



**SERVICE AGREEMENT FOR THE PANEL OF PRE-QUALIFIED SERVICE PROVIDERS FOR THE Manufacturers, Assembly and Resellers of Standby Generators and Standby Generator Control Panels at various Sentech Transmitter Sites as and when required bases for the period of three (3) years
Tender No.: SENT/035/2018-19**

Made and entered into between

SENTECH SOC LIMITED

Registration Number: 1990/001791/30

("Sentech")

and

_____ **NAME OF SERVICE PROVIDER** _____

Registration Number: _____

("the Service Provider")

(Jointly referred to as the "Parties")

1 INTERPRETATION

1.1. The headings to the clauses of this Agreement are inserted for reference purposes only and shall in no way govern or affect the interpretation hereof.

1.2. Unless inconsistent with the context, the expressions set forth below shall bear the following meanings:

1.2.1. “Agreement” means the terms and condition contained in this agreement and any/all annexures hereto from time to time;

1.2.2. “Commencement Date” means _____

1.2.3. “**Data**” means any data, including personal information as defined in the Protection of Personal Information Act 4 of 2013, including personal information which is stored, encrypted, decrypted, collected, collated, accessed, recovered, retained or processed by the Service Provider on behalf of Sentech, irrespective of media or form;

1.2.4. “**Parties**” means Sentech and the Service Provider, and “party” shall mean either one of the parties or a combination of them as the context may indicate;

1.2.5. “**Service Provider**” means _____, a company, duly registered and incorporated in accordance with the laws of the Republic of South Africa with registration number _____;

1.2.6. “**Sentech**” means Sentech SOC Limited, a company with limited liability duly registered and incorporated in accordance with the laws of the Republic of South Africa, having its registered office at Octave Street, Radiokop, Roodepoort, with Registration Number _____;

1.2.7. “**Services**” means the duties and responsibilities more fully described in clause 5 of this Agreement and in Annexure “A” hereto;

1.2.8. “**Service Fees**” means the fees more fully described in clause 7 below;

1.2.9. “**Signature Date**” means the date of signature of this Agreement by the party signing last in time by a person duly authorized to do so;

1.2.10. “**VAT**” means Value Added Tax as levied in accordance with the Value Added Tax Act 89 of 1991, as amended.

2 INTRODUCTION

2.1 Sentech requires the Services from the Service Provider in respect of, inter alia, to **Manufacturer, Assemble and Resell of Standby Generators and Standby Generator Control Panels. Supply, deliver, rigging, installation, commissioning and SLA maintenance agreement for Open sets, Containerised and Canopy Standby Generators (STG) at various Sentech Transmitter Sites as and when required bases for the period of three (3) years of Sentech**, as more fully described in clause 5 below and in Annexure “A” hereto.

2.2 The Service Provider is willing to provide the Services to Sentech based on the terms and conditions contained herein.

2.3 The Parties require that the terms and conditions of their agreement be reduced to writing and signed by them before the same shall be or become binding upon them.

3 APPOINTMENT

3.1 Sentech hereby appoints the Service Provider onto a panel of pre-qualified service providers with effect from the Commencement Date to provide the Services and the Service Provider hereby accepts such appointment.

3.2 Sentech does not guarantee any work allocation to the Service Provider appointed onto the panel neither does this appointment commit Sentech to any quantum of work to the Service Provider.

3.3 The Service Provider shall perform those duties and render the Services more fully described in clause 5 below and in Annexure “A” hereto, in a proper, diligent and satisfactory manner and, at all times, having regard to the requirements and directions of Sentech.

3.4 The Service Provider shall devote its time and attention to the affairs of Sentech as necessary to enable it to comply with its contractual obligations hereunder.

4 TERM

4.1 The appointment of the Service Provider shall commence on the Commencement Date and shall endure for a period of _____ thereafter.

4.2 Notwithstanding the afore-going, Sentech shall be entitled to terminate the Agreement upon 30 (thirty) days' written notice to the Service Provider without any liability of any nature whatsoever to the Service Provider.

5 SERVICES

5.1 The duties of the Service Provider shall, inter alia, be to **Manufacturer, Assemble and Resell of Standby Generators and Standby Generator Control Panels. Supply, deliver, rigging, installation, commissioning and SLA maintenance agreement for Open sets, Containerized and Canopy Standby Generators (STG) at various Sentech Transmitter Sites as and when required bases** as more fully described in Annexure "A" hereto, as and when required.

