



## MASTER SPECIFICATIONS

## LIGHTNING PROTECTION SYSTEMS FOR

Schools  
Churches  
Hotels  
Apartments  
Offices  
Factories  
Hospitals  
Storage Elevators  
Warehouses  
Mills  
Hangars  
Terminals  
Residences  
Farms  
Golf Courses  
Parks  
All Other Commercial  
Industrial Type Buildings

# Thompson Lightning Protection, Inc.

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# MASTER SPECIFICATION SETS

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**GENERAL INFORMATION:**

This booklet contains eight sets of detailed construction specifications and two special case supplements for lightning protection system installations for all types of conventional building construction. These specifications are written so that the specifier and building owner can be assured of receiving only the highest quality materials installed to meet or exceed all code requirements and industry standards. Current codes on lightning protection systems, NFPA 780, UL96 and 96A, and LPI-175 were used in preparing these specifications.

Following is a guide to the usage and application for these specifications. Keep in mind that these guides are for general construction only and are not meant for use on such facilities as electrical distribution, switching stations, or lines, or for structures used for production, storage, or handling of explosives, hazardous or flammable substances.

**USAGE GUIDE:**

Each of the nine sets of specifications included in this booklet is meant to be used on a specific type and size structure. The three factors for selecting a specification are 1) frame type i.e., electrically continuous steel frame versus non-conductive concrete/masonry, or wood frame; 2) building height i.e. Class I (under 75 feet above grade) or Class II (over 75 feet above grade); and 3) choice of system material type, i.e. aluminum or copper components.

**SETS 1-2**

These sets are for concrete/masonry or wood frame structures less than 75' tall. The final choice of specification in this group is based on material type. Set 1 uses copper equipment for the entire system. Set 2 makes an aluminum roof system mandatory where this situation is desired or necessary due to roof construction. Copper is still retained for the downlead and grounding portions of the system.

**SETS 3-4**

These sets are for concrete/masonry or wood frame structures where all or part of the building exceeds 75' above grade. The selection of a specification is based on material type required. The choices are the same as those outlined above for Sets 1 and 2.

**SETS 5-8**

These four sets pertain to continuous steel frame buildings. The basis for choice of specification on these type of buildings are material, either copper or aluminum, and building height. Sets 5 and 7 are for all copper systems, and Sets 6 and 8 call for aluminum to be used in the roof system with a copper ground system. The choice again depends on material preference and structural considerations.

**SET 9**

This specification is for use on buildings with existing lightning protection systems that are being reroofed. This specification insures a system updated to current code criteria and compatibility.

### SELECTION CHART

Combine Proper Combination of I, II and III In Same Horizontal Row To Determine Applicable Specification

<u>I. Frame Type</u>	<u>II. Bldg. Height</u>	<u>III. Material Required</u>	<u>IV. Use Spec Set</u>
Conductive (continuous steel frame) versus non-conductive (wood or masonry frame)	All or part of structure 75' or more above finished grade versus below 75'	Copper or aluminum lightning protection system components	Select proper spec from this column based on Col. I, II, and III
Non-conductive	Below	Copper Only	Use Set 1
Non-conductive	Below	Aluminum on Roof w/Copper Ground	Use Set 2
Non-conductive	Above	Copper Only	Use Set 3
Non-conductive	Above	Aluminum on Roof w/Copper Ground	Use Set 4
Conductive	Below	Copper Only	Use Set 5
Conductive	Below	Aluminum on Roof w/Copper Ground	Use Set 6
Conductive	Above	Copper Only	Use Set 7
Conductive	Above	Aluminum on Roof w/Copper Ground	Use Set 8
Either	Re-roof Project	As Required Not	Use Set 9

### COORDINATION

Lightning protection system installation requires close coordination with several other trades and systems. Use of these specifications may require adjustment or clarification to other project specification sections. Refer to paragraph 3.02 in sets 1-8 for specifics.

## SET1 SECTION 16670: LIGHTNING PROTECTION SYSTEM

### PART I: GENERAL

**1.01 Scope:** Furnish all labor, materials, and items of service required to complete a functional and unobtrusive lightning protection system approved by the architect in strict accordance with the specifications and contract drawings. If any departure from the contract or submittal drawings covered below are deemed necessary by the contractor, details of such departures and reasons therefore shall be submitted to the architect for approval. No such departures shall be made without the prior written approval of the architect. The following standards of the latest issue form a part of this specification: (A) Lightning Protection Institute Standard LPI-175; (B) National Fire Protection Association Code NFPA 780 (2011 ed.); (C) Underwriters' Laboratories Standards UL 96A and UL96.

**1.02 Quality Assurance:** The system shall conform to the above cited standards. The system furnished shall be the standard product of a single UL listed manufacturer regularly engaged in the production of lightning protection systems and shall be the manufacturer's latest approved design. All material specified is manufactured by Thompson Lightning Protection, Inc., 901 Sibley Highway, St. Paul, Minnesota 55118, or approved equal. For approval of a manufacturer other than specified, proposed material data and installation drawing must be submitted for review not less than ten days prior to bid.

**1.03 Submittals:** Complete shop drawings shall be prepared by the manufacturer and submitted to the architect for approval prior to start of work. System installer shall submit to the architect an original, project specific, notarized certification from the equipment manufacturer verifying their qualifications as a lightning protection installer. Samples and catalog data shall be submitted to the architect for approval upon request.

### PART II: PRODUCTS

**2.01 Standard:** All equipment shall be factory inspected, approved, and properly labeled in accordance with LPI and UL requirements. All equipment shall be new, the product of a single manufacturer, and of a design and construction to suit the application where used.

