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NC DEPARTMENT OF INSURANCE

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MIKE CAUSEY, INSURANCE COMMISSIONER & STATE FIRE MARSHAL
BRIAN TAYLOR, CHIEF STATE FIRE MARSHAL

Statewide Uniform Requirement of Inspection Procedures for Solar Photovoltaic Systems Installed on Residential Rooftops

Notice: This document replaces the document dated March 20, 2019 with the title of "Inspection Procedures for Solar Photovoltaic Systems Installed on Residential Rooftops".

This document is intended to provide local inspection departments and installers of solar photovoltaic (PV) systems with a Statewide uniformed inspection procedure where PV equipment is to be installed on a residential rooftop. Because a typical residential rooftop is constructed in a manner that creates unusual safety risks while accessing equipment located on the roof's surface, the State Electrical Division has authored the following procedure intended to prevent an inspector from being elevated over eight (8) feet in height from grade while adequately performing his or her duties.

A violation of any Code shall not be created in the installment of a PV system. It shall be the duty of the installer to comply with State and local regulations including conforming to all State Building Codes. Because the inspector will not be required to access the surface of the roof in-person, an inspector cannot be held accountable for any violation of any regulation that cannot be seen while performing inspections in accordance with the following procedure.

The following procedure does not include the alteration of other building systems that may cause additional permits and inspections that may be imposed on the project. Relocation or alteration of a plumbing vent is an example of such modification to the plumbing system that results in a plumbing permit and inspection.

Though this document specifically addresses residential rooftops installations, this logic is not prohibited to be applied to a commercial structure that has a residential type roofing system without access to the equipment. However, permission must be granted from the local inspection department prior to any installation.

The provisions of this document are not optional. No inspections department shall knowingly disregard the provisions within this document. Local inspection departments are required to implement the provisions within this document upon receiving knowledge of its existence. Inspection departments shall notify installers of PV systems of these requirements no

later than at the time of issuance of the permit. Attachment of this document with the permit application(s) is the suggested method. There are two (2) options concerning the electrical inspection; one has a rough-in inspection requirement. The applicant shall notify the inspections department on the electrical permit application for the option sought.

Permits for a PV installation issued by a local inspections department prior to the department's knowledge of this document will be allowed to implement the local department's existing procedures. It is the responsibility of an inspections department to obtain knowledge of all laws, regulations, and memorandums issued by the Department of Insurance, Office of State Fire Marshal within a reasonable amount of time. Therefore, the State Electrical Division does not anticipate any PV installations permitted after sixty (60) days from the creation of this document (June 23, 2019) that do not adhere to these provisions.

In order to create a single document for simplicity that addresses the inspection procedures for both electrical and structural systems effected by a PV installation, these requirements reflect a joint effort between the State Electrical Division and the Engineering and Codes Division. Questions concerning the electrical provisions of this document shall be addressed to the staff of the State Electrical Division. Questions concerning the building and structural provisions of this document shall be addressed to Deputy Commissioner Cliff Isaac, or a building code consultant within the Engineering and Codes Division.

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Statewide Uniform Requirement of Inspection Procedures for Solar Photovoltaic Systems Installed on Residential Rooftops Option No. 1

1. **Application for Electrical and Building Permit must include:**
   a. Sketch of the electrical design that complies with the NEC
   b. Sketch of the equipment's structural mounting design. A North Carolina registered design professional will be required to seal the structural design at the time of application if any of the following exist and are attested to by the applicant:
      i. The weight of the PV system exceeds three (3) pounds per square foot (psf),
      ii. The roof possesses more than one (1) layer of asphalt shingles,
      iii. The roofing material consists of a type other than asphalt shingles or metal, or
      iv. The roof is located in a 140 mph or greater wind zone

2. **Electrical Rough-in Inspection at the Project's Location includes:**
   a. PV equipment must be present on-site with the manufacturer's instructions
   b. Listing and labeling of all parts to be assembled on the roof
   c. Detailed instructions for the rapid shutdown of the system at the roof
   d. Inverter location
   e. Type and size of conductors to be used
   f. Details for how the metal frame(s) and the PV electrical system is to be grounded

3. **Electrical Final Inspection Requirements:**
   a. All equipment exceeding 8 feet above grade must be clearly photographed or recorded to show the following: (Hard copy provided to field inspector at final inspection, to be kept on file)
      i. All connections (splices, terminations, joints, etc.)
      ii. The measurement of any items that have a distance value within the NEC
      iii. Mounting hardware
      iv. The equipment in the photographs are actually located at the property where the work is being inspected (neighboring or landmark items in some of the images should be noted)
   b. All electrical equipment not exceeding 8 feet from grade shall be inspected in the usual manner

4. **Building Final Inspection Requirements:**
   a. A field inspection of the installation has been performed by a North Carolina registered design professional or a person under the direct supervisory control of the registered design professional. This field inspection must be definitively acknowledged in the required document below.
   b. Present a signed written document from a North Carolina registered design professional with a valid seal stating all of the following:
      i. The PV equipment's structural installation has been designed and inspected,
      ii. The equipment will not create a negative impact on the building's structural design, including any additional loads imposed (dead, snow, wind), and
      iii. The installation is in compliance with the North Carolina Residential Code

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Statewide Uniform Requirement of Inspection Procedures for Solar Photovoltaic Systems Installed on Residential Rooftops Option No. 2

1. **Application for Electrical and Building Permit must include:**
   a. Sketch of the electrical design that complies with the NEC
   b. Electrical details of the equipment including:
      i. Manufacturer's instructions
      ii. Documentation that the equipment is listed by a qualified evaluation laboratory
      iii. Instructions for the rapid shutdown of the system at the roof
      iv. Inverter location
      v. Type and size of conductors to be used
      vi. How the metal frame(s) and the PV electrical system is to be grounded

   c. Sketch of the equipment's structural mounting design. A North Carolina registered design professional will be required to seal the structural design at the time of application if any of the following exist and are attested to by the applicant:
      i. The weight of the PV system exceeds three (3) pounds per square foot (psf),
      ii. The roof possesses more than one (1) layer of asphalt shingles,
      iii. The roofing material consists of a type other than asphalt shingles or metal, or
      iv. The roof is located in a 140 mph or greater wind zone

2. **Electrical Final Inspection Requirements:**
   a. All equipment exceeding 8 feet above grade must be clearly photographed or recorded to show the following: (Hard copy provided to field inspector at final inspection, to be kept on file)
      i. Verification of all details described in Part 1.b. of the electrical permit application procedure (this includes photos of the listing laboratory's marking(s) on the equipment)
      ii. All connections (splices, terminations, joints, etc.)
      iii. The measurement of any items that have a distance value within the NEC
      iv. Mounting hardware
      v. The equipment in the photographs are actually located at the property where the work is being inspected (neighboring or landmark items in some of the images should be noted)
   b. All electrical equipment not exceeding 8 feet from grade shall be inspected in the usual manner

3. **Building Final Inspection Requirements:**
   a. A field inspection of the installation has been performed by a North Carolina registered design professional or a person under the direct supervisory control of the registered design professional. This field inspection must be definitively acknowledged in the required document below.
   b. Present a signed written document from a North Carolina registered design professional with a valid seal stating all of the following:
      i. The PV equipment's structural installation has been designed and inspected,
      ii. The equipment will not create a negative impact on the building's structural design, including any additional loads imposed (dead, snow, wind), and
      iii. The installation is in compliance with the North Carolina Residential Code