5.2 The bid is divided into three (3) sections of which any bidder may offer a bid for any one or a combination of the sections or for all the sections. if the bidder chooses to bid for more than one section, they ought to separate the evidence substantiating their claims under mandatory and functional evaluation criteria clearly marked for each section bided for. Bidders are required to indicate which section they are bidding for
The sections are:

No	Description	Please tick (✓)
1	SECTION A = up to 100kVA (SMALL)	
2	SECTION B = above 100kVA but less than 350kVA (MEDIUM)	
3	SECTION C = 350kVA and more (LARGE)	

- 5.3 In performing the Services established for this panel, the Service Provider undertakes to:
- 5.3.1 timeously respond to the Request for Quotations / Proposals issued;
 - 5.3.2 attend site inspections when required to do so;
 - 5.3.3 timeously mobilize resources to perform work within a stipulated period;
 - 5.3.4 not collude with other service providers in the panel in responding to Sentech's requirements;
 - 5.3.5 where possible, obtain local labour as shall be determined by the location of the site where the Services shall be rendered;
 - 5.3.6 at all times carry out its duties and obligations in terms of this Agreement in a competent and professional manner;
 - 5.2.7 at all times act with the utmost good faith towards Sentech and to promptly and punctually carry out and perform all its duties and obligations in accordance with the provisions of this Agreement;
 - 5.2.8 adhere to all Sentech's rules and regulations whilst on the sites.
- 5.4 The Service rendered by the employees of the Service Provider must be rendered under competent supervision provided by the Service Provider.
- 5.5 The Service Provider shall guarantee that the Service shall be rendered and executed in a professional manner in accordance with the job description as provided by Sentech.
- 5.6 The Service Provider shall guarantee that its personnel shall have the expertise to execute their functions properly.
- 5.7 The Service Provider is not entitled to cede any of its rights or delegate any of its obligations under this Agreement without Sentech's prior written consent.
- 5.8 The Service Provider shall not be entitled to appoint any sub-contractor/s without Sentech's prior written consent. Notwithstanding the appointment by the Service Provider of any sub-contractor/s, the Service Provider shall remain liable for the fulfillment of all its obligations in terms of this Agreement.

6 RIGHTS OF SENTECH

Sentech reserves the right to:

- 6.1 Go outside the panel to source services that cannot be sufficiently fulfilled within the panel;
- 6.2 Approach other service provider's if there are no responses from the service providers on the panel;
- 6.3 Remove a service provider from the panel if the service provider's performance is unsatisfactory or if the service provider does not respond to Sentech's Requests for Quotations;
- 6.4 Refrain from using the under-performing service provider for a period not exceeding twenty (24) months;

- 6.5 List a defaulting service provider on the National Treasury Database of prohibited suppliers;
- 6.6 Regularly update the panel through an open tender process;
- 6.7 Negotiate prices received, and
- 6.8 If required, rotate service providers to afford all service providers an opportunity to provide services to Sentech.

7 SENTECH'S DUTIES

- 7.1 Sentech shall make payment to the Service Provider in terms of clause 8 below.

8 SERVICE FEES AND PAYMENT

- 8.1 Prices shall be on a quotation basis. When Sentech wishes to acquire any of the Goods listed in Annexure A hereto, Sentech shall request the Service Provider to provide a quotation for the cost thereof, which quotation will be valid for a period of 30 days from the date of the quotation.

- 8.2 Payment shall be made to the Service Provider into the following Bank account:
Account name:



Bank :

Account number:

Branch code :

- 8.3 Nothing precludes Sentech from withholding payment on any invoice if Sentech, in its sole and absolute discretion, is of the reasonable opinion that the Service Provider has not satisfactorily performed in accordance with its obligations in terms of this Agreement.

9 INDEMNITY

- 9.1 The Service Provider indemnifies and holds Sentech harmless against all liability, damage, obligation, responsibility, cost and expenditure of any nature which may arise out of this Agreement and/ or the use of Sentech's facilities; as well as for any physical damage to the Service Provider's property. Sentech shall not be liable for any damage to the property of the Service Provider which may be caused by its employees, agents, contractors, subcontractors, vehicles and/or activities of Sentech, excluding damage as a result of wilful and/or negligent action. However, any such damage shall be reported to Sentech in writing within 48 (forty-eight) hours, of having knowledge of such damage.
- 9.2 The Service Provider shall indemnify Sentech and keep Sentech indemnified whilst it and/ or its employees are present on the Sentech's premises, or for the duration of this agreement with Sentech, whichever period is the longest, against all losses and claims for injuries or damage, of any nature and howsoever caused, to any person or property whatsoever, which may arise out of or in connection with the Services being performed by the Service Provider.

