EcoFasten®
For Installers. By Installers.

UL 3741

COMMERCIAL INVERTERS

INSTALLATION APPENDIX

REVISION: 04/9/25	**VERSION:** V1.1

UL 3741 COMMERCIAL INVERTERS APPENDIX

EcoFasten®
For Installers. By Installers.

RATINGS

- Max PVHCS System Voltage: 1000V
- See the Clickfit or Rockit UL 3741 Installation Addendums for list of approved attachments, components, Electrical Balance of System Components, Listed Conduit and approved PV Modules.

NOTE: Requirements for PV arrays addressed in UL 3741 are intended for compliance with the National Electrical Code (NEC), NFPA 70, 2017 and later editions and their requirements for controlling electrical shock hazards inside the array boundary as addressed in NEC section 690.12(B)(2), Rapid Shutdown of PV Systems on Buildings and with the Canadian Electrical Code (CE Code) C22.1. The Inverters shown above within this PVHCS additionally comply with the 30V in 30 seconds requirements outside the PV array as required in 690.12 (B)(1).

UL 3741 COMMERCIAL INVERTERS APPENDIX

EcoFasten®
For Installers. By Installers.

APPROVED COMMERCIAL INVERTERS

CANADIAN SOLAR INVERTERS

- CSI-100K-T480GL03-U
- CSI-90K-T480GL03-U
- CSI-80K-T480GL03-U
- CSI-75K-T480GL03-U
- CSI-100K-T480GL02-U
- CSI-75K-T480GL02-U
- CSI-66K-T480GL01-UB
- CSI-60K-T480GL01-UB
- CSI-50K-T480GL01-UB
- CSI-40K-T480GL01-UB
- CSI-36K-T480GL01-UB
- CSI-30K-T480GL01-UB
- CSI-25K-T480GL01-UB
- CSI-60KTL-GS-B
- CSI-40KTL-GS-FLB
- CSI-40KTL-GS-B
- CSI-30KTL-GS-FLB

CHINT INVERTERS

- CPS SCA25KTL-DO/US-208
- CPS SCA25KTL-DO-R/US-480
- CPS SCA36KTL-DO/US-480
- CPS SCA50KTL-DO/US-480
- CPS SCA60KTL-DO/US-480

FRONIUS INVERTERS

- Fronius Symo Advanced 10.0-3 208-240/Lite
- Fronius Symo Advanced 12.0-3 208-240/Lite
- Fronius Symo Advanced 15.0-3 480/Lite
- Fronius Symo Advanced 20.0-3 480/Lite
- Fronius Symo Advanced 22.7-3 480/Lite
- Fronius Symo Advanced 24.0-3 480/Lite

GOODWE

- GW22KLV-SMT-US
- GW28KLV-SMT-US
- GW50K-SMT-US
- GW60K-SMT-US
- GW5000-MS-US30
- GW6000-MS-US30
- GW7700-MS-US30
- GW9600-MS-US30
- GW11K4-MS-US30

NEP INVERTERS

- Neptune 25K, 30K, 30K-LV, 33K, 36K, 40K, 50K, 60K, 75K and 100K

SMA INVERTERS

- STP 33-US-41
- STP 50-US-41
- STP 62-US-41
- STP 20-US-50
- STP 25-US-50
- STP 30-US-50

SOLECTRIA INVERTERS

- Solectria Renewables PVI25TL-208
- Solectria Renewables PVI25TL-480-R
- Solectria Renewables PVI-36TL-480-V2
- Solectria Renewables PVI50TL-480
- Solectria Renewables PVI60TL-480

SOLIS

- S5-GC60K-LV-US
- S5-GC75K-US
- S5-GC80K-US
- S5-GC90K-US
- S5-GC100K-US
- S5-GC125K-US
- Solis-75K-5G-US
- Solis-80K-5G-US
- Solis-90K-5G-US
- Solis-100K-5G-US
- Solis-25K-US (followed by -US-SW, -US-F-SW or -US-LSW)
- Solis-30K-US (followed by -US-SW, -US-F-SW or -US-LSW)
- Solis-36K-US (followed by -US-SW, -US-F-SW or -US-LSW)
- Solis-40K-US (followed by -US-SW, -US-F-SW or -US-LSW)
- Solis-50K-US (followed by -US-SW, -US-F-SW, -US-F-LSW or -US-LSW)
- Solis-60K-US (followed by -US-F-SW, or -US-F-LSW)
- Solis-66K-US (followed by -US-F-SW, or -US-F-LSW)
- S6-GC25K-US
- S6-GC33K-US
- S6-GC36K-US
- S6-GC40K-US
- S6-GC50K-US
- S6-GC60K-US
- S6-GC30K-LV-US

SUNGROW INVERTERS

- SG36CX-US
- SG60CX-US

UL 3741 COMMERCIAL INVERTERS APPENDIX

EcoFasten®
For Installers. By Installers.

