SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Basic electrical methods.
   2. Grounding and bonding.
   3. Motor Starters, controls, and connections to mechanical equipment.

B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 REFERENCES

A. National Electrical Contractors Association (NECA):
   1. NECA SI - Standard of Installation.

B. National Electrical Manufacturers Association (NEMA):
   1. NEMA KS 1 - Enclosed Switches.

C. National Electrical Testing Association (NETA):
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

D. National Fire Protection Association (NFPA):
   1. NFPA 70 - National Electrical Code.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing Work of this Section with minimum 5 years documented experience.

B. Regulatory Requirements:
   1. Products: Listed and classified by Underwriters Laboratories, Incorporated as suitable for the purpose specified and indicated.
   2. Work herein shall conform to all applicable laws, ordinances and regulations in accordance with the latest applicable as specified in "Section 01 00 00 – Special Conditions – Section 1.15 References and Standards" and the requirements of:
      a. Underwriter's Laboratories.
      b. National Electrical Code - 2014.
      c. International Energy Conservation Code - 2012.

1.4 BASIC ELECTRICAL METHODS

A. Surface mounted raceways or conduit permitted only at locations indicated on Drawings.

B. Proposed equipment, switches or devices, shown mounted on and/or adjacent to equipment, which if installed, would impair proper operation of existing or new equipment, shall be removed

and relocated by Contractor as required so equipment will function properly. Notify Contracting Officer through TPWD Project Manager immediately if any such condition exists.

C. Seal and make permanently watertight penetrations by electrical raceways or equipment through walls.

D. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A, and NFPA 70.

E. Install equipment and materials to provide required maintenance and code working clearance for servicing and maintenance. Coordinate final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow required space for removal of parts that require replacement or servicing.

F. Remove existing equipment, lighting fixtures, switches, and receptacles as required to facilitate proposed installation and as specified in Section 024119 - Selective Structure Demolition. Remove existing wiring and conduit serving items to be removed. Conduit in inaccessible areas shall be cut off below finished surfaces and existing surface patched to match existing. Provide blank plates on existing flush mounted outlet boxes that will be abandoned. Remove all abandoned conductors from raceways.

PART 2 - PRODUCTS

2.1 MOTOR STARTERS, CONTROLS, AND CONNECTIONS TO MECHANICAL EQUIPMENT

A. Motor Starters:
1. Provide manual, single phase, 120/277V, toggle type, motor rated switches with thermal overload element (sized at 115 percent of full load current) for fractional horsepower motors not requiring automatic control interfaces.
2. Provide across-the-line, AC magnetic motor starters in applications where controls other than manual on and off are involved. Motor starters shall be UL labeled. Provide starters with the following features:
   a. Rating for the voltage and current imposed.
   b. Enclosure for the application usage: NEMA 1 for dry, indoors, NEMA 3R for outdoors, etc.
   c. Control circuit voltage and amperage to match coil voltage and ratings of control apparatus.
   d. Control transformers with primary and secondary fusing for control circuits, as required.
   e. Overload elements for every conductor leg above ground. Elements are to be "thermal alloy" type, resettable and properly sized to motor nameplate rating. Elements located near boilers, heat strips, duct heaters or other heat sources or where heating by conduction or radiation can occur, shall be ambient temperature compensated types.
   f. Adjustable phase loss/phase reversal protection (0-15 seconds), factory set at 7 seconds and a minimum of two field convertible auxiliary contacts.
   g. Cover-mounted control switch is to be a "start-stop" or "hand-off-auto" type with "running" and "auto" pilot lights, as required by the control sequence. A suitable reset device for manually resetting overcurrent trip shall be provided.
3. Magnetic starters for motors 10 hp or less shall be connected to automatically return the motor to service after a power interruption. Starters for motors over 10 hp shall be

equipped with time delay relays so that after a power resumption and after a preset delay of 0-30 seconds, the motor shall automatically be returned to service.

4. Combination magnetic motor starter/fused disconnect unit shall be utilized wherever possible.

B. Furnish and Install the Following:
   1. Conduit, wiring and electrical connections to motors, safety switches, starters, relays, electrical interlock circuits, valves, unit heaters, fan coil units, air handling units, and other similar equipment, required for complete and ready for operation. Coordinate with and review other sections of the specifications describing electrical equipment in order to fully understand the wiring requirements.
   2. Starters as indicated on Drawings except factory provided starters such as those physically mounted on the unit or any piece of equipment where starter is furnished as an integral part of the equipment.
   3. Electrical line voltage control components and installation as specified in Division 26 Sections.
   4. Furnish and install low voltage (below 50 volts) control wiring as indicated on Drawings using metallic conduit and No. 12 type THHN wire, minimum.

C. Refer to Drawings for quantity and size of motor starters.

D. Individual motor starters and those starters factory provided integral with the equipment shall be furnished in accordance with paragraph 2.4 B

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 INSTALLATION - GROUNDING AND BONDING

A. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.

B. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing, building steel above grade and metallic cold water pipe.

C. Provide bonding and grounding in conformance with NFPA 70.

D. Equipment Grounding Conductor: Provide separate, insulated conductor within all lighting and power raceways. Terminate each end on suitable lug, bus, or bushing.

3.3 INSTALLATION – MOTOR STARTERS. CONTROLS, AND CONNECTIONS TO MECHANICAL EQUIPMENT

A. Verify and check equipment manufacturer's nameplate and installation instructions to obtain exact location of outlets for equipment before installation.

B. Wire and connect line voltage controls in accordance with approved wiring diagrams. Provide line voltage interlock and control wiring as indicated on Drawings using conduit and No. 12 type THHN wire.

3.4 FIELD QUALITY CONTROL - ELECTRICAL TESTING AND INSPECTION

A. Conduct testing to Determine that Electrical Equipment and Systems:
   1. Are in conformance with Contract Documents and applicable reference standards.
   2. Is properly installed without damage due either to installation or shipment.
   3. Operate correctly, meet design intent, and are performing at optimum level, in safe manner.

B. Regulatory Requirements:
   1. Safety Practices: Include, but not limited to, the following requirements:
      a. Occupational Safety and Health Act of 1970 - OSHA.
      b. Accident Prevention Manual for Industrial Operations, Seventh Edition, National Safety Council, Chapter 4.
      c. Applicable State and Local Safety Operating Procedures.
      d. NETA Safety/Accident Prevention Program.
      e. United States Postal Service Safety Practices.
      f. NFPA 70E - Electrical Safety Requirements for Employee Workplace.
      g. American National Standards for Personnel Protection, ANSI Z244.1.
   2. Perform tests with apparatus de-energized except where otherwise specifically required herein.
   3. Testing Laboratory: Provide a designated safety representative present at Project Site and supervise safety operations.
   4. Power Circuits: Conductors shorted to ground by a hot line grounded device approved for the purpose.
   5. Do not proceed until safety representative has determined that it is safe to do so.
   6. Testing Laboratory: Provide sufficient protective barriers and warning signs to conduct specified tests safely.

END OF SECTION 26 05 00