



## Tender Technical Specification

Generation Division

Title: **INSULATION (SPF AND CEILING BOARDS), ELECTRICAL REWIRING AND THE SUPPLY OF LPG (LIQUID PETROLEUM GAS) HEATERS AND HYBRID STOVES WITH ASSOCIATED 9KG LPG CYLINDERS FOR THE AIR QUALITY OFFSET PROJECT ON AN "AS AND WHEN REQUIRED BASIS"**

Unique Identifier: **GX-PM00000008T**

Alternative Reference Number: **N/A**

Area of Applicability: **Engineering**

Documentation Type: **Technical Specification**

Revision: **2.0**

Total Pages: **16**

Next Review Date: **N/A**

Disclosure Classification: **Public Domain**

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Date: 17 July 2024

Date: 18 July 2024

Date: 22 July 2024

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## 1. INTRODUCTION

New emission legislation as instructed by the Department of Forestry, Fisheries and Environmental (DFFE) to the Employer's Power Stations (Air Quality Act, 2004 [Act 39/2004], Notice 248; 31 March 2010: Minimum Emission Standards) states that all operating plant shall conform to the new plant particulate emission limit of 50 mg/Nm<sup>3</sup> by 2020.

Eskom is now embarking on the implementation of phase 2 on the roll-out of Air quality offset intervention, focussing on reducing household emissions in areas classified in the clusters outlined in the table 1 below.

**Table 1: Cluster Allocation for Insulation and Draught Proofing**

Cluster	Intervention Areas	Linked Stations	No of Households
A	Phola, Emalahleni & Masakhane	Kendal & Duvha	9 181
B	Emzinoni plus & Thubelihle	Matla & Kriel	7 287
C	Silobela, New Ermelo & Nederland	Arnot & Camden	5 099
D	Sivukile, Nthorwane & Refengkotso	Tutuka, Grootvlei & Lethabo	3 670
Total			<b>25 237</b>

The project addresses Eskom's strategic imperative of reducing the organization's environmental footprint and pursuing low-carbon growth opportunities. The aim is to reduce household emissions in the communities by swapping wood/coal burning stoves with a hybrid domestic cooking stove. In addition, the project aims to implement proposed alterations to these houses is to make the building thermally comfortable which will save cost of keeping the interior warm in winter and cool in summer thereby reducing household emissions.

The scope of work is therefore the Insulation (SPF and Ceiling boards), electrical rewiring and the supply of hybrid (LPG (liquid petroleum gas) and electric) heaters, hybrid Stoves with associated 9kg LPG cylinders and asbestos roofing (If applicable) for the Air Quality Offset Project on an "as and when required basis" for a period of 3 years.

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## **2. SUPPORTING CLAUSES**

### **2.1 SCOPE**

The document covers the architectural, structural, electrical and gas requirements for the Insulation (SPF and Ceiling boards), electrical rewiring and the supply of hybrid (gas and electric) heaters, hybrid Stoves with associated 9kg LPG cylinders and asbestos roofing where required for the Air Quality Offset Project.

#### **2.1.1 Purpose**

The aim of the document is to appoint a Contractor that will execute the scope contained herein.

#### **2.1.2 Applicability**

This document shall apply to the Phase 2 Air Quality offset Project only.

### **2.2 NORMATIVE/INFORMATIVE REFERENCES**

#### **2.2.1 Normative**

Refer to Section 3.4

#### **2.2.2 Informative**

- [1] 240-51544462 Eskom Quality Requirements for Suppliers
- [2] ISO 9001 Quality Management Systems – Requirements
- [3] SO 10005 Quality Management Systems - Guidelines for Quality Plans

### **2.3 DEFINITIONS**

<b>Definition</b>	<b>Description</b>
Supplier	A successful tenderer, with whom a supply contract is placed. In other words, all tenderers are potential suppliers.
Tenderer	Prospective service provider to bid for tender and submit as required
Employer	Refers to Eskom
Service Provider	Supplier

#### **2.3.1 Disclosure Classification**

**Public domain:** published in any public forum without constraints (either enforced by law, or discretionary).

### **2.4 ABBREVIATIONS**

<b>Abbreviation</b>	<b>Description</b>
LPG	Liquefied petroleum gas

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Abbreviation	Description
NG	Natural Gas
PMO	Project Management Office
SABS	South African Bureau of Standards
SANS	South African National Standard
SPF	Spray Polyurethane Foam
NHBRC	National Home Builders Registration Council

## **2.5 ROLES AND RESPONSIBILITIES**

It is the role of the Generation Programme Management department to ensure that all architectural, structural, electrical and gas requirements are catered for in this scope, and that the scope is executed in accordance with this Technical Specification.