UNDERSTANDING UL 3741 AND NEC 690.12

2020/2023 NEC 690.12(B)(2) Controlling Conductors Within the Array Boundary

The Clickfit and Rockit Photovoltaic Hazard Control Systems (PVHCS) are UL 3741 Listed systems that comply with NEC 690.12(B)(2), when installed by qualified persons per the installation procedures outlined in the Clickfit and Rockit Installation Manuals and this Addendum. Please refer to the following pages of this addendum for various example cases of system designs that comply with 690.12(B)(2).

2020/2023 NEC 690.12 Background

NEC 690.12 Rapid Shutdown of PV Systems on Buildings requires that all PV arrays installed on or in buildings shall include rapid shutdown functions to reduce shock hazard for Fire Fighters (FF) in accordance with 690.12(A) through (D):

(A) Controlled Conductors

(1) PV system DC circuits

(2) Inverter output circuits originating from inverters located within array boundary

(B) Controlled Limits

(1) Outside Array Boundary: ≤30V within 30 seconds

(2) Inside Array Boundary - The PV System shall comply with one of the following:

(1) Listed PV Hazard Control System (UL 3741)

(2) ≤80V within 30 seconds after rapid shutdown initiation

(3) PV array without exposed wiring methods or conductive parts (NEC 2020 only)

(C) Initiation Devices

Initiation device(s) shall initiate the rapid shutdown function of the PV system

(D) NEC 2020 - Equipment

Equipment that performs the rapid shutdown functions, other than initiation devices such as listed disconnect switches, circuit breakers, or control switches, shall be listed for providing rapid shutdown protection.

(D) NEC 2023 - Building with Rapid Shutdown

Buildings with PV systems shall have a permanent label located at each service equipment location to which the PV systems are connected or at an approved readily visible location and shall indicate the location of rapid shutdown initiation devices.

NEC 690.2 (2020) or Article 100 (2023) defines the array as a mechanically and electrically integrated grouping of modules with support structure, including any attached system components such as inverter (s) or dc-to-dc converter(s) and attached associated wiring.

NEC 690.12(B) defines the array boundary as 1ft from array in all directions. This indicates that the array boundary can extend 1 ft from the edge of the racking system or module.

INSTALLATION METHODS PER UL 3741 AND NEC 690.12

The following case studies are provided by EcoFasten to show examples of installation configurations that comply with NEC 690.12(B), compliance is not limited to these examples.

The simplest installation method to comply with NEC690.12(B) is to utilize the UL 3741 system with a contiguous array with one or more collocated inverters, as all inverter DC input circuits are within the 1ft array boundary (Case 1). Installations where sub-arrays are required and cannot be included within the 1ft array boundary can comply by using a single or combining one or more of the three options below (Cases 2-4).

