PV Permit Design

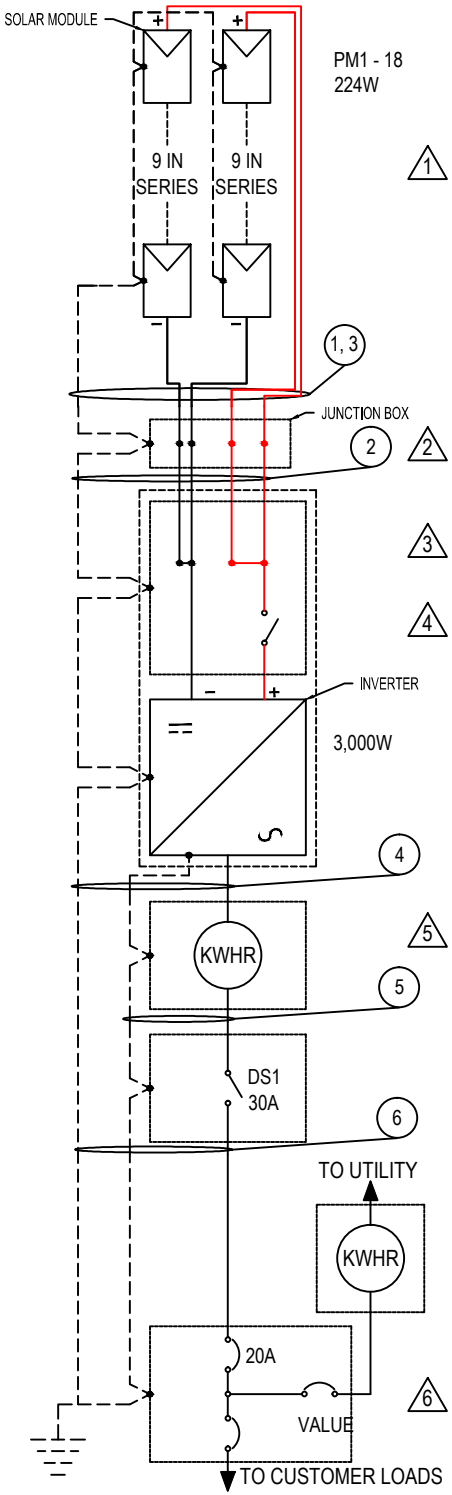
Example Output Documents

- Single Line Electrical Diagram
- NEC Code Compliance Report

Examples provided by:

SolarDesignTool

solarnexus
Accelerating Your Solar Business



1 SINGLE-LINE SCHEMATIC
E1.1 SCALE: NTS

COMPONENT SPECIFICATIONS

PHOTOVOLTAIC MODULE									
REF.	TYP.	MODULE	STC POWER	PTC POWER	ISC	IMP	VOC	VMP	FUSE RATING
PM1	18	SHARP ND-224UC1	224W	192.6W	8.33A	7.66A	36.6V	29.3V	15A

INVERTER									
REF.	TYP.	INVERTER	NOMIINAL OUTPUT VOLTAGE	NOMINAL OUTPUT FREQUENCY	MAX OUTPUT POWER	MAX AC CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	CEC WEIGHTED EFFICIENCY
I1	1	PV POWERED PVP3000	240VAC	60HZ	3,000W	13A	18A	500V	93.5%

OVER CURRENT PROTECTION DEVICES			
REF.	TYP.	CURRENT RATING	MAX. VOLTAGE
CB1	1	20A	240VAC

DISCONNECTS				
REF.	TYP.	POLES	CURRENT RATING	MAX. VOLTAGE
DS1	1	2	30A	240VAC

SYSTEM SPECIFICATIONS

ARRAY STC POWER	4,032W
ARRAY PTC POWER	3,632W
ARRAY ISC	16.66A
ARRAY IMP	15.32A
MODULES IN SERIES	9
ARRAY VOC	329.0V
ARRAY VMP	264.0V
MAX SYSTEM VOLTAGE	500V
MAX AC OUTPUT	3,000W
CEC AC OUTPUT	3,396W

