- 1.1 Requirements: A. The work covered by this Section of the specification includes furnishing of all labor, equipment, supplies and materials and performing all operations including excavation and backfilling, cutting, channeling and chasing necessary for the installation of wiring systems, as shown on the drawings, as hereinafter specified, and as directed by the Engineer.
- B. The Contractor shall perform all work hereunder in strict accordance with the rules and regulations of all applicable municipal, state, City and other local codes, and in accordance with applicable provisions of the 2012 edition of the National Electrical Code or latest adopted NEC edition.
- C. The Contractor shall make application for all necessary permits, licenses and inspections as required under the above codes and shall pay all fees and charges appurtenant thereto.
- D. The electrical contractor shall make application for electrical service with the local electrical utility and forward anticipated electrical loads for the project. In addition, the electrical contractor shall be responsible for coordinating the installation of the permanent electrical service with the utility company to assure completion at the earliest possible date so
- E. The general arrangement of conduit, wiring and equipment shall be as shown on the contract drawings. The Contractor shall carefully examine all contract drawings and shall be responsible for the proper fitting of materials and equipment in each location as indicated, without substantial alteration. In as much as the drawings are generally diagrammatic and due to the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories, as may be required. The Contractor shall carefully investigate the site, structural, and finish conditions affecting his work and shall arrange such work accordingly, furnishing such fitting and accessories as may be required to meet such conditions, at no additional cost to the Owner. The right to make any reasonable change in location of apparatus, equipment, outlets or routing of conduit and wiring, up to the time of roughing-in is reserved by the Engineer without involving any additional expense to the Owner.
- F. Drawings are diagrammatic and indicate general arrangement of systems and work. Scale dimensions shall not be used. In as much as the drawings are generally diagrammatic and due to the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories, as may be required. The contractor shall carefully investigate the site, structural, and finish conditions affecting his work and shall arrange such work accordingly, furnishing such fitting and accessories as may be required to meet such conditions, at no additional cost to the owner. The right to make any reasonable change in location of apparatus, equipment, outlets or routing of conduit and wiring, up to the time of roughing-in is reserved by the engineer without involving any additional expense to the owner.
- A. All materials shall be new and the best of their respective kinds, suitable for the conditions and duties imposed on them after installation. All such material shall be as found in the approved list of the National Board of Fire Underwriters. All equipment and systems shall be UL approved and installed per NEC requirements and manufactures printed instructions.
- B. Where material or equipment is identified by proprietary name, model number and/or manufacturer, furnish the named item or equal thereof, subject to acceptance by the Engineer. Substituted items shall be equal or better in quality and performance and must be suitable for the available space, required arrangement and application. Submit any and all data necessary to determine the suitability of substituted items. The suitability of only the named item has been verified. Where more than one item is named, only the first item has been verified as suitable.
- 1.3 Examination of Premises:
- A. Electrical contractor shall visit the site prior to submission of bid. He shall observe and note existing conditions, familiarize himself with the layout of existing, lighting, power systems, and fire alarm in order to thoroughly understand the scope of the modifications to the present job and the effect of those modifications. No allowance will be made subsequently in this connection for any error or negligence in the Contractor's part. Should contract documents' scope of work differ from field conditions that cause an upset in bid, it shall be reported to the engineer of record so revised bid documents or addendum(s) can be issued. Neglect to visit proposed site shall be the electrical contractor's sole responsibility.
- B. Engineer of record shall not be responsible for the verification of existing conditions that are not readily visible. This includes but is not limited to: equipment, piping, devices or items that are located below grade, within partitions, enclosed in chases or above inaccessible ceilings. Allowances are to be included for unforeseen conditions that may affect the contractor's scope of work. Minor deviations required for accomplishing the intent of this design are to be included in that allowance
- 1.4 Shop Drawings:
- A. The Contractor shall prepare and submit detailed shop drawings to the Engineer for approval, prior to installation or roughing-in of any equipment. In general, catalog cuts, specification sheets, descriptive data, etc., shall be acceptable for submittal of all equipment specified by standard catalog numbers
- 1.5 Low Voltage Testing:
- A. The Contractor shall furnish all labor, materials, instruments, fuel and power required to perform all necessary tests. All tests shall be performed to the satisfaction of the Engineer. All defective materials and/or workmanship discovered as a result of these tests, shall be removed and replaced at the Contractor's expense and the test repeated.
- B. A thorough test shall be made to demonstrate that the system is entirely free from ground faults, short circuits, and open circuits; that the resistance to ground all non-grounded circuits, before and after connection of equipment meets the requirements of the National Electrical Code.
- 1.6 Identification: A. Mark and permanently identify all motor starters, switches, controls, panelboards and other equipment in
- Lettering for panels and other equipment shall be 3/8" high. Attach identification plates by permanent means. B. No embossed plastic tape markers or hand written marker pens will be permitted for use in marking equipment.