10 CONFIDENTIALITY

10.1 The Service Provider shall keep confidential and not use directly or indirectly, at any time during or after termination of this Agreement disclose or divulge to any person (save and except insofar as may be required by law):

10.1.1 any written instructions, drawings, notes, memoranda, data, discs or records (the “documents”) relating to Sentech’s business and affairs which are made by the Service Provider or which come into its possession during the currency of this Agreement. Any such documents shall be deemed to be the property of Sentech and shall be surrendered to Sentech in the event of the termination of this Agreement by Sentech, and the Service Provider will not retain any copies thereof or extracts therefrom.

11 TERMINATION

11.1 Sentech may immediately, and within its sole discretion terminate this Agreement at any time, by providing written notice to the Service Provider if:

11.1.1 it is not satisfied with the quality of any of the Services;

11.1.2 the Service Provider becomes insolvent, or guilty of fraud or dishonesty, willful default, negligence or incompetence;

11.1.3 there is a change in Sentech’s strategic direction,

11.1.4 circumstances exist justifying such termination at the sole and absolute discretion of Sentech including due to operational requirements.



12 DOMICILIUM CITANDI ET EXECUTANDI

12.1 The Parties hereto respectively choose *domicilium citandi et executandi* (“*domicilium*”) for all purposes of and in connection with this Agreement as follows:

SENTECH

Octave Street,
Radiokop Ext. 3
Honeydew
Private Bag X06
Honeydew, 2040

Fax: 086 743 1794

Attention:

Executive: Legal and Regulatory

AND

The Service Provider

Tel: _____

Fax: _____

Email: _____



12.2 Any notice given by either party to the other shall be deemed to be received by the addressee:

12.2.1 on the date on which the same was delivered to the addressee's *domicilium*, if delivered by hand (unless proven otherwise); or

12.2.1 on the date on which the same was despatched by facsimile transmission at the addressee's *domicilium* (unless proven otherwise).

12.2.2 Any party hereto may change a *domicilium* referred to above to any address within the Republic of South Africa by giving written notice to that effect to the other party hereto.

12.2.3 The Parties hereto shall be entitled to change their *domiciliumi* from time to time provided that any new *domicilium* selected by them shall be situated in the Republic of South Africa and any such change shall only be effective upon receipt of notice in writing by the other party.

13 DATA PRIVACY AND PROTECTION

13.1 The Service Provider acknowledges that in providing the Services to Sentech, the Service Provider may be exposed to Sentech's Data, including Data of any of Sentech's clients and/or other third parties.

13.2 The Parties specifically record that all Data provided by Sentech to the Service Provider, or to which the Service Provider may be exposed, shall constitute Confidential Information and as such, the Service Provider shall comply with all the provisions of clause 10 with regard to such Data.

13.3 The Service Provider hereby warrants in favour of Sentech that it shall at all times strictly comply with all applicable legislation and with all the provisions and requirements of the Sentech's Data protection policies and procedures, as may be updated from time to time, and any further requirements of which Sentech may, from time to time, advise the Service Provider in writing, or which may be required by legislation, regulation or any relevant industry body, whether within the Republic of South Africa or elsewhere in the world.



- 13.4 The Service Provider hereby warrants and undertakes that it shall not, at any time copy, compile, collect, collate, process, mine, store, transfer, alter, delete, interfere with or in any other manner use Data for any purpose other than with the express prior written consent of Sentech, and to the extent necessary to provide the Services to Sentech. All data and software, including Sentech Data, provided by Sentech or accessed (or accessible) by Service Provider Staff members shall be used by such Staff members only in connection with the provision of the Services and shall not be commercially exploited by the Service Provider in any manner whatsoever.
- 13.5 The Service Provider further warrants that it shall ensure that all its systems and operations which it uses to provide the Services, including all systems on which Data is copied, compiled, collected, collated, processed, mined, stored, transmitted, altered or deleted or otherwise used as part of providing the Services, shall at all times be of a minimum standard required by law and further be of a standard no less than the standards which are in compliance with the international best practice for the protection, control and use of Data.
- 13.6 The Service Provider indemnifies and holds harmless Sentech for any loss, whether direct or indirect, arising out of a failure to process any Sentech Data in accordance with the applicable laws.

