

SECTION 260501 - COMMON WORK RESULTS FOR ELECTRIC**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to all sections.

1.2 GENERAL DIRECTION

- A. Submittal of a bid indicates that the contractor has examined the drawings, specifications, and had an opportunity to visit the site to be able to provide a comprehensive complete bid.
- B. The intent of these specifications and the accompanying drawings is to provide complete and workable systems as shown, specified and required by applicable codes. Interpret these specifications in conjunction with the drawings and provide all work described. If work is shown on drawings and not mentioned in the specifications, or vice versa, it is to be included in the work the same as though clearly set forth by both. Should there be a conflict between the specifications and drawings, provide the greater quantity or better quality. Immediately notify owner's representative and design professional of such conflicts.
- C. The drawings that accompany these specifications are diagrammatic and although size and location of equipment is drawn to scale wherever possible make use of submittal data and verify all dimensions on site. They do not show every conduit, offset or pull / junction box which may be required to install work in the space provided and avoid conflicts. The drawings are an outline to indicate the approximate location and arrangement of work. Follow the drawings as closely as is practical and install additional pull / junction boxes and offsets where required by site conditions and codes at no additional cost. Install all new work in such manner as to conform to the structure, avoid obstructions, provide required service clearances and preserve headroom. Do not scale from drawings, all measurements should be taken in the field.
- D. Coordinate all new work with all other contractors and installers in addition to existing building obstructions and install accordingly. Refer to coordination drawings of other trades. Comply with requirements of architectural drawings including but not limited to mounting height and locations.
- E. Provide all labor and material, tools and equipment necessary to render all systems complete and operational, and ready for turnover to Owner. Work defined within this section applies for all Division 26 work, including work of Division 26 that is provided in support of work of other divisions. Unless specifically indicated otherwise in documents of other construction divisions, products to be installed shall also be furnished under Division 26.

- F. Fully research peculiarities and limitations of space available for installation of work with materials being provided. Work around material lead times to not extend project schedule.
- G. Branch circuiting shown on drawings is also diagrammatic not intended to be the installation location. For instance, circuiting shown on the exterior of the building connecting building mounted items shall be installed indoors concealed wherever possible. For circuits remote from the building, provide the work below grade unless otherwise indicated.
- H. Complete work, or part(s) thereof, at times as may be designated by the Owner's Representative, so that it can be used for temporary or permanent use. Do not construe such use of the system as an acceptance of it by Owner.
- I. During mobilization or construction, if an abnormal condition is uncovered either with existing conditions, equipment loads, submittal data, etc. bring these to the attention of the Design Professional for review.
- J. Owner's Representative or Design Professional may relocate fixtures, devices, equipment, etc. prior to installation within a 20-foot limit at no additional charge.

1.3 GENERAL STANDARDS

- A. Provide work in compliance with applicable provisions of the following standards. Provide listing and labeling for all electrical materials, marked for respective intended uses, from UL or other Nationally Recognized Testing Laboratory (NRTL) that is acceptable to applicable Authorities Having Jurisdiction (AHJs).
- B. Provide materials, installation methods, workmanship, testing, etc., in strict accordance with the latest adopted edition of applicable standards and adopted codes, including (but not limited to) the following.
 - 1. International Building Code
 - 2. State Building Code and applicable amendments
 - 3. State Energy Code
 - 4. Utility company requirements and standards as applicable
 - 5. All provisions and requirements of NFPA (National Fire Protection Association)
 - 6. National Electrical Code (NEC), NFPA 70
 - 7. Life Safety Code, NFPA 101
 - 8. Local governmental and other prevailing codes and ordinances
 - 9. ADA/ADAAG requirements (American with Disabilities Act) including all applicable Standards for Accessible Design.
 - 10. UL (Underwriters Laboratories Inc.)
 - 11. ETL (Intertek Testing Services NA, Inc.)
 - 12. CSA (CSA Group Testing and Certification Inc.)
 - 13. FM (Factory Mutual Insurance Company)
 - 14. ASME (American Society of Mechanical Engineers)
 - 15. NEMA (National Electrical Manufacturers Association).