NOTES

1. OPEN CIRCUIT VOLTAGE OF ARRAY WILL FLUCTUATE WITH TEMPERATURE. STRING CONFIGURATION MAY NOT BE SUITABLE FOR ALL REGIONS.
2. OUTDOOR-RATED SPLICE BOX RATED FOR 600VDC
3. PHOTOVOLTAIC OUTPUT STRINGS ARE COMBINED INSIDE THE INVERTER'S DC INTEGRATED DISCONNECT.
4. INTEGRATED DC DISCONNECT IS PROVIDED WITH INVERTER. DISCONNECT IS LISTED FOR USE WITH PVPOWERED UL 1741 LISTED STRING INVERTERS.
5. OPTIONAL PRODUCTION METER
6. OUTPUT OF INVERTER CONNECTED TO UTILITY ON LOAD SIDE OF SERVICE DISCONNECT. OUTPUT IS BACKFED THROUGH BREAKER IN MAIN PANEL.

WIRE SCHEDULE

ID	TYPICAL	CONDUCTOR	CONDUIT	NO. OF CONDUCTORS IN CONDUIT	CONDUIT FILL PERCENT	RATED AMPS	OCPD	EGC	LENGTH
1	1	10 AWG USE-2, COPPER	FREE AIR	N/A	N/A	8.3A	N/A	6 AWG BARE, COPPER	20FT
2	2	10 AWG THWN-2, COPPER	0.5" DIA. FLEXIBLE STEEL	4	32.7%	8.3A	N/A	14 AWG THWN-2, COPPER	45FT
3	1	10 AWG USE-2, COPPER	FREE AIR	N/A	N/A	8.3A	N/A	6 AWG BARE, COPPER	25FT
4	1	12 AWG THWN-2, COPPER	0.5" DIA. FLEXIBLE STEEL	3	19.2%	13.0A	N/A	10 AWG THWN-2, COPPER	15FT
5	1	12 AWG THWN-2, COPPER	0.5" DIA. FLEXIBLE STEEL	3	19.2%	13.0A	N/A	10 AWG THWN-2, COPPER	10FT
6	1	12 AWG THWN-2, COPPER	0.5" DIA. FLEXIBLE STEEL	3	19.2%	13.0A	20A	10 AWG THWN-2, COPPER	10FT

YOUR LOGO HERE

CUSTOMER_NAME
PROJ_NAME
STREET_ADDRESS
CITY_AND_STATE
United States

SHEET TITLE: Single-Line Schematic

Revisions:

File:
Drawn by: MW
Approved by: DM
Scale: NTS
Date: 06/07/2012

Project No.: 1-XXXX

E1.1

Step 1: Structural Review of PV Array Mounting System

Is the array to be mounted on a defined, permitted roof structure? ☐ **Yes** ☐ **No**

If No due to non-compliant roof or a ground mount, submit completed worksheet for the structure WKS1.

Roof Information:

1. Is the roofing type lightweight (Yes = composition, lightweight masonry, metal, etc…)_____

If No, submit completed worksheet for roof structure WKS1 (No = heavy masonry, slate, etc…).

2. Does the roof have a single roof covering? ☐ **Yes** ☐ **No**

If No, submit completed worksheet for roof structure WKS1.

3. Provide method and type of weatherproofing roof penetrations (e.g. flashing, caulk)._____

Mounting System Information:

1. Is the mounting structure an engineered product designed to mount PV modules with no more than an 18" gap beneath the module frames? ☐ **Yes** ☐ **No**

If No, provide details of structural attachment certified by a design professional.

2. For manufactured mounting systems, fill out information on the mounting system below:
   a. Mounting System Manufacturer _____Product Name and Model#_____
   b. Total Weight of PV Modules and Rails _____lbs
   c. Total Number of Attachment Points_____
   d. Weight per Attachment Point (b ÷ c)_____lbs (if greater than 45 lbs, see WKS1)
   e. Maximum Spacing Between Attachment Points on a Rail _____inches (see product manual for maximum spacing allowed based on maximum design wind speed)
   f. Total Surface Area of PV Modules (square feet)_____ ft^2
   g. Distributed Weight of PV Module on Roof (b ÷ f)_____ lbs/ft^2

   If distributed weight of the PV system is greater than 5 lbs/ft^2, see WKS1.

