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Compiled by	Authorised by Engineering	Authorised by Quality
Signature	<i>Ahmed Cassim</i> Signature	Signature
<b>B. Kubeka</b> <b>Initials and Surname</b>  <b>Project co-ordinator</b> <b>Designation</b>	<b>Initials and Surname</b> A Cassim  C&I Engineering <b>Designation</b>	<b>Initials and Surname</b>  <b>Senior Quality Advisor</b> <b>Designation</b>
Date:	Date: 21 October 2021	Date:

Accepted by Procurement
Signature
<b>Tina Bezuidenhout</b> <b>Initials and Surname</b>  <b>Procurement Manager</b> <b>Designation</b>
Date:

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## C3.1: EMPLOYER'S WORKS INFORMATION

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# **1 Description of the works**

## **1.1 Executive overview**

In 2010, the Original Equipment Manufacturer (OEM) declared the pyrometers currently installed on Majuba Units 1-3 (M250-A1) obsolete. In 2011, the pyrometers on Majuba Units 4-6 were replaced due to their obsolescence and spares salvaged were allocated to Units 1-3. To date all spares have been utilised, thereby placing Units 1-3 at risk should any of their pyrometer fail. The pyrometers installed on Unit 4-6 in 2011 (7MC3001) are also obsolete with failed pyrometers being replaced with the newer 7MC3030. Both pyrometers used on Units 4-6 have proven to be problematic due to their linearising and signal conditioning electronics being imbedded in the heads of the pyrometers. This design, when used at Majuba, exposes the electronics to temperatures exceeding the design parameters as specified by the OEM. Consequently, the imbedded electronics overheat, causing the output to be driven to 20.5 mA as per the OEM design.

The objective of this project is to replace the obsolete pyrometers on Units 1-6, as well as the problematic pyrometers on Units 4-6, with a suitable technology for the specific application at Majuba that will be supported by the OEM for the next 15 years. This will not only ensure that the pyrometers are standardised across all Units at Majuba, but will also ensure that the pyrometers can reliably be used as inputs to the Furnace Flame Failure Boiler Protection for the foreseeable future.

## **1.2 Employer's objectives and purpose of the works**

The objectives of the *works* are as follows:

- (1) Replace the obsolete pyrometers on Majuba Power Station Units 1-3.
- (2) Ensure that the pyrometers on Majuba Power Units 1-6 are standardised in terms of instrument models, configuration and installation.
- (3) Provide Majuba Power Station with pyrometers that will be supported by the OEM for the 15 years, as a minimum.
- (4) Install the new pyrometers onto the existing sighting tubes using the existing junction boxes and AC power supplies with minimal impact to the remainder of the plant.
- (5) Make no mechanical modifications to the plant.
- (6) Make no changes to the pyrometer-distributed control system (DCS) interface or any DCS hardware or software apart from the modification in (7).
- (7) Modify the Boiler Protection logic to include an over-range trip for all pyrometers installed at Majuba Power Station.

The purpose of the works is as follows:

- (1) Address the issue of obsolete pyrometers at Majuba Power Station.
- (2) Ensure that the reliability and availability of the new pyrometers are not affected by the combustion issues which cause the over-heating and failure of the current through-the-lens type pyrometers

## 1.3 Interpretation and terminology

### 1.3.1 Definitions

The following terms are used in this Works Information:

Term	Definition
Client	Majuba Power Station
EXIDA	A certification and knowledge company specialising in automation system safety, alarm management, cybersecurity, and availability
Fibre-optic type	A pyrometer type where the pyrometer lens and electronics are enclosed in separate housings which are connected via a fibre optic cable. The lens focuses the infrared radiation into the fibre-optic cable which channels the radiation to the sensor housed with the electronics.
Pyrometer	A non-contact temperature measurement device that relies on the principle of infrared radiation measurement.
Through-the-lens type	A pyrometer type where the lens and all associated electronics are enclosed within a single housing. The lens focuses the infrared radiation directly onto the sensor.
TUV	An internationally accredited certification body

### 1.3.2 Abbreviations

The following abbreviations and acronyms are used in this Works Information:

Abbreviation/Acronym	Definition
C&I	Control & Instrumentation
CM	Configuration Management
CoE	Centre of Excellence
DCS	Distributed Control System
EAF	Energy Availability Factor
EC&I	Electrical, Control and Instrumentation
ECM	Engineering Change Management
ECP	Engineering Change Proposal
EMAP	Engineering Management Plan
FAT	Factory Acceptance Test
FFFR	Fossil -Fuel Firing Regulation
FMEA	Failure Mode and Effects Analysis
FMECA	Failure Mode, Effects, and Criticality Analysis
Gx	Generation
HMI	Human-machine Interface
ISO	International Standards Organisation
KKS	Kraftwerks Kennzeichen System
LDE	Lead Discipline Engineer

Abbreviation/Acronym	Definition
LPS	Low Pressure Services
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
PCLF	Planned Capability Loss Factor
PEI	Production, Engineering, Integration
PF	Pulverised Fuel
RACI	Responsible, Accountable, Consulted, Informed
RAM	Reliability, Availability & Maintainability
SHEQ	Safety, Health, Environment and Quality
SIL	Safety Integrity Level
SRD	Stakeholder Requirements Definition
UCLF	Unplanned Capability Loss Factor
USB	Universal Serial Bus

