.0 plf

**PROGRESSIVE ENGINEERING Inc.**

**SMALL SCALE SHEAR TEST**

Date: 5/5/99

**24 Hr with Plywood**

Temp. : 74 deg.F.

Client: Alpha Systems

Humidity : 57%

Adhesive: ALPHASEAL 5200

Description:

\* Foam from 2x2 failure.

\*\* 50% Foam from 2x2 50% from plywood failure.

\*\*\* Foam from plywood failure.

SAMPLE NO.	BEAD LENGTH	AVE. BEAD SIZE		MAX. LOAD (LBS.)	P.L.F.
		WOOD	Plywood		
1	10.000 in.	.750 in.	1.250 in.	1642 Lbs.*	1970.4 plf
2	10.000 in.	.750 in.	1.250 in.	1520 Lbs.*	1824.0 plf
3	10.000 in.	.750 in.	1.500 in.	1826 Lbs.*	2191.2 plf
4	10.000 in.	.563 in.	1.250 in.	1374 Lbs.*	1648.8 plf
5	10.000 in.	.750 in.	1.375 in.	1536 Lbs.*	1843.2 plf

<b>AVERAGE P.L.F.</b>
1895.5 plf

**PROGRESSIVE ENGINEERING Inc.**

**SMALL SCALE SHEAR TEST**

Date: 5/5/99

**24 Hr with Particle Board**

Temp. : 74 deg.F.

Client: Alpha Systems

Humidity : 57%

Adhesive: ALPHASEAL 5200

Description:

\* Foam from 2x2 failure.

\*\* 50% Foam from 2x2 50% from particle board failure.

\*\*\* Foam from particle board failure.

SAMPLE NO.	BEAD LENGTH	AVE. BEAD SIZE		MAX. LOAD (LBS.)	P.L.F.
		WOOD	Particle Bd.		
1	10.000 in.	.750 in.	1.250 in.	1220 Lbs.*	1464.0 plf
2	10.000 in.	.750 in.	1.250 in.	1180 Lbs.*	1416.0 plf
3	10.000 in.	.625 in.	1.125 in.	1501 Lbs.*	1801.2 plf
4	10.000 in.	.500 in.	1.375 in.	1358 Lbs.*	1629.6 plf
5	10.000 in.	.625 in.	1.250 in.	1406 Lbs.*	1687.2 plf

<b>AVERAGE P.L.F.</b>
1599.6 plf

**PROGRESSIVE ENGINEERING Inc.**

**SMALL SCALE SHEAR TEST**

Date: 5/5/99

**24 Hr with OSB**

Temp. : 74 deg.F.

