

April 23, 2024

K2 Systems, LLC  
4665 North Ave Suite G  
Oceanside, CA 92056



**RE: *Splice Foot X Deck & Rafter Mounting Evaluation***

To whom it may concern:

Per your request, Moment Engineering + Design has performed a comprehensive structural review of the K2 Systems Splice Foot X in Deck Mounting scenarios. When installed per the conditions and design criteria described herein, the Splice Foot X specified is compliant with the applicable sections of the design reference documents noted below.

### **Design Reference Documents**

- ASCE/SEI 7-22 & 7-16 – *Minimum Design Loads for Buildings and Other Structures*
- AA ADM - *2015 Aluminum Design Manual*, by the Aluminum Association
- 2018 NDS – *National Design Specification for Wood Construction*
- TT-051C – *Screw Withdrawal from the Face of APA-Trademarked Structural Panels*
- Technical Bulletin #11b - *Screw Fastener Capacities in OSB*, published by Premier SIPS, dated 6/15/11

### **Overview**

The purpose of this analysis is to provide allowable shear, compression and tensile loads for the K2 Systems Splice Foot X in various attachment configurations including deck mounting. K2 Systems has provided in-house load testing data of the K2 Splice Foot X in shear, compression, and tension. Fastener analysis was completed to provide accurate allowable loads for the K2 Splice Foot X in deck mounting configurations.

Moment Engineering + Design has reviewed the testing materials and reports provided by K2 Systems as well as applicable design codes and has derived allowable shear, compression and tensile loads per mounting configuration based on the results.

### **Methods & Design Parameters**

Calculated allowable loads were based on the following data:

- *Section and materials data provided by K2 Systems*
- *Load/deflection test data provided by K2 Systems*

### **Section Properties**

Tested assembly was based the following:

<u>Property</u>	<u>Splice Foot X</u>
Sx (horizontal axis)	0.354 in <sup>3</sup>
Sy (vertical axis)	0.425 in <sup>3</sup>
A (x-Section)	1.299 in <sup>2</sup>

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We appreciate the opportunity to have assisted you with this project. Should you have any further questions regarding this analysis, please feel free to contact us by phone or email.

Best Regards,



Expires: 2/28/25

Shawn P. Kelley, P.E.

