An introduction to the Solar and Energy Storage System Permitting & Inspection Guidelines
Acknowledgement

www.solsmart.org
Thank you for your participation and feedback.
Background

- Increasing interest in Distributed Energy Resources (DER)
- Increasing installations
- Need to change practices
- Supports single-day, simple permitting
Guides Provide

- Overview of code requirements
- List of permitting and inspection requirements
- Reduce information barriers
- Consistent and code compliant installations
Single Family & Duplex

Solar and Energy Storage System
Permitting & Inspection Guidelines

Multifamily & Office

Solar and Energy Storage System
Permitting & Inspection Guidelines
Referenced National Codes

2020 Versions

• 2020 National Electrical Code (NEC)
• 2021 International Building Code (IBC)
• 2021 International Residential Code (IRC)
• 2021 International Fire Code (IFC)

2017 Versions

• 2017 National Electrical Code (NEC)
• 2018 International Building Code (IBC)
• 2018 International Residential Code (IRC)
• 2018 International Fire Code (IFC)
Guide

Contents

• Permit Submission Requirements
• General Installation Guides
• Plan Review Checklist
• Field Inspection Checklist

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Permit Approval Requirements Section
Permit Approval Requirements

- **Lithium-ion** energy storage systems
- Energy storage systems with total maximum energy capacity on site of **600kWh**
- Energy storage systems installed with simple **solar systems** meeting **SolSmart criteria** that are **less than 15kW** consisting of no more than 2 series strings per inverter and no more than 4 source circuits in total per inverter.
Permit Submission Requirements - Single Family

• Permit application
• Site plan
• Standard electrical diagram
• Specification sheets
• ESS interconnection requirements documentation
• Electrical load calculations
 Permit Submission Requirements - Multifamily

- Permit application
- Site plan
- Standard electrical diagram
- Specification sheets
- Structural load calculations
- Electrical load calculations
Link to your application

**PERMIT SUBMISSION REQUIREMENTS**

TO APPLY FOR A PERMIT SUBMIT THE FOLLOWING:

1. Permit application (see Appendix A) which include basic information about the project, location and installer.

- Jurisdiction can add a link to their own application
- A permit application is included in Appendix A
Appendix A – Sample Permit Application

APPENDIX A: SOLAR AND/OR ESS PERMIT APPLICATION

SECTION 1 - GENERAL INFO

PROJECT ADDRESS

PROPERTY OWNERS NAME, PHONE NUMBER, EMAIL

PROPERTY OWNERS MAILING ADDRESS (DIFFERENT FROM PROJECT ADDRESS)

SECTION 2 - PROJECT DETAILS

BUILDING TYPE/EXISTING USE

NEW OR EXISTING PV SYSTEM

SYSTEM CONFIGURATION

TOTAL PV SYSTEM SIZE

TOTAL SQ. FT. OF PV SYSTEM

PROJECT VALUATION

INCLUDES ENERGY STORAGE SYSTEM

TOTAL SYSTEM CAPACITY RATING

POWER RATING

PROJECT DESCRIPTION:

SECTION 3 - CONTRACTOR INFORMATION

CONTRACTOR BUSINESS NAME

CONTRACTOR LICENCE NUMBER

BUSINESS ADDRESS

CONTRACTOR CONTACT NAME, PHONE NUMBER, EMAIL

SECTION 4 - PERMIT FEE

[Include fee calculations and/or instructions for calculating fee. Directions on how and when to submit the permit fee.]

SECTION 5 - IMPORTANT NOTICE

[Permit must be obtained for all additions or alterations of electrical equipment. Permit required in all cases. Include all required documents, including (1) Site Plan, (2) Electrical Diagram, and (3) Power Calculations and Installation Manual. All permits expire 12 months from date of issuance. Failure to start the work authorized by permit within 12 months from date of issuance may result in the permit being voided. All permits are non-transferable. All work must be completed within 12 months of permit issue date.]

Please submit the following additional documents with the NBI Permit Application:

- Site Plan
- Electrical Diagram
- Power Calculations and Installation Manual

Submit Permit Application: [Describe the submission process. How should the permits be submitted?]

SECTION 6 - APPLICANT SIGNATURE

[The undersigned certifies that the proper authority to apply for this permit. The Contractor has obtained the necessary permits from the proper authorities and has been notified that all information contained in this application is true and accurate to the best of their knowledge.]

