



**THIS IS NOT  
AN ORDER**

**REQUEST FOR BIDS/PROPOSALS COVERSHEET**  
**THE UNIVERSITY OF SOUTHERN MISSISSIPPI**

**Procurement and Contract Services**  
**127 McIlwain Dr. Ocean Springs, MS 39564**

**Date:** \_\_\_\_\_

**Name:** \_\_\_\_\_

**Bid No. 25-40**

**Company:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**City/State/Zip:** \_\_\_\_\_

THE UNIVERSITY OF SOUTHERN MISSISSIPPI is considering the purchase of the following item(s). We ask that you submit your bid and retain one copy for your files. Right is reserved to accept or reject any part of your bid. Your quotation will be given consideration if received in Bond Hall, Room 214 on or before:

April 14, 2025 2:00 p.m. CDT

TERMS - Bidder should state terms of sale. Our terms are 2% ten days, net 45 days.

These terms will apply per Mississippi law.

AWARDING CONTRACT - Cash terms will not be used as a basis for awarding

contracts; however, the University will accept cash discounts when earned.

**Buyer:** Millissa Stork

NOTE: If you cannot quote on the exact material shown, please indicate any exception giving brand name and complete specifications of any alternate. If additional space is required, use a separate sheet or letter of transmittal.

ITEM	QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL NET PRICE
		<p><b>RFP Bid# 25-40</b></p> <p><b>Generator, Fuel System, and Automatic Transfer Switch for the Oyster Hatchery and Research Facility on GCRL's Cedar Point Campus</b></p> <p><b>RFx 3160007273</b></p>		
		PROPOSAL MUST BE RETURNED TO THE UNIVERSITY IN ACCORDANCE WITH THE SPECIFICATIONS. RFP NUMBER AND DATE OF BID OPENING MUST BE SHOWN ON THE OUTSIDE OF THE ENVELOPE IF USING THAT METHOD.		

We quote you as above-F.O.B. The University of Southern Mississippi. Shipment can be made in \_\_\_\_\_ days from receipt of order. DATE \_\_\_\_\_ TERMS \_\_\_\_\_  
Return quotation to Procurement Services at above address.

Sun-Herald

## **NOTICE TO BIDDERS**

Sealed bids will be received on the Gulf Coast Research Laboratory's Cedar Point Campus in the Physical Plant Building at 127 McIlwain Drive, Ocean Springs, Mississippi, until **Monday, April 14, 2:00 p.m.** for the purchase of the following:

**Bid 25-40 Generator, Fuel Filtering System, and Automatic Transfer Switch  
RFx: 3160007273**

Detailed specifications and electronic bid submission instructions may be secured from the above office upon request or our website <https://www.usm.edu/procurement-contract-services/current-bids-and-sole-source-notices.php>. While the electronic bid submission option is available, it is not required and we ask that all potential respondents consider that with any electronic system there could be delays or glitches with the submission process; therefore the University highly encourages traditional sealed bids which are either mailed or submitted in person.

Right is hereby reserved to reject any or all bids.

Millissa Stork  
Procurement Coordinator  
The University of Southern Mississippi  
Gulf Coast Research Laboratory  
(228) 818-8001

Publish 2 times and charge to The University of Southern Mississippi:

03/16/2025

03/23/2025

**SECTION 263213 - PACKAGED ENGINE GENERATOR AND FUEL FILTERING SYSTEM**

**THE PURCHASE AND DELIVERY TO THE SITE OF THE PACKAGED ENGINE GENERATOR AND FUEL FILTERING SYSTEM IS THE SCOPE OF THIS BID. THE INSTALLATION OF THE GENERATOR AND FUEL FILTERING SYSTEM IS PART OF THE BASE PROJECT. ALL ITEMS IN THIS SPECIFICATION DEALING WITH THE INSTALLATION OF THE GENERATOR AND FUEL FILTERING SYSTEM WILL BE PROFORMED AS PART OF THE BASE PROJECT.**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

**1.2 SUMMARY**

- A. This Section includes packaged engine-generator sets for **standby** power supply with the following features:
  - 1. **Diesel** engine.
  - 2. Unit-mounted cooling system.
  - 3. Load bank testing is required for initial commissioning of generator.
  - 4. Skid-mounted fuel tank with fuel conditioner.
  - 5. Fuel Filtering System
  - 6. Outdoor enclosure.
- B. Related Sections include the following:
  - 1. Section on "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine-generator sets.

