



QUOTATION DOCUMENT

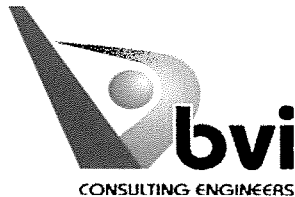
FOR THE

**SUPPLY, DELIVERY AND INSTALLATION OF ONE 160 kVA
PRIME RATED GENERATOR SET**

AT

SARS OFFICES: ANCORLEY BUILDING UPINGTON

ELECTRICAL CONSULTANT:



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**SPECIFICATION FOR THE SUPPLY DELIVERY AND INSTALLATION OF
PRIME RATED GENERATOR SET/S**

SECTION 1 – GENERAL

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SECTION 1 – GENERAL

1. Intent of Document

The specification is intended to cover the complete installation of the self contained Prime Rated Generator for the SARS Offices in Upington at the Ancorley Building. The minimum equipment requirements are outlined, but do not cover all the details of design and construction. Such details are recognised as being the exclusive responsibility of the contractor.

In all cases where a device or part of the equipment is referred to in the singular, it is intended that such reference shall apply to as many devices as are required to complete the installation.

2. Standards and Codes

All work and equipment shall be in accordance with the requirements of BS5514 and shall comply with the Occupational Health and Safety Act, No 85 of 1993 and current regulations of all other codes applicable to this work.

3. Regulations

The installation shall be erected and tested in accordance with the following Acts and regulations:

- a) The latest issue of SANS 10142: "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 amended,
- 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

Supply, delivery and installation of the complete Prime Rated generator set specified in this document.

The Generator must be a Silent Self Contained Diesel Generator Set. The price of the Generator must include delivery in Upington and the hiring of a bobcat to offload and place the unit in the parking lot of the Ancorley Building. Included in this contract is the installation of a new distribution board in the Municipal Low Voltage Distribution Room with all the necessary cable work from the existing Municipal feed to the new Generator and back to the new Distribution Board. See attached drawings of the Distribution board and the layout of the site.

5. Co-ordination

The offloading of the Prime Rated Generator will be time consuming and a nuisance to the Client and other tenants of the building. The Client as well as the owner will need to be notified of the delivery date and time.

The Contractor shall co-ordinate his program with the Electrical Engineer and the Client. His installation rates shall include for such co-ordination as well as the necessary additional time needed for convenient shut-downs during after hours.

Delays due to lack of co-ordination between the Contractor and the Client shall not form a basis for claims by the Contractor of this Contract.

6. Test Certificates and Inspections

The following tests are to be carried out:

- (a) After completion of the works and before first delivery is taken, a full test will be carried out on the installation for a period of sufficient duration to determine the satisfactory working thereof. During this period the installation will be inspected and the contractor shall make good, to the satisfaction of the Representative/Agent, any defects which may arise.
- (b) The Contractor shall provide all instruments and equipment required for testing and any water, power and fuel required for the commissioning and testing of the installation at completion.
- (c) A test report is to be submitted to SARS.

7. Guarantee and Maintenance

The Contractor shall guarantee the complete plant for a period of twelfth months after the first delivery has taken place.

If during this period the plant is not in working order, or not working satisfactorily owing to faulty material, design or workmanship, the Contractor will be notified and immediate steps shall be taken by him to rectify the defects and/or replace the affected parts on site at his own expense.

The Contractor shall maintain the plant in good working condition for the full twelfth month period to the final delivery of the installation. However, should the Contractor fail to hand over the plant in good working order on the expiry of the specified twelfth months, the Contractor shall be responsible for further monthly maintenance until final delivery is taken.

During this period the contractor will undertake to arrange that the plant be inspected at least once per month by a qualified member of his staff who shall: -

- (a) Report to the Officer-in-charge, keeping the maintenance records, and enter into a log book the date of the visit, the tests carried out, the adjustments made, and any further details that may be required.
- (b) Grease and oil moving parts, where necessary.
- (c) Check the air filter and, when necessary, clean the filter and replace filter oil.
- (d) Check the lubricating oil and top-up when necessary.
- (e) After the plant has run one oil change for the number of hours stipulated by the manufacturers, drain the sump and refill with fresh lubricating oil. The control panel of the Generator Unit will give an alarm when fresh lubricating oil is needed.

