



SHIFTING THE LIMITS

TECHNICAL NOTE:

AC AND DC SEPARATION IN INVERTER WIRING COMPARTMENT

While the NEC indicates that inverter AC output circuits should be physically separated from DC PV circuits, this technical note describes how this requirement should be applied when interfacing with an inverter.

NEC 2014 690.31(B) states:

PV source circuits and PV output circuits shall not be contained in the same raceway, cable tray, cable, outlet box, junction box, or similar fitting as conductors, feeders, branch circuits of other non-PV systems, or inverter output circuits, unless the conductors of the different systems are separated by a partition. PV system conductors shall be identified and grouped as required by 690.31(B)(1) through (4). The means of identification shall be permitted by separate color coding, marking tape, tagging, or other approved means.

This paragraph clearly notes that the requirement for separation of PV output circuits and inverter output circuits applies when in raceways, trays, boxes etc. An inverter is a separate listed piece of equipment, not a raceway or box. Its construction and proper use is therefore governed by the UL 1741 standard which addresses terminals, conductor separation, guarding, wire-bending space etc. Outside of inverters (or other listed devices that allow entry of DC PV circuits and inverter output circuits) separation between the two should be maintained.

NEC 90.7 states:

It is the intent of this *Code* that factory-installed internal wiring or the construction of equipment need not be inspected at the time of installation of the equipment, except to detect alterations or damage, if the equipment has been listed by a qualified electrical testing laboratory that is recognized as having the facilities described in the preceding paragraph and that requires suitability for installation in accordance with this *Code*.

Furthermore, 110.3 states:

Listed or labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling.

Internal wiring, wiring compartments and installation instructions of inverters are examined by Nationally Recognized Testing Laboratories. All Fronius inverters are listed by CSA to UL 1741 and thus have already been internally evaluated for safety, with the inclusion of field-wiring practices. In accordance with the UL 1741 listing, sufficient separation between DC and AC conductors in the wiring compartment is achieved with average care by utilizing separate conduit entrances. Zip-tie attachment points are included for the purpose of organizing and separating conductors. When conductors of both circuits are insulated for the highest voltage present, then no separation is required.

No inspection of the internal wiring by the AHJ is required. Field-installed wiring must comply with the installation instructions for the inverter and should be inspected for compliance with 110.3. Portions of the wiring external to listed devices like inverters must meet the rest of the requirements of the Code, including 690.12(B).

If you have questions concerning this Technical Note, please contact Fronius Solar Technical Support at 1-877-FRONIUS or email pv-support-usa@fronius.com.