General Notes:

1. *This guide specification is intended to provide the Design Professional with a basic guideline of suggested materials and installation requirements for a structural Lightning Protection System.*
2. *The guide specification shall be carefully reviewed and edited with respect to application-specific project requirements. Proposed modifications shall be reviewed by Harger Lightning and Grounding.*
3. *The finalized version shall be included in the project contract documents.*

*Editing Notes:*

1. *This specification section must only be altered by notation (i.e. deleted text with strikethrough and additional text with double underline). This shall be accomplished by using Tools / Track Changes / Highlight Changes, and select “Track changes while editing” in MS Word or equivalent.*
2. *The Review Submittal Specification section shall be provided in electronic form for Harger Review.*
3. *Leave the following note (“For Construction Document Review, Design Submittal”) as part of the review submittal to aid any reviewer to understand WHY there are strikeouts and underlines.*
4. *After comments are received from Harger and incorporated, the strikeouts, underlines and reviewer notes are to be deleted before the spec is issued for Bidding.*

SECTION 26 41 13

LIGHTNING PROTECTION FOR STRUCTURES

1. GENERAL
   1. SUMMARY
      1. Section includes lightning protection installation requirements for buildings and associated structures and requirements for lightning protection system components.
   2. RELATED REQUIREMENTS
      1. Section 26 05 26 – Grounding and Bonding for Electrical Systems
      2. Section 26 01 40.13 - Operation and Maintenance of Lightning Protection Systems
   3. REFERENCES
      1. NFPA 780 – Standard for the Installation of Lightning Protection Systems (Current Edition)

Remove paragraph 1.04 if it is determined that a surge threat is negligible or the lines are equivalently protected or where installation compromises safety.

* 1. FURNISHED AND INSTALLED BY 26 05 00
     1. Surge Protective Devices (SPD’s) shall be installed at the entrances of all power service entrances and conductive communications systems.
     2. Surge Protective Device Ratings
        1. The power service entrance SPD shall have a nominal discharge current (In) rating of at least 20 kA 8/20 µs per phase and be listed and labeled by UL 1449, *Standard for Safety for Surge Protective Devices.*
        2. Signal, data, and communications SPDs shall have a maximum discharge current (Imax) rating of at least 10 kA 8/20 µs when installed at the entrance.
  2. ADMINISTRATIVE REQUIREMENTS
     1. Pre-installation Meeting: Installing contractor shall coordinate a site walkthrough with the lightning protection manufacturer prior to the start of any work. Manufacturer representative shall provide a pre-installation site report which includes guidance for design changes or confirmation that current site conditions match contract documents.
     2. Post-Installation Meeting: Installing contractor shall coordinate a site walkthrough with the lightning protection manufacturer at the commencement of work. Manufacturer representative shall provide a post-installation site report to the installing contractor which contains the following:
        1. Any deficiencies in the installation or confirmation that the current installation meets the requirements of the standards specified.
        2. Electronic markup of the approved shop drawing with embedded images showing all concealed bonding (gas piping, water main, electrical service ground, communication grounds) and a random selection of concealed connections (cable to ground rod, cable to cable, cable to steel).
           1. Photographic documentation shall be provided from the installing contractor to the lightning protection manufacturer representative prior to concealing or backfilling.
     3. Sequencing: Coordinate installation of lightning protection system with installation of other building systems and components, including electrical wiring, supporting structures and building materials, metal bodies requiring bonding to lightning protection system, and building finishes.
  3. SUBMITTALS
     1. Product Data: Manufacturer’s descriptive and technical literature or catalog cuts.
     2. Shop Drawings:
        1. Layout of the lightning protection system, specifically for the building(s) or structures included in the contract drawings.
        2. Installation details of the products to be used in the installation.
     3. Manufacturer’s Instructions: Installation instructions shall be provided for lightning protection components that require field assembly or fabrication.
     4. Qualification data for firms or persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include data on listing or certification by a Nationally Recognized Testing Laboratory (NRTL).
     5. Certification, signed by roofing contractor, that roof adhesive and installation method for air terminals, conductors and thru-roof penetrations is approved by manufacturers of the lightning protection components, the roofing manufacturer and the decorative metal finishing manufacturer.
  4. CLOSEOUT SUBMITTALS

*While highly suggested, remove paragraph 1.07.A if a maintenance contract is not desired.*

