# Project Manual

Construction Documents

# Cherokee Nation

## Generator
## CN Redbird Health Center

Sallisaw, OK

Project Number 25-08.68

May 29, 2025

CHILDERS ARCHITECT
A NATIVE AMERICAN OWNED FIRM

Tel: 479.783.2480 Fax: 479.783.4844 E-mail: Breck@ChildersArchitect.com Web: www.ChildersArchitect.com

THIS PAGE INTENTIONALLY LEFT BLANK

DOCUMENT 00 01 00

TABLE OF CONTENTS

| SECTION | DESCRIPTION | DOCUMENT PACKAGE ISSUE | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | CD | # | # | # | # | # | # | Revisions |
| **Division 00 – Procurement and Contracting Requirements** | | | | | | | | | |
| **Introductory Information** | | | | | | | | | |
| 00 01 07 | Professional Seals | **X** | | | | | | | |
| **Division 01 – 25: Not Used** | | | | | | | | | |
| **Division 26 – Electrical** | | | | | | | | | |
| 26 05 00 | Common Work Results for Electrical | **X** | | | | | | | |
| 26 05 19 | Low-Voltage Electrical Power Conductors and Cables | **X** | | | | | | | |
| 26 05 26 | Grounding and Bonding for Electrical Systems | **X** | | | | | | | |
| 26 05 33 | Raceway and Boxes for Electrical Systems | **X** | | | | | | | |
| 26 32 13 | Engine Generators (Diesel) | **X** | | | | | | | |
| 26 36 23 | Automatic Transfer Switches | **X** | | | | | | | |
| **Division 27 – 41: Not Used** | | | | | | | | | |

END OF TABLE OF CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK

**SECTION 00 01 07**
**PROFESSIONAL SEALS**

ARCHITECT
James R. Childers Architect, Inc.
45 South 4th Street
Fort Smith, AR 72901
479.783.2480

CIVIL
Wallace Design Collective
123 N. Martin Luther King Jr. Blvd.
Tulsa, OK 74103
918.584.5858

MECHANICAL, ELECTRICAL, PLUMBING
Lee & Browne Consulting Engineers, Inc.
1207 South Sheridan Road
Tulsa, OK 74112
918.836.0271


**END OF SECTION**

**THIS PAGE INTENTIONALLY LEFT BLANK**

# SECTION 26 0500

# COMMON WORK RESULTS FOR ELECTRICAL

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

**A.** The General Conditions of the Contract, including Supplementary Conditions, and Division 01, General Requirements, apply to the work of this section.

### 1.02 DESCRIPTION

**A.** Furnish and install all electrical wiring, systems, equipment and accessories in accordance with the Specifications and Drawings.

**B.** Capacities of equipment and cable are, in general, indicated on the Drawings.

**C.** All ampacities herein specified or indicated on the Drawings are based on copper conductors with conduit and raceways accordingly sized. Aluminum conductors are not permitted.

### 1.03 WORK INCLUDED

**A.** Work in this section includes service entrance, lighting system, power distribution and control system, temperature control wiring, data/telephone raceway, electrical connection of equipment furnished by others and other special systems and related electrical work. The work of this section is not limited to the above but is composed of all work specified in this section and indicated on the electrical plans.

**B.** Provide all necessary labor, tools, equipment, and materials necessary to accomplish the work. Pay all required local, State and federal fees and obtain and bear all costs of permits required.

### 1.04 WORK NOT INCLUDED

**A.** Related work not included in this section but which is included in other sections of these specifications includes the following:

**1.** Detailed firestopping and membrane specifications

**2.** Furring

**3.** Chases

**4.** Finish Painting

## 1.05 MINIMUM REQUIREMENTS

**A.** The following codes and standards are hereby made a part of these specifications. Work and material furnished under these specifications shall be constructed and designed in accordance with the applicable requirements of these codes and standards, except to the extent that more stringent requirements are indicated or required by governing regulations.

**B.** Whenever a particular standard is referenced, it is the latest edition of that standard to which is referred. In addition to the following list, comply with all state and municipal building and safety laws, ordinances and regulations relating to public health and safety.

**Reference**

| | **Abbreviation** | **Name and Address** |
|---|---|---|
| **1.** | **ADA** | The Americans With Disabilities Act<br>U. S. Department of Justice<br>Civil Rights Division<br>Office on the Americans<br>With Disabilities Act<br>P. O. Box 6611B<br>Washington, D.C. 20035-6118 USA |
| **2.** | **ANSI** | American National Standards Institute, Inc.<br>1430 Broadway<br>New York, New York 10018<br>USA |
| **3.** | **ASTM** | American Society for Testing Materials<br>1916 Race Street<br>Philadelphia, Pennsylvania 19103<br>USA |
| **4.** | **EIA** | Electronic Industries Association<br>2001 Eye Street, NW<br>Washington, D.C. 20006 USA |
| **5.** | **Fed Spec** | Federal Specifications and Standards |

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402 USA

**6. ICC/IBC** International Code Council
500 New Jersey Avenue NW
Washington, D.C. 20001

**7. IEEE** Institute of Electrical & Electronics Engineers
345 East 47th Street
New York, New York 10017
USA

**8. IES** Illuminating Engineering Society
345 East 47th Street
New York, New York 10017
USA

**9. IPCEA** Insulated Power Cable Engineers Association
192 Washington Street
Belmont, Maryland 02178 USA

**10. NEC** National Electrical Code (by NFPA)

**11. NECA** National Electrical Contractors Assoc., Inc.
7315 Wisconsin Avenue
Washington, D.C. 20014 USA

**12. NFPA** National Fire Protection Association
Batterymarch Park
Quincy, MA 02269
USA

**13. NEMA** National Electrical Manufacturers Assoc.
2101 L Street, NW
Washington, D.C. 20037 USA

**14. OSHA** Occupational Safety and Health Act
c/o Department of Labor

200 Construction Avenue, NW
Washington, D.C. 20210 USA

**15. UL** Underwriters Laboratories, Inc.
333 Pfingston Road
Northbrook, IL 60062
USA

## 1.06 STRUCTURAL CONDITIONS

**A.** These Specifications and Drawings accompanying same are intended to cover an installation which will not interfere with the structural design of the building, which will fit into the several available spaces, and which will insure a complete and satisfactory system.

**B.** Contractor shall carefully examine the plans for all branches of the work and shall be responsible for the proper fitting of his material and apparatus into the building.

**C.** Should the particular equipment which any bidder proposes to install require other space conditions than those shown on the Drawings, he shall arrange for such space with the Engineer before submitting his bid. Should changes become necessary on account of failure to comply with this clause, the Contractor shall make necessary changes at his (the Contractor's) own expense.

**D.** The Contractor shall submit working scale drawings of all his apparatus and equipment which in any way varies from these Specifications and Plans, which shall be reviewed by the Engineer and approved before the work is started. Any interferences with the structural conditions shall be corrected by the Contractor before the work proceeds.

