

DJG, INC.
449 McLAWS CIRCLE
WILLIAMSBURG, VA



COUNTY OF ALBEMARLE
PANTOPS PUBLIC SAFETY FACILITY
IFB # 2017-11223-20

DJG Job No: 2160310

NOVEMBER 8, 2016

ADDENDUM #2

This addendum herein supplements, modifies, changes, deletes from or adds to the original contract documents, dated October 28, 2016, for the Pantops Public Safety Facility, and is herein made part of the Contract Documents.

This addendum includes 27 pages.

PART 1 RESPONSES TO QUESTIONS RECEIVED

1. Question: Sheet FA-101 seems to indicate a new fire alarm system. The specification does not say if there are any restrictions as far as the make of the fire alarm control panel. Are there any make and model requirements?

Response: Fire alarm system shall be new and shall meet the performance requirements of the specification.

2. Question: Specification section 283111, page 03, paragraph 2.1A indicates an existing system and that all new components must be compatible with the existing panel. Is there an existing panel? If so what make is it (ie. Notifier siemons, etc.)? Sheet FA-101 seems to indicate all new equipment for this building. Please clarify.

Response: Delete paragraph 2.1A of specification section 283111. Fire alarm shall be new.

PART 2

CHANGES TO THE PROJECT MANUAL

1. Instructions to bidders, Page 04, Paragraph 6 (b): Modification to the sentence which reads "*Written modifications **may** be made on the bid form itself or on the envelope in which the bid is enclosed*", shall be deleted and replaced with the sentence "*Written modifications **must** be made on the bid form itself*". DELETE the words "*or on the envelope in which the bid is enclosed.*"
2. Specification Section 263600, Transfer Switches, shall be added to the project manual.
3. Specification Section 263213, Engine Generators , shall be added to the project manual.
4. Supplemental General Conditions; Paragraph 1 (b), second sentence which reads: "*Likewise, if the work is not finally completed within **365** consecutive calendar days from the date of substantial completion, the contractor shall owe to the owner, not as a penalty but as liquidated damages, the sum of **two hundred dollars** (\$250.00) per day for each and every calendar day of delay in final completion of the work*", shall be deleted and replaced with the sentence: "*Likewise, if the work is not finally completed within **30** consecutive calendar days from the date of substantial completion, the contractor shall owe to the owner, not as a penalty but as liquidated damages, the sum of **two hundred fifty dollars** (\$250.00) per day for each and every calendar day of delay in final completion of the work*".

Attachments:

1. Agenda/Meeting Minutes for Pre-Bid Conference (4 pages)
2. Record of Attendees: Pre-Bid Conference (2 pages)
3. Record of Attendees: Pre-Bid Conference - handwritten (2 pages)
4. Specification Section 263213, Engine Generators (12 pages)
5. Specification Section 263600, Transfer Switches (5 pages)

END OF ADDENDUM #2



Agenda for Pre-Bid Conference

PROJECT: **Pantops Public Safety Facility IFB # 2017-11223-20**

OWNER: County of Albemarle

LOCATION: Charlottesville, Virginia

DATE/TIME: Thursday, November 3, 2016 at 10:00 AM

PURPOSE: Non-mandatory pre-bid conference for the above referenced project

INTRODUCTIONS:

Owner's Representative: Blake Abplanalp
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Project Management Division
County of Albemarle
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Lisa Glass
Senior Project Manager
Project Management Division
County of Albemarle
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Architect/Engineer: Donald F. Booth, Jr., AIA
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Darren R. Curtis, PLA, LEED AP
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RECORD OF ATTENDEES: All attendees present should sign the Pre-Bid Conference "Record of Attendees" sign-in sheet before the end of the conference.

THE FOLLOWING ITEMS WERE COVERED:

INVITATION TO BID:

- Sealed Bids will be accepted until 3:00 pm on Tuesday, November 22, 2016 at the address listed in the IFB at which time they will be opened and read aloud. Hand delivery of bids to Room 248 is strongly encouraged (County mail delivery can be slow).

