

September 20, 2023

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



**RE: K2 Flex Foot Metal Roof Mounting Evaluation**

To whom it may concern:

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

#### **Design Reference Documents**

- ASCE/SEI 7-16 & 7-10 – *Minimum Design Loads for Buildings and Other Structures*
- AA ADM - *2018 Aluminum Design Manual*, by the Aluminum Association
- ESR-4009 – ICC-ES Evaluation Report: EJOT JF3 Screws
- ESR-3064P – SSMA Product Technical Guide

#### **Overview**

The purpose of this analysis is to provide allowable shear, compression, and tensile loads for the K2 Systems Flex Foot in various attachment configurations for metal roof mounting. K2 Systems has provided in-house load testing data of the K2 Flex Foot in shear, compression, and tension. Fastener analysis is required to provide accurate allowable loads for the K2 Flex Foot.

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>K2 Flex Foot</u>    |
|----------------------|------------------------|
| Sx (horizontal axis) | 0.373. in <sup>3</sup> |
| Sy (vertical axis)   | 0.404 in <sup>3</sup>  |
| A (x-Section)        | 1.298 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,

Shawn  
Kelley

Digitally signed by  
Shawn Kelley  
Date: 2023.09.22  
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Expires: 1/31/24

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Attachments:

1. Table 1.1: K2 Flex Foot – Metal Deck Mounting Options

| Table 1.1: Flex Foot - Metal Deck Mounting Options   |   |
|--|---|
| Bracket attached to 26 gauge (0.018" thick) metal roof with (4) #12-18 JF3 self drilling screws from EJOT. Assumes min. 8" distance from all roof panel seams.   |   |
| CONFIGURATION  | ALLOWABLE LOADS <sup>3,4</sup>              |
|   | ALLOWABLE TENSILE LOAD (LBS) <sup>1</sup> : |
|  | 244   |
|  | ALLOWABLE COMPRESSIVE LOAD (LBS.):          |
|  | 244   |
|  | ALLOWABLE SHEAR (LBS) <sup>2</sup> :        |
|  | 220   |
| 1. Determined using ESR-4009 ICC-ES Evaluation Report on EJOT JF3 fasteners.<br>2. Determined using ESR-3064P ICC-ES Evaluation Report on Screw Capacities in thin sheet metals.<br>3. Maximum vertical load to bracket shall not exceed 650 lbs including the effect of any load combinations or load duration factors applicable to the connection |   |
| Bracket attached to 24 gauge (0.024" thick) metal roof with (4) #12-18 JF3 self drilling screws from EJOT. Assumes min. 8" distance from all roof panel seams.   |   |
| CONFIGURATION  | ALLOWABLE LOADS <sup>3,4</sup>              |
|   | ALLOWABLE TENSILE LOAD (LBS) <sup>1</sup> : |
|  | 424   |
|  | ALLOWABLE COMPRESSIVE LOAD (LBS.):          |
|  | 424   |
|  | ALLOWABLE SHEAR (LBS) <sup>2</sup> :        |
|  | 408   |
| 1. Determined using ESR-4009 ICC-ES Evaluation Report on EJOT JF3 fasteners.<br>2. Determined using ESR-3064P ICC-ES Evaluation Report on Screw Capacities in thin sheet metals.<br>3. Maximum vertical load to bracket shall not exceed 650 lbs including the effect of any load combinations or load duration factors applicable to the connection |   |
| Bracket attached to 22 gauge (0.033" thick) metal roof with (4) #12-18 JF3 self drilling screws from EJOT. Assumes min. 8" distance from all roof panel seams.   |   |
| CONFIGURATION  | ALLOWABLE LOADS <sup>3,4</sup>              |
|   | ALLOWABLE TENSILE LOAD (LBS) <sup>1</sup> : |
|  | 516   |
|  | ALLOWABLE COMPRESSIVE LOAD (LBS.):          |
|  | 516   |
|  | ALLOWABLE SHEAR (LBS) <sup>2</sup> :        |
|  | 472   |
| 1. Determined using ESR-4009 ICC-ES Evaluation Report on EJOT JF3 fasteners.<br>2. Determined using ESR-3064P ICC-ES Evaluation Report on Screw Capacities in thin sheet metals.<br>3. Maximum vertical load to bracket shall not exceed 650 lbs including the effect of any load combinations or load duration factors applicable to the connection |   |