NAME

TITLE

SIGNATURE

DATE

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Example Submittal – Single Family

- Permit application
- Site plan
- Standard electrical diagram
- Specification sheets
- ESS interconnection requirements documentation
- Electrical load calculations
Standard Electrical Diagram
ESS Interconnection
Electrical Load Calculations

PERMIT SUBMISSION REQUIREMENTS

TO APPLY FOR A PERMIT
SUBMIT THE FOLLOWING:

1) Permit application (see Appendix A) which include basic information about the project, location and installer.

2) Site plan (see Appendix B) drawn to scale showing:
   - Locations of PV array and ESS components on the property.
   - Primary use of the space or area where the ESS will be installed.
   - Battery and inverter spacing.
   - PV and ESS setback and access pathways.
   - Fire detection, and the suppression systems if applicable.

3) A standard electrical line diagram (see Appendix B) that accurately indicates:
   - PV array configuration (if applicable).
   - Inverter details.
   - ESS components.
   - Conductors, cables, and conduit types, sizes, and markings.
   - Type and wiring of overcurrent protection and disconnects.
   - Inverters.
   - Required signs.
   - Connection to the premises wiring system.
   - Location of additional meters, main electrical service panel, distribution panels or subpanels.

4) Specification sheets and installation manuals for all major system components including: ESS and PV components, inverters, and mounting systems: PV modules, DC-to-DC converters.

5) Documentation showing that ESS meets utility interconnection requirements

6) Electrical Load Calculation

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General Installation Guide

Requirements Covered:

- ESS System Requirements
- ESS Installation
- ESS Size Location
- Interconnection ESS to PV
- PV Electrical Code
- PV Mounting & Installation
General Installation Guide

ESS System Requirements

1. ESS is listed to UL9540 or UL9540a by a Nationally Recognized Testing Laboratory (NRTL). (IFC1207.3)
2. ESS is listed to UL1973. (NEC 706.5)
3. Inverters are certified to UL1741. (NEC 690.4(B))
General Installation Guide

ESS System Requirements

1. ESS is listed to UL9540 or UL9540a by a Nationally Recognized Testing Laboratory (NRTL). (IFC1207.3)
2. ESS is listed to UL1973. (NEC 706.5)
3. Inverters are certified to UL1741. (NEC 690.4(B))
8. The individual ESS units are no larger than 20kWh. (2021 IRC R328.5)

9. ESS units that are UL9540 certified are separated by 3 feet. (2021 IRC R328.3.1, 2021 IFC 1207.5.1)
8. The individual ESS units are no larger than 20kWh.  
(2021 IRC R328.5)

9. ESS units that are UL9540 certified are separated by 3 feet. (2021 IRC R328.3.1, 2021 IFC 1207.5.1)
General Installation Guide

ESS System Installation Requirements

4. ESS is installed according to manufacturer installation instructions. (NEC 110.3(B))
5. All work is done in a neat and workmanlike manner. (NEC 110.12)
6. Access and working space for ESS equipment such as ESS units, battery units, inverters, disconnecting means, and panelboards is adequate. Working space is at least 30 inches in width, 6.5 feet in height and 4 feet in depth or the width, height and depth of the equipment, whichever is greater. (NEC 110.26)
7. Grounding/bonding of ESS units, battery units, inverters, conduit and other electrical equipment according to the NEC and manufacturer’s instructions. (NEC 110.14, 250.148(A), NEC 110.3(B))
8. The individual ESS units are no larger than 20kWh. (IRC R328.5)
9. ESS units that are UL9540 certified are separated by 3 feet. (IRC R328.3.1, IFC1207.5.1)
10. Energy Storage Systems that are UL9540a certified are grouped and separated according to manufacturer instructions.
ESS Size Location Requirements

11. Each ESS unit meets one of the size and location limitations shown below: (IRC R328.4, IRC R328.5)

a. 80 kWh in attached garages separated from the dwelling unit living space with ½” gypsum board between garages and residence or attics and 5/8” Type X gypsum between garage and habitable room above garage. If sheetrock rating of homes built under a code older than the 2009 IRC cannot be verified, sheetrock is installed to meet this requirement. (IRC R302.6)

b. 80 kWh on exterior walls a minimum 3 feet (914 mm) from doors and windows directly entering the dwelling unit. There is no restriction on how close an ESS unit can be to windows or doors entering a garage because the garage is not considered part of the dwelling unit.