## **2.6 PROCESS FOR MONITORING**

Design review procedure

## **2.7 RELATED/SUPPORTING DOCUMENTS**

Refer to Section 2.2 and Appendices.

# **3. SCOPE OF WORKS**

## **3.1 GENERAL**

The scope of work includes the Insulation (SPF and Ceiling boards), electrical rewiring and the supply of hybrid (gas and electric) heaters and hybrid Stoves with associated 9kg LPG cylinders for the Air Quality Offset Project on an “as and when required basis”.

The *Employer's* objective is to perform thermal retrofit in the selected houses to improve thermal comfort for the household and thereby reducing household emissions.

The *Contractor* is responsible for the procurement, supply and installation/construction of the *works* indicated herein. This includes

- Set up a project office local to site with adequate security (central to area of implementation, i.e same township)
- Provide a warehouse and ensure stock received is safe and secured at all times (As per warehouse specification to be provided by *Employer*). Provide the required insurance for the appliance stock

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in storage and ensure there is insurance cover for stock in transit from warehouse to the households for the entire duration of the contract.

- Setup an area in the warehouse specifically for inspection and testing (functionality) of the Gas-Electric (Hybrid) stoves and heaters supplied by the manufacturer prior to installation. The inspection of the delivered appliances is done within a week after delivery by the manufacturer. The results of the test shall be reported to the *Employer*
- Ensure that the eligible participating households are measured and BOQ prepared for installation. The *Employer* to provide the database of household that are participating.
- Prepares the house for insulation by covering and moving furniture before work commence and also returns furniture and cleaning up site after completion of the work. The *Contractor* to note the removal and return of furniture should be done in one day so not to inconvenience the households.
- Ensure the removal of old stoves, incandescent lamps, corrugated steel roofing sheets and associated stove accessories (i.e chimney etc) from the household to where they will be temporarily stored before being recycled. The storage of the old coal stoves may be kept up to a month depending on the installation rate.
- Supply/procurement, delivery, off-loading and perform final inspection at the Settlements, temporary structures/ scaffolding, installation of hybrid domestic cooking stove (3 LPG and 1 Electric plate) and Hybrid heaters( LPG and Electric heater) each with associated 9kg LPG (liquid petroleum gas) cylinder per household, finishing complete in every detail and final certification.
- Supply/procurement, delivery, off-loading and performs final inspection at the Settlements, temporary structures/ scaffolding, erection/ construction, installation of ceiling insulation system (SPF and Ceiling boards) and required final painting, and electrical re-wiring, finishing complete in every detail and final certification.
- Removal of incandescent lamps and replace with new CFLs within the households.
- Any damages incurred during transit must be managed through the appropriate transit insurance by the *Contractor*.
- Ensure recycling of the old stoves, incandescent lamps corrugated steel roofing sheets and associated stove accessories (i.e. chimney) at an Eskom approved facility in an environmentally responsible manner.
- Acquire a licenced recycling company with all necessary permits or licences to recycle the old coal stoves, incandescent lamps, corrugated steel roofing sheets and associated stove accessories (i.e chimney etc) and provide documentation (This will form part of the tender returnable by the *Contractor*)
- Full removal of the asbestos roofs that should then be replaced with corrugated roofing in households that have asbestos roofing.

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The *Contractor* takes full professional accountabilities for all the works as per the scope contained herein.

The *Contractor* takes design liability for the insulation ceiling system to be installed in the different house and the insulation ceiling system must be fire tested as per the scope contained herein. The *Contractor* may not commence with any of the works until a successful fire test is conducted and the insulation ceiling system is deemed "acceptable for use" by the relevant authority/body

Any discrepancy or ambiguity between the Employer's scope of work is immediately brought to the attention of the Project Manager for clarification.

The Contractor repairs all damage caused to existing infrastructure resulting from the works.

The Contractor submits ALL reports, documents, drawings (detailed, fabrication, etc) and certifications to the Project Manager for record keeping, both in soft and hard copy formats.