**2.02 Equipment:** All materials shall be copper or copper alloy and of the size, weight, and construction to suit the application where used in accordance with LPI, UL, and NFPA requirements for Class I structures per manufacturer recommendations. Conductors shall be copper, 29 strands 17 gauge, Cat. No. 29X. Air terminals shall be solid copper 3/8 inch diameter, Cat. No. 52, 662, etc., and shall project 10" minimum above the object to be protected. Locate and space according to LPI, UL, and NFPA requirements. Air terminal bases shall be of cast bronze with bolt pressure cable connections and shall be securely mounted with stainless steel screws or bolts, Cat. No. 690X, 678, 611, etc. Crimp type connections on bases are not acceptable. Bases on built-up tar and gravel or single membrane roofs shall be secured with adhesive and shall have a minimum surface contact area of 18.5 square inches, Cat. No. 688. Coordinate with the roofing contractor to insure compatibility of any adhesive with the roofing system in use. Ground rods shall be a minimum of 5/8 inch in diameter and 10 feet long, Cat. No. TL5810. They shall be connected to the system with a two-bolt cast bronze clamp, Cat. No. 231, having a minimum length of 1-1/2" and employing stainless steel cap screws. Cable fasteners shall be substantial in construction, electrolytically compatible with the conductor and mounting surface and shall be spaced according to LPI, UL, and NFPA code requirements, Cat. No. 730, 166, etc. Bonding devices, cables splicers and miscellaneous connectors shall be of cast bronze with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable. Splicers similar to Cat. No. 423B, 705, 706, etc., bonding devices similar to Cat. No. 702, 704, 551, 142, 561, 142X, etc. All miscellaneous bolts, nuts, and screws shall be stainless steel.

**PART III: EXECUTION**

**3.01 Installation:** The installation shall be accomplished by an experienced installer who is a Certified Master Installer of the LPI or working under the direct supervision of the manufacturer as listed above or their authorized LPI Certified Master Installer Representative. All equipment shall be installed in a neat workmanlike manner in the most inconspicuous manner possible. The system shall consist of a complete cable network on the roof including all air terminals, splices, and bonds with cable downloads routed concealed either directly in the building construction or in 1" PVC conduit to ground. Download cables shall not be brought directly through the roof. Through-roof connectors with solid rods or conduit through approved flashings shall be utilized for this purpose. Copper equipment shall not be connected to aluminum surfaces except by means of an approved bimetal transition fitting. Where system components are to be mounted on coping caps, metal roofs, or mechanical equipment, etc. constructed of aluminum, galvanized, or galvalume coated steel, aluminum components equal to those specified here shall be used. Balance of system to remain copper as specified.

**3.02 Coordination:** The installer will work with other trades to insure a correct, neat, and unobtrusive installation. The lightning protection installer shall assure a sound bond to the main water service and interconnection wrth other building ground systems, including both telephone and electrical. Arresters shall be installed on the power and telephone service by either the utility or the electrical contactor as applicable. All final flashing and sealing of lightning protection system roof penetrations and any special provisions required by the roofing manufacturer i.e. additional buffer strips, pads, membrane strips, etc. associated with mounting lightning protection equipment shall be furnished and installed by the roofing contractor in compliance with the roofing system in use. A copy of the lightning protection system shop drawings shall be forwarded by the architect to the roof contractor for coordination purposes.

**3.03 Completion:** The lightning protection installer shall secure and deliver the LPI System Certification to the architect for the owner upon completion on the installation. The contractor shall also submit copies of as-built shop drawings with the LPI Certified System Application.

**PART I: GENERAL**

**1.01 Scope:** Furnish all labor, materials, and items of service required to complete a functional and unobtrusive lightning protection system approved by the architect in strict accordance with the specifications and contract drawings. If any departure from the contract or submittal drawings covered below are deemed necessary by the contractor, details of such departures and reasons therefore shall be submitted to the architect for approval. No such departures shall be made without the prior written approval of the architect. The following standards of the latest issue form a part of this specification: (A) Lightning Protection Institute Standard LPI-175; (B) National Fire Protection Association Code NFPA 780 (2011 ed.); (C) Underwriters' Laboratories Standards UL96A and UL96.

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**1.03 Submittals:** Complete shop drawings shall be prepared by the manufacturer and submitted to the architect for approval prior to start of work. System installer shall submit to the architect an original, project specific, notarized certification from the equipment manufacturer verifying their qualifications as a lightning protection Installer. Samples and catalog data shall be submitted to the architect for approval upon request.

**PART II: PRODUCTS**

**2.01 Standard:** All equipment shall be factory inspected, approved, and properly labeled in accordance with LPI and UL requirements. All equipment shall be new, the product of a single manufacturer, and of a design and construction to suit the application where used.

**2.02 Equipment:** All materials shall be copper, copper alloy, or aluminum, and of the size, weight, and construction to suit the application where used in accordance with LPI, UL, and NFPA requirements for Class I structures per manufacturer recommendations. Downlead conductors from roof to ground shall be copper, 29 strands 17 gauge, Cat. No. 29X. All main roof conductors shall be aluminum, 24 strands 14 gauge, Cat. No. A24. Air terminals shall be solid, round aluminum 1/2" diameter, Cat. No. A55, A56, etc. and shall project 10" minimum above the object to be protected. Locate and space according to LPI, UL, and NFPA requirements. Air terminal bases shall be of cast aluminum with bolt pressure cable connection and shall be securely mounted with stainless steel screws or bolts, Cat. No. A690X, A678, A611, etc. as required. Crimp type connectors are not acceptable. Bases on built-up tar and gravel or single membrane roofs shall be secured with adhesive and shall have a minimum surface contact area of 18.5 sq. inches, Cat. No. A688, etc. Coordinate with the roofing contractor to insure compatibility of any adhesive with the roofing system in use. Ground rods shall be a minimum of 5/8" diameter and 10' long, Cat. No. TL5810. They shall be connected to the system with a two-bolt cast bronze clamp, Cat. No. 231, having a minimum length of 1-1/2" and employing stainless steel cap screws. Cable fasteners shall be substantial in construction, electrolytically compatible with conductor and mounting surface and shall be spaced according to LPI, UL, and NFPA code requirements, Cat. No. A730, A166, etc. Bonding devices, cable splicers, and miscellaneous connectors shall be of cast aluminum with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable. Splicers similar to Cat. No. A423, A705, A706, etc., bonding devices similar to Cat. No. A702, A704, A551, A142, A561, A142X etc. All miscellaneous bolts, nuts, and screws shall be stainless steel. An approved bimetal transition fitting shall be used at the roof level to change from aluminum roof conductor to copper downlead cable.