- 16. NECA (National Electrical Contractors Association)
- 17. IP (International Protection Rating / Ingress Protection Rating)

1.4 PERMITS AND REGULATIONS

- A. Obtain and pay for permits, fees, certificates of inspection and approval, etc. required for this branch of the work. Furnish Owner with certificates of final inspection and approval prior to final acceptance of this branch of the work.
- B. Laws and regulations which bear upon or affect the various branches of this work shall be complied with by this contractor and are hereby made a part of this contract.

1.5 DEFINITIONS

- A. Furnish - Procure, supply and deliver to project site, ready for installation, install and warrant (unless indicated otherwise on documents). Include warranty expenses.
- B. Install - Assemble, wire and connect loose-shipped components on site. Place in position for service or use, including material, labor, accessories, services, and testing. Wire, connect, and render fully operational for intended use.
- C. Provide - Furnish and Install. Similar Terms: "include", "shall", "equip with", "consisting of"
- D. Equal or Equivalent - Determination of equivalency to be made by design professional for all products not listed as basis-of-design.
- E. Substantial Completion - Where frontend documentation does not define, products and systems must be fully installed as designed, tested, adjusted, labeled, and functionally demonstrated to owner.
- F. NRTL: Nationally Recognized Testing Laboratory
- G. OCPD: Overcurrent protective device.
- H. SCCR: Short-circuit current rating.

1.6 REQUESTS FOR INFORMATION

- A. Submit all questions, requests for information (RFIs) and similar queries through the formally-established RFI process for the project that has been accepted by the Owner's Representative, Design Professionals, Prime Contractor and subcontractors. Submit as a PDF file. Do not submit as text in an email.

1.7 AVAILABILITY OF ELECTRONIC DRAWINGS

- A. If expressly permitted by the Owner and the terms of the Contract, editable electronic drawings may be made available for the creation of shop and as-built drawings upon request. Drawings will be made available at the discretion of the Engineer.
- B. "Request Drawings" form can be accessed, filled out and submitted at <http://www.klhengrs.com> (right hand side of page - Contractor Resources). Direct access to this form can be found here: <http://files.klhengrs.com/requestdrawings.html>

1.8 QUALITY ASSURANCE

- A. Contractor shall have a minimum five (5) years experience in the installation of systems similar to the systems specified. Contractor if requested shall demonstrate his ability to perform all work to be included under the contract. Assurance if requested, shall be in the form of a list of past projects of similar size and complexity and a list of six (6) references pertaining to those projects. Failure to demonstrate these quality assurances shall be taken as a statement of the contractor's inability to perform.
- B. Contactor and all workers trained in electrical safety as required by NFPA 70E.

1.9 WARRANTY / GUARANTEE

- A. Provide a warranty/guarantee in written form as part of O&M manual stating that all work, materials, equipment and parts are warranted to be free of defect for a minimum period of one year from the date of Substantial Completion. Warranty period and requirements may be expanded in drawings or subsequent specification sections. Repair or replace (owner's option) any defects or failures at no cost to the owner within the warranty period. Issues arising within warranty period must be attended to in a timely manner and in no case exceed four (4) working days. State this in writing as part of O&M manual. Replace defective items to the satisfaction of the Owner's Representative and the Design Professional.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Provide materials that are new, full weight, of the best quality. Provide similar materials that are of the same type and manufacturer. Provide materials, apparatus and equipment with NRTL listing and label where regularly supplied. Provide only products that are intended for, rated for and suitable for the installed condition.
- B. Provide basis of design products or listed products equivalent in quality, performance, aesthetics, and product support (factory and local) to that specified as basis of design. Products not basis of design are subject to review by the Design Professional and possible rejection. Listing of a product manufacturer by name alone as an equivalent

manufacturer shall not equate all products offered by that manufacturer to the basis of design.

