Third-Party Lightning Protection System Certification Program for Explosives Facilities

Lightning Protection Institute – Inspection Program

www.lpi-ip.com

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Outline

• History LPI-IP Programs
• Program Objective
• Program Description
• Applicable Requirements Summary
• How it Works
• Lightning Protection Test Plan
• Summary and Recommendations
LPI-IP Inspection Program History

• Established in 2010 as alternative to UL Master Label Program

• > 1500 Systems Certified in 2017

• Master Installation Certification Program
  • NFPA 780
  • LPI 175
  • UL 96A

• Extended Master Inspection Program
Extended Master Inspection Program Objective

• Based on Master Installation Certification Program
• Provide a standardized approach to inspections to get repetitive results
• Fill void in industry
Program Description

• Standards Included in Program
  • NFPA 780  LPI-175  UL 96A
  • UFC 3-575-01
  • AFI 32-1065  PAM 385-64  NAVSEA OP 5

• Interaction between Installer, Owner, and Cert body
• Visual Inspection
• Electrical Testing
• Lightning Protection Test Plan
Applicable Requirements Summary

- NFPA 780 provides baseline criteria
- UFC 3-575-01 indicates AE facilities to comply with applicable:
  - UFC 4-420-01 NAVSEA OP 5 DA PAM 385-64 AFMAN 91-201
- DoD 6055.09M – New or modified facility LPS to be electrically tested
  - NFPA 780 Annex D R (bond) = 1Ω R (gnd) = 25 Ω
- Visual inspection
  - AFI 32-1065 –to include all visible parts of LPS
  - NAVSEA OP 5 – 100% visual plus surge protection systems
  - DA PAM 385-64 – Confirm bonding connections firmly attached and verify installation requirements of NFPA 780
Electrical Testing

- Sketch identifying test points to be provided
- Bonding / Continuity testing
  - DA PAM 385-64 – reference point is down conductor at point if enters earth
  - NAVSEA OP 5 – each air terminal to its grounding electrode for integral systems
- Resistance-to-Earth
  - 3-point Fall-of-potential test method specified by all
  - AFI 32-1065 + NAVSEA OP 5 allow electrode configuration options
  - Recommendations for reference electrode spacing provided by each service
  - AFI 32-1065 allows temporary disconnection of electrical service from other grounds and requires test @ each electrode if no ground loop conductor installed
  - PAM 385-64 - S-curve plot required if ground loop electrode > 25 Ω (ρ possible)
Electrode Configurations
Installer – Owner Interchange

- Confirm scope of certification with all parties
  - Applicable standards surge protection included?
- Provide Owner deliverables as specified in contract
  - Likely includes a Maintenance and Inspection Plan
- Identify and schedule witnesses
- Document and distribute any pre-inspection reference material required as a part of certification
- Confirm with Owner all details of installation and data packages
Program Application – Installer

• LPI-IP Extended Master Installation Certificate application.
• Lightning Protection As-Built Drawings – Reference test Points
• Approved Grounding System Plan – Reference Test Points
• Calibrated test equipment
• Photos/photo waiver (as applicable)
• Site AHJ sign off on test plan
Lightning Protection Test Plan

• Not intended to be same as M&I plan as required by standards
• Visual Inspection requirements similar across standards
• Electrical testing
  • Continuity (bonding) testing
  • 3-point Fall-of-Potential Resistance to earth testing
Summary / Recommendations

• Extended Master Inspection Certification Program:
  • Based on well-established lightning protection system certification program
  • Provides positive controls to allow consistency between inspections with flexibility to meet the needs of the customer
  • Relies on positive confirmation through documentation.

• Lightning Protection Test Plan
  • tool to address deviations between standards providing consistency in comparison
  • takes subjective decisions out of the hands of the inspectors
  • Evaluation plan documented and agreed by both installer and owner prior to on-site inspection

• Suggest UFC 3-575-01, 3-1 be revised to reflect that an LPI-IP Extended Master Inspection Certification is acceptable alternative to UL Lightning Protection Inspection Certificate to ensure compliance with NFPA 780