



CI-0703

TAB 7: TECHNICAL DISCIPLINES

Electrical

BACKUP EMERGENCY POWER SYSTEM

SCOPE

This subject describes the functional requirements for Metrolinx facilities backup power system. The power generated by the backup system shall be either true sinusoidal 60 Hz or DC, depending on the requirements.

The intent is to ensure the continuing operation of essential equipment and services, and to effectively move passengers from station buildings and train platforms to outside parking areas in the event of a sustained power failure.

The final design of the backup power system must include an as-built schematic drawing of the system distribution. It should also include a checklist for commissioning, operation and maintenance, respectively.

Back-up power generators are a mandatory requirement, for providing the majority of our operational elements/systems for 8 hours system operational duration (and additional 16 hours of testing capacity), in the event of a power failure at the following GO facilities:

- GO Rail Line Stations (including Parking Structures)
- GO Bus Terminals (facilities with a station building only)
- GO Rail Layover Facilities
- GO Operational Support Facilities (i.e. Wofldale, GTCC, Middlefield)
- GO Bus Maintenance Facilities
- GO Rail Maintenance Facilities.

GENERAL DESCRIPTION

Backup Power System's design can include components such as: Generator, UPS, Inverter, Rectifier, etc. As a minimum, the backup Power System shall include:

- > Diesel or natural gas generator complete with UPS systems having a minimum of 30 minute duration,
- OR
- > UPS systems with 90 minute minimum duration if there is no diesel/natural gas generator set.

In each case, the UPS shall be double conversion continuous duty type to provide the electronic communications systems with clean sine wave power. The UPS shall be rated for life safety applications



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and shall be provided with signals for indication of UPS general alarms and with dial-in remote monitoring control, plus a remote alarm to the station alarm system.

Diesel is the preferred fuel for back-up generators. Where site and operational conditions do not allow for the use of diesel fuel, natural gas fuel powered generators are acceptable with GO approval.

Rectifiers shall be used for backup DC power in maintenance and layover facilities where required.

ESSENTIAL LOADS

The following table shows a list of items that are considered to be essential. The table shows both backup power system conditions (i.e. Generator + UPS OR UPS only) and provides an estimated power draw for each item. The actual power draws shall be considered in the detail design and specification must be verified on a project by project basis.

ESSENTIAL LOADS				
Essential Load	Estimated Power Draw	With Generator		With NO Generator
		Diesel Generator	UPS System	UPS System
	(Watts)			
<i>Life Safety</i>				
Exit signs - buildings, tunnels and similar structures (LED type)	100	x		x + Life Safety
Public Address System	2,000	x	x	x
CCTV System	2,000	x	x	x
Any additional rack in the Comms Room	2,000 ea.	x	x	x + Life Safety
GO Transit telephone System	500	x	x	x
All Passenger Elevators and shafts	4,500 ea.	x		
Elevator controls	2,000	x		
Alarm Monitoring Systems	400	x	x	x + Life Safety
<i>Lighting</i>				



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ESSENTIAL LOADS				
Essential Load	Estimated Power Draw	With Generator		With NO Generator
		Diesel Generator	UPS System	UPS System
	(Watts)			
Tunnels, bridges and stairwell illumination (at least 1 fixture on normal power)	2,000	x		x + Life Safety
Electrical Room Illumination (at least 1 fixture on normal power)	100	x	x	x
Communications Room Illumination (at least 1 fixture on normal power)	100	x	x	x
Service Area Illumination	300	x		x
Waiting Area Illumination - minimal	1,000	x		x + Life Safety
Platform Lighting (Train and Bus)	9,000	x		
Main Parking Lots (Surface Parking)	Project Specific	x		
Parking Structures	Project Specific	x		
PPUDO (Passenger Pick up and Drop off)	Project Specific	x		
Bus Loop Lighting	Project Specific	x		
<i>Systems</i>				
Ticket Sales Equipment	3,000	x	x	x
Communications Equipment (white board, Pins etc...)				
Presto	4,500	x		
Door Operators (Building, vestibules, Shelters)	Project Specific	x		
<i>Mechanical</i>				



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ESSENTIAL LOADS

Essential Load	Estimated Power Draw	With Generator		With NO Generator
		Diesel Generator	UPS System	UPS System
	(Watts)			
Sump/Sanitary Pump	3,000	x		
HVAC for electrical & communication room	7,500	x		
HVAC for Service Counter and Waiting Area	Project Specific	x		
Water Heater Equipment	Project Specific	x		
HVAC and Exhaust of Elevator Shafts	Project Specific	x		
Estimated Total Power Draw in Watts		280,000	15,000	15,000
		(Varies with site conditions)		

* Public washrooms shall have their own dedicated plug-in emergency light fixture x

** CHUBB security to be considered if automatic locking system is implemented

*** Tunnels, Bridges and stairwell assumed to be single tunnel and stair structure at both ends; separate conduit for emergency lighting

**** Satellite lots not to be included in emergency lighting

***** Presto system is backed up by its own UPS systems (20 and 30 amp receptacles.)

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DIESEL GENERATOR REQUIREMENTS

The generator shall be provided as a factory tested single unit and rated kW, 120/208 or 347/600 Volts, 3 phase, 4 wire, 60Hz, 1800 rpm. The generator shall be certified to CSA C22.2 No. 100, EEMAC MG1-22.40, and NEMA MG1, and shall meet the requirements of Ontario Electrical Safety Code, ESA, EPA, MOE, TSSA, along with all applicable local codes and regulations.

The generator shall be self ventilated and shall be a single bearing type direct coupled to the engine. Under short circuit conditions, the generator shall be capable of delivering sufficient current to enable protective breakers to trip.

Ambient working temperature: -35°C to 40°C

Acceptable noise level: maximum 65 dB(A) at 7.0 m

1. Diesel Engine

- The engine shall be EPA compliant (tier 2 engine), with maximum nox plus hc of 3.87g/kw-hr.
- ULC/CSA labelled double wall construction sub-base mounted steel fuel tank with an enough storage capacity to run the generator set at full load for 24 hours without refuelling. The tanks and fuelling system has to be accepted by TSSA and equipped with fuel paddling system.

2. Alternator

- The alternator (generator) shall be 120/208 or 347/600 Volt, 3 phase, 4 wire, 60 Hz AC, drip proof, rotating field type with an integral exciter of the brushless or static type and a static voltage regulator utilizing silicon rectifiers on solid-state amplifiers.
- Voltage regulation shall be within plus or minus 2% of rated voltage for all loads from no load to full load. Output voltage shall be manually adjustable over a range of plus or minus 5% of rated voltage.
- Rotors shall be salient pole type with amortisseur windings. The generator shall include for 300% short circuit capability for 10 seconds.

3. Engine-generator mounting

- The engine and generator shall be aligned and mounted on a common fabricated steel base of sufficient rigidity to maintain adequate alignment. Approved adjustable steel spring vibration isolators shall be supplied with such set by the set manufacturer.

4. Control panel

- Environmentally sealed, solid state, microprocessor-based module for engine control, monitoring, protection and metering.
- The controller shall meet the CSA (Z462). The controller shall be listed under ULC and UL-508. Set-mounted controller capable of facing right, left, or rear shall be vibration isolated on the generator enclosure. Remote-mounted controller shall also be supplied.