AGENDA

Grand Haven Charter Township Zoning Board of Appeals
Tuesday, March 27, 2018 – 7:00 pm

I. Call To Order

II. Roll Call

III. Approval of the February 27, 2018 ZBA Meeting Minutes

IV. New Business
   A. ZBA Variance Application No. 18-02 – VanOordt

V. Reports

VI. Extended Public Comments (*Limited To Four (4) Minutes Please*).

VII. Adjournment
I. CALL TO ORDER
The regular meeting of the Grand Haven Charter Township Zoning Board of Appeals was called to order at 7:00 p.m. by Chair Voss.

II. ROLL CALL
Board of Appeals members present: Voss, Loftis, Slater, and Hesselsweet
Board of Appeals members absent: Behm, Rycenga (alternate)

Also present: Community Development Director Fedewa, and Assistant Zoning Administrator Hoisington.

Without objection, Fedewa was instructed to record the minutes for the meeting.

III. APPROVAL OF MINUTES

Without objection, the minutes of the October 24, 2017 meeting were approved.

IV. NEW BUSINESS
A. ZBA Case #18-01 – Dimensional Variance – Urbytes

Party Requesting Variance: Mitchell and Susan Urbytes
Applicant Representative: Jeff Swieringa, ReNew Construction
Address: 1378 Spinnaker Ct, Holland 49424
Parcel Number: 70-03-32-132-022
Location: 18326 Holcomb Road

Mitchell and Susan Urbytes, represented by Jeff Swieringa, are seeking a dimensional variance to allow a Side Yard 1 setback of 3-feet, and a Side Yard 2 setback of 7.75-feet to construct a 12’ x 26’ deck with attached 11’ long staircase and a 6’ x 2’ deck extension. Section 21.02, and its associated Section 21.01.16 of the Zoning Ordinance requires a 10-foot minimum, with a 23-foot total combined side yard setback in the R-1 Single Family Residential Zoning District for a lot <70-feet in width. Due to the small, and narrow, nature of the lot the decks cannot meet the setback requirements.

Fedewa provided an overview of the application through a memorandum dated February 22nd.
Following the initial discussions, the Chair invited the applicant’s representative, Jeff Swieringa of ReNew Construction, to speak:

- Board inquired why the proposed south deck extended passed the door.
  - Owner intends to replace existing door with French doors, and place their outdoor grill within the extra space east of the new doors.
- Confirmed the dwelling is constructed of block.
- Will be replacing all windows throughout the house, along with other renovations.

The Board discussed the four standards and noted the following:

- Questioned if the proposed width of 6-feet for the deck along the south wall was excessive.
  - It was noted there is an existing projection on the house that is also 6-feet in width as well as a small portion of a 6-foot wide deck, so the proposed deck expansion would add bulk in the required side yard, but not create a greater nonconformity than already exists.
- Inquired why the porch on the east side of the wall was not included in the application.
  - Per Fedewa, the porch was existing and are replacing at a slightly smaller size. Section 25.02.4 allows for this to occur without a variance.
- It was noted the applicants also own a 5-foot wide swath of land directly south of the subject property. The two lots have not been combined (and cannot be required to combine), but does provide for additional buffer space between the proposed deck and adjacent premises.

**Standard No. 1 – Exceptional or extraordinary circumstances:**

- Exceptionally small lot
- Exceptional narrowness

  Ayes: Voss, Loftis, Slater, Hesselsweet  
  Nays: None

**Standard No. 2 – Substantial property right:**

- Majority of properties along Lake Michigan have a series of decks that provide views.
- Due to narrowness of lot any and all decks would encroach into the required side yards.

  Ayes: Voss, Loftis, Slater, Hesselsweet  
  Nays: None
Standard No. 3 – Will not be a substantial detriment to adjacent parcels, or material impact on the intent and purpose of the Ordinance:

- The Board noted that no opposition was received from adjacent parcels.

Ayes: Voss, Loftis, Slater, Hesselsweet  
Nays: None

Standard No. 4 – Request is not of such a recurrent nature as to make reasonably practical the formulation of a general regulation:

- Case is unique, and does not present a concern that the situation will reoccur and make reasonable the formulation of a general regulation.

Ayes: Voss, Loftis, Slater, Hesselsweet  
Nays: None

Motion by Slater, supported by Hesselsweet, to approve a dimensional variance from Section 21.02 to allow a 12’ x 26’ deck with attached 11’ long staircase, and 6’ x 22’ deck extension at 18326 Holcomb Road. This will result in a Side Yard 1 setback of 3-feet, and a Side Yard 2 setback of 7.75-feet. Approval of this variance is based upon this Board’s findings that all four standards have been affirmatively met. Which motion carried unanimously, as indicated by the following roll call vote:

Ayes: Voss, Loftis, Slater, Hesselsweet  
Nays: None  
Absent: Behm, Rycenga

B. Housekeeping

i. Appointment of Officers

Motion by Slater, supported by Loftis, to nominate and reappoint the existing officers for their current positions. Which motion carried unanimously.

ii. Approve 2018 Meeting Date Schedule

Motion by Voss, supported by Hesselsweet, to approve the 2018 Meeting Date Schedule as presented. Which motion carried unanimously.

