AIR TRAFFIC AND NAVIGATION SERVICES CO. LTD

REPUBLIC OF SOUTH AFRICA

REQUEST FOR QUOTATION:

FAOR Operational Complex Mobile Generator

Specification

Version 1.0 – January 2025

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GENERAL

1 Intent of Document

The requirements described herein are intended to cover the installation of a generator set plant. The minimum product requirements are outlined. The design and construction will be the responsibility of the contractor.

2 Standards and Codes

All work to be performed, and equipment to be supplied shall be by the requirement BS5514 and shall comply with the Occupational Health and Safety Act, No 85 of 1993, and all other relevant standards and codes applicable to this work.

3 Regulations

The installation shall be erected and tested by the following Acts and regulations:

a) The latest issue of SABS 0142: “Code of Practice for the Wiring of Premises”,

b) The Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended,

c) The Local Government Ordinance 1939 (Ordinance 17 of 1939) as amended and the municipal by-laws and any special requirements of the local supply authority,

d) The Fire Brigade services Act 1993 Act 99 of 1987 as amended,

e) The National Building Regulations and Building Standards Act 1977 (Act 103 of 1977) as emended,

f) The Post Office Act 1958 (Act 44 of 1958) as amended,

g) The Electricity Act 1984 (Act 41 of 1984) as amended and

h) The Regulations of the local Gas Board where applicable.

4 Scope of Work

The work includes supply, delivery and testing of a complete integrated mobile generator system to provide an alternative source of power in the event of utility outage. The system

consists of a diesel generator set with related components and accessories, an automatic transfer switch, and a generator room. The delivery shall be made to ATNS FAOR Operational Complex, ACSA Gate 14, Bonaero Drive, Bonaero Park, Kempton Park.

5 Brochures

Detailed brochures of all equipment offered shall be presented together with the quotation documents.

6 Submittals

The following information must accompany the quotation documents;

A. Factory published specification sheet indicating standard and optional accessories, ratings, etc.

B. Manufacturer's catalogue cut sheet of all auxiliary components such as isolators, battery chargers, silencer, exhaust flex, main circuit breaker, etc.

C. Dimensional elevation and layout drawings of the generator set enclosure and transfer switch gear and related accessories.

D. Engine mechanical data at varying loads up to full load, including heat rejection, exhaust gas flows, combustion air and ventilation air flows, noise data, fuel consumption, etc.

E. Generator electrical data including temperature and insulation data, cooling requirements, excitation ratings, voltage regulation, voltage regulator, efficiencies, waveform distortion and telephone influence factor.

Full particulars, performance curves and illustrations of the equipment offered, must be submitted with the Quotation.

GENERATOR SET REQUIREMENTS

1 Engine

1.1 Rating

The set shall be capable of delivering the specified output continuously under the site conditions, without overheating.

The generator shall be standby rated at 36 kW, 45 kVA, 1500 RPM, 0.8 power factor, 3 phase, 50 hertz, including radiator fan and all parasitic loads.

1.2 De-Rating

The engine must be de-rated for the site conditions

1.3 Starting and Stopping

The engine must be able to start from cold, under winter and summer conditions without any special ignition devices. The engine shall be fitted with an electric starter motor.

The bidder shall submit full details of the engine starting mechanism. In the case of water-cooled engines, any electrical heaters shall be thermostatically controlled. The electrical circuit for such heaters shall be taken from the control panel and must be protected by a suitable circuit breaker.

1.4 Starter Battery

The generator set shall be supplied with the battery. The battery must have sufficient capacity to provide the starting torque stipulated by the engine manufacturer. The battery must be of the heavy-duty “low maintenance” type, house in a suitable battery box.

Full details of the starter battery will be submitted with the quotation.

1.5 Cooling

The engine may be either of the air- or water-cooled type. In the case of water-cooling, a built-on heavy duty, tropical type pressurised radiator must be fitted. Only stand-by sets that are water cooled shall have electric heaters.

