FLOOR AND SITE PLAN:

SITE PLAN CHECKLIST:

A DIMENSIONED (OR SCALED) DRAWING THAT INCLUDES THE FOLLOWING:
DRAW THE PROPERTY LINES WITH DIMENSIONS (LOT WIDTH X DEPTH)
SHOW ALL BUILDINGS ON THE PROPERTY. THIS INCLUDES THE HOUSE AND OTHER ABOVE GRADE STRUCTURES LIKE: PATIO COVERS, TRASH ENCLOSURES, BBQ, FIRE PITS, ETC.
___ SHOW POOLS, SPAS, AND OTHER DECORATIVE WATER FEATURES.
SHOW ALL EASEMENTS & SETBACKS FROM ULTIMATE PROPERTY LINES AND THE DISTANCES BETWEEN BUILDINGS AND OTHER STRUCTURES.
SHOW DRIVEWAYS
SHOW STREETS, WITH STREET NAMES, AND SIDEWALKS ADJACENT TO THE PROPERTY
___ SHOW ORIENTATION WITH A NORTH ARROW
___ SHOW FENCE LOCATIONS WITH HEIGHTS AND TYPE (WOOD, VINYL, BLOCK WALL)

WARNINGS & DISCLOSURES:

THE CITY OF COSTA MESA PROVIDES THESE STANDARD PLANS FOR A LIMITED NUMBER OF PERMITS AND A NARROWLY DEFINED SCOPE OF WORK. BY USING THESE STANDARDS, THE PERMIT HOLDER AGREES TO THE FOLLOWING TERMS:

- THE PLANS MUST BE SUBMITTED EXACTLY AS PROVIDED BY THE CITY, WITHOUT ALTERATION OR MODIFICATION. ANY UNAUTHORIZED CHANGES, INCOMPLETE SECTIONS, OR DOCTORED INFORMATION INVALIDATE THE PLANS & PERMIT.
- THESE PLANS MAY ONLY BE USED FOR THE SPECIFIC PROJECT AND SCOPE ASSOCIATED WITH THE CURRENT PERMIT APPLICATION. USE FOR ANY OTHER PURPOSE, INCLUDING PROJECTS OUTSIDE OF COSTA MESA, IS PROHIBITED.
- ALL INTELLECTUAL PROPERTY RELATED TO THESE PLANS REMAINS THE PROPERTY OF THE CITY OF COSTA MESA.
- FAILURE TO ADHERE TO THE PROVIDED STANDARDS, OR SUBMISSION OF INCOMPLETE OR INCORRECT INFORMATION, WILL RESULT IN DELAYS; AND MAY: REQUIRE ADDITIONAL DOCUMENTATION, SUBMITTAL OF NEW APPLICATION(S), VOIDING OF THE PERMIT, AND/OR LEAD TO CODE ENFORCEMENT ACTIONS, INCLUDING CITATIONS AND FINES.

BY PROCEEDING, THE APPLICANT ACKNOWLEDGES THESE TERMS AND AGREES TO COMPLY FULLY WITH THE CITY OF COSTA MESA'S RESIDENTIAL RE-ROOF STANDARD DETAILS, SPECIFICATIONS, LIMITATIONS, AND REQUIREMENTS.

SIGNATURE: ______________________________

PROJECT INFORMATION:

SCOPE OF WORK:

1. GENERAL REQUIREMENTS AND SYSTEM INFORMATION
☐ MICROINVERTER:
NUMBER OF PV MODULES INSTALLED:_______________
NUMBER OF MICROINVERTERS INSTALLED:_______________
☐ AC MODULE (ACM):
NUMBER OF ACMS INSTALLED: _______________
NOTE: LISTED ALTERNATING-CURRENT MODULE (ACM) IS DEFINED IN CEC 690.2 AND INSTALLED PER CEC690.6
1.1 NUMBER OF BRANCH CIRCUITS, 1, 2 OR 3: ________
1.2 ACTUAL NUMBER OF MICROINVERTERS OR ACMS PER BRANCH CIRCUIT: 1.____ 2.____ 3.____
1.3 TOTAL AC SYSTEM POWER RATING = (TOTAL NUMBER OF MICROINVERTERS OR ACMS) * (AC INVERTER POWER OUTPUT) = ______WATTS
1.4 LOWEST EXPECTED AMBIENT TEMPERATURE FOR THIS PLAN IN TABLE 1: FOR -1°TO -5° C USE 1.12 OR FOR -6° TO -10° C USE 1.14 CORRECTION FACTORS.
1.5 AVERAGE AMBIENT HIGH TEMPERATURE FOR THIS PLAN: = +47° C
NOTE: FOR LOWER EXPECTED AMBIENT OR HIGHER AVERAGE AMBIENT HIGH TEMPERATURES, THIS PLAN IS NOT APPLICABLE.

2. MICROINVERTER OR ACM INFORMATION AND RATINGS
MICROINVERTERS WITH UNGROUNDED DC INPUTS SHALL BE INSTALLED IN ACCORDANCE WITH CEC 690.35.
MICROINVERTER OR ACM MANUFACTURER: ______________________________
MODEL: ______________________________
2.1 RATED (CONTINUOUS) AC OUTPUTPOWER: __________WATTS
2.2 NOMINAL AC VOLTAGE RATING: __________ VOLTS
2.3 RATED (CONTINUOUS) AC OUTPUT CURRENT__________ AMPS
IF INSTALLING ACMS, SKIP [STEPS 2.4 & 2.5]
2.4 MAXIMUM DC INPUT VOLTAGE RATING: __________ VOLTS (LIMITED TO 79 V, OTHERWISE THIS COVER SHEET IS NOT APPLICABLE)
2.5 MAXIMUM INPUT SHORT CIRCUIT CURRENT: __________ AMPS
2.6 MAXIMUM AC OUTPUT OVER CURRENT PROTECTION DEVICE (OCPD): __________ AMPS
2.7 MAXIMUM NUMBER OF MICROINVERTERS OR ACMS PER BRANCH CIRCUIT: __________

3. PV MODULE INFORMATION
(IF INSTALLING ACMS, SKIP TO [STEP4])
PV MODULE MANUFACTURER:______________________________
MODEL:______________________________
MODULE DC OUTPUT POWER UNDER STANDARD TEST CONDITIONS (STC) = __________ WATTS
3.1 MODULE VOC AT STC (FROM MODULE NAMEPLATE): __________ VOLTS
3.2 MODULE ISC AT STC (FROM MODULE NAMEPLATE): __________ AMPS [CANNOT EXCEED STEP 2.5]
3.3 ADJUSTED PV MODULEDC VOLTAGE ATMINIMUM TEMPERATURE =[TABLE1]__________ [CANNOT EXCEED STEP 2.4]

4. BRANCH CIRCUIT OUTPUTINFORMATION
FILL IN [TABLE3] TO DESCRIBE THE BRANCH CIRCUIT INVERTER OUTPUT CONDUCTOR AND OCPD SIZE. USE [TABLE 2] FOR DETERMINING THE OCPD AND MINIMUM CONDUCTOR SIZE.

5. SOLAR LOAD CENTER (IF USED)
5.1 CIRCUIT POWER SEE [STEP 1.3]= __________ WATTS
5.2 CIRCUIT CURRENT =(CIRCUIT POWER)/(AC VOLTAGE)= __________ AMPS
5.3 SOLAR LOAD CENTER BUS BAR RATING (USE TABLE 4) = MIN. __________ AMPS
5.4 SOLAR LOAD CENTER FEEDER BREAKER RATING (USE TABLE 4) = __________ AMPS
NOTE: IF OCPDS OF CIRCUITS OTHER THAN FOR THE INVERTER OUTPUTS ARE PRESENT, SOLAR LOAD CENTER BUS BAR RATING MUST BE A MINIMUM OF 100 AMPS, AND THE FEEDER BREAKER IS LIMITED TO A MAXIMUM OF 60 AMPS.

6. POINT OF CONNECTION TO UTILITY
6.1 INVERTER(S) MUST BE CONNECTED TO EITHER LOAD OR SUPPLY SIDE OF SERVICE DISCONNECTING MEANS.
EITHER STEP 6.2 OR 6.3 BELOW SHOULD BE FILLED OUT, AND EITHER SINGLE LINE DIAGRAM #1 OR SINGLE LINE DIAGRAM #2 SHOULD BE FILLED OUT.
6.2 LOAD SIDE CONNECTIONS ONLY (PER 705.12(D)(2)(3)):
IS THE PV OCPD POSITIONED AT THE OPPOSITE END FROM INPUT FEEDER LOCATION OR MAIN OCPD LOCATION?
☐ YES ☐ NO (IF NO, THEN USE 100% ROW IN TABLE 5)
(COMBINED INVERTER OUTPUT OCPD SIZE + MAIN OCPD SIZE) ≤ [BUS BAR SIZE × (100% OR 120%)]

† THIS COVER SHEET LIMITS MAX SYSTEM SIZE TO10KW OR LESS,SO THE OCPD SIZE IS LIMITED TO 60 A. REDUCTION OF MAIN BREAKER IS NOT PERMITTED WITH THIS PLAN. INTERCONNECTION TO CENTER-FED PANELBOARDS MAY BE PERMITTED PER INFORMATIONAL BULLETIN.

6.3 SUPPLY SIDE CONNECTIONS ONLY (PER 705.12(A)):
ONLY USE THIS SECTION FOR CONNECTIONS ON THE SUPPLY SIDE OF THE SERVICE DISCONNECTING MEANS. SELECT ONE:
UTILITY- AND AHJ-APPROVED METER SOCKET ADAPTER.
ADAPTER NAME/MODEL______________________________
___SERVICE EQUIPMENT LISTED FOR THE PURPOSE OF PV INTERCONNECTION.
DESCRIPTION / MODEL NUMBER(S): ______________________________

7. GROUNDING AND BONDING
CHECK ONE OF THE BOXES FOR WHETHER SYSTEM IS GROUNDED OR UNGROUNDED:
GROUNDED UNGROUNDED

FOR MICROINVERTERS WITH A GROUNDED DC INPUT, SYSTEMS MUST FOLLOW THE REQUIREMENTS OF GEC (CEC 690.47) AND EGC (CEC 690.43).