10.2KW Grid Interactive Photovoltaic System

Code Validation Reports

Provided by Verdiseno

Project: SES PO#17882

1. NEC Code Compliance Report

1.1. Maximum System Voltage Test

1.1.1. Solar Edge inverter w/20 REC Solar REC255PE(BLK) (255W)s

Array Properties

Array Type	Distributed MPPT System Inverter Array
System Description	Solar Edge inverter w/20 REC Solar REC255PE(BLK) (255W)s
Module	REC255PE(BLK) (255W)
Highest number of modules in series in a PV Source Circuit	1
Design Low Temp.	-3°C
Module Voc	37.6V
Temp. Coefficient Voc	-0.1V/C

NEC Code Calculations

A. Maximum Voltage of PV Source Circuit *see Article 690.7(A), and Article 690.7(A)*	40.46V

NEC Article 690.7 requires that if the PV module manufacturer provides a temperature coefficient of open-circuit voltage, it must be used to calculate the PV array's maximum system voltage. It includes an information note recommending the use of the ASHRAE 'Extreme Annual Mean Minimum Design Dry Bulb Temperature' as the design low temperature. Using these values, the module Voc (37.6V) will increase to 40.46V at the design low temperature (-3°C).

(-3°C - 25°C) X -0.1V/C + 37.6V = 40.46V
The total Voc for the string is 40.46V.

40.46V X 1 = 40.46V

B. Maximum Voltage of DC Output Circuit *see Article 690.7(C)*	350V

NEC Article 690.7(B) requires that all PV circuits have a voltage that does not exceed 600V. This system's DC Output Circuits are fed by Mage Solar P400 DC-to-DC converter optimization devices. Each device is connected to a single REC255PE(BLK) (255W) PV Module. The voltage of this circuit is regulated by the inverter at a constant 350V.

NEC Code Validation Tests

1.	PV Source Circuit maximum Voc must not exceed 600V 40.46V < 600V = true	*PASS*
2.	DC Output Circuit voltage must not exceed 600V 350V < 600V = true	*PASS*

1.1.2. Solar Edge inverter w/20 REC Solar REC255PE(BLK) (255W)s

Array Properties

Array Type	Distributed MPPT System Inverter Array
System Description	Solar Edge inverter w/20 REC Solar REC255PE(BLK) (255W)s
Module	REC255PE(BLK) (255W)
Highest number of modules in series in a PV Source Circuit	1
Design Low Temp.	-3°C
Module Voc	37.6V
Temp. Coefficient Voc	-0.1V/C

NEC Code Calculations

A. Maximum Voltage of PV Source Circuit	40.46V
see Article 690.7(A), and Article 690.7(A)	

NEC Article 690.7 requires that if the PV module manufacturer provides a temperature coefficient of open-circuit voltage, it must be used to calculate the PV array's maximum system voltage. It includes an information note recommending the use of the ASHRAE 'Extreme Annual Mean Minimum Design Dry Bulb Temperature' as the design low temperature. Using these values, the module Voc (37.6V) will increase to 40.46V at the design low temperature (-3°C).

(-3°C - 25°C) X -0.1V/C + 37.6V = 40.46V
The total Voc for the string is 40.46V.

40.46V X 1 = 40.46V

B. Maximum Voltage of DC Output Circuit	350V
see Article 690.7(C)	

NEC Article 690.7(B) requires that all PV circuits have a voltage that does not exceed 600V. This system's DC Output Circuits are fed by Mage Solar P400 DC-to-DC converter optimization devices. Each device is connected to a single REC255PE(BLK) (255W) PV Module. The voltage of this circuit is regulated by the inverter at a constant 350V.