V. REPORTS

A. Next Zoning Ordinance Update Committee meeting is March 22nd at 6pm.
VI. EXTENDED PUBLIC COMMENTS – None

VII. ADJOURNMENT

Without objection, the meeting was adjourned at 7:22 p.m.

Respectfully submitted,

[Signature]

Stacey Fedewa
Acting Recording Secretary
# Community Development Memo

**DATE:** March 22, 2018  
**TO:** Zoning Board of Appeals  
**FROM:** Cassandra Hoisington, Assistant Zoning Administrator  
Stacey Fedewa, Community Development Director  
**RE:** 10528 168th Ave – Dimensional Variance Application No. 18-02

## PARCEL INFORMATION

<table>
<thead>
<tr>
<th></th>
<th>Owner</th>
<th>Applicant</th>
<th>Property Address</th>
<th>Parcel Number</th>
<th>Lot Size</th>
<th>Lot Type</th>
<th>Zoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Craig Vanoordt</td>
<td>Alison Brookhouse</td>
<td>10528 168th Ave</td>
<td>70-07-27-300-028</td>
<td>2.84 Acres</td>
<td>Typical Lot</td>
<td>RR – Rural Residential</td>
</tr>
<tr>
<td>Applicant</td>
<td>Power Home Solar LLC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Interior Lot</td>
<td></td>
</tr>
<tr>
<td>Property Address</td>
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<td></td>
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<tr>
<td>Required Setbacks for a 239 sqft Accessory Structure</td>
<td>Front</td>
<td>Not Allowed</td>
<td>Rear</td>
<td>10 feet</td>
<td>Side</td>
<td>10 feet</td>
<td>House</td>
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<tr>
<td>Requested Setbacks for a 239 sqft Accessory Structure</td>
<td>Front</td>
<td>25 feet*</td>
<td>Rear</td>
<td>599 feet*</td>
<td>Side</td>
<td>Side 1: 29 feet*</td>
<td>Side 2: 212 feet*</td>
</tr>
</tbody>
</table>

* Please note—Power Home Solar LLC has indicated the precise location may vary upwards of 19-feet. More information is provided below.
The owners are requesting to install a 9’ x 26’-7” ground mounted solar structure in the front yard of their property.

Currently, there is not an ordinance specifically pertaining to solar arrays, so the structure is held to the standards for accessory structures in Section 20.03. These standards would require the solar array to be located in the side or rear yard.

As the ZBA knows, the Township is updating the zoning ordinance. Staff reviewed the current draft of the ordinance, and found it would prohibit this array from being located in the front yard as well.

After initial zoning review of the building permit for the solar array, staff had suggested aligning the array with the house to provide a compliant location. According to the applicant, the proposed location will maximize the sunlight that the solar array receives, thus improving its efficiency. Henceforth, the variance application.

During conversations with the applicant, they indicated these are “typical” figures for a solar array and may be different once installed. Meaning, the location may differ up to 19-feet, which is problematic for a variance that needs to be specific. Please intend to discuss this discrepancy with the applicant.

A caveat the ZBA will need to consider—neither the current zoning ordinance, or the draft of the new zoning ordinance would allow this array to be located in the front yard. Is this a precedence the ZBA wants to set?

The utilization of solar power is a goal established by the Master Plan, which emphasizes the need to become a resilient community that supports the use of renewable energy.
To authorize a dimensional variance from the strict applications of the provisions of this Ordinance, the ZBA shall apply the following standards and make an affirmative finding as to each of the matters set forth in the standards.

The applicant opted to provide a narrative with a broad overview of the project rather than one specifically addressing the standards.

**STANDARD 1**

There are exceptional or extraordinary circumstances or conditions applying to the property that do not apply generally to other properties in the same zoning classification.

The property is in a rural part of the Township and there are lots of varying sizes around the owner’s property. It is not encumbered by unique landscapes such as wetlands, critical dunes, or significant elevation changes. Per the applicant, the request is necessary to provide enough direct sunlight to power the solar array. The ZBA will need to make a determination as to whether this standard is met given the circumstances of this case.

**STANDARD 2**

The variance is necessary for the preservation and enjoyment of a substantial property right similar to that possessed by other properties in the same zoning district and in the vicinity, provided that possible increased financial return shall not of itself, be deemed sufficient to warrant a variance.