**Professional Engineer**

moment ENGINEERING + DESIGN

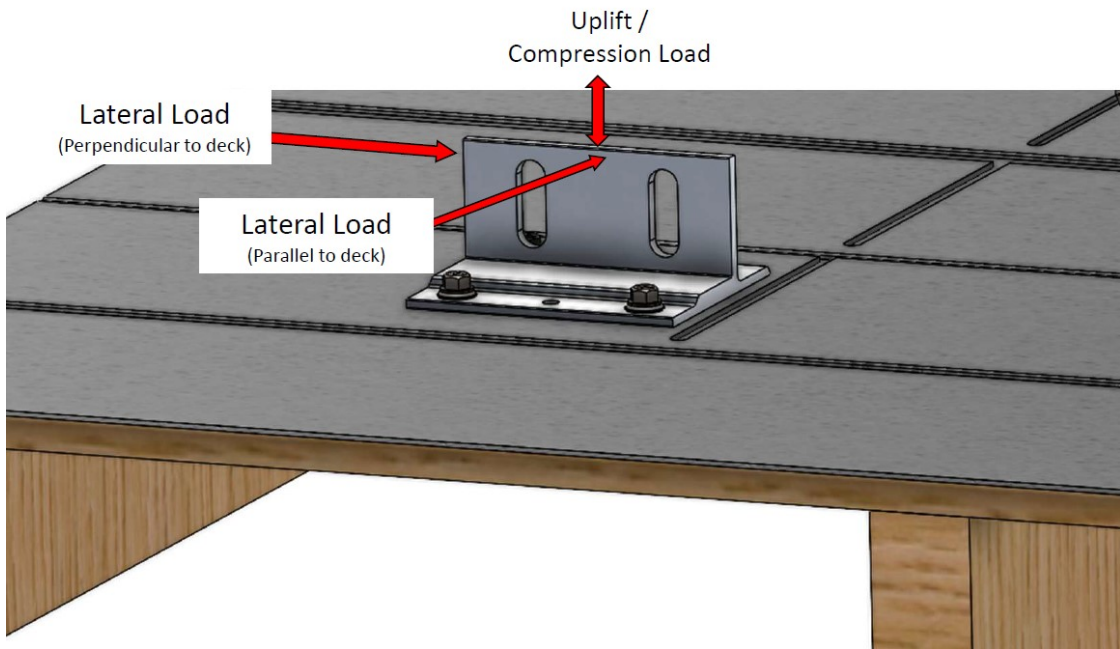
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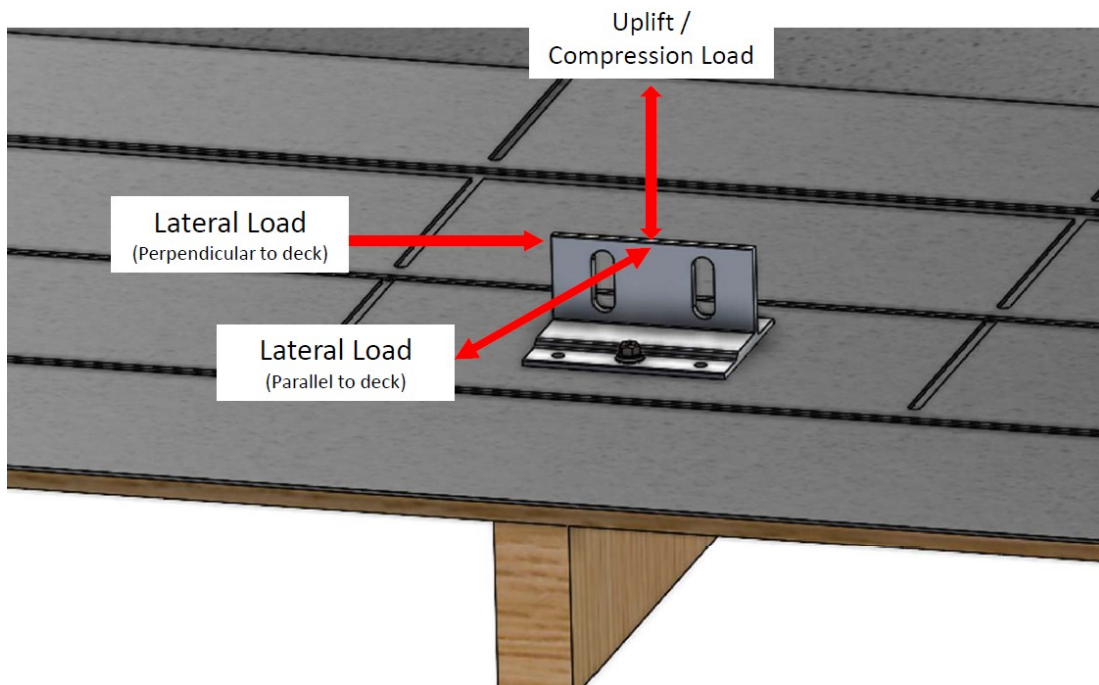
[spkelley@msegllc.com](mailto:spkelley@msegllc.com)

Attachments:

1. Figure 1.1: Splice Foot X – Force loading diagram (deck)
2. Table 1.1: Splice Foot X – Deck Mounting Options
3. Figure 1.2: Splice Foot X – Force loading diagram (rafter)
4. Table 1.2: Splice Foot X – Rafter Mounting Options