Client: Alpha Systems

Humidity : 57%

Adhesive: ALPHASEAL 5200

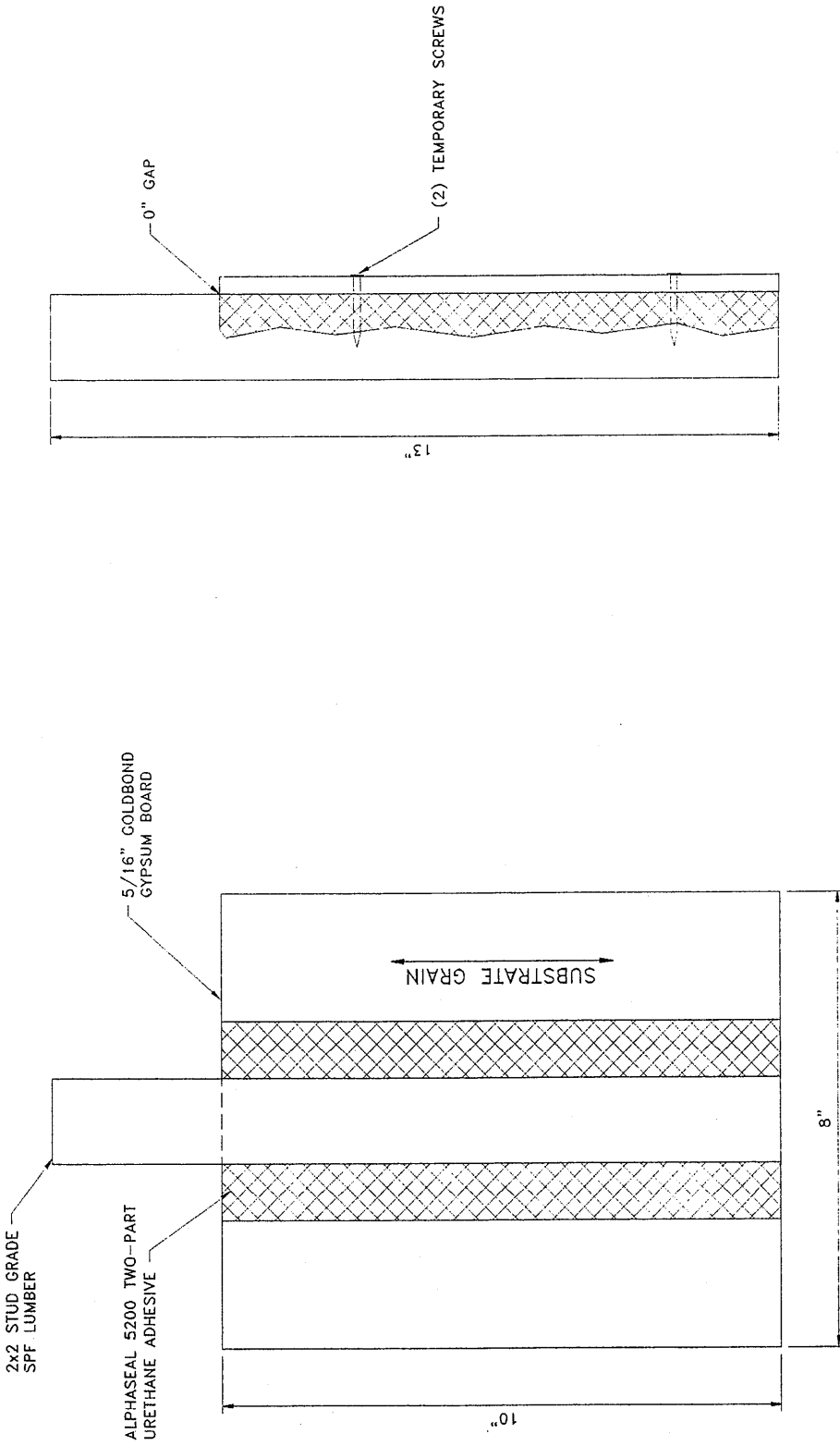
Description:

- \* Foam from 2x2 failure.
- \*\* 50% Foam from 2x2 50% from OSB failure.
- \*\*\* Foam from OSB failure.


SAMPLE NO.	BEAD LENGTH	AVE. BEAD SIZE		MAX. LOAD (LBS.)	P.L.F.
		WOOD	OSB		
1	10.000 in.	.688 in.	1.125 in.	2203 Lbs.*	2643.6 plf
2	10.000 in.	.750 in.	1.375 in.	1916 Lbs.*	2299.2 plf
3	10.000 in.	.750 in.	1.250 in.	1804 Lbs.*	2164.8 plf
4	10.000 in.	.625 in.	1.125 in.	2258 Lbs.*	2709.6 plf
5	10.000 in.	.750 in.	1.000 in.	2090 Lbs.*	2508.0 plf