## 1.07 ACCESS PANELS

**A.** Furnish access panels for installation as specified, where indicated, or wherever required for accessibility of equipment, junction boxes, controls, etc. Cooperate to provide panels that will suit the architectural treatment of the areas where access panels are required. All panels shall be flush type factory prime painted steel, key operated, and of sufficient size to facilitate operation and maintenance of the device enclosed. Furnish shop drawings of access panels for the approval of the Architect, before fabrication.

## 1.08 EQUIPMENT IDENTIFICATION

**A.** Furnish laminated engraved plastic nameplates attached with permanent adhesive to each piece of equipment identified by name or number on the Drawings. Nameplate shall have all capital letters no less than ¼" high. Equipment requiring name tags includes panelboards, switchboards and each individual switch within each switchboard, disconnect switches, starters, control panels, motor control centers and each individual starter within each motor control center, and special function control switches. Nameplates shall include panel or device name, voltage, type of branch power, and name/location of upstream device feeding equipment. First equipment downstream of a transfer switch nameplate shall indicate names and locations of both power sources. Submit nameplate schedule with wording of all nameplates for approval.

| Branch of Power Name | Nameplate Surface Color | Nameplate Core Color |
|---|---|---|
| Commercial | Black | White |
| Legally Required Standby | Yellow | White |
| Optional Standby | Orange | White |
| Emergency | Red | White |
| Life Safety Emergency | Red | White |
| Critical Emergency | Red | White |
| Equipment | Red | White |

**B.** Provide nameplate on each receptacle and light switch plate indicating panel and branch circuit feeding device. Receptacle and light switch nameplates are allowed to consist of ¼" high letters color coded to match engraved equipment nameplates on white or clear background, made from a hand held printing machine. Such nameplates shall be resistant to fading or smudging when subjected to cleaning.

**C.** Clearly mark all branch circuit conduits at each junction box above the lay-in ceiling with permanent marker. Markings shall indicate panel name and associated circuit numbers of all contained wiring. Junction box covers for all other systems shall be marked with layperson terminology as to the system type or function.

**D.** For new service equipment, the Contractor shall coordinate with the electrical utility company to determine maximum available short circuit

fault current. Contractor shall furnish and install label on service equipment enclosure to indicate maximum available short circuit fault current and the date that the information was determined per National Electrical Code 110.24.

## 1.09 EQUIPMENT AND CONNECTIONS

**A.** All apparatus, equipment, devices and appliances which are indicated to be electrically roughed-in shall be so equipped. Electrical connections to have junction box with cover or disconnect as shown on Drawings. This item must be coordinated with plans.

**B.** Make complete final electrical power and electrical control connections to all equipment supplied under this contract and to all electrically powered equipment furnished or installed by others.

## 1.10 USE OF ALLOCATED SPACES

**A.** Consult the architectural plans, as well as the plans for all other trades, for spaces allocated to piping, conduits, equipment, etc. The electrical plans are essentially diagrammatic indicating approximate location of system components. The architectural plans and details shall take precedence in allocating space requirements for the various pipes, electric conduits, etc. All trades must consult with one another to the end that the available space is best utilized by all. Due consideration shall be given to the pipe, junction boxes, and conduit locations so that the accessibility of all the installed lines from access doors, hand holes, etc., is preserved; and space shall not be unnecessarily used by any contractor to save fittings, offsets, etc., whereby any interference results with other trades or where furring limits as shown on the architectural plans are exceeded. Each contractor shall consult the Engineer for space requirements for his equipment whenever same is not clearly indicated on the plans, or otherwise provided for. Failure to obtain clearance will leave the Contractor liable to removal and relocation of the affected equipment.

## 1.11 FOUNDATIONS AND SUPPORTS

**A.** Furnish and install substantial foundations for each piece of apparatus installed under this contract.

**B.** Provide 3-1/2” thick concrete bases under all floor mounted equipment. Support all switchgear, transformers, equipment, etc., from the structure in accordance with NEC, using substantial steel hangers, strut, and fasteners.

## 1.12 OPENINGS - CUTTING REPAIRING

**A.** Holes in Concrete: Sleeves shall be furnished, accurately located and installed in forms before pouring of concrete. This Contractor shall pay all additional costs for cutting of holes as the result of the incorrect location of sleeves. All holes through existing concrete shall be either core drilled or saw cut. All holes required shall have the approval of the Structural Engineer prior to cutting or drilling.

Fire seal around all floor and all wall penetrations to ensure a 2-hour fire rating at penetration. Refer to architectural specifications for firestopping materials and methods.

## 1.13 TESTING AND LOAD BALANCING

**A.** Test all circuits to assure them to be free of grounds. Light and test each lamp. Prove and test energy available at the load side of disconnect switches and the final point of connection to driven equipment. Make all reasonable tests required by the Engineer to prove the integrity of the work and leave the complete electrical installation in first class condition ready for operation. Branch circuits served from the lighting panelboards vary in loading. Carefully balance the load on each phase when connecting branch circuits in each panelboard. When all load is turned on and the system is operating at 100% demand, the initial unbalanced shall not exceed 10%.

## 1.14 SUBSTITUTIONS

**A.** After execution of the contract, substitution of equipment of makes other than those specifically named in the contract documents will be approved by the Engineer for the following reasons only:

**1.** That the equipment proposed for substitution is equal to and/or superior to equipment named (in construction, efficiency and utility) and further that the equipment named in the specifications cannot be delivered to the job in time to complete the work in proper sequence of work with other contractors, due to conditions beyond control of the contractor.

**B.** This does not, in any way, relieve the contractor of the responsibility of ordering equipment for proper sequential delivery.

**C.** Refer to DIVISION 01 for other requirements of substitutions.

## 1.15 CLEANING EQUIPMENT AND MATERIALS

**A.** Provide for the safety and good condition of all materials and equipment until final acceptance by the Owner. Protect all materials and equipment from damage. Provide adequate and proper storage facilities during the progress of the work. Special care shall be taken to provide protection for switchgear, open connections, light fixtures, transformers and electrical apparatus.

**B.** All fixtures, switchgear, finished surfaces and equipment shall have all grease, adhesive labels and foreign materials removed.

## 1.16 INTERRUPTION OF SERVICES

**A.** While work is in progress, except for designated short intervals during which connections are to be made, continuity of service shall be maintained to all existing systems. Interruptions shall be coordinated with the Owner as to time and duration. The Contractor shall be responsible for any interruptions to service and shall repair any damages to existing systems caused by his operations.

## 1.17 GUARANTEE

**A.** Contractor shall guarantee all workmanship, materials and labor for a period of one (1) year, after warranty date set at substantial completion, to be free from defects not due to normal wear or abuse.

## 1.18 OPERATION MANUALS

**A.** Furnish three bound sets of Operation Manuals along with the various warranties for mechanical and electrical equipment. Deliver Operation Manuals and Warranties to the Engineer prior to Final Inspection. Complete and satisfactory submittal of this material is a condition for final payment.

