

## **GUIDELINES FOR PLAN CHECK AND PERMIT REQUIREMENTS FOR SOLAR ENERGY SYSTEMS**

The purpose of this Information Bulletin is to clarify the plan check and permitting process of the Los Angeles Department of Building and Safety (LADBS) for solar photovoltaic (PV) and solar water heating systems, hereby referred to as solar energy systems.

### **I. BUILDING PLAN CHECK/PERMIT AND MATERIALS APPROVAL FOR SOLAR ENERGY SYSTEMS**

**A. Building Permits:** A building permit is required for the structural support of all solar energy systems. Building permits are issued through the Building Plan Check Section.

**Exception 1:** A building permit is not required when all of the following conditions are met:

- a. The solar energy device is roof mounted and does not exceed the existing building height at the highest point.
- b. The modules and support components combined weigh no more than 4 psf for photovoltaic arrays or 5 psf for solar thermal arrays.
- c. The solar energy device is installed within 24" of the roof immediately below.
- d. The maximum concentrated load imposed by a solar energy device support onto the roof structure does not exceed 60 pounds (0.18 kN).
- e. The maximum spacing for supports of the solar energy devices shall be 48" on center. Racking systems shall be anchored to solid wood roof rafters or to solid wood blocking with a minimum of one  $\frac{5}{16}$ " diameter lag screw embedded a minimum of 2 $\frac{1}{2}$ " or as recommended by the manufacturer, whichever is more stringent.
- f. The roof has only one layer of roofing material.
- g. The roof structure appears structurally sound, without signs of alterations or structural deterioration or sagging.
- h. Modules do not overhang any roof edges (ridges, hips, gable ends, eaves).
- i. The array covers no more than half of the total roof area comprising all roof planes.

This exemption from a building permit does not waive the requirement for an electrical or plumbing permit as outlined in Sections X and XI of this Information Bulletin.

**Exception 2:** A building permit is not required for flush mounted rooftop system installations on one- or two-family dwelling, when all of the following conditions are met:

- a. The roof has only one layer of roofing material.
- b. The roof structure appears structurally sound, without signs of alterations or structural deterioration or sagging.
- c. The plane of the modules (panels) is parallel to the plane of the roof.
- d. There is a gap of minimum 2" and maximum 10" between the underside of the module and the roof surface.
- f. Modules do not overhang any roof edges (ridges, hips, gable ends, eaves).
- g. The modules and support components combined weigh no more than 4 psf for photovoltaic arrays or 5 psf for solar thermal arrays.
- h. The array covers no more than half of the total roof area comprising all roof planes.
- i. A roof plan showing the module and anchor layout is provided to the field inspector. The plan shall also show the roof rafter layout.
- j. Solar support component manufacturer's project-specific completed worksheets, tables with relevant cells circled, or web-based calculator results are attached to the plans.
- k. A roof plan showing the module and anchor layout is provided. The plan shall also show the roof rafter layout.
- l. 5/16" diameter lag screws with 2.5" embedment into the rafter are used, or the anchor fastener recommended by the manufacturer's guidelines, whichever is more stringent.
- m. Structural design shall follow the ["Structural Criteria for Residential Flush-Mounted Solar Arrays"](#) in the [2015 California Solar Permitting Guidebook \(2nd Edition\)](#).

**B. Building Plan Check:** When exemptions in Sections "A" above are not met, Building Plan Check will be required.

1. Counter Plan Check: Flush mounted rooftop system installations on one- or two-family dwellings may be checked over the counter when approved by an LADBS plan check counter supervisor.

2. Regular Plan Check: Applications which do not qualify for counter plan check under the above criteria may be required to be submitted for “Regular Plan Check” review.

**C.** Information required on plans submitted to counter or regular plan check shall comply with the following:

1. A roof plan showing the module and anchor layout shall be provided. The plan shall also show the roof rafter layout.

2. Solar panels and method of attachment shall be shown on the roof plan and installation details.

3. Plans shall show dimensions, size, and location of the supporting structure(s) in relation to the property lines and any adjacent buildings.

4. Plans shall show sealing of roof penetrations using approved methods and products to prevent water leakage.

5. Substantiating design calculations are required for supporting member sizes, connection details, and design loads imposed on the roof or other supports. The wind load on the vertical projection of the solar panel/collector shall be included in the analysis.

6. Where the solar panel/collector surface inhibits superimposed concentrated loads, the weight of the collector may replace up to half of the code required live loads.