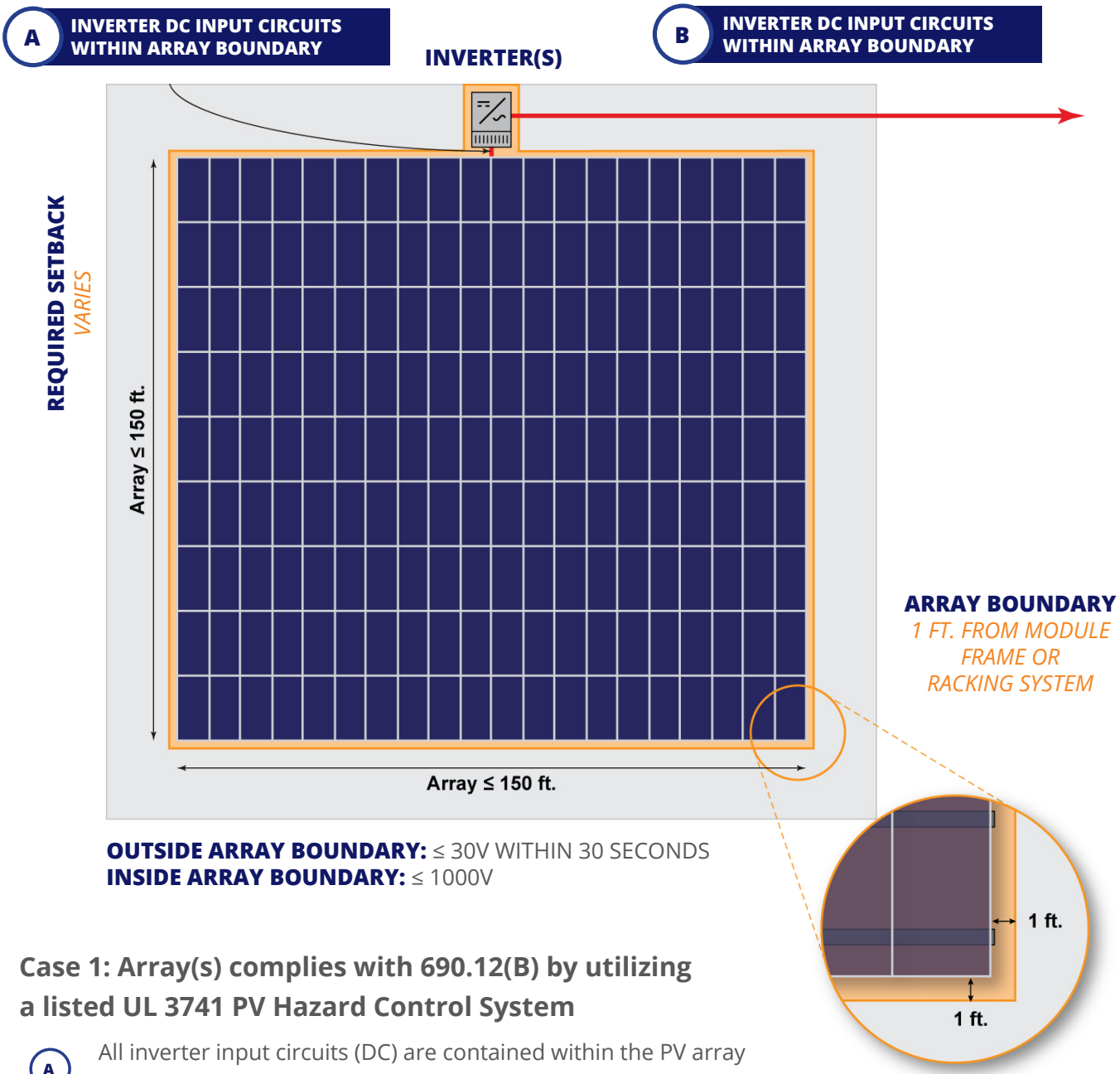
Case studies and NEC guidance have not been verified by Intertek.

UL 3741 COMMERCIAL INVERTERS APPENDIX

EcoFasten®
For Installers. By Installers.

CASE 1: UL 3741 LISTED SYSTEM

ARRAY(S) COMPLY WITH NEC 690.12(B)(2)(1)



OUTSIDE ARRAY BOUNDARY: ≤ 30V WITHIN 30 SECONDS
INSIDE ARRAY BOUNDARY: ≤ 1000V

Case 1: Array(s) complies with 690.12(B) by utilizing a listed UL 3741 PV Hazard Control System

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).

