

TENDER 955-2023

BACK-UP GENERATOR INSPECTION, TEST AND MAINTENANCE

APPENDIX A

Inspection, Test and Maintenance Tables:

Reference: CSA C282 Emergency Electrical Power Supply for Buildings

- Table 1: Weekly Inspection, Test and Maintenance Requirements
- Table 2: Monthly Inspection, Test and Maintenance Requirements
- Table 3: Semi-Annual Inspection, Test and Maintenance Requirements
- Table 4: Annual Inspection, Test and Maintenance Requirements
- Table 5: Quinquennial Inspection, Test and Maintenance Requirements
- Table 6: City of Winnipeg – Equipment List

Table 1
Weekly Inspection, Test and Maintenance Requirements

1. Consumables:

- (a) Inspect day tank fuel level (gas pressure) and main tank level (gas pressure) (if applicable). There shall be a minimum supply of 2 hours
- (b) Inspect lubricating oil level
- (c) Inspect engine coolant level
- (d) Inspect engine, generator, fuel tank(s), and cooling systems for leakage
- (e) Inspect for proper operation of fuel transfer pump (if applicable)
- (f) Inspect fuel filter for contamination if filter is equipped with a transparent bowl

2. Starter system:

- (a) Inspect electric starter for cleanliness, mounting, and terminal security.
- (b) Air starter:
 - (i) Inspect air tanks for pressure
 - (ii) Inspect valves for leakage
 - (iii) Test auxiliary engine and compressor for proper operation
 - (iv) Bleed off any condensation

3. Batteries and charging equipment:

- (a) Inspect all battery cells for correct electrolyte fill level
- (b) Test all battery cells for correct electrolyte specific gravity
- (c) Inspect electrical connections for tightness and evidence of corrosion
- (d) Inspect battery for cleanliness and dryness between terminals
- (e) Inspect charger electrical connections for cleanliness and tightness
- (f) Test charger for proper operation of float and equalize modes

4. Engine:

- (a) Test lubricant and/or coolant heaters for proper operation
- (b) Inspect governor control linkages and oil level (if applicable)
- (c) Inspect fuel pump oil sump (if applicable)
- (d) Inspect fan belts for correct tension and wear

<p>5. Control panel:</p> <ul style="list-style-type: none">(a) Inspect control panel covers for security(b) Test annunciator lamps to confirm that they are operational(c) Inspect control panel settings (ensure that the unit is ready for automatic start-up)(d) Test remote visual and audible trouble signals at the building fire alarm panel
<p>6. Inspect air control louvre settings to ensure proper operation</p>
<p>7. Test emergency lighting unit(s)</p>
<p>8. Verify whether room temperature is above 10 °C.</p>
<p>9. Inspect generator and transfer switch room(s) for cleanliness and accessibility to all components of the emergency system</p>
<p>10. Correct all defects found during inspections and tests NOTE: Before beginning any repairs, approval must be obtained from WFMA</p>
<p>11. Record all inspections, tests, and corrective actions in the log</p>

Table 2 Monthly Inspection, Test and Maintenance Requirements
1. Complete all items specified in Table 1
2. Test and <i>verify</i> the entire system as follows: <ul style="list-style-type: none"> (a) Simulate a failure of the normal electrical supply to the building (b) Operate the system under at least 30% of the rated load for 60 minutes (c) Operate all automatic transfer switches under load (d) Inspect brush operation for sparking (e) Inspect for bearing seal leakage (f) Inspect for correct operation of all auxiliary equipment, e.g., radiator shutter control, coolant pumps, fuel transfer pumps, oil coolers, and engine room ventilation system(s) (g) Record the readings for all instruments in the log and verify that they are normal (h) Drain the exhaust system condensate trap
3. Inspect block heater hoses and wires
4. Correct all defects found during inspection and tests NOTE: Before beginning any repairs, approval must be obtained from WFMA
5. Record all inspections, tests and corrective actions in the log

Table 3
Semi-Annual Inspection, Test and Maintenance Requirements

1. Complete all items specified in Tables 1 and 2
2. Inspect and clean engine crankcase breathers
3. Inspect and clean all engine linkages
4. Lubricate the engine governor and ventilation system
5. Test protective devices for proper operation
6. Before start-up, perform two full cranking cycles. Near the end of each cycle (and while still cranking), measure and record the lowest indicated battery voltage. If the measured voltage is less than 80% of the battery's rated voltage, replace the battery. Alternatively, perform a battery load test using a suitable load tester.
7. Inspect ventilation system belt(s)
8. Correct all defects found during inspections and tests NOTE: Before beginning any repairs, approval must be obtained from WFMA
9. Record all inspections, test and corrective actions in the log

