South African Revenue Service

RFP 39/2019

SPECIFICATIONS FOR THE MAINTENANCE AND SUPPORT, DIESEL REPLENISHMENT AND ONLINE MONITORING OF BACK-UP GENERATORS FOR SARS OFFICES NATIONWIDE FOR A PERIOD OF 36 MONTHS

Contents

1. EXECUTIVE SUMMARY

The South African Revenue Services (SARS) mandate under the South African Revenue Service Act 34 of 1997 includes the collection of all revenues that are due, ensuring maximum compliance with revenue legislation and providing a customs service that will maximise revenue collection, facilitate trade and protect the borders of South Africa. SARS' vision is to be an innovative revenue and customs agency that enhances economic growth and social development and supports South Africa's integration into the global economy in a way that benefits all citizens. SARS strives to exercise its mandate in an efficient and cost effective manner.

There is a need for South African Revenue Service (SARS) to have reliable back-up power supply to its facilities in case of utility power supply unavailability; SARS utilizes diesel generators to achieve this objective. There are two types of facilities occupied by SARS; those that are leased from landlords and those that are owned by SARS. The main objective of the requirements and specifications set out in this document is for SARS-owned facilities and those leased from State Owned Entities and Organs of State, however, it may be also required that the diesel generators in privately leased facilities be maintained by SARS' appointed service provider, thus the mandate set out in this document may be extended to accommodate this requirement. Therefore, the requirements and specifications in this document shall apply to either of the two above-mentioned facilities.

This document aims to further highlight the following;

- The description of the works
- Specifications and requirements for SARS diesel generators
- Safety, Health, Environment, and Quality (SHEQ) requirements
- Performance requirements and measurement
- And other general requirements

2. NORMATIVE REFERENCES

Generating Set Requirements for Inspection and Testing
SANS 8528, Reciprocating internal combustion engine driven alternating current generating sets – All Parts
SANS 60034-22, Rotating electrical machines Part 22: AC generators for reciprocating internal combustion (RIC) engine driven generating sets

3. DURATION OF SERVICE

The appointed service provider(s) will be required to provide the services for a period of thirty six (36) months.

4. DESCRIPTION OF THE WORKS

In the management of infrastructure, maintenance plays vital role in order to ensure reliability, longevity, and return on investment on equipment procured. Maintenance on infrastructure is either planned (preventative) or unplanned (reactive), and in more critical infrastructure even predictive. The latter requires sophisticated installation that will allow for trending of equipment behaviour whose data will be used to create patterns and trends that will allow for prediction of when equipment is likely to fail in order to intervene before the effect.

4.1 Generator Online Monitoring

The criticality of the reliability of back-up power supply at some of SARS' facilities requires that predictive maintenance be employed. This requires the installation of online monitoring on all diesel generators; this will be treated as a once off installation at the commencement of the appointed service provider's contract.

The online monitoring system shall be compatible, as far as possible, with the existing diesel generator electronic control units (ECU). SARS has two types of brands of ECUs currently installed on generators at its facilities; these are Deep Sea Electronics (DSE) and Lovato Electric (Lovato). It must be noted that some of these controllers are very old and may not be compatible with online monitoring technology and may need to be upgraded or modified.

The models of the ECU are as follows;

REGION	BUILDING	CONTROLLER MANUFACTURE	MODEL NUMBER	CONTROLLER SUPPLY VOLTAGE
MP	Witbank	DEEP SEA	7320AMF	24V
MP	Standerton	LOVATO	RGK 60	12V
MP	Lebombo Border Post	DEEP SEA	7320	12V
LIMPOPO	Polokwane	LOVATO	RGAM 4	24V
LIMPOPO	Lebowakgomo	DEEP SEA	7320	12V
LIMPOPO	Sibasa	DEEP SEA	7220	12V
EC	Port Elizabeth BO	DEEP SEA	7320	
EC	Mthatha	DEEP SEA	7320	24V
EC	Sanlam Building	DEEP SEA	7320	24V
EC	Waverley	LOVATO	RGAM 4	24V
EC	Uitenhage	OLYMPIAN & LOVATO	LOVATO ATL & 029961G30514H	12V
KZN	Trescon (800kVA)	LOVATO	31 RGAM 4	24V
KZN	Trescon (800kVA)	LOVATO	RGAM 4	24V
KZN	Albany House	DEEP SEA	7320	12V
KZN	Port Shepstone	LOVATO	RGAM 10	12V
KZN	Pietermaritzburg	AMF	AMF 120-4	24V
KZN	Richards Bay	LOVATO	RGAM 4	24V
KZN	New Castle	DEEP SEA	7320	24V
KZN	Pinetown	DEEP SEA	7320 MKII	12V
KZN	uMhlanga	DEEP SEA	7320	24V
KZN	Bayhead	DEEP SEA	7320	24V
FS	Bethlehem	SMARTGEN	HGM 7120	24V
FS	Bloemfontein	DEEP SEA	7320	24V
FS	Kroonstad	DEEP SEA	7320	12V
FS	Welkom	LOVATO	RGK 60	24V
FS	Kimberley	LOVATO	RGAM 42	12V
NW	Mmabatho	DEEP SEA	7320	24V
NW	Klerksdorp	LOVATO	RGAM 4	24V
NW	Rustenburg	LOVATO	RGAM 4	12V
WC	P166	LOVATO	31 RGAM 24	12V
WC	Bellville (250kVA)	LOVATO	31 RGAM 24	12V
WC	Bellville (500kVA)	LOVATO	RGAM 4	12V
WC	Bellville (800kVA)	LOVATO	RGAM 4	12V
WC	Beaufort West	DEEP SEA	7320	12V
WC	Lower Long BO	LOVATO	RGK 60	12V
WC	Worcester	DEEP SEA	7320	12V
WC	Paarl	AMF	120-4	24V
WC	CT Scanner Centre	DEEP SEA	7310	12V
GS	Alberton BO	DEEP SEA	7320	12V
GS	Kaserne	DEEP SEA	7320	24V
GS	Nigel	DEEP SEA	K1C12	12V