INSTRUCTIONS TO BIDDERS:

- **Conditions at the site:** Bidders are encouraged to visit the site today following this meeting. If prospective bidders wish to re-visit the site after today, they should contact Lisa Glass (contact information listed above) to arrange a follow-up visit.
- **Preparation and Submission of Bids:**
 - The following information should be included along with a bid:
 - Business name, address, phone and fax number, contractor license number, name of project, IFB number, and bid due date/time. Please note that this information shall NOT be provided on the outside of the bid envelope.
 - An addendum is forthcoming containing changes to the 'Instructions to Bidders' included in the Project Manual.
 - Bidders must submit a copy of their valid Virginia Contractor License to qualify as a bidder.
 - Bids shall be valid for a period of (60) days subsequent to the opening of bids.
- **Bid Guarantee** of 5% is REQUIRED. Successful bidder will be required to submit Performance Bond & Standard Labor and Material Payment Bond.
- **Receipt of Bids:** The County of Albemarle Purchasing Office must have bids in hand by specified date and time or they will be marked LATE and shall NOT be considered.

- **Building Permits:** The building permit shall be obtained by the successful Contractor and paid for by the Owner. All other permits, local license fees, taxes, or similar assessments shall be obtained and paid for by the Contractor.
- **Time for Completion:** Work shall commence after receipt of a Notice to Proceed and be substantially completed within 365 consecutive calendar days. The Contractor shall be required to pay liquidated damages in the amount of \$500.00 per calendar day for each and every day of delay beyond the Substantial Completion Date. Additionally, the Contractor shall be required to pay liquidated damages in the amount of \$250.00 per calendar day for each and every day of delay beyond the Final Completion Date.
- **Temporary Construction Facilities:**
 - Water – Contractor’s responsibility.
 - Electricity – Contractor’s responsibility.
 - Sanitary – Contractor’s responsibility.

PRE-BID QUESTION FORM:

- All questions must be submitted in writing by 5:00 pm on November 15, 2016. NO EXCEPTIONS. Forms can be emailed or faxed to DJG or the County of Albemarle. For additional information refer to the Pre-Bid Question Form bound into the Project Manual directly following the ‘Instructions to Bidders.’ The sender bears the sole responsibility of verifying receipt of all fax transmissions.
- All answers to submitted Pre-Bid questions shall be issued as an addendum to the Bid Documents. The resulting addendum will be made available no later than 5:00 pm on November 17, 2016. Bidders can check for issued addenda online at the County’s website www.albemarle.org. It is the bidders’ responsibility to verify if any addenda have been issued prior to submitting bids.

BID FORM:

- A single contract shall be awarded on a Total Base Bid Amount.
- Additive Bid Items: (refer to the bid form bound into the Project Manual)
 - Additive Bid Item 1: asphalt paving and associated markings
 - Additive Bid Item 2: RCP emergency spillway
 - Additive Bid Item 3: copper domestic water distribution piping
 - Additive Bid Item 4: solid surface window sills and aprons

- Additive Bid Item 5: ceramic tile finish floor and base at men's and women's locker rooms
 - Additive Bid Item 6: standing seam metal roofing and associated snow retention system
 - Additive Bid Item 7: industrial, free-standing metal shelving in the maintenance building
- Bid Form shall be filled out completely, signed, and dated.
 - Bidders must acknowledge receipt of all addendum on the bid form including the date received and the addendum number.

GENERAL REVIEW OF DRAWINGS:

- DJG provided a brief summary of the scope of work.
 - Review project site limitations and access
 - Hours of operation

QUESTION AND ANSWER PERIOD:

- Responses to questions that may impact the scope of work and/or bid price shall be made in an Addendum to the Bid Documents. Responses that only involve identifying information already included in the documents shall be made verbally during this meeting.
- An addendum will be issued that will include these meeting minutes, a copy of the 'Record of Attendees' sign-in sheet, and a revised 'Instructions to Bidders.'
- Owner to note changes to the County's General Conditions (Section 38 has revised mark-ups)
- Other Contractors to be hired by the Owner include:
 - Door security/access control (EC&M)
 - Call alerting (Westnet)
 - Data cabling (Piedmont Telesystems)
 - Third party special inspections (ECS Mid-Atlantic)
 - The successful low-bidder shall be required to coordinate construction activities and special inspections with the Owner's entities.
- Clarifications
 - No questions were asked that would impact the scope of work or bid price.