**AVERAGE  
P.L.F.**

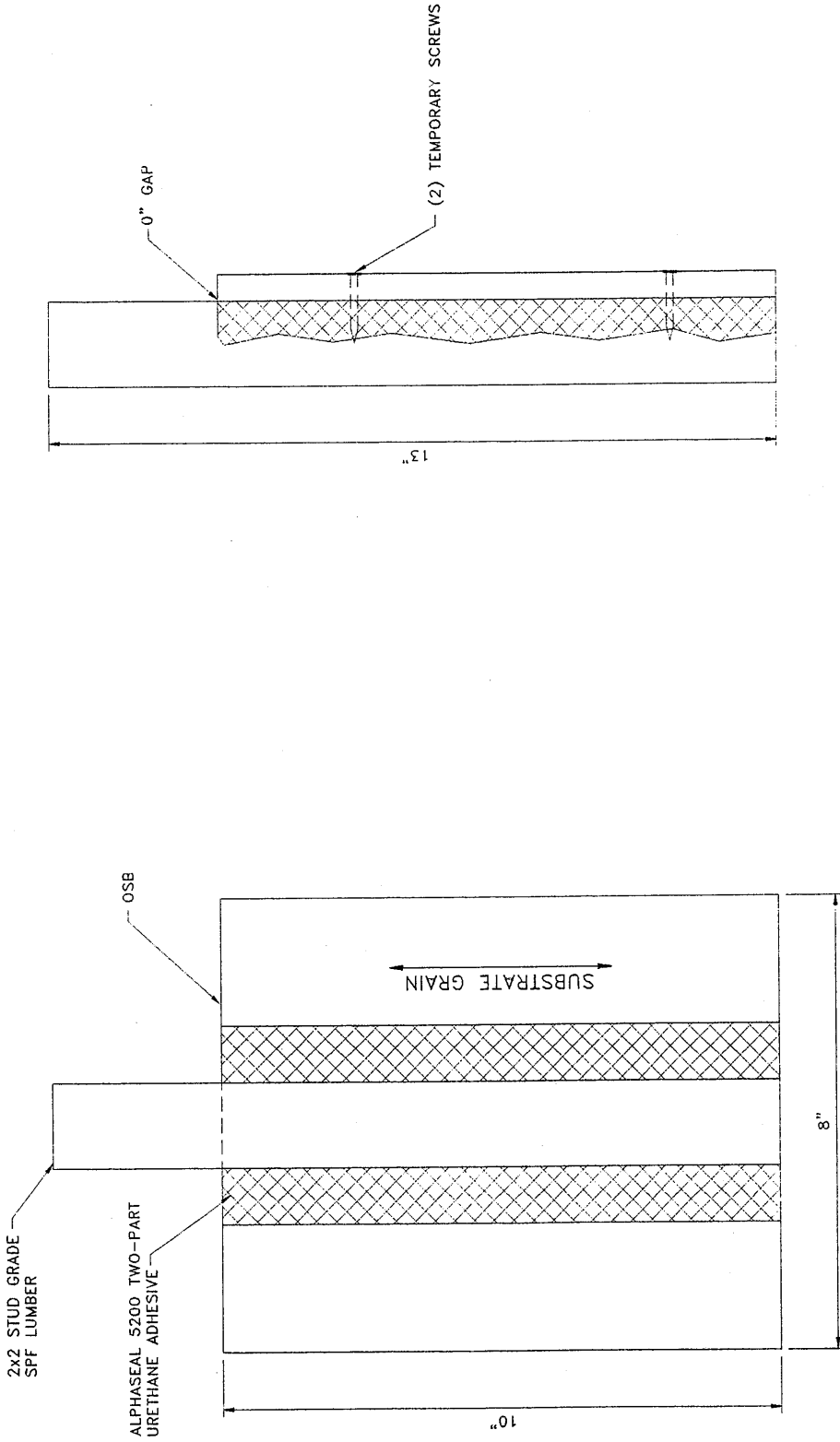
2465.0 plf



THIS DRAWING IS A PART OF TEST REPORT NO. 99-1208

DWN. BY: D. LEHMAN	REVISED ON: 5/19/99	CLIENT: ALPHA SYSTEMS	 PROGRESSIVE ENGINEERING, INC. TESTING LABORATORY
DATE: 5/6/99	SCALE: 6"=12"	TITLE: Gypsum Test Sample	
JOB NO. 99-1208	DWG. NO. B1		
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**OSB NOTE:**