GS	Springs	DEEP SEA	7320	12V
GS	Vereeniging	DEEP SEA	643877	12V
GS	Benoni	DEEP SEA	7320MKII	24V
GN	Ashley Gardens	LOVATO	RGAM4	24V
GN	Doornkloof A	LOVATO	RGK 60	24V
GN	Doornkloof B	LOVATO	RGK 60	24V
GN	Doornkloof C	LOVATO	RGK 60	24V
GN	Khanyisa	LOVATO	RGAM 4	24V
GN	Lehae	LOVATO	31 RGAM 24	12V
GN	Pavillion	LOVATO	RGAM 4	24V
GN	Prospect House	LOVATO	RGAM 4	24V
GN	Pretoria North BO	DEEP SEA	6120 AMF	24V
GN	Riverwalk	LOVATO	31 RGAM 24	24V
GN	Pretoria ROR	LOVATO	RGAM 4	24V
GN	Veale	LOVATO	RGAM 4	24V
GN	Walker Creek	DEEP SEA	7320	24V
GN	Waterkloof	LOVATO	31 RGAM 24	24V
GC	Randburg	LOVATO	RGAM 4	24V
GC	Rissik	DEEP SEA	7320	12V

The minimum requirements of the diesel generator online monitoring system are;

- The system shall have capability to collect and store real-time data which should be accessible via the internet or mobile and/or computer-based installed application
- The system shall be capable of sending out short message service (SMS) texts to alert predefined mobile numbers of certain alarm set points that are reached, e.g. fuel level below 70%, oil temperature above 80 deg. Celsius, etc. The appointed service provider shall be responsible to ensure that the system is registered with relevant authorities to allow for such communication, such as Independent Communications Authority of South Africa (ICASA)
- The system shall either be separately compatible with DSE and Lovato controllers or be one that is capable of integrating all signals from either onto one dashboard for ease of monitoring. The latter is preferred, however, where not possible, the former shall be considered
- The appointed service provider shall be responsible for full-time monitoring of the dashboard; SARS shall be given the same access to all signals being monitored on the same dashboard. Access rights for SARS shall be to dedicated individuals which shall be provided to the appointed service provider, provision shall be made for at least 8 licenses for SARS.

The data collated via the online monitoring system shall also be used to implement predictive or preventative maintenance.

4.2 Planned and unplanned Maintenance

It is an inherent nature of maintenance of rotating machinery that there will be planned and unplanned activities. The implementation of predictive maintenance aims to also reduce the portion of unplanned maintenance or change what would be unplanned activities to planned ones.

The requirements attached as Annexure A shall be adhered to and used as a minimum guideline for planned maintenance and procurement of diesel generators for SARS, should the latter be so required. This will also help to guide the service provider on their pricing on the bid documents. The planned maintenance intervals or frequency is set out on the requirements (Annexure A) as well as on the Service Level Agreement (SLA). A draft SLA document is also attached as Annexure B of this document to give an indication of the requirements of the contract.

Unplanned maintenance shall comprise, as a minimum, of the following;

- Fault finding and resolution
- Repair and/or replacement of parts
- Drafting of scope of work for repairs and issuing of quotation or itemised bill of quantities for such works

Response times for unplanned maintenance are stipulated in the SLA document and shall be adhered to, refer to Annexure C.

4.3 Replenishment of diesel

Replenishing or refuelling of diesel is also part of the scope of services for the appointed service provider. SARS shall pay for refuelling at market resale price (including an agreed mark-up) at the time of requirement of such service; however, the bidder is expected to indicate a fixed rate per kilometre for transportation of fuel and also a fixed rate per hour for the labour. A detailed invoice shall be submitted by the appointed service provider for every refuelling event, and this shall clearly indicate the fuel price as per the amount of litres used to fuel the generator, the travel time and rate per hour, and the rate per kilometre and distance travelled.

Most of SARS facilities do not have on-site storage tanks for diesel nor bowsers; thus the replenishment of diesel shall be required on an ad-hoc basis and at short-notice where necessary. The online monitoring system shall strategically allow for such short-notice occurrences to be averted and allow for better planning.

5. REQUIREMENTS AND SPECIFICATION FOR SARS DIESEL GENERATORS

The requirements and specifications for SARS diesel generators are clearly stipulated in Annexure A of this document.

6. SAFETY HEALTH ENVIRONMENT AND QUALITY (SHEQ) REQUIREMENTS

The Successful Bidder will ensure that all work performed and all vehicles, plant and equipment bought onto or used on site complies with the Occupational Health and Safety Act, 1993 (Ac no 85 of 1993) as well as the Compensation for Occupation Injury and Disease Act, 1993 (Act no 130 of 1993).

The bidder shall submit their company's SHEQ policy, plans, procedures, standards, etc. These shall be attached to Annexure B under the relevant sections. It is to be noted that these must not be generic documents, but must be tailored to suite the scope of works detailed in this document.

6.1 Safety

Safety is of paramount importance at all SARS facilities, particularly when dealing with rotating machinery, it is therefore a requirement that a Safety File be submitted by the appointed service provider upon appointment.

The appointed service provider shall;

- Ensure the safety of their personnel when carrying out any works on SARS facilities
- Ensure the safety of SARS personnel when carrying out any works on SARS facilities

- Ensure the safety of SARS all persons within the vicinity when carrying out any works on SARS facilities
- Ensure the safe operation of the equipment that is under their maintenance responsibility
- Submit a safety file that contains a Baseline Risk Assessment for working on diesel generators and their auxiliaries, as well as a Baseline Risk Assessment for business operations should there be any downtime as a result of any faults on the diesel generators. This will be conducted in conjunction with SARS technical team and safety personnel.
- Ensure compliance with the Occupational Health and Safety Act, Act 85 of 1993

6.2 Health

Health of SARS personnel, contractor's personnel, and SARS' clients are also paramount at all SARS facilities.

The appointed service provider shall:

- Ensure that there are no hazards that may be harmful to health when carrying out of works. If there is need for hazardous chemicals to be used, these shall be clearly communicated via signage, and must also form part of the risk assessment
- Diesel exhaust fumes can be harmful to health, therefore, the appointed service provider shall continuously check (either visual or using instruments) that there are no exhaust fumes that are directed towards occupied spaces. Generator exhaust pipes shall discharge safely away to prevent being carried into buildings, this should be at points where the fumes can be carried away via natural air draught.