Under this heading only the cost of the actual oil used, shall be charged as an extra on the monthly account.

- (f) Clean the lubricating oil filter and/or replace the filter element at intervals recommended by the engine manufacturer, the cost of a new filter element to be charged as an extra on the monthly account.

- (g) Check and when necessary adjust the valve settings and the fuel injection equipment.
- (h) Check the battery and top-up the electrolyte when necessary.
- (i) Test-run the plant for 0,5 hour and check the automatic starting with simulated faults on the mains, the proper working of all parts, including the electrical gear the protective devices with fault indicators, the changeover equipment and the battery charger. Make the necessary adjustments.
- (j) Report to SARS and to the Engineer on any parts that become unserviceable through fair wear and tear, or damaged by causes beyond the control of the Contractor.

The Contractor on receiving the report, shall immediately submit a detailed quotation for the repair or replacement of such parts to SARS.

- (k) Advise SARS when it has become necessary to de-carbonise the engine and submit a quotation for this service.
- (l) Top up the water of the radiator, if applicable.
- (m) Clean the plant and its components.

8. Materials and Workmanship

- (a) The work throughout shall be executed to the highest standards and to the entire satisfaction of the Representative/Agent who shall interpret the meaning of the Contract Document and shall have the authority to reject any work and materials, which, in his judgement, are not in full accordance therewith. All condemned material and workmanship shall be replaced or rectified as directed and approved by the Engineer.
- (b) All work shall be executed in a first-class manner by qualified tradesman.
- (c) The Contractor shall warrant that the materials and workmanship shall be of the highest grade, that the equipment shall be installed in a practical and first-class manner in accordance with the best practices and ready and complete for full operation. It is specifically intended that all material or labour which is usually provided as part of such equipment as is called for and which is necessary for its proper completion and operation shall be provided without additional cost whether or not shown or described in the Contract Document.
- (d) The Contractor shall thoroughly acquaint himself with the work involved and shall verify on site all measurements necessary for proper installation work. The Contractor shall also be prepared to promptly furnish any information relating to his own work as may be necessary for the proper installation work and shall co-operate with and co-ordinate the work of others as may be applicable.
- (e) All components and their respective adjustment, which do not form part of the equipment installation work, but influence the optimum and safe operation of the equipment shall be considered to form part of, and shall be included in the Contractor's scope of works.
- (f) All control equipment and serviceable items shall be installed and positioned such that they will be accessible and maintainable.
- (g) The Contractor shall make sure that all safety regulations and measures are applied and enforced during the installation and guarantee periods to ensure the safety of the public and the User Client.

- (h) The Contractor is to include for all scaffolding required to complete the work required.

9. Imported Content

This equipment will not be subject to fluctuations in the rate of exchange.

10. Brochures

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

11. Submittals

The following information must accompany the tender documents

- (a) Full particulars, performance curves and illustrations of the equipment offered, must be submitted with the Tender.
- (b) The design of the control system to comply with the requirements for automatic starting, stopping, interlocking and isolation as specified.
- (c) Curves furnished by the engine makers, showing the output of the engine offered against the speed, for both intermittent and continuous operation as well as fuel consumption curves when the engine is used for electric generation

The successful Tenderer must, as soon as possible after receipt of the order, submit detailed drawings and wiring diagrams of the plant and the switchgear. One diagram shall be contained in a metal pouch on the side of the switchboard.

SPECIFICATION FOR THE SUPPLY DELIVERY AND INSTALLATION OF AN PRIME RATED GENERATOR SET

SECTION 2 – EQUIPMENT REQUIREMENTS

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SECTION 2 – EQUIPMENT REQUIREMENTS

1. Engine

1.1 General

The engine must comply with the requirements as laid down in BS 5514 and must be of the atomised injection, compression ignition type, running at a speed not exceeding 1500 r.p.m. The engine must be amply **rated** for the required electrical output of the set, when running under the site conditions. The starting period for either manual or automatic switching-on until the taking over by the generating set, in one step, of a load equal to the **specified** site electrical output, shall not exceed 15 seconds. This must be guaranteed by the Tenderer.

