

SECTION 260500 - GENERAL REQUIREMENTS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 SECTION INCLUDES:

- A. General
- B. Intent Of Drawings
- C. Interpretation Of Drawings
- D. Quality Control
- E. Submittals
- F. Location Environmental Considerations
- G. Products
- H. Coordination
- I. Demolition
- J. Electrical Installation
- K. Relocate or Make Modifications to Any Existing Electrical, Instrumentation or Control Systems Wiring
- L. Quality Assurance
- M. Examination
- N. Preparation And Storage
- O. Installation
- P. Field Quality Control
- Q. Painting
- R. Cleaning
- S. Operation - Maintenance And Spare Parts Data

1.2 GENERAL

- A. The Electrical Contractor shall be responsible to check with the equipment manufactures of the physical size of the equipment that it will fit and that it can be moved into the indicated locations.
- B. Intent of Drawings – The Drawings are not intended to be used for construction purposes for the electrical work, but to supplement the Specifications as to the principal features of the electrical design. The intent of this section is that all equipment and electrical devices furnished and installed under this and other sections of the Specifications be properly interconnected to permit successful system operation regardless of whether all interconnections are specifically referenced in the Specifications and associated Drawings.
- C. Interpretation of Drawings
 - 1. The locations of equipment to which electrical connections are to be made are approximate as shown on the Drawings. It shall be the Electrical Contractor's responsibility to determine the exact conduit locations by reviewing shop drawings. The sizes of disconnect switches, motor starters, overload heaters, fuses or circuit breakers are approximate, and it shall be the Electrical Contractors responsibility to obtain the correct sizes based on the actual installed equipment or items. The conduit and wire sizes shown on the Drawings are the minimum sizes required and shall not be reduced.

- D. Quality Control
 - 1. The Electrical Contractor shall maintain a level of quality of materials and installation means as to assure the completed electrical, instrumentation and control system will be completed in compliance with the Specifications.
- E. Submittals
 - 1. Shop Drawings – Submit shop drawings under provision of Section 01061 for all electrical equipment and devices.
 - 2. Shop drawings shall include manufacturer's literature, specifications, schematic diagrams, field wiring interconnection diagrams and any other data necessary to indicate compliance with the Specifications
 - 3. Final "Record" Contract Drawings - Drawings and information required shall include but not be limited to the following:
 - a. Conduit runs shall be shown and identified at the end of each run. Labels shall include from where the conduit originates and where it terminates. Each conduit shall have a pull string attached and fastened at each end.
 - b. Power Distribution Schematics - Show actual installed switching details, cable size and type, conduit size, locations and runs, fuse size and type, circuit breaker frame size, trip setting and type.
 - c. Details and Diagrams
 - 1. Elementary Wiring Diagrams – Show actual motor control wiring with wire numbers, telephone system cable routing and station identification with cable numbers.
 - 2. One Line Diagrams - Show equipment names, fuse sizes and types, heater sizes, conduit and wire sizes, motor FLA and horsepower. Include wire and cable numbers or identification.
 - 3. Instrumentation and control Diagrams - Show actual installed, wired instrumentation loop diagrams, include actual installed device Tag Numbers, Model Numbers, Scaling
 - d. Lighting and Device Schedule
 - 1. Show actual manufacturers and model numbers.
 - 2. Lighting panel layouts
 - 3. Actual circuit No. circuit description, breaker size and type.
 - 4. Payment for the Division 26 work and materials shall not exceed 90% of the total bid price until all Operations and Maintenance data and record as built drawings have been completed and received by the Owner.
- G. Location Environmental Considerations
 - 1. Provide satisfactory operation and maintenance under the following conditions
 - 2. Temperature:
 - a. Outside: - 20° to 110°F
 - b. Inside: +40° to 120°F
 - 3. Relative Humidity: 100 percent
 - 4. Process Temperature:
 - a. Liquid: 32° to 105°F
 - b. Air: - 32° to 200°F
 - 5. Atmosphere:
 - a. As indicated on the drawings
 - b. Corrosive atmosphere Hydrogen Sulfide