GRANT  
 CONFORMS TO CAN 3-0437.0M  
 GRADE 0-2  
 RATED SHEATHING  
 32/16 1/2 INCH  
 SIZED FOR SPACING  
 EXPOSURE 1

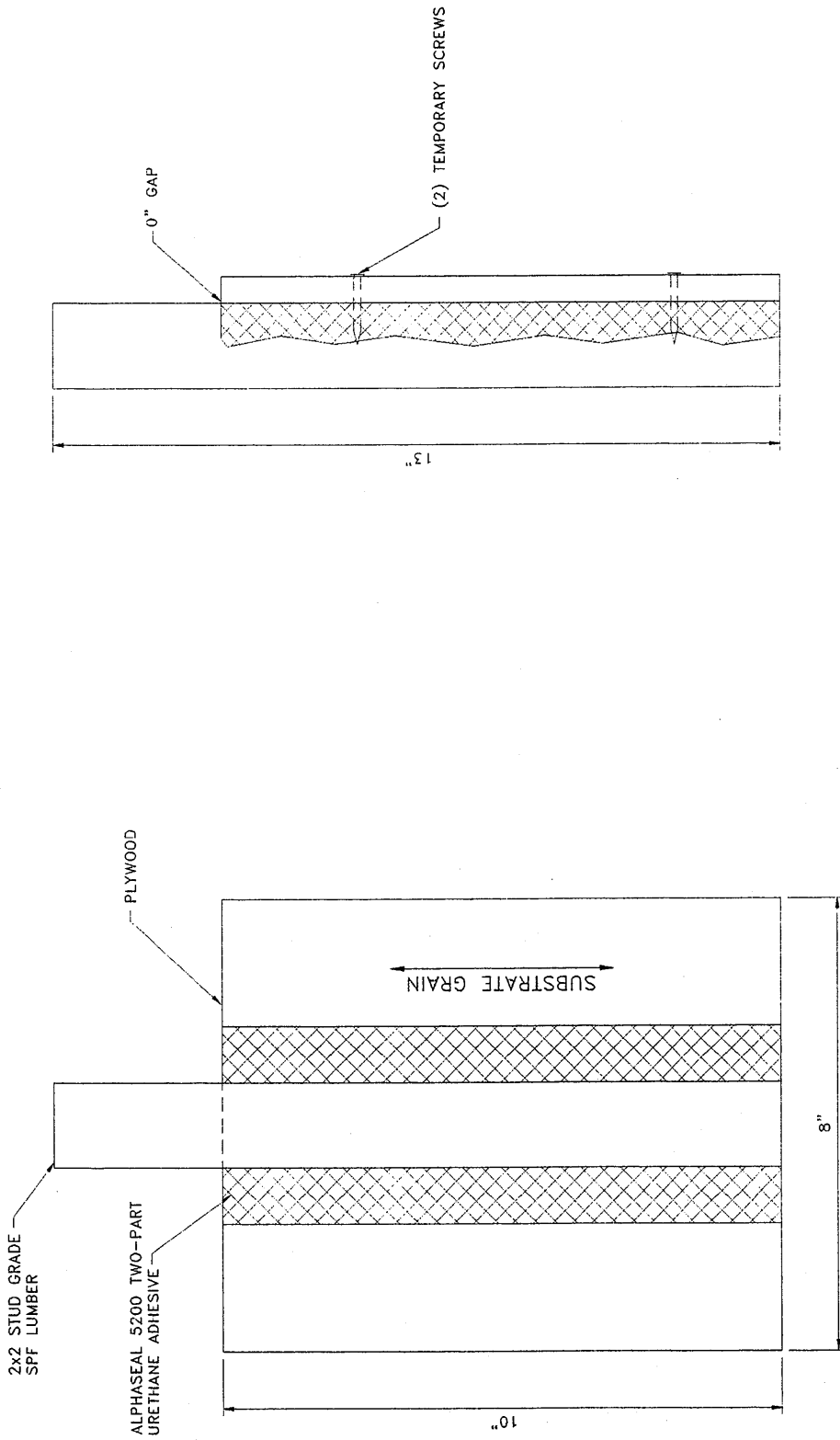
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DATE: 5/6/99	SCALE: 6"=12"	TITLE: OSB Test Sample
JOB NO. 99-1208	DWG. NO. B2	