There are no other known free-standing solar arrays located in the Township. The few solar arrays that exist are roof-mounted. The ZBA will need to make a determination as to whether this standard is met given the circumstances of this case.

**STANDARD 3**

Authorization of such variance will not be of substantial detriment to adjacent property, and will not materially impair the intent and purpose of this Ordinance or the public health, safety, and general welfare of the community.

No written correspondence has been received, but staff received a phone call showing support for the single array, but would not be supportive of a larger array or more arrays in the future. The ZBA will need to make the determination as to whether this standard is met given the circumstances of this case and the findings on standards 1 and 2.
STANDARD 4

The condition or situation of the specific piece of property or the intended use of said property for which the variance is sought, is not of so general or recurrent a nature as to make reasonably practical the formulation of a general regulation for such condition or situation, a part of this Ordinance.

The ZBA will need to make the determination as to whether this standard is met.

SAMPLE MOTIONS

If the ZBA determines each standard has been affirmatively met, the following motion can be offered:

Motion to approve a dimensional variance from Section 20.03.1.J to construct a 9’ x 26’-7” ground mounted solar array structure in the front yard at 10528 168th Avenue. Approval of this variance is based upon this Board’s findings that all four standards have been affirmatively met.

If the ZBA determines each standard has not been affirmatively met, the following motion can be offered:

Motion to deny a dimensional variance from Section 20.03.1.J to construct a 9’ x 26’-7” ground mounted solar structure in the front yard at 10528 168th Avenue because an alternative exists that does not violate the Grand Haven Charter Township Zoning Ordinance. Denial of this variance is based upon this Board’s findings that all four standards have not been affirmatively met.

If the ZBA determines that more information is needed to make an affirmative finding, the following motion can be offered:

Motion to table the dimensional variance application for 10528 168th Avenue, and direct the applicant and/or staff to provide the following information:

1. List items.

Please contact me with questions or concerns.
**ZONING BOARD OF APPEALS APPLICATION**

**Fees**

<table>
<thead>
<tr>
<th>Request for Variance or Appeal</th>
<th>$125</th>
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<tr>
<td>Special Meeting</td>
<td>$250</td>
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<tr>
<td>Request for Interpretation</td>
<td>No Charge</td>
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**Applicant/Appellant Information**

<table>
<thead>
<tr>
<th>Name</th>
<th>Peter DeNicola</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>704-800-6780</td>
</tr>
<tr>
<td>Fax</td>
<td>704-900-2645</td>
</tr>
<tr>
<td>Address</td>
<td>38905 Mound Rd Sterling Heights, MI 48310</td>
</tr>
<tr>
<td>Email Address</td>
<td><a href="mailto:mkeller@powerhome.com">mkeller@powerhome.com</a></td>
</tr>
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</table>

**Owner Information (If different from applicant/appellant)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Craig Van Oordt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone</td>
<td>616-836-9284</td>
</tr>
<tr>
<td>Address</td>
<td>10528 168th Ave West Olive, MI 49460</td>
</tr>
<tr>
<td>Email Address</td>
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**Property Information (Include a survey or scaled drawing)**

<table>
<thead>
<tr>
<th>Address</th>
<th>10528 168th Ave</th>
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<tbody>
<tr>
<td>Parcel No.</td>
<td>70 - 07 - 27 - 300 - 028</td>
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<td>Lot Width</td>
<td>192.54' feet</td>
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<td>Parcel Size</td>
<td>2.81 acres</td>
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<td>Lot Type</td>
<td>Typical Lot</td>
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**General Information (Check one)**

<table>
<thead>
<tr>
<th>Application for Variance</th>
<th>Request for Interpretation</th>
<th>Notice of Appeal</th>
</tr>
</thead>
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**VARIANCE REQUESTED (If applicable)**

1. Attach a Narrative: Description of Request; Why it is needed; and Addresses each of the 4 Standards
2. Variance Requested From the Requirements of Section Number(s) ____________ For Land Use ____________
3. Relating to ____________ Ground mounted Solar Structure
4. Structure/Land Use (After Variance) Residential Self Generation, Grid-tied/dependent
5. Overall Building Size (After Variance) 10' 9" wide by 26' long  See drawings for profile detail
6. Setbacks from lot lines (After Variance):
   a. Front Yard 125 feet
   b. Rear Yard 599 feet
   c. Side Yard #1 29 feet
   d. Side Yard #2 212' feet

**NOTE:** Please provide a scaled drawing with details of your proposed work including the dimensions of any structure(s) (i.e. height, width & length), building materials, the setbacks to ALL property lines, and other existing structures on the parcel, and any other relevant information, as needed.
Interpretation/Exemption (If applicable) Narrative
Description of requested interpretation(s) and relevant Section number(s):

It appears there are very few utterances of renewable energy structures within Grand Haven ordinances which apply to residential solar installations. We request a variance for Chapter 6 15.0602 (6). Section 6.02, Permitted uses, includes small tower mounted wind turbines as Permitted. Specifically, we ask the board to consider a variance to include ground mounted solar, a similarly purposed structure, as a permissible renewable energy structure. The function of a solar array depends inherently on the exposure to sunlight. During shade or absence of direct sunlight the system will not produce energy or at least very limited amounts.