**PART III: EXECUTION**

**3.01 Installation:** The installation shall be accomplished by an experienced installer who is a Certified Master Installer of the LPI or working under the direct supervision of the manufacturer as listed above or their authorized LPI Certified Master Installer representative. All equipment shall be installed in a neat workmanlike manner in the most inconspicuous manner possible. The system shall consist of a complete cable network on the roof including all air terminals, splicers, and bonds with cable downleads routed concealed either directly in the building construction or in conduit to ground. Downlead cables shall not be brought directly through the roof. Through-roof connectors with solid rods or conduit through approved flashings shall be utilized for this purpose. The limitations on areas of usage for aluminum cables and for copper and aluminum materials together as outlined in NFPA 780, UL 96A, and LPI-175 shall be observed.

**3.02 Coordination:** The installer will work with other trades to insure a correct, neat and unobtrusive installation. The lightning protection installer shall assure a sound bond to the main water service and interconnection with other building ground systems, including both telephone and electrical. Arresters shall be installed on the power and telephone service by either the utility or the electrical contractor as applicable. All final flashing and sealing of lightning protection system roof penetrations and any special provisions required by the roofing manufacturer i.e. additional buffer strips, pads, membrane strips, etc. associated with mounting lightning protection equipment shall be furnished and installed by the roofing contractor in compliance with the roofing system in use. A copy of the lightning protection system shop drawings shall be forwarded by the architect to the roof contractor for coordination purposes.

**3.03 Completion:** The lightning protection installer shall secure and deliver the LPI System Certification to the architect for the owner upon completion of the installation. The contractor shall also submit copies of as-built shop drawings with LPI Certified System Application.



**PART I: GENERAL**

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**2.02 Equipment:** All materials shall be copper or copper alloy and of the size, weight, and construction to suit the application where used in accordance with LPI, UL, and NFPA requirements for Class II structures per manufacturer recommendations. Should there be any roof areas of the building below 75' above grade that require protection, the cable and air terminal sizes shown can be reduced to Class I equipment of the same material as Class II equipment specified. Requirements for bases, splicers, and other fittings will remain the same. Conductors shall be copper, 28 strands 14 gauge, Cat. No. 28R. Air terminals shall be solid, round copper, 1/2" diameter, Cat. No. 55, 56, etc., and shall project 10" minimum above the object to be protected. Locate and space according to LPI, UL, and NFPA requirements. Air terminal bases shall be of cast bronze with bolt pressure cable connections and shall be securely mounted with stainless steel screws or bolts Cat. No. 690X, 678, 611, etc. as required. Crimp type connections are not acceptable. Bases on built-up tar and gravel or single membrane roofs shall be secured with adhesive and shall have a minimum surface contact area of 18.5 square inches, Cat. No. 688. Coordinate with the roofing contractor to insure compatibility of any adhesive with the roofing system in use. Ground rods shall be a minimum of 5/8" in diameter and 10' long, Cat. No. TL5810. They shall be connected to the system with a two-bolt cast bronze clamp Cat. No. 231, having a minimum length of 1 1/2" and employing stainless steel cap screws. Cable fasteners shall be substantial in construction, electrolytically compatible with the conductor and mounting surface, and shall be spaced according to LPI, UL and NFPA code requirements, Cat. No. 730, 166, etc. Bonding devices, cable splicers, and miscellaneous connectors shall be of cast bronze with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable. Splicers similar to Cat. No. 423B, 705, 706, etc., bonding devices similar to Cat. No. 702, 704, 551, 142, 561, 142X, etc. All miscellaneous bolts, nuts, and screws shall be stainless steel.

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**PART II: PRODUCTS**

**2.01 Standard:** All equipment shall be factory inspected, approved, and properly labeled in accordance with LPI and UL requirements. All equipment shall be new, the product of a single manufacturer, and of a design and construction to suit the application where used.

**2.02 Equipment:** All materials shall be copper, copper alloy, or aluminum, and of the size, weight, and construction to suit the application where used in accordance with LPI, UL, and NFPA requirements for Class II structures per manufacturer recommendations. Should there be any roof areas of the building below 75' above grade that require protection, the cable and air terminals sizes shown can be reduced to Class I equipment of the same material as Class II equipment specified. Requirements for bases, splicers, and other fittings will remain the same. Downlead conductors from roof to ground shall be copper, 28 strands 14 gauge, Cat. No. 28R. All main roof conductors shall be aluminum, 32 strands 12 gauge, Cat. No A508. Air terminals shall be solid aluminum, 5/8" diameter, Cat. No. A665, A666, etc., and shall project 10" minimum above the object to be protected. Locate and space according to LPI, UL, and NFPA requirements. Air terminal bases shall be of cast aluminum with bolt pressure cable connections and shall be securely mounted with stainless steel screws or bolts, Cat. No. A690X, A678, A611, etc., as required. Crimp type connections are not acceptable. Bases on built-up tar and gravel or single membrane roofs shall be secured with proper adhesive and shall have a minimum surface contact area of 18.5 square inches, Cat. No. A688, etc. Coordinate with the roofing contractor to insure compatibility of any adhesive with the roofing system in use. Ground rods shall be a minimum of 5/8" in diameter and 10' long, Cat. No. TL5810. They shall be connected to the system with a two-bolt cast bronze clamp, Cat. No. A231, having a minimum length of 1-1/2" and employing stainless steel cap screws. Cable fasteners shall be substantial in construction, electrolytically compatible with the conductor and mounting surface and shall be spaced according to LPI, UL, and NFPA code requirements, Cat. No. A730, or A166X, etc.. Bonding devices, cable splicers, and miscellaneous connectors on the roof shall be of cast aluminum with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable. Splicers similar to Cat. No. A423, A705, A706, etc., bonding devices similar to Cat. No. A702, A704, A551, A142, A561, A142X, etc All miscellaneous bolts, nuts, and screws shall be stainless steel. An approved bimetal transition fitting shall be used at the roof level to change from aluminum roof conductor to copper downlead cable.