accordance with the project nomenclature. Identification plates shall be laminated plastic, black and white engraved letters.

- C. All receptacles and junction boxes with branch circuiting shall be labeled with panel designation and circuit number. Clearly label on face of cover plate or place tag behind cover plate.
- A. The material and workmanship of all parts of the electrical installation specified herein shall be guaranteed unconditionally for a period of one (1) year from date of acceptance against mechanical and electrical defects arising from faulty materials or workmanship. Either replacement or repairs shall be made promptly on any defective materials or workmanship without charge during that period.
- A. Upon completion of the electrical installation, the Contractor shall deliver to the Owner one (1) set of prints of electrical contract drawings which shall be legibly marked in red pencil to show all additions, changes and departures of the
- installation as compared with the original design. They shall be suitable for use in preparation of Record Drawings. 1.9 Record and Information Manual: A. The Contractor shall have prepared three (3) copies of the Record and Information Manual and deliver three
- copies of the booklet to the Owner. The manuals shall include copies of all specifications, shop drawings and maintenance instructions for all electrical equipment provided. The Contractor shall also collect all operating instructions, shipping information, adjusting and maintenance manuals, parts lists, etc., pertaining to the distribution equipment and bind in the Operation and Maintenance Manuals. 1.10 Cutting and Patching:
- A. All cutting and patching necessary for the installation of the electrical work shall be done by the electrical contractor. Any damage done to the work already in place by reason of this work shall be repaired at the Contractor's expense. Patching shall be uniform in appearance and shall match with the surrounding surface.
- 1.11 Mounting Heights:
- A. The following mounting heights of the various electrical outlets and devices are for guidance, the Contractor shall study the Architectural and Electrical Drawings for exact locations coordinated with door swings, glass partitions, etc. All devices shall be mounted to comply with American Disabilities Act.
- Switches & Pull Stations 48" to center of outlet box above floor.
- Receptacles 18" to center of outlet box above floor (unless otherwise noted).
- Voice/Data Outlets 18" to center of outlet box above floor (unless otherwise noted).
- Fire Alarm Horns/Flashing lights 80" min to 84" max to top of device or 6" below ceiling, whichever is lower.
- Exceptions: Code violation, as noted or directed by local AHJ.

operation until the new systems and equipment are ready for operation.