Appeals and other Applications (If applicable) Narrative continued
Description of action being appealed or other matter which is basis of application.

When choosing the location for the array, we try to eliminate all possible shading from trees and other structures. The center of the array should be oriented at an azimuth as close to 180 degrees South. We want to be able to benefit from direct sunlight all day. If aimed East, we would only benefit most during morning sunlight ours and afternoon hours, if the array were aimed West. We propose the side yard location at 10528 168th Ave because of the natural shading over the rest of the parcel created by trees and the residence. We would easily be able to meet the minimum side yard setback requirement. The anti-glare properties of the array would not allow any glare or reflection nuisances to anyone, ever. Solar panels are not mirror, often a misconception. This array design is not imposing and certainly smaller than tower mounted wind mills. Please see drawings and photos also submitted with this application.

Grounds for Appeal or Other Application (If applicable) Narrative Conclusion

I hereby attest the information on this application is, to the best of my knowledge, true and accurate.

Peter DeSoto
Signature of Applicant

3/2/2018
Date

For Office Use Only

Date Received Fee Paid?
RELEASE FORM

The undersigned has applied to the Grand Haven Charter Township Zoning Board of Appeals for a variance. The undersigned hereby authorizes the members of the Zoning Board of Appeals and appropriate Township staff members to inspect the property (address stated below) at reasonable times, in regards to the consideration of my request for a variance.

Applicant’s Signature: ___________________________  Date: 8/1/2018

Owner’s Signature (if different from applicant): ___________________________  Date: 

Property Address: ___________________________

ACTION TAKEN BY TOWNSHIP BOARD OF APPEALS

( ) Application Approved

( ) Application Denied

Description of variance granted or other action taken including conditions imposed, if any:

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

Grounds for Board action including findings as to standards and requirements prerequisite to imposition of conditions under ordinance:

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

Signature of ZBA Chairperson: ___________________________  Date: ___________________________
PROJECT DESCRIPTION:
16x295 MISSION SOLAR MSE295SQ5T MODULES
GROUND MOUNTED SOLAR PHOTOVOLTAIC MODULES
SYSTEM SIZE: 4.72 kW DC STC
ARRAY AREA: ARRAY #1 : 286.24 SQ FT

EQUIPMENT SUMMARY
16 MISSION SOLAR MSE295SQ5T MODULES
16 SOLAREDGE POWER OPTIMIZER P300
01 SOLAREDGE SE5000H-US INVERTER

APPLICABLE CODES & STANDARDS
BUILDING: MICHIGAN RESIDENTIAL CODE 2015
ELECTRICAL: NEC 2014
FIRE: IPC 2015

DESIGN SPECIFICATIONS
OCCUPANCY: II
CONSTRUCTION: SINGLE-FAMILY
ZONING: RESIDENTIAL
GROUND SNOW LOAD: 35 PSF
WIND EXPOSURE: C
WIND SPEED: 105 PSF

AUTHORITIES HAVING JURISDICTION
BUILDING: OTTAWA COUNTY
ZONING: OTTAWA COUNTY
UTILITY: CONSUMERS ENERGY

PROJECT DESCRIPTION:
PV-1 PLOT PLAN & VICINITY MAP
PV-2 ROOF PLAN & MODULES
PV-2A STRING LAYOUT
PV-3 RACKING DETAILS
PV-3A RACKING DETAILS
PV-4 ELECTRICAL LINE DIAGRAM
PV-5 WIRING CALCULATIONS
PV-6 SOLAREDGE OPTIMIZER CHART
PV-7 to 10 EQUIPMENT SPECIFICATIONS

PV-1 SCALE: NTS
PV-4 SCALE: NTS
PV-7 SCALE: NTS
PV-8 SCALE: NTS
PV-9 SCALE: NTS
PV-10 SCALE: NTS

PV PROJECT SITE
NOTE: GROUND MOUNT LOCATION TBD ON-SITE
NOTE: THE PV SYSTEM IS TILTED AT 35° TO GET MAXIMUM SOLAR PRODUCTION THROUGHOUT THE DAY. IT IS THE OPTIMUM ANGLE FOR A GROUND-MOUNT IN MICHIGAN.
1. **RACKING DETAIL (Rear View)**

   SCALE: 1" = 5'-0"