- C. Bear all costs incurred from deviation from basis-of-design materials, methods, labor, services, etc. Use of materials, methods, labor, services, etc. that deviate from the basis-of-design will be considered a statement that capacities, requirements, clearances, arrangements, performance, etc. have been checked, verified, found satisfactory, and align with intent of specified work and applicable codes and regulations.
- D. Should deviation from basis of design equipment impact other contractors scope of work it shall be the responsibility of this contractor to coordinate with and cover these costs in addition to their own.

PART 3 - EXECUTION

3.1 GENERAL DIRECTION

- A. Unless specifically indicated, provide all specified and drawn work as required to render all equipment and systems fully operational, including all ancillary, accessory, and support work.
- B. Install equipment and materials in strict accordance with manufacturer's written instructions. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque values.
- C. In cases where products / materials are furnished by Owner or others, provide the following services: receive, transport and securely store materials on site; remove materials and components from packaging; assemble all materials and components per factory instructions; install, wire and connect materials and components as recommended by manufacturer for a fully operational installation.
- D. Wire and connect electrical equipment furnished under this branch of work, other branches of work and by the Owner. Review documents of other trades to identify electrically operated/controlled equipment that is furnished or installed by the Owner, or by other trades. Provide power connections and local disconnects for same. Provide control wiring (including relays, starters, programming, etc.), as required to render equipment fully operable.
- E. Except where otherwise indicated, provide fully-rated or series-rated overcurrent protection (OCP). Provide equipment and OCP rated to meet or exceed the calculated available series-rated fault current at the respective node in the power distribution system. Series-rated breakers/systems are not permitted where prohibited by prevailing codes and standards, including applications involving motor contribution as addressed in Article 240.86(C) of NFPA 70.

- F. Remove and replace items that may impede new work installation including but not limited to fencing, doors, gypsum, lift-out panels, and structures to provide pathway for moving equipment into place.
- G. Examine surfaces to receive products for suitable mounting conditions and verify compliance with installation tolerances and other conditions affecting performance of the work. Proceed with installation only after unsatisfactory conditions have been corrected.
- H. Drawings indicate dimensions for typical equipment configurations including clearances between equipment and adjacent surfaces and other items. Ensure selected products and equals comply with layout provided and required clearances.

3.2 SUPERVISION AND WORKMANSHIP

- A. Workmanship throughout shall conform to the standards of best practice and all labor employed must be competent and qualified to do all the work required.
- B. Furnish the services of an experienced superintendent to be in constant charge of the work at all times.
- C. Provisions shall be made for owner's representative or design professional to make rough-in and open ceiling inspections prior to covering up work.

3.3 CHANGE OF WORK

- A. In the event of revised scope or work formally issued through Change of Work order, contractor shall provide an itemized breakdown of pricing and receive approval prior to commencing with work.

3.4 COORDINATION

- A. Commence with coordination in a timely manner. Subsequent additional compensation, special allowances, additional construction time, etc. will not result from failure to coordinate (including providing related information to other trades for review) in a timely manner. Do not plan, fabricate or install work before consulting with and properly coordinating with other trades so that work will not interfere with that of other trades.
- B. Coordinate layout and installation of equipment and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces.
- C. Participate in multi-trade coordination efforts prior to commencing with material procurement or installations. Provide electrical coordination drawings, and participate in preparation of coordination drawings by other trades, prior to fabrication or installation of equipment, materials, etc. Coordinate actual clearances of installed

equipment. Coordinate exact location of electrical outlets, lighting fixtures, conduits, raceways, equipment, cable assemblies, applicable devices, etc. well in advance of installation so there will be no interferences at installation between the various trades.