14 WHOLE AGREEMENT

- 14.1 This Agreement constitutes the whole Agreement between the Parties as to the subject matter of this Agreement and no agreements; representations or warranties between the Parties other than those set out herein will be binding on the Parties.

15 VARIATION

- 15.1 This agreement, including this clause, cannot be varied, added to, or cancelled by agreement otherwise than by means of a further written and signed agreement between the parties.

16 RELAXATION

16.1 No latitude, extension of time or other indulgence which may be given or allowed by either Party to the other in respect of the performance of any obligation hereunder or the enforcement of any right arising from this Agreement and no single or partial exercise of any right by either Party shall under any circumstances be construed to be an implied consent by such Party or operate as a waiver of, or otherwise affect any of that Party's rights arising from this Agreement.

EXECUTION:

THUS DONE AND SIGNED AT _____ ON THIS THE ____ DAY OF _____ 201_ IN THE PRESENCE OF THE UNDERSIGNED WITNESSES.

**DULY AUTHORISED FOR AND
ON BEHALF OF SENTECH SOC LIMITED**

NAME: **ZUNAID ADAMS**

DESIGNATION: EXECUTIVE: LEGAL AND REGULATORY

WITNESSES

1. _____
2. _____

THUS DONE AND SIGNED AT _____ ON THIS THE ____ DAY OF _____ 201_ IN THE PRESENCE OF THE UNDERSIGNED WITNESSES.

**DULY AUTHORISED FOR AND
ON BEHALF OF _____**

NAME: _____

DESIGNATION: _____

WITNESSES

1. _____
2. _____

ANNEXURE A

DESCRIPTION OF SERVICES

1. Scope of Work

This specification covers the requirement for a self-contained automatic starting diesel Standby Generating set, which shall operate as a standby back-up power source. A weatherproof canopy with soundproof shall be provided if called for.

The system as described in this document will be used to power a transmitting station at a remote location.

A highly reliable and stable electrical supply must be generated under varying load condition without increasing the ambient noise level above acceptable limits.

2. System Description

The system shall consist of a diesel driven generating set mounted on a duplex base frame capable of delivering the power rating specified for each Sentech station / OR as listed in the schedule of information as requested by Sentech.

The generating set shall be housed within an engine room or Container / Canopy on site as specified by Sentech.

The control panel shall be housed within the said engine room as specified above.

An oil make up tank and auxiliary filler equalizer tank with ball valve be housed in the engine room or Container / Canopy.

All other requirements are detailed elsewhere in this specification.

3. Extent of Work

The extent of work covered by this specification includes the, design, manufacture, works testing and delivery of a complete operating system as specified.

In addition, twelve (12) months warranty must be provided.

Three (3) hour full load factory witness test (fuel for same to be provided by tenderer). Additionally, the provision of all handbooks, workshop manuals, drawings and circuit diagrams.

4. Cooling System

The control equipment shall be cooled by radiation and convection only and no cooling fans will be acceptable.

All equipment shall be capable of a continuous operation within their specified performance at transmitting sites having the worst physical compatible combination of the following environment factors:

- Altitude : 2000 meters above sea level
- Temperature : worst possible minimum room ambient - 5°C

Normally: expected minimum room ambient + 10°C

Worst: possible maximum room ambient + 45°C

Normally expected maximum room ambient + 30°C

- Relative humidity : between 20% and 90% RH

5. Exhaust System

The exhaust system shall be designed in accordance with recommendations by the diesel manufacturers to obviate excessive back pressure under full and overload conditions.

Flexible connections of the bellows type shall be used between the engine exhaust manifold and exhaust pipe.

Flanged bolt-on type connections with suitable gaskets shall be used on the entire exhaust system.

The Exhaust Silencer to be Stainless steel clad.

6. Oil-Make-up Tank

The lubricating oil system in the engine sump shall contain sufficient oil to allow 24 hours continuous running at full load without the need for replenishment. An oil-make-up tank shall be supplied to allow for prolonged continuous running.