Table 4
Annual Inspection, Test and Maintenance Requirements

1. Complete all items specified in Tables 1 to 3

2. Control panel:

- (a) Open all inspection covers and inspect all electrical connections
- (b) Test breakers for proper operation
- (c) Clean insulators and bushings
- (d) Test voltage regulator for proper operation
- (e) Operate all moving parts to ensure that they move freely
- (f) Clean and dress contacts as necessary
- (g) Remove all dust
- (h) Check gauge calibration
- (i) With the generator set operating at full load, conduct an infrared survey of all electrical connections to identify any high-resistance connections
- (j) For off-site fueled generators, turn position indicating gas valve to off-position to ensure valve rotates properly and that the audible alarm on generator control panel is activated

3. Engine:

- (a) Change engine lubrication oil and filters
- (b) Test strength of coolant and chemical protection level of coolant inhibitors
- (c) Change fuel filters, clean strainer(s), and verify that the fuel supply valve is open.
- (d) Inspect the exhaust system. Check and record the back pressure of the exhaust system to ensure that it complies with the engine manufacturer's requirements, and compare with previous readings
- (e) Clean and lubricate linkages
- (f) Inspect air filters
- (g) Inspect all mechanical connections
- (h) Inspect all electrical connections
- (i) For spark ignition engines, inspect all components of ignition system(s) and service or replace as appropriate
- (j) Inspect all external surfaces of heat exchanger(s) and clean as necessary
- (k) Inspect all belts and hoses and replace if necessary
- (l) Test and inspect ignition system(s). Replace any defective components
- (m) Inspect coolant pump(s) for leaks and external wear (if belt driven, remove the belt(s) first)

<p>4. Diesel fuel storage tanks(s): The fuel oil in any storage tank (and day tank, if used) shall be tested, and if the fuel oil fails the test, it shall be:</p> <ul style="list-style-type: none"> (a) drained and refilled with fresh fuel; or (b) full filtered to remove water, scale, bacteria, and oxidized gums/resins in order to minimize filter clogging and ensure diesel start-up <p>Note: When the fuel is filtered, it shall be treated with a suitable conditioner and stabilizer to minimize degradation while in storage</p> <p>Note: The bottom(s) of the tank(s) shall be also tested chemically for water</p>
<p>5. Generator:</p> <ul style="list-style-type: none"> (a) Test surge suppressor and rotating rectifier on brushless machines (b) Grease bearings (replace old grease with new) (if applicable) (c) Clean commutator and slip rings (if applicable) (d) Clean rotor and stator windings using clean compressed air (e) Inspect coupling bolts and alignment (f) Inspect conduits for tightness (g) Inspect windings at rotor and stator slots (h) Inspect all electrical connections (i) With the generator <i>set</i> operating at full load, conduct an infrared survey of all electrical connections to identify any high-resistance connections
<p>6. Transfer switches:</p> <ul style="list-style-type: none"> (a) Isolate transfer switch, open all inspection covers, and inspect all electrical connections (b) Operate all moving parts to ensure that they move freely (c) Clean and dress contacts as required (d) Remove all dust (e) Clean and lubricate linkages (f) Conduct an infrared survey of all electrical connections, contacts, and energized components while under load on both the normal and emergency side
<p>7. Lubricate door locks and hinges (if necessary), especially those of outdoor enclosures</p>
<p>8. Conduct a 2-hour full-load test</p>
<p>9. As needed, review and provide instruction on the technical requirements specified in Tables 2 to 4 with the person(s) responsible for carrying out the work</p>

10. Correct all defects found during inspections and tests

NOTE: Before beginning any repairs, approval must be obtained from WFMA

11. Record all inspections, tests, and corrective actions in the log

Table 5 Quinquennial (every five years) Inspection, Test and Maintenance Requirements	
1. Generator:	<p>Inspect insulation of generator windings. Use an insulation tester (megger). The resistance in megohms should be not less than</p> $\frac{\text{Rated voltage} + 1000}{1000}$ <p>If the resistance is less, dry out the insulation using the auxiliary heat process</p>
2. Engine:	<ul style="list-style-type: none"> (a) Drain and flush the cooling system. Refill the system with new coolant (b) Clean radiator tubes and cooling fins (c) Replace thermostats (d) Inspect valve clearances and adjust as appropriate
3.	Correct all defects found during inspections and tests
4.	Record all inspections, tests, and corrective actions in the log

Table 6
City of Winnipeg – Equipment List

Pacific

- Make - Cummins
- Model - DGBC-5936993
- S/N J070118872
- Hours -

McPhillips

- Make - Cummins
- Model - DGBC-7590267
- S/N B090231947
- Hours -

552 Plinguet

- Make - Cummins
- Model - DGGD-5661144
- S/N B040602138
- Hours -

Waverley

- Make - Cummins
- Model - DGBC-7582286
- S/N K080220471
- Hours -

Assiniboine

- Make - Cummins
- Model - DGBC-7282311
- S/N K080220472
- Hours -