- 1.12 Motor Connections and Control Wiring:
- A. Provide all power wiring and connections from source to starter, starter to disconnect, and disconnect to motor or device, except where such wiring is provided by equipment manufacturer. All automatic temperature control wiring shall be furnished and installed under Division 15 - Mechanical, unless indicated or specified otherwise. However, Electrical Contractor shall provide and install all starters and make all power connections. Manual control switches shall be furnished and/or installed by the Electrical Contractor as indicated.
- B. Furnish and install disconnect for each motor. Disconnects shall be fused or unfused safety switches as required.
- 1.13 Connections and Alterations to Existing Work: A. Any electrical work which will interfere with the normal use of the building in any manner shall be done at such
- times as mutually agreed upon between the Contractor and the Owner's representative. B. All existing electrical systems in occupied areas shall be kept in operation during the progress of the work. Temporary electrical connections shall be provided to all systems and equipment where necessary to maintain continuous
- C. When existing electrical work is removed, all conduit, ducts, wiring and appurtenances shall be removed to a point below the finished floors or behind finished walls and capped. Such points shall be far enough behind finished surfaces to allow for the installation of the normal thickness of finish material.
- D. When the work specified herein connects to any existing conduit, wiring or other equipment, the Contractor shall perform all necessary alterations, cutting and fitting of the existing work as may be necessary or required to make satisfactory connections between the new and existing work and shall leave the completed work in a finished and workmanlike condition, to the entire satisfaction of the Engineer.
- E. When the work specified herein or under other divisions of this contract necessitates relocation of existing conduit, wiring or electrical equipment, the Contractor shall perform all work and make all necessary changes to existing work as may be required to leave the completed work in a finished and workmanlike condition to the entire satisfaction of the
- All existing electrical materials not reused under this division and not salvaged by the Owner shall become the property of the Contractor and shall be disposed of in a proper manner off the project site.
- G. Removal of existing equipment and feeder renovations shall be closely coordinated with the Owner's representative where they impact critical areas. Interruption of electrical service to critical equipment shall be kept to a minimum and performed on off hours as designated by the Owner's representative.
- A. In areas indicated to be renovated, remove that portion of the existing electrical installation to complete the new work and all equipment, wiring, conduits and appurtenances not required in the completed installation. All unused conduit and wiring exposed after demolition shall be removed back to the point of concealment.
- B. Where electrical systems pass through the renovated areas to serve other portions of the facility, they shall be suitably relocated and the system restored to normal operation.
- C. The extent of electrical demolition and relocation is not specifically indicated on the drawings. The contractor shall visit the site prior to submitting his bid to thoroughly review the existing installations and the proposed construction to include the full scope of electrical demolition and relocation. The contractor shall review all areas of the proposed renovation and the required removal and relocation of existing electrical work. In addition, the contractor shall review in detail, the architectural drawings for areas of demolition and removal of existing construction and review in detail, the associated existing electrical installations at the site. This review shall include all necessary costs in the bid to make the necessary

adjustments to the existing electrical work to meet the proposed building construction. No allowances or change orders will be made after the bid for insufficient review and/or cost for the electrical demolition.

BASIC ELECTRICAL MATERIALS AND METHODS

- 1.1 Conduits and Fittings: A. General:
- 1) Install all wiring in conduit (except where noted under Wire and Cable) and provide empty conduit for special systems described elsewhere
- 2) Minimum conduit size shall be 1/2". All conduit embedded in concrete shall be 3/4" minimum. All exterior underground conduit shall be 1" minimum.
- 3) In finished areas, install all conduits concealed unless otherwise indicated. Where conduit cannot be concealed utilized surface metal raceway as manufactured by Wiremold. All surface metal raceway shall be run
- walls, in mechanical equipment spaces and elsewhere as indicated. 4) Support all conduit not embedded in concrete or masonry so that strain is not transmitted to outlet boxes and pull

inconspicuously and painted to match adjacent wall/ceiling finishes. Conduit may be run exposed on unfinished

- boxes, etc. Supports to be sufficiently rigid to prevent distortion of conduits during wire pulling.
- 1) Provide hot-dip galvanized, rigid steel conduit for work exposed to weather and for embedded work in concrete or masonry and in or below the concrete slab on grade (above the vapor barrier).
- 2) Provide galvanized, (inside and out) electrical metallic tubing (EMT) for interior exposed work, for concealed work above suspended ceilings and within interior partitions or non-masonry walls.
- 3) Provide polyvinylchloride (PVC) schedule 40 conduit for exterior underground direct burial and exterior
- underground concrete encased installation.
- 1) All parts and hardware used for support of equipment, conduits and fittings, shall be galvanized. 2) Support single runs of suspended feeder conduit with adjustable hangers using threaded rods attached to the
- 3) Support groups of suspended conduits run in parallel on trapeze hangers constructed of "Kindorf" channels and conduit straps suspended with threaded hanger rods attached to the structure above. No tie wires or building wire shall be used for strapping conduits.
- 4) Support surface runs of conduit using one hold pipe straps or two hold pipe straps. Strap spacing maximum 6 ft.
- 5) Fasten pipe straps and hangers to concrete using inserts or expansion bolts and to hollow masonry using toggle bolts. Wooden plugs and shields will not be permitted. All supports in bar jcist construction shall be attached to
- Support conduits from joists and beams using clamps and/or Caddy clips approved for the purpose.

the top cord of the joists using suitable clamps approved for the purpose.