**PART III: EXECUTION**

**3.01 Installation:** The installation shall be accomplished by an experienced installer who is a Certified Master Installer of the LPI or working under the direct supervision of the manufacturer as listed above or his authorized LPI Certified Master Installer representative. All equipment shall be installed in a neat workmanlike manner in the most inconspicuous manner possible. The system shall consist of a complete cable network on the roof including all air terminals, splicers, and bonds with cable downleads routed concealed either directly in the building construction or in conduit to ground. The copper downlead cables shall not be brought directly through the roof. Through-roof connectors with solid rods or conduit through approved flashings shall be utilized for this purpose. The limitations on areas of usage for aluminum cables and for copper and aluminum materials together as outlined in NFPA 780, UL96A, LPI-175 shall be observed.

**3.02 Coordination:** The installer will work with other trades to insure a correct, neat, and unobtrusive installation. The lightning protection installer shall assure a sound bond to the main water service and interconnection with other building ground systems, including both telephone and electrical. Arresters shall be installed on the power and telephone service by either the utility or the electrical contractor as applicable. All final flashing and sealing of lightning protection system roof penetrations and any special provisions required by the roofing manufacturer i.e. additional buffer strips, pads, membrane strips, etc. associated with mounting lightning protection equipment shall be furnished and installed by the roofing contractor in compliance with the roofing system in use. A copy of the lightning protection system shop drawings shall be forwarded by the architect to the roof contractor for coordination purposes.

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**2.01 Standard:** All equipment shall be factory inspected, approved, and properly labeled in accordance with LPI and UL requirements. All equipment shall be new, the product of a single manufacturer, and of a design and construction to suit the application where used.

**2.02 Equipment:** All materials shall be copper or copper alloy and of the size, weight, and construction for use on steel framed buildings in accordance with LPI, UL, and NFPA requirements for Class I structures per manufacturer recommendations. All main conductors shall be copper, 29 strands 17 gauge, Cat. No. 29X. Air terminals shall be solid copper of 3/8" diameter, Cat. No. 52, 662, etc., and shall project 10" minimum above the object to be protected. Locate and space according to LPI, UL, and NFPA requirements. Air terminal bases shall be of cast bronze with bolt pressure cable connections and shall be securely mounted with stainless steel screws or bolts, Cat. No. 690X, 678, 611, etc., as required. Bases on built-up tar and gravel or single membrane roofs shall be secured with a proper adhesive and shall have a minimum surface contact area of 18.5 sq. inches, Cat. No. 688. Coordinate with the roofing contractor to insure compatibility of any adhesive with the roofing system in use. Crimp type connectors at bases are not acceptable. Ground rods shall be a minimum of 5/8" in diameter and 10' long, Cat. No. TL 5810. They shall be connected to the system with a two-bolt cast bronze clamp, Cat. No. 231, having a minimum length of 1-1/2" and employing stainless steel cap screws. Cable fasteners shall be substantial in construction electrolytically compatible with the conductor and mounting surface and shall be spaced according to LPI, UL, and NFPA code requirements, Cat. No. 730, 166, etc. Bonding devices, cable splicers, and miscellaneous connectors shall be of cast bronze with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable. Splicers similar to Cat. No. 423B, 705, 706, etc., bonding devices similar to Cat. No. 702, 704, 551, 142, 561, 142X, etc. All miscellaneous bolts, nuts, and screws shall be stainless steel. Connections to structural steel shall be made with bonding plates of cast bronze with bolt tension cable clamps, Cat. No. 639, 701X, 702, etc.

**PART III: EXECUTION**

**3.01 Installation:** The installation shall be accomplished by an experienced installer who is a Certified Master Installer of the LPI or working under the direct supervision of the manufacturer as listed above or their authorized LPI Certified Master Installer representative. All equipment shall be installed in a neat workmanlike manner in the most inconspicuous manner possible. The electrically continuous steel frame of the building shall serve as the down conductors for the lightning protection system. The number, size, type, and location of grounds and connections to steel at roof and grade level shall be as required by NFPA, UL, and LPI Code requirements. A complete cable system with related air terminals, splicers, and bonds, etc., shall be used on the roof. Downlead cables to steel frame from the cable roof system shall not be brought directly through the roof. Through-roof connectors with solid rods or conduit through approved flashings shall be utilized for this purpose. Copper equipment shall not be connected to aluminum surfaces except by means of an approved bimetal transition fitting. Where system components are to be mounted on coping caps, metal roofs, or mechanical equipment, etc. constructed of aluminum, galvanized, or galvalume coated steel, aluminum components equal to those specified here shall be used. Balance of system to remain copper as specified.

**3.02 Coordination:** The Installer will work with other trades to insure a correct, neat, and unobtrusive installation. The lightning protection installer shall assure a sound bond to the main water service and interconnection with other building ground systems, including both telephone and electrical. Arresters shall be installed on the power and telephone service by either the utility or the electrical contractor as applicable. All final flashing and sealing of lightning protection system roof penetrations and any special provisions required by the roofing manufacturer i.e. additional buffer strips, pads, membrane strips, etc. associated with mounting lightning protection equipment shall be furnished and installed by the roofing contractor in compliance with the roofing system in use. A copy of the lightning protection system shop drawings shall be forwarded by the architect to the roof contractor for coordination purposes.

**3.03 Completion:** The lightning protection installer shall secure and deliver the LPI System Certification to the architect for the owner upon completion of the installation. The contractor shall also submit copies of as-built shop drawings with LPI Certified System Application.