7. Miscellaneous Requirements

A drip-tray large enough to catch drops from anywhere on the engine or cooling system and at least 25mm deep shall be provided and installed such that easy removal is possible.

All wiring shall be carried out in PVC insulated conductors of adequate size, and no joints shall be allowed.

An approved trap filter assembly (**Or Equal Approved**) (**Duvalco Mk 4 DSF – 6.5L / min.**) or (**Duvalco Mk 3 – 4.5 L / min.**) with a minimum useful life of 200 hours shall be fitted in the engine fuel lines.

A synchronous electrical hour control counter shall be connected to the engine output to indicate true engine hours.

The engine shall be fitted with heavy duty air, fuel and oil filter cartridges with a minimum useful life of 200 hours.

The tenderer shall supply the specific fuel consumption of the set with auxiliary equipment in 1/hour at full and half load.



The completed diesel alternator set shall comply with the Occupational Health and Safety Act 85 of 1993 as amended.

Approval of working drawings to be obtained before any assembly can begin.

8. Earthing

All metal parts shall be solidly bonded and electrically connected to each other and to a common earth point. The neutral of the system shall be solidly connected to this point.

In case of a Cambus 2 engine controls, Surge arrestors need to be fitted on the communication line 1 at ECU and 1 at the controller.

9. Labelling

All controls, meters and switches shall be labeled in English.

Wires shall be clearly marked at all termination points in accordance with the numbering of the manufacturer's diagram.

10. Engine

Multi cylinder diesel engine running at 1500 rpm and rated for continuous duty in accordance with B.S. 5514 shall be provided. Water cooled engine is preferred.

The engine shall be fine governed to a tolerance of plus / minus 5 rpm for all loads.

Transient speed variations on change of load on or off by 50% shall not exceed 50 rpm and recovery shall be within 5 seconds.

All ratings shall be for 2000 meters altitude, 40°C and a relative humidity of between 20% and 90%.

NOTE: ENGINE TO BE ABLE TO DELIVER MAXIMUM ALTERNATOR OUTPUT – CONTINUOUSLY AT UNITY POWER FACTOR (PF 1) ON SITE.

The engine shall be equipped with the following facilities:

- Cooling Radiator if water cooled engine is offered.
- Engine starter motor.
- Automatic Radiator Louver arranged to close when engine is stationary – ONLY in some instances when required.
- Cold starting equipment – engine heater system
- Fuel pump solenoid arranged to be energized to run.
- Fuel lift pump.
- Fuel filters.
- By-pass type lubricating oil filter.
- Lubricating oil level dipstick.

- Easy facilities for draining lubricating oil sump.
- Dry type replaceable cartridge air filter.
- Engine driven battery charging alternator.
- Low oil pressure switch arranged to shut down plant on low oil pressure.
- Low coolant level switch arranged to shut down plant on low coolant level.
- Electrical sensors for remote indication of oil pressure and water temperature.
- Fixed overload stop set at 10%.
- High engine temperature switch fixed in a suitable position on the engine and arranged to shut down the plant on high engine temperature.
- Over speed shut-down device to protect against run-away.
- Instrument panel containing engine hour meter, oil pressure and water temperature gauge, H.E.T. and L.O.P. test buttons mounted conveniently on Generator Base Frame.

The lubricating oil system in the engine sump shall contain sufficient oil to allow 24 hours continuous running at full load without the need for replenishment.

Should an oil make-up tank be supplied in order to meet the above requirements, it shall comply with the following:

- An equalizing device shall be fitted in order to maintain the sump oil level constant – **Murphy type oil device recommended. (Or Equal Approved)**
- An isolating valve shall be fitted between the tank and engine sump.
- The filler cap shall be such that the tank may be easily filled, but once closed, no spillage can occur in transit.

11. Battery

A 12V/24V fully charged heavy duty **Delco type 1250 (high cycle) maintenance free battery (Or Equal Approved)**, rated for the voltage and current requirements of the starting motor(s) and control equipment shall be supplied. The battery discharge capacity at 0°C shall be such that the full cranking current may be drawn for three (3) successive engine start attempts lasting 10 seconds with 10 second rest periods without the voltage falling below 1, 3 volts per cell.

The battery shall be maintained in a fully charged state by an engine driven battery charging alternator with automatic charge rate control.

The battery shall stand in an acid spillage tray treated with acid resistant paint, positioned in such that adequate ventilation is provided.