County of Albemarle

Pantops Public Safety Facility
IFB # 2017-11223-20

Thursday, November 3, 2016 @ 10:00 am

'Record of Attendees'

Name		Phone	Email Address
Chris Puffenbarger	Mathers Const	540.241.9391	cpuff@mathers-team.com
Darren Curtis	DJG Inc.	757.253.0673	dcurtis@djginc.com
Donald Booth	DJG Inc.	757.253.0673	dbooth@djginc.com
Burton Marshall	Daniel & Co.	804.213.0400	estimating@danielco.net
Chelsea Reynolds	Commonwealth Interiors	434.981.8889	
Greg Edwards	Commonwealth Interiors	434.960.3491	greg@commonwealthinteriors.com
Doug Hyden	Moores Elec & Mech.	434.293.8669	dhyden@mooreselectric.com
Billy Maddox	Lantz Construction Co.	540.896.8911	bmaddox@lantzcc.com
Jeff Deavers	Lantz Construction Co.	540.896.8911	bmaddox@lantzcc.com
Robert Pierce	Kenbridge Construction Co.	434.676.8221	estimating@kenbridge.com
John Mangialetti	Woodland Construction	804.360.0545	jelko@woodlandconst.com
Robert Zureck	Sentry Electric	434.973.4633	Bob.zureck@sentryelectricco.com

Bruce Senn	Nielsen Builders	540.434.7376	bsenn@nielsen-inc.com
Scott Gresham	ECS	434.973.3232	sgresham@ecslimited.com
Jared Andrews	Harrisonburg Construction	434.296.0122	jared@harrisonburgconstruction.com
Arthur Rodgers	Martin Horn Inc.	434.293.6171	estimating@martinhorn.com
Dan Mead	Edifice Solutions	202.517.0652	d.mead@edificesolutions.com
Audrey Storm	Artisan	434.979.6399	astorm@artisaninc.com
Drake Maudeville	Artisan	434.979.6399	dmandeville@artisaninc.com



County of Albemarle

Pantops Public Safety Facility
IFB # 2017-11223-20



Thursday, November 3, 2016 @ 10:00 am

'Record of Attendees'

Name	Firm	Phone	Email Address
CHRIS PUFFENBARGER	MATHERS CONST.	540.241.9391	cpuff@mathers-team.com
DARREN CURTIS	DJG INC	757-253-0673	DCURTIS@DJGINC.COM
DONALD BOOTH	DJG INC	757-253-0673	DBOOTH@DJGINC.COM
Burton Marshall	Daniel & Co.	(804)213-0400	estimating@danielco.net
Chelsea Reynolds	Commonwealth Interiors	434-981-8889	
Greg Edwards	Commonwealth Interiors	434-966-3491	greg@commonwealthinteriors.com
DOUG HYDEN	MOORES ELEC+MECH	434-293-8469	dhyden@mooreselectric.com
Billy Maddox	Lantz Construction Co.	540-896-7911	bmaddox@lantzcc.com
Jeff Deararis	Lantz Construction	540-896-8911	jdeararis@lantzcc.com
Robert PIERCE	Kenbridge Const Co	434 676 8821	estimating@Kenbridge.com
John Manginlett	WOODLAND Construction	804 360 0545	jsetko@woodlandconst.com
Robert Zwick	Sentry Electric	434-573 4633	bob.zwick@sentryelectricco.com

Bruce Senn	Nielsen Builders	540-434-7376	bsemm@nielsen-inc.com
Scott Gresham	ECS	434-973-3232	sgresham@ecslimited.com
Jared Andrews	Harrisonburg Construction	434-296-0122	jared@harrisonburgconstruction.com
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Audrey Storm	ARTISAN	434-979-6399	astorm@artisaninc.com
Drake Maldeville	"	"	dmandeville@artisaninc.com

SECTION 263213 - ENGINE GENERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes packaged engine-generator sets for standby power supply with the following features:
 - 1. Gas engine.
 - 2. Unit-mounted cooling system.
 - 3. Unit-mounted control and monitoring.
 - 4. Performance requirements for sensitive loads.
 - 5. Fuel system.
 - 6. Outdoor enclosure.

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.
- B. LP: Liquid petroleum.
- C. EPS: Emergency power supply.
- D. EPSS: Emergency power supply system.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 - 2. Include fuel consumption in cubic feet per hour at 0.8 power factor at 0.5, 0.75 and 1.0 times generator capacity.
 - 3. Include generator efficiency at 0.8 power factor at 0.5, 0.75 and 1.0 times generator capacity.
 - 4. Include generator characteristics, including, but not limited to kw rating, efficiency, reactances, and short-circuit current capability.

