

ITEM 599.36 10 M - TRAILER-MOUNTED STANDBY ENGINE-GENERATOR SET

DESCRIPTION

This work shall consist of furnishing a complete trailer-mounted, standby engine-generator set ready for operation, including a diesel-fueled engine-generator, batteries and battery charger, a main circuit breaker, cables with plugs and receptacles, a weather-proof engine-generator enclosure, a fuel tank and a transporting trailer in accordance with the contract documents and as directed by the Engineer. The generator is to be used by the contractor only for the purpose of operating the bridge during power outages. At the conclusion of the contract, the generator shall be turned over to the State.

MATERIALS

A. Engine-generator Set. The engine-generator set shall meet the requirements of NEMA MG-1, Motors and Generators, and shall have the following ratings and features:

- Voltage: Selectable, 120/208 volts, 60 Hz, 3 phase, 4 wire
120/240 volts, 60 Hz, 3 phase, 4 wire
277/480 volts, 60 Hz, 3 phase, 4 wire
- Power Capacity: 200 kW, 250 kVA Standby
- Rated Speed: 1800 rpm
- Speed Regulation
(no load to full load): plus or minus 0.5%
- Voltage Regulation
(no load to full load): plus or minus 0.5%
- Random voltage Variation: plus or minus 0.5%
- Frequency Regulation: Isochronous
- Random Frequency Variation: plus or minus 0.25%

The engine shall be heavy-duty, rugged 4-cycle industrial diesel, fast response to load change and low exhaust emissions, certified to U.S. Environmental Protection Agency Nonroad Source Emission Standards, 40 CFR 89, Tier 3, and shall have stability under 100% step load change. The exhaust system shall be furnished with industrial grade silencer. The engine shall be liquid cooled. .

The main generator (alternator) shall be brushless, 4 pole, drip-proof revolving field, capable of withstanding high motor-starting currents, and shall have class H insulation, low waveform distortion with non-linear loads, fault clearing short-circuit capability. The control system shall provide total system integration, including frequency and voltage regulation with access-code-protected adjustments limited to a maximum of plus or minus 5%, alarm and status message display, current protection, output metering, and auto-shutdown at fault detection.

The entire unit shall be mounted on robust base supports, and shall be enclosed in a factory-installed, weather-protective and sound-attenuated enclosure. The enclosure shall be constructed from minimum 2 mm thick panels and posts, designed to withstand a wind speed of 193 km/hour. The inside and outside surfaces of the enclosure shall be painted with a rust-inhibiting primer and an enamel coating over the primer. The muffler and sound insulating panels shall be internal to the enclosure. All louvers shall be fixed and all metal hardware shall be corrosion resistant. The roof shall be cambered to prevent water accumulation. All fuel and electrical stub-up areas shall be within the enclosure perimeter. Rain collars and rain caps shall be provided. Hinged or removable and lockable doors shall be provided on the enclosure for easy access to the engine-generator for inspection and maintenance. Doors shall be designed and gasketed for weather protection. The enclosure shall be designed to have a single-point lifting eye and shall conform to the installation requirements of the National Electrical Code. All oil and coolant drains shall be exterior with interior valves for ease of service.

ITEM 599.36 10 M - TRAILER-MOUNTED STANDBY ENGINE-GENERATOR SET

The fuel tank shall be U.L. listed, internal to the generator enclosure and constructed from minimum 2.5 mm thick aluminized steel with continuously welded seams. The tank shall have a minimum fuel capacity of 860 liters and shall have supports compatible for trailer mounted generator sets. The fuel tank shall be equipped with all necessary fuel filters and rigid and flexible fuel lines for the operation of the engine-generator set, and with a U.L. listed stainless steel overspill box. The fuel tank shall be air-pressure tested at 20,684 pascals using a leak detection solution. Means for tank grounding shall be provided. The fuel tank shall be labeled by product, capacity and manufacturer.

The generator main, molded-case circuit breaker shall be furnished and rated 600 amps frame, 3 pole, 600 volts AC, and shall be U.L. 489 listed for 100% continuous operation and U.L. 869A for use as service equipment. Electronic current sensing devices shall also be furnished for the overcurrent protection when the generator is switched for 480 volt, 3 phase operation.

A fully automatic, four-stage battery charger, conforming to vibration resistant requirements of U.L. 991, shall be furnished and readily wired for battery charging. The battery charging alternator shall produce at least 65 amps. Batteries shall be included for engine starting at 12 volts or 24 volts DC with negative ground, suitable for the starter installed on the engine generator. The charger shall produce 15 amp charging current at 12 volts DC or 12 amps at 24 volts DC, with field-configurable for charging either 12 or 24 volt batteries. The charger shall be enclosed in an aluminum enclosure, which will be enclosed in the generator enclosure. Feeders and plug shall be furnished for 120 volt AC input voltage to the charger. A 20 amp DC output circuit breaker, monitoring LED user displays of charger operating conditions such as normal charging operation, equalizing condition, and fault condition, a voltage surge protector, and an annunciator of fault conditions shall be furnished.