## 1.19 CONDITIONS OF FINAL INSPECTION

**A.** The following items must be accomplished and delivered to the Engineer before request for Final Inspection and final payment will be acknowledged:

**1.** Operating and Maintenance Instructions: Furnish three (3) complete sets of Operating and Maintenance Instructions for all equipment furnished under this contract.

**2.** Deliver all electrical inspection receipts and job record drawings to Engineer.

**3.** Deliver one set of reproducible record drawings to the Engineer showing all deviations from the contract drawings.

**4.** All work and materials as called for by the contract must be complete.

**5.** All lamps shall be new. Personally make a special inspection trip to assure that the work on the project, as a whole, is ready for final acceptance before calling upon the Engineer to make a Final Inspection.

**6.** Deliver spare fuses to Owner as called for in Section 26 2813.

**7.** Deliver signed temperature control letter to Engineer as called for in Section 26 0519.

## 1.20 SHOP DRAWINGS AND SUBMITTED DATA

**A.** Refer to DIVISION 01 for submittal requirements. No work indicated on any shop drawing shall be started until such drawings have been reviewed and approved by the Engineer.

**B.** Submittal data shall be referenced to section and paragraph numbers of the specifications and to fixture and equipment numbers listed or scheduled, and shall be assembled in numerical order of the specification paragraphs. Submittals shall be bound in sets between covers and all sets within a section shall be identical. Identification marks on submittals shall be made in black ink. Do not use red pencil or ink.

**C.** Where equipment manufacturers named as equivalent, or approved equal, are proposed for use by the Contractor, he shall be responsible to coordinate the change with all trades affected and bear cost of changes required by other trades to accommodate the equipment substitution. Submit for approval ¼" scale working drawings of equipment rooms, plan and section.

**D.** Submit the following shop drawings for approval in accordance with these specifications:

**1.** Raceway, Conduit, Boxes, Fittings, Underfloor Raceway.

**2.** Wire and Cable.

**3.** Disconnect Switches.

**4.** Fuses.

**5.** Motor Starters.

**6.** Contactors.

**7.** Packaged Standby Generator Set.

## 1.23 PROTECTION OF PERSONS AND PROPERTY

**A.** The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work. Take all reasonable precautions for safety and provide all reasonable protection to prevent personal injury or damage of existing and new materials on site.

**B.** Although engineering documents may have suggested work sequences and activities, jobsite safety is the sole responsibility of the Contractor.

# SECTION 26 0519

# LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

## PART 1 - GENERAL

### 1.01 DESCRIPTION

**A.** Run all wire in metal raceways unless noted otherwise.

**B.** Provide cable, wire and connectors in accordance with plans and specifications and in compliance with manufacturers' published application and installation recommendations.

**C.** Single phase branch circuits shall each have their own neutral conductor. No multiwire branch circuits will be accepted (no shared neutrals).

### 1.02 QUALITY ASSURANCE

**A.** Comply with National Electrical Code (NFPA 70), and National Electrical Manufacturers Association/Insulated Power Cable Engineers Assoc. Standards.

**B.** Provide electric cable wire and connectors which have been listed and labeled by Underwriters Laboratories.

**C.** Remove from project site any damaged materials.

### 1.03 SUBMITTALS

**A.** Submit manufacturers' data on all cable wire and connectors to be used.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

**A.** Wire and Cable: General Cable Corp., Southwire, Triangle, or acceptable equal.

**B.** Connectors: Amp, Burndy Corp, General Electric Co., Ideal Industries Inc., Minnesota Mining and Mfg. Co., 0.Z./Gedney Co., Thomas & Betts Co., or acceptable equal.

## 2.02 WIRE

**A.** Use soft drawn annealed copper having a conductivity not less than 98% of that of pure copper and with thermoplastic 600 volt insulation. Use no aluminum wire unless called for specifically on plans.

**B.** All lighting and power wire indicated on drawings is size 12 unless indicated otherwise or otherwise required by codes. Use no wire smaller than size 12 for power or lighting.

**C.** Wire Sizes #12 and #10. Use solid copper rated THHN/THWN-2 insulation temperature rated for 90 degrees C in wet and dry locations.

**D.** Wire Size #8 and Larger. Use stranded copper Type THHN-2/THWN-2 90 degrees C temperature rated insulation for wet and dry locations. Use XHHW-2 where called for on drawings.

**E.** Temperature Control Wire. Use stranded THHN copper wire with crimp spade lugs. Minimum size #16.

## 2.03 CONNECTORS.

**A.** Provide factory made metal connectors of size, rating, material, type, and class as indicated by NEC, NEMA, or as indicated on plans.

**B.** Use pre-insulated spring-type pressure or crimp-type solderless connectors on wire sizes #12, #10, and #8. For wire sizes larger than #8, use solderless hydraulically die crimped compression type connectors.

**C.** Insulate all splices and taps using preformed factory made insulating boots with scotch fill and electrical tape.

# PART 3 - EXECUTION

## 3.01 INSTALLATION

**A.** Do not pull any wire into raceway until raceway is complete and all burrs and abrading surfaces have been removed.

**B.** A U.L. approved lubricant may be used where necessary to facilitate installation of conductors.

**C.** Use only continuous conductors without welds or splices or joints between boxes. Mains and feeders are to be run their entire length without splices.

**D.** Identify all conductors using color coded insulation or numbered linen or plastic Brady tags. Use the following color coding chart for all lighting and power circuits.

**120/208 Volts**

| | |
|---|---|
| Phase A | Black |
| Phase B | Red |
| Phase C | Blue |
| Neutral | White |
| Ground Wire | Green |

Use numbered stick-on Brady wire tags to label all control wire ends according to the numbering scheme printed on the wiring diagram.

**E.** Install crimp type ring or spade lugs on ends of all control wires.

**F.** Strip and pre-twist branch circuit conductors where wire nuts are used. Verify that wire nut manufacturer allows pre-twisting of conductors, and use product that allows pre-twisting. The intent is that when the wire nut is removed from conductors, they stay together because they are tightly twisted together.

**G.** Install all wire cable and connectors as indicated and in accordance with manufacturers' written instructions, NEC requirements, and the National Electrical Contractors Association "Standard of Installation".

**H.** Insulate all splices and taps to produce an insulated assembly equivalent to, or better than, the electrical and mechanical strength of the conductors being insulated.

**I.** Use connectors compatible with the conductor and terminal materials.

**J.** Before energizing, check for short circuits and megger all circuits in accordance with NEC.

**K.** Do not install more than two single phase branch circuits with two neutrals and one equipment ground conductor in a ½" conduit. No shared neutrals.

**L.** Do not install more than four single phase branch circuits with four neutrals and one equipment ground conductor in a ¾" conduit. No shared neutrals.

# SECTION 26 0526

# GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

**A.** System Grounding.

**1.** Secondary service neutrals shall be grounded at the supply side of the secondary disconnecting means and at the related transformers.