c. 40 kWh within utility closets, basements, and storage or utility spaces with finished or noncombustible walls and ceilings. Walls and ceilings of unfinished wood-framed construction shall be provided with minimum 5/8” Type X gypsum.

d. 80 kWh in detached garages and detached accessory structures.

e. 80 kWh outdoors on the ground a minimum 3 feet from doors and windows directly entering the dwelling unit. There is no restriction on how close an ESS unit can be to windows or doors entering a garage because the garage is not considered part of the dwelling unit.
ESS Size Location Requirements

12. ESS is protected from vehicular impact by one of the following: (IRC 328.8, IFC 1207.4.5, 312)
   a. Installed in a location not subject to vehicular impact such as on a side wall (area highlighted in yellow) or 4' above floor level, or
   b. Protected by guard posts located 6 inches or more away from the ESS,
   c. Protected by wheel barriers anchored in place located 4.5 feet or more away from the ESS.
   d. Protected by other barriers where approved

13. Smoke alarms are installed in dwelling units and basements in which ESS is installed. (IRC R328.7, IRC R314)

14. For ESS installed in unconditioned indoor spaces such as dwelling units and attached garages that can exceed the temperature limits of smoke alarms (32°F-100°F), heat alarms are installed. (IRC R328.7)
General Installation Guide

ESS Size Location Requirements

12. ESS is protected from vehicular impact by one of the following: (IRC 328.8, IFC 1207.4.5, 312)
   a. Installed in a location not subject to vehicular impact such as on a side wall (area highlighted in yellow) or 4' above floor level, or
   b. Protected by guard posts located 6 inches or more away from the ESS.
   c. Protected by wheel barriers anchored in place located 4.5 feet or more away from the ESS.
   d. Protected by other barriers where approved

13. Smoke alarms are installed in dwelling units and basements in which ESS is installed. (IRC R328.7, IRC R314)

14. For ESS installed in unconditioned indoor spaces such as dwelling units and attached garages that can exceed the temperature limits of smoke alarms (32°F-100°F), heat alarms are installed. (IRC R328.7)
General Installation Guide

ESS Size Location

The following figure illustrates the effect that the location limitations have on an ESS on the outside wall of a residence or on this inside wall of an attached garage. The highlighted area depicts zones that meet the location limitations for outside walls in this guideline.
ESS Size Location

The following figure illustrates the effect that the location limitations have on an ESS. The highlighted area depicts zones that meet the location limitations for outside walls in this guideline.
15. The inverter installation meets the requirements of one of the items below: (NEC 705)

B. Load-side connection complies with the following:

a. Each source interconnection is made at a dedicated circuit breaker or fusible disconnecting means. (NEC 705.12 (A))

b. The bus amp meet the 120% busbar rating allowance in a building. Table 2: AC 15 Interconnection Options below displays several AC Interconnection options. (NEC 705.12 (B))

c. Equipment containing OCPD is marked to indicate the presence of all sources (705.12 (C))

d. Fused disconnects is suitable for backfeed. Circuit breakers must either not be marked “line” or “load” or be specifically rated for backfeed. (705.12 (D))

e. Circuit breakers backfed from power sources that are interactive do not need a fastener. (705.12 (E))
15. The inverter installation meets the requirements of one of the items below: (NEC 705)

C. Load-side Power Control Systems which use controls to prevent overcurrent of equipment are listed to UL1741 CRD shall comply with the following:

a. Each source interconnection is made at a dedicated circuit breaker or fusible disconnecting means. (NEC 705.12 (A))

b. The bus amp meet the 120% busbar rating allowance in a building. Table 2: AC Interconnection Options below displays several AC Interconnection options. (NEC 705.12 (B))

c. Equipment containing OCPD is marked to indicate the presence of all sources NEC 705.12(C))

d. Fused disconnects are suitable for backfeed. Circuit breakers must either not be marked “line” or “load” or be specifically rated for backfeed. (NEC 705.12 (D))

e. Circuit breakers backed from power sources that are interactive do not need fastener. (NEC705.12 (E))

D. Load-side distribution equipment listed to combine sources and supply loads.
General Installation Guide

PV Electrical Code Installation Requirements

16. All work done in a neat and workmanlike manner. (NEC 110.12)

17. Access and working space is provided for PV equipment such as inverters, disconnecting means, and panelboards (not required for PV modules). (NEC 110.26)

18. Exposed cables are properly secured, supported, and routed to prevent physical damage.

19. Grounding/bonding of rack, modules, inverter(s), and other electrical equipment according to the manufacturer’s instructions. (NEC 110.3(B))

20. PV system markings, labels, and signs according to the NEC. (NEC 690.13(B), 690.53, 690.54, 690.56)

21. Major electrical components including PV modules, DC-to-DC converters, and inverters, are identified for use in PV systems.