**1.3 DEFINITIONS**

- A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

**1.4 SUBMITTALS**

- A. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:
1. Thermal damage curve for generator.
  2. Time-current characteristic curves for generator protective device.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
  2. Vibration Isolation Base Details: Provide mounting detail from manufacturer outlining fabrication, including anchorages and attachments to structure and to supported equipment. Include base weights.
  3. Wiring Diagrams: Power, signal, and control wiring.
- C. Manufacturer Seismic Qualification Certification: Submit certification that **skid-tank** engine-generator set, batteries, battery racks, accessories, components and fuel filtering system will withstand seismic forces defined in Section on "Electrical Supports and Seismic Restraints." Include the following:
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
    - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
    - b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Source quality-control test reports.
1. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
  2. Report of sound generation.
  3. Report of exhaust emissions showing compliance with applicable regulations.
- E. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals. In addition to items specified in Section on "Operation and Maintenance Data," include the following:

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1. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.

F. Warranty: Special warranty specified in this Section.

**1.5 QUALITY ASSURANCE**

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1. Maintenance Proximity: Not more than two hours normal travel time from Installer's place of business to Project site.
2. Engineering Responsibility: Preparation of data for vibration isolators and seismic restraints of engine skid mounts, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with ASME B15.1.

D. Comply with NFPA 37.

E. Comply with NFPA 70.

F. Comply with NFPA 110 requirements for Level 2 emergency power supply system.

G. Comply with UL 2200.

H. Engine Exhaust Emissions: Comply with applicable state and local government requirements.

I. Noise Emission: Comply with all applicable state and local government requirements and shall have a **maximum dBA level of 75 at 23 feet**. Noise levels are due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

J. Must be ISO 9001 Certified.

**1.6 PROJECT CONDITIONS**

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify engineer and Owner no fewer than 14 days in advance of proposed interruption of electrical service.

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2. Do not proceed with interruption of electrical service without Owner's written permission.

B. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: Minus 15 to plus 100 deg F.
2. Relative Humidity: 0 to 95 percent.
3. Altitude: Sea level to 1000 feet

#### 1.7 COORDINATION

A. Coordinate size and location of concrete bases for package engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3. See detail on sheet E002 for concrete pad details.

#### 1.8 WARRANTY

The manufacturer's authorized standard warranty shall in no event be for a period of less than Five (5) years from date of initial start-up of the system (or 2500 hours) whichever comes first. This warranty shall be comprehensive including repair, parts, labor, travel expense necessary for repairs at the job site, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of repair. No deductibles shall be allowed. Warranty work on the entire engine and generator shall be performed only by the supplying distributor. Running hours shall be limited to 500 hours annually for the system warranty by both the manufacturer and servicing distributor. Submittals received without written warranties as specified **will be rejected in their entirety.**

##### A. Manufacturer Requirements

The work includes supplying a complete integrated generator system. The system consists of a diesel generator set with related component accessories. The equipment supplied and installed shall meet the requirements of the NEC and all applicable local codes and regulations. All equipment shall be of new and current production by a MANUFACTURER who has 25 years of experience building this type of equipment. Manufacturer shall be ISO9001 certified. There shall be one source responsibility for warranty; parts and service through the local generator distributor with factory trained service personnel. Manufacturer must also serialize the engine.

##### B. Generator Set and Fuel Filtering Distributor

The completed engine generator set shall be supplied by the Manufacturer's authorized distributor only. Generator Set Distributor shall be a single service provider. Single service provider means that the generator set distributor's service personnel can perform warranty work on both the engine, alternator and fuel filtering system, a third party is not allowed for warranty work on the engine and alternator.

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**C. Service Facility**

The engine-generator and fuel filtering system distributor shall maintain a 24-hour parts and service facility within 50 miles of the project site. The distributor shall stock parts as needed to support the generator set and fuel filtering system package for this specific project. The distributor must carry sufficient parts inventory to cover no less than 80% parts service within 24hrs and 95% within 48 hours. Customer service agreements shall be available to end user.

**D. Service Personnel**

The distributor shall maintain qualified factory trained service personnel that are dispatched from service facility within 100 miles of the project site. Service shall not be provided by a third party contractor(s) that are not employees of the servicing distributor. The distributor shall have a call service to dispatch technicians 24 hours per day, 365 days a year.