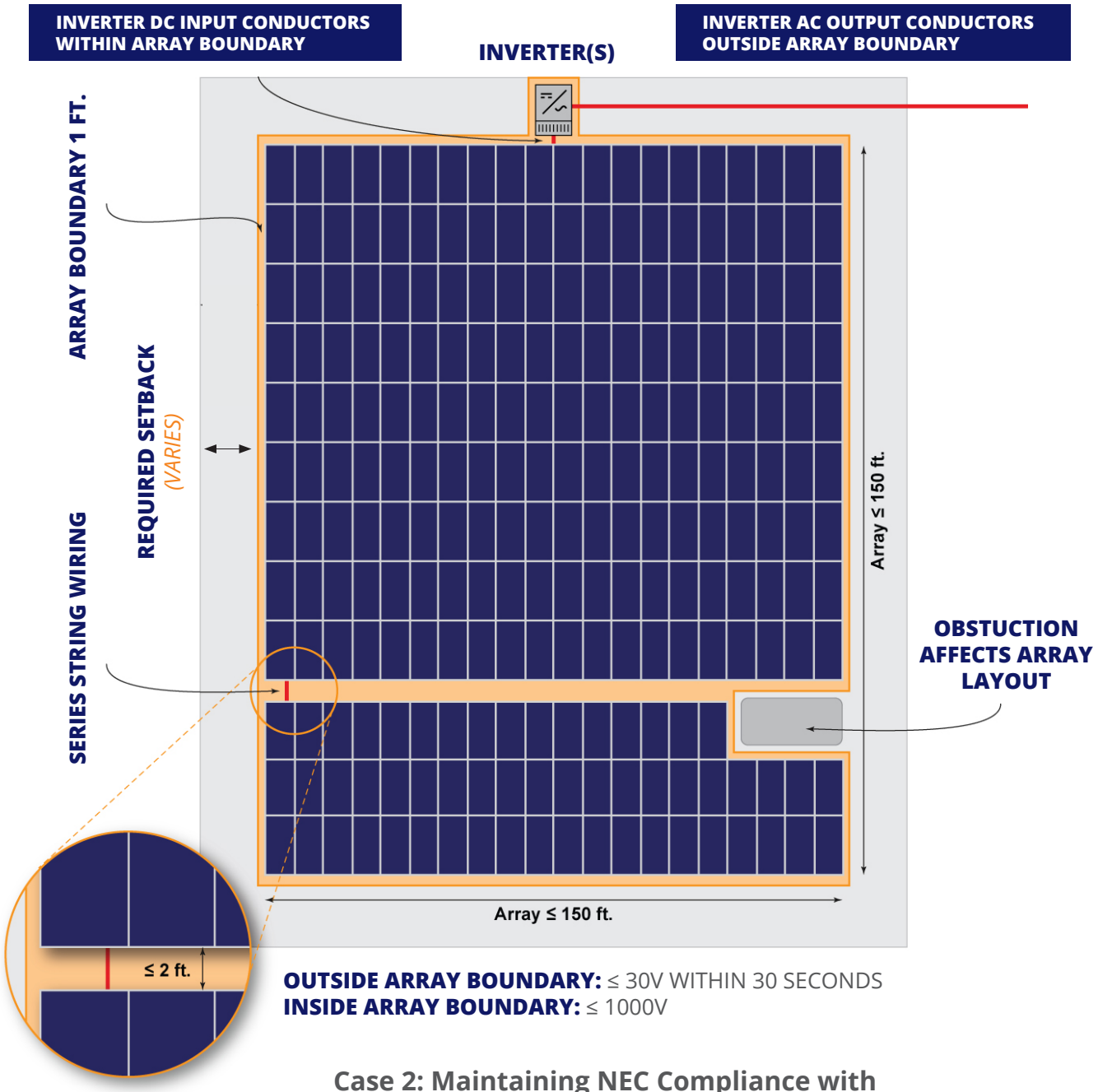
B Inverter output circuits (AC) are outside of the array boundary and meet the 690.12(B)(1) requirement after initiation (AC breaker or AC disconnect).

UL 3741 COMMERCIAL INVERTERS APPENDIX

EcoFasten®
For Installers. By Installers.

CASE 2: UL 3741 LISTED SYSTEM WITH CONTIGUOUS SUB-ARRAY

SUB-ARRAY(S) ARE WITHIN THE SAME ARRAY BOUNDARY AND ARRAY(S) COMPLY WITH NEC 690.12(B)(2)(1)



OUTSIDE ARRAY BOUNDARY: ≤ 30V WITHIN 30 SECONDS
INSIDE ARRAY BOUNDARY: ≤ 1000V

2 ALL MODULES WITHIN SAME ARRAY BOUNDARY

Case 2: Maintaining NEC Compliance with sub-array(s) within array boundary

Maximum 2 ft. spacing between all array components resulting in a single array boundary.

