# Sunshine Coast Regional District
# Lee Bay Waste Water Plant
# 4336 Orca Road
# Garden Bay, BC

# Generator and Transfer Switch Replacement
# Tender Scope

# ENGINE GENERATORS

**PART 1 – GENERAL**

**1. SUMMARY**

A. Work Included:

1. Packaged Engine Generator System
2. Engine
3. Fuel System
4. Lubrication
5. Inlet Air System
6. Exhaust System
7. Cooling System
8. Heaters
9. Engine Speed Governing System
10. Batteries and Charger System
11. Automatic Starting System
12. Generator
13. Generator Control Panel
14. Weather-Resistant Sound Attenuating Enclosure
15. Generator Docking Station

B. System Description:

1. Engine generator set, in conjunction with the necessary control and accessories, will comprise complete operating package for **30 KW single phase** ratings and **200 amp 120/240v** service for installation at local elevation and local ambient temperature.
2. Provide diesel fuel source, unless otherwise noted, including storage, pumps, sensors, piping, venting and other associated equipment.
3. CSA or ULC approved (or equivalent)

**2.1 MANUFACTURERS**

A. Packaged Engine Generator:

1. Caterpillar
2. Cummins
3. Kohler
4. Bluestar
5. Or approved equivalent

## 2.2 PACKAGED ENGINE GENERATOR SYSTEM

A. Generator set to meet requirements for Level 2, type per NFPA 110. System to be capable of providing power within 2 minutes following loss or failure of normal power supply and accept full load at each level of priority in a single step.

1. Unit mounting:
2. Unit to be mounted on structural steel base and be provided with vibration isolators and seismic restraints as required. Restraints/isolators to be in accordance with seismic design category and importance factor as indicated on structural documents, and to be adjusted per manufacturer's recommendations at start-up. Unit must be connected to the battery maintainer.
3. Isolators (Spring Type): install isolators between generator set base and mounting surface. Provide isolators bolted to base with waffled or ribbed pad on their bottom surface.
4. Isolators (Pad type): resistant to heat and age, impervious to oil, water, antifreeze and cleaning compounds.
5. Exterior, weather proof, sound attenuating enclosure – 67 DBA @ 7m

B. Shop Drawings

1. Engine: make and model, with performance curves
2. Alternator: make and model
3. Voltage regulator: make, model and type
4. Battery: make, type and capacity
5. Battery charger: make, type and capacity
6. Alternator control panel: make and type of meters and controls
7. Governor: type and model
8. Dimensioned drawing showing complete generating set mounted on steel base, including exhaust system and total weight
9. Continuous full load output set at 0.80 power factor lagging
10. Description of set operation including:
    - Automatic starting and transfer to load and back to normal power including time in seconds from start of cranking until unit reaches rated voltage and frequency
    - Manual starting
    - Automatic shut down on: over cranking, overspeed, high engine temperature, low lube oil pressure and alternator overvoltage

- Alarms and indicator lights

11. Automatic transfer switch

NOTE: Shop drawings shall included detailed requirements for seismic restraint anchoring to the concrete mounting pad based on National Building Code of Canada seismic classification Zone 4.

C. Operation and Maintenance Data

1. Supplier shall furnish 3 sets of operating maintenance and parts manuals for equipment furnished

2. Operation and maintenance instructions for engine, alternator, control panel, automatic transfer switch, manual bypass switch, battery charger, battery, fuel system, exhaust system and accessories, to permit effective operation, maintenance and repair

3. Technical data:

- Illustrated parts lists with parts catalogue numbers
- Schematic diagram of electrical controls
- Flow diagrams for:
  - Fuel system
  - Lubricating oil
  - Cooling system
- Certified copy of factory test results

D. Quality Control

1. Factory test generator set including engine, alternator, control panels and accessories. Factory test shall include running generator set for four hours at 100% rated load.

a) Manual and automatic starting of set
b) Single-step load pickup
c) Transient and steady-state governing
d) Safety shutdown device testing and alarm testing
e) Voltage regulation
f) Rated power & maximum power

E. Warranty

Provide a written warranty, stating that the generating set and automatic transfer switch are guaranteed against defects in material and workmanship for a period of 2 years (24 months) or 1500 operating hours (for genset), whichever occurs first, from the date the unit is placed into service.

## 2.3 ENGINE

A. Type: water-cooled, four stroke cycle, compression ignition diesel internal combustion engine producing 1.5 HP per KW.

B. Emissions: comply with current tier for exhaust emissions and possess best available current technology to provide absolute minimum smoke, fumes and exhaust emissions discharge.

C. Engine Speed: 1800 rpm.

D. Safety Devices: engine shutdown on high engine temperature, low oil pressure, overspeed, and engine overcrank. Limits are selected by manufacturer.

E. Engine Starting: DC starting system with positive engagement, number and voltage of starter motors in accordance with manufacturer's instructions. Include starting control circuit, with MANUAL-OFF-REMOTE selector switch on engine-generator control panel.