22. Inverters are listed as utility interactive in accordance with UL 1741.

23. PV panel systems and array mounting system are listed and identified with a fire classification in accordance with UL 2703. (NEC 690.43 (A))

24. PV Modules are listed as UL 1703, UL 61730-1, or UL 61730-2. (NEC 690.4(B))

25. The PV array consists of no more than 2 series strings per inverter input and no more than 4 source circuit strings in total per inverter.
26. All exposed PV source circuit wiring is a minimum 10 AWG copper PV wire. (NEC 690.31)

27. The maximum PV DC system voltage for a multifamily or office building is limited to 600Vdc. Use either the checklist shown below or methods described in 690.7(A)(1) or 690.7(A)(3) to ensure the system is designed and connected so that 600Vdc is not exceeded on the average coldest day of the year. (NEC 690.7)

   a. ASHRAE Extreme Annual Mean Minimum Design Dry Bulb Temperature (one source is https://energyresearch.ucf.edu/solar-certification/solar-reference-map/) = ; Table 690.7(A) (NEC) value __________

   b. Max module Voc (adjusted at minimum temperature): Rated Voc ___ V x Table 690.7(A) value= ___ V

   c. DC-to-DC converter(s) or microinverter rated maximum input voltage: ___ V (must be greater than Max module Voc in (b.))

   d. Maximum number of DC-to-DC converters allowed in series (up to 600Vdc*): ___

   e. Maximum number of DC-to-DC converters allowed in series (up to 600Vdc*): ___

   f. Inverter(s) rated maximum input voltage: ___ V (must be greater than g. below)

   g. Inverter input max V: Max module Voc (b.) ___V x max # in series= ___ V
General Installation Guide

PV Electrical Code Installation Requirements

28. PV system circuits on buildings meet requirements for controlled conductors.
   a. Controlled conductors more than one foot from the array are capable of being shutdown to below 30 volts within 30 seconds
   b. PV array wiring within the array are either listed to the PV Hazard Control product safety standard (UL3741) or limited to not more than 80 volts within 30 seconds of rapid shutdown initiation. (NEC 690.12)

29. The PV System disconnecting means is sized for the maximum short circuit current and voltage and installed in a readily accessible location. (NEC 690.13(A))
30. PV arrays are located to meet the IRC fire setback and access pathway requirements. At least two pathways not less than 3 feet wide are provided on separate roof planes from lowest roof edge to ridge. At least one pathway is on the street or driveway side of the roof. PV arrays occupying less than 1/3 of the roof area are set back 1.5 feet on both sides of the horizontal ridge. PV arrays occupying more than 1/3 of the roof area have a 3 foot setback on both sides of a horizontal ridge. (IRC 324.6)
31. The weight of the PV system is 4 lbs/square foot or less.

32. The attachment points of the mounting system are either staggered or installed in a low snow load (10 psf or less) and low wind load (120 mph or less) location.

33. Roof penetrations flashed/sealed according to the approved plan and manufacturers’ instructions. (NEC 110.3(B))

34. The maximum spacing in inches between adjacent attachment points of the mounting system is either 2 feet or less or no larger than 6 feet in a low snow load (10 psf or less) and low wind load (120 mph or less) location.

35. The array is on a single roof face. If no check, how many roof surfaces at different slopes and/or orientations will be used for installation? The PV array is flush mounted (parallel to roof) or the maximum distance off the roof is no greater than 10”.

General Installation Guide

Structural PV Array Mounting & Installation Location Requirements

Single Family Version
General Installation Guide

Structural PV Array Mounting & Installation Location Requirements

36. The solar module and mounting system rated by the manufacturer to withstand the upward force of the local wind speed and evenly distribute load into the supporting structure at the proposed maximum spacing, and confirmed in UL 1703 or 61730, and 2703 listings.

