SOLAR PHOTOVOLTAIC INSPECTION CHECKLIST

Central Inverter Systems for Single Family Dwellings

Modules and Combiner boxes

1. Check that the installation manuals for the modules and inverter(s) are at the job site. If the installation exceeds 10 kilowatts, check that the approved plans are available. Review for any changes or errors.
2. Check that the installation of the PV system is not compromising any working clearances for existing equipment on the roof, or that any junction boxes or outlets are not rendered inaccessible by the array.
3. Check that there are no existing conduits or new PV system conduits running under the array for a distance exceeding ten feet, where the modules are mounted within a couple of inches of the roof surface. (Conductors may be subjected to excessive heat beyond their insulation rating.)
4. Check that any junction boxes under the modules are accessible. (Unbolting and lifting a module to provide access is okay.)
5. Check that the modules carry a listing from a recognized testing agency (UL, ETL, or similar).
6. Check and note the nameplate ratings of the modules for "open-circuit voltage (Voc)", "short circuit current (Isc)" and the maximum fuse size permitted for protection of the modules.
7. If using "Crystalline" or "Multicrystalline" modules, check that each PV string is under 600 volts after temperature correction by using the following formula:
   Multiply the number of modules in the longest string by the "open circuit" voltage of one module, then multiply that number by the correction factor from Table 690.7 (2010 CEC) based on the LOWEST ambient temperature for your area. (The "open circuit" voltage is found on the nameplate on the back of each module. The abbreviation is "Voc" followed by a number, usually between 30 and 50 volts.)
   Your location Temperature Correction Factor (Provided by your local Building Department) is:- _____
   EXAMPLE: # of modules _____ x Voc _____ x Temp correction factor _____ = Max system voltage _____ V.
8. Check that equipment bonding lugs are attached to the modules and metallic frame rails of the array correctly, and are the correct type (tinned copper NOT aluminum), and the screws in the lugs and the screws that hold the lugs to the module are stainless steel. (Aluminum lugs are not approved for outdoor use, they corrode. The lugs should be marked "DBT" for Direct burial – Tinned.)
   If an alternate type of equipment grounding of the modules is used ("Weebs"or similar), check that they are installed just like the installation instructions for the modules show.
9. Check that the SOLID equipment ground for the modules is securely attached at each module. If connected to another conductor, is the splice approved? (Split bolts are acceptable.)
10. Check that isolated pieces of metallic raceway used as sleeves to protect PV conductors are bonded with an equipment grounding conductor. ("Tek" screws & one hole straps to the support frame of the modules are not sufficient.)
11. Check that "Tie wraps" (even U.V. resistant ones), are not used to secure the cables from the modules to the rails of the array. Use approved clips or straps. They ARE available.
12. Check that conduits are adequately supported in an approved manner.
13. Check that combiner boxes are adequately supported, listed and accessible.
14. Check that the combiner box is approved for the location in which it is installed and that it meets any temperature restrictions per the nameplate marking or in the installation instructions.
15. If the combiner boxes are non-metallic, check that metallic raceways connected to them use an approved connection method if specified on the box label, ("Myers hubs" or similar) and that the raceways are bonded. (Myers hubs are available with a bond screw if needed.)
16. Check that all equipment grounds and the equipment grounds from the modules (if installed) land on the equipment ground bus of the combiner box.
17. Check that the fuse size for each string is correct, and it is rated for DC with the correct voltage. (A 300 volt DC fuse looks just like a 600 volt DC fuse.)
18. Check that the strain relief connectors used for the termination of the source circuits at the combiner box are approved for this use, location, and number of cables installed.
19. Check the size of the output circuit conductors leaving the combiner box. Any deration for temperature and conductor fill shall not reduce the conductor ampacity below the output ampacity of the combiner box.

Inverter

1. Check that the inverter is "listed" by an approved testing agency, and also labeled "Utility Interactive".
2. Where the inverter comes with a bolt-on factory DC disconnect switch, check that the switch is suitable for use with the inverter by comparing the model numbers on both components.
3. If the built- in DC disconnect contains fuses, check that they are sized to handle the current output of the individual string(s) or combiner box, and that they do not exceed the maximum permitted size in the installation manual. (On small inverters this is usually 20 amps.) Check they are the correct size AND voltage and are rated for use in a DC circuit.
4. If a separate DC disconnect is installed at the inverter location, check for rated DC use and is sized accordingly. If it contains fuses, check they are the correct size and voltage and are rated for use in a DC circuit.
5. Check that the incoming conduit from the array, is bonded at the inverter (and at the separate DC disconnect if installed.)
6. Check the AC output of the inverter for the sizing of the AC over-current protection. (Add 25% to the rated output for Long Continuous Load.)
7. At the inverter AC disconnect, check that the conductors from the AC output of the inverter connect to the LOAD terminals of the switch, and the conductors from the utility side connect to the LINE side terminals.
8. Check that the fuse size and voltage are correct for the inverter AC output.