FOR ACM SYSTEMS AND MICROINVERTERS WITH UNGROUNDED A DC INPUT FOLLOW THE EGC REQUIREMENTS OF (CEC 690.43).

8. MARKINGS
INFORMATIONAL NOTE: ANSI Z535.4-2011 PROVIDES GUIDELINES FOR THE DESIGN OF SAFETY SIGNS AND LABELS FOR APPLICATION TO PRODUCTS. A PHENOLIC PLAQUE WITH CONTRASTING COLORS BETWEEN THE TEXT AND BACKGROUND WOULD MEET THE INTENT OF THE CODE FOR PERMANENCY. NO TYPE SIZE IS SPECIFIED, BUT 20 POINT (3/8”) SHOULD BE CONSIDERED THE MINIMUM.

ALL MATERIALS, EQUIPMENT, INSTALLATION, AND WORK SHALL COMPLY WITH THE LATEST VERSION OF ALL APPLICABLE CODES, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

- 2022 CALIFORNIA BUILDING CODE (CBC)
- 2022 CALIFORNIA RESIDENTIAL CODE (CRC)
- 2022 CALIFORNIA MECHANICAL CODE (CMC)
- 2022 CALIFORNIA ELECTRICAL CODE (CEC)
- 2022 CALIFORNIA PLUMBING CODE (CPC)
- CALIFORNIA FIRE CODE (CFC),
- CALIFORNIA ENERGY CODE (T24),
- CALIFORNIA GREEN CODE (CALGREEN),
- CITY OF COSTA MESA MUNICIPAL CODE

CITY OF
COSTA MESA

RESIDENTIAL SOLAR STANDARD

FOR OFFICE USE ONLY:

PERMIT #:
___-___-___

ISSUED:
___-___-___

PROJECT NAME: ______________________________
PROJECT ADDRESS: ______________________________ **COSTA MESA, CA**

PERMIT LIMITATIONS:

1. THIS PERMIT IS FOR THE INSTALLATION OF A NEW, GRID-TIED, FLUSHED-MOUNTED, RESIDENTIAL SOLAR SYSTEM ON THE ROOF OF A SINGLE-FAMILY DETACHED DWELLING.
2. THIS PERMIT IS ONLY VALID FOR THE SOLAR INSTALLATION AND DOES NOT INCLUDE ROOFING, ENERGY STORAGE SYSTEMS (ESS), OR MAIN PANEL UPGRADES.
3. PLANS DESIGNED BY A LICENSED ENGINEER AND AN APPROVED INSPECTION WORKSHEET FROM SOLARAPPS+ MUST ACCOMPANY THESE PLANS.
4. THIS PERMIT AND CITY STANDARD PLANS SHALL NOT BE USED FOR WORK BEYOND THE SCOPE OF THE RESIDENTIAL SOLAR INSTA-PERMIT. ANY ADDITIONAL WORK WILL REQUIRE A SEPARATE APPLICATION AND PERMIT TO BE SUBMITTED).

CITY REQUIREMENTS:

1. JOB PLACARD SHALL BE POSTED ON THE SITE, IN A LOCATION READILY VISIBLE FROM THE STREET.
2. ALL COMPANIES & CONTRACTORS WORKING OR OPERATING WITHIN THE CITY OF COSTA MESA MUST HAVE A VALID CITY OF COSTA MESA BUSINESS LICENSE. (BUSINESS LICENSES CAN BE APPLIED FOR ONLINE WITH TESSA)
3. OVERSIZED LOAD PERMITS ARE REQUIRED FOR:
   - SINGLE TRUCKS EXCEEDING 8'-6" W X 40' L X 14.
   - COMBINATION TRUCKS EXCEEDING 8'-6" W X 75' L X 14'.
4. (OVERSIZED LOAD PERMITS CAN BE APPLIED FOR ONLINE WITH TESSA)
5. A PRELIMINARY PUBLIC WORKS INSPECTION IS REQUIRED PRIOR TO THE COMMENCEMENT OF ANY WORK.
6. A FINAL PUBLIC WORKS INSPECTION IS REQUIRED IMMEDIATELY PRIOR TO THE FINAL BUILDING INSPECTION.
7. ANY DAMAGE TO THE EXISTING PUBLIC IMPROVEMENTS (E.G. SIDEWALKS, CURB & GUTTER, STREET PAVING, LANDSCAPING, ETC.) THAT OCCURRED TO THE AREA SURROUNDING THE SITE DURING THE COURSE OF CONSTRUCTION SHALL BE REPAIRED PER THE CITY STANDARDS AT THE PROPERTY OWNERS EXPENSE.
8. AN ENCROACHMENT PERMIT IS REQUIRED FOR ANY AND ALL WORK WITHIN THE PUBLIC RIGHT-OF-WAY (SEPARATE APPLICATION REQUIRED)

CONSTRUCTION WORKING HOURS:

- MONDAY THROUGH FRIDAY, 7AM TO 7PM
- SATURDAYS, 9AM THROUGH 6PM
- CONSTRUCTION WORK IS NOT ALLOWED ON SUNDAYS OR THE FOLLOWING SPECIFIED FEDERAL HOLIDAYS: NEW YEAR'S DAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, THANKSGIVING DAY, AND CHRISTMAS DAY.
- VIOLATORS WILL BE CITED AND POTENTIALLY FINED.

INSPECTIONS:

☐ 108 - ELEC - ROUGH CONDUIT
☐ 110 - ELEC - ROUGH WIRING
☐ 414 - ELEC - FINAL ELECTRICAL
☐ 450 - FINAL - FINAL BUILDING OCCUPANCY

* AFTER BOOKING THIS INSPECTION, LOG INTO TESSA TO UPLOAD THE SUPPORTING DOCUMENTATION TO THIS INSPECTION ITEM BEFORE THE INSPECTOR ARRIVES.

TO BOOK AND INSPECTION, VIEW THE INSPECTION SCHEDULE, OR SEE INSPECTION RESULTS, VISIT TESSA

OWNER INFO
NAME:
PHONE:
EMAIL:

CONTRACTOR INFO
NAME:
PHONE:
EMAIL:
LICENSE: EXPIRATION:

PLAN PREPARER INFO
NAME:
PHONE:
EMAIL:

EMERGENCY CONTACT INFO
NAME:
PHONE:
ROLE/RELATION TO PROPERTY:

TENANT INFO (IF APPLICABLE)
NAME:
PHONE:
EMAIL:

INCORPORATED 1953

FORM NUMBER:
CBPV-1

(RELEASE: 09-2024)

TABLES:

Table 5: Maximum Combined Inverter Output Circuit OCPD

Bus Bar Size (Amps)	100	125	125	200	200	200	225	225	225
Main OCPD (Amps)	100	100	125	150	175	200	175	200	225
Maximum Combined Inverter OCPD with 120% of bus bar rating (Amps)	20	50	25	60†	60†	40	60†	60†	45
Maximum Combined Inverter OCPD with 100% of bus bar rating (Amps)	0	25	0	50	25	0	50	25	0

**CEC 690.8 AND210.19 (A)(1) FACTORED IN TABLE 4, CONDUCTORS ARE COPPER, INSULATION MUST BE 90° CWET-RATED.TABLE 4 VALUES ARE BASED ON MAXIMUM AMBIENT TEMPERATURE OF 47° C(NO ROOF TOP TEMPERATURE ADDER IN THIS CALCULATION), ≤ 3 CURRENT CARRYING CONDUCTORS IN A CIRCULAR RACEWAY. OTHERWISE, THIS PLAN IS NOT APPLICABLE.
***EXCEPTION: LISTED COMBINERS ARE PERMITTED TO BE USED WHEN THEY'RE INSTALLED IN ACCORDANCE WITH THEIR LISTING AND THE MANUFACTURER'S INSTRUCTIONS.

2022 CEC Table 250.122
Minimum Size Equipment Grounding Conductors
for Grounding Raceway and Equipment

Rating or Setting of Automatic Overcurrent Device in Circuit Ahead of Equipment, Conduit, etc., Not Exceeding (Amperes)	Size (AWG or kcmil)	
	Copper	Aluminum or Copper-Clad Aluminum*
15	14	12
20	12	10
60	10	8
100	8	6
200	6	4
300	4	2
400	3	1

Note: Where necessary to comply with 250.4(A)(5) or (B)(4), the equipment grounding conductor shall be sized larger than given in this table.

2022 CEC Table 310.16 Ampacities of Insulated Conductors with Not More Than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried)

The maximum ampacities shall be as specified in Table 310.16 where all of the following conditions apply:
1. Conductors are rated 0 volts through 2000 volts.
2. Conductors are rated 60°C (140°F), 75°C (167°F), or 90°C (194°F).
3. Wiring is installed in a 30°C (86°F) ambient temperature.
4. There are not more than three current-carrying conductors.

Size AWG or kcmil	Temperature Rating of Conductor						Size AWG or kcmil
	60°C (140°F)	75°C (167°F)	90°C (194°F)	60°C (140°F)	75°C (167°F)	90°C (194°F)	
	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, XHWN, USE, ZW	Types TBS, SA, SIS, FEP, FEPB, MI, PFA, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, XHWN, XHWN-2, XHHN, Z, ZW-2	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, XHWN, USE	Types TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, XHWN, XHWN-2, XHHN	
	COPPER			ALUMINUM OR COPPER-CLAD ALUMINUM			
18*	—	—	14	—	—	—	—
16*	—	—	18	—	—	—	—
14*	15	20	25	—	—	—	—
12*	20	25	30	15	20	25	12*
10*	30	35	40	25	30	35	10*
8	40	50	55	35	40	45	8
6	55	65	75	40	50	55	6
4	70	85	95	55	65	75	4
3	85	100	115	65	75	85	3
2	95	115	130	75	90	100	2
1	110	130	145	85	100	115	1
1/0	125	150	170	100	120	135	1/0
2/0	145	175	195	115	135	150	2/0
3/0	165	200	225	130	155	175	3/0
4/0	195	230	260	150	180	205	4/0
250	215	255	290	170	205	230	250
300	240	285	320	195	230	260	300
350	260	310	350	210	250	280	350
400	280	335	380	225	270	305	400
500	320	380	430	260	310	350	500
600	350	420	475	285	340	385	600
700	385	460	520	315	375	425	700
750	400	475	535	320	385	435	750
800	410	490	555	330	395	445	800
900	435	520	585	355	425	480	900
1000	455	545	615	375	445	500	1000
1250	495	590	665	405	485	545	1250
1500	525	625	705	435	520	585	1500
1750	545	650	735	455	545	615	1750
2000	555	665	750	470	560	630	2000

Notes:

1. Section 310.15(B) shall be referenced for ampacity correction factors where the ambient temperature is other than 30°C (86°F).