37. The individual roof structure appears to be structurally sound, without signs of alterations or significant structural deterioration or sagging. There are no visually apparent disallowed rafter holes, notches or truss modifications, no visually apparent structural decay or unrepairs fire damage. Roof sag, measured in inches is not more than the rafter or ridge beam length in feet divided by 20.

38. What is the roof covering material? Click or tap here to enter text. Standing seam metal roofs are limited to a design snow load of no greater than 15 psf.

39. What is the slope of the roof. If multiple roof faces are used that have different slopes, each slope should be recorded here?
General Installation Guide

Structural PV Array Mounting & Installation Location Requirements

32. PV arrays are located to meet the fire setback and access pathway requirements: (IFC 1205.3.1 IFC 1205.3.2)

   a. There is a 4-foot wide clear perimeter around the edges of the roof for building sides less than 250 feet. For building sides equal to or larger than 250 feet, 6-foot wide clear perimeter pathways are required.

   b. Interior pathways are provided at intervals not greater than 150 feet throughout the length and width of the roof.

   c. A pathway at least 4 feet wide is provided in a straight line to roof standpipes or ventilation hatches.

   d. A pathway at least 4 feet wide is provided around roof access hatches, with at least one pathway to a parapet or roof edge.

33. Roof structures are designed to resist the applicable uniform concentrated roof live loads with PV panel dead loads and with PV panels present. Roof live loads do not need to be applied if the space between the panels and the roof surface is 2 feet or less. (IBC 1607.14.4.1)
General Installation Guide

Structural PV Array Mounting & Installation

Location Requirements

34. The roof structure is designed to accommodate PV panels or modules and ballast dead load, including concentrated loads from support frames, roof live loads, snow drift loads created by PV panels and modules if applicable, and other applicable loads. (IBC 1607.14.4.2)

35. Roof penetrations flashed/sealed according to manufacturers’ instructions. (NEC 110.3(B))
Plan Review Checklist
PLAN REVIEW CHECKLIST

ENERGY STORAGE SYSTEM REQUIREMENTS

1. ESS is listed to UL 9544 or UL 1915 by a Nationally Recognized Testing Laboratory (NRTL).
2. ESS is listed to UL 8912.
3. Inverters are certified to UL 1741.
4. The individual ESS units are no larger than 20kW.
5. ESS units that are UL 1915 certified are separated by 3 feet.

ENERGY STORAGE SYSTEM INSTALLATION REQUIREMENTS

6. Energy Storage Systems that are UL 9544a certified are grouped and spaced according to manufacturer instructions.

ENERGY STORAGE SYSTEM SIZE AND LOCATION REQUIREMENTS

7. Each ESS unit meets one of the size and location limitations specified in NEC (ART 690.10 and ART 690.15).
8. 80 kVA is not allowed in attached garages, pantries, adjacent to windows or doors entering a garage because the garage is not considered part of the dwelling unit.
9. ESS is protected from vehicle impact by one of the following:
   a. Isolated in a secured location subject to vehicle impact such as on a side or garage above floor level.
   b. Protected by guard posts, a fence or other enclosures from the ESS.
   c. Protected by walls or barriers where approved.
   d. Smoke alarms are installed in dwelling units and basements in which ESS is installed.
10. For ESS installed in unconditioned indoor spaces such as dwelling units and attached garages that exceed the temperature limits of smoke alarms (95°F), other alarms are installed.

PHOTOVOLTAIC AND ENERGY STORAGE SYSTEM INTERCONNECTION REQUIREMENTS

11. The inverter installation meets the requirements of use of the ESS below:
   a. Supplementary connection complies with power sources continuous output rating, conductor size, over current protection, connection, and ground fault requirements in NEC 725.11.
   b. Load-side connection complies with 705.12 and must meet the 100% disconnecting allowance in a residence.
   c. Load-side Power Control Systems which use controls to prevent overcurrent equipment are listed to UL 4902 and comply with monitoring, reporting, operation protection, simple power source ratings, and access control in NEC 725.11.
   d. Load-side distribution equipment is listed to complete sources and supplies load.
12. Major electrical components including PV modules, ESS, ESS converters, and inverters, are identified for use in PV systems.
13. Inverters are listed as utility interactive according to UL 1741.
14. PV Modules are listed to UL 775, UL 61727-1, or UL 61727-2.
15. PV panel systems and array mounting system are installed and identified per a B1 classification in accordance with UL 2079.
16. The PV array consists of no more than 2 series strings per inverter input, and no more than 4 parallel strings per inverter input.
17. All exposed PV source circuit wiring is minimum 10 AWG copper wire.