6.3 Environment

The environment in and around the diesel generators shall be preserved at all times. The appointed service provider shall;

- Ensure that there are no diesel or oil spillages that affect the surrounding environment. If a spillage does happen, it shall be contained within the bund wall of the generator.
- Report any spillage that has impacted on the environment and carry out the clean-up operations
- Ensure that noise pollution is also addressed

The appointed service provider shall perform assessments on the generator plants to identify any factors that may affect the environment, and advise SARS accordingly.

6.4 Quality

To ensure that back-up power supply to SARS facilities is reliable at all times, any works that are carried out on the diesel generator plant shall of high quality, whether workmanship or the supply of replacement parts or fuel grade.

The appointed service provider shall;

- Submit a Quality Control Programme (QCP) with provision for necessary intervention points (e.g. Hold Point, Witness Points, etc.)

7. PERFORMANCE REQUIREMENTS AND MEASUREMENT

There are key performance indicators that SARS wishes the bidder to respond to in order to give guidance to SARS prior to effecting any appointment. It is required that the bidder responds to each item with either a “Yes” or “No” on the respective column in Schedule A. “Yes” indicates full conformance to the requirements and “No” indicates non-conformance. If the answer is “No”, the bidder may then choose to indicate an alternative under the column in Schedule B or comment.

Note: A “No” does not mean the bidder shall be exonerated from conforming to the requirements that SARS have set out.

Item	Description	Schedule A - SARS Specification		Schedule B - Service Provider Alternative
		Specification	Yes or No	
6.1	Preventative Maintenance			
6.1.1	Routine Maintenance and Tests - As per Annexure A	Weekly		
6.1.2	Minor services - As per Annexure A	Quarterly interval, i.e. 3 times a year		
6.1.3	Major Services - As per Annexure A	Every 12 months or 2500 hours		
6.2	Reactive Maintenance			
6.2.1	Availability of service provider's Service Centre or Call Centre	Mondays to Fridays from 07h00 to 17h00		
6.2.2	Availability of emergency response technician	24 hours a day - 7 days a week		
6.2.3	Resolution of reported faults after receipt of purchase order Note: Written motivation shall be submitted to SARS should there be reasons that prevent the resolution of a particular fault within 24 hours, this shall be submitted by the service provider as soon as such realisation comes to light.	Within 24 hours		
6.3	Response to Call Outs (measured from time of call to arrival on site)			
6.3.1	Emergency - With immediate impact on business < or = 100km from affected site* >100km to <300km from affected site > or = 300km from affected site	 Within 2 hours Within 4 hours Within 8 hours		
6.3.2	Urgent - With no immediate impact to business (07h00 to 17h00)			

	< or = 100km from affected site >100km to <300km from affected site > or = 300km from affected site	Within 4 hours Within 6 hours Within 24 hours		
6.3.3	Urgent - With no immediate impact to business (17h00 to 07h00) < or = 100km from affected site >100km to <300km from affected site > or = 300km from affected site	 Within 4 hours Within 6 hours Within 24 hours		
6.3.4	**Critical** – All Town Concentrator site**, regardless of distance	Within 2 hours		

* Distance is measured from the service provider's office in the cluster to the affected site

**List of Town Concentrator sites

- Polokwane office
- Alberton Campus
- Sable House (Belville)
- Klerksdorp office
- George office
- P166 (Cape Town)
- Bloemfontein office
- Prospect House (Pretoria)
- Nelspruit office
- Port Elizabeth office
- Kimberly office
- Trescon House (Durban)

7.1 SARS Regions/Clusters

The following table indicates the clustering of SARS regions. The bidder is to indicate which clusters they are submitting stating “Yes” on the relevant cluster. The bidder is to clearly indicate “No” for clusters of which they are not bidding for.

Item	Description	Comment [Yes or No]
Cluster A	Head Office/ Gauteng North/Limpopo	
Cluster B	Northern Cape/Free State	
Cluster C	Gauteng South/Mpumalanga	
Cluster D	Gauteng Central/ North West	
Cluster E	KwaZulu Natal/Eastern Cape	
Cluster F	Western Cape	

Annexure A – Generator Specification, and requirements for Inspection and testing

GENERATING SET REQUIREMENTS FOR INSPECTION AND TESTING

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Preface

The South African Revenue Service (SARS) has a core mandate of collecting revenue on behalf of the Republic of South Africa (RSA). The successful collection of revenue depends on various facets which need to work together and seamlessly, one of these facets is infrastructure. There has to be infrastructure where a taxpayer can be hosted should they wish to have face-to-face service with a SARS official. There also has to be infrastructure to accommodate SARS officials who assist taxpayers remotely, either telephonically or online. Furthermore, there has to be infrastructure to accommodate SARS officials who either have to work at a port of entry or in an office to ensure the successful day-to-day operations.

The above-mentioned are but a few examples of the need for infrastructure at the South African Revenue Service. This resulted in a need to have a dedicated business unit that deals directly with the infrastructural needs of the organisation. The Corporate Real Estate (CRE) is a business unit, under the Finance Division, which is responsible for all infrastructural requirements of SARS, for both leased and SARS-owned property.

In order to ensure uniformity within the organisation, CRE has assumed the responsibility of compiling and obtaining approval of strategies and standards that will guide the organisation regarding infrastructure. These strategies and standards are the life-blood of SARS as far as infrastructure is concerned and CRE remains the custodian of these strategies and standards. The latter, in particular Standard Operating Procedures (SOPs), are to be adhered to at all times and any deviations should be sought through written consent from the Group Executive: CRE.

1 Scope

This Standard Operating Procedure (SOP) aims to highlight the philosophy around generating sets, the requirements on commissioning of generating sets, as well as inspection and test methods to be used on generating sets for SARS.

This SOP is applicable to generating sets driven by reciprocal internal combustion (RIC) engines. It is a rule of thumb that SARS utilises generating sets that use diesel as a fuel-medium, thus this SOP will focus on and cover diesel-fuelled generating sets. If a need arises to utilise petrol as a fuel-medium, this will be dealt with on a case-by-case basis and the CRE Electrical Engineer or Mechanical Engineer will be requested to develop a temporary SOP for this application, once they have assessed and found it necessary to do so. This SOP does not apply to low-power generating sets, i.e. generating set up to 10kW, if this is a requirement, then a request should be sent to the CRE Electrical or Mechanical engineer.