2. Section 310.15(C)(1) shall be referenced for more than three current-carrying conductors.

3. Section 310.16 shall be referenced for conditions of use.

* Section 240.4(D) shall be referenced for conductor overcurrent protection limitations, except as modified elsewhere in the California Electrical Code.

GENERAL REQUIREMENTS:

  - c. USE MINIMUM #8 COPPER OR #6 ALUMINUM, SEE PROVIDED SIZE OF EQUIPMENT GROUNDING CONNECTORS TABLE (CEC TABLE 250.122) FOR SIZES AT RODS, UFER AND RING (CEC 250.166, CEC 250.52(A)(5))
- 110. AUXILIARY GES SHALL BE PERMITTED FOR ROOF AND GROUND-MOUNTED ARRAYS (CEC 690.47(B), CEC 250.53(A)(2))

T. <u>CONDUCTOR AND CABLE IDENTIFICATION</u>
- 111. DC CONDUCTORS SHALL HAVE IDENTIFICATION BY TAGGING, COLOR CODING, OR OTHER MEANS AT ALL TERMINATION, CONNECTION AND SPLICE POINTS (CEC 690.31(B)(1), CEC 210.5(C)(2))
- 112. POLARITY IDENTIFICATION SHALL BE PROVIDED BY COLOR CODING OR OTHER PERMANENT MEANS (CEC 690.31(B)(1), CEC 200.6(A))
- 113. WHITE WIRE SHALL ONLY BE PROVIDED FOR SOLIDLY GROUNDED SYSTEMS (CEC 690.31(B)(1), CEC 200.7(A))
- 114. TYPE PV WIRE AND TYPE DG CABLE SHALL BE LISTED (CEC 690.31(C), CEC 110.3(B))
- 115. SINGLE-CONDUCTOR CABLE LOCATED IN EXPOSED OUTDOOR LOCATIONS, PV WIRE, AND SINGLE-CONDUCTOR CABLE SHALL BE MARKED SUNLIGHT-RESISTANT, USE-2, OR RHW-2 (CEC 690.31(C)(1), CEC 310.104(A))

U. <u>FIELD-APPLIED MARKINGS, GENERAL</u>
- 116. FIELD-APPLIED MARKINGS SHALL:
  - a. WARN OF HAZARDS USING EFFECTIVE WORDS, COLORS AND SYMBOLS (CEC 110.21(B)(1), CEC 1003.3.4)
  - b. BE PERMANENTLY AFFIXED AND NOT HAND-WRITTEN (CEC 110.21(B)(1), CEC 1013.4)
    - EXCEPTION: PORTIONS THAT ARE VARIABLE AND INTENDED TO BE FILLED IN BY INSTALLER (CEC 110.21(B)(2), CEC 1003.3.4.2)
  - c. BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT (CEC 110.21(B), CEC 1003.4)
- 117. IF LINE AND LOAD TERMINALS OF A DISCONNECT MAY POTENTIALLY BE ENERGIZED WHEN OPEN, MARKING SHALL BE REQUIRED (CEC 690.13(B), 705.20, CEC 705.12(D)(2)(3))

V. <u>MARKING OF MODULES AND POWER SOURCES</u>
- 118. MODULES AND AC MODULES SHALL BE MARKED IN ACCORDANCE WITH THEIR LISTING (CEC 690.51 NOTE 100, CEC 110.3(A))
- 119. PERMANENT, READILY VISIBLE LABEL INDICATING HIGHEST MAXIMUM DC VOLTAGE SHALL BE PLACED AT INVERTER, PV DISCONNECTING MEANS, OR AT DISTRIBUTION EQUIPMENT ASSOCIATED WITH THE PV SYSTEM (CEC 690.53 NOTE 101, CEC 705.10)
- 120. INTERACTIVE SYSTEM POINTS OF INTERCONNECTION WITH OTHER SOURCES SHALL BE MARKED AT DISCONNECTING MEANS AS A POWER SOURCE, MARKING SHALL INCLUDE RATED AC OUTPUT CURRENT AND OPERATING VOLTAGE (CEC 690.54, CEC 705.12)
- 121. PLAQUE OR DIRECTORY DENOTING THE LOCATION OF ALL POWER SOURCES SHALL BE INSTALLED AT SERVICE EQUIPMENT AND EACH SYSTEM DISCONNECT (CEC 705.10, CEC 705.10(B))

W. <u>UTILITY INTERACTIVE SYSTEMS</u>
- 122. MICROGRID SYSTEMS SHALL BE ACCEPTABLE AS DISCONNECT FROM UTILITY FOR STAND-ALONE MODE (CEC 705.50, CEC 702.7)
- 123. PLAQUE OR DIRECTORY DENOTING THE LOCATION OF EACH POWER SOURCE DISCONNECTING MEANS SHALL BE INSTALLED AT SERVICE EQUIPMENT (CEC 705.10 AND 706.21, CEC 705.10(B))
- 124. SUPPLY SIDE SOURCE CONNECTIONS OUTPUT SHALL NOT BE GREATER THAN THE RATING OF SERVICE CONDUCTORS, AND SHALL NOT BE LESS THAN #6 COPPER OR #4 ALUMINUM (METER SOCKET BACKFEED REQUIRES UTILITY APPROVAL) (CEC 705.11, CEC 230.82(6))
- 125. SUPPLY SIDE DISCONNECT SHALL HAVE A RATING EQUAL TO THE SERVICE EQUIPMENT (CEC 230.82 NOTE 102, CEC 705.12(D)(2))

X. <u>LOAD SIDE CONNECTIONS</u>
- 126. LOAD SIDE CONNECTION SHALL BE ACCEPTABLE AT ANY DISTRIBUTION EQUIPMENT (CEC 705.12, CEC 705.12(A))
- 127. EACH LOAD SIDE CONNECTION SHALL HAVE A DEDICATED BREAKER OR FUSED SWITCH (CEC 705.12(A), CEC 705.12(D))
- 128. POWER SOURCE OUTPUT CIRCUIT CURRENT SHALL BE MULTIPLIED BY 125% IN CALCULATIONS (CEC 705.12(B), CEC 705.12(D)(2))
- 129. CONNECTION SHALL NOT BE LOCATED AT LOAD END OF FEEDER SIZED GREATER THAN OR EQUAL TO 125% OF POWER SOURCE OUTPUT CURRENT OR BY OCPD SIZED TO FEEDER AMPACITY AT LOAD SIDE OF POWER SOURCE CONNECTION POINT (CEC 705.12(B)(1), CEC 705.12(D)(2)(3))
- 130. TAP RULES SHALL BE BASED ON SUM OF 125% OF POWER SOURCE OUTPUT AND CIRCUIT PLUS OCPD PROTECTING THE FEEDER CONDUCTORS (CEC 705.12(B)(2), CEC 240.21(B))
- 131. BUSBAR CONNECTION OPTIONS SHALL BE AS FOLLOWS: (CEC 705.12(B)(3), CEC 705.12(D)(2)(3))
  - a. (A) SUM OF OCPD PROTECTING BUS PLUS 125% OF POWER SOURCE OUTPUT CURRENT NOT EXCEEDING BUS RATING (CEC 705.12(B)(3)(1), CEC 705.12(D)(2))
  - b. (B) WHEN OCPDS ARE AT OPPOSITE END OF BUSBAR OR FAR END OF CENTER-FED BUS, THE SUM OF OCPD PROTECTING BUS PLUS 125% OF POWER SOURCE OUTPUT CURRENT LESS THAN OR EQUAL TO120% OF BUS RATING (CEC 705.12(B)(3)(2), CEC 705.12(D)(2))
  - c. (C) SUM OF OCPDS OF LOAD AND SUPPLY (EXCLUSIVE OF OCPD PROTECTING BUS) LESS THAN OR EQUAL TO BUS RATING (E.G., PANEL COMBINING PV AND ESSS) (CEC 705.12(B)(3)(3), CEC 705.12(D)(2))
- 132. FUSED DISCONNECTS SHALL BE CONSIDERED SUITABLE FOR BACKFEED (CEC 705.12(D), NOTE 103, CEC 705.12(D)(4))
- 133. FASTENER SHALL NOT BE REQUIRED ON BACKFED BREAKER FROM INTERACTIVE POWER SOURCE (CEC 705.12(E), CEC 705.12(D)(5))

Y. <u>POWER CONTROL SYSTEMS (PCS)</u>
- 134. PCS THAT LIMIT SOURCE OUTPUTS MAY BE USED TO LIMIT CURRENTS AND LOADING ON BUS BARS AND CONDUCTORS (CEC 705.13 NOTE 104, CEC 705.13)
- 135. PCS-CONTROLLED CIRCUITS AND ALL MONITORED CIRCUITS FROM OTHER SUPPLY SOURCES SHALL NOT EXCEED AMPACITY OF BUS OR CONDUCTORS (CEC 705.13(A), CEC 705.12(D)(6))
- 136. ACCESS TO PCS SETTINGS SHALL BE RESTRICTED TO QUALIFIED PERSONNEL (CEC 705.13(E), CEC 705.12(D)(7))

TABLES:

Table 1: Module Voc at STC Based on Inverter Maximum DC Input Voltage Derived from CEC 690.7