Adequate natural ventilation shall be provided between and around the batteries.

The battery shall be date stamped with the year and month of manufacturing.

12. Alternator

The alternator shall be of the two bearing type coupled to the engine through a suitable flexible coupling. It shall be of the brushless, self-excited screen protected drip proof type, and shall comply with the following conditions:

Output Voltage	400 / 231 Volts
Voltage Waveform	Sinusoidal
Max acceptable wave-form distortion	5%
Power factor	Between 0, 8 lagging to unity
Phases and Wires	3 phase 4 wire
Frequency	50 Hz
Insulation class	H
Speed	1500 rpm
Overload rating and 300% for 10 Seconds	10% for 1 hour
Max. & Min. operating temperatures	+45°C and -5°C
Voltage regulation	Plus/minus 3% from 0 to 100% load at any power factor between 0, 8 lag and unity inclusive of speed variation of 4.5%
Transient recovery	To within 3% of steady State value in less than 1second upon application of full load at 0, 8 lagging
Steady state voltage	0, 5% of rated voltage
Max. Voltage dip on application of Load	<20% of rated full load voltage

Radio and TV interference suppression shall comply with local legislation.

13. Control Panel

The control panel shall be controlled by a dedicated generator controller (Deep Sea Electronics Model 7320) or equal approved/ equivalent , which shall be suitable for 12 Volt/24 Volt DC Power supply and have a suitable amount of inputs and outputs for the control of a standby diesel generator plant with all the related indications and alarms required in the specification. It must have a front panel graphic user interface and it must be remotely configurable(via IP network) with separate access levels(operator, programmer)

Also add that it must be remote configurable with certain access levels? This must be via a Network

All Control Circuits to be protected with Circuit Breakers.

The control panel shall be fitted with a suitable Circuit Breaker sized to the set output and in some instances change-over equipment is required. Note: - NS 100 frame size – with electronic trip to suit application – no Isolators to be used.

The control panel shall be supplied and due consideration shall be given to protecting it from ingress of moisture. Adequate working space shall be provided in front of the panel and it shall be complete with the following instruments and facilities:

- Stop/start buttons where applicable.
- Frequency meter, Read or digital read-out type in the range 47 to 53Hz with an accuracy consistent with frequency stability being achieved
- "Alternator output available" LED indicating lamps
- "Mains available" LED indicating lamps
- Auto/manual/test selector switch
- Over speed alarm indication
- Engine temperature high alarm indication
- Engine oil pressure low alarm indication
- Engine low coolant indication
- Mains contactor or Motorized breaker failure
- Alternator overload alarm indication
- Start failure alarm indication
- Abnormal voltage alarm indication
- Faulty switch position indication
- Battery charger Warning alarm indication

It should be noted that the operation of any alarm condition should cause the engine to stop.

Should the engine stop due to the operation of any of the protection circuits, a light shall indicate why the engine has stopped. This indication shall remain on until cancelled and no secondary light shall come on which could confuse fault diagnoses.

14. System Operation

The power supply control unit is required to:

- Monitor the mains supply continuously
- Disconnect the load in the event of a mains fail or Mains Dip
- **Mains contactor or Motorized breaker monitoring.**
- Start the diesel driven power generating set and connect to the load as soon as the alternator output voltage is within specification
- Provide the necessary protection to the generating equipment and load equipment while the standby generator is in operation
- Reconnect the load to the normal mains supply when the mains fault has been cleared
- Provide a single switch to facilitate bypass to mains direct or alternator direct (part of Controller) With Visible Standard operating Procedure
- The system shall operate in a Fail Safe Mode (In the event of a Controller Failure)
- Mains failure counter
- Hour meter- Engine Operating Hours

The abovementioned functions shall be performed in the following sequence:

When main contactor opens the start command to the diesel engine shall be delayed for 6 seconds after the detection of an "out of specification" mains condition.

Should the mains "out of specification" condition causes the mains contactor to drop out, then the engine shall be forced to run and accept the station load.

Should the Mains contactor fail under normal conditions the STG needs to be started (with a 50 second Delay) take the load with an indication.

Three start attempts of 10 second duration with ten second intervals between attempts are required.

The starter motor shall be disengaged immediately after the engine has started and engine protection devices to be activated ten seconds later to allow for oil pressure to reach working pressure.

The alternator contactor shall be closed six seconds after the alternator output has reached the correct voltage and frequency.