There are various tests that are performed on the generator (or alternator) and the engine separately. This SOP is developed under the assumption that these have been performed successfully by the respective Original Equipment Manufacturer (OEM) and all data packs (containing test reports, operating and maintenance manuals, etc.) have been made available, supplied to, and accepted by CRE Mechanical or Electrical Engineer.

2 Normative references

The following referenced documents have been utilised in the compilation of this SOP, to ensure that it conforms to national and international standards, i.e. South African National Standards (SANS), International Organisation for Standardisation (ISO), and International Electrotechnical Commission (IEC).

SANS 8528-1, Reciprocating internal combustion engine driven alternating current generating sets Part 1: Application, rating and performance

SANS 8528-2, Reciprocating internal combustion engine driven alternating current generating sets Part 2: Engines

SANS 8528-3, Reciprocating internal combustion engine driven alternating current generating sets Part 3: Alternating current generators for generating sets

SANS 8528-4, Reciprocating internal combustion engine driven alternating current generating sets Part 4: Controlgear and switchgear

SANS 8528-5, Reciprocating internal combustion engine driven alternating current generating sets Part 5: Generating sets

SANS 8528-6, Reciprocating internal combustion engine driven alternating current generating sets Part 6: Test methods

SANS 8528-7, Reciprocating internal combustion engine driven alternating current generating sets Part 7: Technical declarations for specification and design

SANS 8528-8, Reciprocating internal combustion engine driven alternating current generating sets Part 8: Requirements and tests for low-power generating sets

SANS 8528-9, Reciprocating internal combustion engine driven alternating current generating sets Part 9: Measurement and evaluation of mechanical vibrations

SANS 8528-10, Reciprocating internal combustion engine driven alternating current generating sets Part 10: Measurement of airborne noise by the enveloping surface method

SANS 8528-12, Reciprocating internal combustion engine driven alternating current generating sets Part 12: Emergency power supply to safety services

SANS 60034-22, Rotating electrical machines Part 22: AC generators for reciprocating internal combustion (RIC) engine driven generating sets

3 Informative references

Occupational Health and Safety Act 1993 (Act No. 85 of 1993)

4 Abbreviations

Abbreviation	Description
AC	Alternating Current
ATS	Automatic Transfer Switch
AVR	Automatic Voltage Regulator
CRE	Corporate Real Estate
DIST	Digital Information Services and Technology
ECU	Electronic Control Unit
FAT	Factory Acceptance Test
ICT	Information and Communications Technology
IEC	International Electrotechnical Commission
ISO	International Organisation for Standardisation
kVA	kilo-Volt-Ampere
kW	kilo-Watt
OEM	Original Equipment Manufacturer
PO	Purchase Order
PPE	Protective Personal Equipment
RIC	Reciprocal Internal Combustion
RSA	Republic of South Africa
SANS	South African National Standards
SARS	South African Revenue Service
SAT	Site Acceptance Test
SOP	Standard Operating Procedure
THD	Total Harmonic Distortion

5 Philosophy on generating sets

5.1 Generating set

A generating set is equipment that produces mechanical energy which is in turn converted to electrical energy to supply a designated load. The generating set mainly consist of one or more prime movers, one or more generators (or alternators), control gear and switchgear, and auxiliaries. During inspection and testing, these components need to be given due attention as individuals as well as part of the set.

The following highlights SARS requirements on generating sets;

- Prime mover – This shall be a compression-ignition engine. If there is a need to utilise a spark-ignition engine, a request shall be made to the CRE Electrical or Mechanical engineer to assess and if necessary, compile a temporary SOP for the application

- Electrical generator (or alternator) – Only synchronous machines shall be used. If there is a need for an asynchronous machine to be used, a request shall be made to the CRE Electrical or Mechanical engineer to assess and if necessary, compile a temporary SOP for the application

- Control gear and switchgear – An on-board or off-board control gear and switchgear can be used, these will be determined based on operational requirements, safety, etc.

- Auxiliaries – These are additional items to those that have already been fitted on the generating set and are essential in order to ensure proper, safe, and reliable operation.

5.2 Mode of operation

Generating sets for SARS shall be those designed for CONTINUOUS OPERATION AT VARYING LOAD, land use, and outdoor installation. Furthermore, depending on the organisation's operational requirements, e.g. a Tier 3 Data Centre Infrastructure, there may be a requirement for generating sets to operate in parallel to each other, but not with the utility supply. In such applications, the generating sets shall be equipped with synchronising devices to ensure that safe and reliable parallel operation is realised. The Information and Communications Technology (ICT) requirements will be informed by Digital Information Services and Technology (DIST) division within SARS thereafter, CRE will advise on which best method is to be utilised to supply the ICT requirements.

The national grid is governed by the National Grid Code, hence any power source that intends on operating in parallel to the national grid has to conform to the Grid Code. The national grid is seen as an infinite source or busbar, hence it would require unnecessary overdesign and cost for SARS to procure a generating set that would operate in parallel to the national grid. Due to the above-mentioned reasons, all SARS generating sets shall be fitted with Automatic Transfer Switches (ATS) to prevent any parallel operation with the national grid or utility supply.

Generating sets shall be fully equipped and capable of Automatic and Manual operations using a two-way selector switch. In some instances a Test mode may also be added with a three-way selector switch.

5.3 Performance classes

Generating sets at SARS shall be either Class G3 or Class G4, depending on the application and organisation's operational requirements. The required performance class will be informed by the requirements from DIST, which CRE will analyse and advise on.

- Class G3 – This is for applications where the connected equipment makes severe demands on the stability and level of the frequency, voltage and waveform characteristics of the electrical power supplied by the generating set, e.g. telecommunications and thyristor-controlled loads.

- Class G4 – This is for applications where the demands made on the stability and level of the frequency, voltage and waveform characteristics of the electrical power supplied by the generating set are exceptionally severe, e.g. data-processing equipment or computer systems.