**2.** Separately derived systems (transformers downstream from the service entrance) shall have the secondary neutral grounded.

**B.** Equipment Grounding.

**1.** All metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be grounded for personnel safety and to provide a low impedance path for possible ground fault currents.

**C.** Structure Grounding.

All structural steel columns shall be bonded to a perimeter ring grounding system as indicated on plans.

### 1.02 RELATED WORK

**A.** Section 26 0500, COMMON WORK RESULTS FOR ELECTRICAL.

**B.** Section 26 4100, FACILITY LIGHTNING PROTECTION.

### 1.03 SUBMITTALS

**A.** Shop Drawings.

**1.** Submit catalog cuts and descriptive literature for approval.

**2.** Include sufficient information, clearly presented, to determine compliance with drawings and specifications.

**B.** Test Reports.

**1.** Submit certified test reports of ground resistance to the Engineer for approval.

**C.** Certifications: Two weeks prior to final inspection, deliver to the Engineer four copies of the following:

**1.** Certification that the material and installation is in accordance with the drawings and specifications and has been properly installed.

## 1.04 APPLICABLE PUBLICATIONS

**A.** The following specifications and standards, except as hereinafter modified, are incorporated herein by reference and form a part of this specification to the extent indicated by the references thereto. Except where a specific date is given, the issue in effect (including amendments, addenda, revisions, supplements, and errata) on the date of invitation for Bids shall be applicable. In text such specifications and standards are referred to by basic designation only.

**1.** National Fire Protection Association (NFPA) Publications:

No. 70.....National Electrical Code (NEC)

**2.** Underwriters Laboratories, Inc. (UL) Publications:

No. 83.....Thermoplastic Insulated Wires

No. 44.....Rubber-Insulated Wires and Cables

No. 467.....Electrical Grounding and Bonding Equipment

**3.** Institute of Electrical and Electronics Engineers, Inc. (IEEE)

No. 142.....Recommended Practice for Grounding of Industrial and Commercial Power Systems

## PART 2 - PRODUCTS

### 2.01 GROUNDING WIRES.

**A.** Shall be UL and NEC approved types, copper, with TW or THWN/THHN or THW insulation color identified green, except where otherwise shown on the drawings, or specified.

**B.** Wire size shall not be less than shown on the drawings and not less than required by the NEC.

### 2.02 GROUND RODS

**A.** Shall be copperclad steel, 3/4-inch diameter by 10 feet long.

## PART 3 - EXECUTION

### 3.01 INSTALLATION, GENERALLY

**A.** Grounding shall be in accordance with the NEC, as shown on the drawings, and as hereinafter specified.

### 3.02 SECONDARY EQUIPMENT AND CIRCUITS

**A.** Main Bonding Jumper.

**1.** Connect the secondary service neutral to the ground bus in the service equipment.

**B.** Water Pipe and Supplemental Electrode.

**1.** Grounding electrode conductor: Provide a connection between the service equipment ground bus and the metallic water pipe system. Jumper insulating joints in the water pipe.

**2.** Provide a supplemental ground electrode and bond to the water pipe ground, or connect to the service equipment ground bus.

**C.** Service Disconnect (Separate Individual Enclosure).

**1.** Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors.

**D.** Conduit Systems.

**1.** Ground all metallic conduit systems.

**2.** Non-metallic conduit systems shall contain a grounding conductor.

**3.** Conduit provided for mechanical protection and containing only a grounding conductor shall be bonded to that conductor at the entrance and exit from the conduit.

**E.** Feeders and Branch Circuits: Install green grounding conductors with all feeders and branch circuits as follows:

**1.** Install grounding conductor with all feeders and branch circuits.

**2.** Connect to all circuits serving fixed equipment and appliances.

**3.** Connect to all receptacle outlets.

**4.** Connect to all motors and motor controllers.

**5.** All items of equipment where the final connection is made with flexible metal conduit shall have a grounding wire.

**6.** All additional locations and systems as shown on the drawings.

**F.** Boxes, Cabinets, Enclosures, and Panelboards.

**1.** Bond the grounding wires to each pull box, junction box, outlet box, cabinets, and other enclosures through which the ground wires pass.

**2.** Provide lugs in each box and enclosure for ground wire termination.

**3.** Provide ground bars in panelboards, bolted to the housing, with sufficient lugs for terminating the ground wires.

**G.** Motors and Starters.

**1.** Provide lugs in motor terminal box and starter housing for ground wire termination.

**2.** Make ground wire connections to ground bus in motor control centers.

**H.** Receptacles: Receptacles not approved for grounding through their mounting screws shall have a ground wire from green ground terminal to the outlet box ground screw.

**I.** Lighting Fixtures: Shall be grounded through green ground wire. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

**J.** Electrical Appliances and Equipment: Fixed electrical appliances and equipment shall have a ground lug installed for termination of the green ground conductor.

## 3.03 CONDUCTIVE PIPING

**A.** Bond all conductive piping systems in the building to the electrical system ground. Bonding connections shall be made as close as practical to the water pipe ground or service equipment ground bus.

## 3.04 GROUND RESISTANCE

**A.** The grounding system shall be tested to ensure that the ground resistance does not exceed 5 ohms.

**B.** Services at power company interface points shall comply with the power company ground resistance requirements.

**C.** Necessary modifications to the ground electrodes for compliance shall be without change in contract amount.

## 3.05 GROUND ROD INSTALLATION

**A.** Distance: Drive each rod vertically for not less than ten feet.

**B.** Multiple Rods: Where required to obtain the specified ground resistance, install multiple rods.

**C.** Where ground connections will be permanently concealed, make the connections by the exothermic process to form solid metal joints. Make accessible ground connections with mechanical pressure type ground connectors.

**D.** Where rock prevents the driving of vertical ground rods, install grounding electrodes in horizontal trenches to achieve the specified resistance.

# SECTION 26 0533

# RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

**A.** Furnish and install complete systems of electrical raceways, including but not limited to, all conduit, fittings, outlet boxes, cover plates, wireways, gutters, expansion fittings, and accessories.

**B.** Unless noted otherwise, on drawings, all raceway systems installed underground, in poured concrete floors and walls, and all exposed conduit outside, shall be rigid metal conduit.

**C.** All conduit drops not supported by walls or columns in mechanical rooms shall be rigid metal conduit.

**D.** Steel EMT may be used in building voids, concealed spaces and where exposed inside.

**E.** In intermittent moisture environments use rigid metal conduit.

**F.** PVC conduit may be used only where called for on drawings or where allowed by the Engineer in writing.

**G.** All conduit that contains conductors that operate at over 600 volts shall be rigid metal conduit.

**H.** All underground conduit bends shall be at least 8 times the trade size diameter, or 18” (whichever is larger).

### 1.02 QUALITY ASSURANCE

**A.** All raceway products shall have UL label stamp and shall comply with National Electrical Manufacturers Association standards and current edition of the National Electrical Code.

