TECHNICAL SPECIFICATION
AUXILIARY & OFF GRID SUPPLIES

TCC-TTS-SPEC-E006

Revision History

Revision	Status	Prepared by	Reviewed by	Approved by	Date
0	Issued for Use	D Philipson	L Eastlake	T Laveti	25/09/2025

Contents

1. Introduction

1.1. Purpose

This standard covers Auxiliary Power Supplies and generating sets owned, operated or installed on behalf of Townsville City Council (TCC).

1.2. Scope

This standard provides requirements for incorporating Auxiliary Power Supplies into a TCC electrotechnical project. Auxiliary Power Supplies can include, but are not limited to:

- Standby Generators;
- Other sources of power that are not grid connected supply; and,
- This Specification is not for mains connected renewable energy systems.

1.3. Electrical Specification Manual

This document forms part of the Electrical Installation section of the TCC Electrical Specification Manual (ESM) and shall be read in conjunction with other documents in the ESM and the Job Specification to determine the requirements for a particular project.

The intention of the ESM is to provide consistency in electrical design and installation requirements that will better enable council to fulfil its duties in the delivery and implementation of their electrical works.

Contractors shall comply with all requirements in this document and the documents referenced in TCC-TTS-SPEC-E001 Introduction to Technical Specifications, unless specified otherwise.

1.4. Exceptions and Feedback

Should the Contractor propose any exceptions, deviations or variations from this specification or referenced documents, such variations shall be submitted in writing to the TCC Nominated Electrical Representative for approval.

If there exists a requirement that is unclear or ambiguous, the Contractor shall contact the TCC Nominated Electrical Representative for clarification and feedback.

2. General

General requirements for all supplied Auxiliary Power Supplies shall also meet the requirements set out in TCC-TTS-SPEC-E004 Low Voltage Switchboards which details change-over and interfacing to Auxiliary Supplies.

Generators shall be supplied to ensure continuity of supply for critical infrastructure. Typically, in a permanently installed, standby basis, but also trailer mounted for emergency requirements at specific sites.

2.1. Generating Sets

2.1.1. Sizing

Generator sets shall be sized to suit the applicable loads, duty and starting methods without requiring additional modification.

2.1.2. Mounting

The generator set shall be supplied with a rigid, fully welded, structural steel frame to support the engine, the alternator and local control board. The frame shall form a skid base with angled end rails to facilitate dragging and shall incorporate suitable lifting points so that the whole assembly can be lifted as a unit without distortion of the frame or causing misalignment of the engine and alternator.

For mobile sets, the frame shall be constructed so that it can be mounted on a trailer and without requiring any special modification.

The supplier shall include with each generator set suitable vibration isolation materials for mounting between the generator and trailer. This can be waffle-pads if the engine and alternator is suitably vibration isolated from the base, or alternatively Embleton Housed Spring Mounts if it they are not.

To improve corrosion resistance, the frame shall be hot-dipped galvanised (unquenched) prior to final surface treatment, e.g. powder-coating.

Mounting of permanent generators shall be on a suitable pad above the Q100 flood level.

2.1.3. Coupling

Directly couple the engine and generator shafts with a self-aligning type coupling, capable of transmitting the engine maximum output torque under operating conditions, including starting and overload.

2.1.4. Alternators

Alternators shall be four pole and provide a sinusoidal waveform with total wave form deviation not exceeding 10%.

The alternator shall withstand an overspeed of 1.2 times the unit rated speed for both alternator and engine and an under speed of 0.95 times the unit rated speed (at full load current) without overheating.

The sustained short-circuit withstand shall be at least 2.5 times full load steady state short-circuit current, for at least 5s.

Enclosure classification shall be IP21, with screened ventilation openings. Cooling method classification Class IC 01, to AS 1359.106.

Insulation classification shall be Thermal class 180 (H), to IEC 60085.

Alternator windings shall be tropic-proofed.