For either method of cooling, protection must be provided against running at excessive temperatures. The operation of this protective device must give a visual and audible indication on the control panel. Water-cooled engines shall in addition be fitted with a low water cut-out switch, installed in the radiator, to switch the set off in the event of a loss of coolant. All air ducts for the cooling of the engine are to be allowed for. The air shall be supplied from the cooling fan cowling/radiator face to air outlet louvers in the plant room wall.

1.6 Lubrication

Provision for lubrication of the main bearings and other important moving parts shall be made. An automatic low oil pressure cut-out must be fitted, operating the stop solenoid on the engine and giving a visible and audible indication on the control panel.

1.7 Fuel Tank

A fuel tank shall be installed in the plant room. The tank shall have sufficient capacity for standby sets to run the engine on full load for 12 hours. The fuel tank shall be a free-standing type.

A water trap is fitted in the fuel pipeline from the tank to the engine.

The tank shall be fitted with a suitable filter, a full-height gauge glass, “low fuel level” alarm, giving an audible and visible signal on the control panel.

The interconnection fuel piping shall consist of copper tubes and the connection to vibrating components shall be in flexible tubing with armoured covering.

1.8 Electronic Governor

An electronic governor must be supplied and installed to ensure accurate speed control of the diesel engine under varying load conditions.

1.9 Flywheel

A suitable flywheel must be fitted, so that lights fed from the set will be free from any visible flicker.

1.10 Exhaust Silencer

A critical type of silencer, companion flanges, and flexible stainless-steel exhaust fitting properly sized shall be furnished and installed according to the manufacturer's recommendation. Mounting shall be provided by the contractor. The silencer shall be mounted so that its weight is not supported by the engine nor will exhaust system growth due to thermal expansion be imposed on the engine. Exhaust pipe size shall be sufficient to ensure that exhaust backpressure does not exceed the maximum limitations specified by the engine manufacturer.

1.11 Accessories

The engine must be supplied complete with all accessories, air and oil filters, 3 instruction manuals, spare parts lists, the first fill of all lubricating oils, fuel, etc.

2 Alternator

2.1 General

The alternator shall be capable of delivering an output of 110% of the specified output, for one hour in any period of 12 hours consecutive running.

Both windings must be fully impregnated for tropical climates and must have an oil-resisting finishing varnish.

3 Control panel

3.1 Generator-Mounted Control Panel

The bidder shall provide a generator-mounted control panel for complete control and monitoring of the engine and generator set functions. Panel shall include automatic start/stop operation; adjustable cycle cranking, digital AC metering with phase selector switch, digital engine monitoring, shutdown sensors and alarms with horn and reset, adjustable cooldown timer, and emergency stop push-button. The panel shall incorporate self-diagnostics capabilities and fault logging. Critical components shall be environmentally sealed to protect against failure from moisture and dirt.

3.2 Digital Readouts

The control panel shall have the following readouts.

1. Engine oil pressure
2. Coolant temperature
3. Engine RPM
4. System DC Volts
5. Engine running hours
6. Generator AC volts
7. Generator AC amps
8. Generator frequency
9. KW meter
10. Percentage of rated Power
11. KVA meter
12. KVAr meter
13. Power Factor meter
14. KWHR meter

3.3 Protection and alarm devices

The control panel shall be equipped with the following protection and alarm devices.

1. Low oil pressure
2. High water temperature
3. Low coolant level
4. Overspeed
5. Overload
6. Emergency stop depressed
7. Approaching high coolant temperature
8. Approaching low oil pressure
9. Low coolant temperature
10. Low voltage in battery
11. Control switch not in auto position
12. Low fuel main tank
13. Battery charger ac failure
14. High battery voltage
15. EPS supplying load

3.4 ATS

Provision shall be made for an automatic transfer switch during mains failure. The contractor shall ensure that the changeover equipment is compatible with the generator control panel.