   - **MISSION SOLAR MSE295SQ5T**
   - **SOLAREEDGE POWER OPTIMIZER P300**
   - **(N) STAMPED Z-PURLIN**
   - **(N) C-CHANNEL POST**
   - **EXISTING GRADE**
   - **(N) CONCRETE FOUNDATION**

2. **RACKING DETAIL (Grounding Details)**

   SCALE: 1" = 2'-0"

   - **EQUIPMENT GROUNDING CONDUCTORS SIZED ACCORDING TO NEC 690.45**
   - **JUNCTION BOX**
   - **GROUNDING LUG NEC 250.8**
   - **GROUNDING ELECTRODE CONDUCTOR SIZED ACCORDING TO NEC 250.166**
   - **8' X 2' COPPER CLAD GROUND ROD**

   - **REF NEC 690.47 (D)**
   - **NEC 250.52**
   - **NEC 250.54**
   - **8' X 5' COPPER CLAD GROUND ROD**

   - **MISSION SOLAR MSE295SQ5T**
   - **SOLAREEDGE POWER OPTIMIZER P300**
   - **(N) STAMPED Z-PURLIN**
   - **(N) C-CHANNEL POST**
   - **EXISTING GRADE**
   - **(N) CONCRETE FOUNDATION**

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**POWER HOME SOLAR, LLC**

"POWER YOUR FUTURE"

919 N. MAIN ST.

MOORESVILLE, NC 28115

Phone: 704-800-6591 (OFFICE)

Email: info@powerhome.com

Web: www.powerhome.com

**DATE: 02/2/2018**

**CRAIG VAN OORDT RESIDENCE**

10528 168TH AVE

WEST OLIVE, MI 49460

---

**Ansi B 11" X 17"**
1. RACKING DETAIL (Rear View)

PV-3A

SCALE: 1"=5'-0"

(N) STAMPED Z-PURLIN

MISSION SOLAR MSE295SQ2ST

SOLAREDGE POWER OPTIMIZER P300

(N) C-CHANNEL POST

EXISTING GRADE

(N) CONCRETE FOUNDATION

2. RACKING DETAIL (Side View)

PV-3A

SCALE: 1"=5'-0"

STAMPED Z-PURLIN

MISSION SOLAR MSE295SQ2ST

(N) STAMPED TRUSS

(N) C-CHANNEL POST

(N) CONCRETE FOUNDATION
### Electrical Line Diagram

**Project Name & Address:**
Residence 10528 168th Ave, West Olive, MI 49460

**Utility Provider:**
Consumers Energy

**Main Panel Brand:**
Mission Solar MSE295SQ5T Modules

**Main Panel Voltage:**
240V

**Main Service Panel Rating:**
200A

**Main Circuit Breaker Rating:**
200A

**Service Feed Source:**
Overhead

#### QTY | CONDUCTOR INFORMATION | CONDUCTOR SIZE | CONDUIT TYPE |
--- | --- | --- | --- |
2 | #10 AWG - PV WIRE/USE-2 | N/A | N/A |
2 | #10 AWG - THWN-2 | 3/4" | PVC or EMT |
3 | #6 AWG - THWN-2 | 3/4" | PVC or EMT |
1 | EXISTING GROUNDING SYSTEM | | |

**Service Info**
- Utility Provider: Consumers Energy
- Main Panel Brand: Mission Solar MSE295SQ5T Modules
- Main Panel Voltage: 240V
- Main Service Panel: 200A
- Main Circuit Breaker Rating: 200A
- Service Feed Source: Overhead

**Conduit Schedule**
- (2)#10 AWG - PV WIRE/USE-2
- (3)#10 AWG - THWN-2
- (1)#6 AWG - THWN-2
- (1)EXISTING GROUNDING SYSTEM

**Conduit Types**
- IMC or PVC
- EMT or PVC
- PVC 3/4"
DC CONDUCTOR AMPACITY CALCULATIONS:

**ARRAY TO JUNCTION BOX:**

<table>
<thead>
<tr>
<th>EXPECTED WIRE TEMP (In Celsius)</th>
<th>TEMP. CORRECTION PER TABLE (310.16)</th>
<th>NO. OF CURRENT CARRYING CONDUCTORS</th>
<th>CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)</th>
<th>CIRCUIT CONDUCTOR SIZE</th>
<th>CIRCUIT CONDUCTOR AMPACITY</th>
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</thead>
<tbody>
<tr>
<td>0.96</td>
<td>0.96</td>
<td>2</td>
<td>1</td>
<td>10 AWG</td>
<td>48A</td>
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**REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)**

1.25 x Isc 18.75A

**DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16**

40A

**CIRCUIT CONDUCTOR AMPACITY**

40A

**RESULT**

Result should be greater than (18.75A) otherwise less the entry for circuit conductor size and ampacity