The Contractor takes note that review and acceptance of any document or drawing by the *Employer* in no way relieves the *Contractor* of his liability for the works. The *Contractor* remains liable for all works conducted as per this scope.

The *Contractor* ensures that the households understand the terms and conditions of the contract to be entered with them and also that there will be surveys conducted.

The *Employer* reserves the right to terminate the contract at any time in line with the contract if the estimates for the houses are not reachable/cost effective or the environmental condition changes in such a way that there is no need for such a service anymore.

### **3.2 PROPOSED LAYOUT**

The *Contractor* is issued the google site layout drawing for each settlement which depicts the co-ordinated locations of the various communities that have been identified for each cluster.

### **3.3 RISK OF ASBESTOS**

The *Contractor* is made aware of the possibility of certain household having asbestos roofing. The contractor is required to have a resource or a contractor that is competent in asbestos Roofing safe handling, removal and disposal as per South African environmental requirements and regulation on handling Asbestos material.

### **3.4 CODES & STANDARDS TO BE USED IN THE WORKS**

The *Contractor* adheres to the latest edition of all applicable SANS standards, Eskom standards and other codes of practice, regulations & standards. This includes but is not limited to:

- [1] SANS 10400 (all parts)
- [2] SANS 1539, Appliances operating on liquefied petroleum gas (LPG) or natural gas (NG) - Safety aspects.
- [3] SANS 1156-2, Hose for natural gas and liquefied petroleum gas (LPG) Part 2: Hose and tubing for use in natural gas and liquefied petroleum gas vapour phase.

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- [4] SANS 1237, Single-stage regulators for liquefied petroleum gas (LPG).
- [5] SANS 10019, Transportable pressure receptacles for compressed, dissolved and liquefied gases — Basic design, manufacture, use and maintenance.
- [6] SANS 199, Shut-off valves for transportable, refillable liquefied petroleum gas cylinders

### **3.5 INSULATION (SPF AND CEILING BOARDS) AND ELECTRICAL REWIRING**

#### **3.5.1 General Requirements**

The average household at identified communities is to be regarded as 60m<sup>2</sup> as maximum. This average household measurement is to be used to propose cost/pricing of delivering a full insulation and rewiring of household.

The *Contractor* is responsible for taking actual measurement of houses as per signed work instruction(s) from the project manager and in line with the database list of household participants. The estimates after measurement will be the final amount to be used for payment. The *Contractor* is responsible for preparing the BOQ for actual cost per household and submits this to the project Manager for approval before continuing with other activities of the work. The *Contractor* is responsible to ensure that each house has been sanitized before any work can proceed.

The *Contractor* shall identify households with asbestos roofing as well as those that require draught proofing as well as roof repairs. The cost for asbestos removal and disposal thereof and the cost associated with draught proofing and roof repairs shall be included and clearly marked as “ad hoc” activity in the BOQ for actual cost that will be submitted to the project manager for approval. The households with Asbestos Roofing will require total roof replacement. Where draught proofing is not possible, the contractor is to replace broken windowpanes and doors with significant gaps, this cost is to be also clearly indicated on the BOQ for actual cost.

#### **3.5.2 Architectural design construction and finishes**

The purpose of the proposed alterations to these household is to make the building thermally comfortable which will save cost of keeping the interior warm in winter and cool in summer. All new architectural works to be done is to comply with all parts of SANS 10400.

Construction and architectural finishes:

##### **Roof Structure**

The *Contractor* is responsible for removing the coal stove, the chimney and close off the roof before insulation and other related activities can proceed.

In existing IBR roof sheeting the *Contractor* is to prepare, remove dust and repair any defect that causes leaks to existing roof and timber/metal rafters. The houses with Asbestos Roofing will require total roof replacement.

All metal roof sheeting is required to be the "IBR" type profile. The sheets are laid down, fastened and sealed in strict accordance with the manufacturer's specifications.

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The *Contractor* is responsible to apply spray paint polyurethane foam (SPF) on the inside of the roof according to specialist's directions/manufacturer's instructions. This is to be 20-30mm thick and as per requirements for the application of the SPF Foam.

The *Contractor* is to apply the SPF with an electronically governed spraying rig to ensure accurate mixing rates and provide cut-out in case of anomalies. In addition to spraying SPF, the contractor shall apply a rated waterborne intumescent paint coating to SPF by airless spraying.