**B.** All outdoor steel boxes, fittings, conduits and accessories shall be galvanized.

**C.** Indoor steel boxes may be galvanized or painted.

**D.** Submit manufacturer's data on all raceway system components.

## PART 2 - PRODUCTS

### 2.01 CONDUIT AND FITTINGS

**A**. Rigid Metal Conduit.

**1.** Hot dip galvanized inside and outside, standard pipe size, threaded wrought steel. ANSI: C80.1, Federal Spec. WW-C-581.

**2.** No intermediate metal conduit is allowed.

**3.** Acceptable Manufacturers: Allied Tube and Conduit, LTV, Wheatland Tube or acceptable equal.

**B.** Weatherproof Outlet Boxes.

**1.** Provide cast metal weatherproof outlet boxes of type and shape to suit the application with threaded conduit connections, gasketed spring hinged covers, and corrosion-proof hinges and fasteners.

**2.** Acceptable Manufacturer: Appleton, Crouse-Hinds, or acceptable equal.

**C.** Junction and Pull Boxes (Inside).

**1.** Provide galvanized steel junction and pull boxes with removable screw-fastened covers of size and gauge to comply with NEC and requirements of the application.

**2.** Acceptable Manufacturers: Appleton, RACO, Steel City, Hoffman, or acceptable equal.

**D.** Junction and Pull Boxes (Exterior).

**1.** Provide cast metal junction and pull boxes with gasketed screw on cover and threaded conduit connections, of size to comply with NEC and requirements of the application.

**2.** Acceptable Manufacturers: Appleton, Crouse-Hinds, or acceptable equal.

**E.** Conduit Bodies.

**1.** Provide cast metal conduit bodies with threaded conduit connections and gasketed removable galvanized steel or aluminum covers. Conduit bodies specially designed for E.M.T. may be used where applicable.

**2.** Acceptable Manufacturers: Appleton, Crouse-Hinds, Killark, or acceptable equal.

**F.** Electric Metallic Tubing (EMT).

**1.** Cold rolled steel electro-galvanized outside, Silicon painted inside. ANSI: C80.3, Federal Spec. WW-C-563.

**2.** Acceptable Manufacturers: Allied Tube and Conduit, LTV Copperweld, Western Tube & Conduit, Wheatland Tube, or acceptable equal.

**G.** PVC Conduit.

**1.** NEMA Standard Pub. No. TC-6. Schedule 40, UL stamped.

**2.** Acceptable Manufacturers: Carlon, or acceptable equal.

**H.** Flexible Metal Conduit.

**1.** Zinc coated steel, aluminum alloy. Federal Spec. WW-C-566.

**2.** Acceptable Manufacturers: Greenfield, General Cable, or acceptable equal.

**I.** Liquid Tight Flexible Metal Conduit.

**1.** Steel core with moisture and oil proof PVC jacket with copper ground strap.

**2.** Acceptable Manufacturers: General Cable, or acceptable equal.

**J.** Conduit Fittings.

**1.** All conduit fittings shall be steel. No die cast fittings are allowed.

**2.** All EMT fittings, smaller than 2”, shall be compression gland raintight or set screw type. Indenter style fittings are not allowed.

**3.** All EMT fittings 2” and larger shall be compression gland raintight or set screw type with no fewer than 2 screws in each pipe.

**4.** Acceptable Manufacturers: Appleton, RACO, Thomas & Betts, Carlon (plastic only), or acceptable equal.

## 2.02 BOXES

**A.** General.

**1.** Provide metal boxes of shape, size, and mounting means to suit each respective location and usage, and to comply with NEC.

**B.** Interior Boxes and Accessories.

**1.** Hot-dip galvanized steel with extension rings, plaster rings, brackets, fixture studs, and mounting clips to suit the usage. Boxes installed in masonry or concrete walls shall be masonry type. Boxes installed in drywall construction shall be braced on both ends of box such that box end cannot move and does not depend on coverplate or device tabs to brace box.

**2.** Acceptable Manufacturers: RACO, Steel City, Appleton, or acceptable equal.

**C.** Wireways and Gutters.

**1.** Provide steel wireways and gutters of size as indicated on plans with hinged or removable covers. Exterior wireways to be galvanized with conduit entries to use weather tight hubs; interior wireways to be bonderized enameled steel.

**2.** Acceptable Manufacturer: Square D, Appleton, or acceptable equal.

# PART 3 - EXECUTION

## 3.01 INSTALLATION

**A.** General. Conduit.

**1.** No conduits shall be supported by wire type hangers. Use all thread and strut supports.

**2.** Horizontal branch circuit conduit in walls is allowed only between boxes that are less than six feet apart. Provide vertical conduit from each box up to ceiling and install horizontal conduit above ceiling where boxes are over six feet apart.

**3.** In general, conceal all conduit in walls and ceiling spaces and run as indicated on drawings.

**4.** Run parallel or perpendicular to building walls and floors in straight runs, using bends and offsets as required. Make all bends using proper bending tools with no more than 360 degrees in bends in a run of conduit without using pull boxes. Bends are to be made in such a manner that the internal diameter of the tubing will not be effectively reduced. Replace all flattened or crushed conduit prior to pulling wire. Ream all conduit ends.

**5.** Swab all underfloor conduit, prior to pulling wire, and cap, or plug all conduit exposed to weather during construction. Wire shall be drawn into a completed conduit system so there is no danger to wire insulation.

**6.** Size all conduits as indicated on plans or as indicated in National Electrical Code, if not indicated on plans. In no case shall conduit be less than 3/4 inch when installed in poured concrete or underground. All conduit shall be of such size that required conductors may be drawn in without injury or excessive strain.

**7.** No conduit may be less than 1/2 inch.

**8.** Do not install conduit larger than 3/4 inch in concrete slabs. Larger conduit may be installed in the underslab fill where indicated on drawings.

**9.** Maintain a minimum of 3 inches between conduit and steam or hot water lines pipe insulation when running parallel with pipe. Maintain a minimum of 1 inch from the pipe insulation when crossing steam or hot water pipe.

**10.** Support all conduit using pipe clamps spaced a maximum of 8 feet apart. Rigid non-metallic conduit shall be supported as per table 347-8 of NEC.

**11.** Support all raceway systems from building structure, not from ceiling system or ceiling hangers or from other pipe or duct systems.

**12.** Make final conduit connections to motors and other equipment, subject to vibration using liquid tite flexible metallic tubing minimum 12 inches long and maximum 24 inches long. Connection to 1 horsepower or smaller motors within a housing may use flexible metallic tubing.

**13.** Use liquid tite flexible metallic tubing where flexible conduit is required outdoors or in intermittent moisture environments and for all motor connections and connections to motor driven equipment. Install liquid tight flex conduit so that liquids run off of the surface without draining toward fittings. In areas subject to much vibration or strain, S.T. type connectors shall be used.

**14.** Provide nylon pull cord in all empty conduits with ends marked to identify terminal points.

**15.** For conduit stub ups in floors, for future use, set threaded coupling flush with finished floor. Where stub is for future use, install threaded plug in coupler flush with finished floor.