B. Shop Drawings:

1. Include plans and elevations for engine-generator set and other components specified. Indicate access requirements affected by height of subbase fuel tank.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for EPS equipment and functional relationship between all electrical components.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved by manufacturer.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance:
 1. Comply with NFPA 37.
 2. Comply with NFPA 70.

- B. UL Compliance: Comply with UL 2200.
- C. Provide commercial grade generator set.
- D. Engine Exhaust Emissions: Comply with local, state and federal EPA emissions requirements without the Owner having to add any emissions control devices in the field.
- E. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.
- F. 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 40 deg C.
 - 2. Relative Humidity: Zero to 95 percent.
 - 3. Altitude: Sea level to 1000 feet.

2.3 ASSEMBLY DESCRIPTION

- A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
- C. Induction Method: Naturally aspirated.
- D. Governor: Adjustable isochronous, with speed sensing.
- E. Emissions: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.
- F. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.
 - 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.
- G. Capacities and Characteristics:
 - 1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries.
 - 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.

H. 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.

2.4 ENGINE

- A. Fuel: Natural gas.
- B. Rated Engine Speed: Per manufacturer.
- C. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm.
- D. 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.
 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.
- E. 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 maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.
 - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
- F. 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. Minimum sound attenuation of 25 dB at 500 Hz.
 2. Sound level measured at a distance of 25 feet from exhaust discharge after installation is complete shall be 78 dBA or less.
- G. Air-Intake Filter: Standard-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- H. Starting System: 12-V electric, with negative ground.
1. Components: Sized so they are not damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Performance Requirements" Article.
 2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
 3. Cranking Cycle: 60 seconds.
 4. Battery: Lead acid, with capacity within ambient temperature range specified in "Performance Requirements" 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 "Performance Requirements" Article. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.
 7. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
 8. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35 A minimum continuous rating.
 9. Battery Charger: Current-limiting, automatic-equalizing and float-charging type designed for lead-acid batteries. Unit shall comply with UL 1236 and include the following features:
 - a. Operation: Equalizing-charging rate of 2 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 F to 140 deg F 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. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.5 GASEOUS FUEL SYSTEM

- A. Natural-Gas Piping: Comply with requirements in Section 231123 "Facility Natural-Gas Piping."
- B. Engine Fuel System:
 - 1. Natural-Gas, Vapor-Withdrawal System:
 - a. Carburetor.
 - b. Fuel-Shutoff Solenoid Valves: NRTL-listed, normally closed, safety shutoff valves; one for each fuel source.
 - c. Fuel Filters: One for each fuel type.
 - d. Manual Fuel Shutoff Valves: One for each fuel type.
 - e. Flexible Fuel Connectors: Minimum one for each fuel connection.

2.6 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 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.
- B. Provide minimum run time control set for 15 minutes with override only by operation of a remote emergency-stop switch.
- 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. Panel shall be powered from the engine-generator set battery.
- D. 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.

2.7 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with UL 489.
 - 1. Tripping Characteristic: Designed specifically for generator protection.
 - 2. Trip Rating: Matched to generator output rating.
 - 3. Mounting: Adjacent to or integrated with control and monitoring panel.

2.8 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H or Class F.
- D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required. Provide six or 12 lead alternator.
- E. Range: Provide limited range of output voltage by adjusting the excitation level.
- F. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 100 percent of rated capacity.
- G. Enclosure: Dripproof.
- H. Voltage Regulator: Solid-state type, separate from exciter.
- I. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
- J. Subtransient Reactance: 12 percent, maximum.

2.9 OUTDOOR GENERATOR-SET ENCLOSURE

- A. Description: Vandal-resistant, weatherproof steel housing, wind resistant up to 100 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. 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.
 - 1. Louvers: Fixed-engine, cooling-air inlet and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.
 - 2. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.

3. Ventilation: Provide temperature-controlled exhaust fan interlocked to prevent operation when engine is running.

2.10 VIBRATION ISOLATION DEVICES

- A. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
 1. Material: Standard neoprene separated by steel shims per manufacturer.
 2. Minimum Deflection: 1 inch.
- B. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

2.11 FINISHES

- A. Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.12 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.
- 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. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
 2. Test generator, exciter, and voltage regulator as a unit.
 3. Full load run.
 4. Maximum power.
 5. Voltage regulation.
 6. Transient and steady-state governing.
 7. Single-step load pickup.
 8. Safety shutdown.
 9. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
 10. Report factory test results within 10 days of completion of test.