* + 1. Maintenance Contracts: Installing contractor shall provide building owner with pricing for yearly system inspections. Building owner is under no obligation to have yearly inspections performed.
    2. Operation and Maintenance Data: Installing contractor shall provide building owner with an operation and maintenance manual. Refer to Section 26 01 40.13 - Operation and Maintenance of Lightning Protection Systems
    3. Warranty Documentation: The completed installation shall carry a one-year guarantee against defects in material or installation.
       1. Exclusions: Routine preventative maintenance, accidental or intentional damage shall not be included as part of the warranty service.
    4. Record Documentation: Installing contractor shall provide building owner a copy of the pre-installation site report, post-installation site report and (3) full-size plots of accurate as-built shop drawings.
  1. EXTRA STOCK MATERIALS
     1. Provide extra stock materials to building owner in a single, durably packed container labeled with “26 41 13 – Lightning Protection for Structures”, installing contractor contact information, date and complete listing of contents.
        1. (5) Air Terminal Assemblies
        2. (5) Secondary sized bonding lugs
        3. (5) Main sized bonding lugs or bonding plates
        4. (10) Cable-to-Cable splice connectors
        5. (100’) Main sized conductor
        6. (50) Cable fasteners/holder with related hardware
  2. QUALITY ASSURANCE
     1. Qualifications:
        1. Manufacturer shall maintain current lightning protection material listings a Nationally Recognized Testing Laboratory (NRTL).
        2. Installer Qualifications: Engage an experienced installer who has been trained and certified to perform installations by the lightning protection manufacturer.

Example: https://www.harger.com/harger-university

* + 1. The system shall be physically inspected by a Nationally Recognized Testing Laboratory (NRTL) to the current edition of NFPA 780. The certification shall be provided to the building owner at completion of the project.

1. PRODUCTS
   1. APPROVED MANUFACTURER
      1.  301 Ziegler Drive, Grayslake IL 60030

<http://www.harger.com> | <hargersales@harger.com>

* 1. AIR TERMINALS
     1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding air terminals.
     2. Substitution Limitations: Project conditions may dictate the use of an air terminal not shown, installing contractor shall coordinate with lightning protection manufacturer to determine proper materials.
     3. Product Options:
        1. Length: 12” minimum when installed around the perimeter or along the ridge of a building and 24” minimum when installed in mid-roof areas or mounted on equipment.
        2. Point Type: Gently tapered air terminals shall be used in all areas. Exception, mid-roof mounted air terminals shall be safety tipped to prevent personnel injury.
        3. Material Type: Where applicable, copper air terminals shall be used. Exception, copper materials shall not be mounted on aluminum, Galvalume ®, galvanized steel, zinc or directly onto other ferrous metal surfaces. In these instances, aluminum air terminals shall be used.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Material Type | Class I – 12” | Class I – 24” | Class II – 12” | Class II – 24” |
| Aluminum | [1212ALAT](https://www.harger.com/product/gently-tapered) | [1224ASTAT](https://www.harger.com/product/safety-tipped) | [5812ALAT](https://www.harger.com/product/gently-tapered) | [5824ASTAT](https://www.harger.com/product/safety-tipped) |
| Copper | [3812CUAT](https://www.harger.com/product/gently-tapered-0) | [3824CSTAT](https://www.harger.com/product/safety-tipped-0) | [1212CUAT](https://www.harger.com/product/gently-tapered-0) | [1224CSTAT](https://www.harger.com/product/safety-tipped-0) |

* 1. AIR TERMINAL BASES
     1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding air terminal bases.
     2. Substitution Limitations: Project conditions may dictate the use of an air terminal base not shown. Installing contractor shall coordinate with lightning protection manufacturer to determine proper materials.
     3. Product Options:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Material Type | Universal | Swivel | Ridge Saddle | Pipe Railing |
| Aluminum | [AUBU Series](https://www.harger.com/product/universal) | [AUBS Series](https://www.harger.com/product/swivel) | [A160 Series](https://www.harger.com/product/ridge-saddle-1) | [APRB Series](https://www.harger.com/product/pipe-or-railing) |
| Copper | [CUBU Series](https://www.harger.com/product/universal-0) | [CUBS Series](https://www.harger.com/product/swivel-0) | [160 Series](https://www.harger.com/product/ridge-saddle-1) | [CPRB Series](https://www.harger.com/product/pipe-or-railing-0) |