**B.** Sleeves.

**1.** Provide a sleeve constructed from electric metallic tubing for each location where a conduit or hanger passes through a concrete slab, masonry wall, roof or other portion of the building structure. Make sleeve flush on both sides of the surface penetrated and pack around the conduit with approved fire stop sealant to maintain the fire rating of rated walls or slabs. Refer to the architectural specifications for firestopping details that apply to all trades. Extend sleeves 1" above the finished floor in equipment rooms.

**2.** When conduit passes through concrete or other structural outside walls below grade, a sleeve must be cast in place. Fill gap between sleeve and pipe with rubber link seal by Thunderline and with silicone sealant and make entire installation water tight

**C**. Boxes.

**1.** Install all outlet boxes with front of box within 1/4" of finished non-flammable surface and flush with finished ceiling or wall surface of a flammable surface. Use approved plaster rings to build out to wall surface when box is recessed.

**2.** Locate boxes and drywall penetrations to maintain the wall membrane fire rating. Refer to architectural firestopping specification section for details that apply to all trades.

**3.** Secure all boxes rigidly to building structural members.

**4.** Support all conduit from structure within 18” of all boxes or cabinets.

**5.** Locate all boxes for ease of accessibility.

**6.** Provide knockout closures for knockouts not used.

**7.** Install all floor boxes in accordance with the manufacturer's written installation instructions and recommendations, and so that box trim is flush with finished floor. Provide carpet flanges where appropriate.

**8.** Generally locate outlet and switch boxes where indicated on plans. Refer to architectural plans for locations of doors, casework, door swings, and other architectural features which must be considered when selecting box locations. Consult the Architect prior to installing any box which conflicts with architectural features. Failure to do so will obligate the Contractor to relocate said box without cost.

**D.** Fittings.

**1.** Use double lock nut bushings on all rigid steel conduit to box fittings, and secure all conduit tight to box.

**2.** Screw all set screw and compression type couplers and connectors tight to retain ground integrity of raceway system.

**3.** Use expansion fittings with bonding jumpers where rigid or EMT conduits cross building expansion joints.

**THIS PAGE INTENTIONALLY LEFT BLANK**

## SECTION 26 3213

## PACKAGE ENGINE GENERATOR SET (DIESEL)

### PART 1 - GENERAL

### 1.01 DESCRIPTION

**A**. Provide emergency power system for supply of power in event of failure of normal supply, consisting of power supply unit, integral radiator cooled diesel engine directly coupled to AC generator complete with fittings, connections, auxiliaries, control panels, safety devices and meters.

**B.** Provide Level 1, Class 48, Type 10 system.

**C**. Provide fully automatic operation so that unit takes full load within 10 seconds after power failure. On resumption of normal power after time delay on transfer switch, automatically retransfer load to normal power and automatically shut down generator, returning to starting condition ready for another operating cycle.

**D.** Furnish and install two remote annunciator panels with locations and alarms as indicated on the construction documents.

**E.** Capable of delivering 500 KW at installed location after consideration of applicable derating factors.

**F.** Overall generator enclosure dimensions shall be approximately 86” wide x 234” long. Tank shall be constructed to provide partial platform walking space for access to generator maintenance doors.

### 1.02 QUALITY ASSURANCE

**A.** Conform to National Electrical Code and applicable inspection authority.

**B.** Generator manufactured to NEMA standards.

### 1.03 SUBMITTALS

**A.** Submit shop drawings and product data in accordance with Section 26 0500.

**B.** Submit full technical data service and parts facilities complete with manufacturer's published data.

**C.** Submit engine data with shop drawings:

**1.** Number of cylinders,

**2.** Piston displacement,

**3.** Break mean effective pressure,

**4.** Piston speed.

**D.** Submit manufacturer's installation instructions.

**E.** Submit manufacturer's descriptive literature, operating instructions, and maintenance and repair data.

**F.** Submit test readings made after installation.

## PART 2 – PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

**A.** Cummins, Caterpillar, or Kohler (Nixon). No other manufacturers will be accepted.

### 2.02 CONSTRUCTION

**A.** Provide with Quiet Site II Second Stage sound attenuated outdoor weatherproof enclosure or approved equal. Sound pressure levels shall be no greater than 73dB(A) average of 8 positions measured at 7 meters horizontally from the center of the generator set in any direction.

**B.** Mount on common steel rail base.

**C.** Provide semi-flexible couplings between generator and engine and protective guards over moving parts.

**D.** Machine enamel finish to be manufacturer's standard.

**E.** Subbase Diesel Fuel Tank

**a.** Shall be UL 142 listed sub-base tank.

**b.** Mount on common steel rail with integral double walled diesel fuel tank with sensors between the two tank walls which report inner tank leakage via generator control panel.

**c.** Fuel tank shall support generator weight and shall allow rigging of total weight of fuel tank and generator in one piece.

**d.** Tank shall have structural steel perimeter material. Formed steel perimeter material shall not be accepted.

**e.** Tank shall be provided with lifting lugs and shall be capable of rigging into place with the generator mounted to tank.

**f.** Tank shall be baffled and constructed of 7 gauge (minimum) steel.

**g.** Tank shall be pressure tested to check welded steel construction for leaks.

**h.** Diesel fuel tank shall be sized to run generator continuously for 48 hours at full rated standby load. The size of fuel tank shall take into account unusable fuel volume at top and bottom of the tank such that a true 48 hour run time at full rated standby load is possible.

**i.** Tank shall have provision for conduit penetrations from below grade.

**j.** Provide fuel fill station with audible and visible alarm when tank is 90% full.

**k.** Provide vent and level gauge fill with locking cap on tank.

**l.** Tank shall be painted to match engine generator enclosure.

**m.** Tank shall be manufactured by Wedlake Fabricating, Inc. or approved equal.

**n.** Install engine at sufficient height above base to permit dropping oil pan without removing unit.

**o.** Tank shall be designed with bolt-on cantilevered platform extending the top of the tank area such that maintenance and foot traffic can access the generator hinged doors. Platform shall extend on three sides sufficiently to fully open all access doors. Platform extension shall include 42" (min) hand railing meeting applicable codes and standards. Platform surface shall have anti-slip surface. Platform and railing design shall coordinate and account for on-sight construction of a metal stair (by others) connection from grade to platform.

## 2.03 GENERATOR

**A.** Capacity for 500KW Generator: 0.8 power factor, 625 KVA, 277/480 volts, 3 phase, 4 wire, 60 Hertz. Permanent magnet type.

**B.** Rotative speed: 1800 rpm.

**C.** Alternator temperature rise at full rated load shall not exceed 105 degrees centigrade over 40 degrees centigrade ambient.

**D.** Excitor: directly coupled with plus or minus two percent (±2%) regulation from No Load to Full Load. 3 Phase full wave rectifier.