3.5 Start Delay

Starting shall be automatic in the event of a mains failure. A 0-15 second adjustable start delay timer shall be provided to prevent start-up on power trips or very short interruptions.

3.6 Stop Delay

A stop delay with timer is required for the set, to keep the set on load for an adjustable period of five to ten minutes after the return of the mains supply, before changing back to the supply

4 Generator Canopy

The generator set and all associated equipment shall be installed in a weatherproof and sound-attenuated canopy.

Full details of the generator set canopy shall be submitted with the quotation.

5 380/400V 3 Phase Plug, Socket and Cable

The generator shall be supplied with three 3-phase power cables. The amp rating shall be sized according to the generator size.

6 Warning Notices

Notices must be installed in the plant rooms.

The contents of these notices are summarised below.

(a) Unauthorised entry prohibited.

(b) Unauthorised handing of equipment prohibited.

(c) Procedure in case of electric shock.

(d) Procedure in case of fire.

The successful bidder must consult the Occupational Health and Safety Act 83 of 1993 and get approval of the wording from the Department's representative, prior to ordering the notices.

The bidder will indicate lettering colours.
Notices (a) must be installed outside next to the entrance of the plant room and (b-d) inside the plant room.

In the plant room, a clearly readable and permanent warning notice must be mounted in a visible position.

The motive shall be made of a non-corrodible and non-deteriorating material, preferable plastic, and must read as follows:

DANGER: This engine will start without notice. Turn selector switch on control board to "OFF" before working on the plant.

7 Operation

The set is required to supply the lighting and power requirements in the case of a mains power failure.

The set shall be fully automatic i.e. it shall start when any one phase of the main supply fails or gets switched and shall shut down when the normal supply is re-established. In addition, it shall be possible to manually start and stop the set using pushbuttons on the control panel.

The automatic control shall make provision for three consecutive starting attempts. Thereafter the set must be switched off, and the start failure relay on the control panel must give a visible and audible indication of the fault.

To prevent the alternator from being electrically connected to the mains supply when the mains supply is on and vice versa, a safe and fail-proof system of suitably interlocked contactors shall be supplied and fitted to the changeover control panel.

TECHNICAL SPECIFICATION

1 General

Supply and delivery of the generating set shall be made to ATNS FAOR Operational Complex, ACSA Gate 14, Bonaero Drive, Bonaero Park, Kempton Park

This installation must comply fully with all the sections. This technical specification is supplementary to the Equipment Requirements, Section 2, and must be read together where they are at variance the Technical Specification shall apply.

The Generator set including the fuel tank must be supplied with a weatherproof and sound attenuated canopy.

2 Site Information and Conditions

Highveld conditions will be applicable, and equipment shall be suitably rated to develop their assigned rating and duty at these conditions.

3 Output and Voltage

After the de-rating factors for the engine and generator due to site conditions have been considered, the set must have a site output and voltage as follows: -

No load voltage	:	400/230 Volt
Rating	:	45kVA
Power at 0,8 power factor	:	36kW
Frequency	:	50Hz
Fault Level	:	5kA

The generating set is required to feed the following electrical load:

Lights

Air-conditioning

Stoves

Fridges

Radars

Servers

Computer

Motors

4 Switchboard/Control Panel Unit

All switch- and control gear shall be rated for a fault current level of 5kA.

The switchboard/control panel unit shall be a free-standing floor-mounted type, which shall be installed in the plant room.

5 Cables

The contractor will be responsible for all electrical cable connections and supply associated with the complete generating set to be delivered.

6 Engine

A sump drainpipe must be fitted with a shut-off valve placed in a convenient position outside the base frame to facilitate drainage.

Recommended oil types must be indicated on the engine, or base frames, by means of suitable labels.

All engine instruments shall have clear markings on the faceplates, indicating the normal operating zone(s), maximum and minimum allowable values/limits and danger zone(s).