Microinverter Max. DC Input [Step 2.4] (Volts)	34	37	40	43	46	49	52	55	58	61	64	67	70	73	76	76
Max. Module VOC @ STC, 1.12 (-1° to -5° C) Correction Factor (Volts)	30.4	33.0	35.7	38.4	41.1	43.8	46.4	49.1	51.8	54.5	57.1	59.8	62.5	65.2	67.9	67.9
Max. Module VOC @ STC, 1.14 (-6° to -10° C) Correction Factor (Volts)	29.8	32.5	35.1	37.7	40.4	43.0	45.6	48.2	50.9	53.5	56.1	58.8	61.4	64.0	66.7	69.3

Table 2: Branch Circuit OCPD and Minimum Conductor Size*

Circuit Current (Amps)	Circuit Power (Watts)	OCPD (Amps)	Minimum Conductor Size (Amps)	Minimum Metal Conduit Size for 6 Current Carrying Conductors
12	2880	15	12	3/4"
16	3840	20	10	3/4"
20	4800	25	8	1"
24	5760	30	8	1"

*CEC 690.8 AND 210.19 (A)(1) FACTORED IN TABLE 2, CONDUCTORS ARE COPPER, INSULATION MUST BE 90°C WET-RATED. TABLE 2 VALUES ARE BASED ON MAXIMUM AMBIENT TEMPERATURE OF 69° C, WHICH INCLUDES 22°C ADDER,EXPOSED TO DIRECT SUNLIGHT, MOUNTED> 0.5 INCHES ABOVE ROOFTOP, ≤ 6 CURRENT-CARRYING CONDUCTORS (3 CIRCUITS) IN A CIRCULAR RACEWAY.OTHERWISE, THIS COVER SHEET IS NOT APPLICABLE.

Table 3: PV Array Configuration Summary

	Branch 1	Branch 2	Branch 3
Number of Microinverters or ACM's [Step 1]			
Selected Conductor Size [Table 2] (AWG)			
Selected Branch and Inverter Output OCPD [Table 2]			

Table 4: Solar Load Center and Total Inverter Output OCPD and Cunductor Size**

Circuit Current (Amps)	Circuit Power (Watts)	OCPD (Amps)	Min. Solar Load Center Bus Bar Rating (Amps)***	Minimum Conductor Size (Amps)	Minimum Metal Conduit Size
24	5760	30	30	10	1/2"
28	6720	35	35	8	3/4"
32	7680	40	40	8	3/4"
36	8640	45	45	8	3/4"
40	9600	50	50	8	3/4"
41.6	≤ 10000	60	60	8	3/4"

GENERAL REQUIREMENTS:

I. <u>EQUIPMENT DISCONNECTING MEANS</u>
- 52. EQUIPMENT DISCONNECTING MEANS SHALL HAVE AIC RATING (CEC 690.15(C), CEC 110.9)
- 53. EQUIPMENT DISCONNECTING MEANS SHALL DISCONNECT ALL CONDUCTORS THAT ARE NOT SOLIDLY GROUNDED (CEC 690.15(C), CEC 250.4(A))
- 54. DISCONNECTS NOT WITHIN SIGHT OR WITHIN 10 FT. OF EQUIPMENT SHALL HAVE LOCKING MEANS WITH LOCKING HASP THAT REMAINS IN PLACE WHEN NOT IN USE (CEC 690.15(C), CEC 705.12)
- 55. EQUIPMENT DISCONNECTING MEANS SHALL BE REQUIRED FOR DC CIRCUITS GREATER THAN 30 AMPS (CEC 690.15(D)(1), CEC 240.15(B))
- 56. ISOLATING DEVICE SHALL BE PERMITTED FOR DC CIRCUITS LESS THAN 30A (CEC 690.15(D)(2), CEC 240.15(C))

J. <u>ISOLATING DEVICES (NON-LOAD-BREAK DISCONNECTS)</u>
- 57. ISOLATING DEVICES SHALL BE REQUIRED IN CIRCUITS CONNECTED TO EQUIPMENT SHALL BE LOCATED EITHER WITHIN EQUIPMENT OR WITHIN SIGHT NO MORE THAN 10 FT. FROM EQUIPMENT (CEC 690.15(A), CEC 110.27(B))
- 58. "DO NOT DISCONNECT UNDER LOAD" MARKING SHALL BE REQUIRED (CEC 690.15(B), CEC 702.10)
- 59. ISOLATING DEVICES MAY BE LISTED AND LABELED MATING CONNECTORS, FINGER-SAFE FUSE HOLDERS, OR ISOLATING SWITCHES (CEC 690.15 AND 690.33, CEC 110.27(C))

K. <u>CIRCUIT VOLTAGES</u>
- 60. THE MAXIMUM DC VOLTAGE SHALL EQUAL THE HIGHEST VOLTAGE BETWEEN CIRCUIT CONDUCTORS OR BETWEEN ANY CONDUCTOR AND GROUND (CEC 690.7, CEC 310.15(B)(7), CALIFORNIA ELECTRICAL CODE (CEC) TABLE 310.15(B)(16))
- 61. THE MAXIMUM ALLOWABLE DC VOLTAGE ON 1- AND 2-FAMILY DWELLINGS SHALL BE 600V (CEC 690.7, CEC 230.79(D))
- 62. THE MAXIMUM VOLTAGE SHALL EQUAL THE SUM OF RATED OPEN-CIRCUIT VOLTAGE OF SERIES-CONNECTED MODULES TIMES CORRECTION FACTORS LISTED IN THE PROVIDED VOLTAGE CORRECTION TABLE (CEC TABLE 690.7(A)) FOR THE LOWEST COLD TEMPERATURE (CEC 690.7(A), CEC 690.7)
- 63. THE MAXIMUM VOLTAGE OF DC-TO-DC CONVERTER CIRCUITS SHALL EQUAL THE RATING WITHIN THE INSTRUCTIONS IN THE LISTING AND LABELING OF CONVERTERS OR, IF NOT STATED IN INSTRUCTIONS, THE SUM OF THE RATED OUTPUTS OF CONVERTERS IN THE SERIES (CEC 690.7(B)(2), CEC 110.3(B))

L. <u>PV CIRCUIT RATINGS</u>
- 64. PV SOURCE CIRCUIT CURRENTS SHALL EQUAL 125% × SUM OF THE PARALLEL MODULE SHORT CIRCUIT CURRENTS (CEC 690.8(A)(1)(A), CEC 110.14(C))
- 65. PV OUTPUT CIRCUIT CURRENTS SHALL EQUAL THE SUM OF ALL PARALLEL SOURCE CIRCUIT CURRENTS (CEC 690.8(A)(1)(B), CEC 310.15(B)(16))
- 66. DC-TO-DC CONVERTER SOURCE CIRCUIT CURRENT SHALL EQUAL THE CONVERTER RATING (CEC 690.8(A)(1)(C), CEC 110.14(C))
- 67. DC-TO-DC CONVERTER OUTPUT CIRCUIT CURRENT SHALL EQUAL THE SUM OF ALL PARALLEL-CONNECTED DC-TO-DC SOURCE CIRCUIT CURRENTS (CEC 690.8(A)(1)(D), CEC 690.8(B))
- 68. INVERTER OUTPUT CIRCUIT CURRENTS SHALL EQUAL THE INVERTER CONTINUOUS OUTPUT RATING (CEC 690.8(A)(1)(E), CEC 110.3(B))
- 69. WHERE CIRCUIT CONDUCTORS PROTECTED AT LESS THAN OR EQUAL TO THEIR AMPACITY, THE CURRENT SHALL EQUAL THE RATED INPUT CURRENT OF THE ELECTRONIC POWER CONVERTER (CEC 690.8(A)(2), CEC 240.4(D))

M. <u>PV CIRCUIT SIZE AND OVERCURRENT PROTECTION</u>
- 70. PV SYSTEM CIRCUITS SHALL BE SIZED FOR THE GREATER OF:
  - a. (1) 125% OF MAX CURRENT BEFORE APPLICATION OF ADJUSTMENT AND CORRECTION FACTORS OR
  - b. (2) THE MAXIMUM CURRENTS WITH ADJUSTMENT AND CORRECTION FACTORS PER THE PROVIDED AMBIENT TEMPERATURE CORRECTION FACTORS TABLE (CEC TABLE 690.31(A) (CEC 690.8(B), CEC 240.4(B))
- 71. COMMON RETURN CONDUCTOR OF POWER SOURCE WITH MULTIPLE OUTPUT VOLTAGES SHALL HAVE AN AMPACITY GREATER THAN OR EQUAL TO THE SUM OF OCPD RATINGS OF THE INDIVIDUAL OUTPUT CIRCUITS (CEC 690.8(C), CEC 240.21)
- 72. DC CIRCUITS, INVERTER OUTPUT CIRCUIT AND EQUIPMENT SHALL HAVE OCPD(CEC 690.9(A), CEC 240.4(F))
  - a. EXCEPTION: WHERE CONDUCTOR AMPACITY IS GREATER THAN OR EQUAL TO THE MAXIMUM CURRENT AND CURRENTS FROM ALL SOURCES ARE LESS THAN OR EQUAL TO THE MAXIMUM OCPD RATING OF THE PV MODULE OR ELECTRONIC POWER CONVERTER (CEC 690.9(A)(1), CEC 310.15(B)(16))
- 73. CIRCUITS RATED FOR AND CONNECTED TO A LIMITED POWER SUPPLY AND ALSO CONNECTED TO SOURCES HAVING AVAILABLE MAX CURRENT GREATER THAN THE CONDUCTOR AMPACITY SHALL HAVE PROTECTION FROM OVERCURRENT AT CONNECTION TO HIGHER CURRENT SOURCE (CEC 690.9(A)(2), CEC 240.4(G))
- 74. CIRCUITS NO MORE THAN 10 FT. IN BUILDINGS MAY BE PROTECTED ON ONLY ONE END IF LOCATED WITHIN A RACEWAY OR METAL CLAD CABLE (CEC 690.9(A)(3), CEC 240.21(C))
- 75. DC OCPDS SHALL BE LISTED FOR USE IN PV SYSTEMS (CEC 690.9(B), CEC 240.60(A))
- 76. ELECTRONIC DEVICES LISTED TO PREVENT BACK-FEED SHALL BE PERMITTED TO PREVENT OVERCURRENT ON THE PV ARRAY SIDE OF THE DEVICE (CEC 690.9(B), CEC 690.15(A))
- 77. A SINGLE DEVICE MAY PROTECT PV SOURCE AND OUTPUT CIRCUITS (CEC 690.9(C), CEC 240.15(B))
- 78. PV AFCI PROTECTION SHALL BE REQUIRED FOR SYSTEMS GREATER THAN OR EQUAL TO 80V DC (CEC 690.11, CEC 240.6(A))
  - a. EXCEPTION: SYSTEMS NOT ON BUILDINGS AND WHERE PV AND DC-TO-DC OUTPUT CIRCUITS ARE INSTALLED IN METAL RACEWAYS OR MC CABLE OR UNDERGROUND (CEC 690.11, CEC 690.33)