**E.** Terminal Box: Provide terminal box for generator and excitor leads.

**F.** Provide generator winding 120 volt single phase anti-condensation heater.

## 2.04 ENGINE

**A.** Capacity: Full standby rated capacity operating on natural gas at an ambient temperature of 104F, and at 700 Ft. above mean sea level.

**B.** Engine shall operate on diesel fuel supply.

**C.** Rotative speed: 1800 rpm.

**D.** Governor: electronic isochronous speed regulation 3 cycles from No Load to Full Load with two second recovery to steady state.

## 2.05 ACCESSORIES

Provide the following standard equipment and accessories:

**A.** Lubricating Oils, Greases, and Coolants.

**B.** Vibration Isolators.

**C.** Critical Zone Muffler mounted inside sound attenuated enclosure.

**D.** Flexible Exhaust Connection from Engine to Muffler.

**E.** Rain Flap for Vertical Exhaust Discharge.

**F.** Spin on Full Flow Lube Oil Filter.

**G.** Oil Pressure Gauge

**H.** Fuel Strainer and Solenoid Valve.

**I.** Racor dual fuel filters with “hot swap” selection valve.

**J.** Mounted Control Box.

**K.** Exciter Field Circuit Breaker.

**L.** Manual Reset, Remote Control Terminals.

**M.** Mounted Connection Box.

**N.** Battery Cables.

**O.** Starting Battery.

**P.** Immersion Heater – 1500 watt, 120 volt in Water Jacket with 120 volt Thermostat.

**Q.** Control panel heater – 100 watt, 120 volt.

**R.** Alternator winding heater – 100 watt, 120 volt.

**S.** Two remote annunciator panels.

**T.** 10 gpm hand priming pump between fuel tank base and engine.

**U.** Ground fault alarm with annunciation.

**V.** Two break-glass emergency shutoff buttons (in addition to the EPO on the generator and one EPO on the remote annunciators).

**W.** Provide (2)-circuit breakers: (2)-800A, 3 pole, connected to generator power output terminals. breaker shall be 100%-rated electronic LSIG type.

## 2.06 COOLING EQUIPMENT

**A.** Engine: self-contained liquid cooling complete with pusher type fan maintaining safe operation temperature for unit under full load conditions.

**B.** Coolant: glycol base anti-freeze good to -40F.

## 2.07 WARNINGS AND SHUTDOWNS

**A.** Provide NFPA 110 Level 1 warnings and shutdowns plus others at engine generators and remote annunciators as indicated below:

| | Engine Generator Shutdown Upon Alarm | Individual Visual Alarm / Indication at Engine Generator | Individual Visual Alarm / Indication at Remote Annunciators | Common Audible Alarm at Remote Annunciators |
|---|---|---|---|---|
| High Engine Coolant Temperature Alarm / Shutdown | Yes | Yes | Yes | Yes |
| High Engine Coolant Temperature PreAlarm | No | Yes | Yes | Yes |
| Low Engine Oil Pressure Alarm / Shutdown | Yes | Yes | Yes | Yes |
| Low Engine Oil Pressure PreAlarm | No | Yes | Yes | Yes |
| Low Engine Coolant Level | No | Yes | Yes | Yes |
| Low Engine Coolant Temperature Alarm | No | Yes | Yes | Yes |
| Overcrank / Fail to Start | Yes | Yes | Yes | Yes |
| Overspeed | Yes | Yes | Yes | Yes |
| Utility Supplying Load / Normal Operation | No | No | Yes | No |
| Engine Generator Supplying Load / In Use | No | Yes | Yes | No |
| Engine Generator Ground Fault Alarm | No | Yes | Yes | Yes |
| Not In Auto | No | Yes | Yes | Yes |
| High Battery Voltage | No | Yes | No | No |
| Low Battery Voltage | No | Yes | No | No |
| Battery Charger AC Failure | No | Yes | No | No |
| Battery Charger Malfunction (Common Alarm) | No | Yes | Yes | No |
| | | | | |
| Low Fuel Tanks Level | No | Yes | Yes | Yes |
| Rupture Basin Alarm | No | No | Yes | Yes |
| Automatic Transfer Switch in Normal Position | No | No | Yes | No |
| Automatic Transfer Switch in Neutral / Load Shed Position | No | No | Yes | No |
| Automatic Transfer Switch in Emergency Position | No | No | Yes | No |

## 2.08 EXHAUST EQUIPMENT

**A.** Muffler and piping: critical type integral to sound attenuated enclosure.

## 2.08 EXHAUST EQUIPMENT

**A.** Muffler and piping: critical type integral to sound attenuated enclosure.

## 2.09 CONTROL PANEL

**A.** Provide exhaust temperature pyrometers and gage for each exhaust discharge or engine control system to indicate proper engine loading when tested with building load. Pyrometer location(s) shall be suitable for use in documenting NFPA 110-8.4.2(1) exhaust temperature compliance. Gage shall be located at control panel.

**B.** Provide 120 volt ac control panel heater/thermostat to prevent condensation in control panel.

**C.** Manufacturer's full function microprocessor-based control box with the following features:

- **a.** Ethernet connection for customer local area network. Communication via internet protocol over network with no special software shall be provided. Access shall be via standard internet browser software and shall provide the ability to monitor the engine generator and automatic transfer switches.
- **b.** Manual-stop-auto switch with extra contacts wired to terminal block for remote indication of switch position.
- **c.** Terminal block contacts for remote auto start and stop from all ATS's.
- **d.** Dry contact for remote engine running status indicator.
- **e.** Exciter filed circuit breakers, manual reset.
- **f.** Remote control terminals.
- **g.** Oil temperature gauge.
- **h.** Coolant temperature gauge.
- **i.** Output voltage meter.
- **j.** Output amp meter.
- **k.** Frequency meter.
- **l.** Running time meter.

## 2.10 ACCESSORIES

**A.** Remote Status: Provide two remote annunciator panels as detailed on drawings.

## 2.11 AUTOMATIC TRANSFER SWITCHES

**A.** Refer to Section 26 3623 for full requirements.

# PART 3 - EXECUTION

## 3.01 COORDINATION

**A.** Coordinate with ventilation, fuel supply, and exhaust, to provide an efficient and well coordinated layout.

## 3.02 INSTALLATION

**A.** Install unit complete and make operational. Install muffler horizontally as close to unit as practical. Provide 1/2" (12 mm) copper drain line with draincock from bottom of muffler to grade for periodic draining of muffler.

**B.** Install engine at sufficient height above base to permit dropping oil pan without removing unit.

**C.** Consideration should be given to site conditions.

## 3.03 WIRING AND CONNECTIONS

**A.** Provide conduit, wiring, and connections required and recommended by unit supplier.

## 3.04 TESTING

**A.** Test and adjust unit on site. Provide full load test utilizing portable test bank, if required, for four hours minimum. Simulate power failure including operation of transfer switch, automatic starting cycle, and automatic shut down and return to normal.

