

**TECHNICAL SPECIFICATION SECTION No. 28 – LIGHTING AND ELECTRIC
POWER DISTRIBUTION**

Separation of Contract, to be awarded separate with “Contract 4”.

28.1 - SCOPE

This work is furnishing and installing all the normal and emergency power lighting fixtures with controls, electric power distribution systems wiring and devices for the new building as shown on the Drawings. This work includes installing all over-current protectors within the 200-amp electrical service panel and installation of the telephone and data lines from the office to the mechanical room and office.

28.2 – GENERAL

The drawings are indicative of the character and scope of the electrical work and are not intended to show all the details. The actual location of all wiring, outlets and equipment shall be determined at the site. The Contractor may install flush mount or recessed boxes in the heated bay on the FRP walls.

All work shall be manufactured, tested and installed accordance with the National Electric Code (NEC) 2005, the International Building Code (IBC) 2015 and all applicable local codes. The Contractor shall furnish a fire underwriter’s certificate of inspection covering the work installed under this specification.

28.3 – MATERIALS

A. Circuit Panel Box – The circuit panel box shall be dead front design complying with NEMA PB 1 and be circuit breaker type. Panel-board bus shall be copper with copper ground bus. The enclosure shall be NEMA PB 1, Type 1 with a surface type cabinet front, screw fastened cover with hinged door and flush lock. Finish color is standard gray enamel. Provide a 42-space minimum panel box (200-amp service) for the new building. Acceptable manufacturers are Siemens, Cutler-Hammer, Square-D or General Electric. No Homeline will be accepted.

B. Circuit Breakers – The circuit breakers are molded case circuit breakers conforming to NEMA AB 1, stab lock design. Circuit breakers must be equipped with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type SWD for lighting circuits. Do not use tandem circuit breakers. Acceptable manufacturers shall be Siemens, Cutler-Hammer, Square-D or General Electric. No Homeline will be accepted.

C. Wire – Metal Clad type MC AWG #6 through #12 wire with ground. Wire must be in rigid conduit where exposed and where drops occur down along building posts.

D. Outlet and Junction Boxes – Metal or PVC for surface or recessed mounting only in the heated bay and outside of the building. Provide closures for unused ports and waterproof covers for outside receptacle boxes. PVC “New Work” boxes can be used in walls.

BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Adalet.
2. Cooper Technologies Company.
3. EGS/Appleton Electric.
4. Erickson Electrical Equipment Company.
5. FSR Inc.
6. Hoffman; a brand of Pentair Equipment Protection.
7. Hubbell Incorporated.
8. Kraloy.
9. Milbank Manufacturing Co.
10. MonoSystems, Inc.
11. Oldcastle Enclosure Solutions.
12. O-Z/Gedney; an EGS Electrical Group brand; an Emerson Industrial Automation business.
13. RACO; Hubbell.
14. Robroy Industries.

Metal Floor Boxes:

1. Material: Cast metal or sheet metal.
2. Type: Fully adjustable.
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

Boxes:

1. Outlet boxes shall be no smaller than 2 inches wide, 3 inches high, and 2-1/2 inches deep.
2. Outlet boxes for optical-fiber cables shall be no smaller than 4 inches square by 1-1/2 inches 2-1/8 inches deep with extension ring sized to bring edge of ring to within 1/8 inch of the finished wall surface.
3. Flexible metal conduit shall not be used.

E. Outlets and Switches – Rated for 20 amps (or more if required by equipment manufacturer), 120/277 and as manufactured by Hubbell, Bryant, Arrow-Hart, GE, P&S or Leviton. Light switches in the “break room, restroom and utility room” are to fitted with motion sensing switches. Where 3-way switches are found, install the motion sensing switch in the location that best scans the area.

F. Lighting Fixtures – The lighting fixture schedule is shown on the drawings.

G. Bulbs – Install the maximum wattage as recommended by the lighting fixture manufacturer.

H. Conduit – **All exposed wiring shall be in conduit.** Conduit shall be Schedule 40 PVC rigid non-metallic conduit conforming to NEMA TC-2 and UL651. Conduit fittings shall

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conform to NEMA TC-3 and UL514b. MC cable may be used in unheated storage bay area if desired.

I. Exhaust Fan – Nutone Model # HD110NT, 110 CFM exhaust fan or approved equal with the following characteristics. Furnish and install 4” dia. metal flexible duct with 90-degree metal elbow including wall cap with connector duct for side wall discharge. Provide stainless steel anchors, silicone sealants, foil duct tape, and all hardware required for installation in accordance with product specifications.

