ELI FIELD CHECKLIST • L3 HAZARD

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Industrial Grounding & Bonding Verification: Effective Ground-Fault Current Path in Raceways and Cable Tray

A field checklist to prove the fault-clearing path is continuous and low-impedance

A circuit breaker can only clear a ground fault if the fault current has a continuous, low-impedance path back to the source. When bonding jumpers are missing across cable tray expansion joints, loose splice bolts choke that current below the breaker's trip threshold — and the fault burns instead of clearing. This checklist captures the verification steps that prevent the failure mode behind a documented 480V cable tray ground-fault fire.

Use it at commissioning, after any raceway modification, and as part of periodic maintenance. Sign each line. File the completed checklist with the commissioning or work-order package.

COMPANION RCA
The Broken Path: Cable Tray Ground Fault Fire

AUDIENCE
E&I crews, contractors, commissioning / QA, maintenance planners

STANDARDS
NEC 250 & 392, IEEE 142, CEC Section 10, NETA MTS

Use this checklist to verify the effective ground-fault current path wherever a metallic raceway or cable tray serves as, or carries, the equipment grounding conductor. Each item must be verified and signed off. Metal touching metal is not a ground path — if you cannot measure it, do not assume it.

1. CABLE TRAY & RACEWAY BONDING

- [ ] **Listed bonding jumpers installed across all expansion joints.**
  Every expansion / discontinuity joint bridged with a listed flexible bonding jumper. Splice plates and bolts are mechanical hardware, not the fault path.

- [ ] **Bonding restored across every cut or modified section.**
  Each section that was cut, added, or re-routed has its bonding re-established and re-tested as part of the modification.

- [ ] **Bonding jumpers sized correctly.**
  Jumpers sized for the largest upstream overcurrent device per NEC 250.122.

PASS CRITERIA — JOINT BONDING

Do not rely on splice-plate bolts for continuity. Each bonded joint should read essentially negligible resistance — typically `< 0.1 Ω` across a single connection — measured with a low-resistance (DLRO) ohmmeter.

2. EQUIPMENT BONDING

- [ ] **Paint removed at all lug landings.**
  Coatings removed where ground lugs land on enclosures and tray to guarantee metal-to-metal contact, per NEC 250.96.

- [ ] **Listed lugs and connectors, torqued to spec.**
  Grounding/bonding connectors listed for the conductor and surface, installed and torqued to the manufacturer's value.

- [ ] **Isolated and separately derived grounds bonded back to service.**
  Any isolated ground or separately derived system correctly bonded to the main service grounding system — no floating grounds.

3. DEDICATED EQUIPMENT GROUNDING CONDUCTOR

- [ ] **Sized green EGC pulled in the tray.**
  A dedicated, sized equipment grounding conductor run in the tray alongside the power cables so continuity does not depend on tray joints alone.

- [ ] **EGC bonded to each tray section and load.**
  The dedicated EGC bonded to every tray section and to each connected piece of equipment to provide a redundant fault path.

4. CONTINUITY & RESISTANCE TESTING

- [ ] **Point-to-point resistance test performed.**
  Resistance measured from the farthest point of the raceway back to the main service ground bus with a low-resistance ohmmeter.

- [ ] **Tested at commissioning and periodically.**
  Ground-path continuity verified before energization and re-verified on a periodic basis over the life of the installation.

- [ ] **Path proven low enough to operate upstream protection.**
  Confirmed that prospective ground-fault current over the measured path exceeds the upstream device's trip threshold so the fault clears fast.

PASS CRITERIA — EFFECTIVE GROUND-FAULT PATH

Per NEC 250.4(A)(5), the path must be electrically continuous, low-impedance, and capable of carrying the maximum imposed fault current. The measured end-to-end resistance must be low enough that the prospective fault current exceeds the breaker's instantaneous pickup. Record the value and the calculated fault current on the test sheet.

5. FAULT-CLEARING VERIFICATION

- [ ] **Available fault current vs. path impedance confirmed.**
  The arc-fault and bolted-fault current at the load end verified against the protective device's clearing characteristic.

- [ ] **Ground-fault protection applied where faults can sit below pickup.**
  Where arcing ground faults can remain below the overcurrent pickup, GFPE / ground-fault relaying is applied so low-level faults still clear.

REFERENCE STANDARDS

- **NEC 250.4(A)(5)** — Effective ground-fault current path — continuous, low-impedance, fault-rated
- **NEC 250.96 / 250.122** — Bonding for continuity; sizing of equipment grounding/bonding conductors
- **NEC 392.60** — Cable tray as equipment grounding conductor; bonding jumper requirements
- **IEEE 142 (Green Book)** — Grounding of industrial and commercial power systems
- **CEC Section 10** — Grounding and bonding (Canadian Electrical Code)
- **NETA MTS** — Maintenance Testing Specifications — ground/bonding resistance testing

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