

SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division - 1 Specification sections, apply to the work of this section.

1.2 DESCRIPTION

- A. The work of this section includes the furnishing and installation of all electrical equipment, materials and devices as shown on the electrical drawings and/or as specified herein, including but not limited to:
 - 1. Conduit and Wire
 - 2. Safety Switches and Fuses
 - 3. Panelboards
 - 4. Lighting and Lighting Control
 - 5. Fire Alarm Systems and Devices
 - 6. Telecom and Security Infrastructure Systems
- B. The term "provide" shall mean furnish and install.
- C. Applicable Publications:
 - 1. Where publications are listed in each Section, they form a part of that Section to the extent referenced.
 - 2. When a standard is specified by reference, comply with the requirements and recommendations stated in that standard, except when its requirements are modified by the Contract Documents, or applicable codes establish stricter standards.
 - 3. When a code is not specified by reference in a Section, the work of that Section shall comply with applicable codes listed in the General Conditions.
 - 4. The publication date is the publication in effect as of the bid date, except when a specific publication date is specified.
 - 5. Obtain copies of referenced standards direct from publication source, when needed for proper performance of work, or when required for submittal by Contract Documents.

1.3 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. The installation of all work under this section shall comply with all applicable codes, laws, standards and regulations. Nothing in the specifications shall be construed to permit deviation from these governing items.

2. **Electrical material and equipment shall be listed and labeled. Materials, equipment and installation shall meet the requirements of applicable codes and standards listed at the end of this section.**

B. Qualifications of Workmen:

1. Provide sufficient qualified journeyman electricians who are thoroughly experienced with the materials and methods specified and familiar with the design requirement.
2. At least one qualified journeyman shall be present at all times during the execution of the work.
3. In acceptance or rejection in any portion of the electrical work, no allowance will be made for lack of skill on the part of the workmen.

C. Definitions:

1. The term “as indicated” means as shown on drawings by notes, graphics or schedules, or written into other portions of contract documents. Terms such as “shown”, “noted”, “scheduled” and “specified” have the same meaning as “indicated”, and are used to assist the reader in locating particular information.
2. The term “provide”, means furnish and install.
3. The term “furnish”, means supply to the project only, for installation under other Divisions as part of this contract.
4. The term “install”, means to place and put in service equipment furnished under other Divisions as part of this contract.
5. The term “Owner’s Representative” when referenced here in shall be the Architect unless otherwise noted.
6. The term “Division 21 Contractor” shall mean the fire protection subcontractor and their lower tier subs.
7. The term “Division 22 Contractor” shall mean the plumbing subcontractor and their lower tier subs.
8. The term “Division 23 Contractor” shall mean the HVAC subcontractor and their lower tier subs.
9. The term “Division 26, Division 27 or Division 28 Contractor” shall mean the electrical subcontractor and their lower tier subs.
10. For additional definitions refer to the General Conditions.

1.4 INTENT OF DRAWINGS AND SPECIFICATIONS

- A. The implied and stated intent of the drawings and specifications is to establish minimum acceptable quality standards for materials, equipment and workmanship, and to provide operable electrical and mechanical systems in every respect.
- B. The drawings are diagrammatic only, intending to show general arrangement and location of system components. Due to the small scale of the drawings, and to unforeseen job conditions, all required offsets and fittings may not be shown, but shall be provided at no change in contract price.

1.5 SUBMITTALS

- A. Submit shop drawings of the electrical materials to the Designer for review in accordance with the provisions of Division 01 of these specifications.
- B. The following is a list of those items required to be submitted:
 - 1. Conduit and Wire
 - 2. Safety Switches and Fuses
 - 3. Panelboards
 - 4. Wiring Devices
 - 5. Lighting and Lighting Control
 - 6. Fire Alarm System and Devices
 - 7. Telecommunications Systems
- C. Contractor shall not begin fabrication or work which requires submittals until return of submittals with Designer's approval.

1.6 SUBSTITUTIONS

- A. Within 30 days after contract date, submit to Designer a complete list of major products proposed to be used, with the name of the manufacturer and the installing subcontractor.
- B. Contractor's Options:
 - 1. For products specified only by reference standard, select any product meeting that standard.
 - 2. For products specified by naming several products or manufacturers, select any one of the products or manufacturers named, which complies with the specifications.
 - 3. For products specified by naming one or more products or manufacturers and "or equal", contractor must submit a request as for substitutions for any product or manufacturer not specifically named.
- C. Substitutions:
 - 1. For a period of 30 days after contract date, the Designer will consider written requests from the Contractor for substitution of products.
 - 2. Submit a separate request for each product, supported with complete data, with drawings and samples as appropriate, including:
 - a. Comparison of the qualities of the proposed substitution with that specified.
 - b. Changes required in other elements of the work because of the substitution.
 - c. Effect on the construction schedule.
 - d. Cost data comparing the proposed substitution with the product specified.
 - e. Availability of maintenance service, and source of replacement materials.
 - 3. The Designer shall be the judge of the acceptability of the proposed substitution.