N. <u>PV WIRING</u>
- 79. PV SOURCE AND OUTPUT CONDUCTORS GREATER THAN 30V SHALL HAVE GUARDING, RACEWAY, OR MC CABLE IF LOCATED WITHIN A READILY ACCESSIBLE LOCATION (CEC 690.31(A), CEC 300.4(D), CEC TABLE 300.5)
- 80. AMPACITY SHALL BE PERMITTED TO BE DETERMINED BY PROVIDED AMPACITIES OF INSULATED CONDUCTORS TABLE (CEC TABLE 310.16) (CEC 690.31(A) NOTE 95, CEC 310.15(B)(2))
- 81. AMPACITY CORRECTION PER THE PROVIDED AMBIENT TEMPERATURE CORRECTION FACTORS TABLE (CEC TABLE 690.31(A) (CEC TABLE 690.31(A)(A)) SHALL BE REQUIRED WHERE AMBIENT TEMPERATURE EXCEEDS 86°F (CEC 690.31(A), CEC 310.15(B)(1), CEC TABLE 310.15(B)(2)(A))
- 82. PV DC CIRCUITS SHALL NOT BE LOCATED WITHIN THE SAME RACEWAY OR CABLE AS NON-PV (CEC 690.31(B), CEC 300.3(C))
  - a. EXCEPTION: WHERE SEPARATED BY BARRIER (CEC 690.31(B)(X), CEC 300.5(D)(3))
- 83. MULTICONDUCTOR CABLE SHALL BE IDENTIFIED FOR THE APPLICATION (CEC 690.31(B)(X), CEC 310.104(A))
- 84. FLEXIBLE FINE-STRANDED CABLES SHALL BE TERMINATED ONLY WITH DEVICES IDENTIFIED FOR THE SPECIFIC CONDUCTOR TYPE AND CLASS (CEC 690.31(C)(5), CEC 110.14(B))
- 85. SINGLE-CONDUCTOR CABLES IN SIZES #16 AND #18 SHALL BE PERMITTED FOR MODULE INTERCONNECTION WHERE MEETING AMPACITY OF PROVIDED AMPACITIES OF INSULATED CONDUCTORS TABLE (CEC TABLE 310.16) (CEC 690.31(C)(6), CEC 310.106(C))
- 86. BOXES SHALL BE ACCESSIBLE EITHER DIRECTLY OR BY DISPLACEMENT OF MODULE BY REMOVABLE FASTENERS AND CONNECTED BY FLEXIBLE WIRING SYSTEM (CEC 690.34, CEC 314.29)

O. <u>MATING CONNECTORS</u>
- 87. MATING CONNECTORS SHALL BE POLARIZED AND NON-INTERCHANGEABLE WITH OTHER RECEPTACLES (CEC 690.33(A), CEC 110.14(C))
- 88. MATING CONNECTORS SHALL BE LATCHING AND LOCKING TYPE (CEC 690.33(C), CEC 406.3)
- 89. WHEN NOT RATED FOR INTERRUPTING CURRENT WITHOUT HAZARD TO OPERATOR, MATING CONNECTORS SHALL REQUIRE A TOOL TO OPEN AND BE MARKED "DO NOT DISCONNECT UNDER LOAD" (CEC 690.33(D), CEC 110.27(B))

P. <u>MINIMUM PV WIRE STRAND TABLE (CEC TABLE 690.31(C)(4))</u>
- 90. PV WIRE STRANDS SHALL BE INSTALLED PER PROVIDED MINIMUM PV WIRE STRAND TABLE (CEC TABLE 690.31(C)(4))

O. <u>PROTECTION AND SUPPORT</u>
- 91. SECURE AND SUPPORT EXPOSED CABLES AT MAX OF 2 FT. INTERVALS (CEC 690.31(C)(1), CEC 334.30, CALIFORNIA ELECTRICAL CODE TABLE 334.30)
- 92. INSTALL LISTED MULTICONDUCTOR JACKETED CABLES IN ACCORDANCE WITH MANUFACTURER'S APPROVED INSTALLATION INSTRUCTIONS (CEC 690.31(C)(3), CEC 310.104(A))
- 93. WHEN NOT LOCATED WITHIN A LISTED ASSEMBLY OR WITHIN Q RACEWAYS, THE FOLLOWING REQUIREMENTS SHALL APPLY: (CEC 690.31(C)(3) NOTE 97, CEC 300.4(B)(1))
  - a. CABLES SHALL BE MARKED SUNLIGHT RESISTANT WHERE EXPOSED OUTDOORS (CEC 690.31(C)(3), CEC 310.8(D))
  - b. CABLES SHALL BE PROTECTED OR GUARDED WHERE SUBJECT TO PHYSICAL DAMAGE (CEC 690.31(C)(3), CEC 300.5(D)(3))
  - c. CABLES SHALL CLOSELY FOLLOW SURFACES OF SUPPORT STRUCTURES (CEC 690.31(C)(3), CEC 330.30(B))
  - d. CABLES SHALL BE SECURED AT MAX 6 FT. INTERVALS (CEC 690.31(C)(3), CEC 334.30(A)(2))
  - e. CABLES SHALL BE SECURED WITHIN 24 IN. OF MATING CONNECTORS OR ENTERING ENCLOSURES (CEC 690.31(C)(3), CEC 300.14(B))

P. <u>DC CIRCUITS INSIDE BUILDINGS</u>
- 94. DC CIRCUITS GREATER THAN 30V THAT ARE ON OR INSIDE BUILDINGS SHALL BE REQUIRED TO BE IN MC CABLE, METAL, RACEWAYS, OR OTHER METAL ENCLOSURES (CEC 690.31(D), CEC 300.22(B))
- 95. FMC LESS THAN ¾ IN. AND MC LESS THAN 1 IN. THAT RUNS ACROSS CEILINGS SHALL HAVE GUARD STRIPS AND SHALL CLOSELY FOLLOW BUILDING SURFACE EXCEPT WITHIN 6 FT. OF EQUIPMENT CONNECTION (CEC 690.31(D), CEC 300.23(B))
- 96. UNDERGROUND SERVICE EQUIPMENT CABLE SHALL NOR BE USED FOR INTERIOR WIRING (CEC 338.12(B)(1), CEC 310.104(A))

Q. <u>LABELING OF DC CONDUCTORS</u>
- 97. EXPOSED RACEWAYS AND BOX COVERS SHALL HAVE REQUIRED LABELING (CEC 690.31(B)(2), CEC 110.21(B))
- 98. LABELS SHALL BE SUITABLE FOR THE ENVIRONMENT WHERE THEY ARE INSTALLED (CEC 690.31(B)(2), CEC 110.21(A)(1))
- 99. LABELS SHALL BE REFLECTIVE, WITH MIN ⅜ IN. LETTERS IN ALL CAPS THAT ARE WHITE LETTERING ON A RED BACKGROUND (CEC 690.31(B)(2), CEC 110.21(A)(2))
- 100. LABELS SHALL BE PLACED AT 10 FT. INTERVALS AND ON EVERY SECTION SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS (CEC 690.31(B)(2), CEC 110.21(A)(3))

R. <u>ARRAY GROUNDING</u>
- 101. NON-CURRENT CARRYING METAL PARTS OF MODULE FRAMES, ELECTRICAL EQUIPMENT AND CONDUCTOR ENCLOSURES SHALL HAVE CONNECTION TO EGC (CEC 690.43(A), CEC 250.110)
- 102. MODULE FRAME BONDING BY MOUNTING DEVICES SHALL BE LISTED AND LABELED AND IDENTIFIED FOR PV (CEC 690.43(A), CEC 250.136(A))
- 103. METAL SUPPORT RACKS SHALL HAVE BONDING JUMPERS BETWEEN SECTIONS OR SHALL BE IDENTIFIED FOR EQUIPMENT BONDING AND CONNECTED TO EGC (CEC 690.43(B), CEC 250.96(A))
- 104. EGC SHALL BE CONTAINED IN THE SAME RACEWAY, CABLE, OR OTHERWISE RUN WITH PV SYSTEM CONDUCTORS WHERE THOSE CONDUCTORS LEAVE PV ARRAY (CEC 690.43(C), CEC 250.134(B))
- 105. EGCS SHALL BE SIZED PER THE PROVIDED MINIMUM WIRING BEND SPACE TABLES (CEC TABLE 312.6(A) AND (B), (CEC 690.45, CEC 250.122)
- 106. UPSIZING EGC SHALL NOT BE REQUIRED WHEN CIRCUIT CONDUCTORS ARE UPSIZED FOR VOLTAGE DROP (CEC 690.45, CEC 250.122(B))