### **Ceiling**

The contractor shall supply/procurement, delivery, off-loading and performs final inspection, temporary structures/ scaffolding, erect/construct and instal a 6.4 mm thick Gypsum ceiling board with an R value of 2 or above. The ceiling board system shall be nailed to steel brandering at maximum 400mm c/c which are affixed to the ceiling joist or roof purlins directly under and to follow the pitch of roof which ever is applicable. The *Contractor* supplies the nails and other accessories required for the ceiling board system.

The *Contractor* shall the prime ceiling with plaster primer and 2 finishing coats of PVA fire resistant paint as per the manufacturer's instructions. Finishing strips/cornices 76mm coved cornice should be fixed to ceiling boards (and not to walls).

The ceiling must perform adequately in terms of fire propagation properties according to the SANS 428 protocol, using the test specifications as contained in SANS 10177-10:2007 SOUTH AFRICAN NATIONAL STANDARD. Fire testing of materials, components and elements used in buildings. Part 10: Surface burning characteristics of building materials using the inverted channel tunnel test.

Paint color – crisp white

All electrical rewiring is to be done before installation of ceiling board.

The *Contractor* takes design liability for the insulation ceiling system insulated. Thus, the *Contractor's* insulation system must be fire tested and deemed acceptable for use by competent body/authority.

The *Contractor* may not commence with any of the works until a successful fire test is conducted.

### **Draught proofing**

The *Contractor* provides permanent ventilation in all rooms where permanent ventilation is required in accordance with SANS 1539. The *Contractor* uses a heater heat input of at least 4.5 kW when determining the need for permanent ventilation and assumes that the heater can be used in the same room as the hybrid stove.

The *Contractor* replaces broken windowpanes and doors with significant gaps where proofing is not possible.

The *Contractor* shall do plastering in and around the beam filling area on houses with significant gaps on the brickwork laid between the lower sides of the roof trusses up to the roof covering.

It is the responsibility of the *Contractor* to identify houses that requires draught proofing. The *Contractor* submits the required house information, material, and pricing to the Project Manager prior to implementation for approval.

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### **3.6 ELECTRICAL WIRING**

#### **3.6.1 General Requirements**

The Scope of work includes supply, install, commission and provide a certificated of compliance of a specific building in compliance with the requirements of SANS 10142-1, SANS 10400XA and SANS 204.

The *Contractor* remains liable to hand over a complete and functioning electrical installation system for a specific building as per the requirements of SANS 10142-1.

The *Contractor* provides all tools, equipment and personnel required to execute and implement the Scope of Works.

The *Contractor* remains liable for all works conducted as per the requirements of the Scope of Works.

The *Contractor* submits a fully detailed Method Statement and Quality Control Plan (QCP) to the *Employer* in two weeks' time prior commencing of work, for review and acceptance.

Any discrepancy or ambiguity between the *Employer's* Scope of Works is immediately brought to the attention of the *Employer* for clarification.

The *Contractor* submits Certificate of Compliance (CoC) after commissioning the installation in compliance with the SANS 10142-1.

The *Employer* standardised material list which the contractor is to provide and utilised for installation is outlined in the table below.

It is the responsibility of the *Contractor* to identify houses that require additional material over and above what is provided for on the standardised material list. The *Contractor* submits the required house information, material and pricing to the Project Manager prior to implementation for approval.

Table 1 : Standardised Material List per Household

Item	Description	Unit	Quantity
1	DB Board 8 MOD Flush, Including circuit Breakers	No.	1
2	Well E/GALV 100x50	No.	5
3	Conduit Pipe 20mm	No.	28
4	PVC Saddles 20mmx10	No.	15
5	PVC Coupling 20mm Pack x10	No.	5
6	PVC Adaptors Mae Pack x10	No.	5
7	Elec 11 Switch Complete	No.	5
8	Elec Single plug complete	No.	5
9	Insulation tape 19mm	No.	3
10	PVC Box 3 way top entry	No.	3
11	PVC box 4 way top entry	No.	7
12	Surfix 1.5mm	m	80
13	Surfix 2.5mm	m	60
14	light Complete with Fittings	No.	5

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### **3.6.2 Wiring design construction and finishes**

#### **Distribution Board**

The *Contractor* provides, installs, tests and commissions sufficient distribution board for a specific installation in compliance with the requirements of SANS 10142-1.

