## Transverse Shear Testing of GFRP Rebar

### Rebar Size
- **RB6**

### Diameter
- **0.7500**

### SO #
- 

### WO #
- **774293**

### Date Produced
- **12/17/2015**

### Matrix
- VE

### Formulation
- RBVEIP2567-22

### Barcol Hardness
- **62.2**

### Impregnation
- **74.92 / 25.08**

### Tested By
- R Kruse

### Test Date
- **12/22/2015**

### Test Temp
- **69.8°F**

### Test R/H
- **19 %**

### Glass Type
- OC 366

### Yield
- **113**

### # of Ends
- **98.5**

### Sample Length
- **12.000"**

### Standard CSA
- **0.4418"**

### Load Rate
- **0.070"/min**

### Line Speed
- **30 RPM**

### Sample Length to be 225 mm (9.0")

### PS$I$ = (Load divided by 2) divided by CSA

### PS$I$ = (L/2)/CSA

### Table of Load/Failure, Transverse Stress, and Mode of Failure:

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Load/Failure (lbs)</th>
<th>Transverse Stress (psi)</th>
<th>Transverse Stress (MPa)</th>
<th>Mode of Failure</th>
<th>Line Traceability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23,695.7</td>
<td>26,817.2</td>
<td>184.9</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>22,345.1</td>
<td>25,288.7</td>
<td>174.4</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>21,970.3</td>
<td>24,864.5</td>
<td>171.4</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>24,400.4</td>
<td>27,614.8</td>
<td>190.4</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>23,408.7</td>
<td>26,492.4</td>
<td>182.7</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>24,813.1</td>
<td>28,081.8</td>
<td>193.6</td>
<td>Double Shear</td>
<td></td>
</tr>
</tbody>
</table>

**Averages:**
- **23,438.9**
- **26,526.6**
- **182.9**

**Ranges:**
- **2,842.8**
- **3,217.3**
- **22.2**

**σ Sigma:**
- **1,153.5**
- **7.953**

**3σ Sigma:**
- **3,460.5**
- **0.055**

**Coefficient of Variation:**
- **4.35 %**

**Minimum Load:**
- **19,438.6**

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**TEST MACHINE**
- Baldwin Model 120 CS S/N: 1005
- Electromechanical 120,000 lbs Capacity
- Tension/Compression
- Certification Number 148101216100627
- By Instron 12-October-2016
- System - MTest Quattro Admet
- Grip V Style Per ASTM E4-13

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Hughes Brothers, Inc Per ASTM D7617-11
# Transverse Shear Testing of GFRP Rebar

## Sample Specifications

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Load/Failure (lbs)</th>
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<tbody>
<tr>
<td>1</td>
<td>12,236.8</td>
<td>31,168.6</td>
<td>214.9</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>12,302.1</td>
<td>31,334.9</td>
<td>216.1</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>11,021.8</td>
<td>28,073.9</td>
<td>193.6</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>10,579.6</td>
<td>26,947.5</td>
<td>185.8</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>12,690.5</td>
<td>32,324.2</td>
<td>222.9</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>11,406.3</td>
<td>29,053.2</td>
<td>200.3</td>
<td>Double Shear</td>
<td></td>
</tr>
</tbody>
</table>

**Averages**: 11,706.2, 29,817.1, 205.6  
**Ranges**: 2,110.9, 5,376.7, 37.1

- **σ Sigma**: 1,926.7, 13.285
- **3σ Sigma**: 5,780.1, 0.092
- **Coefficient of Variation**: 6.46%

**Sample Length**: 225 mm (9.0”)

**PSI** = (Load divided by 2) divided by CSA

## Test Conditions

- **Test Date**: 5/31/2017  
- **Test Temp**: 75.2°F  
- **Test R/H**: 20%  
- **Glass Type**: OC 366  
- **Impregnation**: 75.14 / 24.86  
- **Barcol Hardness**: 60.4

**Load Rate**: 0.070”/min

**Line Traceability**

**Standard CSA A₀ (in / mm)**: 0.196, 126.68

**Minimum Load**: 8,639.4

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## Test Machine Specifications

- **TEST MACHINE**  
  Baldwin Model 120 CS S/N: 1005  
  Electromechanical 120,000 lbs Capacity  
  Tension/Compression  
  Certification Number 148101216100627  
  By Instron 12-October-2016  
  System - MTest Quattro Admet  
  Grip V Style Per ASTM E4-13

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Hughes Brothers, Inc  
Per ASTM D7617-11
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**Sample Length to be 225 mm (9.0")**

PSI = (Load divided by 2) divided by CSA  
PSI = (L/2)/CSA

<table>
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<th>Sample #</th>
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<th>Line Traceability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18,826.1</td>
<td>30,681.4</td>
<td>211.5</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>19,684.8</td>
<td>32,080.8</td>
<td>221.2</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>18,859.2</td>
<td>30,735.3</td>
<td>211.9</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>19,517.0</td>
<td>31,807.4</td>
<td>219.3</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>18,720.7</td>
<td>30,509.6</td>
<td>210.4</td>
<td>Double Shear</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>19,550.2</td>
<td>31,861.5</td>
<td>219.7</td>
<td>Double Shear</td>
<td></td>
</tr>
</tbody>
</table>

**Averages**  
19,193.0  
31,279.3  
215.7

**Ranges**  
964.1  
1,571.2  
10.8

\( \sigma \) Sigma  
646.3  
4.456

3\( \sigma \) Sigma  
1,938.8  
0.031

**Coefficient of Variation**  
2.07%

**Minimum Load**  
13,499.0

TEST MACHINE  
Baldwin Model 120 CS S/N: 1005  
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Sample # | Load/Failure (lbs) | Transverse Stress (psi) | Transverse Stress (MPa) | Mode of Failure | Line Traceability
--- | --- | --- | --- | --- | ---
1 | 38,553.5 | 24,543.9 | 169.2 | Double Shear | Double Shear
2 | 36,367.1 | 23,152.0 | 159.6 | Double Shear | Double Shear
3 | 38,348.2 | 24,413.2 | 168.3 | Double Shear | Double Shear
4 | 37,307.8 | 23,750.8 | 163.8 | Double Shear | Double Shear
5 | 37,781.0 | 24,052.1 | 165.8 | Double Shear | Double Shear
6 | 35,758.9 | 22,764.8 | 157.0 | Double Shear | Double Shear

Averages | 37,352.8 | 23,779.4 | 164.0 |
Ranges | 2,794.6 | 1,779.1 | 12.3 |
σ Sigma | 643.5 | 4.437 |
3σ Sigma | 1,930.4 | 0.031 |
Coefficient of Variation | 2.71 % |

Minimum Load | 34,557.5 |

Sample length to be 225 mm (9.0")

PSI = (Load divided by 2) divided by CSA

Hughes Brothers, Inc

Per ASTM D7617-11