S. <u>CONNECTION TO GROUNDING ELECTRODE SYSTEM</u>
- 107. PV ARRAY EGCS SHALL CONNECT TO BUILDING GES (CEC 690.47(A), CEC 250.50)
- 108. FOR SYSTEMS THAT ARE NOT SOLIDLY GROUNDED, EGC CONNECTION TO ASSOCIATED EQUIPMENT (E.G., INVERTER) SHALL BE SUFFICIENT AS A CONNECTION TO GES (CEC 690.47(A)(1), CEC 250.32(B)(1))
- 109. EGC FOR SOLIDLY GROUNDED SYSTEMS SIZED PER THE FOLLOWING REQUIREMENTS: (CEC 690.47(A)(2), CEC 250.66(A))
  - a. IF NEUTRAL PRESENT, SHALL NOT BE SMALLER THAN NEUTRAL (CEC 250.166(A), CEC 250.24(B))
  - b. IF NEUTRAL NOT PRESENT, SHALL NOT BE SMALLER THAN LARGEST CONDUCTOR (CEC 250.166(A), CEC 250.66(B))

GENERAL REQUIREMENTS:

A. <u>GENERAL REQUIREMENTS:</u>
1. SYSTEMS MUST BE IN COMPLIANCE WITH CURRENT CALIFORNIA BUILDING STANDARDS CODES AND LOCAL AMENDMENTS OF THE CITY OF COSTA MESA. OTHER ARTICLES OF THE CALIFORNIA ELECTRICAL CODE (CEC) SHALL APPLY AS SPECIFIED IN SECTION 690.3.
2. MANUFACTURER'S SPECIFICATION SHEETS MUST BE PROVIDED FOR PROPOSED INVERTERS, MODULES, COMBINER/JUNCTION BOXES AND RACKING SYSTEMS. INSTALLATION INSTRUCTIONS FOR BONDING AND GROUNDING EQUIPMENT SHALL BE PROVIDED AND BUILDING OFFICIAL MAY REQUIRE ADDITIONAL DETAILS. LISTED AND LABELED EQUIPMENT SHALL BE INSTALLED AND USED IN ACCORDANCE WITH ANY INSTRUCTIONS INCLUDED IN THE LISTING OR LABELING (CEC 110.3). EQUIPMENT INTENDED FOR USE WITH PV SYSTEM SHALL BE IDENTIFIED AND LISTED FOR THE APPLICATION CEC 690.4(D)
3. ALL MATERIALS, EQUIPMENT, INSTALLATION AND WORK SHALL COMPLY WITH THE LATEST EDITION OF THE CALIFORNIA BUILDING CODE (CBC), CALIFORNIA ELECTRICAL CODE (CEC), CALIFORNIA ENERGY CODE (T24), CALIFORNIA GREEN CODE (CALGREEN), CALIFORNIA FIRE CODE (CFC), CALIFORNIA MECHANICAL CODE (CMC), CALIFORNIA PLUMBING CODE (CPC), CALIFORNIA RESIDENTIAL CODE (CRC), AND CITY OF COSTA MESA MUNICIPAL CODE.
4. INVERTERS, MODULES, PANELS, AC MODULES AND AC MODULE SYSTEMS, DC-TO-DC CONVERTERS, DC COMBINERS, RS EQUIPMENT, DC CONTROLLERS, AND CHARGE CONTROLLERS SHALL BE APPROVED AND LISTED FOR PV APPLICATIONS (CEC 690.4(B), CEC 1604.2)
5. PV PANELS AND MODULES SHALL BE LISTED AND LABELED PER UL 1703, INVERTERS TO UL 1741 (CEC 690.4(B), CEC 1609.5)
6. PV SHALL BE INSTALLED ONLY BY QUALIFIED PERSONS (CEC 690.4(C), CEC 110.26(D), CALIFORNIA HEALTH AND SAFETY CODE 25916)
7. IF MULTIPLE SYSTEMS ARE INSTALLED REMOTE FROM EACH OTHER ON A SINGLE BUILDING OR STRUCTURE, DIRECTORY SHOWING EACH DISCONNECT LOCATION SHALL BE PROVIDED (CEC 690.4(D), CEC 703.2.2)
8. PV SYSTEM EQUIPMENT AND DISCONNECTING MEANS SHALL NOT BE INSTALLED IN BATHROOMS (CEC 690.4(E), CEC 310.15(B)(3))
9. OUTPUT OF AC MODULE OR AC MODULE SYSTEM SHALL BE CONSIDERED AS INVERTER OUTPUT CIRCUIT; CONDUCTORS AND INVERTERS SHALL BE CONSIDERED AS INTERNAL COMPONENTS (CEC 690.6, CEC 110.9, TITLE 24 PART 6)

B. <u>FIRE ACCESS REQUIREMENTS FOR PV SYSTEM INSTALLATIONS</u>
10. SOLAR PHOTOVOLTAIC POWER SYSTEMS SHALL COMPLY WITH GENERAL SAFETY REQUIREMENTS TO ENSURE SAFE INSTALLATION, DESIGN, AND LABELING PRACTICES. (CFC 1204)
11. PV SYSTEMS SHALL ALLOW FOR ACCESS AND PATHWAYS FOR FIRE DEPARTMENT OPERATIONS, INCLUDING ADEQUATE ROOF ACCESS POINTS, MINIMUM CLEARANCE AROUND ARRAYS, AND APPROPRIATE EQUIPMENT LOCATIONS. (CFC 1204.2)
12. GROUND-MOUNTED PHOTOVOLTAIC ARRAYS SHALL MAINTAIN REQUIRED CLEARANCES TO ALLOW FOR SAFE FIREFIGHTING OPERATIONS AND PREVENT FIRE SPREAD. (CFC 1204.3)
13. ROOF ACCESS AND PATHWAYS FOR PV INSTALLATIONS SHALL MEET MINIMUM WIDTH AND SPACING REQUIREMENTS TO FACILITATE EMERGENCY ACCESS AND FIREFIGHTING OPERATIONS. (CFC 1204.4)
14. PV INSTALLATIONS SHALL MAINTAIN SMOKE VENTILATION OPTIONS ON ROOFS TO ALLOW EFFECTIVE SMOKE REMOVAL DURING A FIRE. (CFC 1204.5)
15. PV SYSTEMS SHALL BE MARKED AND LABELED CLEARLY FOR VISIBILITY AND UNDERSTANDING BY EMERGENCY RESPONDERS, INCLUDING THE TYPE, CONTENT, AND PLACEMENT OF LABELS. (CFC 1204.6)
16. PV SYSTEMS SHALL BE EQUIPPED WITH A RAPID SHUTDOWN MECHANISM TO MINIMIZE HAZARDS TO FIREFIGHTERS AND FIRST RESPONDERS, WITH APPROPRIATE LABELING AND CONTROL LOCATIONS. (CFC 1204.7)
17. DC CONDUCTORS ASSOCIATED WITH PV SYSTEMS SHALL BE LOCATED AND ROUTED APPROPRIATELY TO REDUCE RISK DURING FIREFIGHTING OPERATIONS AND EMERGENCIES. (CFC 1204.8)
18. EMERGENCY RESPONSE ACCESS AND PATHWAYS FOR RESIDENTIAL ROOFS (SECTION BB103.2):
    - a. ACCESS POINTS:
      - FOR SINGLE-FAMILY RESIDENTIAL ROOFS WITH PV ARRAYS, THERE SHALL BE A MINIMUM OF TWO ACCESS POINTS ON OPPOSITE SIDES OF THE ROOF. THIS IS TO PROVIDE MULTIPLE ENTRY OPTIONS FOR FIREFIGHTERS AND TO FACILITATE EMERGENCY ACCESS.
    - b. ROOF RIDGE ACCESS:
      - A MINIMUM 3-FOOT-WIDE (914 MM) CLEAR ACCESS PATHWAY IS REQUIRED ALONG AT LEAST ONE SIDE OF THE ROOF RIDGE. THIS PATHWAY ALLOWS FOR SAFE MOVEMENT OF FIREFIGHTERS ALONG THE RIDGE.
      - PATHWAYS ON ROOF SLOPES GREATER THAN 2:12 (SECTION BB103.2.1):
      - FOR ROOFS WITH SLOPES GREATER THAN 2:12, ACCESS PATHWAYS SHALL BE PROVIDED IN A MANNER THAT ALLOWS DIRECT ACCESS TO THE RIDGE AND SHALL BE A MINIMUM OF 3 FEET (914 MM) WIDE.
      - PATHWAYS SHOULD BE LOCATED OVER STRUCTURALLY SOUND AREAS CAPABLE OF SUPPORTING THE WEIGHT OF FIREFIGHTERS AND THEIR EQUIPMENT.
    - c. HIP AND VALLEY PATHWAYS (SECTION BB103.2.2):
      - WHERE PV PANELS ARE INSTALLED ON HIP ROOFS, A MINIMUM 18-INCH (457 MM) WIDE PATHWAY SHALL BE PROVIDED ALONG EACH SIDE OF A HIP OR VALLEY. THIS ALLOWS FOR SAFE ACCESS AND PASSAGE ALONG THE ROOF'S FEATURES.
      - FOR ROOFS WITH SLOPES GREATER THAN 2:12, THESE 18-INCH PATHWAYS ARE MANDATORY ON BOTH SIDES OF ANY HIP OR VALLEY WHERE PV ARRAYS ARE LOCATED.
    - d. PATHWAY SPACING REQUIREMENTS (SECTION BB103.2.3):
      - PATHWAYS SHALL BE LOCATED IN AREAS THAT PROVIDE THE MOST DIRECT ROUTE TO ROOF ACCESS POINTS AND MUST BE IN STRUCTURALLY SOUND LOCATIONS TO SUPPORT FIREFIGHTER OPERATIONS.
      - ON EACH ROOF PLANE WHERE PV PANELS ARE INSTALLED, A 3-FOOT (914 MM) CLEAR PATHWAY MUST BE PROVIDED TO ENSURE PROPER VENTILATION AND FIRE SUPPRESSION ACCESS.
19. EMERGENCY RESPONSE SETBACKS AND CLEARANCES FOR RESIDENTIAL PV SYSTEMS (SECTION BB103.2.4):
    - a. SETBACKS FROM RIDGE, HIP, AND VALLEYS:
      - PV PANELS AND MODULES SHALL BE LOCATED NO CLOSER THAN 18 INCHES (457 MM) FROM A RIDGE, HIP, OR VALLEY TO ENSURE ACCESS FOR VENTILATION AND EMERGENCY OPERATIONS.
    - b. SETBACKS ON FLAT ROOFS:
      - FOR RESIDENTIAL FLAT ROOFS, A MINIMUM 4-FOOT-WIDE (1219 MM) PATHWAY IS REQUIRED ALONG THE STRUCTURAL LOAD-BEARING LINES AND ALONG THE PERIMETER TO PROVIDE ACCESS AND SUPPORT FOR FIREFIGHTERS.
20. EMERGENCY RESPONSE SMOKE VENTILATION REQUIREMENTS (SECTION BB103.4):
    - a. VENTILATION OPERATIONS ACCESS:
      - A CLEAR AREA OF AT LEAST 3 FEET (914 MM) BY 3 FEET (914 MM) SHALL BE PROVIDED ON EACH SIDE OF A RIDGE OR OTHER HORIZONTAL ROOF FEATURES TO ACCOMMODATE SMOKE VENTILATION OPERATIONS.
    - b. PANEL LAYOUT FOR VENTILATION:
      - PV PANEL LAYOUTS SHALL BE DESIGNED TO PROVIDE THE REQUIRED CLEAR SPACES FOR FIREFIGHTING OPERATIONS, INCLUDING POTENTIAL LOCATIONS FOR VERTICAL VENTILATION CUTS OR OPENINGS.