* 1. CONDUCTORS
     1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding conductors.
     2. Substitution Limitations: No Substitutions
     3. Product Options:
        1. Material type: Where applicable, bare copper conductors shall be used. Exception, copper materials shall not be mounted on aluminum, Galvalume ®, galvanized steel, zinc or directly onto other ferrous metal surfaces. In these instances, aluminum conductors shall be used.

|  |  |  |
| --- | --- | --- |
| Material Type | Class I | Class II |
| Aluminum | [A24](https://www.harger.com/product/class-i-1) | [A28](https://www.harger.com/product/class-i-1) | [A37R](https://www.harger.com/product/class-ii-1) |
| Copper | [24](https://www.harger.com/product/class-i) | [29](https://www.harger.com/product/class-i) | [32](https://www.harger.com/product/class-i) | [28](https://www.harger.com/product/class-ii) | [40-28](https://www.harger.com/product/class-ii) |
| Tinned | [24T](https://www.harger.com/product/class-i-0) | [29T](https://www.harger.com/product/class-i-0) | [32T](https://www.harger.com/product/class-i-0) | [28T](https://www.harger.com/product/class-ii-0) | [4028T](https://www.harger.com/product/class-ii-0) |

* 1. CONDUCTOR FASTENERS
     1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding conductor fasteners.
     2. Substitution Limitations: No Substitutions
     3. Product Options:
        1. Material type: Where applicable, bare copper conductors shall be used. Exception, copper materials shall not be mounted on aluminum, Galvalume ®, galvanized steel, zinc or directly onto other ferrous metal surfaces. In these instances, aluminum conductors shall be used.

|  |  |  |
| --- | --- | --- |
| Material Type | Adhesive Cable Holder | Mechanical Cable Clip |
| Aluminum | [A262](https://www.harger.com/product/aluminum-0) | [ACC Series](https://www.harger.com/product/aluminum-2) |
| Copper | [262](https://www.harger.com/product/copper-4) | [CCC Series](https://www.harger.com/product/copper-7) |
| Tinned | [262T](https://www.harger.com/product/tin-plated-copper) | [CCCT Series](https://www.harger.com/product/tin-plated-copper-0) |

* 1. ABOVE GRADE CONNECTORS
     1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding connectors.
     2. Substitution Limitations: No Substitutions
     3. Product Options:
        1. Material type: Where applicable, bare copper connectors shall be used. Exception, copper materials shall not be mounted on aluminum, Galvalume ®, galvanized steel, zinc or directly onto other ferrous metal surfaces. In these instances, aluminum connectors shall be used.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Material Type | Parallel | “T” | Straight | Cross |
| Aluminum | [A1BC](https://www.harger.com/product/1-bolt-parallel-splice) | [A207](https://www.harger.com/product/tee-1) | [A206](https://www.harger.com/product/2-bolt-straight-splice-2)R | [A210](https://www.harger.com/product/cross-run-2) |
| Copper | [B1BC](https://www.harger.com/product/1-bolt-parallel-splice-0) | [207](https://www.harger.com/product/tee) | [206](https://www.harger.com/product/2-bolt-straight-splice) | [210](https://www.harger.com/product/cross-run) |
| Bi-Metal | [BM1BC](https://www.harger.com/product/1-bolt-parallel-splice-1) | n/a | [211R](https://www.harger.com/product/2-bolt-straight-splice-1) | [210BM](https://www.harger.com/product/cross-run-0) |

* 1. BONDING LUGS AND PLATES
     1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding bonding lugs and plates.
     2. Substitution Limitations: No Substitutions
     3. Product Options:
        1. Material type: Where applicable, bare copper bonding connections shall be used. Exception, copper bonding materials shall not be mounted on aluminum, Galvalume ®, galvanized steel, zinc or directly onto other ferrous metal surfaces. In these instances, aluminum or bi-metallic bonding connections shall be used.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Material Type | Secondary | Main Sized | Flat Bonding Plate | Flange Bonding Plate | Pipe Bonding Clamp |
| Aluminum | [A214](https://www.harger.com/product/secondary-bonding-lug-2) | [A222](https://www.harger.com/product/main-sized-bonding-lug-1) | [A217](https://www.harger.com/product/bonding-plate-0) | [A223](https://www.harger.com/product/flange-bonding-plate-1) | [APC Series](https://www.harger.com/product/pipe-clamp) |
| Copper | [214](https://www.harger.com/product/secondary-bonding-lug) | [222](https://www.harger.com/product/main-sized-bonding-lug) | [217](https://www.harger.com/product/bonding-plate) | [223](https://www.harger.com/product/flange-bonding-plate) | [CPC Series](https://www.harger.com/product/cpc-pipe-clamps) |
| Bi-Metal | [216BM](https://www.harger.com/product/secondary-bonding-lug-1) | [BMBL](https://www.harger.com/product/main-sized-bonding-lug-2) | [BMBP](https://www.harger.com/product/bonding-plate-1) | n/a | n/a |