- A. Building wire, unless otherwise indicated, shall be 600 volt, type THHN/THWN-2 insulation for interior use and exterior use within conduit. Conductors shall be sized and run as indicated. Conductors shall be soft drawn copper of not less than 98% conductivity. Branch circuits (rated 60 amperes or less), installed above ceilings and within walls, where permitted by code, may be type MC cable (with ground wire). No Romex or BX cable is permitted.
- B. No wire smaller than number twelve (12) AWG shall be used unless otherwise indicated. The wire size indicated in the homerun shall be used throughout the circuit. Conductors shall be continuous from outlet to outlet and from terminal board to point of final connection, and no splice shall be made except within outlet or junction boxes. All conductors shall be of the sizes as indicated. All wires number eight (8) AWG and larger shall be stranded. The Contractor shall make wiring connections of all electrical equipment requiring electric service. Wires and cables shall be as manufactured by Plastic Wire & Cable Corporation, Okonite Company, General Electrical or equivalent.
- C. Electrical design has been based on the installation of 75°c. Conductors connected to terminal lugs and equipment U.L. listed for a minimum 75°c. Conductors terminated on equipment with a lower rating (60°c) or no rating shown shall have conductor size increased to conform to N.E.C. table 310-16 and U.L. no. 489 requirements. D. A color coding system, as listed below, shall be used for throughout the building's network of feeders and circuits and used as a basis of balancing the load. Selection shall be based on applicable work covered by this Contract.

System	120/208V	277/480
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green

- E. All control wiring shall be color coded with wires of colors different from those to designate phase wires. All isolated ground conductors shall be green with a yellow tracer.
- F. Voltage Drop: For conductors sized per NEC on drawings, increase size by number of standard copper sizes shown in table to compensate for voltage drop, and increase conduit and grounding conductor sizes accordingly as per om source to load exceeds maximums shown.

NEC. Contact Engineer of rec	cord for assistance if circuit	length fron
CIRCUIT VOLTS/PH	CIRCUIT LENGTH FT.	UPSIZE
120/1	75-150	1
120/1	150-200	2
120/1	over 200	3
208/3 OR 277/1	150-200	1
208/3 OR 277/1	200-250	2
208/3 OR 277/1	over 250	3
480/3	300-450	1

over 450

- 1.3 Disconnects (Safety Switches): Furnish and install safety switches where indicated and as required for motor outlets or other equipment. Switches shall be of size, number of poles and fused or non-fused, as required for job conditions and the National Electrical
- B. Switches shall be equipped with fuse contacts and jaws which insure positive fuse and jaw contact by means of reinforcing spring clips or other approved means. All current carrying parts shall be silver plated. Hinges shall be non-current carrying. Switches shall be so designed that they can be locked in either open or closed position. Switches used with Class R fuses installed shall have rejection clip provisions.
- C. All safety switches shall be quick-make, quick-break, and have interlocking cover with handle that may either be front or side operating with a padlocking provision, as manufactured by Square "D" or approved equal. Provide NEMA 3R enclosures where required to be weatherproof.

1.4 Grounding:

- Contractor shall provide a grounding system consisting of driven ground rods with interconnecting cables. Ground rods shall be installed with two feet of cover and cables exothermically welded. Ground rods shall be 3/4" diameter by 10 feet long copper clad steel, one piece, Copperweld #9450, or approved equal. Ground grid conductors shall be #1/0 bare direct buried. The ground system shall be so constructed that the resistance between the equipment and the ground
- Provide equipment grounding conductors in all raceways and cables sized in accordance with the NEC.

SERVICE AND DISTRIBUTION

- 1.1 Fuses: A. Fuses for service entrance and distribution equipment shall be U.L. listed class RK-1 and L current limiting type. All fused switches shall incorporate rejection clips to insure only current limiting replacement fuses. Provide Bussman "low peak" or equal by Gould-Shawmut. Provide a spare set of three fuses to the owner for each ampere size and type used.
- 1.5 Short Circuit/Coordination Study: A. An independent firm, qualified and experienced in short circuit/coordination studies, shall perform a protective short circuit study following conditional approval of the circuit protective device shop drawings.
- B. The study shall be prepared in accordance with ANSI and IEEE standards and shall include a one line diagram, recommendations for all adjustable trip protective device settings and substitute equipment as necessary to meet the calculated fault currents and to provide proper selective coordination of overcurrent protective devices. The contractor and/or switchboard manufacturer shall include allowances in the bid to adjust equipment selections to conform to all recommendations made in the study.