**1.9 MAINTENANCE SERVICE**

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

**1.10 EXTRA MATERIALS**

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Fuses: One for every 10 of each type and rating, but no fewer than one of each.
  2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
  3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.
  4. Belts and related items: One set of each size used on the system

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Caterpillar; Engine Div.
  2. Kohler / Rehlko Co.; Generator Division.
  3. Onan/Cummins Power Generation; Industrial Business Group.
  4. Taylor Power Systems

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5. Others as allowed by USM.

B. Generator and SER-ATS must be provided by the same manufacturer and/or distributor.

**2.2 ENGINE-GENERATOR SET**

A. Factory-assembled and -tested, engine-generator set.

B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.

1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.

C. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated on riser.

2. Output Connections: Three-phase, **four** wire.

3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

D. Generator-Set Performance:

1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.

2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.

3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.

4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.

5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.

6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.

7. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.

8. Start Time: Comply with NFPA 110, Type 10, system requirements.

E. Generator-Set Performance for Sensitive Loads:



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1. Oversizing generator compared with the rated power output of the engine is permissible to meet specified performance.
  - a. Nameplate Data for Oversized Generator: Show ratings required by the Contract Documents rather than ratings that would normally be applied to generator size installed.
2. Steady-State Voltage Operational Bandwidth: 1 percent of rated output voltage from no load to full load.
3. Transient Voltage Performance: Not more than 10 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 0.5 second.
4. Steady-State Frequency Operational Bandwidth: Plus or minus 0.25 percent of rated frequency from no load to full load.
5. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
6. Transient Frequency Performance: Less than 2-Hz variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within three seconds.
7. Output Waveform: At no load, harmonic content measured line to neutral shall not exceed 2 percent total with no slot ripple. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
8. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to winding insulation or other generator system components.
9. Excitation System: Performance shall be unaffected by voltage distortion caused by nonlinear load.
  - a. Provide permanent magnet excitation for power source to voltage regulator.
10. Start Time: Comply with NFPA 110, Type 10, system requirements. **MUST BE ONLINE AND PROVIDING POWER IN 10 SECONDS, NO EXCEPTIONS.**

2.3 ENGINE

- A. Fuel: **Fuel oil, Grade DF-2.**
- B. Rated Engine Speed: 1800 rpm.
- C. Lubrication System: The following items are mounted on engine or skid:
  1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
  2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.

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3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
- D. Engine Fuel System:
1. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.
  2. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.
- E. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity.
- F. Governor: Adjustable isochronous, with speed sensing.
- G. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.
1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
  2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
  3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
  4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
  5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.
    - a. Rating: 50-psig (345-kPa) maximum working pressure with coolant at 180 deg F (82 deg C), and noncollapsible under vacuum.
    - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
- H. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
1. Sound level measured at a distance of 23 feet from exhaust discharge after installation is complete shall be **75 dBA** or less.
- I. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- J. Starting System: 12-V electric, with negative ground.
1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.

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2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
3. Cranking Cycle: [As required by NFPA 110 for system level specified.
4. Battery: Adequate capacity within ambient temperature range specified in Part 1 "Project Conditions" Article to provide specified cranking cycle at least [three times] without recharging.
5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10 deg C regardless of external ambient temperature within range specified in Part 1 "Project Conditions" Article. Include accessories required to support and fasten batteries in place.
7. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
8. Alternator shall have an anti-condensation heater.
9. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:
  - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
  - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
  - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
  - d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
  - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
  - f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

**2.4 FUEL OIL STORAGE**

- A. Comply with NFPA 30.
- B. Base Mounted Fuel Oil Tank: Comply with UL 142, freestanding, factory-fabricated fuel tank assembly, with integral, float-controlled transfer pump and the following features:
  1. Containment: Integral rupture basin with a capacity of 150 percent of nominal capacity of tank.
    - a. Leak Detector: Locate in rupture basin and connect to provide audible and visual alarm in the event of tank leak.