**Figure 1.1: Splice Foot X: Force Loading Diagram (deck)**



**Figure 1.2: Splice Foot X: Force Loading Diagram (rafter)**

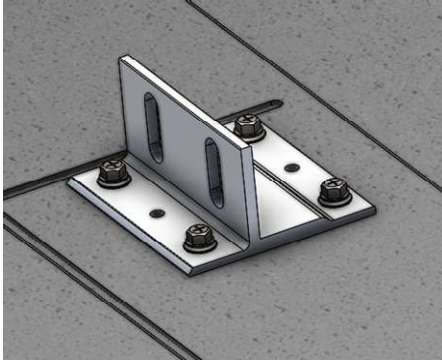
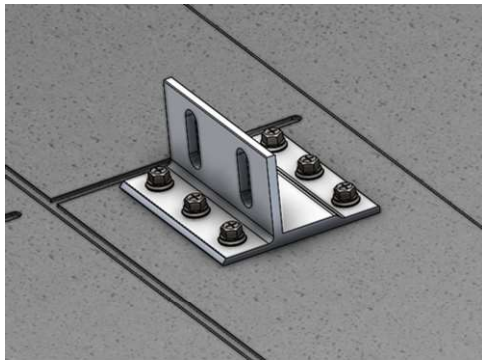
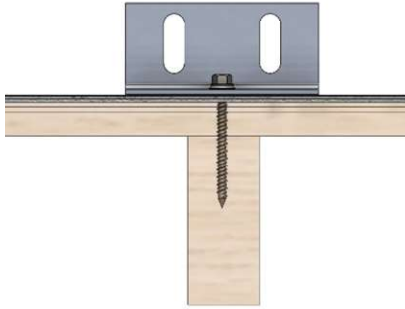
Table 1.1: Splice Foot X - Deck Mounting Options	
Bracket attached to 7/16" OSB sheathing (G=0.42) with (4) M5x60 wood screws fully embedded through OSB sheathing. Assumes min. 8" distance from all OSB panel edges and 24" O.C. maximum rafter spacing.	
CONFIGURATION	ALLOWABLE LOADS <sup>3,4</sup>
	ALLOWABLE UPLIFT LOAD (LBS) <sup>1</sup> :
	275
	ALLOWABLE COMPRESSIVE LOAD (LBS.) <sup>4</sup> :
	275
ALLOWABLE LATERAL LOAD (LBS) <sup>1,2</sup> :	
(PERPENDICULAR)	
120	
ALLOWABLE LATERAL LOAD (LBS) <sup>1,2</sup> :	
(PARALLEL)	
125	
<p>1. Determined using NDS Eq. 12.2-2 with full thread engagement through 7/16" OSB. Includes 1.6 Cd for wind loads. Additional load duration factors may <u>not be applied</u>.</p> <p>2. Allowable lateral load assumes worst case loading at top of slots. Additional load duration factors may <u>not be applied</u>.</p> <p>3. Reference Figure 1.1 for load direction and application.</p> <p>4. The effect of bolt slippage has not been evaluated.</p>	
Bracket attached to 7/16" OSB sheathing (G=0.42) with (6) M5x60 wood screws fully embedded through OSB sheathing. Assumes min. 8" distance from all OSB panel edges and 24" O.C. maximum rafter spacing.	
CONFIGURATION	ALLOWABLE LOADS <sup>3,4</sup>
	ALLOWABLE UPLIFT LOAD (LBS) <sup>1</sup> :
	415
	ALLOWABLE COMPRESSIVE LOAD (LBS.) <sup>4</sup> :
	415
ALLOWABLE LATERAL LOAD (LBS) <sup>1,2</sup> :	
(PERPENDICULAR)	
180	
ALLOWABLE LATERAL LOAD (LBS) <sup>1,2</sup> :	
(PARALLEL)	
190	
<p>1. Determined using NDS Eq. 12.2-2 with full thread engagement through 7/16" OSB. Includes 1.6 Cd for wind loads. Additional load duration factors may <u>not be applied</u>.</p> <p>2. Allowable lateral load assumes worst case maximum height above roof deck. Additional load duration factors may <u>not be applied</u>.</p> <p>3. Reference Figure 1.1 for load direction and application.</p> <p>4. The effect of bolt slippage has not been evaluated.</p>	

Table 1.2: Splice Foot X - Rafter <sup>5</sup> Mounting Options	
Note: Rafter attached with (2) M5x60 long self-drilling wood screws through 7/16" OSB directly into the rafter (fully threaded, 1.75" of embedment into rafter)	
CONFIGURATION	ALLOWABLE LOADS <sup>3,6</sup>
	ALLOWABLE UPLIFT LOAD (LBS) <sup>1,4</sup> :
	580
	ALLOWABLE COMPRESSIVE LOAD (LBS.) <sup>4</sup> :
	580
	ALLOWABLE LATERAL LOAD (LBS) <sup>2</sup> :
(PERPENDICULAR TO RAFTER)	135
ALLOWABLE LATERAL LOAD (LBS) <sup>2</sup> :	
(PARALLEL TO RAFTER)	240
<p>1. Determined using NDS Eq. 12.2-2 with 1.75" minimum thread length</p> <p>2. Allowable lateral load assumes worst case loading at top of slots, with allowable shear values based on Table 12M (NDS) with appropriate reduction factors</p> <p>3. Allowable uplift load includes a 1.6 load duration factor for wind. Allowable shear load includes a 1.15 load duration factor for snow. No additional increases are permitted.</p> <p>4. The effect of bolt slippage has not been evaluated</p> <p>5. Assumes a minimum specific gravity G=0.43</p> <p>6. Reference Figure 1.2 for load direction and application</p>	