**PART I: GENERAL**

**1.01 Scope:** Furnish all labor, materials, and items of service required to complete a functional and unobtrusive lightning protection system approved by the architect in strict accordance with the specifications and contract drawings. If any departure from the contract or submittal drawings covered below are deemed necessary by the contractor, details of such departures and reasons therefore shall be submitted to the architect for approval. No such departures shall be made without the prior written approval of the architect. The following standards of the latest issue form a part of this specification: (A) Lightning Protection Institute Standard LPI-175; (B) National Fire Protection Association Code NFPA 780 (2011 ed.); (C) Underwriters' Laboratories Standards UL96A and UL96.

**1.02 Quality Assurance:** The system shall conform to the above cited standards. The system furnished shall be the standard product of a single, UL listed manufacturer regularly engaged in the production of lightning protection systems and shall be the manufacturer's latest approved design. All material specified is manufactured by Thompson Lightning Protection, Inc., 901 Sibley Highway, St. Paul, Minnesota 55118, or approved equal. For approval of a manufacturer other than specified, proposed material data and installation drawings must be submitted for review not less than ten days prior to bid. **1.03 Submittals:** Complete shop drawings shall be prepared by the manufacturer and submitted to the architect for approval prior to start of work. System installer shall submit to the architect an original, project specific, notarized certification from the equipment manufacturer verifying their qualifications as a lightning protection installer. Samples and catalog data shall be submitted to the architect for approval upon request.

**PART II: PRODUCTS**

**2.01 Standard:** All equipment shall be factory inspected, approved, and properly labeled in accordance with LPI and UL requirements. All equipment shall be new, the product of a single manufacturer, and of a design and construction to suit the application where used.

**2.02 Equipment:** All materials shall be copper or copper alloy and of the size, weight, and construction for use on steel framed buildings in accordance with LPI, UL, and NFPA requirements for Class I structures per manufacturer recommendations. Downlead conductors from the base of steel columns to ground shall be copper, 29 strands 17 gauge, Cat. No. 29X. All main roof conductors shall be aluminum, 24 strands 14 gauge, Cat. No. A24. Air terminals shall be solid aluminum 1/2" diameter, Cat. No. A55, A56, etc., and shall project 10" minimum above the object to be protected. Locate and space according to LPI, UL, and NFPA requirements. Air terminal bases shall be of cast aluminum with bolt pressure cable connections and shall be securely mounted with stainless steel screws or bolts, Cat. No. A690X, A678, A611 .etc., as required. Bases on built-up tar and gravel or single membrane roofs shall be secured with a proper adhesive and shall have a minimum surface contact area of 18.5 square inches, Cat. No. A688, etc. Coordinate with the roofing contractor to insure compatibility of any adhesive with the roofing system in use. Crimp type connectors at bases are not acceptable. Ground rods shall be a minimum of 5/8" in diameter and 10' long, Cat. No. TL5810. They shall be connected to the system with a two-bolt cast bronze clamp, Cat. No. 231, having a minimum length of 1-1/2" and employing stainless steel cap screws. Cable fasteners shall be substantial in construction, electrolytically compatible with the conductor and mounting surface and shall be spaced according to LPI, UL, and NFPA code requirements, Cat. NO. A730, A166, etc. Bonding devices, cable splicers, and miscellaneous connectors on the roof shall be of cast aluminum with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable. Splicers similar to Cat. No. A423, A705, A706, etc., bonding devices similar to Cat. No. A702, A704, A551, A142, A561, A142X, etc. All miscellaneous bolts, nuts, and screws shall be stainless steel. Connections to structural steel shall be made with bonding plates of cast bronze or aluminum with bolt tension cable clamps, Cat. No. 639, A639, 701X, A701X, 702, A702, etc.

### **PART III: EXECUTION**

**3.01 Installation:** The installation shall be accomplished by an experienced installer who is a Certified Master Installer of the LPI or working under the direct supervision of the manufacturer as listed above or their authorized LPI Certified Master Installer representative. All equipment shall be installed in a neat workmanlike manner in the most inconspicuous manner possible, the electrically continuous steel frame of the building shall serve as the down conductors for the lightning protection system. The number, size, type, and location of grounds and connections to steel at roof and grade level shall be as required by NFPA, UL, and LPI code requirements. A complete cable system with related air terminals, splicers, and bonds, etc., shall be used on the roof. Aluminum downlead cables to steel frame from the cable roof system shall not be brought directly through the roof. Through-roof connectors with solid rods or conduit through approved flashings shall be utilized for this purpose. The limitations on areas of usage for aluminum cables and for copper and aluminum materials together as outlined in NFPA 780, UL96A, and LPI175 shall be observed.

**3.02 Coordination:** The installer will work with other trades to insure a correct, neat, and unobtrusive installation. The lightning protection installer shall assure a sound bond to the main water service and interconnection with other building ground systems, including both telephone and electrical. Arresters shall be installed on the power and telephone service by either the utility or the electrical contractor as applicable. All final flashing and sealing of lightning protection system roof penetrations and any special provisions required by the roofing manufacturer i.e. additional buffer strips, pads, membrane strips, etc. associated with mounting lightning protection equipment shall be furnished and installed by the roofing contractor in compliance with the roofing system in use. A copy of the lightning protection system shop drawings shall be forwarded by the architect to the roof contractor for coordination purposes.

**3.03 Completion:** The lightning protection installer shall secure and deliver the LPI System Certification to the architect for the owner upon completion of the installation. The contractor shall also submit copies of as-built shop drawing with the LPI Certified System Application.



**PART I: GENERAL**

**1.01 Scope:** Furnish all labor, materials, and items of service required to complete a functional and unobtrusive lightning protection system approved by the architect in strict accordance with the specifications and contract drawings. If any departure from the contract or submittal drawings covered below are deemed necessary by the contractor, details of such departures and reasons therefore shall be submitted to the architect for approval. No such departures shall be made without the prior written approval of the architect. The following standards of the latest issue form a part of this specification: (A) Lightning protection Institute Standard LPI-175; (B) National Fire Protection Association Code NFPA780 (2011 ed.); (C) Underwriters' Laboratories Standards UL96A and UL96.