**DC CONDUCTOR AMPACITY CALCULATIONS:**

**FROM JUNCTION BOX TO INVERTER:**

<table>
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<th>AMBIENT TEMPERATURE ADJUSTMENT FOR EXPOSED CONDUIT PER NEC 310.15(B)(2)(c)</th>
<th>TEMP. CORRECTION PER TABLE (310.16)</th>
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<th>CONDUIT FILL CORRECTION PER NEC 310.15(B)(2)(a)</th>
<th>CIRCUIT CONDUCTOR SIZE</th>
<th>CIRCUIT CONDUCTOR AMPACITY</th>
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<td>0.96</td>
<td>2</td>
<td>1</td>
<td>10 AWG</td>
<td>48A</td>
</tr>
</tbody>
</table>

**REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)**

1.25 x Max Inverter Output Current 26.25A

**DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16**

72A

**CIRCUIT CONDUCTOR AMPACITY**

72A

**RESULT**

Result should be greater than (26.25A) otherwise less the entry for circuit conductor size and ampacity

**AC CONDUCTOR AMPACITY CALCULATIONS:**

**No. OF INVERTER**

1

<table>
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<th>EXPECTED WIRE TEMP (In Celsius)</th>
<th>TEMP. CORRECTION PER TABLE (310.16)</th>
<th>NO. OF CURRENT CARRYING CONDUCTORS</th>
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<td>10 AWG</td>
<td>48A</td>
</tr>
</tbody>
</table>

**REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B)**

1.25 x Isc 18.75A

**DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16**

40A

**CIRCUIT CONDUCTOR AMPACITY**

40A

**RESULT**

Result should be greater than (18.75A) otherwise less the entry for circuit conductor size and ampacity

**ELECTRICAL NOTES:**

1.) ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.

2.) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.

3.) WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.

4.) WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.

5.) DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.

6.) WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.

7.) ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.

8.) MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURERS INSTRUCTION.

9.) MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.

10.) THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE.
MSE PERC 60
High Power PERC Roof Top Module

**Certifications**
- IEC 61215
- IEC 61701
- IEC 61730
- UL 1703

**EQUIPMENT SPECIFICATION**

**ELECTRICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Module Type</th>
<th>MSE280SQST</th>
<th>MSE300SQST</th>
<th>MSE325SQST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Output</td>
<td>Pmax</td>
<td>Wp</td>
<td>Pmax</td>
</tr>
<tr>
<td></td>
<td>260</td>
<td>260</td>
<td>285</td>
</tr>
<tr>
<td>Module Efficiency</td>
<td>%</td>
<td>17.45</td>
<td>17.75</td>
</tr>
<tr>
<td>Tolerance</td>
<td>%</td>
<td>0.4%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Short-Circuit Current</td>
<td>Isc</td>
<td>A</td>
<td>9.44</td>
</tr>
<tr>
<td>Open Circuit Voltage</td>
<td>Voc</td>
<td>V</td>
<td>39.81</td>
</tr>
<tr>
<td>Max Power</td>
<td>Imp</td>
<td>A</td>
<td>8.95</td>
</tr>
<tr>
<td>Rated Voltage</td>
<td>Vmp</td>
<td>V</td>
<td>32.54</td>
</tr>
</tbody>
</table>

**TEMPERATURE COEFFICIENTS**

| Normal Operating Cell Temperature (NOC) | 44°C (±2°C) |
| Temperature Coefficient of Pmax | -0.427%/°C |
| Temperature Coefficient of Voc | -0.318%/°C |
| Temperature Coefficient of Isc | 0.042%/°C |

**OPERATING CONDITIONS**

| Maximum System Voltage | 1,000VDC |
| Operating Temperature Range | -40°C to +85°C (149°F) |
| Maximum Series Fuse Rating | 15A |
| Fire Safety Classification Type | C6 |
| Front & Back Load Limit | 1,000 Pa (117 lbs) |
| Salt Spray Resistance | Class C |

**MECHANICAL DATA**

- **Solar Cells**: P-type Mono-crystalline Silicon (150.75mm)
- **Cell Orientation**: 60 cells (5×10), 4 busbar
- **Module Dimension**: 1,954mm x 999mm x 40mm (77.1 in. x 39.39 in. x 1.57 in.)
- **Weight**: 18.2 kg (40.1 lbs)
- **Front Glass**: 3.2mm (0.126 in.) tempered, low-iron, anti-reflective coating
- **Frame**: Anodized aluminum alloy
- **Encapsulant**: Ethylene vinyl acetate (EVA)
- **J-Box**: Protection class IP67 with 3 bypass-diodes
- **Cables**: PV w/ins, 1mm^2 (20AWG), 10 AWG
- **Connector**: MC4 or compatible