6 Functional Tests and Acceptance Tests

Under no circumstances shall a generating set be accepted by any SARS official without the tests discussed under this section are or have been undertaken and all necessary documentation (e.g. test reports, operating and maintenance manuals, etc.) has been verified and accepted by CRE Mechanical or Electrical engineer.

Depending on the criticality of the generating set, in terms of application within SARS, there may requirements for both a Factory Acceptance Test (FAT) or functional test and a Site Acceptance Test (SAT) or acceptance test to be conducted on the same generating set and be witnessed by CRE Mechanical and/or Electrical engineer(s). The CRE engineer shall, at their discretion and to the benefit of SARS, choose to place points of control (verification point, or witness point, or hold point) on the programme works for either of the tests.

6.1 Functional tests

All generating sets that are procured as-built (off-the-shelf) or specifically manufactured for the use on SARS property or infrastructure shall have functional tests conducted in accordance to relevant national standards, or international standards if the former is not available.

In the case of an off-the-shell generating set, the functional test does not have to be repeated if it has been conducted before and there is documented proof of such a test being carried out with all test reports and manuals made available and accepted by CRE Electrical or Mechanical engineer. In the absence of documented proof, a full functional test shall be conducted either on site or at the supplier's premises.

In the case of a functional test performed at the supplier's premises, the accuracy of the measuring equipment shall be as per Table 1 below;

Table 1 Measurement equipment accuracy

Parameter	Units	Tolerance (%)
Current	A	1,5
Voltage	V	1,5
Active Power	kW	1,5
Reactive Power	kVA	1,5
Power factor	-	3,0
Frequency	Hz	0,5

6.2 Acceptance tests

The CRE Electrical or Mechanical engineer can, at his discretion and to the benefit of SARS, choose to waive the performance of the acceptance test. The waiver shall be in writing, in the form of a memo, indicating that the acceptance test is waived as well as listing substantiating reasons for the decision. Some of the reasons could be based on when the Functional test was performed on the generating set and the results thereof. It would be futile and not economical to perform an Acceptance test if the Functional test has been performed recently and all test results are made available and acceptable. This remains a technical function and shall be only exercised by CRE Electrical or Mechanical engineer.

In the absence of a waiver, all generating sets procured by SARS shall be subjected to Acceptance tests. Unlike the Functional test which should be performed at rated power factor, the Acceptance test shall be performed at unity power factor. Unless there are compelling reasons to perform the acceptance test at rated power factor, the results from the unity power factor test using a resistive load bank shall be deemed acceptable.

6.2.1 Tests

The following tests shall be performed as a minimum during the Acceptance test; the latter can be on the day of commissioning or before:

- Step load tests at 30%, 50%, 75%, 100%, and 110% of rated power (kW). The first test should only commence once the generating set has reached steady-state conditions. Each of the load tests should be performed for at least 30 minutes, with exception of the 30% load test which can be conducted for a minimum of 15 minutes after steady-state has been reached by the generating set. The 110% load test is mandatory for all generating sets that will be used for prime power; it may be waived, in writing for standby power generating sets, by the CRE Electrical or Mechanical engineer.

- Full load (100%) rejection test to verify the capability of the Automatic Voltage Regulator (AVR) to regulate the voltage within acceptable tolerances.

- Battery charging capability of the auxiliary alternator. The battery voltage level shall be checked before any of the tests commence as well as after.

- Noise level measurements with all canopy doors opened as well as when closed.

- Electrical Control Unit (ECU) tests, switchgear tests, ATS test, as well as all other functionalities including emergency stops.

6.2.2 Checks (C)

It is an integral part of the Acceptance test to perform key checks and inspections on the generating set, the following minimum checks are to be conducted;

Group CA

- Completeness of items supplied and to be tested

Group CB

- Alignment, Vibrations (steadiness), Unusual running noises

- Operating functions of auxiliary equipment
- Tightness of pipework joints and components
- Protection against accidental contact (mechanical and electrical)
- Operating and monitoring functions
- Unusual running noises
- Temperature rise of important components
- Positioning of exhaust gas ducting, airflow intake and discharge openings

Group CC

- Switching functions of the associated switchgear
- Control functions of the associated switchgear
- Monitoring functions of the associated switchgear

Group CD

Suitability for parallel operation, where required

6.2.3 Measurements (M)

It is an integral part of the Acceptance test to perform measurements of key parameters on the generating set, the following minimum measurements are to be conducted under steady-state conditions where required;

Group MA (under steady-state operating conditions)

- Voltage
- Frequency

Group MB (under steady-state operating conditions)

- Current
- Range of voltage setting
- Range of frequency setting
- Active power or power factor

- Steady-state frequency band
- Rate of change of voltage setting
- Rate of change of frequency setting

Group MC

- Start-up behavior, i.e. period taken to reach steady-state, no-load start-up and load start-up, etc.

Group MD (under steady-state operating conditions)

- Lubricating oil pressure
- Coolant temperature at input and output of engine and generator

Group ME

- Exhaust gas temperature

Group MF

- Noise emission, with canopy doors open and also closed

Group MG

- Exhaust gas emission

Group MH

These parameters should be measured using an oscillography or oscilloscope at a defined power factor whilst the generator is loaded and de-loaded to assed transient behavior.

- Voltage
- Current
- Frequency

Group MJ

- The harmonic content of the voltage waveform, including Total Harmonic Distortion (THD)

Group MK

- The amplitude modulation of the voltage waveform, influenced by AVR performance

Group ML (under steady-state operating conditions)

- Power distribution in parallel operation and load sharing in parallel.

Group MM

- The fuel consumption of the generating set relative to the electric power available at the alternating current (AC) generator terminals, taking into account the calorific value of the fuel

Group MN

- Effectiveness of the electrical protection devices, including electronic relays, mechanical trips, etc.