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2. Tank Capacity: **48 HOURS at 100% load**
  3. Pump Capacity: Exceeds maximum flow of fuel drawn by engine-mounted fuel supply pump at 110 percent of rated capacity, including fuel returned from engine.
  4. Low-Level Alarm Sensor: Liquid-level device operates alarm contacts at 25 percent of normal fuel level.
  5. High-Level Alarm Sensor: Liquid-level device operates alarm and redundant fuel shutoff contacts at midpoint between overflow level and 100 percent of normal fuel level.
  6. Piping Connections: Factory-installed fuel supply and return lines from tank to engine; local fuel fill, vent line, overflow line; and tank drain line with shutoff valve.
  7. Redundant High-Level Fuel Shutoff: Actuated by high-level alarm sensor in tank to operate a separate motor device that disconnects tank pump motor. Sensor shall signal solenoid valve, located in fuel suction line of storage tank to close. Both actions shall remain in shutoff state until manually reset. Shutoff action shall initiate an alarm signal to control panel but shall not shut down engine-generator set.
- C. Base-Mounted Fuel Oil Tank: Factory installed and piped, complying with UL 142 fuel oil tank. Features include the following:
1. Tank level indicator.
  2. Capacity: Fuel for 48 hours' continuous operation at 100 percent rated power output.
  3. Vandal-resistant lockable fill cap.
  4. Containment Provisions: Comply with requirements of authorities having jurisdiction.

**2.5 CONTROL AND MONITORING**

- A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.
- B. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.
- C. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration.
- D. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common wall-mounted control and monitoring panel.
- E. Configuration: Operating and safety indications, protective devices, basic system controls, engine gages, instrument transformers, generator disconnect switch or circuit breaker, and other indicated components shall be grouped in a combination control and power panel. Control and

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monitoring section of panel shall be isolated from power sections by steel barriers. Panel features shall include the following:

1. Wall-Mounting Cabinet Construction: Rigid, self-supporting steel unit complying with NEMA ICS 6. Power bus shall be copper. Bus, bus supports, control wiring, and temperature rise shall comply with UL 891.
  2. Switchboard Construction: Freestanding unit complying with Division 26 Section "Switchboards."
  3. Switchgear Construction: Freestanding unit complying with Division 26 Section "Switchgear."
  4. Current and Potential Transformers: Instrument accuracy class.
- F. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level [2] system, and the following:
1. AC voltmeter.
  2. AC ammeter.
  3. AC frequency meter.
  4. DC voltmeter (alternator battery charging).
  5. Engine-coolant temperature gage.
  6. Engine lubricating-oil pressure gage.
  7. Running-time meter.
  8. Ammeter-voltmeter, phase-selector switch(es).
  9. Generator-voltage adjusting rheostat.
  10. Fuel tank derangement alarm.
  11. Fuel tank high-level shutdown of fuel supply alarm.
  12. Generator overload.
- G. Indicating and Protective Devices and Controls:
1. AC voltmeter.
  2. AC ammeter.
  3. AC frequency meter.
  4. DC voltmeter (alternator battery charging).
  5. Engine-coolant temperature gage.
  6. Engine lubricating-oil pressure gage.
  7. Running-time meter.
  8. Ammeter-voltmeter, phase-selector switch(es).
  9. Generator-voltage adjusting rheostat.
  10. Start-stop switch.
  11. Overspeed shutdown device.
  12. Coolant high-temperature shutdown device.
  13. Coolant low-level shutdown device.
  14. Oil low-pressure shutdown device.
  15. Fuel tank derangement alarm.
  16. Fuel tank high-level shutdown of fuel supply alarm.
  17. Generator overload.

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- H. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.
- I. Connection to Data Link: A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication is reserved for connections for data-link transmission of indications to remote data terminals. Data system connections to terminals are covered in Division 26 Section "Electrical Power Monitoring and Control."
- J. Common Remote Audible Alarm: Signal the occurrence of any events listed below without differentiating between event types. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset.
  - 1. Engine high-temperature shutdown.
  - 2. Lube-oil, low-pressure shutdown.
  - 3. Overspeed shutdown.
  - 4. Remote emergency-stop shutdown.
  - 5. Engine high-temperature prealarm.
  - 6. Lube-oil, low-pressure prealarm.
  - 7. Fuel tank, low-fuel level.
  - 8. Low coolant level.
- K. Remote Alarm Annunciator: An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated. Locate as directed by engineer and provide conduit(s) for conductors as required by generator manufacturer.
- L. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation. Located as directed by engineer. Provide conduit(s) as required by generator manufacturer.

**2.6 GENERATOR OVERCURRENT AND FAULT PROTECTION**

- A. Generator Circuit Breaker: Insulated-case, electronic-trip type; 100 percent rated; complying with UL 489.
  - 1. Tripping Characteristics: Adjustable long-time, long-time delay, short-time, short-time delay and instantaneous.
  - 2. Trip Settings: Selected to coordinate with generator thermal damage curve.
  - 3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
  - 4. Mounting: Adjacent to or integrated with control and monitoring panel.
- B. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground-fault. Integrate ground-fault alarm indication with other generator-set alarm indications.

