



STEENHOF

BUILDING SERVICES GROUP

"DESIGN *ideas*, ENGINEER *concepts*, MANAGE *the process*."

Date: August 27, 2018

Project No: 180052

Unirac, Inc.
1411 Broadway NE
Albuquerque, NM 87102

Attention: Jennifer Carey, Senior Structural Engineer,

Dear Ms. Carey;

Re: Structural Review of Application of Unirac Pro Series Clamps and L Foot Connections for Solar PV Roof Mounting Systems Utilizing Unirac SM-2 Rail Profile

Background

Steenhof Building Service Group (SBSG) completed a structural review of the Unirac Pro Series clamps and L-foot connections for Solar PV Panel Mounting Systems that utilize SM -2 Rail Profile. SBSG's review was based on information and test results conducted and provided by Unirac Inc. The purpose of the review was to determine if the span tables produced by SBSG in the previous reviews for SM-2 rail profile applications are applicable with use of Pro Series clamps and L-foot connections. Documented below are our analysis, structural notes and conclusions.

Analysis and Discussion

Based on our review of the pro-series clamp capacities and L-Foot capacities, the following limitations apply to the tables SBSG have previously produced for Unirac SM2 rail applications in Canada.

1. North-South orientation – All the tables previously provided are applicable without additional limitations for both 72 cell and 60 cell panels.
2. East – West orientation, 60 cell panels, minimum 2 continuous panels installed – The previous tables are only applicable for areas with ground snow loads not more than 2.2kPa.
3. East – West orientation, 72 cell panels, minimum 2 continuous panels installed – The previous tables are only applicable for areas with ground snow loads not more than 1.7kPa. Ground snow loads up to 1.9 kPa could be allowed provided that roof slopes conform to the limitations below;
 - a. Slope \leq 20 degrees or Slope \geq 40 degrees

Structural Notes

1. This letter shall be read in conjunction with the following SBSG's previous letters (Attachment 1);
 - a. SOLARMOUNT SM2 – Solar PV Panel Mounting System Structural Evaluation Letter (East – West Rail Orientation) sealed March 13, 2017 for Province of Ontario.
 - b. SOLARMOUNT SM2 – Solar PV Panel Mounting System Structural Evaluation Letter (North – South Rail Orientation) sealed March 29, 2017 for Province of Ontario.

- c. SOLARMOUNT SM2 – Solar PV Panel Mounting System Structural Evaluation Letter (East – West Rail Orientation) sealed April 28, 2017 for Province of Alberta.
 - d. SOLARMOUNT SM2 – Solar PV Panel Mounting System Structural Evaluation Letter (North – South Rail Orientation) sealed April 28, 2017 for Province of Alberta.
 - e. SOLARMOUNT SM2 – Solar PV Panel Mounting System Structural Evaluation Letter (East – West Rail Orientation) sealed April 28, 2017 for Province of British Columbia.
 - f. SOLARMOUNT SM2 – Solar PV Panel Mounting System Structural Evaluation Letter (North – South Rail Orientation) sealed April 28, 2017 for Province of British Columbia.
2. SBSG's previous reviews did not include structural review of standard Unirac mid clamps or end clamps. However the limitations provided for Pro series mid clamps and end clamps are applicable for standard mid clamps and end clamps as well.
 3. The Pro series L-foot connections can be used in place of standard L-Foot connections subject to the limitations provided in SBSG's previous letters referred to in Note 1. However as noted in the previous reports, the L-Foot to roof connection capacity will depend on a number of site specific factors (including the condition of the roof framing, roof joist or truss spacing, member sizes, etc.), therefore each application should be reviewed on a site specific basis.
 4. The Pro series clamps shall be installed in conformance with the SM-Installation Guide – Pro Series (Attachment 3).

We trust the above information is clear, however, please do not hesitate to contact the undersigned if you have any questions or require additional information. SBSG will be pleased to undertake any project specific reviews of conditions outside the above mentioned criterion.

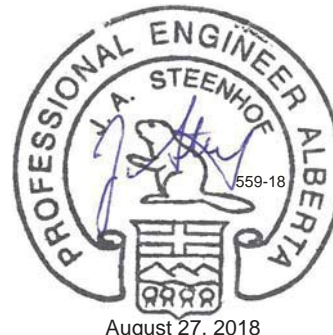


J. Arachchi

Steenhof Building Service Group
Jinith Arachchi, P.Eng.
Structural Engineer



August 27, 2018



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J. Steenhof

Steenhof Building Service Group
Jack Steenhof, M.A.Sc., P.Eng.
Principal Structural Engineer

Attachments:

1. SBSG's previous SM2 Solar PV Panel Mounting System Structural Evaluation Letters.
2. Pro Series Limit States Clamp and L-foot Resistance Data
3. SM-Installation Guide – Pro Series