C. <u>ROOF-MOUNTED PHOTOVOLTAIC PV SYSTEM ARRAYS</u>

21. ROOF-MOUNTED ARRAYS SHALL BE DESIGNED TO SUSTAIN GRAVITY LOADS, ENVIRONMENTAL LOADS, AND WIND LOADS. (CEC 324.4.1)
22. ROOF PENETRATIONS FOR PV SYSTEMS SHALL BE PROPERLY FLASHED AND SEALED TO PREVENT WATER INTRUSION. (CEC 324.4.1)
23. PHOTOVOLTAIC PANEL SYSTEMS SHALL HAVE A FIRE RATING THAT MATCHES THE RATING OF THE ROOF ON WHICH THEY ARE INSTALLED. (CEC 324.4.2 AND 902.4)
24. PANELS AND MODULES FOR PV SYSTEMS SHALL BE LISTED AND LABELED IN ACCORDANCE WITH UL 1703 OR UL 61730-1 AND -2 STANDARDS. (CEC 324.3.1)

D. <u>PHOTOVOLTAIC SHINGLES</u>

25. PHOTOVOLTAIC (PV) SHINGLES SHALL BE INSTALLED ON A SOLID OR CLOSELY FITTING DECK. (CEC 905.16.1)
26. PV SHINGLES ARE ONLY ALLOWED ON ROOF SLOPES OF 2:12 OR GREATER. (CEC 905.16.2)
27. PV SHINGLES SHALL BE LISTED AND LABELED TO UL 1703 OR UL 61730-1 AND -2 STANDARDS. (CEC 905.16.4)
28. PV SHINGLES SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROVED MANUFACTURER INSTRUCTIONS. (CEC 905.16.5)

E. <u>BUILDING-INTEGRATED PHOTOVOLTAIC (BIPV) ROOF PANELS</u>

29. BIPV ROOF PANELS SHALL BE INSTALLED ON A SOLID OR CLOSE-FITTING DECK UNLESS THE PANELS ARE SPECIFICALLY DESIGNED FOR SPACED SHEATHING. (CEC 905.17.1)
30. BIPV ROOF PANELS ARE ONLY ALLOWED ON ROOFS WITH A SLOPE OF AT LEAST 2:12. (CEC 905.17.2)
31. BIPV ROOF PANELS SHALL BE LISTED AND LABELED TO UL 1703 OR UL 61730-1 AND -2 STANDARDS. (CEC 905.17.5)
32. BIPV ROOF PANELS SHALL BE INSTALLED IN ACCORDANCE WITH THE APPROVED MANUFACTURER INSTRUCTIONS. (CEC 905.17.6)

F. <u>INTERACTIVE INVERTERS</u>

33. INVERTERS SHALL CEASE EXPORTING POWER IN GRID OUTAGE (CEC 705.40, CEC 120.6.3)
    - a. EXCEPTION: SHALL BE ALLOWED AS STAND-ALONE SYSTEM TO LOADS DISCONNECTED FROM GRID (CEC 705.40, CEC 690.10)
34. INVERTER MAX CURRENTS SHALL MATCH THE RATED OUTPUT CURRENTS (CEC 705.28(A), CEC 110.14(C))
35. INVERTER CURRENTS SHALL BE CONSIDERED CONTINUOUS; CONDUCTORS SHALL BE SIZED TO 125% OF RATED CURRENT
36. CONDUCTOR OCPDS SHALL BE SIZED TO 125% MAX CURRENTS (CEC 705.30(B), CEC 240.4(D)(7))
    - a. EXCEPTION: INVERTER OUTPUT CONDUCTORS CONNECTED TO A LARGER FEEDER MAY BE SIZED USING TAP RULES (CEC 705.28(B)(3), CEC 240.21(B))

G. <u>GROUND-FAULT PROTECTION</u>

37. DC CIRCUITS GREATER THAN 30V OR 8A SHALL REQUIRE DC GROUND-FAULT PROTECTION EXC (CEC 690.41(B), CEC 250.167(B))
38. GROUND-FAULT PROTECTIVE DEVICE (GFPD) SHALL HAVE LISTING FOR PV (CEC 690.41(B)(1), CEC 110.3(B))
39. GFPD SHALL DISCONNECT FAULTED CIRCUITS OR CASE INVERTER OUTPUT AND ISOLATE FAULTED CIRCUITS FROM GROUND REFERENCE IN A FUNCTIONALLY GROUNDED SYSTEM (CEC 690.41(B)(2), CEC 705.12(B)(1))
40. GFPD SHALL HAVE IDENTIFICATION AT A READILY ACCESSIBLE LOCATION (CEC 690.41(B)(3), CEC 230.95(C))
41. FOR SYSTEMS WITH GFPD, ALL CURRENT-CARRYING CONDUCTOR-TO-GROUND CONNECTIONS SHALL BE MADE BY THE GFPD (CEC 690.42(A), CEC 250.24(A))

H. <u>SYSTEM DISCONNECTING MEANS</u>

42. MEANS SHALL BE PROVIDED TO DISCONNECT PV SYSTEM FROM ALL OTHER WIRING SYSTEMS (CEC 690.13(A), CEC 230.70(A))
43. DISCONNECTING MEANS SHALL BE READILY ACCESSIBLE (CEC 690.13(A), CEC 240.24(A))
44. WHERE DISCONNECTING MEANS GREATER THAN 30V ARE READILY ACCESSIBLE TO UNQUALIFIED PERSONS, ENCLOSURE SHALL BE LOCKED OR REQUIRE A SPECIAL TOOL TO OPEN (CEC 690.13(A)(4), CEC 110.27)
45. EACH DISCONNECTING MEANS SHALL BE REQUIRED TO PLAINLY INDICATE OPEN (OFF) OR CLOSED (ON) AND BE PERMANENTLY MARKED "PV SYSTEM DISCONNECT" (CEC 690.13(B), CEC 230.40)
46. IF DISCONNECT LINE AND LOAD TERMINALS ARE POTENTIALLY ENERGIZED WHEN OPEN, PERMANENT DURABLE WARNING SIGN SHALL BE REQUIRED AND STATE "WARNING - ELECTRIC SHOCK HAZARD TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION" (CEC 690.13(B), CEC 702.6)
47. EACH PV SYSTEM SHALL HAVE A MAXIMUM OF 6 DISCONNECTS GROUPED WITHIN ONE ENCLOSURE OR GROUP OF ENCLOSURES (CEC 690.13(C), CEC 705.20(A))
48. SINGLE DISCONNECT SHALL BE PERMITTED FOR COMBINED INVERTER AC OUTPUTS (CEC 690.13(C), CEC 240.15(B))
49. SYSTEM DISCONNECT SHALL HAVE AIC RATING GREATER THAN OR EQUAL TO AVAILABLE FAULT CURRENT (CEC 690.13(D), CEC 110.9)
50. DISCONNECTING MEANS SHALL SIMULTANEOUSLY DISCONNECT ALL PV CONDUCTORS THAT ARE NOT SOLIDLY GROUNDED FROM ALL OTHER WIRING SYSTEMS (CEC 690.13(E), CEC 230.85)
51. DISCONNECTING MEANS SHALL BE CAPABLE OF BEING LOCKED OPEN (CEC 690.13(E), CEC 110.25)

RESIDENTIAL SOLAR
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PROJECT ADDRESS: __________ **COSTA MESA, CA**

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CONTRACTOR INFO
NAME:
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PLAN PREPARER INFO
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FORM NUMBER:
CBPV-2