7 Alternator

The Alternator shall be of the low harmonic type.

8 Load Acceptance

The generator set shall be capable of accepting 75% of the specified site electrical output 10 seconds after the starter motor is energized and the remaining 25%, 5 seconds thereafter, i.e. 100% load acceptance shall not exceed 15 seconds.

9 Fuel Supply Tank

The fuel tank shall be an integrated onto the generator. The tank shall have sufficient capacity for the generating set to run the engine on full load for a period of 24 hours.

10 Chassis and Canopy

Chassis and canopy shall integrate the following:

Item No.	Description	Requirements
1	Chassis base frame	Heavy duty steel base frame with integral fuel tank
2	Chassis design	Designed for careful lifting/pushing/pulling
3	Canopy type	Silent weather-resistant enclosure
4	Ventilation	Modular louvre design
5	Coating	Powder Coated
6	Accessibility	Lockable doors on each side and removable modular panel
7	Exhaust insulation	Thermally insulated
8	Sound attenuated	Fitted with sound reducing foam lining

11 Outlets

The mobile generator shall incorporate the following outlets

Item No.	Description	Requirement(s)
1	230V 3-Pin Outlets	4
2	380V 5-Pin Outlets	3
3	Circuit Breakers	Yes
4	Surge Protection	Yes

12 Trailer

The mobile generator trailer shall incorporate the following:

Item No.	Description	Requirement(s)
1	Roadworthy Certificate	Yes, Included
2	Spare Wheel	Yes, A Frame
3	Jockey Wheel	Yes
4	Chevron	Yes
5	Lights	LED
6	Anti-Theft Wheel Locking System	Yes
7	Anti-Theft Alarm System	Yes

13 Remote Monitoring

The Generator set shall incorporate a remote monitoring function and be installed with the generator set. Full description of the remote monitoring system will be submitted with the quotation.

14 Training

The Contractor shall provide training and adequate operation support documentation to the Client's operations personnel during the commissioning of the generator set.

15 Warranty

A 12-month warranty shall be offered and shall commence at the final acceptance of the generator set. All services offered in the warranty shall be stipulated.

16 Testing, Inspection, and Manuals

The following shall be fulfilled as part of the mobile generator supply and delivery

Item No.	Description	Requirements
1	Pre-Delivery Testing	Filled with oil and coolant, tested under full load.

2	Pre-Delivery Inspection	Full inspection of generator
3	User Manuals	Shall be supplied prior to training

TECHNICAL INFORMATION SCHEDULE

Instruction to Bidders

The bidder shall submit all remarks diagrams and drawings according to the technical information schedule document and in the English Language.

ALL REMARKS TO THE TECHNICAL INFORMATION SCHEDULE SHALL BE PROVIDED IN FULL AND, IN THE SPACE, PROVIDED.

Remarks provided in the space allowed, that are not clear or inadequate or the lack there of will not be considered.

1 ENGINE

NO	ITEM	REMARKS
1.	Manufacturer's Name	
2.	Country of Origin	
3.	Manufacturer's model No. and year of manufacture	
4.	Continuous sea level rating after allowing for ancillary equipment: a) In b.h.p. b) In kW	
5.	Percentage de-rating for site conditions a) For altitude b) For temperature c) For humidity d) Total de-rating	
6.	Net output on site in kW	
7.	Nominal speed in r.p.m.	
8.	Number of cylinders	
9.	Strokes per working cycle	

NO	ITEM	REMARKS
10.	Stroke in mm	
11.	Cylinder bore in mm	
12.	Swept volume in cm^3	
13.	Mean piston speed in m/min	
14.	Compression ratio	
15.	Cyclic irregularity	
16.	Fuel consumption of the complete generating set on site in l/h of alternator output at: a) Full load b) ¾ load c) ½ load NOTE: A tolerance of 5% shall be allowed above the stated value of fuel consumption.	
17.	Make of fuel injection system.	
18.	Capacity of fuel tank in litres	
19.	Is gauge glass fitted to tank?	
20.	Is electric pump for filling the fuel tank included?	
21.	Method of starting	
22.	Voltage of starting system	