F. Engine Jacket Heater: thermal circulation type water heater with integral thermostatic control, sized to maintain engine jacket water at 90 degrees F with shut off valves on both sides for servicing purposes.

G. Engine Accessories: fuel filter, lube oil filter, intake air filter, lube oil cooler, fuel transfer pump, fuel priming pump, gear-driven water pump. Include water temperature gauge and lube oil pressure gauge on engine/generator control panel.

## 2.4 FUEL SYSTEM

A. Fuel Oil: no.2 diesel conforming to all provincial and local regulations.

B. Fuel System Accessories: fuel filter, fuel/water separator, fuel cooler (as required), fuel transfer pump, fuel priming pump, injection pumps, lines, and nozzles.

C. Provide dual fuel filters, independently valved.

D. Unit fuel injector to be mounted in each cylinder head. Injection timing and duration electronically controlled by an engine-mounted Electronic Engine Control Module to maximize combustion efficiency and minimize exhaust smoke levels.

E. Engine: mounted integral manual fuel-priming pump to facilitate priming and bleeding air from system.

F. Filter/Separator: in addition to standard fuel filters provided by engine manufacture, install primary fuel filter/water separator in fuel inlet line to engine.

G. Piping: unit mounted fuel piping to be black iron or flexible fuel hose rated for this service. No galvanized piping will be permitted. Flexible Fuel Lines: Minimally rated for 300 degrees F and 100 PSI.

H. Fuel cooler: as required, to be mounted on radiator and cool fuel before return to storage tank.

I. Storage:

1. Sub-base Tank: provide unit with vented secondary containment tank of equal construction mounted to floor.

2. Fuel Tank: heavy gauge suitable for diesel storage. Minimum capacity of storage system to provide **48 hours** operation under full load.

3. Tank shall be double walled, located below the mounting base of the generator, with leakage detection sensor installed in the interwall cavity and wired back to the generator control panel as an alarm condition.

# TRANSFER SWITCH

**PART 1 – GENERAL**

**1.1 SUMMARY**

A. Work Included: materials, installation and testing of:

1. Open Transition Transfer Switch
2. Bypass Isolation Switches
3. Microprocessor Controller
4. Accessories
5. Automatic Sequence of Operation

**1.2 SPECIFICATIONS**

1. The automatic transfer switch (ATS) shall be 120/240VAC, 200 amp, 2 pole, solid neutral and shall be capable of carrying rated ampacity on a continuous basis. The transfer switch shall be of suitable use on all types of loads without derating.
2. The ATS shall be CSA-approved (or equivalent)
3. The ATS shall be housed in an EEMAC1 enclosure
4. The ATS shall automatically transfer the load to the standby power source when the line voltage falls below 70% of normal. Load transfer shall be open-transitions ("break before make"), with neutral-position delay to ensure adequate voltage decay to prevent out-of-phase transfers or retransfers.
5. The ATS shall be equipped with an internally-accessible operating handle for manual operation
6. The ATS shall be electrically operated and mechanically held in both normal and emergency positions so that it shall not be possible for load circuits to be connected to normal and emergency sources simultaneously, regardless of whether switch is electrically or manually operated
7. The ATS shall be equipped with power switching units that do not incorporate overcurrent protection. Upstream overcurrent protection will be provided external to the ATS.
8. The ATS shall be suitable for wall-mounting
9. The ATS shall be equipped with a controller that incorporates the following:
    a) Display of utility/generator voltages, system frequency and timer countdown operation
    b) "Load on Utility" and "Load on Generator" indication
    c) Utility and generator source available indication

d) Voltage sensing on utility and generator sources
e) Under/over-frequency sensing on generator source
f) Engine start delay timer (adjustable 0-60 seconds)
g) Engine cooldown delay timer (adjustable 0-30 minutes)
h) Engine warmup timer (adjustable 0-30 minutes)
i) Neutral position delay timer (adjustable 0-60 minutes)
j) Utility return delay timer (adjustable 0-30 minutes)
k) Engine start contact (Form C dry contact, 7A resistive, 120/240 VAC)
l) Automatic exercise timer
m) Eight user-programmable output contacts (Form C dry contacts, 2A resistive 120/240VAC). Each contact individually programmable for different functions
n) Utility power failure simulation test

**1.3 COORDINATION**

A. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.

B. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.

C. Coordinate the work with placement of supports, anchors, etc. required for mounting.

D. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

**1.4 DELIVERY, STORAGE AND HANDLING**

A. Receive, inspect, handle and store transfer switches in accordance with manufacturer's instructions.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water construction debris and traffic.

C. Handle carefully in accordance with manufacturer's instructions to avoid damage to transfer switch components, enclosure and finish.

**2.1 MANUFACTURERS**

A. Approved manufacturers listed below are allowed on condition of meeting the specified conditions including available space allocated for the equipment (including code required working clearances) and functionality of system. Remove and replace electrical equipment installed and not meeting these conditions at no cost to owner.

1. ASCO Power Technologies
2. Caterpillar
3. Cummins
4. Eaton Corporation
5. Thompson Technologies
6. Or approved equivalent