UL3741 Commercial Implementation Guide

S6-GC(25-60)K-US
S6-GC30K-LV-US

S5-GC(75-125)K-US
S5-GC60K-LV-US

UL 3741 Defined

ANSI/CAN/UL 3741: Standard for Safety for Photovoltaic Hazard Control

First published in December 2020, ANSI/CAN/UL 3741: Standard for Safety for Photovoltaic Hazard Control, provides a means of evaluation for photovoltaic (PV) hazard control components, equipment and systems that reduce shock hazards from energized PV system equipment and circuits in a PV array. It is specifically intended to establish and expand requirements for the evaluation of a rapid-shutdown PV array that can keep firefighters out of hazardous current paths when responding to emergency situations in homes and buildings with PV systems.

The Standard is nationally recognized and approved by the American National Standards Institute (ANSI) and the Standards Council of Canada (SCC), offering greater consistency in safety of photovoltaic hazard control across both countries and jurisdictions. The binational Standard eliminates the risk of de-harmonization as updates are implemented, while also allowing manufacturers to design and evaluate products for both countries.

1. **Source: https://ulse.org/ul-standards-engagement/solar-energy**

Introduction

This guide only addresses the practical implementation of Solis Three Phase String Inverters to meet the requirements of the UL3741 PV Hazard Control Standard.

Installers and planners are advised to refer to the addenda of their preferred racking manufacturers, as well as the corresponding installation manuals, for complete guidance and compliance.

Utilizing UL3741 to Implement a Simpler and More Cost-Effective Installation

Solis Inverters

- Fuse-free design and spring clamp terminals reduce maintenance, as well as products are built with premium components for better long-term reliability.
- The industry's largest range of 208/480V power classes, suitable for any project.
- Ensure simple operations and maintenance with separable wiring box and advanced monitoring.
- Wide operating voltage windows, high amperage inputs, and low startup voltages for optimum performance.

FASTER INSTALLS

FEWER PARTS

FIREFIGHTER PREFERRED

COST EFFECTIVE

Case studies have shown an average 7 cents/watt savings by reducing module-level power electronics

WARNING

TO REDUCE THE RISK OF INJURY, READ ALL INSTRUCTIONS

AVERTISSEMENT: POUR PRÉVENIR LES BLESSURES, LIRE TOUTES LES INSTRUCTIONS

Installer Responsibility:

- Ensure safe installation of all electrical aspects of the array. All electrical installation and procedures should be conducted by a licensed and bonded electrician or solar contractor. Routine maintenance of a module or panel shall not involve breaking or disturbing the bonding path of the system. All work must comply with national, state and local installation procedures, product and safety standards.
- Comply with all applicable local or national building and fire codes, including any that may supersede this manual.
- Ensure all products are appropriate for the installation, environment, and array under the site's loading conditions.
- Use only parts recommended by the manufacturer; substituting parts may void any applicable warranty.
- Ensure provided information is accurate. Issues resulting from inaccurate information are the installer's responsibility.
- Ensure bare copper grounding wire does not contact aluminum and zinc-plated steel components, to prevent risk of galvanic corrosion.
- If loose components or loose fasteners are found during periodic inspection, retighten immediately. Any components showing signs of corrosion or damage that compromise safety shall be replaced immediately.
- Provide an appropriate method of direct-to-earth grounding according to the latest edition of the National Electrical Code, including NEC 250: Grounding and Bonding, and NEC 690: Solar Photovoltaic Systems.
- Disconnect AC power before servicing or removing modules, AC modules, microinverters, and power optimizers.
- Review module and any 3rd party manufacturer's documentation for compatibility and compliance with warranty terms and conditions

Solis Certified Inverters

These products, when deployed with approved racking and at the array-level, conform to ANSI/CAN/UL 3741 requirements. Please refer to your racking provider's addendum.

- S5-GC60K-LV-US
- S5-GC75K-US
- S5-GC80K-US
- S5-GC90K-US
- S5-GC100K-US
- S5-GC125K-US
- S6-GC25K-US
- S6-GC30K-LV-US
- S6-GC33K-US
- S6-GC36K-US
- S6-GC40K-US
- S6-GC50K-US
- S6-GC60K-US

Note for Ordering Solis Products

If you do order an inverter integrated with a transmitter, it does not need to be disabled. If you order an inverter with an APS transmitter, for example, but want to utilize Tigo, this is when you would need to disable the transmitter. Our team is here to support you in design and string sizing to optimize your site solution.