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**PLYWOOD NOTE:**

GEORGIA PACIFIC  
 GROUP 1 EXTERIOR  
 220  
 PSI 95  
 MEETS REQUIREMENTS OF  
 PSI 95 UNDERLAYMENT

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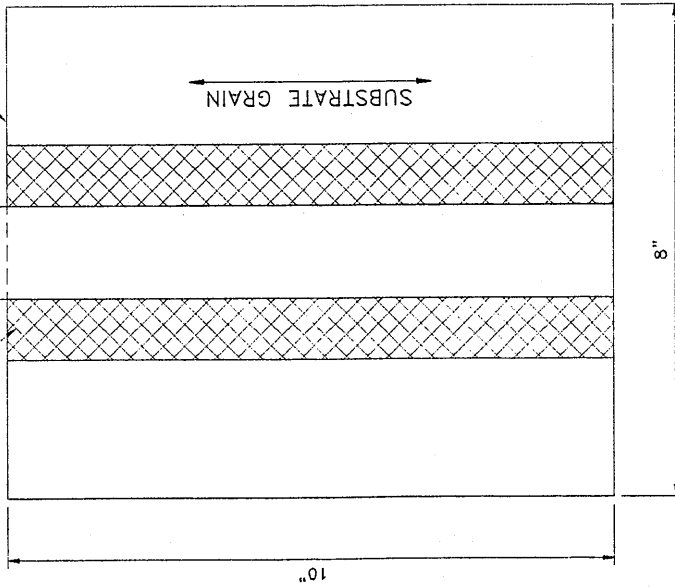
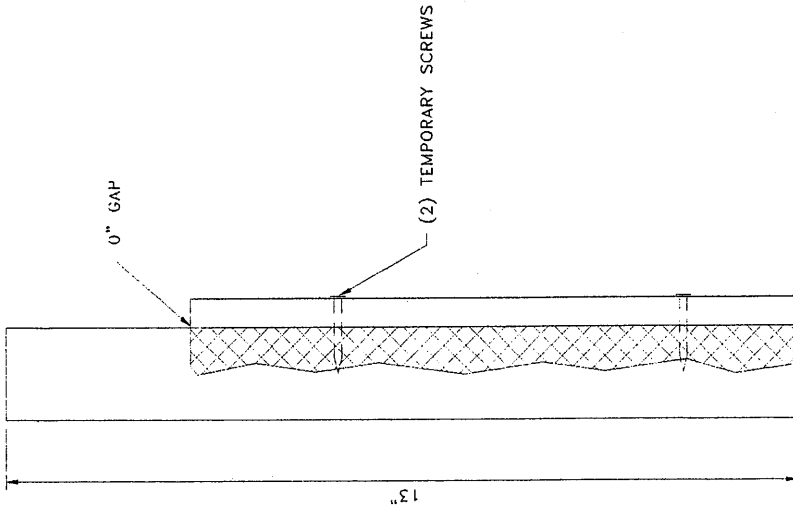
DWN. BY: D. LEHMAN	REVISED ON: 5/19/99	CLIENT: ALPHA SYSTEMS
DATE: 5/6/99	SCALE: 6"=12"	TITLE: Plywood Test Sample
JOB NO. 99-1208	DWG. NO. B3	

2x2 STUD GRADE  
SPF LUMBER

ALPHASEAL 5200 TWO-PART  
URETHANE ADHESIVE

1/2" PARTICLE BOARD

SUBSTRATE GRAIN



PARTICLE BOARD NOTE:

