Grounding Failure Case Study
Verifying Absence of Voltage
Electrical Enclosure with Incoming 3-Phase 480V AC Power

Situation

Worker approaches the enclosure and the disconnect switch for the 480V power source is in the OFF position. The disconnect switch has failed with one phase (L1) in the closed position (L2, L3 are open). The ground leads of the devices are NOT connected to ground because of an improper installation or termination failure.

The worker applies a lock. Following safety procedures, the worker performs an absence of voltage test with the electrical enclosure closed using a permanently mounted device.

### Absence of Voltage Tester (AVT)
- **Failure Mode**: Ground lead(s) are NOT connected to ground
- **Potential Cause**: Improper installation or termination failure
- **System State**: Disconnect is in the OPEN/OFF position with L1 energized
- **Detection**: YES
  - The AVT will detect open ground (or phase) lead(s) and communicate the installation of sensor leads is not verified
- **Failure Effect**: AVT will detect open ground lead(s) and communicate installation is the reason the absence of voltage test cannot be confirmed
- **Incident Consequence**: None - Incident Avoided

### Test Portal
- **Failure Mode**: Ground lead(s) are NOT connected to ground
- **Potential Cause**: Improper installation or termination failure
- **System State**: Disconnect is in the OPEN/OFF position with L1 energized
- **Detection**: NO
  - Voltage measurement results in zero voltage when voltage is present
- **Failure Effect**: Worker erroneously considers electrical enclosure as deenergized
- **Incident Consequence**: Worker opens equipment while energized
  - Probable shock or arc flash event
  - Equipment damage is likely

### Voltage Test Station
- **Potential Cause**: Ground lead(s) are NOT connected to ground
- **System State**: Disconnect is in the OPEN/OFF position with L1 energized
- **Detection**: NO
  - The L1 LED for the voltage indicator will not be illuminated and measurement results in zero voltage when voltage is present
- **Failure Effect**: Worker erroneously considers electrical enclosure as deenergized
- **Incident Consequence**: Worker opens equipment while energized
  - Probable shock or arc flash event
  - Equipment damage is likely