NEC Code Validation Tests

1.	PV Source Circuit maximum Voc must not exceed 600V 40.46V < 600V = true	*PASS*
2.	DC Output Circuit voltage must not exceed 600V 350V < 600V = true	*PASS*

1.2. Wire, Conduit, and OCPD Code Compliance Validation

1.2.1. Wire and Conduit Schedule

Id	Typ	Description	Conductor	Conduit	No. Cndrs. in Cndt.	Fill %	Rated Amps	OCPD	EGC	Len.	V.D.
1	2	PV Source: Series String Output to Junction Box	10 AWG PV Wire, Copper	Free Air	N/A	N/A	14.6A	N/A	6 AWG Bare, Copper	45ft	0.47 %
2	2	PV Source (Transitioned): Junction Box to Inverter	8 AWG THWN-2, Copper	0.5" dia. Flexible Steel	2	29.7 %	14.6A	N/A	10 AWG THWN-2, Copper	45ft	0.29 %
3	2	DC Disconnect Output: DC Disconnect to Inverter	8 AWG THWN-2, Copper	0.5" dia. Flexible Steel	2	29.7 %	14.6A	N/A	10 AWG THWN-2, Copper	10ft	0.07 %
4	2	Inverter Output: Inverter to AC Combiner Panel	10 AWG THWN-2, Copper	0.5" dia. Flexible Steel	3	24.2 %	21.0A	30A	10 AWG THWN-2, Copper	15ft	0.33 %
5	1	Combined Output of Inverters: AC Combiner Panel to Utility Disconnect	6 AWG THWN-2, Copper	0.75" dia. Flexible Steel	3	32.5 %	42.0A	N/A	10 AWG THWN-2, Copper	20ft	0.34 %
6	1	Utility Disconnect Output: Utility Disconnect to Point of Connection	6 AWG THWN-2, Copper	0.75" dia. Flexible Steel	3	32.5 %	42.0A	60A	10 AWG THWN-2, Copper	10ft	0.17 %

1.2.2. #1: PV Source: Series String Output to Junction Box

Circuit Section Properties

Conductor	10 AWG PV Wire, Copper
Equipment Ground Conductor (EGC)	6 AWG Bare, Copper
OCPD Rating	N/A
Raceway	Free Air
Lowest Terminal Temperature Rating	60°C
Maximum Wire Temperature	73°C
Power Source Description	String of 20 Mage Solar P400 power optimizers, each connected to a REC255PE(BLK) (255W) PV module
Power Source Rated Current	14.57A
Power Source Rated Voltage	350V

NEC Code Calculations

A. Continuous Current 14.57A
see Article 100

The output voltage of the power optimizers are regulated by the inverter. They are not impacted by the number of modules in the string. The continuous current is calculated by dividing the maximum power by the voltage.

5100W / 350V = 14.57A

B. Base Ampacity 55A
see Table 310.16

Base ampacity (30°C) for a copper conductor with 90°C insulation in free air is 55A.

C. Conditions of Use Ampacity 27.5A
see Table 310.15(B)(2)(A), Table 310.15(B)(3)(A), and Article 100

The temperature factor for 90°C insulation at 73°C is 0.5.
The fill factor for conductors in free air is 1.
The ampacity derated for Conditions of Use is the product of the Base Ampacity (55A) multiplied by the temperature factor (0.5) and by the conduit fill factor (1).

55A X 0.5 X 1 = 27.5A

D. Ampacity at Terminal Rating 40A
see Article 110.114(C)

The lowest terminal temperature rating for this segment is 60°C.
The base ampacity of this conductor at 60°C is 40A.

E. Minimum Required EGC Size 10 AWG
see Table 250.122

The smalled EGC size allowed by Table 250.122 is 10 AWG.

NEC Code Validation Tests

1.	Conditions of Use ampacity must be greater than or equal to the Continuous Current (Article 100) 27.5A >= 14.57A = true	PASS
2.	Base Ampacity must be at least 125% of Continuous Current (Article 215.2(A)(1)) 55A > 18.21A = true	PASS
3.	Base conductor ampacity at the terminal temperature rating must exceed the 125% of the Continuous Current. (Article 110.114(C)) 40A >= 14.57A X 1.25 = true	PASS
4.	EGC must meet NEC requirements for minimum size (Table 250.122) 6 AWG >= 10 AWG = true	PASS
5.	Confirm that array EGC meets NEC requirements for physical protection (Article 690.46) 6 AWG >= 6 AWG = true	PASS

1.2.3. #2: PV Source (Transitioned): Junction Box to Inverter

Circuit Section Properties

Conductor	8 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD Rating	N/A
Raceway	0.5" dia. Flexible Steel
Lowest Terminal Temperature Rating	60°C
Maximum Wire Temperature	73°C
Power Source Description	String of 20 Mage Solar P400 power optimizers, each connected to a REC255PE(BLK) (255W) PV module
Power Source Rated Current	14.57A
Power Source Rated Voltage	350V

NEC Code Calculations

A. Continuous Current 14.57A
see Article 100

The output voltage of the power optimizers are regulated by the inverter. They are not impacted by the number of modules in the string. The continuous current is calculated by dividing the maximum power by the voltage.