Example of UL3741 Bill of Materials

PV Hazard Control System Equipment and Components

Solis PV String Inverters & qualified PV racking systems have been certified to UL 3741 and meet NEC Rapid Shutdown 690.12(B)(2)(1), forming a PV Hazard Control System (PV FHC). Solis PV string inverters are PVRSS certified-tested as part of a Rapid Shutdown. Compliant systems, however, may require more components depending on deployment method and region. It is suggested, in addition to complying to all requirements of product installation guides and manuals, to check with your local utility and ruling body to confirm preferred compliance methods. An example Bill of Materials (BOM) may include, but is not limited to:

1. PV Modules
2. Approved racking solution
3. Inverters
4. Rapid Shutdown components
5. PV wire and connector management tray
6. Conduit and clips for PVHCS
7. Placards and markings indicating compliance
8. Additional connectivity or optimization equipment

Installation: Meeting Requirements in Commercial Applications

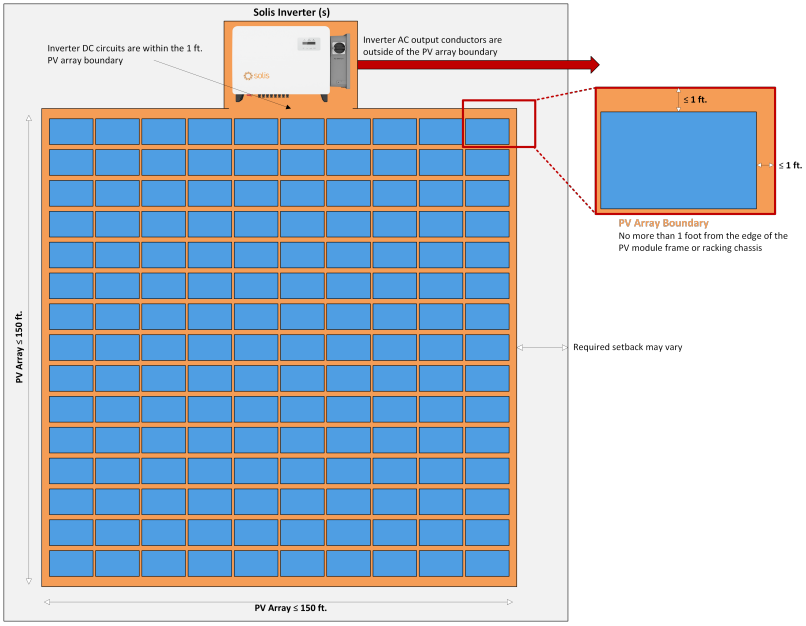
Conceptual Scenario 1 // Array(s) complies with NEC 690.12(B) by utilizing a listed UL 3741 PV Hazard Control System

PV Circuit Voltages

- Outside Array Boundary: ≤ 30V within 30 Seconds
- Inside Array Boundary: ≤ 1000V

A. All inverter input circuits (DC) are contained within the PV array boundary and do not require additional measures to reduce string voltages per 690.12(B)(2)(1) after initiation (Inverter DC disconnect, AC breaker or AC disconnect).

B. Inverter output circuits (AC) are outside of the array boundary and meet 690. 12(B)(1) requirement after initiation (AC breaker or AC disconnect).



Conceptual Scenario 2 // Maintaining NEC Compliance Sub-Array(s) are within the same array Boundary and Array(s) comply with NEC 690.12(B)(2)

PV Circuit Voltages

- Outside Array Boundary: ≤ 30V within 30 Seconds
- Inside Array Boundary: ≤ 1000V

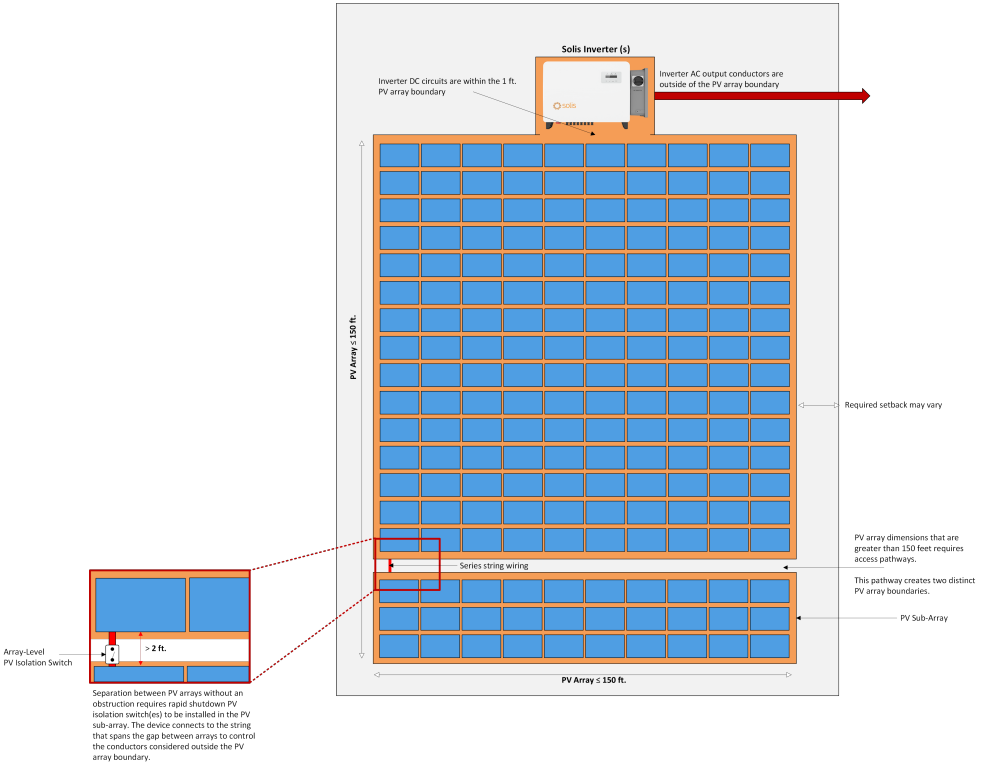
Conceptual Scenario 3 // Maintaining NEC Compliance Multiple Sub-Arrays with conductors outside of Array Boundary are controlled via String I solation Device(s)690.12(B)(2)(1)