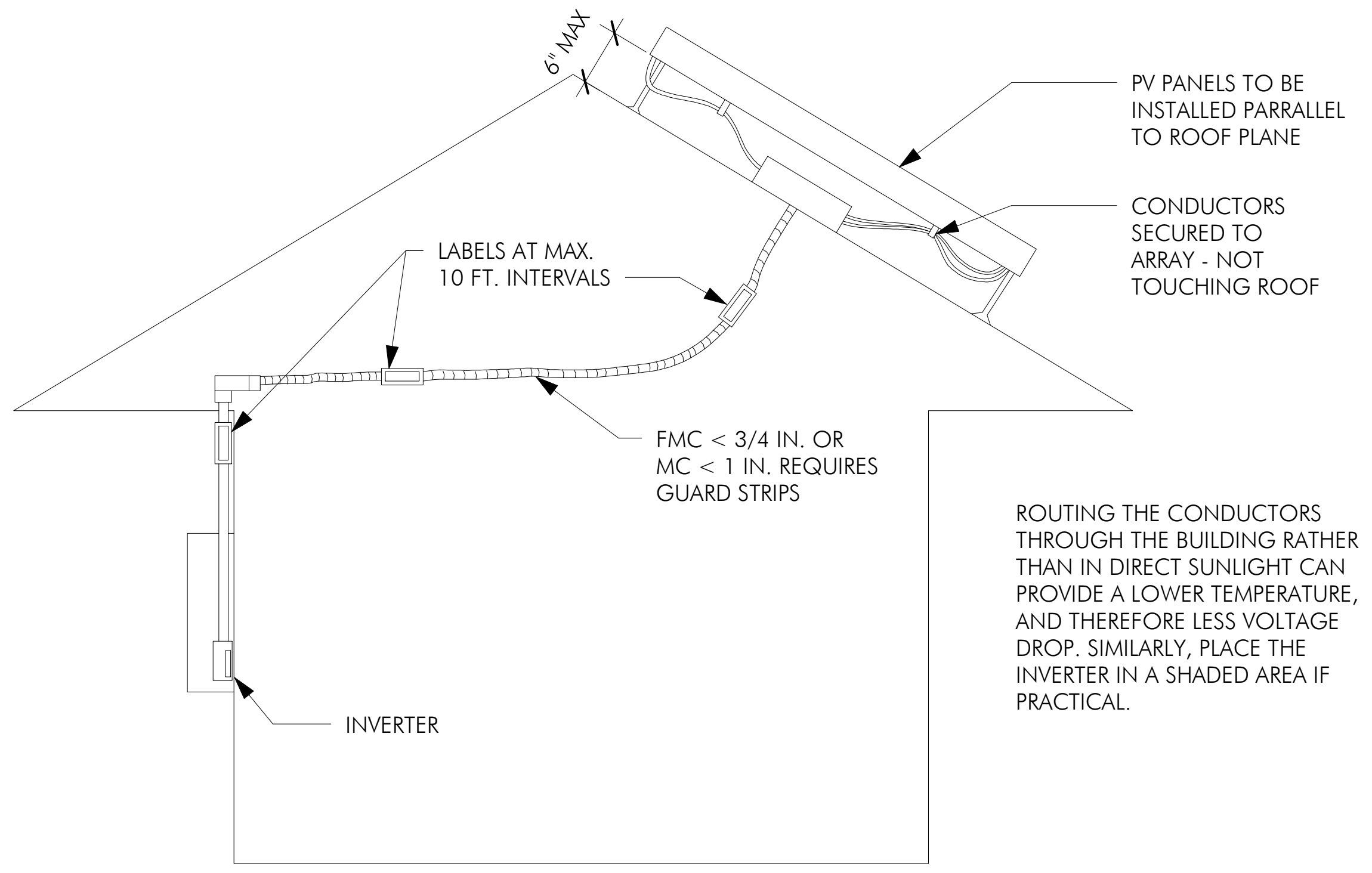
(RELEASE: 09-2024)

TABLES:

2022 CEC Table 690.31(C)(4) Minimum PV Wire Strands	
PV Wire AWG	Minimum Strands
18	17
16—10	19
8—4	49
2	130
1 AWG—1000 MCM	259

2022 CEC Table 690.7(A) Voltage Correction Factors for Crystalline and Multicrystalline Silicon Modules		
Ambient Temperature (°C)	Factor	Ambient Temperature (°F)
24 to 20	1.02	76 to 68
19 to 15	1.04	67 to 59
14 to 10	1.06	58 to 50
9 to 5	1.08	49 to 41
4 to 0	1.1	40 to 32
—1 to —5	1.12	31 to 23
—6 to —10	1.14	22 to 14
—11 to —15	1.16	13 to 5
—16 to —20	1.18	4 to —4
—21 to —25	1.2	—5 to —13
—26 to —30	1.21	—14 to —22
—31 to —35	1.23	—23 to —31
—36 to —40	1.25	—32 to —40

ROUTING DC PV CIRCUITS:



ROUTING THE CONDUCTORS THROUGH THE BUILDING RATHER THAN IN DIRECT SUNLIGHT CAN PROVIDE A LOWER TEMPERATURE, AND THEREFORE LESS VOLTAGE DROP. SIMILARLY, PLACE THE INVERTER IN A SHADED AREA IF PRACTICAL.

TABLES:

2022 CEC Table 312.6(A) Minimum Wire-Bending Space at Terminals and Minimum Width of Wiring Gutters

Wire Size (AWG or kcmil)		Wires per Terminal									
		1		2		3		4		5	
All Other Conductors	Compact Stranded AA-8000 Aluminum Alloy Conductors (see Note 2)	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
14—10	12—8	Not specified		—	—	—	—	—	—	—	—
8—6	6—4	38.1	1 1/2	—	—	—	—	—	—	—	—
4—3	2—1	50.8	2	—	—	—	—	—	—	—	—
2	1/0	63.5	21/2	—	—	—	—	—	—	—	—
1	2/0	76.2	3	—	—	—	—	—	—	—	—
1/0—2/0	3/0—4/0	88.9	31/2	127	5	178	7	—	—	—	—
3/0—4/0	250—300	102	4	152	6	203	8	—	—	—	—
250	350	114	41/2	152	6	203	8	254	10	—	—
300—350	400—500	127	5	203	8	254	10	305	12	—	—
400—500	600—750	152	6	203	8	254	10	305	12	356	14
600—700	800—1000	203	8	254	10	305	12	356	14	406	16
750—900	—	203	8	305	12	356	14	406	16	457	18
1000—1250	—	254	10	—	—	—	—	—	—	—	—
1500—2000	—	305	12	—	—	—	—	—	—	—	—

Notes:

1. Bending space at terminals shall be measured in a straight line from the end of the lug or wire connector (in the direction that the wire leav...
2. This column shall be permitted to be used to determine the minimum wire-bending space for compact stranded aluminum conductors in sizes up to 1000 kcmil and manufactured using AA-8000 series electrical grade aluminum alloy conductor material in accordance with 310.3(B). The minimum width of the wire gutter space shall be determined using the all other conductors value in this table.

2022 CEC Table 312.6(B) Minimum Wire-Bending Space at Terminals

Wire Size (AWG or kcmil)		Wires per Terminal							
		1		2		3		4 or More	
All Other Conductors	Compact Stranded AA-8000 Aluminum Alloy Conductors...	mm	in.	mm	in.	mm	in.	mm	in.
14—10	12—8	Not specified		—	—	—		—	—
8	6	38.1	2-Nov	—	—	—		—	—
6	4	50.8	2	—	—	—		—	—
4	2	76.2	3	—	—	—		—	—
3	1	76.2	3	—	—	—		—	—
2	1/0	88.9	31/2	—	—	—		—	—
1	2/0	114	41/2	—	—	—		—	—
1/0	3/0	140	5 1/2	140	5 1/2	178	7	—	—
2/0	4/0	152	6	152	6	190	71/2	—	—
3/0	250	165 (a)	6 1/2 (a)	165 (a)	6 1/2 (a)	203	8	—	—
4/0	300	178 (b)	7 (b)	190 (c)	7 1/2 (c)	216 (a)	8 1/2 (a)	—	—
250	350	216 (d)	8 1/2 (d)	216 (d)	8 1/2 (d)	229 (b)	9 (b)	254	10
300	400	254 (e)	10 (e)	254 (d)	10 (d)	279 (b)	11 (b)	305	12
350	500	305 (e)	12 (e)	305 (d)	12 (e)	330 (e)	13 (e)	356 (d)	14 (d)
400	600	330 (e)	13 (e)	330 (e)	13 (e)	356 (e)	14 (e)	381 (e)	15 (e)
500	700—750	356 (e)	14 (e)	356 (e)	14 (e)	381 (e)	15 (e)	406 (e)	16 (e)
600	800—900	381 (e)	15 (e)	406 (e)	16 (e)	457 (e)	18 (e)	483 (e)	19 (e)
700	1000	406 (e)	16 (e)	457 (e)	18 (e)	508 (e)	20 (e)	559 (e)	22 (e)
750	—	432 (e)	17 (e)	483 (e)	19 (e)	559 (e)	22 (e)	610 (e)	24 (e)
800	—	457	18	508	20	559	22	610	24
900	—	483	19	559	22	610	24	610	24
1000	—	508	20	—	—	—		—	
1250	—	559	22	—	—	—		—	
1500	—	610	24	—	—	—		—	
1750	—	610	24	—	—	—		—	
2000	—	610	24	—	—	—		—	

Notes:

1. Bending space at terminals shall be measured in a straight line from the end of the lug or wire connector in a direction perpendicular to the enclosure wall.

2. For removable and lay-in wire terminals intended for only one wire, bending space shall be permitted to be reduced by the following number of millimeters (inches):

(a) 12.7 mm (1/2 in.)

(b) 25.4 mm (1 in.)

(c) 38.1 mm (11/2 in.)

(d) 50.8 mm (2 in.)

(e) 76.2 mm (3 in.)

3. This column shall be permitted to determine the required wire-bending space for compact stranded aluminum conductors in sizes up to 1000...

2022 CEC Table 690.31(A)(a) Correction Factors

Ambient Temperature (°C)	Temperature Rating of Conductor		Ambient Temperature (°F)
	105°C (221°F)	125°C (257°F)	
30	1	1	86
31—35	0.97	0.97	87—95
36—40	0.93	0.95	96—104
41—45	0.89	0.92	105—113
46—50	0.86	0.89	114—122
51—55	0.82	0.86	123—131
56—60	0.77	0.83	132—140
61—65	0.73	0.79	141—149
66—70	0.68	0.76	150—158
71—75	0.63	0.73	159—167
76—80	0.58	0.69	168—176
81—85	0.52	0.65	177—185
86—90	0.45	0.61	186—194
91—95	0.37	0.56	195—203
96—100	0.26	0.51	204—212
101—105	—	0.46	213—221
106—110	—	0.4	222—230
111—115	—	0.32	231—239
116—120	—	0.23	240—248

Table 690.31(A)(b) Ampacities of Insulated Conductors Rated Up To and Including 2000 Volts, 105°C Through 125°C (221°F Through 257°F), Not More Than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)

RESIDENTIAL SOLAR STANDARD

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PERMIT #: ____-____-____

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PROJECT NAME: ____________

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