5100W / 350V = 14.57A

B. Base Ampacity 55A
see Table 310.16

Base ampacity (30°C) for a copper conductor with 90°C insulation in conduit is 55A.

C. Conditions of Use Ampacity 27.5A
see Table 310.15(B)(2)(A), Table 310.15(B)(3)(A), and Article 100

The temperature factor for 90°C insulation at 73°C is 0.5.
The fill factor for a conduit that has 2 wires is 1.
The ampacity derated for Conditions of Use is the product of the Base Ampacity (55A) multiplied by the temperature factor (0.5) and by the conduit fill factor (1).

55A X 0.5 X 1 = 27.5A

D. Ampacity at Terminal Rating 40A
see Article 110.114(C)

The lowest terminal temperature rating for this segment is 60°C.
The base ampacity of this conductor at 60°C is 40A.

E. Minimum Required EGC Size 10 AWG
see Table 250.122, and Article 690.45(A)

The smalled EGC size allowed by Table 250.122 is 10 AWG. According to Article 690.45(A), it is not necessary to increase EGC when conductors are oversized for voltage drop considerations if the circuits are PV source circuits.

F. Minimum Recommended Conduit Size 0.5" dia.
see Article 300.17

The total area of all conductors is 0.0943in². With a maximum fill rate of 0.4, the recommended conduit diameter is 0.5.

Qty	Description	Size	Type	Area	Total Area
2	Conductor	8 AWG	THWN-2	0.0366in²	0.0732in²
1	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0211in²
3					0.0943in²

0.0943in² / 0.4 = 0.2358in² (Corresponding to a diameter of 0.5")

NEC Code Validation Tests

1.	Conditions of Use ampacity must be greater than or equal to the Continuous Current (Article 100) 27.5A >= 14.57A = true	PASS
2.	Base Ampacity must be at least 125% of Continuous Current (Article 215.2(A)(1)) 55A > 18.21A = true	PASS
3.	Base conductor ampacity at the terminal temperature rating must exceed the 125% of the Continuous Current. (Article 110.114(C)) 40A >= 14.57A X 1.25 = true	PASS
4.	EGC must meet NEC requirements for minimum size (Table 250.122) 10 AWG >= 10 AWG = true	PASS
5.	Conduit must meet NEC recommendation for minimum size (Article 300.17) 0.5in. >= 0.5in. = true	PASS

1.2.4. #3: DC Disconnect Output: DC Disconnect to Inverter

Circuit Section Properties

Conductor	8 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD Rating	N/A
Raceway	0.5" dia. Flexible Steel
Lowest Terminal Temperature Rating	60°C
Maximum Wire Temperature	55°C
Power Source Description	String of 20 Mage Solar P400 power optimizers, each connected to a REC255PE(BLK) (255W) PV module
Power Source Rated Current	14.57A
Power Source Rated Voltage	350V

NEC Code Calculations

A. Continuous Current 14.57A
see Article 100

The output voltage of the power optimizers are regulated by the inverter. They are not impacted by the number of modules in the string. The continuous current is calculated by dividing the maximum power by the voltage.

5100W / 350V = 14.57A

B. Base Ampacity 55A
see Table 310.16

Base ampacity (30°C) for a copper conductor with 90°C insulation in conduit is 55A.

C. Conditions of Use Ampacity 27.5A
see Table 310.15(B)(2)(A), Table 310.15(B)(3)(A), and Article 100

The temperature factor for 90°C insulation at 73°C is 0.5.
The fill factor for a conduit that has 2 wires is 1.
The ampacity derated for Conditions of Use is the product of the Base Ampacity (55A) multiplied by the temperature factor (0.5) and by the conduit fill factor (1).