- c. Wet Locations
 - 1) As defined in NEC ART. 100.
 - 2) Outside exposed areas, areas indoors near pumps, frequent washdown areas.
 - d. The interiors of conduits and raceways located in wet areas shall also be classified as wet areas.
 - e. Damp Locations
 - 1) As defined in NEC ART 100
 - 2) Areas under covered enclosures,
 - f. Wet and Corrosive areas
 - 1) Enclosures located in areas that are wet and corrosive shall be rated for NEMA 4X Stainless Steel or as noted on the drawings.
 - g. Hazardous Areas (Classified)
 - 1) Areas that are a hazardous area are indicated on the drawings. All new equipment and installation methods shall conform to the requirements in the NEC.
- H. Products
- 1. Electrical materials and equipment shall be new and shall be labeled by the Underwriters Laboratories, Inc when ever standards have been established and the label service applies.
 - 2. Wire and Terminal Labeling - Tag all wire, cable and conduit at each end or termination with suitable permanent tags, printed, stamped, or engraved with the wire, cable or conduit number. The figures on the tags shall be clear and legible.
 - 3. Safety Signs - High voltage warning signs shall be provided and placed at all guarded locations as required by the N.E.C. The signs shall be permanent and conspicuous, and shall be plainly visible even when doors are open or panels removed from compartments.
 - 4. Engraved Nameplates - Identify all electrical enclosures with engraved phenolic nameplates. Engrave and mount nameplates for all switchgear, disconnect switches, and individual motor starter enclosures indicating equipment served. Nameplates shall be **white with black letters**. Minimum letter size shall be one-quarter inch.
- I. Demolition
- 1. Electrical Contractor shall disconnect power from existing equipment to be removed. General Contractor to remove and dispose of actual equipment.
 - 2. Electrical contractor shall perform the demolition of electrical equipment where indicated on the electrical contract drawings.
- J. Electrical Installation
- 1. Electrical Contractor shall furnish and install, adjust, connect, and put into satisfactory operation all electrical equipment, control components and instrumentation items as indicated on the Drawings and specified herein.
- K. Coordination
- 1. Electrical Contractor shall review all Specifications and Drawings for the electrical work included under these sections and coordinate this work. Investigate existing conditions in the field before submitting proposal. Become acquainted with the conditions under which the work of this section of the Specifications will be performed and accept all conditions as found.
 - 2. Schedule and coordinate all relocations of, or modifications to electrical,

instrumentation or control systems wiring, conduit equipment, or appurtenances to whatever extent is necessary and required in order to conform to structural and architectural conditions, duct work and piping interference's, etc., shall be included under this section of the Specifications.

3. Coordinate with other trades on the project so that all trades install their work to avoid interference with each other. Arrangements made among the trades which result in deviations from Drawings and Specifications are subject to the approval of the Owner.
4. The control panels and/or equipment are to be provided by the equipment supplier, General Contractor, and System Integrator. These items will require power and/or interconnections from the disconnect switch to the control panel and/or field mounted devices or junction boxes for power and control. Specific details to be determined by the shop drawings.

1.3 REFERENCES

- A. American National Standards Institute (ANSI)
- B. Factory Mutual Engineering Division (FM)
- C. Illumination Engineering Society (IES)
- D. Institute of Electrical & Electronics Engineers (IEEE)
- E. Insulated Cable Engineers Association (ICEA)
- F. Instrumentation, Systems and Automation Society (ISA)
- G. Joint Industrial Council (JIC)
- H. National Electrical Code (NEC)
- I. National Electrical Manufacturers Association (NEMA)
- J. International Electrical Testing Association (NETA)
- K. National Fire Protection Association (NFPA)
- L. Occupational Safety and Health Administration (OSHA)
- M. Ohio Building Code (OBC)
- N. Underwriters' Laboratories Incorporated (UL)
- O. ANSI/NEMA 1-2000 Standard Practices for Good Workmanship in Electrical Contracting.
- P. Quality Assurance
 1. Regulatory requirements
 - a. The Contractor shall obtain and pay for all fees for permits and inspections as required.
 2. Installation Standards
 - a. NEC – installation of electrical items shall be in accordance with the NEC.
 - b. Instrumentation and control – Installation of the instrumentation, control system shall be in accordance with standards of the ISA.

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all devices at delivery for damage.
- B. Confirm all devices at delivery are as required according to design and shop drawings.
- C. Examine the site and structures for any obstructions which may interfere with the electrical installation as planned.

3.2 PREPARATION AND STORAGE

- A. Provide a dry heated storage area for all electrical and electronic equipment and devices.
 - B. Electrical and electronic equipment devices shall be stored and shall be heated to prevent condensation from forming. Electrical and electronic equipment found with condensation in the enclosure or condensation caused damage will not be accepted.