Turbo-charged engines will only be accepted if the Tenderer submits a written guarantee that the engine can deliver full load within the specified starting period.

1.2 Rating

The set shall be capable of delivering the specified output continuously under the site conditions, without overheating. The engine shall be capable of delivering an output of 110 % of the specified output for one hour in any period of 8 hours consecutive running in accordance with BS 5514.

1.3 De-Rating

The engine must be de-rated for the site conditions as set out in the Technical Specification, Section 3 of this document.

The de-rating of the engine for site conditions shall be strictly in accordance with BS 5514 of 1977 as amended to date. Any other methods of de-rating must have the approval of the Engineer and must be motivated in detail. Such de-rating must be guaranteed in writing and proved by the successful Tenderer at the site test.

1.4 Starting and Stopping

The engine shall be fitted with an electric starter motor and be easily started from cold, without the use of any special ignition devices under summer as well as winter conditions.

Tenderers must state what arrangements are provided to ensure easy starting in cold weather. Full details of this equipment must be submitted. 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.

1.5 Starter Battery

The set must be supplied a fully charged lead-acid type battery, complete with necessary electrolyte. The battery must have sufficient capacity to provide the starting torque stipulated by the engine makers. The battery capacity shall not be less than 120 Ah and shall be capable of providing three consecutive start attempts from cold and thereafter a fourth attempt under manual control of not less than 20 seconds duration each. The battery must be of the heavy duty "low maintenance" type, housed in a suitable battery box.

1.6 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 switchboard. 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. The protection shall operate in the same way as the other cut-outs (e.g. low oil pressure). All air ducts for the cooling of the engine are to be allowed for.

1.7 Lubrication

Lubrication of the main bearings and other important moving parts shall be by forced feed system. 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 switchboard.

1.8 Fuel Pump

The fuel injection equipment is suitable for operation with the commercial brands of diesel fuel normally available in South Africa.

1.9 Fuel Tank

A fuel tank shall form part of the self contained unit. The tank shall have sufficient capacity for Prime Rated sets to run the engine on full load for a period of 8 hours.

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 switchboard as well as a low-low fuel level cut-out.

An electrically operated pump with sufficient length of oil resistant hose to reach 2m beyond the unit shall be supplied, for filling the fuel tank/s from 200 litre drums.

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

1.10 Exhaust Silencer

It is essential to keep the noise level as low as possible. An effective exhaust silencing system of the residential type must be provided.

The exhaust pipe shall be installed in such a way that the expelled exhaust fumes will not cause discomfort to the public. The exhaust pipe must be flexibly connected to the engine to take up vibrations transmitted from the engine, which may cause breakage. The exhaust piping and silencer shall be lagged to reduce the heat and noise transmission into the parking area and shall be protected against the ingress of driving rain at 45° to the horizontal. The exhaust pipe must extend 0,5m above the roof gutters. It must be secured by flanges.

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. **Switchboard**

2.1 General

A switchboard must be supplied and installed to incorporate the equipment for the control and protection of the generating set and battery charging.

The switchboard must consist of the specification as set out in the following paragraphs.

2.2 Construction

The switchboard/control panel must form part of the self contained unit. The LCD display must be visible through a window of the unit. The self contained unit must be lockable to ensure a safe, tamper proof installation for the public. Three sets of keys for the locks must be handed over to SARS.

All equipment on the switchboard, such as contactors, isolators, busbars, etc., shall have ample current carrying capacity to handle at least 110% of the alternator full load current.

2.3 Protection and Alarm Devices

All switchboards shall be equipped with protection and alarm devices as described below.

A circuit breaker and an adjustable current limiting protection relay must be installed for protection of the alternator. The protection relay shall be of the type with inverse time characteristics. The relay shall cause contactor to isolate the alternator and stop the engine.

Protection must be provided for overload, high engine temperature, low lubricating oil pressure, over speed, start-failure, and low water level.