PV SYSTEM ELECTRICAL CODE INSTALLATION REQUIREMENTS

18. The maximum PV DC system voltage for a multi-family or office building is limited to 600Vdc. Use either the checklist shown in the general installation guide or methods described in 690.45.1(B) or 690.9(A) to ensure the system is designed and connected so that 600Vdc is not exceeded on the averaged day of the year.
19. PV system results in building systems requirements for controlled conditions.
   a. Conductors for multi-family buildings have at least one foot from the array to allow for future attachment of inverters and other equipment.
   b. PV array mounting is to be either covered to listed or UL 9544 or UL 61727-2.
20. The PV System disconnecting means is sized for the maximum short circuit current and voltage and installed in a readily accessible location.

STRUCTURAL PV ARRAY MOUNTING AND INSTALLATION LOCATION REQUIREMENTS

21. PV arrays are located to meet the IRC fire setback and access pathway requirements. At least two pathways parallel and at least 3 feet wide are provided on separate roof planes from lowest roof edge to ridges.
22. Array as access pathway on the exterior surface of the roof.
23. PV arrays occupying more than a 3/4 of the roof area are under 1 foot setback on both sides of the horizontal ridge.
24. The weight of the PV system is 4 thousand square feet or less.
25. The attachment points of the mounting system are either installed or installed in a low snow load (10 psf) and low wind load (120 mph or less) locations.
26. The maximum spacing in inches between adjacent attachment points of the mounting system is 12 inches or less and 1 inch or less.
27. The maximum spacing in inches between adjacent attachment points of the mounting system is 12 inches or less and 1 inch or less.
28. The array is on a single roof face. If not, check, how many roof surfaces at different pitches and orientations will be used for installation.
29. What is the roof covering material?
   a. Standing seam metal roofs are limited to a design snow load of no greater than 15 psf.
   b. What is the slope of the roof? The most multiple roof surface to be connected to one ESS.
   c. How are these connected to the multiple roof surfaces, each slope should be regarded here.

SOLAR AND STORAGE PERMITTING AND INSPECTION GUIDELINES / 13
Field Inspection Checklist
FIELD INSPECTION CHECKLIST

HELPFUL TIP
Numbers that correspond to the requirement in the permitting checklist are presented in the same requirement in the field inspection checklist.

ENERGY STORAGE SYSTEM REQUIREMENTS
Make sure all ESS disconnects and circuit breakers are in the open position and verify the following:

1. All work done in a neat and workmanlike manner (NEC 110.12).
2. Equipment installed, listed, and labeled according to the approved plan and manufacturer’s instructions (NFPA 70, NEC).
3. ESS equipment model numbers, quantities, and locations according to the approved plan (see NFPA 70, Section 690.4).
4. Batteries are installed 3 feet apart, including between units or ESS unit to substation building and manufacturer’s electrical requirements are followed.
5. A short space between units and doors of windows entering the electrician’s unit are installed, (2), (7).
6. ESS equipment is followed (40 kW inside cabinet or 80 kW in cabinet and exterior) (7).
7. Access and working space for ESS equipment is at least 36 inches wide and 36 inches high (7).
8. All equipment is in the open position and verified (7).
9. Grounding bonding of ESS units, battery units, inverters, and other electrical equipment according to the NEC and manufacturer’s instructions (7).
10. Conductors, cables, and conduit types, sizes, and markings according to the approved plan (7).
11. Overcurrent devices are the type and size according to the approved plan (7).
12. Disconnects according to the approved plan and properly installed as required by the NEC (7).
13. Circuit breaker is installed (7).
14. All ground-connection systems are documented (7).
15. PV modules are installed (7).
16. Mounting system and structural connections according to the approved plan and manufacturer’s instructions (7).
17. Rigid penetrations for evaluation according to the approved plan and manufacturer’s instructions (7).
18. Rigid penetrations are properly secured, supports, and routed to prevent damage (7).
19. Conduit installation according to NEC 680.31 and the approved plan (7).
20. Firefighter access according to IRC R234 and the approved plan (7).
21. Rigid conduit is installed (7).
22. Rigid conduit is installed (7).
23. PV modules, inverters, dc-dec power systems, and other electrical equipment according to the manufacturer’s instructions (7).
24. Equipment installed, listed, and labeled according to the approved plan and manufacturer’s instructions (7).
25. The rapid shutdown system is installed and operational according to the approved plan and manufacturer’s instructions (7).