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**2.7 GENERATOR, EXCITER, AND VOLTAGE REGULATOR**

- A. Comply with NEMA MG 1.
- B. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.
- C. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- D. Enclosure: Dripproof.
- E. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.
  - 1. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.
- F. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

**2.8 OUTDOOR GENERATOR-SET ENCLOSURE**

- A. Description: Vandal-resistant, weatherproof steel housing, wind resistant up to **150 mph.** Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.
- B. Description: Prefabricated or pre-engineered walk-in enclosure with the following features:
  - 1. Construction: ALUMINUM enclosure, integral structural-aluminum-framed building erected on concrete foundation.
  - 2. Structural Design and Anchorage: Comply with ASCE 7 for wind loads.
  - 3. Louvers: Equipped with bird screen and filter arranged to permit air circulation when engine is not running while excluding exterior dust, birds, and rodents.
  - 4. Hinged Doors: With padlocking provisions.
  - 5. Ventilation: Louvers equipped with bird screen and filter arranged to permit air circulation while excluding exterior dust, birds, and rodents.
  - 6. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine-generator-set components.
  - 7. Muffler Location: Within the enclosure.
  - 8. Radiator exhaust shall be discharged horizontally.
- C. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.

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1. Louvers: Fixed-engine, cooling-air inlet and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.
- D. Interior LED Lights with Switch: Factory-wired, vaporproof-type fixtures within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.
  1. AC lighting system and connection point for operation when remote source is available.
- E. Convenience Outlets: Factory wired, GFCI receptacle. Arrange for external electrical connection.

**2.9 VIBRATION ISOLATION DEVICES**

- A. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
  1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
  2. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.
  3. Minimum Additional Travel: 50 percent of required deflection at rated load.
  4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
  5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

**2.10 FINISHES**

- A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish is acceptable.

**2.11 SOURCE QUALITY CONTROL**

- A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
  1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.
- B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
  1. Full load run.
  2. Maximum power.
  3. Voltage regulation.
  4. Transient and steady-state governing.
  5. Single-step load pickup.



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6. Safety shutdown.
7. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
8. Report factory test results within 10 days of completion of test.

**2.12 PLATFORM FOR GENERATOR**

- A. The platform shall be cantilever supported off of the engine generator sub-base with formed aluminum frame, structural members, toe plates, railing posts, rails and floor assemblies.
- B. Platform shall be used to walk on each side (outside of all generator set service doors). A "stand-ard stair" shall be used to access the platform on both sides. Design of platform shall permit in-spection of all serviceable components.
- C. Platform height shall be no greater than 1.5" above the bottom of the generator base frame.
- D. The platform frame shall be of 0.125" aluminum formed construction in the design of the ladder assembly, walkway, horizontal and vertical support members, diagonal members, toe-plates and other miscellaneous aluminum components. Frame design shall be pre-drilled to accept vertical handrail mounting supports. Structural frame members shall serve as the walkway toe-board sup-ports. Vertical railing supports shall be secured to the toe-plates and horizontal structural mem-bers using 5/16" bolts on 6" centers. All pieces shall be cut and formed using computer assisted design software. Adjustments for horizontal and vertical alignment of the "platform and posts" shall be performed as required for field condition. All bolts shall be 5/16" minimum.
- E. The walkway tread shall utilize 0.125" aluminum tread plate, formed 1-inch-thick minimum, to provide sufficient cross section to resist vertically applied loads. Walkway shall have 1" raised holes, 3" on centers to provide anti skid walking pattern.
- F. Platform shall provide for 180 degree "full swing opening" of all side service doors.
- G. Handrails shall be a nominal 42" from the walkway surface. All hand rails are to be 0.125" formed aluminum, with a 2-inch angle. Hand rails shall be secured to the top of the rail posts us-ing 5/16" bolts and nuts.
- H. The walkways, stairs or ladder, and platform) shall meet standards of OSHA 3124 - (Stairways and Ladders), this specification and applicable drawings.
- I. Provide shop drawings for approval by engineer prior to ordering.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.