**B.** Record in 20 minute intervals during four hour tests:

**1.** Kilowatts.

**2.** Amps.

**3.** Voltage.

**4.** Coolant Temperature.

**5.** Frequency.

**6.** Oil Pressure.

**C.** Test alarm and shut down circuits by simulating conditions.

## 3.05 WARRANTY

**A.** Provide comprehensive manufacturer 5-year warranty.

**THIS PAGE INTENTIONALLY LEFT BLANK**

# SECTION 26 3623

# AUTOMATIC TRANSFER SWITCHES

## PART 1 - GENERAL

### 1.01 DESCRIPTION

**A.** This section includes the furnishing, installation, and connection of automatic transfer switches.

### 1.02 QUALITY ASSURANCE

**A.** Automatic transfer switches shall be in accordance with UL, NEMA, NEC, ANSI, as hereinafter specified, and as shown on the drawings.

**B.** Automatic transfer switches shall be listed by the Underwriters Laboratories, Inc., under UL 1008 and, where applicable, also meet the additional withstand test requirements herein specified.

**C.** The unit shall be a complete assembly, factory wired so that only external circuit connections are required in the field. The unit shall include, but not be limited to, operating mechanism, main contacts, auxiliary contacts, timers, pilot lights, switches, and auxiliary sensing devices. Units shall have full analog metering packages.

**D.** Automatic transfer switches shall contain network cards and full metering displays such that they are connected to generator Power Command 500 Remote Monitoring System. See Specification 263213 for additional remote monitoring description.

### 1.03 SUBMITTALS

**A.** Submit Shop Drawings and product data in accordance with Section 26 0500.

**B.** Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

**A.** Cummins power systems CHPC or preapproved substitute.

## 2.02 CONSTRUCTION

**A.** Automatic transfer switches shall be electrically operated, mechanically held, open contact type, without integral over-current protection. Transfer switches utilizing automatic or nonautomatic molded case circuit breakers as switching mechanisms are not acceptable.

**B.** Automatic transfer switches shall be capable of operating in open and short-duration closed transition modes. In open transition mode, neutral position delay time shall be adjustable. In closed transition mode, overlap of utility and generator sources shall be less than 100 milliseconds. Selection of mode shall be by switches or software that can be easily selected in the field without any hardware modifications or special software.

**C.** Where four pole automatic transfer switches are indicated on drawings, provide overlapping neutral pole.

**D.** Automatic transfer switch shall have capability of loadshed. This feature shall cause the automatic transfer switch to disconnect from the generator source when signaled remotely.

**E.** Automatic transfer switches shall be from same manufacturer as Package Engine Generator set.

## 2.03 RATINGS, MARKINGS AND TESTS

**A.** Ratings

**1.** Phase, voltage, and ampere rating shall be as shown on the drawings. The ampere rating shall be for 100 percent continuous load current.

**2.** Transfer switches shall be rated for total system transfer on emergency systems.

**3.** Ratings shall be with non-welding of contacts during the performance of withstand and closing tests.

## 2.04 HOUSING

**A.** Transfer switches shall be enclosed in indoor steel cabinets in accordance with UL 508, or in a switchboard assembly in accordance with UL 891, as shown on the drawings.

**B.** Doors: Shall have three-point latching mechanism where required.

**C.** Finish: Cabinets shall be given a phosphate treatment, painted with rust inhibiting primer, and finish painted with the manufacturer's standard enamel or lacquer finish.

## 2.05 FEATURES

Transfer switches shall include the following:

**A.** Operating Mechanisms:

**1.** Shall be actuated by an electrical operator,

**2.** Shall be interlocked electrically and mechanically such the main contacts cannot be closed simultaneously in both normal and emergency position.

**3.** Normal and emergency main contacts shall be mechanically locked in position by the operating linkage upon completion of transfer. Release of the locking mechanism shall be possible only by normal operating action.

**4.** Shall not be used as a current carrying part. Components and mechanical interlocks shall be insulated or grounded.

**B.** Contacts

**1.** Current carrying capacity of arcing contacts shall not be used in the determination of the transfer switch rating, and shall be separate from the main contacts.

**2.** Main and arcing contacts shall be visible for inspection with cabinet door open and barrier covers removed.

**C.** Manual Operator

**1.** Shall be external, operable from outside of enclosure with door closed.

**2.** Shall be capable of operation in either direction.

**3.** Shall be capable of operation by one person.

**D.** Replaceable Parts

**1.** Shall include the main and arcing contacts individually or as units, relays, and control devices.

**2.** Switch contacts and accessories shall be replaceable from the front without removing the switch from the cabinet and without removing main conductors.

**E.** Sensing Relays

**1.** Shall have voltage sensing relays in each phase of the auxiliary power supply.

**2.** Shall have a voltage frequency sensing relay in one phase of the auxiliary power supply.

**F.** Elevator Transfer Pre-signal

**1.** Automatic transfer switches shall have adjustable transfer pre-signal time delay to prevent interruption of power during elevator operation. Provide form C contacts for signal to elevator system.

## 2.06 ACCESSORIES

Transfer switches shall include the following accessories

**A.** Indicating Lights

**1.** Provide a signal light for normal source position.

**2.** Provide a signal light for emergency source position.

**3.** Lights shall be different colors.

**4.** Provide nameplates to indicate transfer switch position.

**B.** Manual Test switch: Shall simulate normal source failure.

**C.** Time Delay Relays

**1.** Provide time-delay relays to accomplish the functions hereinafter specified.

**D.** Auxiliary Contacts

**1.** Provide additional contacts as necessary to accomplish the functions shown on the drawings, hereinafter specified, and designated in other sections of these specifications.

**2.** Contacts shall have a minimum rating of ten amperes and be positive acting on pickup and dropout.

**E.** Load current monitoring current transformers.

**F.** Automatic electronic exerciser timeclock in ATS-LS.

**G.** Meters on door for load current, kilowatts, kilovoltamperes, and source voltages. Readouts may be analog or digital.

**H.** Front panel security keyswitch.

**I.** Provide manufacturer standard communications capability for communication with engine generator network or for internet protocol communication over the building local area network.

## 2.07 TRANSFER SWITCH OPERATION

**A.** Transfer to Emergency: Transfer switches shall transfer their loads from normal to emergency source when normal source voltage decreases on one or more phases to less than 80% of normal and when frequency and voltage of the emergency source have attained 90 percent of rated value.

**B.** Retransfer to Normal: Transfer switch shall retransfer to normal source upon restoration of normal supply in all phases to 90 percent or more of normal voltage, at transfer switch and after a time-delay. Time-delays shall be field adjustable. Should the emergency source fail during the timing transfer switch shall immediately transfer to normal when that source is available.

**C.** Exercise Mode: Transfer to emergency power source shall be accomplished by local test switches on a selective basis.

**D.** Interlock transfer switch to load bank controller such that if utility power fails, load bank heating elements are disabled.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

**A.** Installation shall be in accordance with the NEC and as shown on the drawings.

### 3.02 WARRANTY

**A.** Provide manufacturer's standard comprehensive 5-year warranty.