7. Since maintenance of solar energy devices is not required in the same manner as general mechanical equipment, the guard requirements of LAMC 91.1013.6 shall not apply to the installation of solar energy devices.

**II. Zoning Requirements:** Structures with permitted use underneath that support solar energy panels and associated equipment shall conform to all applicable Zoning Code requirements, such as height, yards, HPOZ, Specific Plans, ICOs, and CRA, as for a building or structure. Allowable height projections of roof mounted solar systems shall comply with LAMC Section 12.21.1B3 (a) and [Information Bulletin P/ZC 2002-008](#).

Ground mounted solar panels having no use underneath, when approved as an accessory to the main use, are permitted on the property in commercial, industrial, and residential zones, with the following limitations:

1. Whenever the height of the ground mounted solar panel exceeds the height permitted for a fence wall in LAMC Section 12.22.C.20(f), LADBS will evaluate the installation to ensure the proposed height is necessary for the proper operation of the system.
2. Solar panels that are installed in yards will be evaluated by the LAFD to ensure the installation does not impede life safety.

Solar photovoltaic projects under the Department of Water and Power's Feed-in-Tariff (FiT) program shall comply with all the conditions of the FiT Program Master Conditional Use Permit (CUP); otherwise a separate CUP from the Department of City Planning shall be required.

For projects which are not part of the FiT program, ground mounted solar panels installed as the main use of a property such as an electric generating facility shall require a CUP from the Department of City Planning.

- III. **Grading Information:** For ground mounted installations, a grading pre-inspection is required for sites within the Grading Hillside Area (Special Grading Area, BOE Basic Grid Map A-13372) and where site grading is involved or where the existing drainage pattern will be affected. Plans must indicate the location of ground mounted panels with respect to slopes. See <http://zimas.lacity.org/> to find out if the property is located within the Special Grading Area (BOE Basic Grid Map A-13372).
- IV. **Roof Access:** For roof mounted installations, access to the roof shall be provided in accordance with the Los Angeles Fire Department's (LAFD) [Fire Prevention Bureau Requirement No. 96](#).
- V. **Fire Rating Classification of Solar Energy Panels:**
  1. **Solar Photovoltaic Systems Installed on Top of a Roof:** Solar energy panels installed immediately above the roof of any building shall comply with the following:
    - a) Photovoltaic panel and rack assemblies shall be tested, listed, and identified with a fire classification in accordance with UL 1703.

Where Class A roofing is required (such as in buildings in Very High Fire Hazard Severity Zones), the photovoltaic panels and rack support assembly shall have a class A fire rating.
    - b) When a building requires minimum Class B or C roofing, the photovoltaic panels and rack support assembly shall have a minimum Class B or Class C fire rating, respectively.
  2. **Solar Energy Panels Used as Roofing Material:** Solar energy panels installed as roofing material of any building (such as building integrated PV systems) shall have the same required fire rating classification as the roof. The solar energy panels shall

be listed, tested, and identified with a fire classification in accordance with UL 790 or ASTM E 108.

3. **Solar Photovoltaic Systems Used as Roof:** Solar photovoltaic systems used as roof of structures shall meet Building Code applicable fire rating classification. UL 790 or ASTM E 108.

VI. **Building Area and Height Limitations:** Where the requirements of California Building Code (CBC) Section 503.1, Exception 2 are met, the following shall apply to construction designed in accordance with the CBC (this does not apply to Residential Code construction):

1. Solar photovoltaic panels supported by a structure with no potential use underneath shall not constitute an additional story or additional floor area and may exceed the height limit when constructed on a roof top of a building.
2. Solar photovoltaic panels supported by a structure over parking stalls shall not constitute an additional story or additional floor area and may exceed the height limit.

VII. **Construction Classification:** Structural support for ground mounted panels shall comply with the applicable fire rating classification requirements of the Building Code. Noncombustible structural members supporting solar photovoltaic panels are not required to meet the minimum required fire resistance rating when the requirements of CBC Section 602.1, Exceptions 1, 2, or 3 are met.

VIII. **Ballasted PV System:** PV panels in a ballasted system are typically not attached to the roof and rely on their weight, aerodynamics, and friction to counter the effect of wind and seismic forces. In some cases, ballasted systems are provided with attachment points to supplement the friction forces.