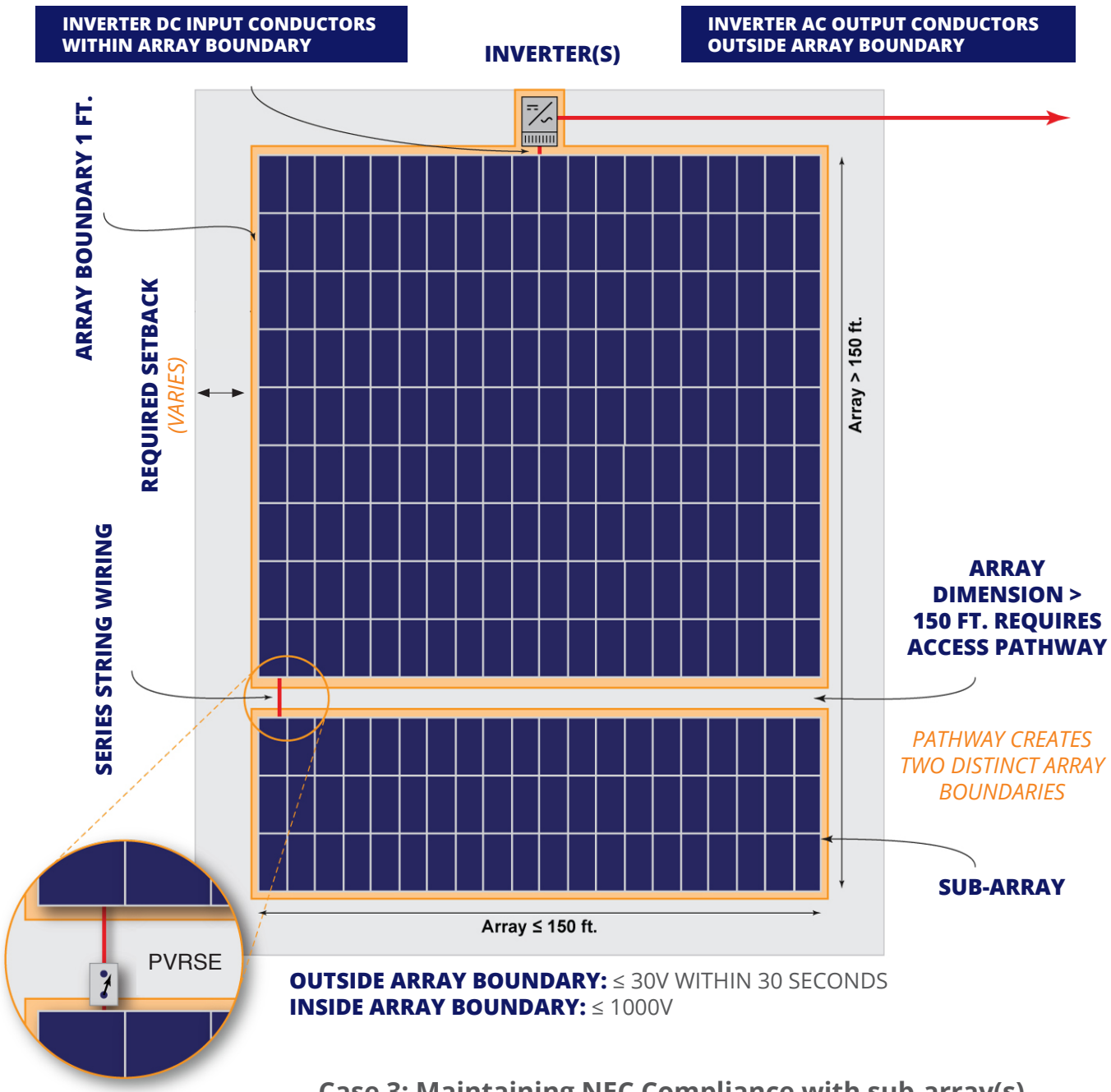
UL 3741 CASES

UL 3741 COMMERCIAL INVERTERS APPENDIX

EcoFasten®
For Installers. By Installers.

CASE 3: UL 3741 LISTED SYSTEM WITH NON-CONTIGUOUS SUB-ARRAY

MULTIPLE SUB-ARRAYS WITH CONDUCTORS OUTSIDE OF ARRAY BOUNDARY ARE CONTROLLED VIA PHOTOVOLTAIC RAPID SHUTDOWN EQUIPMENT (PVRSE)