2.1.5. Anti-condensation Heaters

Anti-condensation heaters shall be provided to assist in maintaining insulation resistance during standby periods.

Heaters shall maintain the windings and insulation at least 6°C above ambient temperature when the alternator is at rest and one heater is in service.

Heaters shall be connected to separate identified terminals within an accessories terminal box which is connected to a permanent supply.

Heaters shall be supplied via the common auxiliary supply circuit and shall only operate when the set is not running.

Heaters shall be isolated by the incoming auxiliary supply isolation point.

2.1.6. Overload Protection

The generator is to be protected against overload. The protection shall be matched against the generator's thermal limit curves. Overload protection may be provided by one or more of the following:

- Circuit Breaker (electronic trip unit);
- PTC Thermistors (to AS 60947.8); and,
- Electronic control unit.

2.1.7. Terminal Boxes

Metal terminal boxes for all electrical connections to the alternator shall be provided.

Terminal boxes shall have an IP rating of IP54 unless located within a weatherproof acoustic enclosure where IP23 shall be acceptable.

Terminal boxes shall be suitably sized to allow the current transformers, power and control cables and cable lugs to be neatly installed and terminated with necessary clearances between live parts and the box, and without placing undue strain on termination points.

Cable entry shall be from the bottom.

Refer TCC-TTS-SPEC-E004 for terminal box details.

2.1.8. Circuit Breaker

The generator shall be fitted with a 4-pole out going circuit breaker suitable for the standby rating of the set. The circuit breaker shall be a moulded case type with an electronic trip unit and shall be operable without exposing live electrical parts. An auxiliary contact shall be provided for remote indication that the circuit breaker is closed.

The circuit breaker shall be interfaced to the generator controls for tripping on engine shutdown.

2.1.9. MEN Link

The MEN Link shall not be located within the generator unless otherwise directed in the Job Specification.

2.1.10. Engine

Engines shall be diesel powered only and in accordance with AS 4594, unless specified otherwise.

The diesel engine shall be equipped with all ancillary equipment required to satisfactorily achieve the required performance under the environmental conditions experienced within the generator room when installed on site.

The output and fuel consumption of the engine shall be guaranteed to AS 4594 Engine Rating.

The Contractor shall also state, in a Schedule entitled “Performance Guarantees”, the minimum load at which the engine can operate with satisfactory behaviour without requiring excessive or abnormal maintenance.

For turbocharged engines the manufacturer shall state the maximum sudden load increase allowable for AS 4594 Clause 4.3.2 and resulting maximum transient speed difference.

2.1.11. Exhaust System

Internally mounted generators will have exhaust piping from the engine complete with residential grade silencers, piping, ductwork, supports and expansion devices. Size the silencer for maximum engine load and over-revving conditions. The exhaust outlet shall be suitable for all weather conditions in the installed location.

The exhaust system shall be vandal resistant.

The exhaust system will be appropriately insulated in its entirety. Weatherproof flashing, sleeves and acoustic seals shall be used where the exhaust system penetrates the enclosure or building.

Weighted end flap will be used to seal the exhaust pipe against the weather when not operating.

External Skid Mounted generator shall have an integral exhaust system.

2.1.12. Fuel System

The fuel system shall be provided for each generator set shall include:

- Storage Tank;
- Fuel filler point with gauge and vent;
- Fuel filters;
- Level switches;
- Level indicator; and,
- Valves, fittings and fuel lines.

The fuel system shall be complete with all necessary filters, water separators, valves and piping. Any valves external to the acoustic enclosure shall be lockable.

All piping/valves shall be screwed connections. Fuel piping and associated auxiliary equipment shall comply with AS 1940.

Provide warning signs and fire extinguishers as required by the applicable codes.

2.1.13. Fuel Storage

The fuel storage tank shall provide for at least 24 hours running with full site full load connected.

It is preferred that the tank is incorporated into the skid base however, if the base cannot accommodate a tank of sufficient capacity, then the tenderer must provide an option for the supply of an external tank and fuel transfer equipment suitable for mounting on a trailer.