A ballasted solar array system can be used on flat roofs without a positive connection when the following requirements are met:

1. The seismic design of ballasted solar photovoltaic arrays shall fully comply with Report PV1-2012 ([www.seaoc.org](http://www.seaoc.org)) from the Structural Engineers Association of California (SEAOC). The displacement for unattached arrays can be determined by the following methods:
  1. Prescriptive design method per Section 7 of Report PV1-2012.
  2. Nonlinear response history analysis per Section 9 of Report PV1-2012.
  3. Shake table testing per Section 9 of Report PV1-2012.
2. The wind design of solar ballasted photovoltaic arrays shall fully comply with Report PV2-2012 ([www.seaoc.org](http://www.seaoc.org)) from the SEAOC. The wind load design factor for unattached arrays can be determined by the following methods:
  1. Prescriptive pressure coefficient  $GC_{rn}$  per Section 3 of Report PV2-2012.

2. Wind tunnel tests per Section 5 of Report PV2-2012.
  3. A sliding test shall be performed by an LA City approved test agency ([http://ladbs.org/LADBSWeb/LADBS\\_Forms/MaterialControl/testing\\_agency.pdf](http://ladbs.org/LADBSWeb/LADBS_Forms/MaterialControl/testing_agency.pdf)) to determine the dynamic coefficient of friction having the same type of roofing material under critical roof slopes and dry/wet conditions. The tests shall conform to the applicable requirements of ASTM G115.
  4. The Engineer of Record shall provide gravity load and lateral load analysis to justify that the addition of the ballasted rooftop solar array systems will not increase the demand on roof framing members by more than 5% and the demand on building lateral force-resisting systems and elements by more than 10% per LABC Sections 3403.3 and 3403.4. Otherwise, the building structural systems shall be upgraded to comply with current code standards.
  5. An affidavit of 'Maintenance of Building for Ballasted Photovoltaic Solar Arrays' shall be signed by the building owner and shall be recorded at the County Recorder's Office to agree to maintain the location of arrays, number of ballasts, separation between array and any roof structures, setback from the roof edges, and maintenance of the original roofing material. Any changes from the approved conditions shall be made with all required building and electrical permits.
  6. The form, "Modification of Building Ordinance," will be required for any of the following cases: (1) to allow the use of friction resistance in lieu of a positive anchorage connection to the roof as required per Section 13.4 of ASCE 7; (2) to allow the use of the prescriptive methodologies in Reports PV1 and PV2 in lieu of the nonlinear time history analysis and wind tunnel test; (3) to waive a peer review for the non-linear time history analysis when the design is based on the results of non-linear time history procedure, and the design forces being used are no less than 50% of the prescriptive method required in PV1; (4) to waive a peer review for the wind tunnel data collection methods, data analysis, array and building modeling when the design is based on the results of wind tunnel test, and the design forces being used are no less than 50% of the prescriptive method required in PV2.
- IX. **Historical Buildings:** Applicants shall be required to sign the "[Advisory Notice for Installing Solar Equipment in Historic Buildings](#)" form prior to permit issuance. No clearance is required from the Department of City Planning. The Building Plan Check staff shall attach the signed form to the permit application when sending the customer to the Cashier. The Cashier shall ensure that the form is attached to the permit before sending to microfilm.



**X. ELECTRICAL PLAN CHECK AND PERMIT FOR SOLAR PHOTOVOLTAIC SYSTEMS**

**A. Electrical Permits:** An electrical permit is required for the installation of solar photovoltaic systems. Permits are issued as follows:

1. **Online Permits:** Installations meeting the following criteria are issued online at <http://www.LADBS.org> and the installation shall meet the approved plans generated through the online system:

- a. A rooftop system on a one- or two-family dwelling.
- b. The total capacity of the photovoltaic system being installed is 10 kW or less.
- c. No GFCI or AFCI overcurrent devices are installed in the alternating current (AC) output of the inverter.
- d. AC Power system shall be 120/240 volts single phase.
- e. The rating of the service panel shall not exceed 225 amperes.
- f. Central/String inverter systems with a maximum of two inverters with up to four strings and one combiner box per inverter.
- g. Microinverter systems having up to four branch circuits.

2. **Permits for systems that require plan check:** Installations that do not meet the criteria for Online Permits shall require plan check. Once the plans are approved, the Electrical Plan Check Section will issue the permit.

**B. Electrical Plan Check:** Photovoltaic systems requiring approval from the Electrical Plan Check Section may be reviewed at the counter or may be required to be submitted to Regular Plan Check.