55A X 0.5 X 1 = 27.5A

D. Ampacity at Terminal Rating 40A
see Article 110.114(C)

The lowest terminal temperature rating for this segment is 60°C.
The base ampacity of this conductor at 60°C is 40A.

E. Minimum Required EGC Size 10 AWG
see Table 250.122, and Article 690.45(A)

The smalled EGC size allowed by Table 250.122 is 10 AWG. According to Article 690.45(A), it is not necessary to increase EGC when conductors are oversized for voltage drop considerations if the circuits are PV source circuits.

F. Minimum Recommended Conduit Size 0.5" dia.
see Article 300.17

The total area of all conductors is 0.0943in². With a maximum fill rate of 0.4, the recommended conduit diameter is 0.5.

Qty	Description	Size	Type	Area	Total Area
2	Conductor	8 AWG	THWN-2	0.0366in²	0.0732in²
1	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0211in²
3					0.0943in²

0.0943in² / 0.4 = 0.2358in² (Corresponding to a diameter of 0.5")

NEC Code Validation Tests

1.	Conditions of Use ampacity must be greater than or equal to the Continuous Current (Article 100) 27.5A >= 14.57A = true	PASS
2.	Base Ampacity must be at least 125% of Continuous Current (Article 215.2(A)(1)) 55A > 18.21A = true	PASS
3.	Base conductor ampacity at the terminal temperature rating must exceed the 125% of the Continuous Current. (Article 110.114(C)) 40A >= 14.57A X 1.25 = true	PASS
4.	EGC must meet NEC requirements for minimum size (Table 250.122) 10 AWG >= 10 AWG = true	PASS
5.	Conduit must meet NEC recommendation for minimum size (Article 300.17) 0.5in. >= 0.5in. = true	PASS

1.2.5. #4: Inverter Output: Inverter to AC Combiner Panel

Circuit Section Properties

Conductor	10 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD Rating	30A
Raceway	0.5" dia. Flexible Steel
Lowest Terminal Temperature Rating	60°C
Maximum Wire Temperature	55°C
Power Source Description	Solar Edge SE5000A-US 5000W Inverter
Power Source Rated Current	21A
Power Source Rated Voltage	240V

NEC Code Calculations

A. Continuous Current 21A
see Article 100

Equipment nameplate power: 5000W
Equipment nameplate current: 21A
Calculated output current: 5000W / 240V = 20.83A
Continuous current (greater of calculated or nameplate amps): 21A

Max(20.83A, 21A) = 21A

B. Minimum Required OCPD Rating 26.25A
see Article 215.3

NEC Code requires that the OCPD be rated for no less than 1.25 times the Continuous Current of the circuit.

21A X 1.25 = 26.25A

C. Base Ampacity 40A
see Table 310.16

Base ampacity (30°C) for a copper conductor with 90°C insulation in conduit is 40A.

D. Conditions of Use Ampacity 30.4A
see Table 310.15(B)(2)(A), Table 310.15(B)(3)(A), and Article 100

The temperature factor for 90°C insulation at 55°C is 0.76.
The fill factor for a conduit that has 3 wires is 1.
The ampacity derated for Conditions of Use is the product of the Base Ampacity (40A) multiplied by the temperature factor (0.76) and by the conduit fill factor (1).

40A X 0.76 X 1 = 30.4A

E. Ampacity at Terminal Rating 30A
see Article 110.114(C)

The lowest terminal temperature rating for this segment is 60°C.
The base ampacity of this conductor at 60°C is 30A.

F. Minimum Required EGC Size 10 AWG
see Table 250.122

The smalled EGC size allowed by Table 250.122 is 10 AWG.

G. Minimum Recommended Conduit Size 0.5" dia.
see Article 300.17

The total area of all conductors is 0.0766in². With a maximum fill rate of 0.4, the recommended conduit diameter is 0.5.