In the event of a start failure or any alarm condition causing failure of the standby plant the mains shall be reconnected to the load.

When the mains supply is reinstated the standby generator shall continue to operate on load for a further fifteen to thirty minutes. Any further mains faults registered during this load rundown period shall reset the timing sequence and keep the standby plant on load until the mains has stabilized.

Two 6 seconds delays are required when changing back from the standby power to mains, i.e. between opening of alternator contactor and closing of mains contactor.

A five (5) minute no-load rundown time shall be required for cooling of the diesel engine.

In the event of the mains failure during the no-load rundown period the same delay of six seconds as specified in 14.2.8 shall be introduced between mains contactor opening and alternator contactor closing.

On a mains failure, within ten seconds after the rundown period has lapsed; the system shall ensure that a start command shall not be given whilst the diesel engine may still be rotating.

In the event of the mains contactor opening, re-closure of same shall be delayed for 6 seconds irrespective of the reason for opening.

Two voltage monitoring facilities shall be provided, one each for mains and alternator, and shall comply with the following requirements:

- The voltage/phase sensing circuitry shall be physically isolated from the rest of the control circuitry in order to limit possible lightning damage to one area only.
- Voltage sensing between phases and phase and neutral.
- Over voltage drop-out shall be adjustable between 110% and 120% of the normal supply voltage (230V) and adjusted to 115%.
- Under voltage drop-out shall be adjustable between 80% and 90% of normal supply voltage (230V) and set at 85%.
- The monitors shall be of the eleven pin circular plug type and shall be Electrometric or equivalent.
- The alternator shall be provided with a frequency monitor, set to limits of plus/minus 10% to 50Hz.

The following timing functions are required:

- Mains contactor opening on detection of a voltage or phase fault – 1, 5 / 3, 0 seconds.
- Mains contactor closing - Two (6) seconds.
- Start command - Initiated by mains contactor opening – six (6) seconds
- Start attempts - Three of ten seconds duration with ten second intervals between attempts.
- Alternator contactor closing - Six seconds after output has reached voltage and frequency specification.
- Alternator to mains changes-over - Adjustable from 10 to 60 minutes after restoration of mains supply.
- Alternator to mains contactor delay - A six second delay is required between alternator contactor opening and mains contactor closing.
- No-load rundown time - Five minutes.
- Mains to alternator contactor delay - A six second delay are required between mains contactor opening and alternator contactor closing when a mains failure occurs during rundown period.



- Engine protection bypass (for oil pressure) - A ten second delay is required after the diesel has started.
- Override facility - This facility shall be provided to switch back to the mains, should the alternator fail to take load after a mains failure - bearing in mind the 6 second delay required as stipulated above.

A parallel protection circuit with individual indications shall be provided for the following functions:

- Engine oil
- Engine temperature

The following alarm outlets shall be provided for remote indication **via a dedicated generator controller Remote monitoring Unit.**(Deep Sea 892) or equal approved/ equivalent . It must be **SNMP** enabled for remote connectivity to Sentech's NMS system.

- Mains out of specifications
- Diesel Engine running
- Alternator on load
- Mains on load
- Urgent alarm
- Common / deferred alarm

Above alarm outlets shall consist of one voltage free change over contact, and shall be locked till the condition has been reset.

One mains operated battery charger complete with ammeter, voltmeter and protection, shall simultaneously charge the engine starter battery and control battery (if provided), the latter via isolating and limiting circuitry.

The Battery charger shall operate in parallel with the engine driven generator and shall have self-adjusting step less control characteristics (constant voltage, current limiting) to prevent excessive loss of water under float conditions.

A loss-of-charge current alarm shall be provided to indicate failure of the mains charger. This may be a current or voltage monitor. The alarm signal (contacts or voltage) shall be brought to terminals for connection to an external monitoring system.

An earth bar to which the metal parts of all individual units and sub-units are connected shall be provided in the equipment racks. The neutral point of the system shall be solidly connected to the bar. Suitable terminals shall be provided on the earth bar for connection of the main earth conductor.

Suitable surge suppression devices shall be included in the design to combat line voltage surges resulting from cloud induced charges and lightning. Surge suppression devices shall be **Dehventil /Dehngaurd /Blitzductor** type **(Or Equal Approved)**

Equipment racks shall be of the free-standing floor mounted type of folded sheet steel construction having a minimum thickness of 2mm.

