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2018 International Explosives
Safety Symposium & Exposition

August 6 – 9, 2018 | San Diego, CA



Third-Party Lightning Protection System Certification Program for Explosives Facilities

Lightning Protection Institute – Inspection Program

www.lpi-ip.com

9 August 2018



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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

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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

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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

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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) = 1 Ω 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

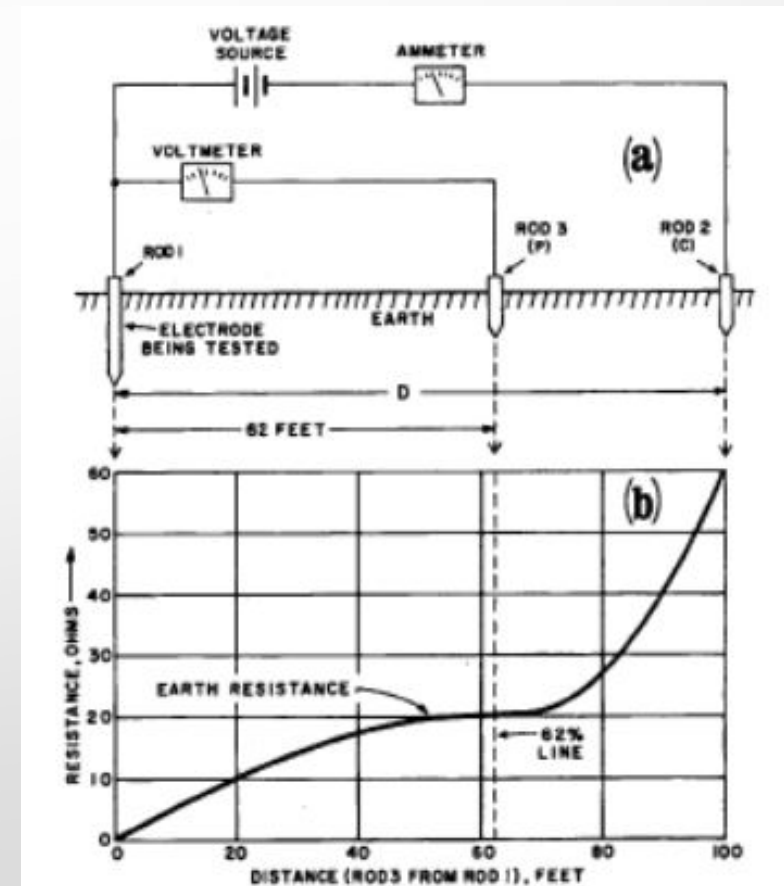
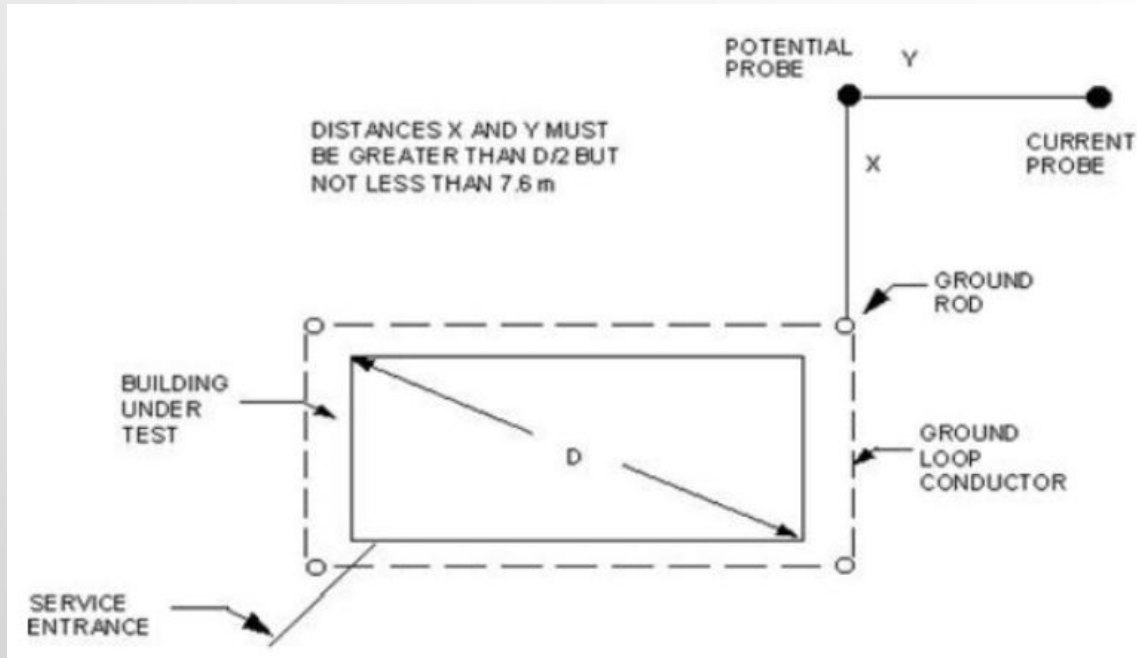
Electrical Testing



- Sketch identifying test points to be provided
- Bonding / Continuity testing
 - DA PAM 385-64 – reference point is down conductor at point it 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



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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

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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

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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