STANDBY GENERATOR

PART 1 - GENERAL

Scope of Work

- Provide a generator set for on-site electric power generation. Basis of design Generac SD130.
- General Requirements
- A. It is the intent of this specification to secure an emergency generator system that has been tested during design verification, production and at the final job site. The generator set will be of the lasted commercial design and will be complete with all of the necessary accessories for complete installation as shown on the plans, drawings, and specifications herein. The equipment supplied and installed shall meet the requirements of the National Electrical Code, along with all applicable local codes and regulations. All equipment shall be new and of current production of a national firm which manufactures the generator and controls, transfer switches, switchgear, and assembles the generator sets as a complete and coordinated system. There will be one source responsibility for warranty, parts, and service through a local representative with factory-trained servicemen.
- Submittal

A. The submittal shall include prototype test certification and specification sheets showing all standard and optional accessories to be supplied, schematic wiring diagrams, dimension drawings, and interconnection diagrams identifying by terminal number, each required interconnection between the generator set, the transfer switch, and the remote annunciator panel if it is included elsewhere in these specifications.

- Testing
- A. To assure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer and/or local representative shall be responsible for three separate tests: design prototype tests, final production tests, and 2 hour site test.
- 1. Design Prototype Tests: Components of the emergency system such as the engine/generator set, transfer switch,

and accessories shall not be subjected to prototype tests since the tests are potentially damaging. Rather, similar design prototypes and preproduction models, which will not be sold, shall have been used for the following tests.

- Maximum power (kW).
- 3. Maximum motor starting (KVA) at 35% instantaneous voltage dip.
- 4. Alternator temperature rise by embedded thermocouple and/or by resistance method per NEMA MG1-22.40 and
- Governor speed regulation under steady-state and transient conditions.
- Voltage regulation and generator transient response.
- 7. Fuel consumption at 1/4, 1/2, 3/4, and full load.
- Harmonic analysis, voltage waveform deviation, and telephone influence factor.
- Three-phase short circuit tests.
- Alternator cooling air flow. 11. Torsional analysis to verify that the generator set is free of harmful torsional stresses.
- Endurance testing.
- B. Production Tests
- 1. Final Production Tests: Each generator set shall be tested under varying loads with guards and exhaust system in
- Tests shall include:
- Single-step load pickup.
- Transient and steady state governing.
 - Safety shutdown device testing
 - Voltage regulation.
 - Rated Power @ 0.8 PF
 - Maximum Power. Upon request, arrangements to either witness this test will be made, or a certified test record will be sent prior to shipment.

1. Site Tests: An installation check, start-up, and full load bank test shall be performed by the manufacturer's local representative. The engineer, regular operators, and the maintenance staff shall be notified of the time and date of the site test. The unit shall run for a full two hours (minimum)at rated load. An external load bank shall be connected to load the generator to the full nameplate kW rating. Submit the field test report upon completion.

- 2. Fuel, lubricating oil, and antifreeze shall be checked for conformity to the manufacturer's recommendations, under the environmental Conditions present and expected.
- 3. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include: block heaters, battery charger, generator strip heaters, remote annunciator, etc.
- movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage and frequency, and phase rotation. 5. Automatic start-up by means of simulated power outage to test remote- automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper system coordination. Engine

coolant temperature, oil pressure, and battery charge level along with generator voltage, amperes, and frequency shall be

4. Start-up under test mode to check for exhaust leaks, path of exhaust gases outside the building, cooling air flow,

- monitored throughout the test. Warranty & Maintenance
- A. The generator set shall be guaranteed against defective material and workmanship in accordance with the manufacturer's published warranty for one year from date of start-up. Optional warranties shall be available upon request. B. The generator set manufacturer and its distributor shall maintain a 24-hour parts and service organization. This organization shall be regularly engaged in a maintenance contract program to perform preventive maintenance and service on equipment similar to that specified. A service agreement shall be available and shall include system operation

under simulated operating conditions, adjustment to the generator, transfer switch, and switchgear controls as required, and