- D. Ensure that required workspace clearances, required clearances for access and maintenance and electrical working clearances of all devices and equipment complies with NEC (NFPA 70) Article 110. This also applies to finalizing locations of disconnects, starters, contactors and other electrically operated equipment that may require testing or maintenance while energized. Layout all affected equipment on paper, and meet with electrical inspector on-site as needed, prior to ordering related materials or commencing with installations, to ensure compliance with NEC Article 110.
- E. Coordinate and correct conflicts in equipment and materials prior to installation. If a conflict cannot be resolved, refer the matter to the Owner's Representative for a final decision as to method and material.

3.5 ARCHITECTURAL COORDINATION ITEMS

A. Cutting and Patching:

1. Hold cutting and patching to a minimum by arranging with other trades for sleeves and openings before construction is started.
2. Cut and drill all openings in roofs, walls, and floors required to perform the work. Neatly patch all openings cut. Hold cutting and patching to a minimum by arranging with other contractors for all sleeves and openings before construction is started. When drilling / cutting concrete slabs, utilize ground penetrating radar (GPR) and/or X-ray scanning equipment to verify the location is free from obstruction, including but not limited to: structural rebar / strands / tendons and electrical conduit / wiring. Repair all damage to structural elements that may occur. Provide temporary partitions, dust barriers, vacuums to keep all dust to a minimum. Allow inspection by owner's rep and inspection by authority having jurisdiction prior to concealing any work or uncover and restore work to allow for observation.

B. Fire Caulking:

1. Fire stopping requirements/locations are not indicated on electrical drawings. Review architectural and other drawings to determine where there will be fire/smoke rated walls, floors, membranes, etc. and rating requirements of same. Provide required fire stopping work associated with electrically related penetrations. Patching through fire rated walls and enclosures shall not diminish the rating of wall or enclosure. Patch shall be equal to rockwool, firestop, caulk or approved "rated" patch / sealant / pillow / grommet / compound / etc. Clean affected surfaces, joints, etc. immediately before applying fire stopping and only apply under recommended temperature and humidity. Apply primer as required by manufacturer. Properly tool sealants for clean look. Subject to compliance with requirements, provide products by one of the following:

- a. Fire Stop Pillows: Nelson PLW, STI, Hilti, 3M
- b. Fire Stop Putty: Nelson FSP, STI, Hilti, 3M
- c. Latex Intumescent Sealant: Nelson LBS3, STI, Hilti, 3M
- d. Outlet boxes: Nelson FSP, STI, Hilti, 3M

C. Access Panels:

1. Provide all access panels required for proper servicing of equipment or access to junction boxes as a last resort after first searching out locations for equipment and junction boxes in accessible areas. All access panel locations and sizes must be coordinated with and approved by design team and owner's representative. Provide fire rated and smoke rated access panels where required. Provide frame as required for finish. Coordinate installation with General Contractor as they may elect to install access panel. Exact location(s) must be approved by the Architect. Minimum size to be 12" x 12" for junction boxes and 22" x 22" for equipment, units to be 16-gauge steel, primed for paint, door opens beyond 90 degrees and locking device shall be screwdriver cam locks.
2. For equipment or junction boxes above gypsum board or "hard ceilings", provide equipment access panels sized to permit complete holistic removal of the unit in its entirety. Access panel shall also be sized to accommodate removal of the largest piece of equipment in the case where such access panel is used as a removal pathway for multiple pieces of equipment. Subject to compliance with requirements, provide products by one of the following:
 - a. Bar-Co., Inc.
 - b. J.L. Industries.
 - c. Karp Associates, Inc.
 - d. Milcor Div. Inryco, Inc.
 - e. Nystrom, Inc.