D. Contractor's Representation:

1. A request for a substitution constitutes a representation that Contractor:
 - a. Has investigated the proposed product and determined that it is equal to or superior in all respects to that specified.
 - b. Will provide the same warranties or bonds for the substitution as for the product specified.
 - c. Will coordinate the installation of an accepted substitution into the work, and to make the work complete in all respects.
 - d. Waives all claims for additional costs, under his responsibility, which may subsequently become apparent.
 - e. Absorb all costs incurred by the substitution when affecting other trades, including but not limited to electrical, structural and architectural, etc.
 - f. Absorb any cost incurred by the Owner's Representative in review of the substituted product if the acceptance of the substituted item creates the need for system modification and/or redesign, or if the substituting contractor exhibits negligence in his substituting procedure thus submitting inferior, misapplied or mis-sized equipment. In the event of additional Designer costs, the billing structure shall be agreed upon prior to review by all involved parties.

- E. The Designer will review the requests for substitutions with reasonable promptness, and notify Contractor, in writing, of the decision to accept or reject the requested substitution.

1.7 VISIT TO THE SITE

- A. All persons proposing to submit quotations for work in accordance with these plans and specifications MUST visit the site of the work covered by the plans and specifications; and are to familiarize themselves with existing conditions as they affect the work of this section of the specifications. Claims resulting from a failure to visit the site or inspect the existing conditions will not be considered.

1.8 OPERATING AND MAINTENANCE DATA

- A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under Contract.
 1. Prepare operating and maintenance data as specified in this section and as referenced in the General Conditions and applicable Section of Division 1 General Requirements.
 2. Provide copies of all testing report data in the manual for future reference by the Owner.
- B. Instruct Owner's personnel in maintenance of products and in operation of equipment and systems.
- C. Preparation of data shall be done by personnel:
 1. Trained and experienced in maintenance and operation of desired products.

2. Familiar with requirements of this Section.
3. Skilled as technical writer to the extent required to communicate essential data.
4. Skilled as drafts person competent to prepare required drawings.

D. Prepare data in form of an instructional manual for use by Owner's personnel.

1.9 PAINTING

- A. Suitable finish coatings shall be provided under this section of the Specifications on all items of electrical equipment and wiring which are exposed. This shall consist of either an approved factory applied finish or an acceptable finish applied during or after installation. Equipment which is furnished in finishes such as stainless steel or satin aluminum are not to be painted. Exposed equipment and/or wiring in finished areas such as panel covers or surface raceway shall be supplied with factory applied prime coat and shall be professionally painted or enameled as directed to result in a completely coated and attractively finished manner. All such finishing shall be as directed and shall be satisfactory to the Designer.
- B. All factory-finished steel surfaces; boxes, enclosures, etc., shall be cleaned and retouched or repainted as necessary to provide a rust-resistant coating. Where painting or galvanizing is not specifically specified, ferrous devices, bolts, nuts, inserts, etc., shall be galvanized.
- C. All nameplates shall be left unpainted and in a clean condition.

1.10 WIRING AND ELEMENTARY DIAGRAMS

- A. Wiring and elementary diagrams for equipment as shown on the drawings are based on the product of the specified equipment manufacturer and are shown for convenience to aid in estimating the extent of the work involved. The equipment actually installed shall be wired and connected in accordance with the equipment manufacturer's recommendations and shall conform to details in approved wiring diagrams to be furnished by the equipment manufacturer. All equipment so connected shall be made to operate in a safe, proper and efficient manner. Note that control circuitry is not necessarily shown on the drawings but shall be installed in conduit between the points and devices indicated on the diagrams.

1.11 POWER AND CONTROL WIRING RESPONSIBILITIES FOR SYSTEMS OTHER THAN ELECTRICAL

- A. Definitions:
 1. Power Wiring (by electrical contractor): The contractor shall provide all wiring to the line side of junction boxes or disconnects for all mechanical and plumbing equipment. Wiring from the load side of the junction box or disconnect shall be provided by the Div. 22/23 contractor for plumbing and mechanical systems.
 2. Control Wiring (by Automatic Temperature Control Contractor; ATC): All wiring, high or low voltage other than power wiring, required for the proper control operation of the mechanical systems.