** pushGuard Certification:**

**25-YEAR LINEAR WARRANTY**

---

**Location**

PV-7
SolarEdge Single Phase Inverters
for North America

Optimized installation with HD-Wave technology
- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Integrated arc fault protection for NEC 2011 690.11 and integrated rapid shutdown for NEC 2014 690.12
- Extremely small
- High reliability without any electrolytic capacitors
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

USA-Germany-Italy-France-Japan-China-Australia-The Netherlands-UK-Denmark-Turkey-South Africa-Bulgaria
www.solaredge.us

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated AC Power Output</td>
<td>1000</td>
<td>1800</td>
<td>2000</td>
<td>3000</td>
<td>5000</td>
</tr>
<tr>
<td>Max. AC Power Output</td>
<td>1000</td>
<td>1800</td>
<td>2000</td>
<td>3000</td>
<td>5000</td>
</tr>
<tr>
<td>AC Output Voltage Nom. / Min. / Max. 110V - 208V - 230V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC Frequency (Nominal)</td>
<td>60Hz</td>
<td>50Hz</td>
<td>60Hz</td>
<td>50Hz</td>
<td>60Hz</td>
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<tr>
<td>Maximum Continuous Output Current (Amps)</td>
<td>10.1</td>
<td>16.2</td>
<td>19.5</td>
<td>24.5</td>
<td>30.5</td>
</tr>
<tr>
<td>Maximum Continuous Output, Control 230V</td>
<td>10.1</td>
<td>16.2</td>
<td>19.5</td>
<td>24.5</td>
<td>30.5</td>
</tr>
<tr>
<td>Ground THD</td>
<td>3</td>
<td>3</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Utility Monitoring, Monitoring Protection; Country/Configurable Thresholds</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Maximum DC Power</td>
<td>4600</td>
<td>7900</td>
<td>7900</td>
<td>7900</td>
<td>7900</td>
</tr>
<tr>
<td>Transformer loss, Ungrounded</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Input Voltage</td>
<td>480</td>
<td>480</td>
<td>480</td>
<td>480</td>
<td>480</td>
</tr>
<tr>
<td>Nominal DC Input Voltage</td>
<td>480</td>
<td>480</td>
<td>480</td>
<td>480</td>
<td>480</td>
</tr>
<tr>
<td>Maximum Input Current (Amps)</td>
<td>10.1</td>
<td>16.2</td>
<td>19.5</td>
<td>24.5</td>
<td>30.5</td>
</tr>
<tr>
<td>Maximum Input Current (Amps)</td>
<td>10.1</td>
<td>16.2</td>
<td>19.5</td>
<td>24.5</td>
<td>30.5</td>
</tr>
<tr>
<td>Maximum Input Short Circuit Current</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
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<tr>
<td>Reverse Polarity Protection</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Maximum Inverter Efficiency</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>CCC Weighted Efficiency</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>High-Voltage Power Consumption</td>
<td>&lt; 2.5</td>
<td>&lt; 2.5</td>
<td>&lt; 2.5</td>
<td>&lt; 2.5</td>
<td>&lt; 2.5</td>
</tr>
</tbody>
</table>

SELF-SUSTAINING POWER OUTLET (OPTIONAL)
- Nominal Output Voltage | 100 |
- Maximum Output Power | 2000 |
- External Outlet with GFCI | Yes |

ADDITIONAL FEATURES
- Supported Communication Interfaces: Ethernet, Zigbee (optional), Cellular (optional)
- Revenue Grade Data, ANSI C12.20

STANDARD COMPLIANCE
- IEC62108, UL6949, CSA C22.2, Canadian cCUL, according to EN, IEC, AS/NZS
- Emissions: FCC Part 15, Class A

INSTALLATION SPECIFICATIONS
- AC Output Conductive Loss (2000W):
  - 0.16% - Convector / 0.14% - MCS
  - 0.20% - Candel / 0.3% - MCS
- DC Input Conductive Loss / AM Loss:
  - 0.3% - Convector / 0.3% - MCS
- Dimensions with Safety Switch (W x H x D):
  - 17.7 x 24.6 x 6.5 (446 x 625 x 165) in / mm
- Weight with Safety Switch: 26 lbs / 11.7 kg
- Noise: 25 dBA @ 4 ft
- Cooling: Natural Convection
- Operating Ambient Temperature Range: 0°F (-18°C) to 113°F (45°C)
- Protection Rating: NEMA 3R (Enclosure with Safety Switch)

RoHS
- Lead-free welding for all components (Lead-free solder)
- Example of RoHS compliant components:
  - Silica Gel (203350)
  - PV Cells (203350)
  - SolarEdge Transformers (203350)
  - PV Cells (503350)