**1.02 Quality Assurance:** The system shall conform to the above cited standards. The system furnished shall be the standard product of a single, UL listed manufacturer regularly engaged in the production of lightning protection systems and shall be the manufacturer's latest approved design. All material specified is manufactured by Thompson Lightning Protection, Inc., 901 Sibley Highway, St. Paul, Minnesota 55118, or approved equal. For approval of a manufacturer other than specified, proposed material data and installation drawings must be submitted for review not less than ten days prior to bid.

**1.03 Submittals:** Complete shop drawings shall be prepared by the manufacturer and submitted to the architect for approval prior to start of work. System installer shall submit to the architect an original, project specific, notarize certification from equipment manufacturer verifying their qualifications as a lightning protection installer. Samples and catalog data shall be submitted to the architect for approval upon request.

**PART II: PRODUCTS**

**2.01 Standard:** All equipment shall be factory inspected, approved, and properly labeled in accordance with LPI and UL requirements. All equipment shall be new, the product of a single manufacturer, and of a design and construction to suit the application where used.

**2.02 Equipment:** All materials shall be copper or copper alloy and of the size, weight, and construction for use on steel framed buildings in accordance with LPI, UL, and NFPA requirements for Class II structures per manufacturer recommendations. All main conductors shall be copper, of 28 strands 14 gauge, Cat No. 28R. Air terminals shall be solid copper of 1/2" diameter, Cat. No. 55, 56, etc., and shall project 10" minimum above the object to be protected. Locate and space according to LPI, UL, and NFPA requirements. Air terminal bases shall be of cast bronze with bolt pressure cable connections and shall be securely mounted with stainless steel screws or bolts, Cat. No. 690X, 678, 611, etc., as required. Bases on built-up tar and gravel or single membrane roof shall be secured with a proper adhesive and shall have a minimum surface contact area of 18.5 square inches, Cat No. 688. Coordinate with the roofing contractor to insure compatibility of any adhesive with the roofing system in use. Crimp type connections are not acceptable. Ground rods shall be a minimum of 5/8" diameter and 10' long, Cat No. TL5810. They shall be connected to the system with a two-bolt cast bronze clamp, Cat. No. 231, having a minimum length of 1-1/2" and employing stainless steel cap screws. Cable fasteners shall be substantial in construction, electrolytically compatible with the conductor and mounting surface and shall be spaced according to LPI, UL, and NFPA code requirements, Cat. No. 730,166, etc. Bonding devices, cable splicers and miscellaneous connectors on the roof shall be of cast bronze with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable. Splicers similar to Cat. No. 423B, 705, 706, etc., bonding devices similar to Cat. No. 702, 704, 551, 142, 561,142X, etc. All miscellaneous bolts, nuts, an screws shall be stainless steel. Connections to structural steel shall be made with bonding plates of cast bronze with bolt tension cable clamps, Cat. No. 639, 701X, 702, etc.

**PART III: EXECUTION**

**3.01 Installation:** The installation shall be accomplished by an experienced installer who is a Certified Master Installer of the LPI or working under the direct supervision of the manufacturer as listed above or their authorized LPI Certified Master Installer representative. All equipment shall be installed in a neat workmanlike manner in the most inconspicuous manner possible. The electrically continuous steel frame of the building shall serve as the down conductors for the lightning protection system. The number, size, type, and location of grounds and connections to steel at roof and grade level shall be as required by NFPA, UL, and LPI code requirements. A complete cable system with related air terminals, splicers, and bonds, etc., shall be used on the roof. Aluminum downlead cables to steel from the cable roof system shall not be brought directly through the roof. Through-roof connectors with solid rods or conduit through approved flashings shall be utilized for this purpose. The limitations on areas of usage for aluminum cables and for copper and aluminum materials together as outlined in NFPA 780, UL96A, and LPI175 shall be observed.

**3.02 Coordination:** The installer will work with other trades to insure a correct, neat, and unobtrusive installation. The lightning protection installer shall assure a sound bond to the main water service and interconnection with other building ground systems, including both telephone and electrical. Arresters shall be installed on the power and telephone service by either the utility or the electrical contractor as applicable. All final flashing and sealing of lightning protection system roof penetrations and any special provisions required by the roofing manufacturer i.e. additional buffer strips, pads, membrane strips, etc. associated with mounting lightning protection equipment shall be furnished and installed by the roofing contractor in compliance with the roofing system in use. A copy of the lightning protection system shop drawings shall be forwarded by the architect to the roof contractor for coordination purposes,

**3.03 Completion:** The lightning protection installer shall secure and deliver the LPI System Certification to the architect for the owner upon completion of the installation. The contractor shall also submit copies of as-built shop drawings with the LPI Certified System Application.

**PART I: GENERAL**

**1.01 Scope:** Furnish all labor, materials, and items of service required to complete a functional and unobtrusive lightning protection system approved by the architect in strict accordance with the specifications and contract drawings. If any departure from the contract or submittal drawings covered below are deemed necessary by the contractor, details of such departures and reasons therefore shall be submitted to the architect for approval. No such departures shall be made without the prior written approval of the architect. The following standards and the latest issue form a part of this specification: (A) Lightning protection Institute Standard LPI-175; (B) National Fire Protection Association Code NFPA 780 (2011 ed.); (C) Underwriters' Laboratories Standards UL96A and UL96.

**1.02 Quality Assurance:** The system shall conform to the above cited standards. The system furnished shall be the standard product of a single, UL listed a manufacturer regularly engaged in the production of lightning protection systems and shall be the manufacturer's latest approved design. All material specified is manufactured by Thompson Lightning Protection, Inc., 901 Sibley Highway, St. Paul, Minnesota 55118, or approved equal. For approval of a manufacturer other than specified, proposed material data and installation drawings must be submitted for review not less than ten days prior to bid.