Individual relays with reset pushed are required, to give a visible signal and stop the engine when any of the protective devices operate. In the case of manual operation of Prime Rated sets, it shall not be possible to restart the engine.

All relays must operate an alarm hooter. A pushbutton must be installed in the hooter circuit to stop the audible signal, but the fault indicating light on the control panel must remain lit until the fault has been rectified.

An on/off switch is not acceptable. After the hooter has been stopped, it must be re-set automatically, ready for a further alarm.

The hooter must be of the continuous duty and low consumption type. Both hooter and protection circuits must operate from the battery.

Potential free contacts from the alarm relay must be brought down to terminals for remote indication of alarm conditions. A data point must be supplied for these alarms to be connected to the SARS network and programmed for monitoring and warnings.

2.4 Manual Starting

Manual operation must form part of the control panel.

2.5 Battery Starting Equipment

Each switchboard shall be equipped with battery charging equipment.

The charger shall operate automatically in accordance with the state of the battery and shall generally consist of an air-cooled transformer, a full wave solid state rectifier, and the necessary automatic control equipment of the constant voltage system.

The charger must be fed from the mains. An engine driven alternator must also be provided for charging the battery while the set is operational. Failure of this alternator must also activate the battery charger failure circuit.

2.6 Earthing

An earth bar must be fitted in the switchboard, to which all non-current carrying metal parts shall be bonded.

The neutral point of the alternator must be solidly connected this bar by means of a removable link labelled "EARTH". Suitable terminals must be provided on the earth bar for connection of up to three earth conductors.

2.7 Automatic Change-over System

A fully automatic change-over system must be provided to isolate the mains supply and connect the Prime Rated set to the outgoing feeder in case of a mains failure and reverse this procedure on return of the mains.

2.8 By-pass Switch and Main Isolator

The switchboard shall be equipped with an on-load isolator to isolate the mains and a manually operated on-load by-pass switch, which shall either connect the incoming mains to the automatic control gear or directly to the outgoing feeder. In the latter position the automatic control gear, including the main contractors, shall be isolated for maintenance purposes. It shall not be possible to start the engine except with the selector switch in the "TEST" position.

It is required that this by-pass switch and mains isolator be mounted away from the automatic control gear, in a separate compartment either on the side or in the lower portion of the switchboard cubicle, and that the switches operated from the front of the compartment.

2.9 Start Delay

Starting shall be automatic in 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.

2.10 Stop Delay

A stop delay with timer is required for the set, to keep the set on load for an adjustable period of one to sixty seconds after the return of the mains supply, before changing back to the supply. An additional timer shall keep the set running for a further adjustable cooling period of 5 to 10 minutes at no-load before stopping.

3. **Installation**

Except for the supply of the incoming mains cable and outgoing feeder cables, the tenderer must include for the complete installation and wiring of the plant in running order, including the connection of the incoming cable and outgoing feeder cables.

The connecting of the cable and control cabling to the generator and the control terminals in the Distribution Board will also form part of this Quotation.

4. **Warning Notices**

Notices must be installed on the Self Contained Unit as well as the new Distribution Board in the LV Room.

The contents of these notices are summarised below.

- (a) Unauthorised entry prohibited.
- (b) Unauthorised handling of equipment prohibited.
- (c) Procedure in case of electric shock.
- (d) Procedure in case of fire.

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

Lettering must be black on a yellow background.

Notices (a-d) must be installed outside next to the opening panel of the self contained unit.

In the self contained unit, a clearly legible and indelible warning notice must be mounted in a conspicuous 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.

5. Operation

The set is required to supply all three SARS Distribution Boards 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 get 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 by means of pushbuttons on the switchboard.

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 switchboard must give a visible and audible indication of the fault.

To prevent the alternator 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 switchboard.

**SPECIFICATION FOR THE SUPPLY DELIVERY AN INSTALLATION OF AN
PRIME RATED GENERATOR SET**

SECTION 3 – TECHNICAL SPECIFICATION

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SECTION 3 – TECHNICAL SPECIFICATION

1. General

Supply, deliver, install, commission, test and maintain a 160kVA Prime Rated Generating Set and new Distribution Board at the SARS Offices, Ancorley Building in Uppington.