The accuracy of the measuring equipment shall be as follows, for Acceptance tests performed on site;

Table 2 On-site Acceptance test measuring equipment accuracy

Parameter	Units	Tolerance (%)
Current	A	2,5
Voltage	V	2,5
Active Power	kW	2,5
Reactive Power	kVA	2,5
Power factor	-	5,0
Frequency	Hz	1,0

7 Routine Maintenance (Inspection and Testing)

7.1 Overview of onsite procedure

7.1.1 Safety

Health and safety regulations and provisions are to be adhered to, including but not limited to:

- Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);

The prerequisites before any work can be carried out on a SARS generating set are as follows;

- Only qualified technicians (with proof of such qualification presented to SARS upon request) may carry out inspection and testing;

- Correct Personal Protective Equipment (PPE) must be utilized at all times;

- Inspect the outside of the generating set, vents if in canopy, water, oil and diesel leaks before any procedure; and

- If in a canopy, open all the canopy doors, with the generating set switched off (OFF/Manual Mode), and perform through inspection of the components, e.g. engine block, for any signs of wear and tear.

7.1.2 Inspection

Only once the generating set has been placed to **OFF/Manual Mode,** inspection can proceed.

7.1.3 Test Run/Off-load testing

The generating set must only be started (or switched on) once all inspection procedures have taken place. The generating set must be allowed to run for 10 minutes whilst data is written in the inspection checklist (report). Once all tests are completed, the generating set must be switched back to **AUTO** mode before leaving the site.

7.1.4 Shut Down/Full load testing

The generating set should be left on **AUTO** mode in order to observe the switch over function.

7.2 Details of onsite procedure

The following procedure should be followed for generating set inspection and testing:

7.2.1 Weekly and/or monthly inspection and testing of generating sets (off-load testing)

These inspections and tests should be performed in accordance to the CRE maintenance strategy.

Prior to starting the generating set, tier 1 checks should be performed. Tier 1 activities include the following checks:

- Check control panel for any alarms;

- Oil Levels;

- Coolant levels;
- Check battery voltage level, charge rate and electrolyte level;
- Visual inspection for any oil, water, coolant or diesel leaks;
- Diesel fuel levels;
    - If diesel is below 70% then follow diesel replenishment procedure;
- Check engine oil level and radiator water level. Top up water, oil and electrolyte as required;
- Check that heater jacket is warm;
- Check water heater jacket operation and condition of hoses;
- Check alternator fan belt tension;
- Running hours on the unit; and
- Ensure that generating set room or canopy is clean and obstruction-free at all times.

After all tier 1 checks have been completed, the generating set can be started on **TEST** mode**.** It must be allowed to run for no more than 10 minutes.

Once the generating set has been switched on and running, the following checks should be performed and recorded as a minimum;

- Observing start-up;
- Battery charge rate;
    - Check and record generator output voltages and maximum demand amperage;
- Check generator output frequency and stability;

- Monitor fuel levels;
- Check and record water temperature and oil pressure reading during operation;
- Monitor temperature of engine via heat gauge;
- Monitor phase balancing per phase;
- Visual inspection of any loose components, bolts, nuts or wiring;
- Visual inspection to ensure that the belts are running correctly and freely;
- Check for oil and water leaks during operation; and
- Ensure that control panel is fully functional.

The generating set should be then switched **OFF** after 10 min (this should happen automatically in **TEST** mode). The following checks should then be performed and recorded;

- Any oil, coolant or diesel leaks;
- Check Fuel levels; and
- Check battery charge.

At the end of all inspection and testing, ensure that generating set is placed back on **AUTO** mode before leaving site. All relevant stakeholders should sign off on the checklist. Any remedial or corrective work should be logged and always executed via a maintenance contract (if one is in place) with an incident number and Purchase Order (PO) number. The checklist and all other relevant documentation should be filed via SARS configuration management system.

7.2.2 Monthly and/or quarterly inspection and testing of generating set (On-load testing)

These inspections and tests should be performed in accordance to the CRE maintenance strategy.

The following are prerequisites before any on-load testing is performed on a generating set;

- Ensure that procurement is engaged to acquire the services of a registered technician or electrician.
- Ensure that a change is logged with DIST.
- Record the change number and communicate this change number with the relevant local DIST Technical Manager.
- Notify the service provider of the test date and times.

- Notify all relevant business units of the on-load test.

- Ensure that the generating set is placed on **AUTO** mode.

Prior to starting the generating set, begin tier 1 checks/inspections. Tier 1 activities include the following checks/inspections:

- Check control panel for any alarms;

- Oil Levels;

- Coolant levels;

- Check battery voltage level, charge rate and electrolyte level;

- Visual inspection for any oil, water, coolant or diesel leaks;

- Diesel fuel levels;

    - If diesel is below 70% then follow diesel replenishment procedure;

- Check engine oil level and radiator water level. Top up water, oil and electrolyte as required;

- Check that heater jacket is warm;

- Check water heater jacket operation and condition of hoses;

- Check alternator fan belt tension;

- Running hours on the unit; and

- Ensure that generating set room or canopy is clean and obstruction-free at all times.

Upon completion of the tier 1 inspection, allow the contracted electrician to trip the main incomer breaker to stimulate a mains failure. The generating set should then be allowed to start and the changeover to occur.

Whilst the generating set is running and on-load, the following checks should be conducted;

- Observing start-up, load acceptance and satisfactory operation of the ATS;
- Battery charge rate;
- Check and record generator output voltages and maximum demand amperage;
- Check generator output frequency and stability;
- Monitor fuel levels;
- Check and record water temperature and oil pressure reading during operation;
- Monitor temperature of engine via heat gauge;
- Monitor phase balancing per phase;
- Visual inspection of any loose components, bolts, nuts or wiring;
- Visual inspection to ensure that the belts are running correctly and freely;
- Check for oil and water leaks during operation; and
- Ensure that control panel is fully functional.
- Record all findings on the spreadsheet.

- Ensure that all emergency equipment is fully functional.

- Record all anomalies that were found, if any.

- Log the anomalies and ensure that remedial actions are executed.

Utility supply should be restored within 60 minutes, and once the generating set cuts out, all it to cool down and switch off (Automatic process after power is restored). Then the following checks shall be performed;

- Any oil, coolant or diesel leaks;
- Check fuel levels; and
- Check battery charge

At the end of all inspection and testing, ensure that generating set is placed back or remains on **AUTO** mode before leaving site. All relevant stakeholders should sign off on the checklist. Any remedial or corrective work should be logged and always executed via a maintenance contract (if one is in place) with an incident number and Purchase Order (PO) number. The checklist and all other relevant documentation should be filed via SARS configuration management system.