A distribution board needs to be functioning and acceptable, it is the *Contractor's* responsibility to conduct an inspection and test (QCP to be compiled, accepted and applied) before delivery to site.

#### **Lighting Fittings**

The *Contractor* determines, provides, installs, tests and commissions sufficient lighting for a specific installation in compliance with the requirements of SANS 10142-1, SANS 10400XA and SANS 204.

It is the *Contractor's* responsibility to ensure that the Lux level inside all the rooms of the houses is of acceptable level.

#### **Wiring**

The *Contractor* determines, provides, installs, tests and terminates (both ends) a sufficient wiring cable for a specific installation in compliance with the requirements of SANS 10142-1.

Wiring shall be carried out in PVC conduit. All conduits shall be clear of moisture and debris before any wiring is commenced.

#### **Socket Outlet**

The *Contractor* determines, provides, installs, wires and tests a sufficient socket outlet for a specific installation in compliance with the requirements of SANS 10142-1.

#### **Switch**

The *Contractor* determines, provides, installs, wires and tests a sufficient switch for a specific installation in compliance with the requirements of SANS 10142-1.

#### **Certificate of Compliance**

The *Contractor's* competent person shall perform illumination measurements (as recommended in SANS 10114 -1) and submitted illumination measurement reports to the *Employer*. Measurements shall be performed once the installation has been completed.

On completion of the installation, The *Contractor* issued an Electrical Certificate of Compliance (CoC) to the *Employer* in terms of the Occupational Health and Safety Act, (OHS Act 85 of 1993).

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### **3.7 HYBRID HEATERS AND HYBRID STOVES WITH ASSOCIATED 9KG LPG CYLINDERS**

#### **3.7.1 General Requirements**

Each gas appliance is provided with a dedicated pressure regulator and flexible hose.

The Contractor submit compliance certificates for the following:

- Roll-about heater compliance to SANS 1539;
- Hybrid stove compliance to SANS 1539
- Pressure regulator compliance to SANS 1237
- Flexible hose compliance to SANS 1156-2
- Gas cylinder compliance to SANS 10019
- Gas cylinder shut off valve to SANS 199
- Hybrid stove to VC 8055 from the National Regulator of Compulsory Specifications (NRCS)

#### **3.7.2 Hybrid (gas and electrical) Roll-about heaters**

Requirements:

- Comply to SANS 1539.
- Suitable for use with 9kg LPG cylinder.
- Heat input between 4 kW and 4.5 kW
- Three (3) Ceramic Panels
- Three (3) different heat settings.
- Fitted with built in manual ignition device.
- Fitted with bullnose and other accessories
- Flame failure protection mechanism during operation.
- Flame cut-out when the heater is tilted.
- Standard dimension electrical heater with maximum output rating not exceeding 2 kW.
- Electrical functions compatible to the South African electrical network (50Hz and 230V).
- Plug-in cable compatible to South African electrical plugs.
- Regulator complying to SANS 1237
- Flexible hose complying to SANS 1156-2.
- Dimensions
  - Total height (Ht) not exceeding 800 mm,
  - Width (W) not exceeding 500 mm,
  - Depth (D) not exceeding 450 mm.

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### 3.7.3 Hybrid Stoves

Requirements:

- Comply to SANS 1539.
- Comply to VC 8055 from the National Regulator of Compulsory Specifications (NRCS)
- Suitable for use with standalone 9kg LPG cylinder.
- Fitted with 3 gas burners and one electrical plate with independent variable temperature control knobs for the gas burners and electrical plate.
- Integrated electrical oven with its variable control knobs (i.e. Grill and Bake functions)
- Storage/Utility compartment.
- Large standard dimension electrical plate, solid or spiral continuous top, with maximum output rating not exceeding 2 kW.
- Electrical functions compatible to the South African electrical network (50Hz and 230V).
- Plug-in cable compatible to South African electrical plugs.
- Electronic Burner Ignition
- Fitted with bullnose and other accessories
- The maximum operating temperature of the integrated oven does not exceed 250°C, with grill and bake functionalities as standard.
- Purchase details for future reference written on the stove i.e. – Serial Number.
- Regulator complying to SANS 1237
- Flexible hose complying to SANS 1156-2.
- The stove with an integrated oven dimensions are as follows:
  - Total height (Ht) not exceeding 1200 mm,
  - Floor to cooking level height (Hfc) not exceeding 950 mm,
  - Width (W) not exceeding 500 mm and,
  - Depth (D) not exceeding 650 mm.
  - Electrical plate's diameter (d) to be large standard dimension
  - The LPG plates' diameter (d) to be a combination of large and small standard dimensions.
  - The integrated oven volume not smaller than 57 Litres.