CRAIG VAN OORDT
RESIDENCE
10528 168TH AVE
WEST OLIVE, MI 49460

PV-8
### SolarEdge Power Optimizer

**Module Add-On For North America**

**P300 / P320 / P400 / P405**

---

**PV power optimization at the module-level**

- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety

---

**POWER OPTIMIZER**

**PV SYSTEM DESIGN USING A SOLAREDGE INVERTER**

<table>
<thead>
<tr>
<th></th>
<th>SINGLE PHASE</th>
<th>THREE PHASE 208V</th>
<th>THREE PHASE 480V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum String Length</td>
<td>8</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>(Power Optimizers)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum String Length</td>
<td>25</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>(Power Optimizers)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Power per String</td>
<td>3250</td>
<td>6000</td>
<td>12750</td>
</tr>
<tr>
<td>Parallel Strings of Different Lengths or Orientations</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**EQUIPMENT SPECIFICATION**

- **Model:** P300 / P320 / P400 / P405
- **Input:**
  - Rated Input DC Voltage: 300 / 320 / 400 / 405 Vdc
  - Maximum Input Voltage (at lowest temperature): 48 / 80 / 125 Vdc
  - MPP Operating Range: 8.8 - 8.8 / 12.5 - 12.5 Vdc
  - Maximum Short-Circuit Current (At): 10 / 13 / 10.3 / 12.6 Adc
  - Maximum DC Input Current: 12.5 / 13.75 / 12.6 Adc
  - Maximum Efficiency: 99.5 %
  - Weighted Efficiency: 99.6 %
  - Overvoltage Category: I
- **Output:**
  - Maximum Output Current: 13 Adc
  - Maximum Output Voltage: 68 / 83 Vdc
  - Safety Output Voltage per Power Optimizer: 1 Vdc
  - **Installation Specifications**
  - Maximum Allowed System Voltage: 1000 Vdc
  - All SolarEdge Single Phase and Three Phase Inverters
  - Dimensions (W x H x D): 5 x 1.97 x 1.08
  - Weight (Including cables): 30 / 1.7 / 1.0
  - Input Connector: MeC4 Compatible
  - Output Wire Type: Single HV insulated MeC4 Compatible
  - Output Wire Length: 0.95 / 0.6 / 1.2 / 3.0
  - Operating Temperature Range: 40°F to 104°F / 1°C to 40°C
  - Protection Rating: IP68 / NEMA6P
  - Relative Humidity: 0 - 90 %

---

**RPC® power optimization module. Module of up to 15 power optimizers allowed.**

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**PROJECT NAME & ADDRESS**

**PV-9**

---

**SIGNATURE WITH SEAL**

- **DATE:** 02/18/2018
- **PROJECT NAME & ADDRESS:** CRAIG VAN OORDT RESIDENCE

---

**SHEET SIZE**

ANSI B

**11” X 17”**

---

**SHEET NUMBER**

PV-9
Superior Cost Savings
The Atlas is a fixed tilt ground mount solution designed for commercial and utility scale installations, with slide-in panel rails, pre-punched hole locations, UL 467 grounding mid clamps and only three major components. Atlas dramatically lowers overall project installation and racking costs by up to 30%.

Key Features
- Simple convenient panel installation
- UL 467 grounding mid clamps
- Only 3 main components: no on-site welding
- Universal hardware for all assembly
- 5° - 40° angles available
- All components are galvanized roll-formed steel
- C-Channel posts are pile-driven into ground
- Accomodates terrain up to 5° EW

"Your Single Solar Source"

Atlas - 2
2-High Post Driven Ground Mount

Major Components
1. C-Channel Post
   Available in multiple lengths for various soils and height clearances. Other Post Options include Helical, I-Beam, and Ground Screw.

2. Stamped Truss
   Pre-stamped truss design allows for faster connection to post and varying truss angles.

3. Stamped Z-Purlin
   Quick assembly with easy adjustment. Swedge add-on rail into preceding rail section without the need for additional assembly hardware or splice bar.

4. Panel Clamps and Grounding
   Mid clamps come complete with UL 467 Grounding solution. Clamp design allows for quick and easy assembly.

Technical Specifications
- Application: Open Field Layout
- Foundation: Pile Driven
- Module Orientation: Portrait
- Module Compatibility: All Major Brands - 60 & 72 Cell Modules
- Tilt Angle Available: 5° - 40°
- Ground Clearance: Standard - 24"*
- Grade of Terrain: EW = 5°
- Wind Load: Up to 100 MPH *
- Snow Load: Up to 60 PSF *
- Purlin Length: 207"
- Material Composition: Galvanized Steel
- G-90 - Post, Truss & Rails
- Warranty: 20 Years
- Manufacturing: Made in USA

*Snow loads are ground snow loads estimated at 40 deg. wind and snow at 120 mph.
*For specifications subject to change without notice.