Note: On-load tests are excluded from the Service Level Agreement. Should these tests be required for any reason, written approval shall be issued by the Senior Manager: CRE Facilities Management to the contracted service provider for this function.

7.2.3 Major Service

Major service shall be as per the Original Equipment Manufacturer's (OEM) manual and recommendation. This shall be a major engine overhaul as well as generator (alternator) overhaul.

7.2.4 General

Cleaning;

- All works must be carried out in a clean and tidy manner, conducive to the normal operation of the building in which the services are carried out. Wipe off oil, fuel or water spills on engine and drip tray, and clean up plant room generally. All rubbish (if any) must be cleared and removed by Service provider after each generator site attendance, at the Service Provider's costs.

Noise Control and discomfort to the building occupants;

- Approval must be obtained prior to any noisy operations a reasonable and practical measures must be taken to avoid discomfort to building occupants (i.e. creation of dust, debris, airborne particles, smoke and colour).

Record keeping;

- A record of all inspections, tests and remedial actions or works must be maintained for quality review or audit purposes. Quality records should include but not limited to: inspection and testing schedule, checklist, book on site, job card, remedy call (with incident number), PO and invoices.

Service Review;

- Where a service provider is required to be on site for any reason including inspection, testing and remedial or corrective works, service quality or performance must be monitored and reviewed. This is done in order to avoid any unnecessary generating set failures as a result of poor service. If no queries or generating set failures are encountered within a reasonable and specified period, proceed to process payment, if any.

Annexure B – Technical Evaluation Documents

Company Experience

Key Staff Skills and Experience

Regional Footprint or Presence

SHEQ Documents

Technical Proposal/Methodology

Online Monitoring System

Annexure C – Draft Service Level Agreement

Annexure D – List of SARS Generators

The following is a list of generators that are installed on SARS facilities. This is included in order to give the bidder an idea of the types of generators with their respective sizes and capacity. The generator list may have changed by the time of the service provider's appointment; hence it is to be used as a guideline to inform the nature of generator sets that SARS requires services for.

Mpumalanga Generator List								
Region		Building	Address	Generator size [kVA]	Make	Serial Number	Barcode	Tank Size [L]
MP		Witbank	Cnr Botha Avenue & Paul Kruger Streets	150	Perkins	U8995495	247DV	1000
MP		Standerton	Cnr Princess & Kerk Streets	100	Perkins	U859052N	6526J	1000
MP		Border Post	Lebombo Border Post	14	Jasco	No serial number- Corroded by the elements	196EE	48
MP		Nelspruit	31 Citrus Street, Ext 7	500	Doosen		No bar code	800

Limpopo Generator List								
Region		Building	Address	Generator size [kVA]	Make	Serial Number	Barcode	Tank Size [L]
Limpopo		Polokwane	40 Landros Mare Street,	315	Volvo	D16030591C3A	1627U	500
Limpopo		Lebowakgomo	Old Government Building	200	Perkins		923DO	300
Limpopo		Sibasa	756 P West Main Road	375	Kirloskar			1000
Limpopo		Giyani	Government Building, Giyani	300	Perkins			400

Eastern Cape generator list								
Region		Building	Address	Generator size [kVA]	Make	Serial Number	Barcode	Tank Size [L]
EC		Port Elizabeth BO	Cnr St Mary's Terrace & Whytes Road	450	Volvo	D12640886D1A	1621U	1000
EC		Mthatha	North Spar Complex, John Beer Road	200	Volvo	MV23398	1614U	800
EC		Sanlam Building	Chapel Street	600	Volvo	D16030781C3A	1629U	600
EC		Waverley	3-36 Phillip Frame Road, Chiselhurst	600	Volvo	D12640886D1A	1621U	1000
EC		Uitenhage	1 Young Street	50	Olympian	KK1328*U102365B	7679H	100

Free State-Natal generator list								
Region		Building	Address	Generator size [kVA]	Make	Serial Number	Barcode	Tank Size [L]
FS		Kimberley	Toyota Building - Villiers & Alan st	450	Volvo	D12640885D1A	1622U	450
FS		Betlehem	32 Church Street	100	Inyata	6B10K017207	Landlord	200
FS		Bloemfontein	New Central Government Building -Cnr Aliwal & Nelson Mandela	750	Detroit	D9212	0286R	1000
FS		Kroonstad	LMC Centre - 54 Hill St	150	Perkins	U8995585	248DV	300
FS		Welkom	Cnr Tulbagh & Graaf Streets	500	Perkins	HGB061161U0971M	3938U	960

Western Cape generator list								
Region		Building	Address	Generator size [kVA]	Make	Serial Number	Barcode	Tank Size [L]
WC		P166	22 Hans Strijdom Avenue	400	Scania	B992.01	9224Q	800
WC		Bellville	Cnr Durban and Voortrekker Rd	250	Scania	6505629	2780Y	480
WC		Bellville	Cnr Durban and Voortrekker Rd	800	Perkins	DGDF2384U15148S	1631U	1000
WC		Bellville	Cnr Durban and Voortrekker Rd	500	Volvo	D16*030240*C3*A	1624U	350
WC		George	New Office	350				700
WC		Beaufort West	Church Street	60	Cummins	28000033	N3967	250
WC		Lower Long BO	17 Lower Long Street	200	Scania	MH28740	9224Q	200
WC		Worcester	59 Church Street	150	Perkins	YD37746*U893492S	240DV	300
WC		Paarl	19/20 Market Street, Paarl	250	Perkins	1456564	No barcode at this stage	600
WC		CT scanning centre	Duncan Road, Cape Town Harbour (Scanner)	150	Perkins	YD51565*U960921Y*	980DO	1000
WC		Mitchell's Plein	Ground floor, Promenade Shopping Centre, AZ Berman Drive					