Qty	Description	Size	Type	Area	Total Area
2	Conductor	10 AWG	THWN-2	0.0211in²	0.0422in²
1	Neutral	12 AWG	THWN-2	0.0133in²	0.0133in²
1	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0211in²
4					0.0766in²

0.0766in² / 0.4 = 0.1915in² (Corresponding to a diameter of 0.5")

NEC Code Validation Tests

1.	OCPD rating must be at least 125% of Continuous Current (Article 215.3) 30A >= 21A X 1.25 = true	PASS
2.	Conditions of Use ampacity must be greater than or equal to the Continuous Current (Article 100) 30.4A >= 21A = true	PASS
3.	Base Ampacity must be at least 125% of Continuous Current (Article 215.2(A)(1)) 40A > 26.25A = true	PASS
4.	Base conductor ampacity at the terminal temperature rating must exceed the 125% of the Continuous Current. (Article 110.114(C)) 30A >= 21A X 1.25 = true	PASS
5.	Conditions of Use ampacity must be greater than OCPD rating, or rating of next smaller OCPD (Article 240.4) 30.4A >= 30A (OCPD Rating) = true	PASS
6.	EGC must meet NEC requirements for minimum size (Table 250.122) 10 AWG >= 10 AWG = true	PASS
7.	Conduit must meet NEC recommendation for minimum size (Article 300.17) 0.5in. >= 0.5in. = true	PASS

1.2.6. #5: Combined Output of Inverters: AC Combiner Panel to Utility Disconnect

Circuit Section Properties

Conductor	6 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD Rating	N/A
Raceway	0.75" dia. Flexible Steel
Lowest Terminal Temperature Rating	60°C
Maximum Wire Temperature	55°C
Power Source Description	Solar Edge inverters w/40 REC Solar REC255PE(BLK) (255W)s
Power Source Rated Current	42A
Power Source Rated Voltage	240V

NEC Code Calculations

A. Continuous Current 42A
see Article 100

Equipment nameplate power: 2 X 5000W = 10000W
Equipment nameplate current: 2 X 21A = 42A
Calculated output current: 10000W / 240V = 41.67A
Continuous current (greater of calculated or nameplate amps): 42A

Max(41.67A, 42A) = 42A

B. Minimum Required OCPD Rating 52.5A
see Article 215.3

NEC Code requires that the OCPD be rated for no less than 1.25 times the Continuous Current of the circuit.

42A X 1.25 = 52.5A

C. Base Ampacity 75A
see Table 310.16

Base ampacity (30°C) for a copper conductor with 90°C insulation in conduit is 75A.

D. Conditions of Use Ampacity 57A
see Table 310.15(B)(2)(A), Table 310.15(B)(3)(A), and Article 100

The temperature factor for 90°C insulation at 55°C is 0.76.
The fill factor for a conduit that has 3 wires is 1.
The ampacity derated for Conditions of Use is the product of the Base Ampacity (75A) multiplied by the temperature factor (0.76) and by the conduit fill factor (1).

75A X 0.76 X 1 = 57A

E. Ampacity at Terminal Rating 55A
see Article 110.114(C)

The lowest terminal temperature rating for this segment is 60°C.
The base ampacity of this conductor at 60°C is 55A.

F. Minimum Required EGC Size 10 AWG
see Table 250.122

The smalled EGC size allowed by Table 250.122 is 10 AWG.

G. Minimum Recommended Conduit Size 0.75" dia.
see Article 300.17

The total area of all conductors is 0.1732in². With a maximum fill rate of 0.4, the recommended conduit diameter is 0.75.

Qty	Description	Size	Type	Area	Total Area
2	Conductor	6 AWG	THWN-2	0.0507in²	0.1014in²
1	Neutral	6 AWG	THWN-2	0.0507in²	0.0507in²
1	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0211in²
4					0.1732in²

0.1732in² / 0.4 = 0.433in² (Corresponding to a diameter of 0.75")

