

**THE NEW SURREY HOSPITAL
AND
BC CANCER CENTRE PROJECT**

Schedule 1 – Statement of Requirements

Appendix 1Z – Electrical Factory Acceptance Testing Requirements

Appendix 1Z - Minimum FAT Requirements

1 Emergency Power Generators

- 1.01 Insulation Resistance
- 1.02 High Potential Test
- 1.03 Alternator Overspeed
- 1.04 Engine Inspection
- 1.05 Generator Inspection
- 1.06 Exciter Field Stator Resistance
- 1.07 Alternator Armatures Resistance
- 1.08 Mounting and Coupling Inspection
- 1.09 Engine Fuel Oil System Inspection
- 1.10 Engine Lube Oil System Inspection
- 1.11 Engine Cooling System Inspection
- 1.12 DC Charging System Inspection
- 1.13 Circuit Breaker Inspection
- 1.14 Anticipatory Alarms and Shutdowns Inspection
- 1.15 Optional Equipment Inspection
- 1.16 Load Test Inspection
- 1.17 Full Nameplate-Rated Load
- 1.18 No-Load Inspection
- 1.19 MAX Load @ 1.0 P.F.
- 1.20 MAX Load @ 0.8 P.F.
- 1.21 Block Loads @ 0–25%, 0–50%, 0–75%, 0–100%
- 1.22 Phase Balance and Sequence Inspection
- 1.23 Extended-run at full nameplate-rated load
- 1.24 Cold and Hot Start and Stop test
- 1.25 Remote Start and Stop Test
- 1.26 Overspeed Protective Device Test
- 1.27 Insulation Resistance Test
- 1.28 Open Circuit Saturation Curve Test
- 1.29 Temperature Rise Test
- 1.30 Frequency Range Adjust Test
- 1.31 Low Oil Pressure Protective Device Test
- 1.32 Over-temperature Protective Device Test
- 1.33 Controls, Direction, and Rotation Test
- 1.34 Frequency and Voltage Regulation, Stability, and Transient Response
- 1.35 Voltage and Frequency Regulation
- 1.36 Voltage Dip and Rise for Rated Load Test
- 1.37 Regulator Range Test
- 1.38 Maximum Power Test
- 1.39 Fuel Consumption Test
- 1.40 Vibration and Mechanical Balance Test
- 1.41 Sound Test
- 1.42 All tests detailed in CSA C282 Section 10 (with load bank for Factory environment)

2 High Voltage Automatic Transfer Switches

- 2.01 Transfer Switch and Controller Inspection
- 2.02 Nameplate Inspection
- 2.03 Indicator Lights Inspection
- 2.04 Double-sided bypass and isolation interlock mechanism inspection
- 2.05 Continuous Monitoring of all three phases and source voltage
- 2.06 Dielectric Test
- 2.07 Basic Insulation Level test
- 2.08 Circuit breaker operation over a range of min to max control voltage
- 2.09 ATS Controller setpoints adjustment
- 2.10 Auto/Manual/Bypass Mode Test
- 2.11 Test communication signal between ATS and generator
- 2.12 Simulate loss of utility power and observe operation
- 2.13 Return of utility power and paralleling operation
- 2.14 Engine starting sequence
- 2.15 Time delay and re-transfer time measurement
- 2.16 Engine cool down and shutdown
- 2.17 Draw-out breaker racking and unracking
- 2.18 Test ethernet connection for data transmission of the ATS

3 Power Transformers

- 3.01 Transformer Inspection
- 3.02 Winding Inspection
- 3.03 Nameplate inspection
- 3.04 Primary and secondary bus terminal inspection
- 3.05 Primary and secondary taps inspection
- 3.06 Fans and fan controls inspection and test
- 3.07 Sound level measurement
- 3.08 Resistance Measurement
- 3.09 Turns Ratio Measurement
- 3.10 DC Resistance Measurement
- 3.11 Temperature Rise Test
- 3.12 Ratio and Phase-Relation Test
- 3.13 No-Load Losses
- 3.14 No-Load Excitation Current
- 3.15 Load Losses and Impedance Voltage
- 3.16 Partial Discharge Test
- 3.17 Switching Impulse Test
- 3.18 Lightning Impulse Test
- 3.19 Short Circuit Test
- 3.20 Dielectric Tests
- 3.21 Insulation Resistance Test
- 3.22 Insulation Power Factor Test
- 3.23 Review efficiency curves from no load to full load, kW and kVAR
- 3.24 Noise level
- 3.25 Oil breakdown voltage strength (if applicable)
- 3.26 Tank pressure test (if applicable)
- 3.27 24 hour leak test (if applicable)

APPENDIX 1Z - ELECTRICAL FACTORY ACCEPTANCE TESTING REQUIREMENTS

4 Uninterruptible Power Supplies

- 4.01 UPS inspection
- 4.02 Nameplate inspection
- 4.03 Verify phase rotation
- 4.04 Resistance test
- 4.05 Alarm circuit test
- 4.06 Module inspection
- 4.07 AC voltage measurement
- 4.08 Bypass interlock mechanism inspection
- 4.09 Internal static bypass switch test
- 4.10 External wrap-around bypass test
- 4.11 Load Test, 0-100% in 10% steps
- 4.12 Full load test at no less than 4 hours
- 4.13 Battery discharge test / runtime verification
- 4.14 Battery recharge duration test
- 4.15 Ambient environment condition test
- 4.16 Input voltage and frequency range test
- 4.17 Noise level test
- 4.18 Simulate loss and return of input power to bypass
- 4.19 Simulate loss and return of input power to each module
- 4.20 Simulate loss and return of input power to the system
- 4.21 Failure of one power module
- 4.22 Failure of two power module
- 4.23 Test ethernet connection for data transmission of the UPS
- 4.24 All failure state simulations such as over temp, battery failure, etc
- 4.25 AC UPS power supply without a neutral test

5 12.5kV & 25kV Switchgear

- 5.01 Switchgear inspection
- 5.02 Nameplate inspection
- 5.03 Hi Potential Test
- 5.04 Breaker operation test
- 5.05 Partial discharge test
- 5.06 Dielectric test
- 5.07 Circuit breaker operation over a range of min to max control voltage
- 5.08 Operational sequence test
- 5.09 No load breaking test
- 5.10 Full load breaking test
- 5.11 Interrupting time test
- 5.12 Interlocking mechanism inspection
- 5.13 Relay operation test
- 5.14 Short circuit and momentary withstand test
- 5.15 Lightning Impulse withstand Test
- 5.16 Remote trip/operation test
- 5.17 Draw-out breaker racking and unranking