D. Conduit Sleeves:

1. Aboveground, exterior wall penetrations: rigid steel pipe sleeve.
2. Below grade, exterior wall and floor penetrations: schedule 40 cast iron pipe sleeve
3. PVC Pipe Sleeves where allowed: ASTM D 1785, Gray, Schedule 40.
4. Rectangular opening sleeves: Galvanized Sheet Steel, thickness min 0.1 inches.
5. Sleeve Seal Systems: Provide modular sealing device designed for field assembly, EPDM, Nitrile or Silicone based on installation environment with stainless steel bolts and polymer pressure plates. Install type and number recommended by manufacturer for a water tight seal. Provide by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. Metraflex Company (The).
 - d. Pipeline Seal and Insulator, Inc.
 - e. Proco Products, Inc.

- f. OZ/Gedney
 - g. Link-Seal
6. Sleeve Seal Fittings: Provide manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Install in wall or slab as constructed and grout area around fitting. Provide by one of the following:
- a. Presealed Systems
 - b. Bio FireShield
 - c. MetaCaulk
7. Sleeves shall be cut flush with both faces of wall. Deburr all sleeves. Floor sleeves shall extend one inch above floor top elevation. Maintain all fire ratings. Use joint compound for around gypsum sleeves. Roof penetrations shall be with flexible boot-type flashing unit or within a pipe curb assembly equal to Pate Co. Curb and flashing per roofing manufacturer's requirements to maintain warranty.
- E. Grout:
- 1. Provide non-shrink grout, recommended for sealing openings in non-fire-rated walls or floors, ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout. Provide 5000-psi strength design mix, premixed and factory packaged.
- F. Silicone Sealants:
- 1. Provide single-component, silicone-based, neutral-curing elastomeric sealant for exterior work. Provide pourable (self-leveling) grade formulation for openings in non-fire rated floors and other horizontal surfaces. Install only in temperature and humidity as recommended by manufacturer. Colors of all visible sealants to be clear or color approved by owner's rep or design team.
- G. Acrylic Sealants:
- 1. Provide one-part, non-sag, mildew-resistant, paintable recommended for exposed applications of interior and protected exterior locations

3.6 PROTECTION OF SURFACES

- A. Make every effort to protect roofs, walls and floors from foot traffic, equipment, carts, lifts, etc. Make roof penetrations and install insulated roof curbs and flashing in accordance with roofing manufacturer's recommendations. Obtain written certification from roofing manufacturer that work has been performed properly and that roof warranty is intact.

3.7 UTILITY VERIFICATION REQUIREMENTS

- A. Field verify locations of underground and aboveground utilities, or those otherwise obscured from view, in the vicinity of work prior to commencing work. Utilize “811” call before you dig and hire locating service to identify, locate and mark remaining utilities and private lines. Obtain on-site approval from local utility prior to connecting services. Failure to perform the above shall result in contractor proceeding at their risk and accepting full responsibility for incorrect connections.

3.8 DELIVERY, STORAGE, HANDLING, AND PROTECTION

- A. Receive, inspect, store and protect all materials required for new work. Do not accept or install any product damaged in any way.
- B. Comply with all manufacturer guidelines and requirements for movement, storage, and protection of new work. All new work must be stored in a clean, dry place protected from weather and construction traffic. Maintain acceptable temperature and humidity per manufacturer recommendations. When stored inside or during transport through building, do not exceed structural capacity of the floor.
- C. Coordinate and account for sizes of all new work included shipping materials with available openings. Account for rigging of all new work as required and as intended by manufacturer.
- D. Do not install work until work area is sufficiently weathertight, all wet work in area is complete and all work above is complete. Provide temporary heating, cooling or humidity control to maintain acceptable conditions for install per manufacturer recommendations until permanent equipment operational.
- E. Prior to installation, all products shall have the ability to be returned to the supplier or manufacturer after purchase and charged a reasonable restocking fee equal to a small portion of the cost.
- F. Protect all new work through construction from damage. Take safeguards necessary to protect from damage. Items damaged during construction will not be accepted and shall be replaced with new.
- G. Remove and replace all materials that have been installed improperly, physically damaged, moisture or water damaged, or mold damaged.
- H. Fully remove all packaging materials inside and out prior to startup.

