CITY OF ANAHEIM
Solar Energy (Photovoltaic) System Installations

Building Department Plan Check Guideline

Anaheim Public Utilities Department Requirements:

For all solar energy systems located at non-residential sites or with main service panels greater than 200 Amps, the solar energy system design must be submitted to Anaheim Public Utilities Electrical Engineering Division for interconnection approval. Follow the Interconnection Guidelines that can be found on Anaheim Public Utilities Solar Energy Programs website. Interconnection approval requires an Interconnection Application signed by the owner of the solar energy system; one copy shall be attached to each plan set.

After plans are approved by Anaheim Public Utilities (if required), plan check is required by the Building Department (structural and electrical) and the Fire Department.

All of the following items must be included on the required plan sheets prior to issuance of any/all permits:

General:

All plans submitted for Plan Check must meet the edition of the California Electric Code currently adopted by the City of Anaheim.

Provide 3 sets of plans, stamped and signed by the system designer on minimum 18" x 24" paper. Permits for the installation of solar energy systems may be obtained by a licensed C-10, or C-46 contractor. A C-10 license is required if the electrical main service/sub-panels are being replaced. At a minimum, Contractor/Engineer responsible for design plans must sign and date the plans.

Provide a complete plan view drawing. Include:

a. A site plan drawn to scale.
b. Dimensioned roof plan with dimensional array rooftop layout (roof plan may be projected on site plan); indicate the overall height of the installation, referenced from grade level.
c. All raceway runs, cable runs, combiner boxes, junction boxes, disconnects, inverters, subpanels, utility electrical service, etc.
d. If the system is a *"ground mount"* system, provide a complete, dimensioned site plan.

Fire Department Requirements:

For City of Anaheim Fire Department design compliance information, please see the Specifications and Requirements for Photovoltaic Solar Energy Systems on the City of Anaheim Fire Department website (http://www.anaheim.net/utilities/adv_svc_prog/pv/FDReq.pdf).

Structural:

a. Specify proposed total square footage of each panel array.
b. Provide the total weight of each panel array.
c. Provide calculations for roof framing members by a California Licensed Civil/Structural Engineer/Architect. **Note:** For detached single family dwellings only, calculations are not required if panels weigh less than 4 pounds per square foot and arrays are supported at a maximum spacing of 4 feet o.c..
d. Specify roof member sizes, spacing, lengths and locations. **Note:** For detached single family dwellings only, framing member information is not required if panels weigh less than 4 pounds per square foot and arrays are supported at a maximum spacing of 4 feet o.c.
e. Panel Anchorage Details
   - Clearly show method of anchorage of panels to racks and anchorage of the racks to the supporting structure.
   - Include size (diameter), spacing and penetration depth of fasteners.
   - Show means of weather protection at penetrations for system supports.
f. Provide wind calculations by a California Licensed Civil/ Structural Engineer/Architect if panel array area is 2000 square feet or more.
g. Provide wind calculations by a California Licensed Civil/Structural Engineer/Architect if panel array is supported by a flat roof and inclined.
h. Provide seismic calculations by a California Licensed Civil/ Structural Engineer/Architect if the combined total area of the panel arrays is 2000 square feet or more. Calculations are to show that affected existing lateral resisting elements are no more than 10% overstressed according to the 2010 CBC.

Electrical

Provide a complete single line schematic drawing. Include:

a. Photovoltaic panels/arrays, raceway runs, cable runs, combiner boxes, junction boxes, disconnects, inverters, subpanels, utility electrical service, and overcurrent devices; include all manufacturer ratings of components.
b. Indicate the quantity of PV panels per string, strings per array, and PV panels per array.
c. Indicate how the strings and/or arrays are electrically configured with regards to series and/or parallel circuitry.
d. All raceway and conductor sizes, types and quantities; indicate on plans whether conduit is surface mounted or within the building.

e. The busbar ratings of the utility service and any intermediate load centers that will conduct the Photovoltaic AC power contribution.
f. All system grounding. Include all grounding electrode(s) to be used, grounding electrode conductor size(s) and type(s), location of all grounding and bonding terminations, etc.

Provide a plan note requiring all code required signage.

Provide a **highly visible** plan note stating the polarity of the DC grounded conductor.

Provide the photovoltaic equipment manufacture's specification sheets **on the plans(not attached 8 ½" x 11".)**

Verify inclusion of all information below:

a. **Inverter/Photovoltaic Module**
   - Maximum system voltage (DC) Open circuit voltage
   - Operating DC voltage range voltage Maximum power
   - DC maximum operating current Short circuit current
   - Maximum array short circuit current Maximum power current
   - Operating AC voltage range Maximum system voltage
   - Nominal AC output voltage Series fuse rating
   - Maximum continuous output AC current
   - Maximum output overcurrent protection
   - Continuous power output

   Note: In order to verify sizing of all equipment, conductors, overcurrent devices, busbar ratings, etc. Include all pertinent calculations detailed in the currently adopted version of the California Electrical Code.

b. **DC Side:**

   Calculations should reflect the current Code requirement that the manufacturer supplied temperature coefficient be used to determine the actual Voc of the module(s).

   - Number of modules x Voc x Temp. Coefficient (-690.7) = string Voc (note: string Voc shall be ≤ 600V)
   - Module Isc x number of strings x 1.25 x 1.25 = DC conductor *basis amperage* (BADC) and Max. DC overcurrent amperage
   - Proposed conductor amperage (T-310.16 – 90°) x ambient Temp. correction factor (T-310.16) x fill factor (T- 310.15(B)(2)(a)) x Rooftop Adjustment Factor(310.15(B)(2)(C) = minimum DC conductor amperage (result must be ≥

BADC **and** ≤ the corresponding AWG entry at the 75° Col. of T310.16, factor in conductor size adjustments for all runs with > 3% VD)

Note: 1.12 is the cold temperature factor required in Anaheim when no Temp. Coefficient is provided by Manufacturer.

c. **AC Side:**

- Inverter maximum output current x 1.25 = AC conductor *basis amperage* (BAAC) and Max. AC overcurrent amperage
- proposed conductor amperage (T-310.16 – 90°) x ambient Temp. correction factor (T-310.16) x fill factor (T-310.15(B)(2)(a)) = minimum AC conductor amperage (result must be ≥ BAAC **and** ≤ the corresponding AWG entry at the 75° Col. of T310.16, factor in conductor size adjustments for all runs with > 3% VD)