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- B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION**

- A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.
- B. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- C. Install packaged engine generator with **restrained spring isolators** having a minimum deflection of **1 inch (25 mm)** on 4-inch- (100-mm-) high concrete base. Secure sets to anchor bolts installed in concrete bases. Concrete base construction is specified in Division 26 Section "Electrical Supports and Seismic Restraints."
- D. Install Schedule 40, black steel piping with welded joints and connect to engine muffler. Install thimble at wall. Piping shall be same diameter as muffler outlet. Flexible connectors and steel piping materials and installation requirements are specified in Mechanical Division Section "Hydronic Piping."
  - 1. Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, and Schedule 40, black steel pipe with welded joints. Flexible connectors and piping materials and installation requirements are specified in Division 15 Section "Hydronic Piping."
  - 2. The contractor shall provide exhaust flapper cap at end of exhaust piping. Seal around wall or opening where exhaust piping exits with high temperature sealant as directed by generator manufacturer.
- E. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

**3.3 CONNECTIONS**

- A. Piping installation requirements are specified in Mechanical Division(s) Sections. Drawings indicate general arrangement of piping and specialties.
- B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.
- C. Connect engine exhaust pipe to engine with flexible connector.
- D. The contractor shall insulate exhaust all exposed exhaust piping with high temperature insulation for interior generators.

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- E. Connect fuel piping to engines with a gate valve and union and flexible connector.
  - 1. Diesel storage tanks, tank accessories, piping, valves, and specialties for fuel systems outside the building are specified in Division 2 Section "Fuel Oil Distribution."
  - 2. Diesel fuel piping, valves, and specialties inside the building are specified in Division 15 Section "Fuel Oil Piping."
- F. Ground equipment according to Division 26 Section "Grounding and Bonding."
- G. Connect wiring according to Division 26 Section "Conductors and Cables."

**3.4 IDENTIFICATION**

- A. Identify system components according to Division 15 Section "Mechanical Identification" and Division 26 Section "Electrical Identification."

**3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
  - 1. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection for "AC Generators, Fuel Filtering and for Emergency Systems" specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 2. **Provide four-hour LOAD BANK test. Report all temperatures, loads and other applicable rating every 15 minutes. Step load at 25% steps intervals up to 100%, then run at 100% for two hours. The contractor shall pay for all fuel during testing.**
  - 3. The contractor shall leave generator with a FULL TANK of fuel when he turns it over to owner. Fuel for re-testing shall be provided by the contractor.
  - 4. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.
  - 5. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
    - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
    - b. Verify acceptance of charge for each element of the battery after discharge.

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- c. Verify that measurements are within manufacturer's specifications.
- 6. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
- 7. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
- 8. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
- D. Coordinate tests with tests for transfer switches and run them concurrently.
- E. Remove and replace malfunctioning units and retest as specified above.
- F. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
- G. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

**3.6 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators. Refer to Division 1 Section "Demonstration and Training."

**4.0 FUEL FILTERING SYSTEM**

- A. Manufacturers: Subject to compliance with requirements, provide product by the following:
  - 1. AXI International - Enclosed Automated Fuel Filtration System AXI International Model: STS 7010
- B. Description: Stand alone, factory complete, automated programmable, fuel filtration and maintenance system shall be provided for the diesel fuel skid storage tank to optimize and maintain the condition of fuel stored in the tank. The system shall be capable of eliminating microbial contamination and removing water, sediment, and particulate to comply with ASTM D975 (Standard Specification for Diesel Fuel Oils).
  - 1. Enclosure: All system components shall be contained within a powder coated, weatherproof, outdoor UL 50 listed enclosure with appropriate ventilation. Hinged front door shall be equipped with quarter turn key lockable handle. Containment basin with leak detection sensor shall be installed. Literature pocket and brackets for wall or rack mounting to be included.
  - 2. Plumbing: System shall be furnished with stainless steel shutoff ball valves on the inlet and outlet for easy filter/water separator maintenance. A flow indicator shall be installed to

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observe fuel flow and flow rate. Above mentioned components shall be located within the enclosure. Internal plumbing primarily stainless steel.