1. Permanently lubricated motor, resilient motor mount to isolate vibration
2. Steel with white finish
3. UL listed and HVI certified for safe use over showers
4. Ceiling mount with galvanized steel housing.
5. Match the ductwork and louvered end cap to the exhaust fan capacities.

J. Hangers/Trays – Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. Flex-Strut Inc.
 - e. GS Metals Corp.
 - f. G-Strut.
 - g. Haydon Corporation.
 - h. Metal Ties Innovation.
 - i. Thomas & Betts Corporation, A Member of the ABB Group.
 - j. Unistrut; an Atkore International company.
 - k. Wesanco, Inc.
 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 5. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

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- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti, Inc.
 - 2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti, Inc.
 - 4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.
 7. Hanger Rods: Threaded steel.
- G. **Control Voltage Electrical Power Cables-**
Performance Requirements

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A. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262 by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.

1. Flame Travel Distance: 60 inches or less.
2. Peak Optical Smoke Density: 0.5 or less.
3. Average Optical Smoke Density: 0.15 or less.

OPTICAL-FIBER CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. 3M.
2. AMP NETCONNECT; a Tyco Electronics brand; a TE Connectivity Ltd. company.
3. Belden CDT Networking Division/NORDX.
4. Belden Inc.
5. Berk-Tek; a Nexans company.
6. CommScope, Inc.
7. Corning Cable Systems.
8. Emerson Connectivity Solutions.
9. General Cable; General Cable Corporation.
10. Mohawk; a division of Belden Networking, Inc.
11. Nexans.
12. Optical Connectivity Solutions Division.
13. Siemon.
14. Siemon Co. (The).
15. Superior Essex Inc.
16. SYSTIMAX Solutions; a CommScope Inc. brand.
17. Tyco Electronics Corporation; a TE Connectivity Ltd. company.

Jacket:

1. Jacket Color: Aqua for 50/125 Orange for 62.5/125-micrometer cable.
2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-C.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.

UTP CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ADC.
2. American Technology Systems Industries, Inc.
3. AMP NETCONNECT; a Tyco Electronics brand; a TE Connectivity Ltd. company.
4. Belden CDT Networking Division/NORDX.
5. Belden Inc.
6. Corning Cable Systems.
7. Dynacom Corporation.
8. Hubbell Incorporated; Wiring Device-Kellems.
9. Hubbell Premise Wiring.
10. KRONE Incorporated.
11. Leviton Manufacturing Co., Inc.
12. Molex Premise Networks.
13. Panduit Corp.

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14. Siemon Co. (The).

E. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

1. Number of Jacks per Field: One for each four-pair UTP cable indicated conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.

F. Jacks and Jack Assemblies: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-C.1.

G. Patch Cords: Factory-made, four-pair cables in 36-inch 48-inch <Insert dimension> lengths; terminated with eight-position modular plug at each end.

1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
2. Patch cords shall have color-coded boots for circuit identification.

H. Workstation Outlets: Two Four -port-connector assemblies mounted in single or multigang faceplate.

I. Faceplates:

1. Plastic Faceplate: High-impact plastic. Coordinate color with Section 262726 "Wiring Devices."
2. Metal Faceplate: Stainless steel Brass , complying with requirements in Section 262726 "Wiring Devices."
3. For use with snap-in jacks accommodating any combination of UTP, optical-fiber, and coaxial work area cords.
 - a. Flush-mounted jacks, positioning the cord at a 45-degree an

2.2

FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

28.4 - PROCEDURE

The installation of every component in the electrical system must be performed according to the National Electric Code (NEC).

Mount the circuit panel box and outlet boxes for the lighting fixtures, equipment power supplies and receptacles in the locations as shown on the Drawings.

Drill holes in the lumber wall framing to run wiring as necessary to all fixtures, equipment, and outlet locations. Use conduit in the heated and not heated bay areas of the building where wiring would be exposed. Secure the conduit with clamps approved by the manufacturer. Conduit must be extended and connected to all the outlet boxes. Use solvent

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cement for all conduit joints and connections. Pull wire through conduit without stripping insulation from the wires.

Install the light fixtures, switches and receptacles in the outlet boxes. Make the required conductor and ground connections. Install the light bulbs in the fixtures.

Trench for the electrical service from the existing service pole to the new building. Telephone and data lines to be installed from the office to the mechanical room. The tele/data lines from the pole will be installed by others in contractor provided conduit. Contractor may use same trench if maintain required separation.

28.5 - MEASUREMENT AND PAYMENT

This price and payment shall constitute full compensation for the installation of a new lighting fixtures and controls and electrical power distribution systems wiring and devices as specified and shown and as directed by PGC staff including but not limited to all labor, materials, equipment, supervision, accessories, disposal of waste and related work.

A. Unit of Measurement: Lump Sum.