3 PVRSE TO CONTROL CONDUCTOR OUTSIDE OF ARRAY BOUNDARY

Case 3: Maintaining NEC Compliance with sub-array(s) outside of array boundary

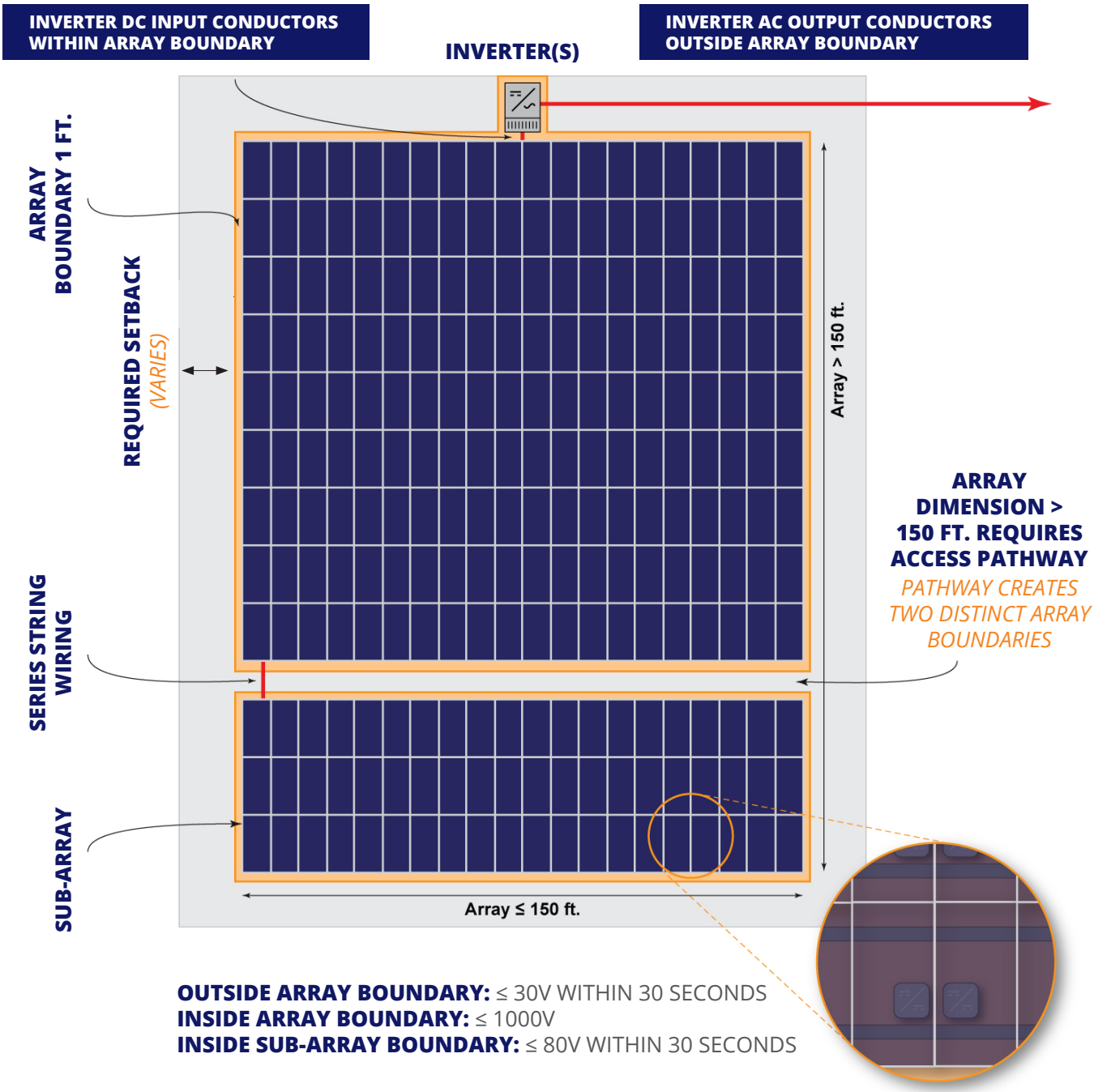
Complete string must be connected to a PVRSE. If used for a partial string, PVRSE is required on both sides of the pathway since voltage will be present on both sides.

UL 3741 COMMERCIAL INVERTERS APPENDIX

EcoFasten®
For Installers. By Installers.

CASE 4: UL 3741 LISTED SYSTEM WITH MLPE SUB-ARRAY

SUB-ARRAY(S) USING MLPES TO CONTROL CIRCUITS FOR 690.12(B)(1) AND (B)(2) COMPLIANCE



4 LISTED MODULE LEVEL POWER ELECTRONICS

Case 4: Maintaining NEC Compliance with sub-array(s) outside of array boundary

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 UL3741 listing without MLPEs for compliance.