3. Installation: System shall provide male pipe connections protruding the enclosure for customer plumbing connection. System shall be located as close as possible to designated fuel tank. The fuel oil supply and return lines to the system shall be independent and separate from other fuel lines, with the supply line originating at the bottom of the tank in the deepest spot and the return line as far away as possible from the supply line within the tank. All interconnections shall be made and the system shall be fully operational. The responsibility of complete installation and warranty shall be that of the generator manufacturer.
4. Filtration/Water Separation: 4 stage filtration/water separation process:
  - A. Stage 1: Centrifugal water and particulate separation
  - B. Stage 2: Water collection (99.9% water removal) and 30-micron hydrophobic particulate filter element - with water detection sensor and "push and turn" safety drain valve
  - C. Stage 3: LG-X Fuel Conditioner – to break down sediments and solids naturally forming in diesel fuel to submicron levels
  - D. Stage 4: Dual parallel, inline, secondary 3-micron particulate and/or water adsorbing spin-on filters
5. Water Sensor: Watect Model 550 microcontroller-based water sensor alarm module.
6. Controls/Display Functions: System control features, indicator lights, and emergency stop button shall be located on a descriptive external control panel on the front door of the enclosure for easy operator access. Additional alarm and system status information shall be displayed inside the system on a full color, programmable touch-screen PLC controller. Alarm and system status may also be displayed on a dedicated webpage that monitors the system, as well as delivered through E-mail and SMS messages to designated individuals (optional modem required). System shall provide following control and display function:
  - A. Programmable Digital Timer – Memory backup to retain program memory during power outages
  - B. Pump operating hour counter
  - C. Pump control switch (Auto/Off/Manual) - Weatherproof, key operated, external front panel access
  - D. Alarm Reset - Weatherproof pushbutton, external front panel access
  - E. Power available - Green LED indicator light, external front panel display
  - F. Pump running - Amber LED indicator light, external front panel display
  - G. High vacuum, high pressure, no flow, high water and leak detection alarms - red LED indicator lights, external front panel display
  - H. Emergency Stop mushroom - top pushbutton - red, latching with turn to reset, external front panel access
  - I. Full Modbus TCP/IP and LAN capability

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7. Electrical Enclosure/Controller: All electrical control features shall be contained within a separate UL 508A listed industrial control panel located within the mechanical enclosure. The controller shall monitor the following system alarm points:
  - A. Leak in enclosure (system shutdown)
  - B. Primary filter high vacuum (system shutdown)
  - C. Primary filter high water level (system shutdown)
  - D. Secondary filter high pressure (system shutdown)
  - E. Flow switch inadequate flow (system shutdown after priming delay)
  - F. Motor overload (system shutdown)
  - G. External system shut down input
8. Pump: Positive displacement, spur gear, direct coupled, rotary pump. Pump flow rate of 10 gallons per minute.
9. Motor: UL Listed, TEFC, Thermal overload protection, continuous duty
- C. Performance/Design Criteria: Manufacturer must have a minimum of 10 years experience within industry. System shall be capable to turn complete tank volume over once a week with a required run time of no more than 48 hours for the total volume. Sufficient contaminant and water holding capacity should be ensured, which will vary with climate, tank layout, fuel delivery, refueling intervals, etc.
- D. Operation: System shall provide dry contacts for summary alarm and leak detection to interface with building monitoring or alarm system. An external shut down feature shall be provided to disable or control pump operation from a remote point.

END OF SECTION 263213

**SECTION 263600 - TRANSFER SWITCHES**

**THE PURCHASE AND DELIVERY TO THE SITE OF THE SER AUTOMATIC TRANSFER SWITCH IS THE SCOPE OF THIS BID. THE INSTALLATION OF THE SER AUTOMATIC TRANSFER SWITCH IS PART OF THE BASE PROJECT. ALL ITEMS IN THIS SPECIFICATION DEALING WITH THE INSTALLATION OF THE SER AUTOMATIC TRANSFER SWITCH WILL BE PROFORMED AS PART OF THE BASE PROJECT (AS PREVIOUSLY BID).**

**NOTE: THE PURCHASE OF THE SER AUTOMATIC TRANSFER SWITCH IS BEING REMOVED FROM THE BASE PROJECT AND IS BEING PURCHASED BY USM AND TURNED OVER TO THE CONTRACTOR TO INSTALLATION.**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes transfer switches rated 600 V and less, including the following:
  - 1. Automatic transfer switches (SER - Service Entrance Rated) NEMA1 rated (Grade 316 stainless Steel) – Eaton model ATC3C5C41200XRU (65kAIC).

**1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
  - 1. Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.
- C. Manufacturer Seismic Qualification Certification: Submit certification that transfer switches accessories, and components will withstand seismic forces defined in Division 26 Section "Electrical Supports and Seismic Restraints." Include the following:

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1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
    - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
    - b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:
1. Features and operating sequences, both automatic and manual.
  2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

**1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.
- B. Source Limitations: Obtain **SER - automatic transfer switch** through one source from a single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NEMA ICS 1.
- E. Comply with NFPA 70.
- F. Comply with NFPA 110.
- G. Comply with UL 1008 unless requirements of these Specifications are stricter.