NEC Code Validation Tests

1.	OCPD rating must be at least 125% of Continuous Current (Article 215.3) 60A >= 42A X 1.25 = true	PASS
2.	Conditions of Use ampacity must be greater than or equal to the Continuous Current (Article 100) 57A >= 42A = true	PASS
3.	Base Ampacity must be at least 125% of Continuous Current (Article 215.2(A)(1)) 75A > 52.5A = true	PASS
4.	Base conductor ampacity at the terminal temperature rating must exceed the 125% of the Continuous Current. (Article 110.114(C)) 55A >= 42A X 1.25 = true	PASS
5.	Conditions of Use ampacity must be greater than OCPD rating, or rating of next smaller OCPD (Article 240.4) 57A >= 50A (Next Smaller OCPD Rating) = true	PASS
6.	EGC must meet NEC requirements for minimum size (Table 250.122) 10 AWG >= 10 AWG = true	PASS
7.	Conduit must meet NEC recommendation for minimum size (Article 300.17) 0.75in. >= 0.75in. = true	PASS

1.2.7. #6: Utility Disconnect Output: Utility Disconnect to Point of Connection

Circuit Section Properties

Conductor	6 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD Rating	60A
Raceway	0.75" dia. Flexible Steel
Lowest Terminal Temperature Rating	60°C
Maximum Wire Temperature	55°C
Power Source Description	Solar Edge inverters w/40 REC Solar REC255PE(BLK) (255W)s
Power Source Rated Current	42A
Power Source Rated Voltage	240V

NEC Code Calculations

A. Continuous Current 42A
see Article 100

Equipment nameplate power: 2 X 5000W = 10000W
Equipment nameplate current: 2 X 21A = 42A
Calculated output current: 10000W / 240V = 41.67A
Continuous current (greater of calculated or nameplate amps): 42A

Max(41.67A, 42A) = 42A

B. Minimum Required OCPD Rating 52.5A
see Article 215.3

NEC Code requires that the OCPD be rated for no less than 1.25 times the Continuous Current of the circuit.

42A X 1.25 = 52.5A

C. Base Ampacity 75A
see Table 310.16

Base ampacity (30°C) for a copper conductor with 90°C insulation in conduit is 75A.

D. Conditions of Use Ampacity 57A
see Table 310.15(B)(2)(A), Table 310.15(B)(3)(A), and Article 100

The temperature factor for 90°C insulation at 55°C is 0.76.
The fill factor for a conduit that has 3 wires is 1.
The ampacity derated for Conditions of Use is the product of the Base Ampacity (75A) multiplied by the temperature factor (0.76) and by the conduit fill factor (1).

75A X 0.76 X 1 = 57A

E. Ampacity at Terminal Rating 55A
see Article 110.114(C)

The lowest terminal temperature rating for this segment is 60°C.
The base ampacity of this conductor at 60°C is 55A.

F. Minimum Required EGC Size 10 AWG
see Table 250.122

The smalled EGC size allowed by Table 250.122 is 10 AWG.

G. Minimum Recommended Conduit Size 0.75" dia.
see Article 300.17

The total area of all conductors is 0.1732in². With a maximum fill rate of 0.4, the recommended conduit diameter is 0.75.

Qty	Description	Size	Type	Area	Total Area
2	Conductor	6 AWG	THWN-2	0.0507in²	0.1014in²
1	Neutral	6 AWG	THWN-2	0.0507in²	0.0507in²
1	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0211in²
4					0.1732in²

0.1732in² / 0.4 = 0.433in² (Corresponding to a diameter of 0.75")

NEC Code Validation Tests

1.	OCPD rating must be at least 125% of Continuous Current (Article 215.3) 60A >= 42A X 1.25 = true	PASS
2.	Conditions of Use ampacity must be greater than or equal to the Continuous Current (Article 100) 57A >= 42A = true	PASS
3.	Base Ampacity must be at least 125% of Continuous Current (Article 215.2(A)(1)) 75A > 52.5A = true	PASS
4.	Base conductor ampacity at the terminal temperature rating must exceed the 125% of the Continuous Current. (Article 110.114(C)) 55A >= 42A X 1.25 = true	PASS
5.	Conditions of Use ampacity must be greater than OCPD rating, or rating of next smaller OCPD (Article 240.4) 57A >= 50A (Next Smaller OCPD Rating) = true	PASS
6.	EGC must meet NEC requirements for minimum size (Table 250.122) 10 AWG >= 10 AWG = true	PASS
7.	Conduit must meet NEC recommendation for minimum size (Article 300.17) 0.75in. >= 0.75in. = true	PASS