- PART II PRODUCTS
- 2.1 Equipment
- A. The generator set shall shall provide 150 kW, 187 kVA when operating at 120/208 volts, .8 power factor. The generator set shall be capable of this rating while operating in an ambient condition of 105°F (40.5°C) and 3300 feet above sea level.
- B. Vibration isolators shall be provided between the engine-generator and heavy-duty steel base.

certification in the owner's maintenance log of repairs made and proper functioning of all systems.

- 2.2 Engine
- A. The engine shall operate a governed speed of 1800 rpm. The engine shall be equipped with the following:
- An isochronous governor.
- 24 Volt positive engagement solenoid shift-starting motor.
- 65-Ampere minimum automatic battery charging alternator with solid-state voltage regulation.
- 4. Positive displacement, full pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain. Dry-type replaceable air cleaner elements for standard duty applications.
- 6. Engine-driven or electric fuel transfer pump capable of lifting fuel 6.8 feet, fuel filters, and electric solenoid fuel
- B. The turbocharged and after cooled engine shall be fueled with No. 2 diesel
- C. The engine shall have a minimum of 6 cylinders, and be liquid-cooled by a unit-mounted radiator, blower fan, water pump, and thermostats. This system shall properly cool the engine with up to 0.5 inches H20 static pressure on the fan in an ambient temperature up to 105°F/40°C. 2.3 Generator
- A. The alternator shall be salient-pole, brushless, 12-lead re-connectable, self-ventilated of drip-proof construction with amortisseur rotor windings and skewed stator for smooth voltage waveform. The insulation shall meet the NEMA standard (MG1-22.40 and 16.40) for Class H and be insulated with epoxy varnish to be fungus resistant per MIL 1-24092. Temperature rise of the rotor and stator shall be limited to NEMA Class F ratings. The excitation system shall be of brushless construction controlled by a solid- state voltage regulator capable of maintaining voltage within +/- 2% at any constant load from 0% to 100% of rating. The regulator must be isolated to prevent tracking when connected to SCR loads, and provide individual adjustments for voltage range, stability and volts-per-hertz operations; and be protected from the environment by conformal coating.
- B. Upon 1-step application of any load up to 100% of the rated load at 0.8 power factor, the voltage dip shall not exceed 35% and the generator set shall recover to rated voltage and frequency.
- C. The generator shall be capable of sustaining at least 250% of rated current for at least 10 seconds under a D. The generator, having a single maintenance-free bearing, shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel.
- 2.4 Controller A. Set-mounted controller capable of facing right, left, or rear, shall be vibration isolated on the generator enclosure. The controller shall be capable of being remote-mounted. The microprocessor control board shall be moisture proof and capable of operation from -40°C to 85°C. Relays will only be acceptable in high-current circuits.

B. Circuitry shall be of plug-in design for quick replacement. Controller shall be equipped to accept a plug-in

- device capable of allowing maintenance personnel to test controller performance without operating the engine. The controller shall include the following features:
- Fused DC circuit. Complete 2-wire start/stop control, which shall operate on closure of a remote contact.
- Speed sensing and a second independent starter motor disengagement systems shall protect against starter engagement with a moving flywheel. Battery charging alternator voltage will not be acceptable for this purpose. 4. The starting system shall be designed for restarting in the event of a false engine start, by permitting the engine to
- completely stop and then re-engage the starter. Cranking cycler with 15-second ON and OFF cranking periods.
- 6. Over-crank protection designed to open the cranking circuit after 75 seconds if the engine fails to start.
- Circuitry to shut down the engine when signal for high coolant temperature, low oil pressure, or over speed is 8. Engine cool down timer factory set at 5 minutes to permit unloaded running of the standby set after transfer of the load to normal.
- 9. 3-position (Automatic-OFF-TEST) selector switch. In the TEST position, the engine shall start and run regardless of the position of the remote starting contacts. In the Automatic position, the engine shall start when contacts in the remote control circuit close and stop 5 minutes after those contacts open. In the OFF position, the engine shall not start even though the remote start contacts close. This position shall also provide for immediate shutdown in case of an emergency. Reset of any fault shall also be accomplished by putting the switch to the OFF position.