This installation must comply fully with all the sections and drawings of this document. 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 self contained generator must be installed in the parking lot of the Ancorley Building in Uppington.

2. Site Information And Conditions

2.1 Location

The site is at the Ancorley Building between Hill Street and River Street in Uppington CBD.

2.2 Site Conditions

The following site conditions will be applicable and equipment shall be suitably rated to develop their assigned rating and duty at these conditions.

- | | | |
|----|------------------------------------|----------------------------|
| a) | Height above sea level | : 810 meter |
| b) | Maximum ambient temperature | : $\pm 45^{\circ}\text{C}$ |
| c) | Lowest ambient temperature | : $- 5^{\circ}\text{C}$ |
| d) | High dusty, dry and hot conditions | |

3. Output And Voltage

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

No load voltage	:	400/230 Volt
Rating	:	160 kVA
Power at 0,8 power factor	:	128 kW
Frequency	:	50Hz
Fault Level	:	5kA

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 form part of the self contained unit.

An Additional Distribution Board (see Drawing Number 31985-400-01) must be supplied and installed in the existing Low Voltage Room of the Ancorley Building. Coordination with the Municipality, SARS and the Landlord must be organised in advance (at least 4 working days) for Shut-downs. After-hours labour must be priced for the shut-down periods.

The preferred supplier of the Distribution Board is George Switchgear, based in George. Additional Cables must be supplied and installed from the existing Low Voltage Distribution Board to the location of the New Prime Rated Generator Set. The quantity of cable in the Tender Document is just an indication, the contractor must measure the distance on site before ordering the cable.

5. Cables

The contractor will be responsible for all electrical cable connections associated with the complete generating set installation. This includes an additional Distribution Board for the metering and contactors.

The following existing cable feeds must be connected to the new Distribution Boards

<u>DB fed</u>	<u>PVC PVC SWA PVC Cable</u>
DB-1-2	16 mm ² x 4 and a 10mm ² Earth
DB-3	16 mm ² x 4 and a 10mm ² Earth
DB-5	16 mm ² x 4 and a 10mm ² Earth

6. Load Acceptance

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

7. Generator Room

The generator will be a self contained unit. There is no generator room.

8. Fuel Drip Tray

A drip tray approximately 100mm deep shall be mounted below the fuel tank and must be large enough to collect any fuel that drips from the tank accessories. The drip tray shall be manufactured from black mild steel. The thickness of the drip tray sheet steel shall not be less than 2mm.

9. Completion Time

The Contract will be two months starting from the date of appointment to accommodate for the manufacturing time of the generator.

10. Inform

The successful tenderer shall inform the Engineer when the set is ready for installation.

11. Data connection for monitoring and alarms

A data connection point must be supplied for the monitoring and alarm alerts on the SARS network.

**SPECIFICATION FOR THE SUPPLY DELIVERY AN INSTALLATION OF AN
PRIME RATED GENERATOR SET**

SECTION 4 – SCHEDULES OF TECHNICAL INFORMATION

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SECTION 4 – SCHEDULES OF TECHNICAL INFORMATION

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, in accordance with BS 551.4 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	
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) $\frac{3}{4}$ load c) $\frac{1}{2}$ 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	

NO	ITEM	REMARKS
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	
40.	Noise level at tail of exhaust pipe in dBA	
41.	BMEP (4 stroke) at continuous rating (kPa)	
42.	% Load acceptance to BS 5514, Part 4, with 10% transient speed drop	

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	

NO	ITEM	REMARKS
10.	Method of excitation	
11.	Efficiency at 0,8 power factor and : a) Full load b) $\frac{3}{4}$ load c) $\frac{1}{2}$ 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	

3. Switchboard

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.	Ratio 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	

NO	ITEM	REMARKS
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?	
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	
30.	Is manufacture of switchboard/control panel to be sub-let?	
31.	If yes, state name and address of specialist manufacturer	

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	

5. Dimensions

NO	ITEM	REMARKS
1.	Overall dimensions of set in mm	
2.	Overall mass	
3.	Is the generator room adequate for the installation of the set	