**1.5 PROJECT CONDITIONS**

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:



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1. Notify Owner and engineer no fewer than 14 days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner and engineer's written permission.

**1.6 COORDINATION**

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Contactor Transfer Switches:
    - a. Caterpillar; Engine Div.
    - b. Eaton
    - c. Emerson; ASCO Power Technologies, LP.
    - d. Kohler Power Systems; Generator Division.
    - e. Onan/Cummins Power Generation; Industrial Business Group.
  2. Generator and SER-ATS must be provided by the same manufacturer and/or distributor.
  3. Transfer Switches Using Molded-Case Switches or Circuit Breakers are NOT allowed. All transfer switches shall be contactor style only.

**2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS**

- A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
- B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
  1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
- C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

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- D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- E. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.
- F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
  - 1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
  - 2. Switch Action: Double throw; mechanically held in both directions.
  - 3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.
- G. Neutral Switching. Provide neutral pole switched simultaneously with phase poles.
- H. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Division 26 Section "Electrical Identification."
  - 1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
  - 2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
  - 3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
- I. Enclosures: General-purpose NEMA 250, Type **1**, complying with NEMA ICS 6 and UL 508, unless otherwise indicate.
- J. **Provide anti-condensation heaters on the ATS enclosure.**
- K. **The enclosure coating shall meet all the requirements of ANSI C57.12.28 including:**
  - **Salt Spray Test**
  - **Humidity Test**

**2.3 AUTOMATIC TRANSFER SWITCHES**

- A. The transfer switch shall be **service entrance rated (SER) four pole NEMA1**.
- B. Comply with Level 1 equipment according to NFPA 110.
- C. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.

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- D. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.
- E. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.
- F. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.
- G. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.
- H. Transfer Switches Based on Molded-Case-Switch Components: Comply with NEMA AB 1, UL 489, and UL 869A.
- A. Automatic Open-Transition Transfer Switches: Include the following functions and characteristics:
  - 1. Fully automatic break-before-make operation.
  - 2. Failure of power source serving load initiates automatic break-before-make transfer.
- B. Automatic Transfer-Switch Features:
  - 1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
  - 2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
  - 3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
  - 4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
  - 5. Test Switch: Simulate normal-source failure.
  - 6. Switch-Position Pilot Lights: Indicate source to which load is connected.
  - 7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
    - a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
    - b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
  - 8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.

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9. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
10. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
11. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
  - a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
  - b. Push-button programming control with digital display of settings.
  - c. Integral battery operation of time switch when normal control power is not available.

## 2.4 SOURCE QUALITY CONTROL

- A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Design each fastener and support to carry load indicated by seismic requirements and according to seismic-restraint details. See Division 26 Section "Electrical Supports and Seismic Restraints."
- B. Floor-Mounting Switch: Anchor to floor by bolting.
  1. Concrete Bases: 4 inches (100 mm) high, reinforced, with chamfered edges. Extend base no more than 4 inches (100 mm) in all directions beyond the maximum dimensions of switch, unless otherwise indicated or unless required for seismic support. Construct concrete bases according to Division 26 Section "Electrical Supports and Seismic Restraints."
- C. Annunciator and Control Panel Mounting: Flush in wall, unless otherwise indicated.
- D. Identify components according to Division 26 Section "Electrical Identification."
- E. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

### **3.2 CONNECTIONS**

- A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Ground equipment according to Division 26 Section "Grounding and Bonding."
- C. Connect wiring according to Division 26 Section "Conductors and Cables."

### **3.3 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installation, including connections, and to assist in testing.
  - 2. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
  - 3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
    - a. Check for electrical continuity of circuits and for short circuits.
    - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
    - c. Verify that manual transfer warnings are properly placed.
    - d. Perform manual transfer operation.
  - 5. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
    - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
    - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
    - c. Verify time-delay settings.
    - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
    - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.

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- f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.
  - g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
- 6. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
  - a. Verify grounding connections and locations and ratings of sensors.
- C. Coordinate tests with tests of generator and run them concurrently.
- D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- E. Remove and replace malfunctioning units and retest as specified above.

**3.4 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below. Refer to Division 1 Section "Demonstration and Training."
- B. Coordinate this training with that for generator equipment.

END OF SECTION 263600