LOUISIANA PACIFIC  
CONFORMS TO ANSI A 208.1  
UBC STD 23-4  
MILL 043

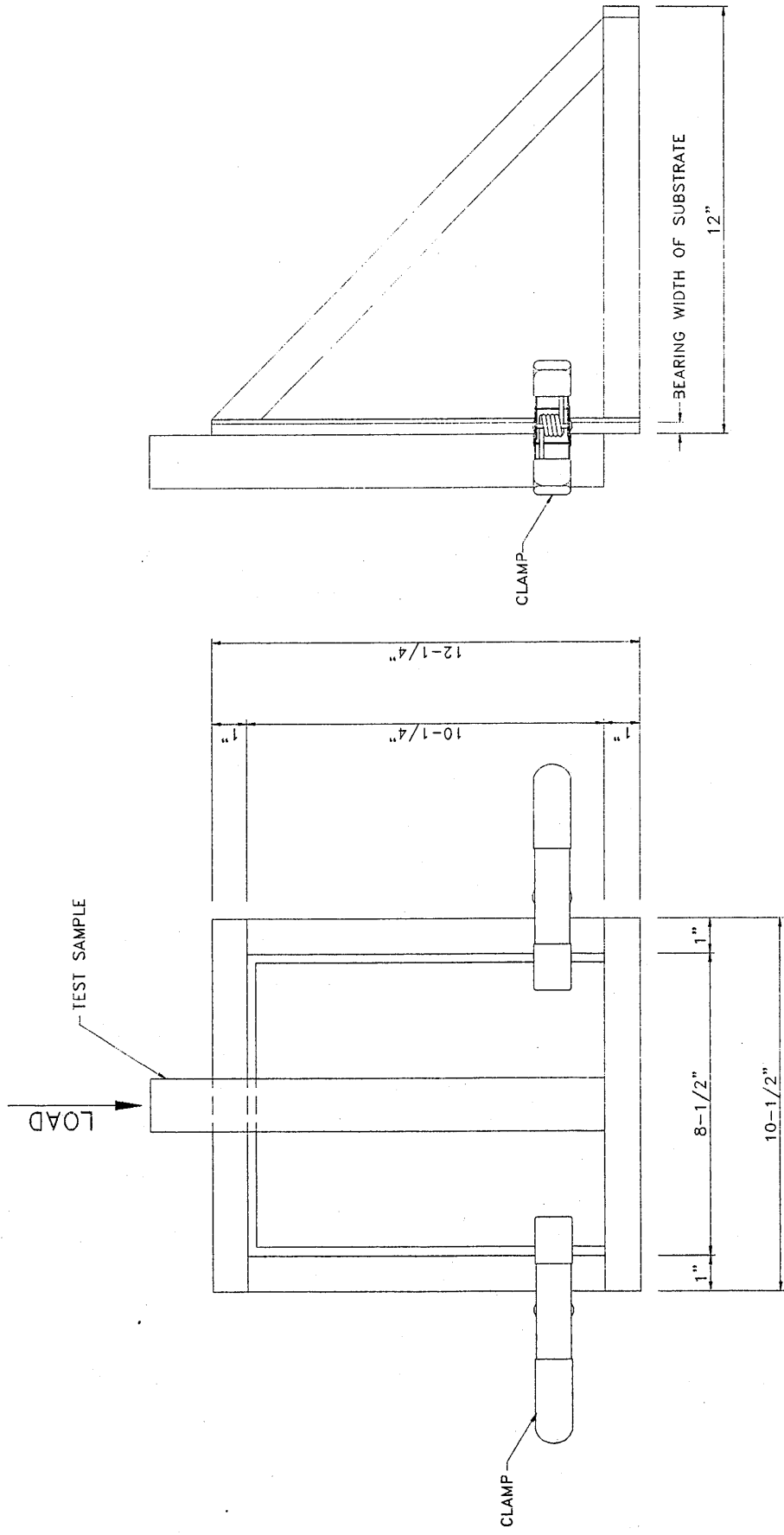
THIS DRAWING IS A PART OF TEST REPORT NO. 99-1208

DWN. BY: D. LEHMAN	REVISED ON: 5/19/99	CLIENT: ALPHA SYSTEMS
DATE: 5/6/99	SCALE: 6"=12"	TITLE: Particle Bd. Test Sample
JOB NO. 99-1208	DWG. NO. B4	