PHOTOVOLTAIC ELECTRICAL AND STRUCTURAL REQUIREMENTS
Make sure all PV disconnects and circuit breakers are in the open position and verify the following:

1. All work done in a neat and workmanlike manner (NEC 110.12).
2. PV module model number, quantity, and location according to the approved plan (7).
3. Array mounting system and structural connections according to the approved plan and manufacturer’s instructions (7).
4. Rigid penetrations for evaluation according to the approved plan and manufacturer’s instructions (7).
5. Rigid penetrations are properly secured, supports, and routed to prevent damage (7).
6. Conduit installation according to NEC 680.31 and the approved plan (7).
7. Firefighter access according to IRC R234 and the approved plan (7).
8. Rigid conduit is installed (7).
9. Rigid conduit is installed (7).
10. Equipment installed, listed, and labeled according to the approved plan and manufacturer’s instructions (7).
11. The rapid shutdown system is installed and operational according to the approved plan and manufacturer’s instructions (7).

SOLAR AND STORAGE PERMITTING AND INSPECTION GUIDELINES / 15
Supporting Resources
Links to Referenced Codes

SUPPORTING RESOURCES

https://codes.iccsafe.org/content/IFC2021P1

https://codes.iccsafe.org/content/IBC2021P1.


“National Simplified Residential PV and Energy Storage Permit Guidelines.” SolSmart, 
Appendices
# Appendix A – Sample Permit

## APPENDIX A: SOLAR AND/OR ESS PERMIT APPLICATION

### SECTION 1 - GENERAL INFO

<table>
<thead>
<tr>
<th>For Office Use Only</th>
<th>Application Number</th>
<th>Permit Number</th>
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<th>Property Owner Name</th>
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<th>Property Owner Mailing Address (If Different From Project Address)</th>
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### SECTION 2 - PROJECT DETAILS

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<th>Building Type/Existing Use</th>
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<td>Multi-Family</td>
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<td>Commercial/Industrial</td>
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<tr>
<th>New or Existing PV System</th>
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<td>Additional System</td>
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<tr>
<td>System Replacement</td>
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<th>PV System Type</th>
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<td>Ground Mount</td>
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<tr>
<td>Rooftop Mount</td>
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<th>Inverter Configuration</th>
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<td>String Inverter w/ DC</td>
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<tr>
<td>Converters</td>
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<tr>
<td>Microinverters AC/DC</td>
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<td>Other</td>
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<th>Total PV System Size (kW)</th>
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<td>Battery</td>
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<tr>
<th>Total System Capacity Rating (kW/Day)</th>
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<th>Project Description</th>
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### SECTION 3 - CONTRACTOR INFORMATION

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<tr>
<th>Contractor Business Name</th>
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<tr>
<th>Contractor Contact Name</th>
<th>Phone Number</th>
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### SECTION 4 - PERMIT FEE

[Include fee schedule and/or instructions for calculating fee, directions on how and when to submit the permit fee.]

### SECTION 5 - IMPORTANT NOTICE

- Permit must be obtained for all additions or alterations of electrical equipment. See PERMIT WORK STARTS.

- Refer to NYC Permitting Checklist for additional documents required. All documents provide an signed endorsement with a permit number and Building Department’s approval. Failure to obtain the work authorized by the permit within the work period renders the permit invalid and a new permit must be obtained. Once work begins, work must continue until completion. All work must be completed within 6 hours of a permit issuance date.

- Please submit the following additional documents with the NYC Permit Application:
  - Site Plan – Electrical Diagram
  - Structural Load Calculation – Additional Document: Edit or delete as necessary

- Submit Permit Application: Describe the submission process, how should the permits be submitted? Inspection, review, review fee, etc.

### SECTION 6 - APPLICANT SIGNATURE

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Appendix B - Standard Line Diagrams for ESS & PV

APPENDIX B: SOLAR AND ENERGY STORAGE STANDARD ELECTRICAL LINE DIAGRAMS

FIGURE B: ONE LINE PV ONLY WITH MICROINVERTERS

FIGURE 10: ONE LINE PV ONLY WITH DC CONVERTERS

FIGURE 11: SITE DIAGRAM PV ONLY WITH DC CONVERTERS

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Thank You!
Contact Us

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