23.	**Method of cooling**	
24.	**Type of radiator if water-cooled**	
25.	Type of heater for warming cylinder heads	
26.	Capacity of heater in kW	
27.	Method of protection against high temperature	
28.	Method of protection against low oil pressure	
29.	Type of governor	
30.	Speed variation in % a. Temporary b. Permanent	
31.	Minimum time required for as assumption of full load in seconds	
32.	Recommended interval in running hours for: a. Lubricating oil change b. Oil filter element change c. Decarbonising	
33.	Type of base	
34.	Can plant be placed on solid concrete floor?	
35.	Are all accessories and ducts included?	
36.	Is engine naturally aspirated?	
37.	Are performance curves attached?	
38.	Diameter of exhaust pipe	
39.	Noise level in plant room in dBA	N/A
40.	Noise level at tail of exhaust pipe in dBA	
41.	Design Life	
42.		

2 ALTERNATOR

NO	ITEM	REMARKS
1.	Maker's name and model no.	
2.	Country of Origin and year of manufacture	
3.	Type of enclosure	
4.	Nominal speed in r.p.m.	
5.	Number of bearings	
6.	Terminal voltage	
7.	Sea level rating kVA at 0,8 power factor	
8.	De-rating for site conditions	
9.	Input required in kW	
10.	Method of excitation	
11.	Efficiency at 0,8 power factor and: a) Full load b) ¾ load c) ½ load	
12.	Maximum permanent voltage variation in %	
13.	Transient voltage dip on full load	
14.	Voltage recovery on full load application in milli-seconds	
15.	Is alternator brushless?	
16.	Class of insulation of windings	
17.	Is alternator tropicalised?	
18.	Symmetrical short circuit current at terminals n Ampere	
19.	Type of Coupling	
20.	Design Life	

3 CONTROL PANEL

NO	ITEM	REMARKS
1.	Maker's Name	
2.	Country of Origin	
3.	Is board floor mounted?	
4.	Finish of board	
5.	Make of volt, amp, and frequency meters	
6.	Dial size of meters in mm	
7.	Scale range of voltmeter	
8.	Scale range of ammeters	
9.	Ration of current transformers	
10.	Make of hour meter	
11.	Range of cyclometer counter	
12.	Smallest unit shown on counter (Item 11)	
13.	Make of circuit breaker	
14.	Type of circuit breaker	
15.	Rating of circuit breaker in Amp and fault level in kA	
16.	Setting range of overload trips	
17.	Setting range of instantaneous trips	
18.	Make of change-over equipment	
19.	Make of voltage relay	
20.	Is control and protection equipment mounted on a small removable panel?	
21.	Type of control equipment	
22.	Make of mains isolator	
23.	**Type of indicators for protective devices**	
24.	Make of rectifier	
25.	Type of rectifier	
26.	Is battery charging	
27.	Are volt- and ammeters provided for charging circuit?	

NO	ITEM	REMARKS
28.	Is the alarm hooter of the continuous duty type?	
29.	Rating in Amps of: a. Change-over equipment b. Mains on load isolator c. By-pass switch d. Circuit breaker to outgoing feed	

4 BATTERY

NO	ITEM	REMARKS
1.	Maker's Name	
2.	Country of Origin	
3.	Type of battery	
4.	Voltage of battery	
5.	Number of cells	
6.	Capacity in cold crank amp	
7.	Is the battery Maintenance free	
8.	Design Life	

5 DIMENSIONS

NO	ITEM	REMARKS
1.	Overall dimensions of set-in mm	
2.	Overall mass	
3.	Is the generator room/container adequate for the installation of the set	
4.	Is the generator room/container sound attenuatted	
5.	Is the generator room/container weatherproof	