### 3.7.4 9KG LPG CYLINDER

The Contractor supplies one 9 kg LPG cylinder for each stove and one 9 kg LPG cylinder for each heater. The *Contractor* is responsible for the first fill of the cylinders.

The LPG cylinders are to be accepted for exchangeable at a minimum of two local LPG retailers. The cylinder complies with SANS 10019. The *Contractor* provides written proof of exchangeability and the details for the local LPG retailers.

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### **3.8 TRANSACTIONAL AND AFTER SERVICE SPECIFICATIONS**

The *Employer* requires an unconditional product guarantee against latent defects inclusive to all parts (Gas and Electrical) for a period of 12 months.

*Employer* accepts no failure for the first year of operation. Should there be any failures within the first twelve (12) months of delivery; the *Contractor* is liable to replace all failure products with new working products at own costs.

The *Contractor* shall provide a written commitment to train 10 (ten) personnel, specified by Eskom. The trainers shall have relevant experience and be competent to provide the training.

As part of after-sale support, the *Contractor* shall provide technical support as follows for the entire warranty period of 12 months:

- Telephonic support within 24 hours after a reported fault/failure
- Based on the outcome of the telephonic support if call out support is required the Supplier needs to give on-site support within 48 hours from the reported fault.
- The *Contractor* shall indicate the lead time on all spares, with a maximum of 48 hours.
- If, within the first six months of the guarantee period, 20 % or more of any class of installed equipment fails, the *Employer* may, at their sole discretion, have the right to demand the replacement of all that class of component or materials for the entire set of unit installations at the cost of the Supplier.

### **3.9 USER MANUALS (USER INSTRUCTIONS)**

The following topics are covered in the user manuals:

- Safety Instruction,
- Installation Instruction,
- Operation Instruction,
- Maintenance,
- List of required spares/parts and
- Warranty.

Manuals to be submitted in both hardcopy and Electronic copy and written in English.

Manuals must be included in the tender submission.

### **3.10 DELIVERABLES/ SUBMISSIONS BY THE CONTRACTOR**

The *Contractor* is responsible for the following deliverables. The *Contractor* is to note that all documents are submitted to the *Project Manager* for review and acceptance prior to implementation. This includes:

- a) Fire Test
- b) Data Base of all completed houses also indicating the GPS coordinate for the houses worked on

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- c) Product Technical Specification for stove and heater
- d) Installation/ Construction Quality Plan;
- e) Electrical Design Drawings
- f) Electrical COC
- g) Gas COC
- h) Asbestos Disposal Permit

Certification is done in accordance with SANS 10400.

All deliverables are to be submitted in both hard and soft copy (USB/CD) formats. All documents are to be in searchable PDF.

#### **4. AUTHORISATION**

<b>Name</b>	<b>Designation</b>
Thapelo Lesame	Engineer – Civil Engineering Lead
Jan Strydom	Engineer – Low Pressure Services Lead
Sakhy Mnguni	Engineer – Electrical Engineering Lead
Sibonelo Sibiya	Architect
Ronald Mandavha	Project Manager -AQO Project
Matimba Nxumalo	Project Manager -AQO Project
Collen Chauke	Project Manager -AQO Project
Cingimiso Nkungwana	Project Manager -AQO Project

#### **5. REVISIONS**

<b>Date</b>	<b>Rev.</b>	<b>Compiler</b>	<b>Remarks</b>
September 2022	1.0	T Lesame S Sibiya S Mnguni J Strydom	First Issue
June 2024	2	Ronald Mandavha	<ul style="list-style-type: none"><li>- Changed heater to Hybrid (gas and Electric)</li><li>- Added intumescent paint to SOW</li><li>- Changed brandering from wood to steel.</li><li>- Update General grammar on document.</li><li>- Updated <i>Supplier</i> to <i>Contractor</i> to align with NEC ECC.</li></ul>

#### **CONTROLLED DISCLOSURE**

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## **6. DEVELOPMENT TEAM**

The following people were involved in the development of this document:

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## **7. ACKNOWLEDGEMENTS**

- N/A

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