3.3 INSTALLATION

- A. The locations of equipment to which electrical connections are to be made are approximate as indicated on the Drawings.
- B. It shall be the Contractor's responsibility to check shop drawings relating to equipment requiring electrical connections and to determine the exact conduit locations.
- C. Electrical and electronic equipment installed but not energized shall continue to have a heat source to maintain the enclosure free of condensation. Electrical and electronic equipment found with condensation in the enclosure or condensation caused damage will not be accepted.
- D. Contractor shall perform all chasing, channeling, drilling and patching necessary. Repair any damage to the building or any equipment. Replace damaged equipment if, in the Engineer's judgment, the repair would not be satisfactory.
- E. No work shall be covered or hidden from view until it has been inspected and approved by the Owner.
- F. Any workmanship or materials not meeting the requirements of the Specifications or Drawings shall be immediately replaced by the Contractor without cost to the Owner and to the satisfaction of the Owner.
- G. All wiring shall have permanent labels at all terminations and junctions of the wires and on all field wiring terminal strips.
- H. Safety signs shall be furnished and installed on or around all electrical equipment.
- I. Permanent marking labels shall be installed on exposed sides of each piece of electrical equipment, pull boxes, junction boxes and terminal boxes stating the maximum voltage level involved with the associated equipment.
- J. Concrete equipment pads for electrical equipment shall be furnished and placed by the Electrical Contractor.

3.4 PAINTING

- A. All wood panel mounting boards shall be painted.
- B. All electrical enclosures shall undergo a phosphatizing prepainting treatment. Final paint coats shall be a polyester powder coating with ANSI 61 light gray color for enclosures mounted inside and with ANSI 24 medium gray color for enclosures mounted outside.
- C. Remove any rust and touch up any scratches on all new electrical devices or enclosures with matching touch-up paint as supplied by the manufacturer.

3.5 FIELD QUALITY CONTROL

- A. Major components of the Electrical System shall be tested per NETA standards. NETA's Standard Specification for Testing, Parts 1 to 5, shall govern all testing.
- B. The following tests are per NETA Acceptance Testing Specifications, Part 7, Inspection and Test Procedures. Visual and Mechanical Inspections shall be performed for all equipment.
 - 1. Cables - Low Voltage shall have the following tests: Insulation resistance, continuity.
 - 2. Circuit Breakers - Low Voltage (Molded Case) that are rated at over 100 amps shall have the following tests: Contact resistance, time-current characteristic, instantaneous pickup current, insulation resistance.
 - 3. Grounding Systems shall have the following test: Fall of potential.
 - 4. Surge Arresters shall have the following tests: 60 Hz sparkover, insulation power factor, ground continuity.
- C. After all testing has been completed to the satisfaction of the Owner, the entire Electrical (Power) System shall operate for a minimum test period of 30 days. Cumulative down time of all components furnished under Division 16 shall not exceed 1/2 hour as recorded by the Engineer during the test period. System documentation shall be delivered on the last day of test period. Test period shall not end until system documentation has been delivered. If the cumulative downtime limit is exceeded, the Engineer shall have the following options.
 - 1. Extend the test period as required until the cumulative downtime during the proceeding 30 days does not exceed 1/2 hour as recorded by the Engineer.
 - 2. Sub-systems that have no components contributing to the cumulative downtime will be approved as a partial acceptance.
- D. Sub-systems which have components that contributed to the cumulative downtime shall have their test period begin after all repairs and adjustments have been made.

3.6 OPERATION - MAINTENANCE AND SPARE PARTS DATA

- A. Submit specific data and information required under individual Division 16 Sections.
 - 1. Submit operation data as required.
 - 2. Submit maintenance data as required.
 - 3. Spare Parts Data - Submit as required. Include manufacturer's list of recommended spare parts.
 - 4. Parts and supplies judged to be necessary to keep equipment and control system operating successfully for first year of operation shall be furnished.

5. Review individual sections for required lists of spare parts to be furnished.

3.7 CLEANING

- A. All areas are to be cleaned of construction debris and wire. Electrical equipment is to be cleaned of all construction dirt, dust, etc.
- B. All electrical and electronic equipment shall be kept clean and free of all dust, dirt, and debris at all times.
- C. All electrical and electronic boxes and enclosures shall have the covers of these boxes and enclosures closed and sealed except when actually working in these boxes and enclosures.

END OF SECTION 260500