

Schletter, Inc.	Standard FS Racking System Representative Calculations - ASCE 7-05	25° Tilt w/o Seismic Design
HCV		

## 1. INTRODUCTION

### 1.1 Project Description

The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. FS ground mount system.

### 1.2 Construction

Photovoltaic modules are attached to aluminum purlins using clamp fasteners. Purlins are clamped to inclined aluminum girders, which are then connected to galvanized steel posts. Each support structure is equally spaced.

PV modules are required to meet the following specifications:

	Maximum		Minimum
Height =	1700 mm	Height =	1550 mm
Width =	1050 mm	Width =	970 mm
Dead Load =	3.00 psf	Dead Load =	1.75 psf

Modules Per Row = 2  
Module Tilt = 25°  
Maximum Height Above Grade = 3 ft



Typical loading conditions of the module dead loads, snow loads, and wind loads are shown on the left.

### 1.3 Technical Codes

- ASCE 7-05 - Chapter 6, Wind Loads
- ASCE 7-05 - Chapter 7, Snow Loads
- ASCE 7-05 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2003, 2006, 2009
- Aluminum Design Manual, Eighth Edition, 2005

## 2. LOAD ACTIONS

### 2.1 Permanent Loads

$g_{MAX}$ =	3.00 psf	Self-weight of the PV modules.
$g_{MIN}$ =	1.75 psf	

### 2.2 Snow Loads

Ground Snow Load, $P_g$ =	30.00 psf	(ASCE 7-05, Eq. 7-2)
Sloped Roof Snow Load, $P_s$ =	18.56 psf	
$I_s$ =	1.00	
$C_s$ =	0.82	
$C_e$ =	0.90	
$C_t$ =	1.20	

### 2.3 Wind Loads

Design Wind Speed, $V$ =	85 mph	Exposure Category = C
Height <	15 ft	Importance Category = II

Peak Velocity Pressure,  $q_z$  = 11.34 psf Including the gust factor,  $G=0.85$ . (ASCE 7-05, Eq. 6-15)

### Pressure Coefficients

$C_{f+ TOP}$ =	1.1	(Pressure)
$C_{f+ BOTTOM}$ =	1.7	
$C_{f- TOP}$ =	-2.2	(Suction)
$C_{f- BOTTOM}$ =	-1	

Provided pressure coefficients are the result of wind tunnel testing done by Ruscheweyh Consult. Coefficients are located in test report # 1127/0510-e. Negative forces are applied away from the surface.

### 2.4 Seismic Loads - N/A

$S_S$ =	0.00	$R$ = 1.25
$S_{DS}$ =	0.00	$C_s$ = 0
$S_1$ =	0.00	$\rho$ = 1.3
$S_{D1}$ =	0.00	$\Omega$ = 1.25
$T_a$ =	0.00	$C_d$ = 1.25

ASCE 7, Section 12.8.1.3: A maximum  $S_s$  of 1.5 may be used to calculate the base shear,  $C_s$ , of structures under five stories and with a period,  $T$ , of 0.5 or less. Therefore, a  $S_{ds}$  of 1.0 was used to calculate  $C_s$ .

## 2.5 Combination of Loads

ASCE 7 requires that all structures be checked by specified combinations of loads. Applicable load combinations are provided below.

### Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

$$\begin{aligned}
 &1.2D + 1.6S + 0.8W \\
 &1.2D + 1.6W + 0.5S \\
 &0.9D + 1.6W^M \\
 &1.54D + 1.3E + 0.2S^R \quad (\text{ASCE 7, Eq 2.3.2-1 through 2.3.2-7}) \text{ \& } (\text{ASCE 7, Section 12.4.3.2}) \\
 &0.56D + 1.3E^R \\
 &1.54D + 1.25E + 0.2S^O \\
 &0.56D + 1.25E^O
 \end{aligned}$$

### Allowable Stress Design, ASD

Member deflection checks and foundation designs are done according to the following ASD load combinations:

$$\begin{aligned}
 &1.0D + 1.0S \\
 &1.0D + 1.0W \\
 &1.0D + 0.75L + 0.75W + 0.75S \\
 &0.6D + 1.0W^M \quad (\text{ASCE 7, Eq 2.4.1-1 through 2.4.1-8}) \text{ \& } (\text{ASCE 7, Section 12.4.3.2}) \\
 &1.238D + 0.875E^O \\
 &1.1785D + 0.65625E + 0.75S^O \\
 &0.362D + 0.875E^O
 \end{aligned}$$

<sup>M</sup> Uses the minimum allowable module dead load.

<sup>R</sup> Include redundancy factor of 1.3.

<sup>O</sup> Includes overstrength factor of 1.25. Used to check seismic drift.

## 3. STRUCTURAL ANALYSIS

### 3.1 RISA Results

Appendix B.1 contains outputs from the structural analysis software package, RISA. These outputs are used to accurately determine resultant member and reaction forces from the loads seen throughout Section 2.

### 3.2 RISA Components

A member and node list has been provided below to correlate the RISA components with the design calculations in Section 4. Items of significance have been listed.

<u>Purlins</u>	<u>Location</u>	<u>Posts</u>	<u>Location</u>
M10	Top	M2	Outer
M11	Mid-Top	M5	Inner
M12	Mid-Bottom	M8	Outer
M13	Bottom		
<u>Girders</u>	<u>Location</u>	<u>Reactions</u>	<u>Location</u>
M1	Outer	N9	Outer
M4	Inner	N19	Inner
M7	Outer	N29	Outer
<u>Struts</u>	<u>Location</u>		
M3	Outer		
M6	Inner		
M9	Outer		

## 4. MEMBER DESIGN CALCULATIONS

### 4.1 Purlin Design

Aluminum purlins are used to transfer loads to the support structure. Purlins are designed as continuous beams with cantilevers. These are considered beams with internal hinges that can be joined with splices at 25% of the support respective span. See Appendix A.1 for detailed member calculations. Section units are in (mm).

Purlin Type =	<b>S1.5</b>
Aluminum Type =	6105-T5
$F_{ty}$ =	35 ksi
$L_b$ =	138 in
$\Phi F_{ty}$ STRONG-AXIS =	25.07 ksi
$\Phi F_{ty}$ WEAK-AXIS =	23.08 ksi
$S_y$ =	1.33 in <sup>3</sup>
$S_x$ =	0.6 in <sup>3</sup>
$E$ =	10100 ksi
$I_y$ =	2.16 in <sup>4</sup>
$I_x$ =	1.07 in <sup>4</sup>
$A$ =	1.25 in <sup>2</sup>
$g$ =	1.50 lbs/ft
$M_y$ =	1.872 k-ft
$M_z$ =	0.322 k-ft
$M_{y \text{ allowable}}$ =	2.779 k-ft
$M_{z \text{ allowable}}$ =	1.154 k-ft
Utilization =	<b>95%</b>



DETAIL VIEW

### 4.2 Girder Design

Loads from purlins are transferred to the posts using an inclined girder, which is connected to the steel post. Loads on the girder result from the support reactions of the purlins. See Appendix A.2 for detailed member calculations. Section units are in (mm).

Girder Type =	<b>T5</b>
Aluminum Type =	6105-T5
$F_{ty}$ =	35 ksi
$L_b$ =	63.82 in
$\Phi F_{ty}$ AXIAL =	30.80 ksi
$\Phi F_{ty}$ STRONG-AXIS =	30.46 ksi
$\Phi F_{ty}$ WEAK-AXIS =	31.56 ksi
$S_y$ =	1.98 in <sup>3</sup>
$S_x$ =	1.32 in <sup>3</sup>
$E$ =	10100 ksi
$I_y$ =	4.74 in <sup>4</sup>
$I_x$ =	1.83 in <sup>4</sup>
$A$ =	1.93 in <sup>2</sup>
$g$ =	2.32 lbs/ft
$M_y$ =	3.309 k-ft
$M_z$ =	0.000 k-ft
$P_n$ =	0.406 k
$M_{y \text{ allowable}}$ =	5.026 k-ft
$M_{z \text{ allowable}}$ =	3.472 k-ft
$P_{n \text{ allowable}}$ =	59.439 k
Utilization =	<b>67%</b>



DETAIL VIEW

### 4.3 Strut Design

The aluminum strut connects a portion of the girder to the galvanized steel post. Girder forces are then transferred down through the strut into the post. The strut is attached with single M10 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

Strut Type =	<b>55x55</b>
Aluminum Type =	6105-T5
$F_{ty}$ =	35 ksi
$L_b$ =	61.00 in
$\Phi F_{ty \text{ AXIAL}}$ =	13.67 ksi
$\Phi F_{ty \text{ BENDING}}$ =	28.22 ksi
$S_y$ =	0.60 in <sup>3</sup>
$S_x$ =	0.60 in <sup>3</sup>
$E$ =	10100 ksi
$I_y$ =	0.67 in <sup>4</sup>
$I_x$ =	0.67 in <sup>4</sup>
$A$ =	0.98 in <sup>2</sup>
$g$ =	1.18 lbs/ft
$M_y$ =	0.000 k-ft
$M_z$ =	0.383 k-ft
$P_n$ =	4.112 k
$M_{y \text{ allowable}}$ =	1.408 k-ft
$M_{z \text{ allowable}}$ =	1.408 k-ft
$P_{n \text{ allowable}}$ =	13.425 k
Utilization =	<b>58%</b>



### 4.4 Post Design

Galvanized steel posts are a roll formed steel section, that are either ram driven into the ground or placed in a concrete foundation at a defined depth. Embedment depths will be provided on the structural drawings or through a geotechnical testing report. See Appendix A.4 for detailed member calculations. Section units are in (mm).

Post Type =	<b>FG8</b>
Steel Type =	J2340
$F_{ty}$ =	60 ksi
$L_b$ =	72.60 in
$\Phi$ =	0.90
$\Phi F_{ty}$ =	54.00 ksi
$S_y$ =	3.46 in <sup>3</sup>
$S_x$ =	1.55 in <sup>3</sup>
$E$ =	29000 ksi
$I_y$ =	10.94 in <sup>4</sup>
$I_x$ =	4.31 in <sup>4</sup>
$A$ =	2.23 in <sup>2</sup>
$g$ =	7.59 lbs/ft
$M_y$ =	11.581 k-ft
$M_z$ =	0.000 k-ft
$P_r$ =	6.410 k
$M_{y \text{ allowable}}$ =	19.207 k-ft
$M_{z \text{ allowable}}$ =	14.389 k-ft
$P_c$ =	38.073 k
Utilization =	<b>76%</b>



## 5. FOUNDATION DESIGN CALCULATIONS

### 5.1 Rammed Post Foundations

The following LRFD loads include a safety factor of 1.3, and are to be used in conjunction with a Schletter, Inc. Geotechnical Investigation Report. The forces below should fall within the guidelines provided in the Geotechnical Investigation Report. If a Geotechnical Investigation Report is not present, please proceed to Section 5.2 for a concrete footing design.

Maximum Tensile Load = 4.75 k  
Maximum Lateral Load = 2.40 k

### 5.2 Design of Drilled Shaft Foundations

The galvanized steel post is to be embedded into a cylindrical drilled shaft foundation. For the purpose of design, the post is considered to be fixed to the ground. The applicable lateral force, uplift, and compression resistance checks are seen below.

### 5.3 Lateral Force Resistance

The equivalent lateral force is applied at the top of the post to determine the required embedment depth. A lateral soil bearing capacity for clay is assumed. Footing is unrestrained at ground level. (IBC, Eq. 18-1)

Lateral Force @ Top of Pole, P = 1.27 k  
Height of Pole Above Grade, H = 5.05 ft  
Diameter of Pole Footing, B = 2.00 ft  
Lateral Soil Bearing Capacity, S = 0.10 ksf/ft  
Isolated Pole Factor, F = 2  
First Trial Depth, D = 3.25 ft

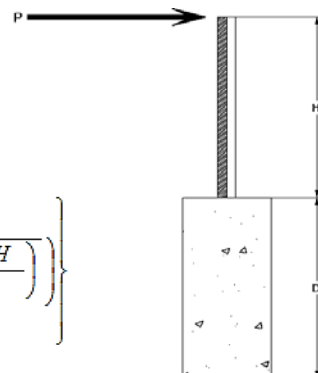
Lateral Bearing @ Bottom =  $S_3$   
Lateral Bearing @ D/3 =  $S_1$   
Required Depth = D

$$S_3 = \text{Min} (D, 12')$$

$$S_1 = \text{Min} \left( \frac{D}{3}, 12' \right)$$

$$A = 2.34 \frac{P}{S_1 B}$$

$$D = \left\{ 0.5 A \left( 1 + \sqrt{1 + \left( \frac{4.36 H}{A} \right)^2} \right) \right\}$$



#### Non-Constrained

Lateral Force @ Top of Pole, P = 1.27 k  
Height of Pole Above Grade, H = 5.05 ft  
Diameter of Pole Footing, B = 2.00 ft  
Lateral Soil Bearing Capacity, S = 0.20 ksf/ft

1st Trial @  $D_1$  = 3.25 ft  
Lateral Soil Bearing @ D/3,  $S_1$  = 0.22 ksf  
Lateral Soil Bearing @ D,  $S_3$  = 0.65 ksf  
Constant  $2.34P/(S_1 B)$ , A = 6.83  
Required Footing Depth, D = 10.44 ft

2nd Trial @  $D_2$  = 6.84 ft  
Lateral Soil Bearing @ D/3,  $S_1$  = 0.46 ksf  
Lateral Soil Bearing @ D,  $S_3$  = 1.37 ksf  
Constant  $2.34P/(S_1 B)$ , A = 3.24  
Required Footing Depth, D = 6.15 ft

3rd Trial @  $D_3$  = 6.50 ft  
Lateral Soil Bearing @ D/3,  $S_1$  = 0.43 ksf  
Lateral Soil Bearing @ D,  $S_3$  = 1.30 ksf  
Constant  $2.34P/(S_1 B)$ , A = 3.42  
Required Footing Depth, D = 6.37 ft

4th Trial @  $D_4$  = 6.43 ft  
Lateral Soil Bearing @ D/3,  $S_1$  = 0.43 ksf  
Lateral Soil Bearing @ D,  $S_3$  = 1.29 ksf  
Constant  $2.34P/(S_1 B)$ , A = 3.45  
Required Footing Depth, D = 6.41 ft

5th Trial @  $D_5$  = 6.42 ft  
Lateral Soil Bearing @ D/3,  $S_1$  = 0.43 ksf  
Lateral Soil Bearing @ D,  $S_3$  = 1.28 ksf  
Constant  $2.34P/(S_1 B)$ , A = 3.46  
Required Footing Depth, D = 6.50 ft

A 2ft diameter x 6.5ft deep footing unrestrained at ground level is required for the racking structure.

## 5.4 Uplifting Force Resistance

Uplifting forces of the racking system are checked against the uplift resistance of the soil. Clay soils are assumed.

Weight of Concrete, $g_{con}$ =	145 pcf
Uplifting Force, $N$ =	2.27 k
Footing Diameter, $B$ =	2.00 ft
Factor of Safety =	2.50
Cohesion =	208.85 psf
$\gamma_s$ =	120.43 pcf
$\alpha$ =	0.45
Required Concrete Weight, $g$ =	1.46 k
Required Concrete Volume, $V$ =	10.10 ft <sup>3</sup>
Required Footing Depth, $D$ =	<u>3.25</u> ft

A 2ft diameter x 3.25ft deep footing unrestrained at ground level is required for the racking structure.



Iteration	z	dz	Qs	Side
1	0.2	0.2	118.10	4.87
2	0.4	0.2	118.10	4.77
3	0.6	0.2	118.10	4.67
4	0.8	0.2	118.10	4.56
5	1	0.2	118.10	4.46
6	1.2	0.2	118.10	4.35
7	1.4	0.2	118.10	4.25
8	1.6	0.2	118.10	4.15
9	1.8	0.2	118.10	4.04
10	2	0.2	118.10	3.94
11	2.2	0.2	118.10	3.84
12	2.4	0.2	118.10	3.73
13	2.6	0.2	118.10	3.63
14	2.8	0.2	118.10	3.52
15	3	0.2	118.10	3.42
16	3.2	0.2	118.10	3.32
17	3.4	0.2	118.10	3.21
18	0	0.0	0.00	3.21
19	0	0.0	0.00	3.21
20	0	0.0	0.00	3.21
21	0	0.0	0.00	3.21
22	0	0.0	0.00	3.21
23	0	0.0	0.00	3.21
24	0	0.0	0.00	3.21
25	0	0.0	0.00	3.21
26	0	0.0	0.00	3.21
27	0	0.0	0.00	3.21
28	0	0.0	0.00	3.21
29	0	0.0	0.00	3.21
30	0	0.0	0.00	3.21
31	0	0.0	0.00	3.21
32	0	0.0	0.00	3.21
33	0	0.0	0.00	3.21
34	0	0.0	0.00	3.21
Max	3.4	Sum	0.80	

## 5.5 Compressive Force Resistance

Skin friction of the soil is checked against the compression force from the racking and the weight of the drilled shaft foundation. Skin friction starts at 3ft below grade. Clay soils are again assumed.