- B. Refer to specification Division 22/23 and coordinate all requirements with that division prior to commencing work. Bring to the attention of the Designer any items requiring clarification.

1.12 EQUIPMENT TESTS

- A. An operating test of the complete electrical system shall be made. System shall test free from grounds, shorts and other faults. Connections shall be for positive mechanical and electrical connection and continuity. Equipment shall be demonstrated to operate in accordance with the requirements of the plans and specifications. Contractor shall furnish all personnel and test instruments required. Performance of tests shall be made in the presence of the Owner's representative.
- B. The following tests shall be performed as a minimum:
 - 1. Control and Distribution Equipment:
 - a. Check the wire terminals, clean connections.
 - b. Check all control switches, alarm devices, indicating instruments for proper operation under normal and simulated abnormal conditions.
 - 2. Phase rotation: The connections of all equipment shall be checked for correct phase rotation.
 - 3. Circuit Breakers: The following tests shall be performed:
 - a. Inspect each circuit breaker.
 - b. Check for loose connections.
 - c. Operate each circuit breaker manually.
 - d. Set the adjustable trips to the values specified.
- C. Spot-checks and/or back-checks to verify the testing accuracy shall be made for the Designer or his agent during job-site visits.
- D. Validity of the ground path shall be assured by constant and careful attention to the thorough tightening of all couplings, connectors, locknuts, screws, bolts, etc. and by frequent checking of the path resistance with a quality low-range ohmmeter. Resistance of the path should not exceed one ohm between any two points. If a reading in excess of this is observed, it shall be discussed with the Designer for an appraisal of the condition.
- E. All current carrying phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance and accidental grounds. This shall be done with a 500 volt cable insulation testing device. The procedures listed below shall be followed:
 - 1. Minimum readings shall be one million (1,000,000) or more ohms for #6 AWG wire and smaller, 250,000 ohms or more for #4 AWG wire or larger, between conductors and between conductor and the grounding conductor.
 - 2. After all fixtures, devices and equipment are installed and all connections completed to each panel – disconnect neutral feeder conductor from neutral bar and take a resistance reading between neutral bar and grounded can. If this reading is less than 250,000 ohms,

disconnect branch circuit (or sub-feeder) neutral wires from this neutral bar. Test each one separately to the panel can until low reading ones are found. Correct troubles, reconnect and retest until at least 250,000 ohms from neutral bar to grounded panel can is achieved with only neutral feeder disconnected.

- F. Upon completion of work, but before final inspection, the Contractor shall send a letter to the Designer and the Owner certifying that these tests have been accomplished and tabulating the resistance readings for each panel. During field visits, contractor shall demonstrate installation and make such tests as may be required to satisfy the Architect/Designer and Owner that work is installed in accordance with drawings, specifications and instructions.

1.13 WARRANTY

- A. All equipment installed under this Division of the work shall be warranted for a minimum of one year after the specified performance has been demonstrated and accepted by the Owner. During this warranty period, replace any and all defective equipment and parts at no cost to the Owner.

1.14 BRANCH CIRCUITS

- A. The branch circuit wiring has been designed to utilize the advantages of multi-wire distribution and shall be installed substantially as indicated on the drawings. No major changes in the grouping or general routing of the branch circuits shall be made without the approval of the Designer in writing.
- B. The number of conductors in each run of conduit is indicated on the drawings and where there is a conflict between the number of wires indicated and the actual number required as determined by the functional design requirements, the number of wires determined by the functional design requirements shall govern.
- C. In general, there is a number associated with each branch circuit outlet which identifies the particular branch circuit to which the device served by the outlet is to be connected. The circuit number indicated has been assigned only for reference and guidance, and is not intended to limit panelboard circuitry. All branch circuits shall be connected to breakers in accordance with circuit requirements and good industry practice. The balancing of all loads shall be included in the work of this DIVISION.
- D. Home runs shall not be combined where such would require derating of conductor ampacity.
- E. **Branch circuit wiring shall include SEPARATE neutrals for each circuit. No combining of neutrals will be allowed.**

1.15 MOTOR, APPLIANCE AND EQUIPMENT CONNECTIONS

- A. Unless otherwise shown on the drawings or specified herein, it is the intent of this DIVISION to provide all electrical equipment and connections required to protect, properly operate, and

control all motors, appliances, electrical devices, and equipment furnished and installed under this and other DIVISIONS of the specifications or shown on the drawings.