Bottom or top cable entry with gland plates shall be provided.

Adequate vermin-proof ventilation openings shall be provided at the bottom and top parts of the cabinets.

Painting of equipment racks shall be done as follows:

- The interior of all equipment racks shall be painted with two coats of best quality "Enamel" paint and the outside shall be painted with two coats of approved colour paint.
- All metal parts to be degreased, rinsed, pickled, rinses, phosphate, neutralized and then to be thoroughly dried. This process shall be followed up within 48 hours by application of one layer of high quality zinc chromate primer of minimum thickness 0,04mm.
- The abovementioned primer to be followed by two coats of a good quality alkyd-based baked enamel. The minimum film thickness of the paint after baking shall not be less than 0,06mm.

The colors of the panel shall be as follows:

- All the frames to be **Electric Orange, code B26 SABS 1091-1975.**
- All doors and removable panels shall be **Red, code CA11 SABC 1091-1975.**

The control equipment shall be cooled by radiation and convection only and no cooling fans shall be acceptable. All equipment shall be capable of a continuous operation with their specified performance at transmitting sites having the worst physical compatible combination of the following environmental factors:

Altitude	- 2000 meters above sea-level
Temperature	- <u>Worst</u> possible minimum room ambient -5°C
	- <u>Normally</u> expected minimum room ambient 10C
	- <u>Worst</u> possible maximum room ambient 45°C
Relative humidity	- <u>Normally</u> expected maximum room ambient 30°C
	- Between 20% and 90% R.R.

15. Spare Parts and Component List for Control Panels

Every handbook supplied shall contain a comprehensive parts list of spare parts considered necessary for the proper operation and maintenance of the plant.

A first spare set of Filters and V-Belts to be supplied with Generator set

16. Drawings and Handbooks

- Three complete handbooks, drawings, circuit diagrams and workshop manuals for the engine and alternator in English language shall be supplied.
- Tenderers are to note that until all of the abovementioned quantities of these handbooks have been delivered to Sentech, delivery will be deemed to be incomplete even though the equipment may have been delivered and put into scheduled service.
- The contractor shall provide Sentech with one transparency of each approved arrangement and final detailed working drawing of all plant.
- All drawings to be supplied by the contractor in terms of this clause shall be used by Sentech for its own purposes only. Sentech shall not knowingly allow the said drawings to be used by others for purposes contrary to those stated above. The undertaking shall also apply to drawings made by approved sub-contractors.

17. Commissioning and Test Facilities

- Tests shall form part of the contract and the contractor is to provide test facilities, instruments and dummy loads including reactive elements and contactors to suit the alternator capacity. Tenderers to specify where the test facilities are available.
- The terminal voltage across each battery is to be checked. The density of the electrolyte in each cell of the lead-acid starter batteries is to be checked.
- The system operation and faults protection circuits have to be tested to the satisfaction of Sentech.
- Comprehensive commissioning tests shall be carried at the contractor's premises.
- The contractor shall be responsible for the provision of all the necessary fuel and equipment in order to carry out the above tests.
- The diesel-alternator set is to undergo a 3-hour load test at the supplier's premises or as mutually agreed under the supervision of Sentech. The set shall be subjected to a full load test for 2-hours followed by 10% overload for one hour. The load shall include reactive elements for a power factor of 0.8 (Unity)
- All the following readings have to be taken at 15 minutes intervals :
 - Engine temperature
 - Oil pressure



- Oil temperature
- Frequency
- Alternator voltage and load
- Alternator current
- Power factor (alternatively wattage)
- Ambient temperature

At the end of the test, the temperature of the alternator is to be checked and the fuel consumption is to be determined.

18. DELIVERY

The completed and tested unit shall be delivered to Sentech premises as specified by Sentech.

Approval of working drawings to be obtained before any assembly can take place.

The contractor shall provide Sentech with working drawings, Maintenance and Operating manuals as well as any other documents / drawings which are called for in the Technical Specification or documentation forming part of this contract or as agreed upon.

Every handbook supplied shall contain a comprehensive parts list considered necessary for the proper operation and maintenance of the plant.

A detailed programme of the design and manufacturing periods subsequent to the contract being awarded shall be submitted.

NB: Spare set of Filters, Belts and dedicated generator (utilized in the control panel) Controller (to be supplied with every Control Panel / Generator set