**Counter Plan Check:** Solar installations up to 10 kW in one- or two-family dwellings will be reviewed at the Electrical Plan Check Counter provided a completed [LADBS Solar PV Standard Plan](#) and related specifications are submitted. The *LADBS Solar PV Standard Plan* is based on the solar PV standard plans contained within the 2015 [California Solar Permitting Guidebook\(2<sup>nd</sup> Edition\)](#).

**Regular Plan Check:** Systems that do not qualify for Counter Plan Check service will be required to be submitted for Regular Plan Check service. A complete set of plans in accordance with Section 93.0207 of the Los Angeles Electrical Code shall be required at the time of submittal.

**C. Product Approval:** The solar photovoltaic system shall be tested and listed by a City of Los Angeles recognized electrical testing laboratory. A list of approved testing agencies is available at [http://ladbs.org/LADBSWeb/LADBS\\_Forms/TestLab/ETL\\_field\\_lab.pdf](http://ladbs.org/LADBSWeb/LADBS_Forms/TestLab/ETL_field_lab.pdf).

**D. Wiring:** Electrical wiring shall comply with the applicable provisions of the 2014 Los Angeles Electrical Code (2014 LAEC).

## E. Required Approvals and Clearances:

**1. Fire Department (LAFD) Approval:** Approval from LAFD is required prior to issuing electrical permits pertaining to solar photovoltaic systems. LAFD's installation guidelines are available at:

[http://ladbs.org/LADBSWeb/LADBS\\_Forms/Publications/LAFD\\_Requirement\\_No\\_96.pdf](http://ladbs.org/LADBSWeb/LADBS_Forms/Publications/LAFD_Requirement_No_96.pdf).

**Exception:** One- or two-family dwelling rooftop-mounted photovoltaic systems do not require LAFD approval, provided the installation complies with the requirements specified within LAFD's "[Fire Department Reference Requirements for Rooftop Photovoltaic \(PV\) Systems on One- and Two-Family Dwellings](#)" form. **A note shall be placed on the plans to this effect.**

**2. Historical Buildings:** Applicants shall be required to sign the "[Advisory Notice for Installing Solar Equipment in Historic Buildings](#)" form prior to permit issuance. No clearance is required from the Department of City Planning. The Electrical Plan Check staff shall select "Historical Building Advisory Notice" in the application's "Checklist Items" screen in PCIS and attach the signed form to the permit application when sending the customer to the Cashier to pay for the permit. The Cashier shall ensure that the form is attached to the issued permit before sending the permit to microfilm.

**3. Approval from Los Angeles Department of Water and Power (LADWP):** LADBS will not refer plan check or permit applicants to LADWP. It is the responsibility of the applicant/installer to ensure all required approvals from LADWP are obtained. For LADWP's requirements and information regarding solar PV systems installation, refer to <http://www.ladwp.com/solar>.

## XI. PLUMBING PLAN CHECK AND PERMIT FOR SOLAR WATER HEATING SYSTEMS

**A. Plumbing Permits:** A plumbing permit is required for solar water heating systems.

**1. Express Permits:** Permits to install solar water heating systems in buildings that have a water supply smaller than 2" are issued at the Express Permit Counter or online and do not require plan check.

**2. Systems Requiring Plan Check:** Permits to install solar water heating systems in buildings that have a 2" or larger water supply require plumbing plan check and will be processed by the Mechanical Plan Check Section.

**B. Plumbing Plan Check:** Installations in one- or two-family dwellings qualify for counter plan check – others may be required to be submitted for regular plan check.

**C. Product Approval:** Solar water heating systems (pumps, storage tanks, tank liners, heat exchangers, mixing valves, collectors, etc.) shall be tested and listed by a recognized



testing agency. A list of approved testing agencies is available at [http://www.ladbs.org/LADBSWeb/LADBS\\_Forms/TestLab/MTL\\_Testing\\_Agencies.pdf](http://www.ladbs.org/LADBSWeb/LADBS_Forms/TestLab/MTL_Testing_Agencies.pdf).

Tanks for potable water shall be constructed of approved materials similar to those allowed for potable water piping. Tanks shall meet the Plumbing Code, the Uniform Solar Energy Code, and NSF 61. Heat exchangers shall meet the requirements of the Plumbing Code and the Uniform Solar Energy Code.