1.16 SETTING OF EQUIPMENT

- A. The setting of equipment shall be carefully coordinated with the work and requirements of the other trades involved to ensure compatibility and to avoid conflicts.
- B. Equipment, base mounted on concrete or masonry slabs, pads and piers, or mounted on stands, gratings, platforms, or other, shall not be set in any manner, except on the finished and permanent support.
- C. Support of equipment on studs or by other means, and the placing or building of the supporting slab, pad, pier, stand, grading, or other, "to the equipment", is prohibited.

1.17 PLYWOOD BACKBOARDS

- A. For mounting electrical or telephone equipment, provide fire-retardant treated plywood panels with grade designation, APA C-D PLUGGED INT with exterior glue, in thickness indicated, or, if not otherwise indicated, not less than 15/32".

1.18 RECORD DRAWINGS/MANUALS

- A. Upon completion of the installation, Contractor shall submit to the Architect/Designer marked prints of drawings showing any changes made in circuits, location of equipment, panelboards or any other revision in the Contract Drawings, for the Owner's use in maintenance work and for future additions and expansions. Marked changes shall also include changes due to change orders unless already recorded by revised drawing or bulletin drawing.
- B. These records shall be submitted in one of two formats: either a clean, legible, marked set of prints with all markings in distinguishable colored pencil such as red; or a set of reverse-run reproducible sepia prints marked in soft pencil so that blue-line prints can be reproduced as required. The format to be used shall be as defined in the General Requirements section of the contract documents. If no format is defined, the marked blue-line prints shall be submitted.
- C. Operation and Maintenance manuals shall be submitted to the Architect/Designer at the end of the project prior to closeout of the project. Information included shall be a copy of all submittal data, shop drawings and necessary operating and maintenance instructions and wiring diagrams on all major items of equipment and all special systems (fire alarm, intercom, etc.). Submit these manuals in the quantities and format described in the General Requirements section.

- 1.19 It shall be the sole responsibility of the Division 26 contractor to notify the Office of the State Consulting Services Section of any necessary inspections and to schedule said inspections. Inspections will only be made Monday-Friday unless specifically exempted and approved by the State Construction Office.

APPENDIX

APPROVED SUITABLE QUALIFIED TESTING LABORATORIES TO LABEL ELECTRICAL & MECHANICAL EQUIPMENT IN ACCORDANCE WITH N.C. GENERAL STATUTE § 66-25 and § 143-139.1 AS OF JANUARY 2022

Applied Research Laboratories Equipment Categories

5371 Northwest 161st Street, Miami, Florida 33014 12, 14, 15, 22, 24, 31, & 43
(305) 624-4800

CSA International Equipment Categories

178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3 All
(416) 747-2798

Curtis-Straus Equipment Categories

527 Great Road, Littleton, Massachusetts 01460 7, & 26-28
(978) 486-8880 x 296

Eurofins E&E North America / MET Laboratories Equipment Categories

901 Sheldon Drive, Cary, NC 27513 7, 10 - 16, 18, 22, 23, 26 - 31, 37 - 40, 43, 44, 47, 48, & 50
(919) 481-9319

FM Approvals LLC Equipment Categories

PO Box 9102, Norwood, Massachusetts 02062 4, 5, 9, 13, 17, 19, 24, 28, 31, 32, 39, 43, & 47-51
(781) 762-4300

IAPMO EGS Equipment Categories

5001 East Philadelphia Drive, Ontario, California 91761 12, & 30
(909) 472-4100

Intertek Testing Services ITS-ETL Equipment Categories

3933 US Route 11, Cortland, New York 13045-2014 All except 21
(607) 753-6711

Intertek Testing Services ITS-Warnock Equipment Categories

3933 US Route 11, Cortland, New York 13045-2014 17, 18, 21, 24, & 25
(607) 753-6711

LabTest Certification, Inc. Equipment Categories

#112-3255 Pepper Lane, Las Vegas, Nevada 89120 12, 13, 17, 18, 21, 28, 29, 30, 40, 43, & 48
(702) 269-0578

National Technical Systems (NTS) Equipment Categories

533 Main Street, Acton, MA 01720 26, 27, & 28
(978) 263-2933

NEMKO North America, Inc. Equipment Categories

2210 Faraday Avenue, Suite 150, Carlsbad, California 92008 6 - 16, 22, 23, 26 - 31, 40, 43, 47, & 48
(760) 444-3500

NSF International Equipment Categories

789 North Dixboro Road, Ann Arbor, Michigan 48105-9723 11-16, 26-31, 40, 43, & 48
(734) 769-8010

Omni-Test Laboratories Equipment Categories

13327 NE Airport Way, Portland, Oregon 97230 17, 18, & 21
(503) 643-3788

PFS Corporation Equipment Categories

1507 Matt Pass, Cottage Grove, Wisconsin 53527 17, 21, & Replacement Blowers & coils

(608) 839-1013

QPS Evaluation Services, Inc. Equipment Categories

1501 Valley Creek Drive, Hillsborough, North Carolina 27278 6-12, 14-16, 22, 23, 26-29, 31, 36, 39, 40, 43, 46-48, 50, & 51

