

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

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 %	

Standard CSA  
A<sub>0</sub> (in / mm)  
0.442  
285.02

**Minimum Load**  
**19,438.6**

Sample length to be 225 mm (9.0")

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

### 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

## Transverse Shear Testing of GFRP Rebar



Rebar Size	RB4
Diameter	0.5000
SO #	35837
WO #	827558
Date Produced	5/22/2017
Matrix	VE
Formulation	RBVEIP234-20
Barcol Hardness	60.4
Impregnation	75.14 / 24.86

Tested By	R Kruse
Test Date	5/31/2017
Test Temp	75.2°F
Test R/H	20 %
Glass Type	OC 366
Yield	113
# of Ends	44
Sample Length	9.000"
Standard CSA	0.1963"
Load Rate	0.070"/min
Line Speed	

Sample #	Load/Failure (lbs)	Transverse Stress (psi)	Transverse Stress (MPa)	Mode of Failure	Line Traceability
1	12,236.8	31,168.6	214.9	Double Shear	
2	12,302.1	31,334.9	216.1	Double Shear	
3	11,021.8	28,073.9	193.6	Double Shear	
4	10,579.6	26,947.5	185.8	Double Shear	
5	12,690.5	32,324.2	222.9	Double Shear	
6	11,406.3	29,053.2	200.3	Double Shear	

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 %	

Standard CSA  
A<sub>0</sub> (in / mm)  
0.196  
126.68

**Minimum Load**  
**8,639.4**

Sample length to be 225 mm (9.0")  
PSI = (Load divided by 2) divided by CSA  
PSI = (L/2)/CSA

**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

## Transverse Shear Testing of GFRP Rebar



**Rebar Size** RB5  
**Diameter** 0.6250  
**SO #**   
**WO #** 744445  
**Date Produced** 4/6/2015  
**Matrix** VE  
**Formulation** RBVEIP2567-22  
**Barcol Hardness** 64.8  
**Impregnation** 74.40 / 25.60

**Tested By** R Kruse  
**Test Date** 4/9/2015  
**Test Temp** 71.5°F  
**Test R/H** 31 %  
**Glass Type** OC 366  
**Yield** 113  
**# of Ends** 68  
**Sample Length** 12.000"  
**Standard CSA** 0.3068"  
**Load Rate** 0.070"/min  
**Line Speed** 38 RPM

Sample #	Load/Failure (lbs)	Transverse Stress (psi)	Transverse Stress (MPa)	Mode of Failure	Line Traceability
1	18,826.1	30,681.4	211.5	Double Shear	
2	19,684.8	32,080.8	221.2	Double Shear	
3	18,859.2	30,735.3	211.9	Double Shear	
4	19,517.0	31,807.4	219.3	Double Shear	
5	18,720.7	30,509.6	210.4	Double Shear	
6	19,550.2	31,861.5	219.7	Double Shear	

Averages	19,193.0	31,279.3	215.7
Ranges	964.1	1,571.2	10.8
σ Sigma		646.3	4.456
3σ Sigma		1,938.8	0.031
Coefficient of Variation		2.07 %	

Standard CSA  
A<sub>0</sub> (in / mm)

0.307  
197.93

**Minimum Load**  
**13,499.0**

Sample length to be 225 mm (9.0")

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

### 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

## Transverse Shear Testing of GFRP Rebar



**Rebar Size**   
**Diameter**   
**SO #**   
**WO #**   
**Date Produced**   
**Matrix**   
**Formulation**   
**Barcol Hardness**   
**Impregnation**

**Tested By**   
**Test Date**   
**Test Temp**   
**Test R/H**   
**Glass Type**   
**Yield**   
**# of Ends**   
**Sample Length**   
**Standard CSA**   
**Load Rate**   
**Line Speed**

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	
2	36,367.1	23,152.0	159.6	Double Shear	
3	38,348.2	24,413.2	168.3	Double Shear	
4	37,307.8	23,750.8	163.8	Double Shear	
5	37,781.0	24,052.1	165.8	Double Shear	
6	35,758.9	22,764.8	157.0	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 %	

Standard CSA  
 $A_0$  (in / mm)  
 0.785  
 506.71

**Minimum Load**  
34,557.5

Sample length to be 225 mm (9.0")  
 PSI = (Load divided by 2) divided by CSA  
 PSI = (L/2)/CSA

**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