The output of the generator shall be wired to two parallel receptacles to supply a full load current of 600-amp at a 208-volt or 240-volt, 3-phase. Each receptacle shall be rated 400 amps, 600 volts AC, and shall be 4-wire and 4-pole. Mating plugs shall be furnished on each end of the portable cables of the generator. Each receptacle and plug shall be U.L. listed, and shall have a copper-free aluminum housing with fiberglass-reinforced polyester insulation. All pressure, solder and binding screw contacts shall be brass. Each receptacle and plug shall be furnished with cap for protection of internal parts.

Two (2) sets of portable power cables shall be furnished. Each cable shall be at least 25 meters long, and stored on reel. Each cable shall consist of four (4) 350 mcm conductors and a AWG #2/0 ground wire. Each conductor shall be of annealed copper per ASTM B-3 and extra-flexible, rope lay stranding per ASTM B-172, with Ethylene Propylene Diene Monomer (EPDM) insulation. The overall jacket of the cable shall be of chlorinated polyethylene (CPE) with open reinforcement. The cable shall be rated 2000 volts, resistant to oil, solvents, aging and abrasion and suitable for use in wet location. Each end of each cable shall be furnished with a plug rated 400 amps, 600 volts AC, 4 wire, 4 pole, suitable for the mating receptacle installed on the generator set. Four additional mating receptacles, with ratings as described herein for the plug furnished on each end of the cable, shall be furnished with the trailer-mounted generator for connections by the Contractor to other equipment as shown on contract drawings.

Each cable storage reel shall be heavy duty, and of rugged steel construction. All steel parts shall be primed and painted with a polyester resin coating. Each cable storage reel shall be installed on a mobile trailer equipped with rubber tires and designed to support the entire weight of the reel and cable. Each reel shall be provided with a suitable hand crank and gear box mechanism to allow winding the cable on and off the reel.

ITEM 599.36 10 M - TRAILER-MOUNTED STANDBY ENGINE-GENERATOR SET

B. Trailer. The entire engine-generator set with enclosure, fuel tank and accessories shall be mounted, as a minimum, on a dual-wheel axle trailer with dual-axle, full frame support chassis. The trailer shall be designed to support the weight of the entire engine-generator and all accessories with the fuel tank filled. The following features and equipment shall be furnished:

- Interchangeable ball hitch or pintle ring lifting eye with safety chains and break-away kits. The hitch shall have height adjustable.
- Electric brake system
- Mud shields (fenders) over wheels
- Leveling jack designed to support the unit
- Running lights with wiring harness and connectors
- Spare tire and lug nut wrench
- Fire extinguisher.

CONSTRUCTION DETAILS

A. General. The complete assembled trailer-mounted engine-generator set shall be furnished by a single supplier who has regularly engaged in the sales, service and installation of engine-generators.

The Contractor shall submit the following documents to the Engineer:

1. Manufacturer's warranties on equipment, materials or products purchased for the project.
2. Operation and Maintenance Manual. The manual shall include, but not be limited to, the following:
 - a. General information and safety precautions
 - b. Operational and functional descriptions of the generator set the control module and associated accessories.
 - c. Maintenance procedures, instructions and schedules of subsystems and systems
 - d. Internal and interconnecting wiring and control diagrams with data and detailed explanations of the system and equipment operation
 - e. Elementary circuit diagrams and pictorial illustrations of the equipment and the overall system
 - f. Testing methods, and performance data
 - g. Lubrication schedule, including type, grade, temperature range, and frequency for all items requiring lubrication
 - h. Part list indicating sources of supply, recommended spare parts, name, address, and telephone numbers of servicing organization.
3. Shop drawings. The Contractor shall provide the manufacturer's shop drawings, catalog cuts, dimensional sheets, product specifications and other descriptive data. Items shall not be ordered or purchased until the shop drawings are approved.

B. Training. The Contractor shall furnish the services of competent and experienced instructors from the engine-generator manufacturer or supplier to give full and in-depth training instruction to Department personnel in the adjustment, operation, and maintenance of the engine-generator set. The training instruction shall be scheduled at a time suitable to personnel of the Department and given at the contract site.

ITEM 599.36 10 M - TRAILER-MOUNTED STANDBY ENGINE-GENERATOR SET

Generator Set. Any adjustments necessary for a reliable and trouble free system shall be made by the supplier's service technician. Installation shall be in compliance with NFPA Standard 37, Combustion Engines, and any other local or state codes that may apply.

The main circuit breaker shall be adjusted and set to the suggested levels of circuit protection as indicated herein. The contractor shall perform all tests and inspection recommended by the equipment manufacturer, unless specifically waived by the engineer.

Spare parts shall be furnished as recommended by the manufacturer, and shall include, as a minimum, one complete replacement of all consumables such as air, oil and fuel filters.

METHOD OF MEASUREMENT

This work will be measured for payment on a lump sum basis.

BASIS OF PAYMENT

The lump sum price bid shall include the costs of all material, labor and equipment to complete the work, including on-site testing and training. The price bid shall also include all spare parts, documentation, tests, and personnel training as described herein.