6. Deviation from the Specification as An Alternative (State Briefly)

NO	DESCRIPTION

7. Spare Parts and Maintenance Facilities

NO	ITEM	REMARKS
1	Approximate value of spares carried in stock for this particular diesel engine and alternator	
2	Where are these spares held in stock	
3	What facilities exist for the servicing of the equipment offered	
4	Where are these facilities available	

SPECIFICATION FOR THE SUPPLY DELIVERY AN INSTALLATION OF AN PRIME RATED
GENERATOR SET

PART B

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1.	Bill of Quantities.....	5.1 – 5.3
2.	Final Summary.....	5.4

Bill of Quantities

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
1.1	Preliminaries and General				R	c
a)	Bidder to allow for a full time, Three-Phase Accredited Electrician, as Supervisor for the duration of the Contract, who shall have the delegated authority to receive instructions and make decisions regarding this Contract, shall take responsibility of all the works done under this contact	No	1			
b)	Summary of Preliminaries	No	1			
c)	PC Amount for unforeseen expences.	PC	1	50 000.00	50 000	00
d)	Any additional items that the Bidder deems necessary for the successful and total completion of the Installation, required by the Specification and Drawings. Specify:	No	1			
1.2	160kVA Silent Self contained Generator Set complete with all equipment as specified including delivery and offloading:					
	Supply	No	1			
	Installation	No	1			
1.3	Extended Exhaust outlet installed as specified:					
	Supply	No	1			
	Installation	No	1			
1.4	Distribution Board complete with all equipment as specified, except the kWh meters listed below (Drawing Number 31985-400-01) To be supplied by George Switch Gear.					
	Supply	No	1			
	Installation	No	1			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
1.5	120mm ² x 4 core PVC SWA Cable Installation to feed from Municipal LV Panels to the Generator and back to the new Distribution Board complete with making off ends onto switchgear and busbars, including all necessary cable end material, glands and cable clamps.					
	Supply	m	70			
	Installation	m	70			
1.6	70mm ² Bare Copper Earth Wire Installation complete with making off ends onto switchgear and busbars, including all necessary cable end material, glands and cable clamps.					
	Supply	m	70			
	Installation	m	70			
1.7	New 300A 3Ø Circuit Breaker to be installed in the existing Municipal Low Voltage Panel for the Feed to the Generator					
	Supply	No	1			
	Installation	No	1			
1.8	3Ø kWh Meters to be bought from the local Municipality. Elster A1100					
	Supply	No	3			
	Installation	No	3			
1.9	16mm ² x 4 core PVC SWA Cable Installation complete with making off ends onto switchgear and busbars, including all necessary cable end material, glands and cable clamps.					
	Supply	No	1		Rate Only	
	Installation	No	1		Rate Only	
1.10	10mm ² Bare Copper Earth Wire Installation complete with making off ends onto switchgear and busbars, including all necessary cable end material, glands and cable clamps.					
	Supply	No	1		Rate Only	
	Installation	No	1		Rate Only	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
1.11	Guardrails complete with bents and end pieces, to be installed 1.5 meter around the Self Contained Generator and painted the same colour as the existing guardrails					
	Supply	m	6			
	Installation	m	6			
1.7	Compilation of Operation and Maintenance Manuals and onsite Training	No	1			
1.7	Full Power shut-down simulation Testing and the issue of a Certificate of Compliance.	No	1			
1.8	12 Month Maintenance as per Clause 7 of Part 1	No	1			
Total Carried to Final Summary				R		

FINAL SUMMARY

Section

R

c

PART B

1 Bill of Quantity Total
(Value-Added Tax excluded)

SUBTOTAL R

ADD

VALUE-ADDED TAX

R

SUBTOTAL R

TOTAL

R

Total Bid Price (in words):

.....(VAT Incl.)

NAME OF CONTRACTOR: ELECTRICAL

.....
.....

ADDRESS:

.....
.....

TELEPHONE NO:

FAX NO:

CELL PHONE:

CONTRACTOR REGISTRATION NUMBER:

.....

.....
SIGNATURE OF ELECTRICAL CONTRACTOR

.....
SIGNATURE OF SARS REPRESENTATIVE