* 1. THRU-ROOFS / THRU-WALLS
     1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding thru-walls or thru-roofs.
     2. Substitution Limitations: No Substitutions
     3. Product Options:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Material Type | Metal Roofing | Flat Roofing -Economy | Flat Roofing –Stainless Steel | Thru-Wall |
| Aluminum | [A225 Series](https://www.harger.com/product/225-series-1) | [ATRC1](https://www.harger.com/product/atrc-series) | n/a | [A226 Series](https://www.harger.com/product/226-series-1) |
| Copper | [225 Series](https://www.harger.com/product/225-series) | [CTRC1](https://www.harger.com/product/ctrc-series) | [SSTRCC Series](https://www.harger.com/product/vertical-sstr-series-0) | [226 Series](https://www.harger.com/product/226-series) |
| Bi-Metal | [225BM Series](https://www.harger.com/product/225-series-0) | [BMTRC1](https://www.harger.com/product/bmtrc-series) | [SSTRACBM Series](https://www.harger.com/product/vertical-sstr-series) | [226BM Series](https://www.harger.com/product/226-series-0) |

* 1. GROUNDING ELECTRODES
     1. Basis of Design: Subject to compliance with requirements, provide Harger Lightning and Grounding, grounding electrodes
     2. Substitution Limitations: Soil conditions may dictate the use of a grounding electrode not shown. Installing contractor shall coordinate with lightning protection manufacturer to determine proper materials.
     3. Product Options:

|  |  |  |  |
| --- | --- | --- | --- |
| Standard Soil | Corrosive Soil | Shallow Topsoil | Rocky Conditions |
| [3410](https://www.harger.com/product/copper-clad-steel) | [3410SS3](https://www.harger.com/product/stainless-steel-0) | [336](https://www.harger.com/product/ground-plates) | [EGRSS10LWG4/0](https://www.harger.com/product/stainless-steel) |

* 1. GROUND ACCESS WELLS
     1. Basis of Design: Subject to compliance with requirements, provide a minimum of (1) Harger Lightning and Grounding ground access well.
     2. Substitution Limitations: Soil conditions may dictate the use of a ground access well not shown. Installing contractor shall coordinate with lightning protection manufacturer to determine proper materials.
     3. Product Options:

|  |  |  |
| --- | --- | --- |
| Standard | Traffic Rated | Heavy Duty |
| [GAW910](https://www.harger.com/product/hdpe) | [GAW121212HD](https://www.harger.com/product/polymer-concrete-wells) | [GAW121212TDLH](https://www.harger.com/product/high-security-wells) |

* 1. BELOW GRADE CONNECTIONS
     1. Basis of Design: Subject to compliance with requirements, provide UltraShot® exothermically welded connections by Harger Lightning and Grounding
     2. Substitution Limitations: No Substitutions
     3. Product Options:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parallel | “T” | Straight | Cross | Ground Rod |
| [PT Series](https://www.harger.com/product/pt) | [RT Series](https://www.harger.com/product/rt) | [BS Series](https://www.harger.com/product/bs) | [XO Series](https://www.harger.com/product/xo) | [GO Series](https://www.harger.com/product/go) |

1. EXECUTION
   1. INSTALLERS
      1. Installer List: Refer to <https://www.harger.com/locator> for current Harger Lightning and Grounding factory trained installers.
   2. INSTALLATION
      1. Install lightning protection system as indicated on approved shop drawing, according to manufacturer’s written instructions.
      2. Installation shall comply with all aspects of NFPA 780.
      3. Conductors shall be concealed from public view.
   3. CORROSION PROTECTION
      1. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture, unless moisture is permanently excluded from the junction of such materials.
      2. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.
   4. FIELD QUALITY CONTROL
      1. The system shall be physically inspected by a Nationally Recognized Testing Laboratory (NRTL) to the current edition of NFPA 780. The certification shall be provided to the building owner at the completion of the project.

END OF SECTION

*REMOVE IF AN EVEN NUMBER OF PAGES EXIST AFTER EDITING.*

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