SOLAR PHOTOVOLTAIC INSPECTION CHECKLIST

Central Inverter Systems for Single Family Dwellings

9. Check that the inverter AC output conductors are sized correctly. (Add 25% to the nameplate rating for Long Continuous Load.)
10. Check that the DC grounding electrode conductor is landed on the correct terminal of the inverter, and the raceway is bonded at the inverter.
11. Check that the DC grounding electrode conductor ties into the building grounding electrode system, just as if it were an AC grounding electrode conductor. (cannot land IN the building service or be just a stand-alone ground rod).
12. Check barrier posts are installed, and working clearances are maintained if the equipment is located in an area subject to vehicular traffic.
13. Check that a permanent label is affixed either to the inverter or to the inverter AC disconnect switch that shows the following information: a) Maximum current output, b) Maximum voltage output, c) Maximum system voltage, and 4) the short circuit current of the system. Lettering shall be minimum 20 point type on a sharply contrasting background.

"Collector" panel (if installed)

1. Check that the individual breakers are approved for use by the panel manufacturer.
2. If a "Main" breaker is installed in this panel, check that there is an approved "hold-down" kit installed, other than just stabbing to the bus. (Part #'s for kits are listed inside the panel cover if they are available for this panel.)

Performance Meter (if installed)

1. Check that the meter height falls within the Utility company parameters.
2. Check that the conductors coming to the meter from the "PV Side" connect to the LINE (top) terminals of the meter.
3. Check that the conductors coming from the "Utility Side" connect to the LOAD (bottom) terminals of the meter.
4. Check that the neutral if present is NOT bonded to the meter enclosure or connected to a grounding electrode at this location.
5. Check there are no other wires "feeding thru" the meter enclosure. (There should only be 4 wires in the meter enclosure; two from the "PV" and two going back to the breaker panel or service, plus a neutral if it is required by the inverter.)
6. If the meter enclosure is located in an area subject to vehicular traffic (driveway, carport, garage), check that barrier posts are installed, working clearance is maintained and that the utility company will approve this location. (Usually they will not allow the performance meter or PV disconnect in a driveway.)
7. Check for any utility company mandated clearances. (Some companies require that the performance meter and safety switch be at least 3 feet clear horizontally and vertically from gas meters or gas piping.)

Utility Company disconnect switch (if installed)

1. Check that the disconnect switch is rated for the ampacity and meets any specific requirements that the local utility company may have. (For example, type of switch, switch location at the property.)
2. Check that the disconnect meets or exceeds the available fault current at the service if it is greater than 10,000 amps. Where the AIC is greater than 10,000, fuses will need to be installed. The fuses installed will be of the fast acting type, usually Class "R" or Class "J". When these fuses are used, they must be used in conjunction with a fuse rejection clip kit. This part number is listed on the label inside of the disconnect cover. The rejection clips prevent the installation of regular non-fast acting fuses that could pose a danger.
3. Check that the conductors from the "Utility Side" connect to the LINE terminals of the switch, and the conductors from the "PV Side" connect to the LOAD terminals.
4. Check the required warning sign is installed on the switch. "Caution Line & Load terminals may be hot in the OFF position."
5. If the switch is located in an area subject to vehicular traffic, check that suitable protection for the switch is provided.

Point of Interconnection Load Side Connections

1. Check that the connection to the building power is made to a DEDICATED breaker or set of fuses. NO "piggybacking".
2. Check that the breaker or fuses are rated to meet or exceed the available fault current at the point of interconnection.
3. If a breaker is used, check that it is a type approved by the manufacturer for installation in this panel.
4. Check that the electrical service, or panelboard is not "field modified" in order to accommodate the interconnection of the "PV" system which will void the listing of the equipment.
5. Check that the addition of a "PV" breaker to a panelboard does not exceed the total number of breakers permitted in the panelboard.
6. Check that the sum of the main breaker protecting the panelboard bus and the breaker connecting the "PV" system to the panel do not exceed 120% of the ampere rating of the bus, and that the "PV" breaker is located at the opposite end of the bus from the main or the feeder terminations of the panelboard. (NOTE: If this cannot be done, or the distribution bus is "center fed" (from the middle), then the sum of the two overcurrent devices is not permitted to exceed 100% of the bus rating.)
7. If the 120% option is used, check that the required warning label "Warning Inverter Output Connection. Do Not Relocate This Overcurrent Device" is affixed at the point of interconnection.

Line Side Connections where the service is factory built to accept a connection ahead of the main:

1. Check that the installed PV breaker does not exceed the manufacturer's maximum size. (This information will usually be found on the inside of the panel cover.)
2. Check that the PV breaker is a type approved by the manufacturer for installation in this panel.