Depth Below Grade, $D$ =	6.50 ft
Footing Diameter, $B$ =	2.00 ft
Compressive Force, $P$ =	4.10 k

Footing Area =	3.14 ft <sup>2</sup>
Circumference =	6.28 ft
Skin Friction Area =	21.99 ft <sup>2</sup>
Concrete Weight =	0.145 kcf

<u>Bearing Pressure</u>	
Bearing Area =	3.14 ft <sup>2</sup>
Bearing Capacity =	1.5 ksf
Resistance =	4.71 k

<u>Weight of Concrete</u>	
Footing Volume	20.42 ft <sup>3</sup>
Weight	2.96 k

<u>Skin Friction Resistance</u>	
Skin Friction =	0.15 ksf
Resistance =	3.30 k

1/3 Increase for Wind =	1.33
Total Resistance =	10.68 k
Applied Force =	7.06 k
Utilization =	<u>66%</u>

A 2ft diameter footing passes at a depth of 6.5ft.



## 6. DESIGN OF JOINTS AND CONNECTIONS

### 6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

Modules are secured to the purlins with Schletter, Inc. Rapid2+ mounting clamps. Purlins are secured to the girders with the use of 40mm mounting clamps. The reliability of calculations is uncertain due to limited standards, therefore the strength of the clamp fasteners has been evaluated by load testing.

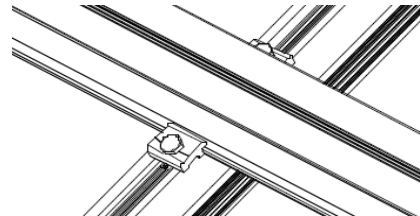
#### Fastening of Modules to Purlins

Maximum Uplifting Force =	0.368 k
Allowable Uplift =	1.214 k
Utilization =	<u>30%</u>



#### Fastening of Purlins to Girders

Maximum Uplifting Force =	1.486 k
Allowable Uplift =	2.180 k
Utilization =	<u>68%</u>

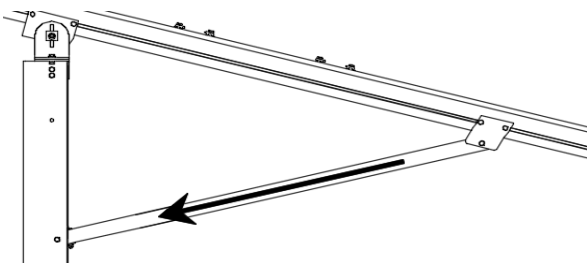


### 6.2 Strut Connections

The aluminum struts connect the front end of girder to a center section of the steel post. Single M10 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Maximum Axial Load =	4.112 k
M10 Bolt Shear Capacity =	8.894 k
Utilization =	<u>46%</u>

Bolt capacity is accounting for double shear. (ASCE 8-02, Eq. 5.3.4-1)



A strut under compression is shown to demonstrate the load transfer from the girder. Single M10 bolts are located at each end of the strut and are subjected to double shear.

### 6.3 Girder to Post Connection

In order to connect the girder to the post, custom extruded sections are assembled to create a post head piece. The reliability of calculations is uncertain due to limited standards, therefore the strength of the head piece has been evaluated by load testing.

Maximum Tensile Load =	3.198 k
Allowable Load =	5.649 k
Utilization =	<u>57%</u>



## 7. SEISMIC DESIGN

### 7.1 Seismic Drift - N/A

The racking structure has been analyzed under seismic loading. The allowable story drift of the structure must fall within the limits provided by (ASCE 7, Table 12.12-1).

Mean Height, $h_{sx}$ =	70.15 in
Allowable Story Drift for All Other Structures, $\Delta$ =	$0.020h_{sx}$
Max Drift, $\Delta_{MAX}$ =	1.403 in
	<u>N/A</u>

The racking structure's reaction to seismic loads is shown to the right. The deflections have been magnified to provide a clear portrayal of potential story drift.





## APPENDIX A

### A.1 Design of Aluminum Purlins - Aluminum Design Manual, 2005 Edition

Purlin = **S1.5**

Strong Axis:

#### 3.4.14

$$L_b = 138 \text{ in}$$

$$J = 0.432$$

$$381.773$$

$$S1 = \left( \frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc} \right)^2$$

$$S1 = 0.51461$$

$$S2 = \left( \frac{C_c}{1.6} \right)^2$$

$$S2 = 1701.56$$

$$\phi F_L = \phi b [Bc - 1.6Dc \sqrt{((LbSc)/(Cb \sqrt{(lyJ)/2}))}]$$

$$\phi F_L = 27.0 \text{ ksi}$$

Weak Axis:

#### 3.4.14

$$L_b = 138$$

$$J = 0.432$$

$$242.785$$

$$S1 = \left( \frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc} \right)^2$$

$$S1 = 0.51461$$

$$S2 = \left( \frac{C_c}{1.6} \right)^2$$

$$S2 = 1701.56$$

$$\phi F_L = \phi b [Bc - 1.6Dc \sqrt{((LbSc)/(Cb \sqrt{(lyJ)/2}))}]$$

$$\phi F_L = 28.3$$

#### 3.4.16

$$b/t = 32.195$$

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

$$S1 = 12.2$$

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

$$S2 = 46.7$$

$$\phi F_L = \phi b [Bp - 1.6Dp \cdot b/t]$$

$$\phi F_L = 25.1 \text{ ksi}$$

#### 3.4.16

$$b/t = 37.0588$$

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

$$S1 = 12.2$$

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

$$S2 = 46.7$$

$$\phi F_L = \phi b [Bp - 1.6Dp \cdot b/t]$$

$$\phi F_L = 23.1 \text{ ksi}$$

#### 3.4.16.1 Not Used

$$Rb/t =$$

$$S1 = \left( \frac{Bt - 1.17 \frac{\theta_y}{\theta_b} Fcy}{1.6Dt} \right)^2$$

$$S1 = 1.1$$

$$S2 = C_t$$

$$S2 = 141.0$$

$$\phi F_L = 1.17 \phi y Fcy$$

$$\phi F_L = 38.9 \text{ ksi}$$

#### 3.4.16.1

N/A for Weak Direction

#### 3.4.18

$$h/t = 37.0588$$

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

$$S1 = 36.9$$

$$m = 0.65$$

$$C_0 = 40.985$$

$$Cc = 41.015$$

$$S2 = \frac{k_1 Bbr}{mDbr}$$

$$S2 = 77.2$$

$$\phi F_L = \phi b [Bbr - mDbr \cdot h/t]$$

$$\phi F_L = 43.2 \text{ ksi}$$

$$\phi F_L St = 25.1 \text{ ksi}$$

$$I_x = 897074 \text{ mm}^4$$

$$2.155 \text{ in}^4$$

$$y = 41.015 \text{ mm}$$

$$S_x = 1.335 \text{ in}^3$$

$$M_{\max} St = 2.788 \text{ k-ft}$$

#### 3.4.18

$$h/t = 32.195$$

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

$$S1 = 36.9$$

$$m = 0.65$$

$$C_0 = 45.5$$

$$Cc = 45.5$$

$$S2 = \frac{k_1 Bbr}{mDbr}$$

$$S2 = 77.3$$

$$\phi F_L = 1.3 \phi y Fcy$$

$$\phi F_L = 43.2 \text{ ksi}$$

$$\phi F_L Wk = 23.1 \text{ ksi}$$

$$I_y = 446476 \text{ mm}^4$$

$$1.073 \text{ in}^4$$

$$x = 45.5 \text{ mm}$$

$$S_y = 0.599 \text{ in}^3$$

$$M_{\max} Wk = 1.152 \text{ k-ft}$$

## Compression

### 3.4.9

$$\begin{aligned} b/t &= 32.195 \\ S1 &= 12.21 \text{ (See 3.4.16 above for formula)} \\ S2 &= 32.70 \text{ (See 3.4.16 above for formula)} \\ \phi F_L &= \phi c [Bp - 1.6Dp \cdot b/t] \\ \phi F_L &= 25.1 \text{ ksi} \end{aligned}$$

$$\begin{aligned} b/t &= 37.0588 \\ S1 &= 12.21 \\ S2 &= 32.70 \\ \phi F_L &= (\phi c k_2 \sqrt{(BpE)}) / (1.6b/t) \\ \phi F_L &= 21.9 \text{ ksi} \end{aligned}$$

### 3.4.10

$$\begin{aligned} Rb/t &= 0.0 \\ S1 &= \left( \frac{Bt - \frac{\theta_y}{\theta_b} Fcy}{Dt} \right)^2 \\ S1 &= 6.87 \\ S2 &= 131.3 \\ \phi F_L &= \phi_y Fcy \\ \phi F_L &= 33.25 \text{ ksi} \\ \phi F_L &= 21.94 \text{ ksi} \\ A &= 1215.13 \text{ mm}^2 \\ &= 1.88 \text{ in}^2 \\ P_{\max} &= 41.32 \text{ kips} \end{aligned}$$

## A.2 Design of Aluminum Girders - Aluminum Design Manual, 2005 Edition

Girder = **T5**

Strong Axis:

### 3.4.14

$$\begin{aligned} L_b &= 63.8189 \text{ in} \\ J &= 1.98 \\ &= 82.1278 \\ S1 &= \left( \frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc} \right)^2 \\ S1 &= 0.51461 \\ S2 &= \left( \frac{C_c}{1.6} \right)^2 \\ S2 &= 1701.56 \\ \phi F_L &= \phi b [Bc - 1.6Dc \sqrt{((LbSc)/(Cb \sqrt{(IyJ)/2}))}] \\ \phi F_L &= 30.5 \text{ ksi} \end{aligned}$$

Weak Axis:

### 3.4.14

$$\begin{aligned} L_b &= 63.8189 \\ J &= 1.98 \\ &= 89.1294 \\ S1 &= \left( \frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc} \right)^2 \\ S1 &= 0.51461 \\ S2 &= \left( \frac{C_c}{1.6} \right)^2 \\ S2 &= 1701.56 \\ \phi F_L &= \phi b [Bc - 1.6Dc \sqrt{((LbSc)/(Cb \sqrt{(IyJ)/2}))}] \\ \phi F_L &= 30.3 \end{aligned}$$

### 3.4.16

$$\begin{aligned} b/t &= 4.5 \\ S1 &= \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp} \\ S1 &= 12.2 \\ S2 &= \frac{k_1 Bp}{1.6Dp} \\ S2 &= 46.7 \\ \phi F_L &= \phi_y Fcy \\ \phi F_L &= 33.3 \text{ ksi} \end{aligned}$$

### 3.4.16

$$\begin{aligned} b/t &= 16.3333 \\ S1 &= \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp} \\ S1 &= 12.2 \\ S2 &= \frac{k_1 Bp}{1.6Dp} \\ S2 &= 46.7 \\ \phi F_L &= \phi b [Bp - 1.6Dp \cdot b/t] \\ \phi F_L &= 31.6 \text{ ksi} \end{aligned}$$

### 3.4.16.1 Used

$$Rb/t = 20.0$$

$$S1 = \left( \frac{Bt - 1.17 \frac{\theta_y}{\theta_b} Fcy}{1.6Dt} \right)^2$$

$$S1 = 1.1$$

$$S2 = C_t$$

$$S2 = 141.0$$

$$\phi F_L = \phi b [Bt - Dt \sqrt{(Rb/t)}]$$

$$\phi F_L = 30.8 \text{ ksi}$$

### 3.4.18

$$h/t = 16.3333$$

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

$$S1 = 37.9$$

$$m = 0.63$$

$$C_0 = 61.046$$

$$Cc = 58.954$$

$$S2 = \frac{k_1 Bbr}{mDbr}$$

$$S2 = 79.4$$

$$\phi F_L = 1.3\phi y Fcy$$

$$\phi F_L = 43.2 \text{ ksi}$$

$$\phi F_L St = 30.5 \text{ ksi}$$

$$I_x = 1970917 \text{ mm}^4$$

$$4.735 \text{ in}^4$$

$$y = 61.046 \text{ mm}$$

$$S_x = 1.970 \text{ in}^3$$

$$M_{max} St = 5.001 \text{ k-ft}$$

### 3.4.16.1

N/A for Weak Direction

### 3.4.18

$$h/t = 4.5$$

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

$$S1 = 36.9$$

$$m = 0.65$$

$$C_0 = 35$$

$$Cc = 35$$

$$S2 = \frac{k_1 Bbr}{mDbr}$$

$$S2 = 77.3$$

$$\phi F_L = 1.3\phi y Fcy$$

$$\phi F_L = 43.2 \text{ ksi}$$

$$\phi F_L Wk = 31.6 \text{ ksi}$$

$$I_y = 763048 \text{ mm}^4$$

$$1.833 \text{ in}^4$$

$$x = 35 \text{ mm}$$

$$S_y = 1.330 \text{ in}^3$$

$$M_{max} Wk = 3.499 \text{ k-ft}$$

### Compression

### 3.4.9

$$b/t = 4.5$$

$$S1 = 12.21 \text{ (See 3.4.16 above for formula)}$$

$$S2 = 32.70 \text{ (See 3.4.16 above for formula)}$$

$$\phi F_L = \phi y Fcy$$

$$\phi F_L = 33.3 \text{ ksi}$$

$$b/t = 16.3333$$

$$S1 = 12.21$$

$$S2 = 32.70$$

$$\phi F_L = \phi c [Bp - 1.6Dp \sqrt{b/t}]$$

$$\phi F_L = 31.6 \text{ ksi}$$

### 3.4.10

$$Rb/t = 20.0$$

$$S1 = \left( \frac{Bt - \frac{\theta_y}{\theta_b} Fcy}{Dt} \right)^2$$

$$S1 = 6.87$$

$$S2 = 131.3$$

$$\phi F_L = \phi c [Bt - Dt \sqrt{(Rb/t)}]$$

$$\phi F_L = 30.80 \text{ ksi}$$

$$\phi F_L = 30.80 \text{ ksi}$$

$$A = 1215.13 \text{ mm}^2$$

$$1.88 \text{ in}^2$$

$$P_{max} = 58.01 \text{ kips}$$

### A.3 Design of Aluminum Struts - Aluminum Design Manual, 2005 Edition

Strut = **55x55**

Strong Axis:

#### 3.4.14

$$L_b = 61 \text{ in}$$

$$J = 0.942$$

$$95.1963$$

$$S1 = \left( \frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc} \right)^2$$

$$S1 = 0.51461$$

$$S2 = \left( \frac{C_c}{1.6} \right)^2$$

$$S2 = 1701.56$$

$$\phi F_L = \phi b [Bc - 1.6Dc \sqrt{((LbSc)/(Cb \sqrt{(IyJ)/2}))}]$$

$$\phi F_L = 30.2 \text{ ksi}$$

Weak Axis:

#### 3.4.14

$$L_b = 61$$

$$J = 0.942$$

$$95.1963$$

$$S1 = \left( \frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc} \right)^2$$

$$S1 = 0.51461$$

$$S2 = \left( \frac{C_c}{1.6} \right)^2$$

$$S2 = 1701.56$$

$$\phi F_L = \phi b [Bc - 1.6Dc \sqrt{((LbSc)/(Cb \sqrt{(IyJ)/2}))}]$$

$$\phi F_L = 30.2$$

#### 3.4.16

$$b/t = 24.5$$

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

$$S1 = 12.2$$

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

$$S2 = 46.7$$

$$\phi F_L = \phi b [Bp - 1.6Dp \cdot b/t]$$

$$\phi F_L = 28.2 \text{ ksi}$$

#### 3.4.16

$$b/t = 24.5$$

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$$

$$S1 = 12.2$$

$$S2 = \frac{k_1 Bp}{1.6Dp}$$

$$S2 = 46.7$$

$$\phi F_L = \phi b [Bp - 1.6Dp \cdot b/t]$$

$$\phi F_L = 28.2 \text{ ksi}$$

#### 3.4.16.1 Not Used

$$Rb/t = 0.0$$

$$S1 = \left( \frac{Bt - 1.17 \frac{\theta_y}{\theta_b} Fcy}{1.6Dt} \right)^2$$

$$S1 = 1.1$$

$$S2 = C_t$$

$$S2 = 141.0$$

$$\phi F_L = 1.17 \phi_y Fcy$$

$$\phi F_L = 38.9 \text{ ksi}$$

#### 3.4.16.1

N/A for Weak Direction

#### 3.4.18

$$h/t = 24.5$$

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

$$S1 = 36.9$$

$$m = 0.65$$

$$C_0 = 27.5$$

$$Cc = 27.5$$

$$S2 = \frac{k_1 Bbr}{mDbr}$$

$$S2 = 77.3$$

$$\phi F_L = 1.3 \phi_y Fcy$$

$$\phi F_L = 43.2 \text{ ksi}$$

$$\phi F_L St = 28.2 \text{ ksi}$$

$$I_x = 279836 \text{ mm}^4$$

$$0.672 \text{ in}^4$$

$$y = 27.5 \text{ mm}$$

$$S_x = 0.621 \text{ in}^3$$

$$M_{\max} St = 1.460 \text{ k-ft}$$

#### 3.4.18

$$h/t = 24.5$$

$$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$$

$$S1 = 36.9$$

$$m = 0.65$$

$$C_0 = 27.5$$

$$Cc = 27.5$$

$$S2 = \frac{k_1 Bbr}{mDbr}$$

$$S2 = 77.3$$

$$\phi F_L = 1.3 \phi_y Fcy$$

$$\phi F_L = 43.2 \text{ ksi}$$

$$\phi F_L Wk = 28.2 \text{ ksi}$$

$$I_y = 279836 \text{ mm}^4$$

$$0.672 \text{ in}^4$$

$$x = 27.5 \text{ mm}$$

$$S_y = 0.621 \text{ in}^3$$

$$M_{\max} Wk = 1.460 \text{ k-ft}$$

## Compression

### 3.4.7

$$\lambda = 1.41113$$

$$r = 0.81 \text{ in}$$

$$S1^* = \frac{Bc - Fcy}{1.6Dc^*}$$

$$S1^* = 0.33515$$

$$S2^* = \frac{Cc}{\pi} \sqrt{Fcy/E}$$

$$S2^* = 1.23671$$

$$\phi_{cc} = 0.77756$$

$$\phi F_L = (\phi_{cc} Fcy)/(\lambda^2)$$

$$\phi F_L = 13.6667 \text{ ksi}$$

### 3.4.9

$$b/t = 24.5$$

$$S1 = 12.21 \text{ (See 3.4.16 above for formula)}$$

$$S2 = 32.70 \text{ (See 3.4.16 above for formula)}$$

$$\phi F_L = \phi c [Bp - 1.6Dp * b/t]$$

$$\phi F_L = 28.2 \text{ ksi}$$

$$b/t = 24.5$$

$$S1 = 12.21$$

$$S2 = 32.70$$

$$\phi F_L = \phi c [Bp - 1.6Dp * b/t]$$

$$\phi F_L = 28.2 \text{ ksi}$$

### 3.4.10

$$Rb/t = 0.0$$

$$S1 = \left( \frac{Bt - \frac{\theta_y}{\theta_h} Fcy}{Dt} \right)^2$$

$$S1 = 6.87$$

$$S2 = 131.3$$

$$\phi F_L = \phi_y Fcy$$

$$\phi F_L = 33.25 \text{ ksi}$$

$$\phi F_L = 13.67 \text{ ksi}$$

$$A = 663.99 \text{ mm}^2$$

$$1.03 \text{ in}^2$$

$$P_{\max} = 14.07 \text{ kips}$$

#### A.4 Design of Galvanized Steel Posts

Post Type = **FG8**

Unbraced Length = 72.60 in  
 Pr = 6.41 k (LRFD Factored Load)  
 Mr (Strong) = 11.58 k-ft (LRFD Factored Load)  
 Mr (Weak) = 0.00 k-ft (LRFD Factored Load)

##### Flexural Buckling:

$kL/r = 104.47$   
 $4.71\sqrt{E/F_y} = 103.55 \Rightarrow kL/r > 4.71\sqrt{E/F_y}$   
 $F_{cr} = 23.00$  ksi  
 $F_e = 26.23$  ksi  
 $P_n = 51.291$  k

##### Torsional/Flexural Torsional Buckling:

$F_{cr} = 17.0733$  ksi  
 $F_{ey} = 66.8981$  ksi  
 $F_{ez} = 21.7595$  ksi  
 $P_n = 38.0734$  k

##### Bending (Strong Axis):

Yielding:  
 $M_n = 21.95$  k-ft

##### Flange Local Buckling:

$M_n = 19.207$  k-ft

$P_r/P_c = 0.1871 < 0.2$   
 Utilization =  $0.76 < 1.0$  OK

##### Bending (Weak Axis):

Yielding:  
 $M_n = 14.65$  k-ft

##### Flange Local Buckling:

$M_n = 14.39$  k-ft

$P_r/P_c = 0.187 < 0.2$   
 Utilization =  $0.00 < 1.0$  OK

##### Combined Forces

Utilization = **76%**

## APPENDIX B

### B.1

The following pages will contain the results from RISA. Please refer back to Section 2 for load information and Section 4-5 for member and foundation design.



Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

Sept 14, 2015

Checked By: \_\_\_\_\_

### Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				4		
2	Dead Load, Min	DL		-1				4		
3	Snow Load	SL						4		
4	Wind Load - Pressure	WL						4		
5	Wind Load - Suction	WL						4		
6	Seismic - Lateral	EL								

### Member Distributed Loads (BLC 1 : Dead Load, Max)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft, %]	End Location[ft, %]
1	M10	Y	-8.366	-8.366	0	0
2	M11	Y	-8.366	-8.366	0	0
3	M12	Y	-8.366	-8.366	0	0
4	M13	Y	-8.366	-8.366	0	0

### Member Distributed Loads (BLC 2 : Dead Load, Min)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft, %]	End Location[ft, %]
1	M10	Y	-4.45	-4.45	0	0
2	M11	Y	-4.45	-4.45	0	0
3	M12	Y	-4.45	-4.45	0	0
4	M13	Y	-4.45	-4.45	0	0

### Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft, %]	End Location[ft, %]
1	M10	Y	-46.9	-46.9	0	0
2	M11	Y	-46.9	-46.9	0	0
3	M12	Y	-46.9	-46.9	0	0
4	M13	Y	-46.9	-46.9	0	0

### Member Distributed Loads (BLC 4 : Wind Load - Pressure)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft, %]	End Location[ft, %]
1	M10	y	-34.799	-34.799	0	0
2	M11	y	-34.799	-34.799	0	0
3	M12	y	-53.78	-53.78	0	0
4	M13	y	-53.78	-53.78	0	0

### Member Distributed Loads (BLC 5 : Wind Load - Suction)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft, %]	End Location[ft, %]
1	M10	y	69.597	69.597	0	0
2	M11	y	69.597	69.597	0	0
3	M12	y	31.635	31.635	0	0
4	M13	y	31.635	31.635	0	0

### Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8										
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6										
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6								
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3								
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3								
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25								
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25								







Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

Sept 14, 2015

Checked By: \_\_\_\_\_

### Envelope Member Section Forces (Continued)

Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
33	17	max	218.105	1	504.598	1	-6.421	15	.318	1	-.01	12	.212	1
34		min	9.223	15	-515.39	3	-158.56	1	-.382	3	-.357	1	-.222	3
35	18	max	.939	4	2.013	4	.001	1	0	1	0	15	0	4
36		min	.221	15	.473	15	0	15	0	1	0	1	0	15
37	19	max	0	1	.001	2	.001	1	0	1	0	1	0	1
38		min	0	1	-.003	3	0	15	0	1	0	1	0	1
39	M4	1	max	0	.015	1	0	1	0	1	0	1	0	1
40		min	0	1	-.003	3	0	1	0	1	0	1	0	1
41	2	max	-.221	15	-.473	15	0	1	0	1	0	1	0	4
42		min	-.939	4	-2.009	4	0	1	0	1	0	1	0	15
43	3	max	-16.065	12	637.719	3	0	1	0	1	0	1	.629	1
44		min	-412.788	1	-1642.925	1	0	1	0	1	0	1	-.248	3
45	4	max	-16.431	12	636.543	3	0	1	0	1	0	1	1.649	1
46		min	-413.519	1	-1644.494	1	0	1	0	1	0	1	-.643	3
47	5	max	-16.797	12	635.367	3	0	1	0	1	0	1	2.671	1
48		min	-414.25	1	-1646.062	1	0	1	0	1	0	1	-1.038	3
49	6	max	944.224	3	1464.077	1	0	1	0	1	0	1	2.551	1
50		min	-3185.712	1	-468.285	3	0	1	0	1	0	1	-1.027	3
51	7	max	943.676	3	1462.508	1	0	1	0	1	0	1	1.643	1
52		min	-3186.443	1	-469.462	3	0	1	0	1	0	1	-.736	3
53	8	max	943.127	3	1460.94	1	0	1	0	1	0	1	.736	1
54		min	-3187.175	1	-470.638	3	0	1	0	1	0	1	-.445	3
55	9	max	920.269	3	196.184	3	0	1	0	1	0	1	.195	1
56		min	-3582.218	1	-232.843	1	0	1	0	1	0	1	-.302	3
57	10	max	919.72	3	195.008	3	0	1	0	1	0	1	.34	1
58		min	-3582.95	1	-234.411	1	0	1	0	1	0	1	-.424	3
59	11	max	919.172	3	193.832	3	0	1	0	1	0	1	.486	1
60		min	-3583.681	1	-235.979	1	0	1	0	1	0	1	-.544	3
61	12	max	901.044	3	1601.433	3	0	1	0	1	0	1	1.206	1
62		min	-3986.66	1	-1711.152	1	0	1	0	1	0	1	-1.225	3
63	13	max	900.496	3	1600.256	3	0	1	0	1	0	1	2.268	1
64		min	-3987.391	1	-1712.721	1	0	1	0	1	0	1	-2.219	3
65	14	max	414.904	1	1459.426	1	0	1	0	1	0	1	3.288	1
66		min	18.03	12	-1408.851	3	0	1	0	1	0	1	-3.17	3
67	15	max	414.173	1	1457.858	1	0	1	0	1	0	1	2.383	1
68		min	17.664	12	-1410.028	3	0	1	0	1	0	1	-2.296	3
69	16	max	413.442	1	1456.29	1	0	1	0	1	0	1	1.478	1
70		min	17.298	12	-1411.204	3	0	1	0	1	0	1	-1.42	3
71	17	max	412.711	1	1454.721	1	0	1	0	1	0	1	.575	1
72		min	16.933	12	-1412.38	3	0	1	0	1	0	1	-.544	3
73	18	max	.939	4	2.014	4	0	1	0	1	0	1	0	4
74		min	.221	15	.473	15	0	1	0	1	0	1	0	15
75	19	max	0	1	.005	1	0	1	0	1	0	1	0	1
76		min	0	1	-.008	3	0	1	0	1	0	1	0	1
77	M7	1	max	0	.006	1	.001	1	0	1	0	1	0	1
78		min	0	1	0	3	0	15	0	1	0	1	0	1
79	2	max	-.221	15	-.473	15	.001	1	0	1	0	1	0	4
80		min	-.939	4	-2.011	4	0	15	0	1	0	15	0	15
81	3	max	-9.198	15	203.742	3	205.318	1	.244	1	-.013	15	.251	1
82		min	-218.067	1	-575.154	1	1.671	12	-.054	3	-.331	1	-.087	3
83	4	max	-9.419	15	202.565	3	205.318	1	.244	1	-.008	15	.609	1
84		min	-218.798	1	-576.723	1	1.671	12	-.054	3	-.203	1	-.213	3
85	5	max	-9.639	15	201.389	3	205.318	1	.244	1	.005	10	.967	1
86		min	-219.529	1	-578.291	1	1.671	12	-.054	3	-.076	1	-.338	3
87	6	max	263.551	3	498.895	1	275.649	1	.064	3	.041	3	.931	1
88		min	-1178.118	1	-122.82	3	-24.396	3	-.07	1	-.139	1	-.344	3
89	7	max	263.003	3	497.327	1	275.649	1	.064	3	.032	1	.622	1



Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

Sept 14, 2015

Checked By: \_\_\_\_\_

### Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
90			min	-1178.849	1	-123.997	3	-24.396	3	-.07	1	-.012	10	-.268	3
91		8	max	262.454	3	495.758	1	275.649	1	.064	3	.203	1	.314	1
92			min	-1179.58	1	-125.173	3	-24.396	3	-.07	1	.007	12	-.19	3
93		9	max	247.017	3	64.425	3	281.89	1	.193	2	-.001	10	.138	1
94			min	-1405.422	1	-64.568	1	-18.811	3	.004	15	-.107	1	-.155	3
95		10	max	246.468	3	63.249	3	281.89	1	.193	2	.068	1	.179	1
96			min	-1406.153	1	-66.136	1	-18.811	3	.004	15	-.05	3	-.195	3
97		11	max	245.92	3	62.073	3	281.89	1	.193	2	.243	1	.221	1
98			min	-1406.885	1	-67.705	1	-18.811	3	.004	15	-.062	3	-.234	3
99		12	max	228.117	3	578.806	3	255.485	3	.449	1	-.007	15	.466	1
100			min	-1628.759	1	-566.127	1	-138.651	2	-.357	3	-.188	1	-.476	3
101		13	max	227.568	3	577.63	3	255.485	3	.449	1	.142	3	.818	1
102			min	-1629.49	1	-567.696	1	-138.651	2	-.357	3	-.242	1	-.835	3
103		14	max	220.299	1	509.303	1	158.56	1	.382	3	.062	1	1.156	1
104			min	9.885	15	-511.861	3	6.421	15	-.318	1	-.046	3	-1.178	3
105		15	max	219.568	1	507.734	1	158.56	1	.382	3	.16	1	.84	1
106			min	9.665	15	-513.037	3	6.421	15	-.318	1	-.026	3	-.86	3
107		16	max	218.837	1	506.166	1	158.56	1	.382	3	.259	1	.526	1
108			min	9.444	15	-514.214	3	6.421	15	-.318	1	-.006	3	-.541	3
109		17	max	218.105	1	504.598	1	158.56	1	.382	3	.357	1	.212	1
110			min	9.223	15	-515.39	3	6.421	15	-.318	1	.01	12	-.222	3
111		18	max	.939	4	2.013	4	0	15	0	1	0	1	0	4
112			min	.221	15	.473	15	-.001	1	0	1	0	15	0	15
113		19	max	0	1	.001	2	0	15	0	1	0	1	0	1
114			min	0	1	-.003	3	-.001	1	0	1	0	1	0	1
115	M10	1	max	158.548	1	501.184	1	-8.783	15	.007	1	.421	1	.318	1
116			min	6.421	15	-517.7	3	-216.987	1	-.014	3	.017	15	-.382	3
117		2	max	158.548	1	364.995	1	-6.853	15	.007	1	.174	1	.193	3
118			min	6.421	15	-381.619	3	-170.069	1	-.014	3	.007	15	-.235	1
119		3	max	158.548	1	228.805	1	-4.924	15	.007	1	.01	2	.593	3
120			min	6.421	15	-245.537	3	-123.15	1	-.014	3	-.016	9	-.614	1
121		4	max	158.548	1	92.616	1	-2.994	15	.007	1	-.006	15	.82	3
122			min	6.421	15	-109.456	3	-76.232	1	-.014	3	-.141	1	-.82	1
123		5	max	158.548	1	26.625	3	-1.065	15	.007	1	-.009	15	.873	3
124			min	6.421	15	-43.573	1	-29.313	1	-.014	3	-.208	1	-.851	1
125		6	max	158.548	1	162.707	3	17.605	1	.007	1	-.009	15	.752	3
126			min	6.421	15	-179.763	1	-1.507	10	-.014	3	-.216	1	-.708	1
127		7	max	158.548	1	298.788	3	64.524	1	.007	1	-.006	15	.457	3
128			min	6.421	15	-315.952	1	2.308	12	-.014	3	-.163	1	-.392	1
129		8	max	158.548	1	434.87	3	111.442	1	.007	1	-.002	15	.099	1
130			min	6.421	15	-452.142	1	4.238	12	-.014	3	-.051	1	-.012	3
131		9	max	158.548	1	570.951	3	158.361	1	.007	1	.121	1	.764	1
132			min	6.421	15	-588.331	1	6.167	12	-.014	3	-.002	10	-.654	3
133		10	max	158.548	1	724.52	1	-8.096	12	.007	1	.354	1	1.603	1
134			min	6.421	15	-707.033	3	-205.28	1	-.014	3	.011	12	-1.471	3
135		11	max	158.548	1	588.331	1	-6.167	12	.014	3	.121	1	.764	1
136			min	6.421	15	-570.951	3	-158.361	1	-.007	1	-.002	10	-.654	3
137		12	max	158.548	1	452.142	1	-4.238	12	.014	3	-.002	15	.099	1
138			min	6.421	15	-434.87	3	-111.442	1	-.007	1	-.051	1	-.012	3
139		13	max	158.548	1	315.952	1	-2.308	12	.014	3	-.006	15	.457	3
140			min	6.421	15	-298.788	3	-64.524	1	-.007	1	-.163	1	-.392	1
141		14	max	158.548	1	179.763	1	1.507	10	.014	3	-.009	15	.752	3
142			min	6.421	15	-162.707	3	-17.605	1	-.007	1	-.216	1	-.708	1
143		15	max	158.548	1	43.573	1	29.313	1	.014	3	-.009	15	.873	3
144			min	6.421	15	-26.625	3	1.065	15	-.007	1	-.208	1	-.851	1
145		16	max	158.548	1	109.456	3	76.232	1	.014	3	-.006	15	.82	3
146			min	6.421	15	-92.616	1	2.994	15	-.007	1	-.141	1	-.82	1



Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

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Checked By: \_\_\_\_\_

### Envelope Member Section Forces (Continued)

Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
147	17	max	158.548	1	245.537	3	123.15	1	.014	3	.01	2	.593	3
148		min	6.421	15	-228.805	1	4.924	15	-.007	1	-.016	9	-.614	1
149	18	max	158.548	1	381.619	3	170.069	1	.014	3	.174	1	.193	3
150		min	6.421	15	-364.995	1	6.853	15	-.007	1	.007	15	-.235	1
151	19	max	158.548	1	517.7	3	216.987	1	.014	3	.421	1	.318	1
152		min	6.421	15	-501.184	1	8.783	15	-.007	1	.017	15	-.382	3
153	M11	1	max	369.481	1	495.022	1	-9.004	15	0	.459	1	.282	1
154		min	-274.236	3	-518.385	3	-221.951	1	-.006	1	.018	15	-.46	3
155	2	max	369.481	1	358.833	1	-7.075	15	0	15	.205	1	.115	3
156		min	-274.236	3	-382.303	3	-175.033	1	-.006	1	.008	15	-.264	1
157	3	max	369.481	1	222.643	1	-5.145	15	0	15	.016	2	.517	3
158		min	-274.236	3	-246.222	3	-128.114	1	-.006	1	0	15	-.635	1
159	4	max	369.481	1	86.454	1	-3.216	15	0	15	.003	3	.744	3
160		min	-274.236	3	-110.14	3	-81.196	1	-.006	1	-.122	1	-.833	1
161	5	max	369.481	1	25.941	3	-1.287	15	0	15	-.004	12	.798	3
162		min	-274.236	3	-49.735	1	-34.277	1	-.006	1	-.196	1	-.856	1
163	6	max	369.481	1	162.022	3	12.641	1	0	15	-.008	12	.678	3
164		min	-274.236	3	-185.925	1	-2.689	3	-.006	1	-.21	1	-.705	1
165	7	max	369.481	1	298.104	3	59.56	1	0	15	-.006	15	.384	3
166		min	-274.236	3	-322.114	1	.205	3	-.006	1	-.164	1	-.381	1
167	8	max	369.481	1	434.185	3	106.478	1	0	15	-.002	15	.118	1
168		min	-274.236	3	-458.304	1	2.205	12	-.006	1	-.057	1	-.084	3
169	9	max	369.481	1	570.267	3	153.397	1	0	15	.109	1	.79	1
170		min	-274.236	3	-594.493	1	4.134	12	-.006	1	-.005	3	-.725	3
171	10	max	369.481	1	730.682	1	-6.063	12	.006	1	.335	1	1.637	1
172		min	-274.236	3	-706.348	3	-200.315	1	-.001	3	.004	12	-1.541	3
173	11	max	369.481	1	594.493	1	-4.134	12	.006	1	.109	1	.79	1
174		min	-274.236	3	-570.267	3	-153.397	1	0	15	-.005	3	-.725	3
175	12	max	369.481	1	458.304	1	-2.205	12	.006	1	-.002	15	.118	1
176		min	-274.236	3	-434.185	3	-106.478	1	0	15	-.057	1	-.084	3
177	13	max	369.481	1	322.114	1	-.205	3	.006	1	-.006	15	.384	3
178		min	-274.236	3	-298.104	3	-59.56	1	0	15	-.164	1	-.381	1
179	14	max	369.481	1	185.925	1	2.689	3	.006	1	-.008	12	.678	3
180		min	-274.236	3	-162.022	3	-12.641	1	0	15	-.21	1	-.705	1
181	15	max	369.481	1	49.735	1	34.277	1	.006	1	-.004	12	.798	3
182		min	-274.236	3	-25.941	3	1.287	15	0	15	-.196	1	-.856	1
183	16	max	369.481	1	110.14	3	81.196	1	.006	1	.003	3	.744	3
184		min	-274.236	3	-86.454	1	3.216	15	0	15	-.122	1	-.833	1
185	17	max	369.481	1	246.222	3	128.114	1	.006	1	.016	2	.517	3
186		min	-274.236	3	-222.643	1	5.145	15	0	15	0	15	-.635	1
187	18	max	369.481	1	382.303	3	175.033	1	.006	1	.205	1	.115	3
188		min	-274.236	3	-358.833	1	7.075	15	0	15	.008	15	-.264	1
189	19	max	369.481	1	518.385	3	221.951	1	.006	1	.459	1	.282	1
190		min	-274.236	3	-495.022	1	9.004	15	0	15	.018	15	-.46	3
191	M12	1	max	37.143	2	558.005	1	-9.097	15	0	.483	1	.257	2
192		min	-19.54	9	-191.047	3	-225.099	1	-.007	1	.019	15	.006	15
193	2	max	37.143	2	402.412	1	-7.167	15	0	12	.225	1	.246	3
194		min	-19.54	9	-132.577	3	-178.181	1	-.007	1	.009	15	-.376	1
195	3	max	37.143	2	246.82	1	-5.238	15	0	12	.03	2	.378	3
196		min	-19.54	9	-74.107	3	-131.262	1	-.007	1	0	15	-.791	1
197	4	max	37.143	2	91.49	2	-3.308	15	0	12	-.004	12	.435	3
198		min	-19.54	9	-15.637	3	-84.344	1	-.007	1	-.11	1	-1.007	1
199	5	max	37.143	2	42.834	3	-1.379	15	0	12	-.008	12	.418	3
200		min	-19.54	9	-64.364	1	-37.425	1	-.007	1	-.188	1	-1.024	1
201	6	max	37.143	2	101.304	3	9.493	1	0	12	-.008	15	.326	3
202		min	-19.54	9	-219.956	1	-2.929	10	-.007	1	-.206	1	-.842	1
203	7	max	37.143	2	159.774	3	56.412	1	0	12	-.006	15	.159	3



Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

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### Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
204			min	-19.54	9	-375.549	1	1.69	12	-.007	1	-.164	1	-.462	1
205		8	max	37.143	2	218.245	3	103.33	1	0	12	-.002	15	.117	1
206			min	-19.54	9	-531.141	1	3.619	12	-.007	1	-.062	1	-.083	3
207		9	max	37.143	2	276.715	3	150.249	1	0	12	.1	1	.895	1
208			min	-19.54	9	-686.733	1	5.548	12	-.007	1	-.006	10	-.399	3
209		10	max	37.143	2	842.325	1	-7.477	12	.007	1	.322	1	1.872	1
210			min	-19.54	9	-335.185	3	-197.167	1	0	12	.009	12	-.79	3
211		11	max	37.143	2	686.733	1	-5.548	12	.007	1	.1	1	.895	1
212			min	-19.54	9	-276.715	3	-150.249	1	0	12	-.006	10	-.399	3
213		12	max	37.143	2	531.141	1	-3.619	12	.007	1	-.002	15	.117	1
214			min	-19.54	9	-218.245	3	-103.33	1	0	12	-.062	1	-.083	3
215		13	max	37.143	2	375.549	1	-1.69	12	.007	1	-.006	15	.159	3
216			min	-19.54	9	-159.774	3	-56.412	1	0	12	-.164	1	-.462	1
217		14	max	37.143	2	219.956	1	2.929	10	.007	1	-.008	15	.326	3
218			min	-19.54	9	-101.304	3	-9.493	1	0	12	-.206	1	-.842	1
219		15	max	37.143	2	64.364	1	37.425	1	.007	1	-.008	12	.418	3
220			min	-19.54	9	-42.834	3	1.379	15	0	12	-.188	1	-1.024	1
221		16	max	37.143	2	15.637	3	84.344	1	.007	1	-.004	12	.435	3
222			min	-19.54	9	-91.49	2	3.308	15	0	12	-.11	1	-1.007	1
223		17	max	37.143	2	74.107	3	131.262	1	.007	1	.03	2	.378	3
224			min	-19.54	9	-246.82	1	5.238	15	0	12	0	15	-.791	1
225		18	max	37.143	2	132.577	3	178.181	1	.007	1	.225	1	.246	3
226			min	-19.54	9	-402.412	1	7.167	15	0	12	.009	15	-.376	1
227		19	max	37.143	2	191.047	3	225.099	1	.007	1	.483	1	.257	2
228			min	-19.54	9	-558.005	1	9.097	15	0	12	.019	15	.006	15
229	M13	1	max	-1.672	12	573.587	1	-8.756	15	.005	3	.414	1	.244	1
230			min	-205.131	1	-206.122	3	-216.148	1	-.018	1	.016	15	-.054	3
231		2	max	-1.672	12	417.995	1	-6.827	15	.005	3	.168	1	.172	3
232			min	-205.131	1	-147.652	3	-169.229	1	-.018	1	.006	15	-.389	1
233		3	max	-1.672	12	262.403	1	-4.897	15	.005	3	.007	10	.323	3
234			min	-205.131	1	-89.182	3	-122.311	1	-.018	1	-.018	1	-.824	1
235		4	max	-1.672	12	106.811	1	-2.968	15	.005	3	-.005	12	.4	3
236			min	-205.131	1	-30.711	3	-75.392	1	-.018	1	-.145	1	-1.06	1
237		5	max	-1.672	12	27.759	3	-1.039	15	.005	3	-.008	12	.402	3
238			min	-205.131	1	-50.215	2	-28.474	1	-.018	1	-.211	1	-1.097	1
239		6	max	-1.672	12	86.229	3	18.445	1	.005	3	-.009	15	.329	3
240			min	-205.131	1	-204.374	1	-1.174	10	-.018	1	-.218	1	-.935	1
241		7	max	-1.672	12	144.7	3	65.363	1	.005	3	-.006	15	.181	3
242			min	-205.131	1	-359.966	1	1.88	12	-.018	1	-.164	1	-.574	1
243		8	max	-1.672	12	203.17	3	112.282	1	.005	3	-.002	15	.006	10
244			min	-205.131	1	-515.558	1	3.809	12	-.018	1	-.051	1	-.041	3
245		9	max	-1.672	12	261.64	3	159.2	1	.005	3	.123	1	.744	2
246			min	-205.131	1	-671.15	1	5.738	12	-.018	1	-.002	10	-.338	3
247		10	max	-1.672	12	826.743	1	136.705	9	.018	1	.356	1	1.7	1
248			min	-205.131	1	-428.007	10	-206.119	1	0	15	.01	12	-.71	3
249		11	max	-1.672	12	671.15	1	-5.738	12	.018	1	.123	1	.744	2
250			min	-205.131	1	-261.64	3	-159.2	1	-.005	3	-.002	10	-.338	3
251		12	max	-1.672	12	515.558	1	-3.809	12	.018	1	-.002	15	.006	10
252			min	-205.131	1	-203.17	3	-112.282	1	-.005	3	-.051	1	-.041	3
253		13	max	-1.672	12	359.966	1	-1.88	12	.018	1	-.006	15	.181	3
254			min	-205.131	1	-144.7	3	-65.363	1	-.005	3	-.164	1	-.574	1
255		14	max	-1.672	12	204.374	1	1.174	10	.018	1	-.009	15	.329	3
256			min	-205.131	1	-86.229	3	-18.445	1	-.005	3	-.218	1	-.935	1
257		15	max	-1.672	12	50.215	2	28.474	1	.018	1	-.008	12	.402	3
258			min	-205.131	1	-27.759	3	1.039	15	-.005	3	-.211	1	-1.097	1
259		16	max	-1.672	12	30.711	3	75.392	1	.018	1	-.005	12	.4	3
260			min	-205.131	1	-106.811	1	2.968	15	-.005	3	-.145	1	-1.06	1



Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

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### Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
261		17	max	-1.672	12	89.182	3	122.311	1	.018	1	.007	10	.323	3
262			min	-205.131	1	-262.403	1	4.897	15	-.005	3	-.018	1	-.824	1
263		18	max	-1.672	12	147.652	3	169.229	1	.018	1	.168	1	.172	3
264			min	-205.131	1	-417.995	1	6.827	15	-.005	3	.006	15	-.389	1
265		19	max	-1.672	12	206.122	3	216.148	1	.018	1	.414	1	.244	1
266			min	-205.131	1	-573.587	1	8.756	15	-.005	3	.016	15	-.054	3
267	M2	1	max	2386.119	1	660.338	3	318.134	1	.004	3	.311	3	5.291	1
268			min	-1209.471	3	-466.18	2	-249.057	3	-.011	1	-.404	1	.211	15
269		2	max	2383.564	1	660.338	3	318.134	1	.004	3	.241	3	5.319	1
270			min	-1211.387	3	-466.18	2	-249.057	3	-.011	1	-.314	1	.209	15
271		3	max	2381.009	1	660.338	3	318.134	1	.004	3	.172	3	5.347	1
272			min	-1213.303	3	-466.18	2	-249.057	3	-.011	1	-.225	1	.207	15
273		4	max	1803.001	1	1228.305	1	246.276	1	.002	1	.124	3	5.17	1
274			min	-1046.983	3	47.281	15	-223.185	3	0	3	-.191	1	.199	15
275		5	max	1800.446	1	1228.305	1	246.276	1	.002	1	.061	3	4.825	1
276			min	-1048.899	3	47.281	15	-223.185	3	0	3	-.122	1	.186	15
277		6	max	1797.891	1	1228.305	1	246.276	1	.002	1	0	12	4.48	1
278			min	-1050.815	3	47.281	15	-223.185	3	0	3	-.053	1	.172	15
279		7	max	1795.336	1	1228.305	1	246.276	1	.002	1	.03	2	4.136	1
280			min	-1052.731	3	47.281	15	-223.185	3	0	3	-.064	3	.159	15
281		8	max	1792.781	1	1228.305	1	246.276	1	.002	1	.088	2	3.791	1
282			min	-1054.647	3	47.281	15	-223.185	3	0	3	-.126	3	.146	15
283		9	max	1790.227	1	1228.305	1	246.276	1	.002	1	.155	1	3.446	1
284			min	-1056.563	3	47.281	15	-223.185	3	0	3	-.189	3	.133	15
285		10	max	1787.672	1	1228.305	1	246.276	1	.002	1	.224	1	3.102	1
286			min	-1058.48	3	47.281	15	-223.185	3	0	3	-.252	3	.119	15
287		11	max	1785.117	1	1228.305	1	246.276	1	.002	1	.293	1	2.757	1
288			min	-1060.396	3	47.281	15	-223.185	3	0	3	-.314	3	.106	15
289		12	max	1782.562	1	1228.305	1	246.276	1	.002	1	.362	1	2.412	1
290			min	-1062.312	3	47.281	15	-223.185	3	0	3	-.377	3	.093	15
291		13	max	1780.007	1	1228.305	1	246.276	1	.002	1	.431	1	2.068	1
292			min	-1064.228	3	47.281	15	-223.185	3	0	3	-.44	3	.08	15
293		14	max	1777.452	1	1228.305	1	246.276	1	.002	1	.5	1	1.723	1
294			min	-1066.144	3	47.281	15	-223.185	3	0	3	-.502	3	.066	15
295		15	max	1774.897	1	1228.305	1	246.276	1	.002	1	.569	1	1.379	1
296			min	-1068.06	3	47.281	15	-223.185	3	0	3	-.565	3	.053	15
297		16	max	1772.342	1	1228.305	1	246.276	1	.002	1	.638	1	1.034	1
298			min	-1069.977	3	47.281	15	-223.185	3	0	3	-.627	3	.04	15
299		17	max	1769.787	1	1228.305	1	246.276	1	.002	1	.708	1	.689	1
300			min	-1071.893	3	47.281	15	-223.185	3	0	3	-.69	3	.027	15
301		18	max	1767.233	1	1228.305	1	246.276	1	.002	1	.777	1	.345	1
302			min	-1073.809	3	47.281	15	-223.185	3	0	3	-.753	3	.013	15
303		19	max	1764.678	1	1228.305	1	246.276	1	.002	1	.846	1	0	1
304			min	-1075.725	3	47.281	15	-223.185	3	0	3	-.815	3	0	1
305	M5	1	max	6430.236	1	1825.57	3	0	1	0	1	0	1	10.949	1
306			min	-3649.535	3	-1814.711	2	0	1	0	1	0	1	.394	15
307		2	max	6427.681	1	1825.57	3	0	1	0	1	0	1	11.275	1
308			min	-3651.452	3	-1814.711	2	0	1	0	1	0	1	.398	15
309		3	max	6425.127	1	1825.57	3	0	1	0	1	0	1	11.601	1
310			min	-3653.368	3	-1814.711	2	0	1	0	1	0	1	.402	15
311		4	max	4800.518	1	2692.043	1	0	1	0	1	0	1	11.33	1
312			min	-3070.863	3	92.435	15	0	1	0	1	0	1	.389	15
313		5	max	4797.963	1	2692.043	1	0	1	0	1	0	1	10.575	1
314			min	-3072.779	3	92.435	15	0	1	0	1	0	1	.363	15
315		6	max	4795.408	1	2692.043	1	0	1	0	1	0	1	9.819	1
316			min	-3074.695	3	92.435	15	0	1	0	1	0	1	.337	15
317		7	max	4792.853	1	2692.043	1	0	1	0	1	0	1	9.064	1





Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

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### Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
318			min	-3076.611	3	92.435	15	0	1	0	1	0	1	.311	15
319		8	max	4790.298	1	2692.043	1	0	1	0	1	0	1	8.309	1
320			min	-3078.527	3	92.435	15	0	1	0	1	0	1	.285	15
321		9	max	4787.743	1	2692.043	1	0	1	0	1	0	1	7.553	1
322			min	-3080.443	3	92.435	15	0	1	0	1	0	1	.259	15
323		10	max	4785.188	1	2692.043	1	0	1	0	1	0	1	6.798	1
324			min	-3082.36	3	92.435	15	0	1	0	1	0	1	.233	15
325		11	max	4782.634	1	2692.043	1	0	1	0	1	0	1	6.043	1
326			min	-3084.276	3	92.435	15	0	1	0	1	0	1	.207	15
327		12	max	4780.079	1	2692.043	1	0	1	0	1	0	1	5.287	1
328			min	-3086.192	3	92.435	15	0	1	0	1	0	1	.182	15
329		13	max	4777.524	1	2692.043	1	0	1	0	1	0	1	4.532	1
330			min	-3088.108	3	92.435	15	0	1	0	1	0	1	.156	15
331		14	max	4774.969	1	2692.043	1	0	1	0	1	0	1	3.777	1
332			min	-3090.024	3	92.435	15	0	1	0	1	0	1	.13	15
333		15	max	4772.414	1	2692.043	1	0	1	0	1	0	1	3.021	1
334			min	-3091.94	3	92.435	15	0	1	0	1	0	1	.104	15
335		16	max	4769.859	1	2692.043	1	0	1	0	1	0	1	2.266	1
336			min	-3093.857	3	92.435	15	0	1	0	1	0	1	.078	15
337		17	max	4767.304	1	2692.043	1	0	1	0	1	0	1	1.511	1
338			min	-3095.773	3	92.435	15	0	1	0	1	0	1	.052	15
339		18	max	4764.749	1	2692.043	1	0	1	0	1	0	1	.755	1
340			min	-3097.689	3	92.435	15	0	1	0	1	0	1	.026	15
341		19	max	4762.194	1	2692.043	1	0	1	0	1	0	1	0	1
342			min	-3099.605	3	92.435	15	0	1	0	1	0	1	0	1
343	M8	1	max	2386.119	1	660.338	3	249.057	3	.011	1	.404	1	5.291	1
344			min	-1209.471	3	-466.18	2	-318.134	1	-.004	3	-.311	3	.211	15
345		2	max	2383.564	1	660.338	3	249.057	3	.011	1	.314	1	5.319	1
346			min	-1211.387	3	-466.18	2	-318.134	1	-.004	3	-.241	3	.209	15
347		3	max	2381.009	1	660.338	3	249.057	3	.011	1	.225	1	5.347	1
348			min	-1213.303	3	-466.18	2	-318.134	1	-.004	3	-.172	3	.207	15
349		4	max	1803.001	1	1228.305	1	223.185	3	0	3	.191	1	5.17	1
350			min	-1046.983	3	47.281	15	-246.276	1	-.002	1	-.124	3	.199	15
351		5	max	1800.446	1	1228.305	1	223.185	3	0	3	.122	1	4.825	1
352			min	-1048.899	3	47.281	15	-246.276	1	-.002	1	-.061	3	.186	15
353		6	max	1797.891	1	1228.305	1	223.185	3	0	3	.053	1	4.48	1
354			min	-1050.815	3	47.281	15	-246.276	1	-.002	1	0	12	.172	15
355		7	max	1795.336	1	1228.305	1	223.185	3	0	3	.064	3	4.136	1
356			min	-1052.731	3	47.281	15	-246.276	1	-.002	1	-.03	2	.159	15
357		8	max	1792.781	1	1228.305	1	223.185	3	0	3	.126	3	3.791	1
358			min	-1054.647	3	47.281	15	-246.276	1	-.002	1	-.088	2	.146	15
359		9	max	1790.227	1	1228.305	1	223.185	3	0	3	.189	3	3.446	1
360			min	-1056.563	3	47.281	15	-246.276	1	-.002	1	-.155	1	.133	15
361		10	max	1787.672	1	1228.305	1	223.185	3	0	3	.252	3	3.102	1
362			min	-1058.48	3	47.281	15	-246.276	1	-.002	1	-.224	1	.119	15
363		11	max	1785.117	1	1228.305	1	223.185	3	0	3	.314	3	2.757	1
364			min	-1060.396	3	47.281	15	-246.276	1	-.002	1	-.293	1	.106	15
365		12	max	1782.562	1	1228.305	1	223.185	3	0	3	.377	3	2.412	1
366			min	-1062.312	3	47.281	15	-246.276	1	-.002	1	-.362	1	.093	15
367		13	max	1780.007	1	1228.305	1	223.185	3	0	3	.44	3	2.068	1
368			min	-1064.228	3	47.281	15	-246.276	1	-.002	1	-.431	1	.08	15
369		14	max	1777.452	1	1228.305	1	223.185	3	0	3	.502	3	1.723	1
370			min	-1066.144	3	47.281	15	-246.276	1	-.002	1	-.5	1	.066	15
371		15	max	1774.897	1	1228.305	1	223.185	3	0	3	.565	3	1.379	1
372			min	-1068.06	3	47.281	15	-246.276	1	-.002	1	-.569	1	.053	15
373		16	max	1772.342	1	1228.305	1	223.185	3	0	3	.627	3	1.034	1
374			min	-1069.977	3	47.281	15	-246.276	1	-.002	1	-.638	1	.04	15



Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

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### Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
375		17	max	1769.787	1	1228.305	1	223.185	3	0	3	.69	3	.689	1
376			min	-1071.893	3	47.281	15	-246.276	1	-.002	1	-.708	1	.027	15
377		18	max	1767.233	1	1228.305	1	223.185	3	0	3	.753	3	.345	1
378			min	-1073.809	3	47.281	15	-246.276	1	-.002	1	-.777	1	.013	15
379		19	max	1764.678	1	1228.305	1	223.185	3	0	3	.815	3	0	1
380			min	-1075.725	3	47.281	15	-246.276	1	-.002	1	-.846	1	0	1
381	M3	1	max	1441.419	1	4.588	4	70.948	1	.019	3	.006	2	0	1
382			min	-425.769	3	1.079	15	-26.258	3	-.045	1	-.003	3	0	1
383		2	max	1441.245	1	4.078	4	70.948	1	.019	3	.026	1	0	15
384			min	-425.9	3	.959	15	-26.258	3	-.045	1	-.01	3	-.001	4
385		3	max	1441.071	1	3.569	4	70.948	1	.019	3	.047	1	0	15
386			min	-426.031	3	.839	15	-26.258	3	-.045	1	-.018	3	-.002	4
387		4	max	1440.896	1	3.059	4	70.948	1	.019	3	.068	1	0	15
388			min	-426.162	3	.719	15	-26.258	3	-.045	1	-.026	3	-.003	4
389		5	max	1440.722	1	2.549	4	70.948	1	.019	3	.088	1	0	15
390			min	-426.292	3	.599	15	-26.258	3	-.045	1	-.033	3	-.004	4
391		6	max	1440.548	1	2.039	4	70.948	1	.019	3	.109	1	-.001	15
392			min	-426.423	3	.479	15	-26.258	3	-.045	1	-.041	3	-.005	4
393		7	max	1440.373	1	1.529	4	70.948	1	.019	3	.13	1	-.001	15
394			min	-426.554	3	.36	15	-26.258	3	-.045	1	-.049	3	-.005	4
395		8	max	1440.199	1	1.02	4	70.948	1	.019	3	.151	1	-.001	15
396			min	-426.685	3	.24	15	-26.258	3	-.045	1	-.056	3	-.006	4
397		9	max	1440.024	1	.51	4	70.948	1	.019	3	.171	1	-.001	15
398			min	-426.816	3	.12	15	-26.258	3	-.045	1	-.064	3	-.006	4
399		10	max	1439.85	1	0	1	70.948	1	.019	3	.192	1	-.001	15
400			min	-426.946	3	0	1	-26.258	3	-.045	1	-.072	3	-.006	4
401		11	max	1439.676	1	-.12	15	70.948	1	.019	3	.213	1	-.001	15
402			min	-427.077	3	-.51	4	-26.258	3	-.045	1	-.079	3	-.006	4
403		12	max	1439.501	1	-.24	15	70.948	1	.019	3	.234	1	-.001	15
404			min	-427.208	3	-1.02	4	-26.258	3	-.045	1	-.087	3	-.006	4
405		13	max	1439.327	1	-.36	15	70.948	1	.019	3	.254	1	-.001	15
406			min	-427.339	3	-1.529	4	-26.258	3	-.045	1	-.095	3	-.005	4
407		14	max	1439.152	1	-.479	15	70.948	1	.019	3	.275	1	-.001	15
408			min	-427.47	3	-2.039	4	-26.258	3	-.045	1	-.102	3	-.005	4
409		15	max	1438.978	1	-.599	15	70.948	1	.019	3	.296	1	0	15
410			min	-427.6	3	-2.549	4	-26.258	3	-.045	1	-.11	3	-.004	4
411		16	max	1438.804	1	-.719	15	70.948	1	.019	3	.317	1	0	15
412			min	-427.731	3	-3.059	4	-26.258	3	-.045	1	-.118	3	-.003	4
413		17	max	1438.629	1	-.839	15	70.948	1	.019	3	.337	1	0	15
414			min	-427.862	3	-3.569	4	-26.258	3	-.045	1	-.126	3	-.002	4
415		18	max	1438.455	1	-.959	15	70.948	1	.019	3	.358	1	0	15
416			min	-427.993	3	-4.078	4	-26.258	3	-.045	1	-.133	3	-.001	4
417		19	max	1438.281	1	-1.079	15	70.948	1	.019	3	.379	1	0	1
418			min	-428.124	3	-4.588	4	-26.258	3	-.045	1	-.141	3	0	1
419	M6	1	max	4140.561	1	4.588	4	0	1	0	1	0	1	0	1
420			min	-1466.77	3	1.079	15	0	1	0	1	0	1	0	1
421		2	max	4140.386	1	4.078	4	0	1	0	1	0	1	0	15
422			min	-1466.901	3	.959	15	0	1	0	1	0	1	-.001	4
423		3	max	4140.212	1	3.569	4	0	1	0	1	0	1	0	15
424			min	-1467.032	3	.839	15	0	1	0	1	0	1	-.002	4
425		4	max	4140.038	1	3.059	4	0	1	0	1	0	1	0	15
426			min	-1467.162	3	.719	15	0	1	0	1	0	1	-.003	4
427		5	max	4139.863	1	2.549	4	0	1	0	1	0	1	0	15
428			min	-1467.293	3	.599	15	0	1	0	1	0	1	-.004	4
429		6	max	4139.689	1	2.039	4	0	1	0	1	0	1	-.001	15
430			min	-1467.424	3	.479	15	0	1	0	1	0	1	-.005	4
431		7	max	4139.514	1	1.529	4	0	1	0	1	0	1	-.001	15



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### Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
432			min	-1467.555	3	.36	15	0	1	0	1	0	1	-.005	4
433		8	max	4139.34	1	1.02	4	0	1	0	1	0	1	-.001	15
434			min	-1467.686	3	.24	15	0	1	0	1	0	1	-.006	4
435		9	max	4139.166	1	.51	4	0	1	0	1	0	1	-.001	15
436			min	-1467.816	3	.12	15	0	1	0	1	0	1	-.006	4
437		10	max	4138.991	1	0	1	0	1	0	1	0	1	-.001	15
438			min	-1467.947	3	0	1	0	1	0	1	0	1	-.006	4
439		11	max	4138.817	1	-.12	15	0	1	0	1	0	1	-.001	15
440			min	-1468.078	3	-.51	4	0	1	0	1	0	1	-.006	4
441		12	max	4138.642	1	-.24	15	0	1	0	1	0	1	-.001	15
442			min	-1468.209	3	-1.02	4	0	1	0	1	0	1	-.006	4
443		13	max	4138.468	1	-.36	15	0	1	0	1	0	1	-.001	15
444			min	-1468.34	3	-1.529	4	0	1	0	1	0	1	-.005	4
445		14	max	4138.294	1	-.479	15	0	1	0	1	0	1	-.001	15
446			min	-1468.47	3	-2.039	4	0	1	0	1	0	1	-.005	4
447		15	max	4138.119	1	-.599	15	0	1	0	1	0	1	0	15
448			min	-1468.601	3	-2.549	4	0	1	0	1	0	1	-.004	4
449		16	max	4137.945	1	-.719	15	0	1	0	1	0	1	0	15
450			min	-1468.732	3	-3.059	4	0	1	0	1	0	1	-.003	4
451		17	max	4137.771	1	-.839	15	0	1	0	1	0	1	0	15
452			min	-1468.863	3	-3.569	4	0	1	0	1	0	1	-.002	4
453		18	max	4137.596	1	-.959	15	0	1	0	1	0	1	0	15
454			min	-1468.993	3	-4.078	4	0	1	0	1	0	1	-.001	4
455		19	max	4137.422	1	-1.079	15	0	1	0	1	0	1	0	1
456			min	-1469.124	3	-4.588	4	0	1	0	1	0	1	0	1
457	M9	1	max	1441.419	1	4.588	4	26.258	3	.045	1	.003	3	0	1
458			min	-425.769	3	1.079	15	-70.948	1	-.019	3	-.006	2	0	1
459		2	max	1441.245	1	4.078	4	26.258	3	.045	1	.01	3	0	15
460			min	-425.9	3	.959	15	-70.948	1	-.019	3	-.026	1	-.001	4
461		3	max	1441.071	1	3.569	4	26.258	3	.045	1	.018	3	0	15
462			min	-426.031	3	.839	15	-70.948	1	-.019	3	-.047	1	-.002	4
463		4	max	1440.896	1	3.059	4	26.258	3	.045	1	.026	3	0	15
464			min	-426.162	3	.719	15	-70.948	1	-.019	3	-.068	1	-.003	4
465		5	max	1440.722	1	2.549	4	26.258	3	.045	1	.033	3	0	15
466			min	-426.292	3	.599	15	-70.948	1	-.019	3	-.088	1	-.004	4
467		6	max	1440.548	1	2.039	4	26.258	3	.045	1	.041	3	-.001	15
468			min	-426.423	3	.479	15	-70.948	1	-.019	3	-.109	1	-.005	4
469		7	max	1440.373	1	1.529	4	26.258	3	.045	1	.049	3	-.001	15
470			min	-426.554	3	.36	15	-70.948	1	-.019	3	-.13	1	-.005	4
471		8	max	1440.199	1	1.02	4	26.258	3	.045	1	.056	3	-.001	15
472			min	-426.685	3	.24	15	-70.948	1	-.019	3	-.151	1	-.006	4
473		9	max	1440.024	1	.51	4	26.258	3	.045	1	.064	3	-.001	15
474			min	-426.816	3	.12	15	-70.948	1	-.019	3	-.171	1	-.006	4
475		10	max	1439.85	1	0	1	26.258	3	.045	1	.072	3	-.001	15
476			min	-426.946	3	0	1	-70.948	1	-.019	3	-.192	1	-.006	4
477		11	max	1439.676	1	-.12	15	26.258	3	.045	1	.079	3	-.001	15
478			min	-427.077	3	-.51	4	-70.948	1	-.019	3	-.213	1	-.006	4
479		12	max	1439.501	1	-.24	15	26.258	3	.045	1	.087	3	-.001	15
480			min	-427.208	3	-1.02	4	-70.948	1	-.019	3	-.234	1	-.006	4
481		13	max	1439.327	1	-.36	15	26.258	3	.045	1	.095	3	-.001	15
482			min	-427.339	3	-1.529	4	-70.948	1	-.019	3	-.254	1	-.005	4
483		14	max	1439.152	1	-.479	15	26.258	3	.045	1	.102	3	-.001	15
484			min	-427.47	3	-2.039	4	-70.948	1	-.019	3	-.275	1	-.005	4
485		15	max	1438.978	1	-.599	15	26.258	3	.045	1	.11	3	0	15
486			min	-427.6	3	-2.549	4	-70.948	1	-.019	3	-.296	1	-.004	4
487		16	max	1438.804	1	-.719	15	26.258	3	.045	1	.118	3	0	15
488			min	-427.731	3	-3.059	4	-70.948	1	-.019	3	-.317	1	-.003	4





Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

Sept 14, 2015

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### Envelope Member Section Forces (Continued)

Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
489	17	max	1438.629	1	- .839	15	26.258	3	.045	1	.126	3	0	15
490		min	-427.862	3	-3.569	4	-70.948	1	-.019	3	-.337	1	-.002	4
491	18	max	1438.455	1	-.959	15	26.258	3	.045	1	.133	3	0	15
492		min	-427.993	3	-4.078	4	-70.948	1	-.019	3	-.358	1	-.001	4
493	19	max	1438.281	1	-1.079	15	26.258	3	.045	1	.141	3	0	1
494		min	-428.124	3	-4.588	4	-70.948	1	-.019	3	-.379	1	0	1

### Envelope Member Section Deflections

Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M1	1 max	-.01	15	.017	3	.032	1	9.301e-3	3	NC	3	NC	3
2		min	-.261	1	-.626	1	.001	15	-2.812e-2	1	196.019	1	2222.745	1
3		2 max	-.01	15	0	3	.01	1	9.301e-3	3	NC	12	NC	3
4		min	-.261	1	-.532	1	0	12	-2.812e-2	1	227.464	1	3517.002	1
5		3 max	-.01	15	-.011	12	0	15	8.875e-3	3	6887.182	12	NC	2
6		min	-.261	1	-.437	1	-.009	1	-2.62e-2	1	270.976	1	7053.279	1
7		4 max	-.01	15	-.013	15	0	15	8.222e-3	3	8150.43	15	NC	1
8		min	-.261	1	-.346	1	-.017	1	-2.325e-2	1	332.334	1	NC	1
9		5 max	-.01	15	-.01	15	0	12	7.568e-3	3	9845.002	15	NC	1
10		min	-.261	1	-.263	1	-.018	1	-2.031e-2	1	418.315	1	NC	1
11		6 max	-.01	15	-.008	15	.001	3	7.757e-3	3	NC	15	NC	2
12		min	-.26	1	-.193	1	-.015	1	-1.961e-2	1	533.51	1	9997.337	1
13		7 max	-.01	15	-.005	15	.001	3	8.528e-3	3	NC	15	NC	2
14		min	-.26	1	-.138	1	-.007	1	-2.045e-2	1	686.412	1	6372.05	1
15		8 max	-.01	15	-.004	15	0	3	9.3e-3	3	NC	5	NC	2
16		min	-.259	1	-.09	1	-.001	2	-2.13e-2	1	906.192	1	4873.231	1
17		9 max	-.01	15	-.002	15	0	15	1.024e-2	3	NC	5	NC	2
18		min	-.259	1	-.047	1	0	1	-2.111e-2	1	1279.826	1	4819.817	1
19		10 max	-.01	15	.002	10	0	1	1.148e-2	3	NC	2	NC	2
20		min	-.258	1	-.039	3	0	3	-1.91e-2	1	2117.844	1	4716.534	1
21		11 max	-.01	15	.033	1	.002	3	1.272e-2	3	NC	5	NC	2
22		min	-.258	1	-.031	3	-.002	1	-1.709e-2	1	2823.662	3	5040.573	1
23		12 max	-.01	15	.069	1	.006	3	1.042e-2	3	NC	1	NC	2
24		min	-.257	1	-.019	3	-.009	1	-1.291e-2	1	2432.586	2	6863.467	1
25		13 max	-.01	15	.099	1	.011	3	6.118e-3	3	NC	4	NC	2
26		min	-.257	1	0	3	-.01	1	-7.499e-3	1	1831.406	2	7420.918	1
27		14 max	-.01	15	.118	1	.011	3	2.013e-3	3	NC	3	NC	2
28		min	-.256	1	.005	15	-.006	2	-2.295e-3	1	1636.614	2	5298.909	1
29		15 max	-.01	15	.12	1	.008	1	6.613e-3	3	NC	4	NC	2
30		min	-.256	1	.005	15	0	10	-6.127e-3	1	1724.789	2	3743.792	1
31		16 max	-.01	15	.133	3	.012	1	1.121e-2	3	NC	4	NC	3
32		min	-.256	1	.005	15	0	15	-9.96e-3	1	1152.541	3	3304.605	1
33		17 max	-.01	15	.198	3	.008	1	1.581e-2	3	NC	4	NC	3
34		min	-.256	1	.004	15	0	15	-1.379e-2	1	738.41	3	3718.742	1
35		18 max	-.01	15	.267	3	0	15	1.881e-2	3	NC	4	NC	2
36		min	-.256	1	0	10	-.009	1	-1.629e-2	1	536.901	3	6838.972	1
37		19 max	-.01	15	.335	3	-.001	15	1.881e-2	3	NC	1	NC	1
38		min	-.256	1	-.013	10	-.028	1	-1.629e-2	1	421.93	3	NC	1
39	M4	1 max	-.02	15	.133	3	0	1	0	1	NC	3	NC	1
40		min	-.568	1	-1.473	1	0	1	0	1	91.742	1	NC	1
41		2 max	-.02	15	.081	3	0	1	0	1	4144.423	12	NC	1
42		min	-.568	1	-1.242	1	0	1	0	1	108.958	1	NC	1
43		3 max	-.02	15	.028	3	0	1	0	1	3875.211	15	NC	1
44		min	-.568	1	-1.011	1	0	1	0	1	134.201	1	NC	1
45		4 max	-.02	15	-.016	12	0	1	0	1	4832.823	15	NC	1
46		min	-.568	1	-.788	1	0	1	0	1	172.806	1	NC	1



Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

Sept 14, 2015

Checked By: \_\_\_\_\_

### Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
47		5	max	-.02	15	-.02	15	0	1	0	1	6232.296	15	NC	1
48			min	-.567	1	-.587	1	0	1	0	1	232.972	1	NC	1
49		6	max	-.02	15	-.015	15	0	1	0	1	8212.645	15	NC	1
50			min	-.567	1	-.425	1	0	1	0	1	324.601	1	NC	1
51		7	max	-.02	15	-.01	15	0	1	0	1	NC	15	NC	1
52			min	-.565	1	-.299	1	0	1	0	1	467.356	1	NC	1
53		8	max	-.02	15	-.007	15	0	1	0	1	NC	5	NC	1
54			min	-.564	1	-.195	1	0	1	0	1	571.822	3	NC	1
55		9	max	-.019	15	-.004	15	0	1	0	1	NC	5	NC	1
56			min	-.563	1	-.102	1	0	1	0	1	583.561	3	NC	1
57		10	max	-.019	15	.003	10	0	1	0	1	NC	1	NC	1
58			min	-.562	1	-.088	3	0	1	0	1	606.571	3	NC	1
59		11	max	-.019	15	.077	1	0	1	0	1	NC	4	NC	1
60			min	-.56	1	-.073	3	0	1	0	1	649.398	3	NC	1
61		12	max	-.019	15	.157	1	0	1	0	1	NC	5	NC	1
62			min	-.559	1	-.051	3	0	1	0	1	666.402	2	NC	1
63		13	max	-.019	15	.221	1	0	1	0	1	NC	5	NC	1
64			min	-.557	1	-.013	3	0	1	0	1	547.341	2	NC	1
65		14	max	-.019	15	.254	1	0	1	0	1	NC	5	NC	1
66			min	-.556	1	.009	15	0	1	0	1	503.826	1	NC	1
67		15	max	-.019	15	.243	1	0	1	0	1	NC	5	NC	1
68			min	-.556	1	.009	15	0	1	0	1	526.83	1	NC	1
69		16	max	-.019	15	.311	3	0	1	0	1	NC	5	NC	1
70			min	-.556	1	.008	15	0	1	0	1	638.811	1	NC	1
71		17	max	-.019	15	.475	3	0	1	0	1	NC	5	NC	1
72			min	-.556	1	.006	15	0	1	0	1	392.717	3	NC	1
73		18	max	-.019	15	.645	3	0	1	0	1	NC	5	NC	1
74			min	-.556	1	-.022	10	0	1	0	1	261.943	3	NC	1
75		19	max	-.019	15	.815	3	0	1	0	1	NC	1	NC	1
76			min	-.556	1	-.082	2	0	1	0	1	196.64	3	NC	1
77	M7	1	max	-.01	15	.017	3	-.001	15	2.812e-2	1	NC	3	NC	3
78			min	-.261	1	-.626	1	-.032	1	-9.301e-3	3	196.019	1	2222.745	1
79		2	max	-.01	15	0	3	0	12	2.812e-2	1	NC	12	NC	3
80			min	-.261	1	-.532	1	-.01	1	-9.301e-3	3	227.464	1	3517.002	1
81		3	max	-.01	15	-.011	12	.009	1	2.62e-2	1	6887.182	12	NC	2
82			min	-.261	1	-.437	1	0	15	-8.875e-3	3	270.976	1	7053.279	1
83		4	max	-.01	15	-.013	15	.017	1	2.325e-2	1	8150.43	15	NC	1
84			min	-.261	1	-.346	1	0	15	-8.222e-3	3	332.334	1	NC	1
85		5	max	-.01	15	-.01	15	.018	1	2.031e-2	1	9845.002	15	NC	1
86			min	-.261	1	-.263	1	0	12	-7.568e-3	3	418.315	1	NC	1
87		6	max	-.01	15	-.008	15	.015	1	1.961e-2	1	NC	15	NC	2
88			min	-.26	1	-.193	1	-.001	3	-7.757e-3	3	533.51	1	9997.337	1
89		7	max	-.01	15	-.005	15	.007	1	2.045e-2	1	NC	15	NC	2
90			min	-.26	1	-.138	1	-.001	3	-8.528e-3	3	686.412	1	6372.05	1
91		8	max	-.01	15	-.004	15	.001	2	2.13e-2	1	NC	5	NC	2
92			min	-.259	1	-.09	1	0	3	-9.3e-3	3	906.192	1	4873.231	1
93		9	max	-.01	15	-.002	15	0	1	2.111e-2	1	NC	5	NC	2
94			min	-.259	1	-.047	1	0	15	-1.024e-2	3	1279.826	1	4819.817	1
95		10	max	-.01	15	.002	10	0	3	1.91e-2	1	NC	2	NC	2
96			min	-.258	1	-.039	3	0	1	-1.148e-2	3	2117.844	1	4716.534	1
97		11	max	-.01	15	.033	1	.002	1	1.709e-2	1	NC	5	NC	2
98			min	-.258	1	-.031	3	-.002	3	-1.272e-2	3	2823.662	3	5040.573	1
99		12	max	-.01	15	.069	1	.009	1	1.291e-2	1	NC	1	NC	2
100			min	-.257	1	-.019	3	-.006	3	-1.042e-2	3	2432.586	2	6863.467	1
101		13	max	-.01	15	.099	1	.01	1	7.499e-3	1	NC	4	NC	2
102			min	-.257	1	0	3	-.011	3	-6.118e-3	3	1831.406	2	7420.918	1
103		14	max	-.01	15	.118	1	.006	2	2.295e-3	1	NC	3	NC	2



Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

Sept 14, 2015

Checked By: \_\_\_\_\_

### Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
104			min	-.256	1	.005	15	-.011	3	-2.013e-3	3	1636.614	2	5298.909	1
105		15	max	-.01	15	.12	1	0	10	6.127e-3	1	NC	4	NC	2
106			min	-.256	1	.005	15	-.008	1	-6.613e-3	3	1724.789	2	3743.792	1
107		16	max	-.01	15	.133	3	0	15	9.96e-3	1	NC	4	NC	3
108			min	-.256	1	.005	15	-.012	1	-1.121e-2	3	1152.541	3	3304.605	1
109		17	max	-.01	15	.198	3	0	15	1.379e-2	1	NC	4	NC	3
110			min	-.256	1	.004	15	-.008	1	-1.581e-2	3	738.41	3	3718.742	1
111		18	max	-.01	15	.267	3	.009	1	1.629e-2	1	NC	4	NC	2
112			min	-.256	1	0	10	0	15	-1.881e-2	3	536.901	3	6838.972	1
113		19	max	-.01	15	.335	3	.028	1	1.629e-2	1	NC	1	NC	1
114			min	-.256	1	-.013	10	.001	15	-1.881e-2	3	421.93	3	NC	1
115	M10	1	max	.002	1	.243	3	.256	1	9.136e-3	3	NC	1	NC	1
116			min	0	15	.004	10	.01	15	-2.956e-3	2	NC	1	NC	1
117		2	max	.002	1	.542	3	.34	1	1.066e-2	3	NC	5	NC	3
118			min	0	15	-.188	2	.013	15	-3.644e-3	2	921.499	3	3293.142	1
119		3	max	.001	1	.819	3	.47	1	1.218e-2	3	NC	5	NC	3
120			min	0	15	-.403	1	.018	15	-4.332e-3	2	479.203	3	1288.674	1
121		4	max	.001	1	1.02	3	.599	1	1.37e-2	3	NC	15	NC	5
122			min	0	15	-.553	1	.023	15	-5.02e-3	2	355.021	3	806.264	1
123		5	max	0	1	1.117	3	.691	1	1.522e-2	3	NC	15	NC	5
124			min	0	15	-.6	1	.027	15	-5.709e-3	2	315.604	3	634.357	1
125		6	max	0	1	1.103	3	.731	1	1.674e-2	3	NC	15	NC	5
126			min	0	15	-.538	1	.028	15	-6.505e-3	1	320.786	3	581.152	1
127		7	max	0	1	.994	3	.716	1	1.826e-2	3	NC	5	NC	5
128			min	0	15	-.386	1	.027	15	-7.302e-3	1	367.654	3	600.171	1
129		8	max	0	1	.827	3	.66	1	1.978e-2	3	NC	5	NC	5
130			min	0	15	-.211	2	.024	15	-8.098e-3	1	472.864	3	683.847	1
131		9	max	0	1	.663	3	.592	1	2.13e-2	3	NC	4	NC	5
132			min	0	15	-.059	2	.021	15	-8.895e-3	1	657.1	3	822.959	1
133		10	max	0	1	.586	3	.556	1	2.282e-2	3	NC	1	NC	5
134			min	0	1	-.009	10	.019	15	-9.692e-3	1	804.625	3	919.776	1
135		11	max	0	15	.663	3	.592	1	2.13e-2	3	NC	4	NC	5
136			min	0	1	-.059	2	.021	15	-8.895e-3	1	657.1	3	822.959	1
137		12	max	0	15	.827	3	.66	1	1.978e-2	3	NC	5	NC	5
138			min	0	1	-.211	2	.024	15	-8.098e-3	1	472.864	3	683.847	1
139		13	max	0	15	.994	3	.716	1	1.826e-2	3	NC	5	NC	5
140			min	0	1	-.386	1	.027	15	-7.302e-3	1	367.654	3	600.171	1
141		14	max	0	15	1.103	3	.731	1	1.674e-2	3	NC	15	NC	5
142			min	0	1	-.538	1	.028	15	-6.505e-3	1	320.786	3	581.152	1
143		15	max	0	15	1.117	3	.691	1	1.522e-2	3	NC	15	NC	5
144			min	0	1	-.6	1	.027	15	-5.709e-3	2	315.604	3	634.357	1
145		16	max	0	15	1.02	3	.599	1	1.37e-2	3	NC	15	NC	5
146			min	-.001	1	-.553	1	.023	15	-5.02e-3	2	355.021	3	806.264	1
147		17	max	0	15	.819	3	.47	1	1.218e-2	3	NC	5	NC	3
148			min	-.001	1	-.403	1	.018	15	-4.332e-3	2	479.203	3	1288.674	1
149		18	max	0	15	.542	3	.34	1	1.066e-2	3	NC	5	NC	3
150			min	-.002	1	-.188	2	.013	15	-3.644e-3	2	921.499	3	3293.142	1
151		19	max	0	15	.243	3	.256	1	9.136e-3	3	NC	1	NC	1
152			min	-.002	1	.004	10	.01	15	-2.956e-3	2	NC	1	NC	1
153	M11	1	max	.004	1	.047	1	.258	1	4.878e-3	1	NC	1	NC	1
154			min	-.003	3	-.027	3	.01	15	1.912e-4	15	NC	1	NC	1
155		2	max	.004	1	.191	3	.324	1	5.544e-3	1	NC	5	NC	3
156			min	-.003	3	-.209	1	.013	15	2.117e-4	15	1078.052	1	4142.98	1
157		3	max	.003	1	.396	3	.446	1	6.21e-3	1	NC	5	NC	3
158			min	-.002	3	-.433	1	.017	15	2.322e-4	15	575.276	1	1468.095	1
159		4	max	.003	1	.536	3	.571	1	6.875e-3	1	NC	15	NC	3
160			min	-.002	3	-.576	1	.022	15	2.527e-4	15	442.93	1	879.768	1



Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

Sept 14, 2015

Checked By: \_\_\_\_\_

### Envelope Member Section Deflections (Continued)

Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
161	5	max	.002	1	.582	3	.667	1	7.541e-3	1	NC	15	NC	3
162		min	-.002	3	-.614	1	.025	15	2.731e-4	15	417.87	1	674.872	1
163	6	max	.002	1	.525	3	.712	1	8.206e-3	1	NC	5	NC	5
164		min	-.001	3	-.542	1	.027	15	2.936e-4	15	468.719	1	607.215	1
165	7	max	.001	1	.383	3	.704	1	8.872e-3	1	NC	5	NC	5
166		min	0	3	-.381	1	.026	15	3.141e-4	15	645.36	1	617.693	1
167	8	max	0	1	.193	3	.655	1	9.537e-3	1	NC	5	NC	5
168		min	0	3	-.172	1	.024	15	3.346e-4	15	1257.201	3	693.737	1
169	9	max	0	1	.019	1	.593	1	1.02e-2	1	NC	1	NC	5
170		min	0	3	0	15	.021	15	3.551e-4	15	6556.064	3	823.356	1
171	10	max	0	1	.106	1	.56	1	1.087e-2	1	NC	4	NC	5
172		min	0	1	-.066	3	.019	15	3.755e-4	15	4625.5	1	913.445	1
173	11	max	0	3	.019	1	.593	1	1.02e-2	1	NC	1	NC	5
174		min	0	1	0	15	.021	15	3.551e-4	15	6556.064	3	823.356	1
175	12	max	0	3	.193	3	.655	1	9.537e-3	1	NC	5	NC	5
176		min	0	1	-.172	1	.024	15	3.346e-4	15	1257.201	3	693.737	1
177	13	max	0	3	.383	3	.704	1	8.872e-3	1	NC	5	NC	5
178		min	-.001	1	-.381	1	.026	15	3.141e-4	15	645.36	1	617.693	1
179	14	max	.001	3	.525	3	.712	1	8.206e-3	1	NC	5	NC	5
180		min	-.002	1	-.542	1	.027	15	2.936e-4	15	468.719	1	607.215	1
181	15	max	.002	3	.582	3	.667	1	7.541e-3	1	NC	15	NC	3
182		min	-.002	1	-.614	1	.025	15	2.731e-4	15	417.87	1	674.872	1
183	16	max	.002	3	.536	3	.571	1	6.875e-3	1	NC	15	NC	3
184		min	-.003	1	-.576	1	.022	15	2.527e-4	15	442.93	1	879.768	1
185	17	max	.002	3	.396	3	.446	1	6.21e-3	1	NC	5	NC	3
186		min	-.003	1	-.433	1	.017	15	2.322e-4	15	575.276	1	1468.095	1
187	18	max	.003	3	.191	3	.324	1	5.544e-3	1	NC	5	NC	3
188		min	-.004	1	-.209	1	.013	15	2.117e-4	15	1078.052	1	4142.98	1
189	19	max	.003	3	.047	1	.258	1	4.878e-3	1	NC	1	NC	1
190		min	-.004	1	-.027	3	.01	15	1.912e-4	15	NC	1	NC	1
191	M12	1	max	0	-.003	15	.259	1	5.785e-3	1	NC	1	NC	1
192		min	0	9	-.062	1	.01	15	2.229e-4	15	NC	1	NC	1
193	2	max	0	2	.095	3	.315	1	6.542e-3	1	NC	5	NC	2
194		min	0	9	-.398	1	.012	15	2.467e-4	15	822.77	1	4936.125	1
195	3	max	0	2	.207	3	.431	1	7.298e-3	1	NC	5	NC	3
196		min	0	9	-.687	1	.017	15	2.705e-4	15	442.089	1	1606.78	1
197	4	max	0	2	.27	3	.555	1	8.054e-3	1	NC	15	NC	5
198		min	0	9	-.875	1	.021	15	2.943e-4	15	339.555	1	932.1	1
199	5	max	0	2	.278	3	.652	1	8.81e-3	1	NC	15	NC	5
200		min	0	9	-.935	1	.025	15	3.18e-4	15	316.142	1	702.195	1
201	6	max	0	2	.233	3	.701	1	9.566e-3	1	NC	15	NC	5
202		min	0	9	-.865	1	.026	15	3.418e-4	15	343.847	1	623.922	1
203	7	max	0	2	.146	3	.698	1	1.032e-2	1	NC	5	NC	5
204		min	0	9	-.688	1	.026	15	3.656e-4	15	441.368	1	628.147	1
205	8	max	0	2	.039	3	.654	1	1.108e-2	1	NC	5	NC	5
206		min	0	9	-.453	1	.024	15	3.894e-4	15	707.22	1	698.574	1
207	9	max	0	2	-.007	15	.595	1	1.184e-2	1	NC	3	NC	5
208		min	0	9	-.235	1	.021	15	4.132e-4	15	1599.709	1	821.332	1
209	10	max	0	1	-.005	15	.563	1	1.259e-2	1	NC	4	NC	5
210		min	0	1	-.135	1	.019	15	4.37e-4	15	3783.274	1	906.665	1
211	11	max	0	9	-.007	15	.595	1	1.184e-2	1	NC	3	NC	5
212		min	0	2	-.235	1	.021	15	4.132e-4	15	1599.709	1	821.332	1
213	12	max	0	9	.039	3	.654	1	1.108e-2	1	NC	5	NC	5
214		min	0	2	-.453	1	.024	15	3.894e-4	15	707.22	1	698.574	1
215	13	max	0	9	.146	3	.698	1	1.032e-2	1	NC	5	NC	5
216		min	0	2	-.688	1	.026	15	3.656e-4	15	441.368	1	628.147	1
217	14	max	0	9	.233	3	.701	1	9.566e-3	1	NC	15	NC	5



Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

Sept 14, 2015

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### Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
218			min	0	2	-.865	1	.026	15	3.418e-4	15	343.847	1	623.922	1
219		15	max	0	9	.278	3	.652	1	8.81e-3	1	NC	15	NC	5
220			min	0	2	-.935	1	.025	15	3.18e-4	15	316.142	1	702.195	1
221		16	max	0	9	.27	3	.555	1	8.054e-3	1	NC	15	NC	5
222			min	0	2	-.875	1	.021	15	2.943e-4	15	339.555	1	932.1	1
223		17	max	0	9	.207	3	.431	1	7.298e-3	1	NC	5	NC	3
224			min	0	2	-.687	1	.017	15	2.705e-4	15	442.089	1	1606.78	1
225		18	max	0	9	.095	3	.315	1	6.542e-3	1	NC	5	NC	2
226			min	0	2	-.398	1	.012	15	2.467e-4	15	822.77	1	4936.125	1
227		19	max	0	9	-.003	15	.259	1	5.785e-3	1	NC	1	NC	1
228			min	0	2	-.062	1	.01	15	2.229e-4	15	NC	1	NC	1
229	M13	1	max	0	12	-.004	12	.261	1	1.269e-2	1	NC	1	NC	1
230			min	-.002	1	-.499	1	.01	15	-2.139e-3	3	NC	1	NC	1
231		2	max	0	12	.136	3	.349	1	1.473e-2	1	NC	5	NC	3
232			min	-.002	1	-.93	1	.014	15	-2.687e-3	3	639.224	1	3126.849	1
233		3	max	0	12	.255	3	.482	1	1.676e-2	1	NC	15	NC	3
234			min	-.002	1	-1.314	1	.019	15	-3.234e-3	3	338.531	1	1245.949	1
235		4	max	0	12	.334	3	.612	1	1.88e-2	1	9202.228	15	NC	5
236			min	-.001	1	-1.593	1	.024	15	-3.782e-3	3	252.235	1	785.743	1
237		5	max	0	12	.361	3	.705	1	2.083e-2	1	8093.479	15	NC	5
238			min	-.001	1	-1.737	1	.027	15	-4.33e-3	3	222.939	1	620.768	1
239		6	max	0	12	.337	3	.745	1	2.286e-2	1	8008.623	15	NC	15
240			min	0	1	-1.741	1	.028	15	-4.878e-3	3	222.25	1	569.901	1
241		7	max	0	12	.271	3	.729	1	2.49e-2	1	8727.993	15	NC	5
242			min	0	1	-1.625	1	.027	15	-5.426e-3	3	244.965	1	588.933	1
243		8	max	0	12	.182	3	.672	1	2.693e-2	1	NC	15	NC	5
244			min	0	1	-1.438	1	.024	15	-5.973e-3	3	293.847	1	670.559	1
245		9	max	0	12	.1	3	.603	1	2.897e-2	1	NC	15	NC	5
246			min	0	1	-1.251	1	.021	15	-6.521e-3	3	367.007	1	805.365	1
247		10	max	0	1	.062	3	.568	1	3.1e-2	1	NC	15	NC	5
248			min	0	1	-1.162	1	.02	15	-7.069e-3	3	416.15	1	898.695	1
249		11	max	0	1	.1	3	.603	1	2.897e-2	1	NC	15	NC	5
250			min	0	12	-1.251	1	.021	15	-6.521e-3	3	367.007	1	805.365	1
251		12	max	0	1	.182	3	.672	1	2.693e-2	1	NC	15	NC	5
252			min	0	12	-1.438	1	.024	15	-5.973e-3	3	293.847	1	670.559	1
253		13	max	0	1	.271	3	.729	1	2.49e-2	1	8727.993	15	NC	5
254			min	0	12	-1.625	1	.027	15	-5.426e-3	3	244.965	1	588.933	1
255		14	max	0	1	.337	3	.745	1	2.286e-2	1	8008.623	15	NC	15
256			min	0	12	-1.741	1	.028	15	-4.878e-3	3	222.25	1	569.901	1
257		15	max	.001	1	.361	3	.705	1	2.083e-2	1	8093.479	15	NC	5
258			min	0	12	-1.737	1	.027	15	-4.33e-3	3	222.939	1	620.768	1
259		16	max	.001	1	.334	3	.612	1	1.88e-2	1	9202.228	15	NC	5
260			min	0	12	-1.593	1	.024	15	-3.782e-3	3	252.235	1	785.743	1
261		17	max	.002	1	.255	3	.482	1	1.676e-2	1	NC	15	NC	3
262			min	0	12	-1.314	1	.019	15	-3.234e-3	3	338.531	1	1245.949	1
263		18	max	.002	1	.136	3	.349	1	1.473e-2	1	NC	5	NC	3
264			min	0	12	-.93	1	.014	15	-2.687e-3	3	639.224	1	3126.849	1
265		19	max	.002	1	-.004	12	.261	1	1.269e-2	1	NC	1	NC	1
266			min	0	12	-.499	1	.01	15	-2.139e-3	3	NC	1	NC	1
267	M2	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
268			min	0	1	0	1	0	1	0	1	NC	1	NC	1
269		2	max	0	3	0	15	0	3	3.057e-3	1	NC	1	NC	1
270			min	0	1	-.001	1	0	1	-1.169e-3	3	NC	1	NC	1
271		3	max	0	3	0	15	0	3	6.114e-3	1	NC	1	NC	1
272			min	0	1	-.005	1	0	1	-2.339e-3	3	NC	1	NC	1
273		4	max	0	3	0	15	.001	3	7.133e-3	1	NC	3	NC	1
274			min	0	1	-.01	1	-.002	1	-2.713e-3	3	5871.548	1	NC	1





Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

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### Envelope Member Section Deflections (Continued)

Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
275	5	max	0	3	0	15	.002	3	6.497e-3	1	NC	3	NC	1
276		min	0	1	-.018	1	-.003	1	-2.441e-3	3	3293.25	1	NC	1
277	6	max	0	3	-.001	15	.003	3	5.862e-3	1	NC	5	NC	1
278		min	0	1	-.029	1	-.004	1	-2.169e-3	3	2121.896	1	NC	1
279	7	max	0	3	-.002	15	.004	3	5.226e-3	1	NC	5	NC	2
280		min	0	1	-.041	1	-.005	1	-1.896e-3	3	1491.317	1	8148.261	3
281	8	max	0	3	-.002	15	.005	3	4.59e-3	1	NC	5	NC	4
282		min	0	1	-.054	1	-.006	1	-1.624e-3	3	1112.301	1	6868.575	3
283	9	max	0	3	-.003	15	.005	3	3.965e-3	2	NC	5	NC	4
284		min	0	1	-.07	1	-.007	1	-1.352e-3	3	866.313	1	6017.163	3
285	10	max	0	3	-.003	15	.006	3	3.399e-3	2	NC	5	NC	4
286		min	0	1	-.087	1	-.008	1	-1.08e-3	3	697.344	1	5452.662	3
287	11	max	0	3	-.004	15	.006	3	2.832e-3	2	NC	15	NC	4
288		min	-.001	1	-.105	1	-.009	1	-8.08e-4	3	576.135	1	5100.204	3
289	12	max	0	3	-.005	15	.006	3	2.266e-3	2	NC	15	NC	4
290		min	-.001	1	-.125	1	-.009	1	-5.359e-4	3	486.176	1	4923.527	3
291	13	max	0	3	-.006	15	.005	3	1.699e-3	2	NC	15	NC	4
292		min	-.001	1	-.145	1	-.009	1	-2.638e-4	3	417.522	1	4916.793	3
293	14	max	0	3	-.006	15	.004	3	1.133e-3	2	9380.596	15	NC	4
294		min	-.001	1	-.167	1	-.009	1	5.971e-6	12	363.913	1	5107.633	3
295	15	max	0	3	-.007	15	.002	3	5.666e-4	2	8283.742	15	NC	4
296		min	-.001	1	-.189	1	-.008	1	-1.197e-4	9	321.237	1	5582.093	3
297	16	max	0	3	-.008	15	0	3	5.525e-4	3	7395.949	15	NC	4
298		min	-.001	1	-.211	1	-.006	1	-4.979e-4	1	286.715	1	6563.644	3
299	17	max	0	3	-.009	15	0	10	8.246e-4	3	6667.515	15	NC	2
300		min	-.002	1	-.235	1	-.004	1	-1.134e-3	1	258.405	1	8747.877	3
301	18	max	0	3	-.01	15	.002	2	1.097e-3	3	6062.802	15	NC	1
302		min	-.002	1	-.258	1	-.007	3	-1.77e-3	1	234.914	1	NC	1
303	19	max	.001	3	-.011	15	.006	2	1.369e-3	3	5555.752	15	NC	1
304		min	-.002	1	-.282	1	-.011	3	-2.406e-3	1	215.225	1	8724.212	12
305	M5	1	max	0	0	1	0	1	0	1	NC	1	NC	1
306		min	0	1	0	1	0	1	0	1	NC	1	NC	1
307	2	max	0	3	0	15	0	1	0	1	NC	1	NC	1
308		min	0	1	-.002	1	0	1	0	1	NC	1	NC	1
309	3	max	0	3	0	15	0	1	0	1	NC	2	NC	1
310		min	0	1	-.009	1	0	1	0	1	6543.559	1	NC	1
311	4	max	0	3	0	15	0	1	0	1	NC	4	NC	1
312		min	0	1	-.022	1	0	1	0	1	2809.744	1	NC	1
313	5	max	0	3	-.001	15	0	1	0	1	NC	5	NC	1
314		min	-.001	1	-.039	1	0	1	0	1	1556.316	1	NC	1
315	6	max	0	3	-.002	15	0	1	0	1	NC	5	NC	1
316		min	-.001	1	-.061	1	0	1	0	1	995.692	1	NC	1
317	7	max	.001	3	-.003	15	0	1	0	1	NC	5	NC	1
318		min	-.002	1	-.087	1	0	1	0	1	696.637	1	NC	1
319	8	max	.001	3	-.004	15	0	1	0	1	NC	15	NC	1
320		min	-.002	1	-.117	1	0	1	0	1	517.961	1	NC	1
321	9	max	.001	3	-.005	15	0	1	0	1	NC	15	NC	1
322		min	-.002	1	-.151	1	0	1	0	1	402.489	1	NC	1
323	10	max	.002	3	-.007	15	0	1	0	1	9294.097	15	NC	1
324		min	-.002	1	-.187	1	0	1	0	1	323.421	1	NC	1
325	11	max	.002	3	-.008	15	0	1	0	1	7676.744	15	NC	1
326		min	-.003	1	-.227	1	0	1	0	1	266.84	1	NC	1
327	12	max	.002	3	-.009	15	0	1	0	1	6476.793	15	NC	1
328		min	-.003	1	-.269	1	0	1	0	1	224.929	1	NC	1
329	13	max	.002	3	-.011	15	0	1	0	1	5561.303	15	NC	1
330		min	-.003	1	-.314	1	0	1	0	1	192.994	1	NC	1
331	14	max	.002	3	-.013	15	0	1	0	1	4846.592	15	NC	1



Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

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### Envelope Member Section Deflections (Continued)

Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
332		min	-.003	1	-.361	1	0	1	0	1	168.09	1	NC	1
333	15	max	.002	3	-.014	15	0	1	0	1	4277.753	15	NC	1
334		min	-.004	1	-.409	1	0	1	0	1	148.287	1	NC	1
335	16	max	.002	3	-.016	15	0	1	0	1	3817.689	15	NC	1
336		min	-.004	1	-.458	1	0	1	0	1	132.283	1	NC	1
337	17	max	.003	3	-.018	15	0	1	0	1	3440.459	15	NC	1
338		min	-.004	1	-.509	1	0	1	0	1	119.169	1	NC	1
339	18	max	.003	3	-.019	15	0	1	0	1	3127.483	15	NC	1
340		min	-.004	1	-.56	1	0	1	0	1	108.296	1	NC	1
341	19	max	.003	3	-.021	15	0	1	0	1	2865.191	15	NC	1
342		min	-.005	1	-.611	1	0	1	0	1	99.188	1	NC	1
343	M8	1	max	0	0	1	0	1	0	1	NC	1	NC	1
344		min	0	1	0	1	0	1	0	1	NC	1	NC	1
345	2	max	0	3	0	15	0	1	1.169e-3	3	NC	1	NC	1
346		min	0	1	-.001	1	0	3	-3.057e-3	1	NC	1	NC	1
347	3	max	0	3	0	15	0	1	2.339e-3	3	NC	1	NC	1
348		min	0	1	-.005	1	0	3	-6.114e-3	1	NC	1	NC	1
349	4	max	0	3	0	15	.002	1	2.713e-3	3	NC	3	NC	1
350		min	0	1	-.01	1	-.001	3	-7.133e-3	1	5871.548	1	NC	1
351	5	max	0	3	0	15	.003	1	2.441e-3	3	NC	3	NC	1
352		min	0	1	-.018	1	-.002	3	-6.497e-3	1	3293.25	1	NC	1
353	6	max	0	3	-.001	15	.004	1	2.169e-3	3	NC	5	NC	1
354		min	0	1	-.029	1	-.003	3	-5.862e-3	1	2121.896	1	NC	1
355	7	max	0	3	-.002	15	.005	1	1.896e-3	3	NC	5	NC	2
356		min	0	1	-.041	1	-.004	3	-5.226e-3	1	1491.317	1	8148.261	3
357	8	max	0	3	-.002	15	.006	1	1.624e-3	3	NC	5	NC	4
358		min	0	1	-.054	1	-.005	3	-4.59e-3	1	1112.301	1	6868.575	3
359	9	max	0	3	-.003	15	.007	1	1.352e-3	3	NC	5	NC	4
360		min	0	1	-.07	1	-.005	3	-3.965e-3	2	866.313	1	6017.163	3
361	10	max	0	3	-.003	15	.008	1	1.08e-3	3	NC	5	NC	4
362		min	0	1	-.087	1	-.006	3	-3.399e-3	2	697.344	1	5452.662	3
363	11	max	0	3	-.004	15	.009	1	8.08e-4	3	NC	15	NC	4
364		min	-.001	1	-.105	1	-.006	3	-2.832e-3	2	576.135	1	5100.204	3
365	12	max	0	3	-.005	15	.009	1	5.359e-4	3	NC	15	NC	4
366		min	-.001	1	-.125	1	-.006	3	-2.266e-3	2	486.176	1	4923.527	3
367	13	max	0	3	-.006	15	.009	1	2.638e-4	3	NC	15	NC	4
368		min	-.001	1	-.145	1	-.005	3	-1.699e-3	2	417.522	1	4916.793	3
369	14	max	0	3	-.006	15	.009	1	-5.971e-6	12	9380.596	15	NC	4
370		min	-.001	1	-.167	1	-.004	3	-1.133e-3	2	363.913	1	5107.633	3
371	15	max	0	3	-.007	15	.008	1	1.197e-4	9	8283.742	15	NC	4
372		min	-.001	1	-.189	1	-.002	3	-5.666e-4	2	321.237	1	5582.093	3
373	16	max	0	3	-.008	15	.006	1	4.979e-4	1	7395.949	15	NC	4
374		min	-.001	1	-.211	1	0	3	-5.525e-4	3	286.715	1	6563.644	3
375	17	max	0	3	-.009	15	.004	1	1.134e-3	1	6667.515	15	NC	2
376		min	-.002	1	-.235	1	0	10	-8.246e-4	3	258.405	1	8747.877	3
377	18	max	0	3	-.01	15	.007	3	1.77e-3	1	6062.802	15	NC	1
378		min	-.002	1	-.258	1	-.002	2	-1.097e-3	3	234.914	1	NC	1
379	19	max	.001	3	-.011	15	.011	3	2.406e-3	1	5555.752	15	NC	1
380		min	-.002	1	-.282	1	-.006	2	-1.369e-3	3	215.225	1	8724.212	12
381	M3	1	max	.006	1	0	15	0	2.795e-3	1	NC	1	NC	1
382		min	0	15	-.003	1	-.001	1	-9.873e-4	3	NC	1	NC	1
383	2	max	.006	1	-.001	15	.01	3	3.33e-3	1	NC	1	NC	4
384		min	0	15	-.023	1	-.025	1	-1.21e-3	3	NC	1	2493.367	1
385	3	max	.005	1	-.002	15	.02	3	3.865e-3	1	NC	1	NC	5
386		min	0	15	-.043	1	-.049	1	-1.433e-3	3	NC	1	1260.896	1
387	4	max	.005	1	-.003	15	.028	3	4.4e-3	1	NC	1	NC	5
388		min	0	15	-.062	1	-.072	1	-1.656e-3	3	NC	1	855.492	1



Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

Sept 14, 2015

Checked By: \_\_\_\_\_

### Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
389		5	max	.004	1	-.004	15	.037	3	4.935e-3	1	NC	1	NC	5
390			min	0	15	-.082	1	-.093	1	-1.879e-3	3	NC	1	657.288	1
391		6	max	.004	1	-.005	15	.044	3	5.469e-3	1	NC	1	NC	5
392			min	0	15	-.102	1	-.112	1	-2.102e-3	3	NC	1	542.478	1
393		7	max	.003	1	-.005	15	.051	3	6.004e-3	1	NC	1	NC	5
394			min	0	10	-.121	1	-.129	1	-2.326e-3	3	NC	1	469.984	1
395		8	max	.003	3	-.006	15	.056	3	6.539e-3	1	NC	1	NC	15
396			min	0	10	-.141	1	-.144	1	-2.549e-3	3	NC	1	422.427	1
397		9	max	.003	3	-.007	15	.061	3	7.074e-3	1	NC	1	NC	15
398			min	0	10	-.16	1	-.154	1	-2.772e-3	3	NC	1	391.41	1
399		10	max	.003	3	-.008	15	.064	3	7.609e-3	1	NC	1	NC	15
400			min	0	10	-.179	1	-.161	1	-2.995e-3	3	NC	1	372.669	1
401		11	max	.003	3	-.009	15	.065	3	8.144e-3	1	NC	1	NC	15
402			min	0	2	-.199	1	-.164	1	-3.218e-3	3	NC	1	364.222	1
403		12	max	.004	3	-.009	15	.065	3	8.679e-3	1	NC	1	NC	15
404			min	-.001	2	-.218	1	-.163	1	-3.441e-3	3	NC	1	365.711	1
405		13	max	.004	3	-.01	15	.062	3	9.213e-3	1	NC	1	NC	15
406			min	-.002	2	-.237	1	-.156	1	-3.664e-3	3	NC	1	378.406	1
407		14	max	.004	3	-.011	15	.058	3	9.748e-3	1	NC	1	NC	15
408			min	-.002	2	-.256	1	-.143	1	-3.887e-3	3	NC	1	405.973	1
409		15	max	.004	3	-.011	15	.051	3	1.028e-2	1	NC	1	NC	5
410			min	-.003	2	-.274	1	-.125	1	-4.11e-3	3	NC	1	456.849	1
411		16	max	.004	3	-.012	15	.042	3	1.082e-2	1	NC	1	NC	5
412			min	-.003	2	-.293	1	-.1	1	-4.333e-3	3	NC	1	551.7	1
413		17	max	.004	3	-.012	15	.031	3	1.135e-2	1	NC	1	NC	5
414			min	-.004	2	-.312	1	-.069	2	-4.556e-3	3	NC	1	753.529	1
415		18	max	.004	3	-.013	15	.017	3	1.189e-2	1	NC	1	NC	5
416			min	-.004	2	-.33	1	-.033	2	-4.779e-3	3	NC	1	1378.779	1
417		19	max	.005	3	-.013	15	.017	1	1.242e-2	1	NC	1	NC	1
418			min	-.005	2	-.349	1	0	3	-5.002e-3	3	NC	1	NC	1
419	M6	1	max	.013	1	0	15	0	1	0	1	NC	1	NC	1
420			min	0	15	-.006	1	0	1	0	1	NC	1	NC	1
421		2	max	.011	1	-.002	15	0	1	0	1	NC	1	NC	1
422			min	0	15	-.049	1	0	1	0	1	NC	1	NC	1
423		3	max	.01	1	-.003	15	0	1	0	1	NC	1	NC	1
424			min	0	15	-.092	1	0	1	0	1	NC	1	NC	1
425		4	max	.008	1	-.005	15	0	1	0	1	NC	1	NC	1
426			min	0	15	-.135	1	0	1	0	1	NC	1	NC	1
427		5	max	.007	1	-.007	15	0	1	0	1	NC	1	NC	1
428			min	0	15	-.178	1	0	1	0	1	NC	1	NC	1
429		6	max	.007	3	-.008	15	0	1	0	1	NC	1	NC	1
430			min	0	10	-.22	1	0	1	0	1	NC	1	NC	1
431		7	max	.007	3	-.01	15	0	1	0	1	NC	1	NC	1
432			min	0	10	-.263	1	0	1	0	1	NC	1	NC	1
433		8	max	.008	3	-.011	15	0	1	0	1	NC	1	NC	1
434			min	-.002	10	-.305	1	0	1	0	1	NC	1	NC	1
435		9	max	.008	3	-.013	15	0	1	0	1	NC	1	NC	1
436			min	-.003	2	-.348	1	0	1	0	1	NC	1	NC	1
437		10	max	.009	3	-.014	15	0	1	0	1	NC	1	NC	1
438			min	-.004	2	-.39	1	0	1	0	1	NC	1	NC	1
439		11	max	.009	3	-.016	15	0	1	0	1	NC	1	NC	1
440			min	-.006	2	-.432	1	0	1	0	1	NC	1	NC	1
441		12	max	.01	3	-.017	15	0	1	0	1	NC	1	NC	1
442			min	-.007	2	-.474	1	0	1	0	1	NC	1	NC	1
443		13	max	.01	3	-.019	15	0	1	0	1	NC	1	NC	1
444			min	-.008	2	-.516	1	0	1	0	1	NC	1	NC	1
445		14	max	.011	3	-.02	15	0	1	0	1	NC	1	NC	1





Company : Schletter, Inc.  
Designer : HCV  
Job Number :  
Model Name : Standard FS Racking System

Sept 14, 2015

Checked By: \_\_\_\_\_

### Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
446			min	-.01	2	-.558	1	0	1	0	1	NC	1	NC	1
447		15	max	.011	3	-.021	15	0	1	0	1	NC	1	NC	1
448			min	-.011	2	-.6	1	0	1	0	1	NC	1	NC	1
449		16	max	.012	3	-.022	15	0	1	0	1	NC	1	NC	1
450			min	-.012	2	-.641	1	0	1	0	1	NC	1	NC	1
451		17	max	.012	3	-.024	15	0	1	0	1	NC	1	NC	1
452			min	-.014	2	-.683	1	0	1	0	1	NC	1	NC	1
453		18	max	.013	3	-.025	15	0	1	0	1	NC	1	NC	1
454			min	-.015	2	-.725	1	0	1	0	1	NC	1	NC	1
455		19	max	.013	3	-.026	15	0	1	0	1	NC	1	NC	1
456			min	-.017	2	-.766	1	0	1	0	1	NC	1	NC	1
457	M9	1	max	.006	1	0	15	.001	1	9.873e-4	3	NC	1	NC	1
458			min	0	15	-.003	1	0	3	-2.795e-3	1	NC	1	NC	1
459		2	max	.006	1	-.001	15	.025	1	1.21e-3	3	NC	1	NC	4
460			min	0	15	-.023	1	-.01	3	-3.33e-3	1	NC	1	2493.367	1
461		3	max	.005	1	-.002	15	.049	1	1.433e-3	3	NC	1	NC	5
462			min	0	15	-.043	1	-.02	3	-3.865e-3	1	NC	1	1260.896	1
463		4	max	.005	1	-.003	15	.072	1	1.656e-3	3	NC	1	NC	5
464			min	0	15	-.062	1	-.028	3	-4.4e-3	1	NC	1	855.492	1
465		5	max	.004	1	-.004	15	.093	1	1.879e-3	3	NC	1	NC	5
466			min	0	15	-.082	1	-.037	3	-4.935e-3	1	NC	1	657.288	1
467		6	max	.004	1	-.005	15	.112	1	2.102e-3	3	NC	1	NC	5
468			min	0	15	-.102	1	-.044	3	-5.469e-3	1	NC	1	542.478	1
469		7	max	.003	1	-.005	15	.129	1	2.326e-3	3	NC	1	NC	5
470			min	0	10	-.121	1	-.051	3	-6.004e-3	1	NC	1	469.984	1
471		8	max	.003	3	-.006	15	.144	1	2.549e-3	3	NC	1	NC	15
472			min	0	10	-.141	1	-.056	3	-6.539e-3	1	NC	1	422.427	1
473		9	max	.003	3	-.007	15	.154	1	2.772e-3	3	NC	1	NC	15
474			min	0	10	-.16	1	-.061	3	-7.074e-3	1	NC	1	391.41	1
475		10	max	.003	3	-.008	15	.161	1	2.995e-3	3	NC	1	NC	15
476			min	0	10	-.179	1	-.064	3	-7.609e-3	1	NC	1	372.669	1
477		11	max	.003	3	-.009	15	.164	1	3.218e-3	3	NC	1	NC	15
478			min	0	2	-.199	1	-.065	3	-8.144e-3	1	NC	1	364.222	1
479		12	max	.004	3	-.009	15	.163	1	3.441e-3	3	NC	1	NC	15
480			min	-.001	2	-.218	1	-.065	3	-8.679e-3	1	NC	1	365.711	1
481		13	max	.004	3	-.01	15	.156	1	3.664e-3	3	NC	1	NC	15
482			min	-.002	2	-.237	1	-.062	3	-9.213e-3	1	NC	1	378.406	1
483		14	max	.004	3	-.011	15	.143	1	3.887e-3	3	NC	1	NC	15
484			min	-.002	2	-.256	1	-.058	3	-9.748e-3	1	NC	1	405.973	1
485		15	max	.004	3	-.011	15	.125	1	4.11e-3	3	NC	1	NC	5
486			min	-.003	2	-.274	1	-.051	3	-1.028e-2	1	NC	1	456.849	1
487		16	max	.004	3	-.012	15	.1	1	4.333e-3	3	NC	1	NC	5
488			min	-.003	2	-.293	1	-.042	3	-1.082e-2	1	NC	1	551.7	1
489		17	max	.004	3	-.012	15	.069	2	4.556e-3	3	NC	1	NC	5
490			min	-.004	2	-.312	1	-.031	3	-1.135e-2	1	NC	1	753.529	1
491		18	max	.004	3	-.013	15	.033	2	4.779e-3	3	NC	1	NC	5
492			min	-.004	2	-.33	1	-.017	3	-1.189e-2	1	NC	1	1378.779	1
493		19	max	.005	3	-.013	15	0	3	5.002e-3	3	NC	1	NC	1
494			min	-.005	2	-.349	1	-.017	1	-1.242e-2	1	NC	1	NC	1