- D. Historical Buildings:** Applicants shall be required to sign the [“Advisory Notice for Installing Solar Equipment in Historic Buildings”](#) form prior to permit issuance. No clearance is required from the Department of City Planning. The Express or Mechanical Plan Check staff shall select “Historical Building Advisory Notice” in the application’s “Checklist Items” screen in PCIS and attach the signed form to the permit application when sending the customer to the Cashier to pay for the permit. The Cashier shall ensure that the form is attached to the issued permit before sending the permit to microfilm.

## XII. INSPECTION REQUIREMENTS FOR SOLAR ENERGY SYSTEMS

### A. General Inspection Requirements:

1. All approved plans and related technical specifications shall be available onsite at the time of inspection.
2. All applicable permits must be obtained prior to inspection of the solar energy system.
3. A person familiar with the installation shall be available onsite to answer questions and provide access (including a ladder) or other accommodations necessary to perform the inspection of all components of the solar energy system. Ladder installations shall comply with the California Code of Regulations, Title 8.
4. The field inspector shall verify that the system is installed per approved plans and specifications and meets all applicable codes.
5. For solar systems installed on One and Two Family Dwellings, the Department of Building and Safety inspector shall verify the requirements of the [Los Angeles Fire Department Requirement No. 96](#) as outlined in the [Fire Department Reference Requirements for Rooftop Photovoltaic \(PV\) Systems on One and Two Family Dwellings](#). Solar systems installed in other occupancies are inspected by the LAFD; contact the LAFD for further information regarding the LAFD inspection process.

The [Los Angeles Fire Department Requirement No. 96](#) applies only to solar photovoltaic systems and not to solar water heating systems.

- B. Building Code Requirements:** The solar energy system installation shall conform to the approved plans and meet the applicable California Building Code and Residential Code

as amended by the City of Los Angeles and as outlined in the California Solar Permitting Guidebook including the following:

1. For roof mounted installations, clear access to the roof shall be provided in accordance with LABC Section 3111.4.1 or LARC Section R331.4.1, as applicable. Access pathways around the gables, hips, valleys, and ridge shall comply with either Sections R331.4 through R331.4.2.4 of the LARC or Sections 3111.4.2.1 through 3111.4.2.4 of the LABC.
2. Roof access points, paths and clearances shall comply with the CFC as amended by the City of Los Angeles.
3. Fire rating classifications of solar energy panels shall meet the requirements specified in Section I, Subsection F of this Information Bulletin.
4. Structural support for ground mounted panels shall comply with the applicable fire rating classification requirements of the LABC.
5. Modules shall be attached to the mounting structure according to the manufacturer's instructions and the approved plans. (CBC 107.4 & CRC R908.1.4)
6. Roof penetrations/attachments shall be properly flashed.
7. Ground mounted PV arrays shall comply with LABC Sections 3111.1 through 3111.3 for structures complying with the LABC. Setback requirements shall not apply to ground mounted, free-standing photovoltaic arrays. A clear, brush-free area of 10 feet shall be required for ground mounted PV arrays.

For structures complying with the LARC, ground mounted PV arrays shall comply with Sections R331.1 through R331.3. Setback requirements shall not apply to ground mounted, free-standing photovoltaic arrays. A clear, brush-free area of 10 feet shall be required for ground mounted PV arrays.

**C. Electrical Code Requirements:** The solar energy system installation shall conform to the approved plans and meet the applicable California Electrical Code as amended by the City of Los Angeles. For small rooftop PV systems in one or two family dwellings, the electrical inspection requirements are outlined in the 2015 California Solar Permitting Guidebook's (2<sup>nd</sup> Edition) [\*Inspection Guide for PV System in One- and Two Family Dwellings \(PV Toolkit Document #7\)\*](#). Proper clearances around equipment shall be maintained to prevent blocking or obstructing of plumbing and mechanical systems vent terminations.

**D. Plumbing Inspection Requirements:** The solar water system installation shall conform to the approved plans and meet the applicable California Plumbing Code as amended by the City of Los Angeles. For solar domestic water heating in one or two family dwellings,

the plumbing inspection requirements are outlined in the 2015 California Solar Permitting Guidebook's (2<sup>nd</sup> Edition) [\*SWH Toolkit Documents 5A and 5B \(SWH Toolkit Document #5A\)\*](#). Proper clearances around equipment shall be maintained to prevent blocking or obstructing of plumbing and mechanical systems vent terminations.