**1.03 Submittals:** Complete shop drawings shall be prepared by the manufacturer and submitted to the architect for approval prior to start of work. System installer shall submit to the architect an original, project specific, notarized certification from the equipment manufacturer verifying their qualifications as a lightning protection installer. Samples and catalog data shall be submitted to the architect for approval upon request.

**PART II: PRODUCTS**

**2.01 Standard:** All equipment shall be factory inspected, approved, and properly labeled in accordance with LPI and UL requirements. All equipment shall be new, the product of a single manufacturer, and of a design and construction to suit the application where used.

**2.02 Equipment:** All materials shall be copper, copper alloy, or aluminum as described below, and of the size, weight, and construction for use in steel framed buildings in accordance with LPI, UL, and NFPA requirements for Class II structures per manufacturer recommendations. Downlead conductors from base of steel columns to ground shall be copper, 28 strands 14 gauge, Cat. No. 28R. All main roof conductors shall be aluminum of 30 strands 12 gauge, Cat. No. A508. Air terminals shall be solid aluminum, 5/8" diameter, Cat. No. A665, A666, etc., and shall project 10" minimum above the object to be protected. Locate and space according to LPI, UL and NFPA requirements. Air terminal bases shall be of cast aluminum with bolt pressure cable connections and shall be securely mounted with stainless steel screws or bolts, Cat. No. A690X, A678, A611, etc., as required. Bases on built-up tar and gravel or single membrane roofs shall be secured with a proper adhesive and shall have a minimum surface contact area of 18.5 square inches, Cat. No. A688, etc. Coordinate with the roofing contractor to insure compatibility of any adhesive with the roofing system in use. Crimp type connections are not acceptable. Ground rods shall be a minimum of 5/8" in diameter and 10' long, Cat. No. TL5810. They shall be connected to the system with a two-bolt cast bronze clamp, Cat. No. 231, having a minimum length of 1-1/2" and employing stainless steel cap screws. Cable fasteners shall be substantial in construction, electrolytically compatible with the conductor and mounting surface and shall be spaced according to LPI, UL, and NFPA code requirements, Cat. No. A730, A166, etc. Bonding devices, cable splicers, and miscellaneous connectors on the roof shall be of cast aluminum with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable. Splicers similar to cat. No. A423, A705, A706, etc., bonding devices similar to cat. No. A702, A704, A551, A142, A561, A142X, etc. All miscellaneous bolts, nuts, and screws shall be stainless steel. Connections to structural steel shall be made with bonding plates of cast bronze or aluminum with bolt tension cable clamps, Cat. No. 639, A639, 701X, A701X, 702, A702, etc.

**PART III: EXECUTION**

**3.01 Installation:** The installation shall be accomplished by an experienced installer who is a Certified Master Installer of the LPI or working under the direct supervision of the manufacturer as listed above or their authorized LPI Certified Master Installer representative. All equipment shall be installed in a neat workmanlike manner in the most inconspicuous manner possible. The electrically continuous steel frame of the building shall serve as the down conductors for the lightning protection system. The number, size, type, and location of grounds and connections to steel at roof and grade level shall be as required by NFPA, UL, and LPI code requirements. A complete cable system with related air terminals, splicers, and bonds, etc., shall be used on the roof. Aluminum downlead cables to steel from the cable roof system shall not be brought directly through the roof. Through-roof connectors with solid rods or conduit through approved flashings shall be utilized for this purpose. The limitations on areas of usage for aluminum cables and for copper and aluminum materials together as outlined in NFPA 780, UL96A, and LPI175 shall be observed.

**3.02 Coordination:** The installer will work with other trades to insure a correct, neat, and unobtrusive installation. The lightning protection installer shall assure a sound bond to the main water service and interconnection with other building ground systems, including both telephone and electrical. Arresters shall be installed on the power and telephone service by either the utility or the electrical contractor as applicable. All final flashing and sealing of lightning protection system roof penetrations and any special provisions required by the roofing manufacturer i.e. additional buffer strips, pads, membrane strips, etc. associated with mounting lightning protection equipment shall be furnished and installed by the roofing contractor in compliance with the roofing system in use. A copy of the lightning protection system shop drawings shall be forwarded by the architect to the roof contractor for coordination purposes.

**3.03 Completion:** The lightning protection installer shall secure and deliver the LPI System Certification to the architect for the owner upon completion of the installation. The contractor shall also submit copies of as-built shop drawings with the LPI Certified System Application.

**PART I: GENERAL**

**1.01 Scope:** Furnish all labor and items of service required for the removal of the existing lightning protection system and reinstallation of this system including any additional new materials required to meet current code criteria. If any departure from the contract drawings or submittal drawings covered below are deemed necessary by the contractor, details of such departures and reasons therefore shall be submitted to the architect for approval. No such departures shall be made without the prior written approval of the architect. The following standards of the latest issue form a part of this specification: (A) Lightning Protection Institute Standard LPI 175; (B) National Fire Protection Association Code NFPA 780 (2011 ed.) (C) Underwriters' Laboratories UL 96 and UL 96A.

**1.02: Quality Assurance:** The lightning protection system shall conform to the requirements of the above cited standards. The LPI Conditional System Certification shall be furnished and submitted. The equipment manufacturer shall be UL listed and approved. All new material specified for this work is manufactured by Thompson Lightning Protection, Inc., 901 Sibley Highway, St. Paul, Minnesota 5118, or approved equal. For approval of a manufacturer other than specified, proposed material data and installation drawings must be submitted for review not less than ten days prior to bid.

**1.03: Submittals:** Complete shop drawings shall be prepared by the manufacturer and submitted to the architect for approval prior to start of work. System installer shall submit to the architect an original, project specific, notarized certification from the equipment manufacturer verifying their qualifications as a lightning protection Installer. Samples and catalog data shall be submitted to the architect for approval upon request.