The fuel tank shall be of fully welded steel construction and be corrosion protected on the external surfaces (HDG & powder coated or equivalent finish) and shall comply with AS 1940.

2.1.14. Access

All rotating parts shall be suitably guarded to prevent finger access during operation.

It shall be possible to remove any access door, cover or guard, or to undertake any routine maintenance adjustment or replacement without having to remove equipment or pipework.

All access points shall be lockable.

2.1.15. Electric Starting

A starter motor, batteries, chargers and associated control equipment to remotely start the engine shall be provided.

An interlock shall be provided, connected directly to the engine, to prevent the starter motor operating when the engine is running.

A starting lock out system which prevents further starting attempts after three successive unsuccessful attempts shall be provided.

2.1.16. Batteries

A common battery and charger system shall be supplied for the following:

- 12/24V Engine start; and,
- 12/24V Control and alarm functions.

Note: If control or alarm function is adversely affected during starting then separate battery systems must be provided.

Starter batteries shall be AGM lead acid specifically designed for starting stationary engines. Battery is to be suitable for extended periods on charge.

Automotive batteries will not be accepted.

Sufficient capacity shall be provided to crank the engine for six successive 10 second cranks with mains supply unavailable. Monitoring and alarm functions shall be available for a period of 48 hours, with mains supply off.

Batteries shall be mounted in an acid-resistant tray in an easily accessible location, isolated from vibration.

A lockable battery isolator shall be provided to prevent accidental starting.

All cabling shall be bi-metal crimp lugged.

2.1.17. Battery Chargers

Battery chargers shall be engine driven with an auxiliary supply.

Battery chargers shall be of the solid-state automatic constant voltage type and shall have an automatic boost charge mode. They shall be selected to match the type of battery connected.

The charger shall have the capability to recharge the battery from 50% to 95% within 8 hours.

Battery chargers shall be mounted in an easily accessible location.

2.1.18. Controls

The following table is an example of the expected documents and typical submission times:

An on-board control system shall be provided to perform the following functions:

- Manual Start/Stop;
- Automatic (Remote) Start/Stop via volt free contacts;
- Emergency Shutdown; and,
- Monitoring & Alarm Functions.

All Emergency shutdowns and alarms are to be provided as audible and visible alarms on the control panel.

Main Generator circuit breaker will only close once generator is at a stable operating voltage and frequency.

Generator shutdown shall be an automatic sequence allowing for removal of the load by opening Generator Circuit Breaker and delayed engine shutdown (Typically 0~30mins).

Emergency shutdown will not allow a restart until all safety devices have been manually reset and alarms have returned to their normal state.

The overspeed shutdown shall act directly to disconnect the fuel supply independent of the governor.

A minimum of four Alarm/Monitoring relay outputs shall be provided to indicate:

- General fault (Generator tripped);
- General warning (Generator requires attention, but still running);
- Low Fuel; and,
- Running status.

Fuel level shall be available via communications (if fitted) or via 4-20mA analogue signal.

A communications interface (Modbus TCP preferred) shall be available as an option.

2.1.19. Emergency Stop Push-buttons

Generating sets less than 2m long shall be provided with one emergency stop push-button per generating set.

Larger generating sets shall be provided with two emergency stop push-buttons located on either side of the generator.

2.1.20. Noise Level

The Contractor shall design, supply and install outdoor weatherproof acoustic attenuated to suit the generator. Acoustic attenuation shall meet requirements of the Environmental Protection (Noise) Policy 2008.

2.1.21. Installation

The generator shall be installed according to AS 3010 and the general guidelines for installation in TCC-TTS-SPEC-E002.

Outdoor:

Where the generator is located outdoors, the unit shall be fully enclosed in a weatherproof, vandal resistant, acoustic enclosure.