3.9 TEMPORARY SERVICE

- A. Provide temporary electrical service.
 - 1. Provide GFCI protection for all work.

2. Provide and maintain power lines (including circuit protection, physical protection, grounding, etc.) to the temporary offices and facilities of trades requiring same, extending from the temporary electrical service. Provide temporary security site lighting to illuminate temporary offices and facilities, material storage areas and other areas as required to prevent theft and injury.
3. Provide sufficient temporary lighting (including lamps) and power complete with wiring and similar equipment, for work on the site and within the affected buildings during the construction period. Provide proper overcurrent and ground fault protection for wiring. Physically protect feeders and lamps along their entire length. Provide temporary branch circuit wiring per NEC in each area with outlets on nominal ten-foot centers for lamps and with receptacles on nominal fifty-foot centers to accommodate extension cords. Provide and maintain a minimum of 10 foot candles of illumination in construction spaces or more if required by NIOSH/OSHA for the duration of the project.
4. Provide necessary specialty temporary power and supplementary light for trades requiring same. At conclusion of the project, remove and take possession of temporary electric materials.
5. Route temporary service lines on the site overhead as required so that the work does not interfere with existing site operations or new construction related work of other trades. Install overhead lines at least 18 feet (from the lowest point) above grade/pavement where lines cross areas accessible to vehicles. Coordinate carefully in field prior to installation. Properly support overhead lines by messenger cable, physically protect wiring at risers and drops, properly mount to supporting structures with insulators and drip loops.
6. Make necessary arrangements with local utility companies for temporary electrical service and pay associated fees for inspections, connections, initiation, etc.

3.10 STARTUP, TESTING AND ADJUSTMENTS

- A. Engage a factory-authorized service representative to perform startup service. Perform tests and inspections and prepare reports for submission. Take corrective action for all non-conforming tests.
- B. Prior to energizing, test wires and cables for proper phase to phase connections, electrical continuity and short-circuits. Properly reference and resistance test grounding electrode and equipment grounding conductors. Test service voltage and configuration and take corrective action if necessary. Verify circuit voltage at source prior to energizing any feeder or branch circuit. Energize circuitry and demonstrate capability and compliance with requirements. Ensure the direction of rotation of each motor. Adjust controls, remote monitoring, safeties, operations, moving parts, etc. as applicable. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting. Complete installation and startup checks according to manufacturer's written instructions.

- C. Set and document final settings of field-adjustable circuit-breaker overcurrent trip values.

3.11 CLEANING EQUIPMENT AND PREMISES

- A. Vacuum, clean and wipe down all new work and equipment inside and out. Exposed parts which are to be painted shall be cleaned of all foreign objects and prepped for paint.
- B. During the progress of work, clean up and leave the premises and portions of the building in which work has occurred in a clean and safe condition. Provide this cleaning on a per-shift basis.

3.12 DEMONSTRATION / TRAINING

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain equipment. Refer to product specific specification for training types and duration.

3.13 PROGRAMMABLE AND SOFTWARE OPERATED EQUIPMENT

- A. This subsection applies for systems that incorporate microprocessor based equipment and components. The systems themselves are specified elsewhere within Project Manual.
 - 1. Program software and equipment specifically for phased turnover of spaces based on construction phases. Program, check, and test each system using respective certified factory technician.
 - 2. Room names and numbers may change from architectural drawing names and numbers to actual operational room names and numbers. Contact Design Professionals and Owner to determine actual operating room names, room numbers, etc. and program using actual operational information. Provide interim and permanent programming and configuration work as required to render and maintain systems in full operation.
 - 3. Provide and adapt as necessary the latest release of system software and provide upgrade(s) at final close-out of project.
 - 4. All programming shall be commented in detail and turned over to owner in hard copy printed form and in electronic form on USB drive. This information shall be provided with Operations & Maintenance Manual submission.

END OF SECTION 260501