(919) 414-5381

RADCO Equipment Categories

3220 East 59th Street, Long Beach, California 90805 17, 18, & Replacement blowers & coils

(310) 272-7231

Salus Engineering International Equipment Categories

3004 Scott Boulevard, Santa Clara, California 95054 16, 28, 37, 43, & 50

(408) 235-8831

SGS Consumer Testing Services Equipment Categories

620 Old Peachtree Road, Suite 100, Suwanee, GA 30024 1-5, 9-16, 22, 26-31, 33, 35-41, 43, 47-48, & 50-51

(770) 570-1800

SolarPTL, LLC Equipment Categories

1107 West Fairmont Drive, Tempe, AZ 85282 4

(480) 966-1700

Southwest Research Institute Equipment Categories

6220 Culebra Road, San Antonio, Texas 78238-5166 4

(210) 684-5111

TUV SUD America Equipment Categories

10 Centennial Drive, Peabody, MA 01960 4-8, 10-20, 22, 23, 26-29, 31, 35, 36, 38, 39, 43, 46-48, & 50

(978) 573-2530

TUV Rheinland of North America Equipment Categories

762 Park Avenue, Youngsville, North Carolina 27596 7-9, 11-14, 16, 26-29, 31, 40, 43, 47-48, & 50

(919) 554-3668

Underwriters Laboratories, Inc. Equipment Categories

12 Laboratory Drive, RTP, North Carolina 27709 All

(919) 549-1400

EQUIPMENT CATEGORIES

1. Conductors for General Wiring
2. Flexible Cords
3. Wires and Cables for Special Applications
4. Materials and Components for Special Applications
5. Alarm Signal and Detecting System Components
6. CATV and Radio Distribution System Components
7. Communication System Components
8. Radio and Television Components
9. Energy Management System Components and Controllers
10. Sound Recording and Reproduction Equipment
11. Fixed Office Appliances and Business Equipment
12. Electrical Appliances
13. Electric Space Heating Equipment and Accessories
14. Air Conditioning Equipment and Accessories
15. Heat Pump Equipment and Accessories
16. Refrigeration Equipment and Accessories

17. Gas Fired Heating Equipment and Accessories
18. Gas Fired Appliances
19. Oil Fired Heating Equipment and Accessories
20. Oil Fired Appliances
21. Solid Fuel Heating Equipment
22. Fans and Ventilators
23. Filtering Equipment
24. Duct Materials Including Dampers
25. Chimneys and Vents
26. Electrical Data Processing Equipment
27. Medical, Dental, and X-Ray Equipment
28. Laboratory Equipment, Electrical Measuring, and Testing Equipment
29. Food Preparation Machines
30. Swimming Pool and Spa Equipment
31. Miscellaneous Fixed Equipment - Amusement Machines, Animal Care, Appliances
Battery Chargers, Cleaning Machines, etc.
32. Fire Extinguishing Equipment
33. Circuit Breakers
34. Fuses
35. Wiring Devices, Attachment Plugs and Toggle Switches
36. Switches and Switching Devices - Other than Toggle
37. Panelboards
38. Switchboards
39. Transformers
40. Electrical Signs and Accessories
41. Ground-Fault Circuit Interrupters
42. Ground-Fault Sensing and Relaying Equipment
43. Industrial Control Equipment - Motor Controllers, Industrial Control Panels,
Motor Control Centers, Motorized Valves, Solenoids, etc.
44. Transient Voltage Surge Suppressors and Filters
45. Lightning Protection System Components and Lightning Protection Devices
46. Metering Enclosures and Meter Sockets
47. Emergency Lighting and Power Equipment System Components
48. Lighting Fixtures, Lamp Holders, and Accessories
49. Auxiliary Gutters, Junction, Pull and Outlet Boxes, and Cabinets and Cutout Boxes
50. Electrical Equipment for Hazardous Locations
51. Grounding and Bonding Equipment
52. Wire Connectors, Lugs, and Terminal Fittings
53. Insulating Tape and Closures

END OF SECTION 260500

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