- 10. Alarm horn with silencer switch per NFPA 110.
- C. Standard indicating lights to signal the following shall be included:
- Not-in-Auto (flashing red)
- Over-crank (red)
- Emergency Stop (red) High Engine Temperature (red)
- Over-speed (red) Low Oil Pressure (red) Battery Charger Malfunction (red)
- Low Battery Voltage (red) Low Fuel (red) 10. Auxiliary Pre-alarm (yellow)
- Auxiliary Fault (red) System Ready (green)
- 13. Fuel Tank Rupture Basin Leak (red)
- D. Test button for indicating lights. E. Terminals shall be provided for each indicating light above, plus additional terminals for common fault and

common pre-alarm. 2.5 Instrument Panel

- A. The instrument panel shall include the following:
- 1. Dual range voltmeter 3 1/2-inch, +/- 2% accuracy
- Dual range ammeter 3 1/2-inch, +/- 2% accuracy.
- 3. Voltmeter-ammeter phase selector switch.
- Lights to indicate high or low meter scale. 5. Direct reading pointer-type frequency meter 3 1/2-inch, 0.5% accuracy, 45 to 65 Hz scale.
- Panel-illuminating lights.
- Battery charging voltmeter Coolant temperature gauge
- Oil pressure gauge.
- Running-time meter.

Voltage-adjust rheostat

2.6 Accessories

- A. Line circuit breaker of 500 amperes, three poles, 600 volt rated, UL listed molded case type with long time, short time, and instantaneous solid state trip, generator mounted. B. Engine block heater. Thermostatically controlled and sized to maintain manufacturers recommended engine
- C. Battery rack, and battery cables, capable of holding the manufacturer's recommended batteries, shall be D. 12-volt lead-antimony battery(ies) capable of delivering the manufacturer's recommended minimum
- E. 10-Ampere automatic float and equalize battery charger with +/- 1% constant voltage regulation from no load to full load over +/-10% AC input line variation, current limited during engine cranking and short circuit conditions, temperature compensated for ambients from -40oC to +60oC, 5% accurate voltmeter and ammeter, fused, reverse polarity and transient
- F. The engine exhaust silencer shall be coated to be temperature and rust resistance, rated for critical application
- Gas-proof, seamless, stainless steel, flexible exhaust bellows with threaded NPT connection.

coolant temperature to meet the start-up requirements of NFPA-99 and NFPA-110, Level 1.

cold-cranking Amps required at 0 degree F, per SAE Standard J-537, shall be supplied.

 A dry contact kit containing 10-Relay Kit. 220 gallon (minimum), double wall, U.L. listed, rupture basis type diesel fuel tank mounted in the base of the unit. If a fuel leak should occur, the outer wall will contain the leak and sound a remote alarm.

J. Weather protective housing with integral louvers and 18 gauge, painted enamel (inside and out), removable

Provide three pole, solid neutral automatic transfer switch rated 225 amperes with microprocessor logic.

- Provide remote generator monitor panel with visual and audible alarms for all critical generator and accessory
- Transfer switches shall be capable of automatically starting the generator and transferring the load. Transfer switches shall be NEMA 1 enclosure, rated 120/208 volts. The transfer switches shall have a minimum current withstand rating of 42,000 amps (symmetrical). Provide Generac or equal by Russelectric or ASCO. B. Provide all required interlock wiring between generator, transfer switches, automatic starting control systems
- PART III EXECUTION 3.1 Shop Drawings

and elevator machine room.

side panels for access and maintenance.

2.7 Transfer Switches and Controls

Submit equipment specifications and catalog cuts of the engine generator, accessories and transfer switches.



AREA OF WORK-

REVISIONS REV# DATE DESCRIPTION 10/20/17 | PERMIT SET

ELECTRICAL SPECIFICATIONS

DRAWING NO. E105.00 DATE DRAWN BY 10/20/17 JCW JOB NUMBER CHECKED BY

11241 MSW