The enclosure is to be fabricated from galvanised sheet steel and powdercoated or painted for corrosion protection. The top of the enclosure is to be manufactured from stainless steel and painted. This may be provided as an additional cover to the proprietary enclosure however the design shall ensure that build-up of organic material and water is not able to contact with the proprietary enclosure. The cover shall not adversely impact the generator rating. The enclosure shall be adequately sealed to prevent the entry of vermin such as frogs, mice, rats, snakes and similar.

The enclosure shall have no glass or Perspex panels.

Specific attention should be given to the prevention of ingress of organic material and rain from above. In particular, air intake and exhaust points.

Lockable covers shall be provided for all access hatches including radiator filler and fuel filler to suit Townsville Water padlock system. Access hatches are to correctly align with the fill point.

A cage may need to be fitted over the exhaust cap to prevent foreign objects been inserted.

There are to be no exposed hot surfaces.

Generally, the generator shall be suitable for coastal conditions and include:

- IP44 rated weatherproof enclosure;
- Vermin proofed;
- Lockable acoustic enclosure manufactured from 2.5mm stainless steel sheet;
- Stainless steel hardware;
- Primer/polyurethane powder paint to 100 microns;
- Stainless steel door locks, hinges and hardware (incl. external nuts and bolts); and,
- Base frame hot dip galvanized.

Indoor:

Where the generator set is to be installed within a plant room or similar indoor environment, the project specification will detail all requirements including, but not limited to:

- Air intake;
- Acoustic louvres;
- Radiator exhaust;
- Duct work;
- Engine exhaust;
- Fuel system;
- Pipework, valves; and,
- Ventilation.

2.1.22. Factory Acceptance Testing

Factory acceptance testing will include, but not be limited to, the following:

- Overspeed functioning correctly in accordance with ISO 3046-4;
- Speed governing functioning correctly in accordance with ISO 3046-4;
- All malfunction protection and warning devices responding correctly to the fault conditions in which they should operate;
- Correct functioning of all automatic pressure and temperature controls; and,
- The ability of the starting system to perform to the requirements of this standard.

The generator shall be run for the following times and conditions:

- 2 hours at 100% rated power;
- 1 hour at 110% rated power;
- 30 min at 75% rated power; and,
- 30 min at 50% rated power.

During the running tests the following shall be recorded at maximum half hour intervals:

- Generator kW and kVAR output;
- Generator output voltage;
- Generator output current;
- Generator output frequency;
- Power factor;
- Oil pressure and water temperature;
- Electrical power requirements of ancillary supplies;
- Each battery charger current and voltage readings; and,
- Noise level.

A report shall be compiled with recorded data and submitted to the TCC Nominated Electrical Representative prior to shipment of the unit to site.

2.2. Solar Generation

2.2.1. General

Solar generation shall be used for small installations requiring less than 1kW (eg: Remote telemetry, CCTV, etc.) and be a maximum voltage of 24VDC.

Solar generation shall be stand-alone and NOT connected to the mains supply.

Solar generation shall be battery backed up to ensure continuous supply and shall allow for extended periods of low sunshine up to seven days.

2.2.2. Solar Array

Any solar Cell mounting arrangement shall have an appropriate wind loading design. Shall be vandal proof and accessible by a step ladder or exiting ladder on a structure (eg-reservoir). Shall have a DC load rated isolator for isolation from the battery/load system.

2.2.3. Solar Regulator and Battery Protection

The Regulator shall be of an appropriate size to match solar array and equipment load. There shall be some form of low battery monitoring and load shut off protection for the battery.

2.2.4. Battery Storage System

Batteries shall be in a ventilated cabinet separate from all other electrical equipment.

Batteries terminals shall have insulated terminal covers protecting the terminals against accidental shorting.

Shall have an appropriately load rated fuse located as close as practical to the battery terminals.

Batteries shall be a deep cycle type with a capacity appropriate to maintain supply to the equipment for 48 hours without any solar supply.

2.2.5. Installation

Refer to TCC-TTS-SPEC-E002.

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