**PART II: PRODUCTS**

**2.01 Standard:** All existing materials shall be inspected for compliance with current code criteria. Any worn, broken or damaged items shall be replaced by new material of equal or better construction. All new equipment shall be approved and labeled per LPI and UL requirements. All new equipment shall be the product of a single manufacturer as cited above, of a design and construction to suit the application where it is used in accordance with LPI, UL, and NFPA requirements.

**2.02 Equipment:** All new materials shall match existing with respect to size, weight and construction. Existing downlead conductors from roof to ground including through-roof riser assemblies shall be inspected and tested prior to reuse and must conform to current codes. Air terminal bases shall be of size, type, and construction required for use on this project. Cable fasteners shall be substantial in construction, electrolytically compatible with the conductor and mounting surface and shall be spaced in accordance with current code criteria. Bonding devices, cable splicers and miscellaneous connectors shall be of size, type, and construction required for use on this class of building. All miscellaneous bolts, nuts and screws shall be stainless steel. Where applicable an approved bimetal transition fitting shall be used at the roof level to change from aluminum roof conductor to copper downlead cable.

**PART III: EXECUTION**

**3.01 Installation:** Removal and reinstallation shall be accomplished by an experienced installer who is a Certified Master Installer of the LPI or working under the direct supervision of the manufacturer or their authorized LPI Certified Master Installer representative. All equipment shall be installed in a neat workmanlike manner in the most inconspicuous manner possible. Existing through-roof riser assemblies and/or downlead cables shall be protected during roof tear-off and shall be extended or modified as required to suit the new roof. Any broken or missing downleads and/or through-roof rise assemblies shall be identified and replaced to meet codes. Cables shall not be brought directly through the roof. Through-roof connectors with solid rods or conduit through approved flashings shall be utilized for this purpose. Final flashing of through-roof connectors is to be by the roofing contractor.

**3.02 Coordination:** The installer will work with other trades to insure a correct, neat and unobtrusive installation. The lightning protection installer shall assure a sound bond to the main water service and interconnection with other building ground systems, including both telephone and electrical. Arresters shall be installed on the power and telephone service by either the utility or the electrical contractor as applicable. All final flashing and sealing of lightning protection system roof penetrations and any special provisions required by the roofing manufacturer i.e. additional buffer strips, pads, membrane strips, etc. associated with mounting lightning protection equipment shall be furnished and installed by the roofing contractor in compliance with the roofing system in use. A copy of the lightning protection system shop drawings shall be forwarded by the architect to the roof contractor for coordination purposes.

**3.03 Completion:** The lightning protection installer shall secure and deliver the LPI Conditional System Certification to the architect for the owner upon completion of the installation. The contractor shall also submit copies of as-built shop drawings with the LPI Certified System Application.

## **SUGGESTED GENERAL AND INSTALLATION NOTES**

1. LOCATE AIR TERMINALS AS SHOWN. TAKE CARE TO INSURE THAT ALL POINTS ARE WITHIN 2'-0" OF OUTSIDE BUILDING EDGE, OUTSIDE CORNERS, AND RIDGE ENDS, AND THAT MAXIMUM SPACING DOES NOT EXCEED 20'-0", AND THAT MINIMUM PROJECTION ABOVE OBJECT PROTECTION IS 10". (POINTS PROJECTING 24" MAY BE SPACED AT 25' MAXIMUM.)
2. MAINTAIN HORIZONTAL OR DOWNWARD COURSING OF MAIN CONDUCTOR AND INSURE THAT ALL BENDS HAVE AT LEAST AN 8" RADIUS AND BENDS DO NOT EXCEED 90 DEGREES.
3. ATTACH ALL EXPOSED ROOF, DOWNLEAD, AND BONDING CABLES AT 3'-0" ON CENTER MAXIMUM. VERIFY COMPATIBILITY OF ADHESIVE ON MEMBRANE ROOF APPLICATIONS PRIOR TO INSTALLATION.
4. GROUND ELECTRODES SHALL BE INSTALLED AS SHOWN BUT IN NO INSTANCE SHALL THEY BE LESS THAN 1'-0" BELOW GRADE AND 2'-0" FROM FOUNDATION WALL DRIVEN RODS SHALL PENETRATE EARTH AT LEAST 10'-0".
5. BOND TO WATER SERVICE AND OTHER PIPING SYSTEMS AS SHOWN AND AS REQUIRED BY CODES.
6. INTERCONNECT LIGHTNING PROTECTION GROUND TO ELECTRIC, TELEPHONE, AND OTHER BUILDING GROUND SYSTEMS AS SHOWN OR AS REQUIRED BY CODES.
7. SYSTEM SHALL BE INSTALLED AS SHOWN TO INSURE PROPER CODE COMPLIANCE AND SYSTEM CERTIFICATION. ANY MAJOR VARIANCE SHALL ENTAIL RE-SUBMITTAL AND NEW APPROVAL.
8. AS BUILT DRAWINGS SHALL BE SUBMITTED IN ACCORDANCE WITH CERTIFICATION PROCEDURES.
9. ALL MATERIALS TO BE UNDERWRITERS' LABORATORIES APPROVED WITH LABELS ON CONDUCTORS AT 10'-0" INTERVALS AND LABELS ON ALL AIR TERMINALS.
10. ALL MATERIALS SHOWN AND INTENDED FOR USE ARE TO BE AS MANUFACTURED BY THOMPSON LIGHTNING PROTECTION, INC., 901 SIBLEY HIGHWAY ST. PAUL, MINNESOTA 55118.
11. INSTALLATION SHALL COMPLY IN ALL RESPECTS TO LPI CODE 175. INSTALLATION SHALL BE MADE BY OR UNDER THE SUPERVISION OF AN LPI CERTIFIED MASTER INSTALLER. COMPLETED INSTALLATION TO RECEIVE SYSTEM CERTIFICATION INCLUDING AS BUILT SHOP DRAWINGS.