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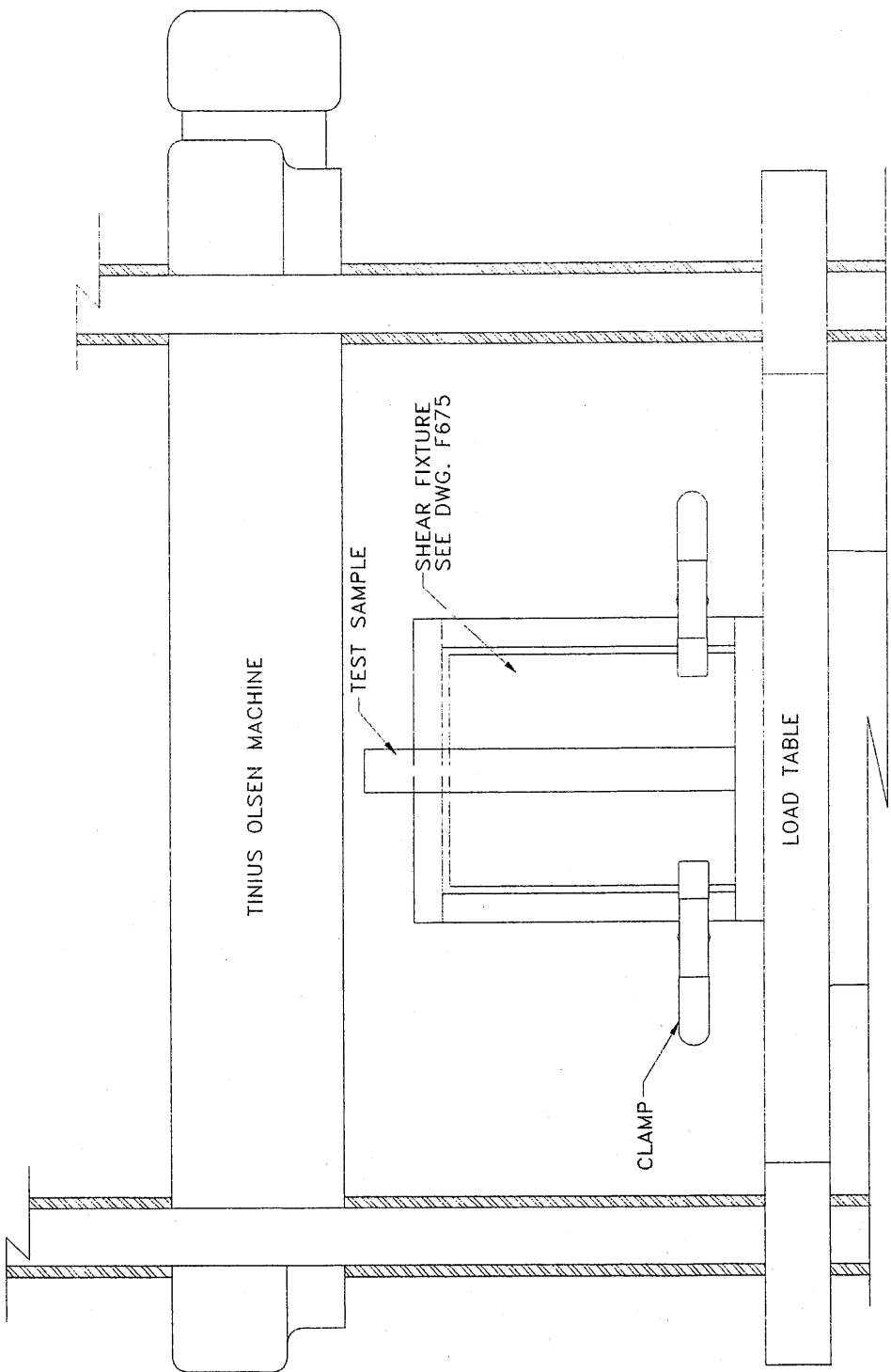
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 DATE: 1/7/99  
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 DRAWING NUMBER: F675

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TITLE: SHEAR FIXTURE

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DWN. BY: D. LEHMAN  
 DATE: 5/6/99  
 SCALE: 3" = 12"

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DRAWING NUMBER  
**F693**

TITLE:  
**SHEAR TEST**

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