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.
- B. Examine roughing-in for 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.
- B. Equipment Mounting:
 - 1. Install packaged engine generators on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
 - 2. Coordinate size and location of concrete bases for packaged engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
- C. Install packaged engine-generator to provide access, without removing connections or accessories, for periodic maintenance.
- D. Install packaged engine-generator with elastomeric isolator pads having a minimum deflection of 1 inch on 4-inch-high concrete base. Secure enclosure to anchor bolts installed in concrete bases.
- E. 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.
 - 1. Install isolating thimbles where exhaust piping penetrates combustible surfaces with a minimum of 9 inches clearance from combustibles.
- F. 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.
- G. 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 other 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 cooling-system water piping to engine-generator set and heat exchanger with flexible connectors.
- D. Connect engine exhaust pipe to engine with flexible connector.
- E. Connect fuel piping to engines with a gate valve and union and flexible connector.
 - 1. Natural-gas piping, valves, and specialties for gas distribution are specified in Section 231123 "Facility Natural-Gas Piping."
 - 2. Install manual shutoff valve in a remote location to isolate natural-gas supply to the generator enclosure.
 - 3. Vent gas pressure regulators outside building a minimum of 60 inches from building openings.
- F. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- G. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Provide a minimum of one 90 degree bend in flexible conduit routed to the generator set from a stationary element.
- H. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

3.4 IDENTIFICATION

- A. Identify system components according to Section 230553 "Identification for HVAC Piping and Equipment" and Section 260553 "Identification for Electrical Systems."
- B. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

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.
- B. Tests and Inspections:

1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in the first two subparagraphs as specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - a. Visual and Mechanical Inspection
 - 1) Compare equipment nameplate data with drawings and specifications.
 - 2) Inspect physical and mechanical condition.
 - 3) Inspect anchorage, alignment, and grounding.
 - 4) Verify the unit is clean.
 - b. Electrical and Mechanical Tests
 - 1) Perform insulation-resistance tests in accordance with IEEE 43.
 - a) be one minute. Calculate the dielectric-absorption ratio.
 - 2) Test protective relay devices.
 - 3) Verify phase rotation, phasing, and synchronized operation as required by the application.
 - 4) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
 - 5) Verify correct functioning of the governor and regulator.
2. 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. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
 - c. Verify acceptance of charge for each element of the battery after discharge.
 - d. Verify that measurements are within manufacturer's specifications.
3. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
4. 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.
5. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg. Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
6. Exhaust Emissions Test: Comply with applicable government test criteria.
7. 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.
8. Harmonic-Content Tests: Measure harmonic content of output voltage at 25 percent and 100 percent of rated linear load. Verify that harmonic content is within specified limits.
9. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four

locations 25 feet from edge of the generator enclosure, and compare measured levels with required values.

- C. Coordinate tests with tests for transfer switches and run them concurrently.
- D. Test instruments shall have been calibrated within the last 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.
- E. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.
- F. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.
- G. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- H. Remove and replace malfunctioning units and retest as specified above.
- I. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
- J. 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.

END OF SECTION 263213

SECTION 263600 - TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes transfer switches rated 600 V and less, including the following:
 - 1. Automatic transfer switches. (UL Rated)

1.3 ACTION 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.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "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.

1.6 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 automatic transfer switches through one source from a single manufacturer.

- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with NEMA ICS 1.
- E. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 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.
- 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.
 - 4. UL Rated.
- G. Neutral Terminal: Solid and fully rated, unless otherwise indicated.
- 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 Section 260553 "Identification for Electrical Systems."

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 indicated.

2.2 AUTOMATIC TRANSFER SWITCHES

- A. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.
- B. 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.
- C. 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.
 9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.

10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
11. 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.
12. 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.

2.3 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. Identify components according to Section 260553 "Identification for Electrical Systems."
- B. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.2 CONNECTIONS

- A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Testing Agency's Tests and Inspections:

1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 3. 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.
 4. 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. 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.
 - f. 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.
- 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.
- F. Prepare test and inspection reports.
- 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 Section 017900 "Demonstration and Training."
 - B. Coordinate this training with that for generator equipment.

END OF SECTION 263600