Gauteng Generator List- Gauteng Regions (Central-GC, South-GS, and North-GN)								
Region		Building	Address	Generator size [kVA]	Make	Serial Number	Barcode	Tank Size [L]
GC		Randburg	Cnr Hill & Kent Street, Randburg	600	Volvo	D16030592C3A	1626U	250
GC		Rissik	4 Rissik street, Johannesburg	400	Perkins	MY29392	171DV	200
GC		Randfontein	39 Stubbs Street	135	Volvo	5311853360	4885R	500
GC		Soweto Orlando East	Cnr Dynamo Drive & Chris Hani Road	150	Perkins	PR83526*1281 6C*	636EE	1000
GS		Alberton	49 Newquay Rd	200	Perkins	U037238W	995DO	500
GS		Alberton Campus	McKinnon Crescent, New Redruth	1600	MTU Detroit	526106149	919DO	11000
GS		Alberton Campus	McKinnon Crescent, New Redruth	1600	MTU Detroit	526106147	920DO	11000
GS		Benoni	65 Howard Ave	250	Volvo	TAD734GE	RAD11	900
GS		Edenvale	Shoprite Building - Cnr Van Riebeeck & Hendrik Potgieter Streets	400	Scania	MT15828	Landlord	500
GS		Kaserne	Maritzburg Road, City Deep, Johannesburg	75	Stamford	H2305/2	2375V	200
GS		Springs	Sanlam Building - 74 3rd Street	200	Perkins	U0360904	608EA	500
GS		Boksburg	Atlas Road, Johannesburg	250		MAM03776	Landlord	400
GS		Nigel	Cnr Hendrik Verwoerd & 4th Avenue	60	Cummins	0102011/01	3965U	300
GS		Vereeniging	21 Merriman Avenue	200	Perkins	8949785	238DV	500

GN		Prospect House	304 Lillian Ngoyi & Francis Baard Streets	300	Volvo	D9AZA7009164697	1619U	300
GN		Pretoria North BO	Cnr Rachel De Beer & Burger Streets	250	Perkins	MZ20946	999EA	300
GN		Walker Creek	90 Flourence Rebeiro	500	Perkins	62691/04	860CT	7000
GN		Waterkloof	209 Waterkloof Street, Brooklyn	500	Perkins	2806CE16T0G2	0253R	300
GN		Brooklyn Bridge	570 Fehrsen Street, Brooklyn Bridge	600	Doosan	DH 08-0028-01537	Landlord	1000
GN		Brooklyn Bridge	570 Fehrsen Street, Brooklyn Bridge	600	Doosan	DH 08-0029-01538	Landlord	1000
GN		Ashlea gardens	46 Lebombo Road, Ashlea Gardens	300	Volvo	D9A2A*9009162382	1617U	300
GN		Riverwalk	Matroosberg Street, Ashlea Gardens	1000	Perkins	MV31338	Landlord	3000
GN		Pretoria ROR	304 Lillian Ngoyi & Francis Baard Streets	300	Volvo	D16029994C3A	1625U	300
GN		Lehae la SARS	299 Bronkhorst Street, Brooklyn	1650	Mitsubishi	PS8-HR-50	908BJ	9000
GN		Lehae la SARS	299 Bronkhorst Street, Brooklyn	1850	Le Roy Somer	604245-3	878DD	9000
GN		Lehae la SARS	299 Bronkhorst Street, Brooklyn	1850	Le Roy Somer	602862-s	879DD	9000
GN		Doringkloof	Protea Road, Doringkloof, Centurion	550	Doosan	EAYOE-800302		9000
GN		Doringkloof	Protea Road, Doringkloof, Centurion	500	Doosan	EASOA-800256		9000
GN		Doringkloof	Protea Road, Doringkloof, Centurion	300	Doosan	FDIOC-800330		9000
GN		Pavilion	Cnr Tram & Bronkhorst Streets	300	Volvo	D12*640883*D1*A	1620U	300
GN		Veale Street	271 Veale Street, Brooklyn	600	Volvo	D9A2A*7009162412	1616U	300
GN		Khanyisa	281 Middle Street, Brooklyn	600	Volvo	D16*029647*C3*A	1630U	300

North West Generator List								
Region		Building	Address	Generator size [kVA]	Make	Serial Number	Barcode	Tank Size [L]
NW		Mmabatho	Cnr Batlhaping & Barokologadi Streets	350	Perkins	MY28443		900
NW		Klerksdorp	18 Anderson Street	500	Volvo		1623U	1000
NW		Rustenburg	39 Heystek Street,	300	Volvo	D9A2A*7009162354	1615U	1000

KwaZulu-Natal generator list								
Region		Building	Address	Generator size [kVA]	Make	Serial Number	Barcode	Tank Size [L]
KZN		Trescon	201 West Street	800	Perkins	U15149S	1633U	900
KZN		Trescon	201 West Street	800	Perkins	U15150S	1632U	900
KZN		Albany House	61-62 Victoria Embankment	500	Perkins	173836 / 004	3938U	900
KZN		Pietermaritzburg	9 Armitage Road, Bird Sanctuary	300	Perkins	Landlord		300
KZN		Port Shepstone	16 Bisset Street	250	Kirloskar	6H.2514/0300001		300
KZN		Richards Bay	Bay Side Mall	300	Volvo	7009162385	1618U	300
KZN		Newcastle	Victorian Mall, 36 Scott Street	350	Volvo	Landlord		500
KZN		Pinetown	36 Kings Road	250	Volvo	5311909970		400
KZN		Scanner	Pier 1 Bayhead Road	167	FAW	52195677		300

Northern Cape								
Region		Building	Address	Generator size [kVA]	Make	Serial Number	Barcode	Tank Size [L]
NC		Upington	Anchorley Building,26 Avenue	160	CUMMINS801510001		260EE	350

Proposed new generator list								
Region		Building	Address	Generator size [kVA]	Make	Serial Number	Barcode	Tank Size [L]
GC		Randfontein	39 Stubbs Street	135	Volvo	5311853360	4885R	500
KZN		Pinetown	36 Kings Road	250	Volvo	5311909970		400
GC		Megawatt Park	Maxwell Drive, Megawatt Park	Landlord (Eskom)				
GC		Giyani	Parliament Building, Dept. of Justice					
KZN		Trescon	201 West Street	1000		LFS3LY16B202226	282DI	1000
KZN		Trescon	201 West Street	1000		LFS3LY16B206731	283DI	1001
NC		Upington	Anchorley Building,26 Avenue					
GC		Soweto Orlando East	Cnr Dynamo Drive & Chris Hani Road	150	PERKINS	342937/ 2	636EE	1000