PV Circuit Voltages

- Outside Array Boundary: ≤ 30V within 30 Seconds
- Inside Array Boundary: ≤ 1000V

Complete string must be connected to a single isolation device.

If used for a partial string, isolation devices required on both sides of the pathway since voltage will be present on both sides.



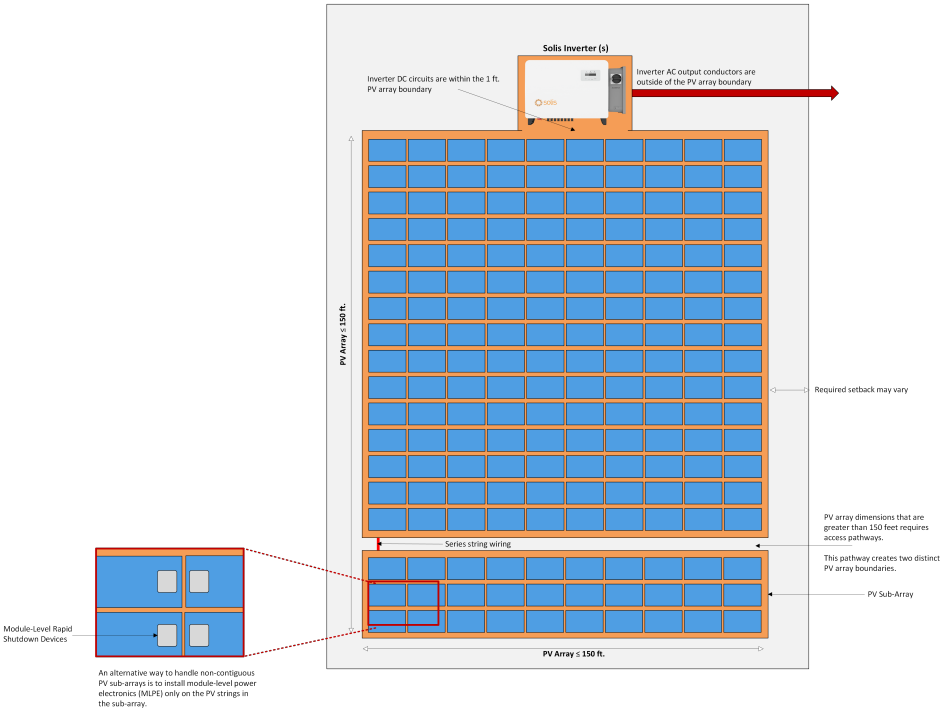
Conceptual Scenario 4 // Maintaining NEC Compliance Sub-array(s) using MLPEs to control circuits for 690.12(B)(1) and (B)(2) compliance

PV Circuit Voltages

- Outside Array Boundary: ≤ 30V within 30 Seconds
- Inside Array Boundary: ≤ 1000V
- Sub-Array Boundary: ≤ 80V Inside within 30 Seconds

Utilize Module-Level Power Electronics on lower sub-array.

All modules on the same inverter input must be connected to an MLPE. Upper array utilizes UL 3741 listing without MLPEs for compliance.



Wire Management Guidelines

- Use UL Listed cable ties or wire management devices for under-module and along-row wiring
- For cross-row wiring, use approved listed raceways.
- Manage large wire bundles with UL Listed Raceways, ensuring wires are routed to avoid firefighter exposure at entry and exit points.

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