## 1.4 Codes and standards

The following codes and standards apply throughout the *works*:

- (1) 240-56355754 Field Equipment Installation Standard
- (2) 240-56355815 Control & Instrumentation Field Enclosures and Cable Termination Standard
- (3) 240-56355535 Process Calibration Equipment Standard
- (4) 240-56227443 Requirements for Control and Power Cables for Power Stations Standard
- (5) 240-56355888 Temperature Measurement Systems Installation Standard
- (6) 240-105453648 Fossil Fuel Firing Regulation
- (7) 240-56241288 Fossil Fired Boiler Protection Functions Standard
- (8) 240-109253238 C&I Protection Systems Redundancy and Voting Guideline
- (9) 240-56227443 Requirements for Control and Power Cables for Power Stations Standard
- (10) 32- 245 Eskom Waste Management Standard
- (11) 240-93576498 KKS Coding Standard
- (12) 240-71432150 Plant Labelling Standard
- (13) 240-105249370 Operating and Maintenance Requirements for Coal Fired Boiler Flame Failure Protection Devices Standard
- (14) 240-53114248 Thyristor and switch mode charger converter power supply standard

- (15) BS EN 13611-2015 Safety and control devices for burners and appliances burning gaseous and/or liquid fuels - General requirements

## 2 Engineering and the *Contractor's* design

### 2.1 *Employer's* design

#### 2.1.1 Plant Description

Majuba Power Station has twelve through-the-lens type pyrometers (as defined in clause 1.3.1 of the Works Information), per Unit, installed in the furnace side walls; six in the Left Hand wall and six in the Right Hand wall. Furthermore, the twelve pyrometers are arranged such that six pyrometers are installed at the 31.65 m level and six at the 53.76 m meter level.

The pyrometers belong to the Steam Generator Combustion Chamber, Furnace, Gas Pass system with system code (KKS) \*HBK\* and are used to measure the flame temperature during normal operation and protect the boiler from flame failure. They are used as inputs to the Boiler Protection System (BPS) which will trip the related mills if a drop of flame temperature is detected (Furnace Flame Failure Protection).

The Furnace Flame Failure Protection is enabled when at least one quick close damper is open, supplying pulverised fuel (PF) to the burners and the flame temperature exceeds 900 °C. Should two out of three pyrometers of any group detect that the flame temperature has fallen below 800 °C, a low-level alarm is triggered. If the temperatures continue to fall to below 600 °C, the Flame Failure protection is triggered and the BPS initiates a master fuel trip. This occurs under the following conditions:

- When two out of three pyrometers, as dictated by the trip logic, detect that ignition has been lost or is in danger of being lost,
- When two out of three pyrometers go over-range (currently not implemented in BPS),
- When flame failure has occurred in either half of the furnace.

The pyrometers measure flame temperature by focusing furnace heat radiation, through a lens, onto a thermopile (or photo-diode) contained within the body of the instrument. The radiation heats the thermopile junctions, thereby generating a thermoelectric potential (millivolts) that is proportional to the junction temperature. This potential is converted from a millivolt signal to a milliamp signal by a lineariser and signal conditioning card. The milliamp signal is then used as an analogue input to the DCS, where it is processed and used in the BPS and for indication purposes.

The current pyrometers installed at Majuba are designed in such a way that should the electronics overheat, the output is driven to 20.5 mA. Should the temperature of the electronics recover instead



of increasing any further, the output will return to the normal range of 0-20 mA. However, if the temperature of the electronics continues to increase beyond the point where the electronics begin to fail, the instrument may fail in which case the output will reduce to 0 mA. This design allows the instrument to provide failsafe operation as well as a method of detecting that the instrument has overheated.

In its current state, the BPS at Majuba PS is not configured to trip the Boiler should the pyrometers go over-range or output an “overheat” value (20.5 mA), but will instead raise an alarm that requires Operator intervention. However, as required by the FFFR, the BPS will trip the Boiler in the event that any group of pyrometers detect that the furnace flame temperature has fallen below 600 °C or in the event of instrument failure.

The pyrometers interface to the Boiler Furnace via sight tubes that are installed in the furnace wall at the relevant elevations.

On Units 1-3, each pyrometer head is terminated directly to its own junction box with 220V<sub>AC</sub> supplied from the Essential Supply (via a common UPS distribution board). The signal conditioning and power converter card (from 220V<sub>AC</sub> to 24 V<sub>DC</sub>) are also housed in this same junction box.

On Units 4-6, each pyrometer head contains the associated signal conditioning electronics which is terminated to a junction box with 220V<sub>AC</sub> supplied from the Essential Supply (via a common UPS distribution board). Each junction box contains a 220V<sub>AC</sub> to 24 V<sub>DC</sub> power converter module (Mean Well MDR 20-24).

The pyrometers, via the junction boxes, interface to the DCS using a 0-20 mA analogue signal. The calibration range on the DCS is 400 °C to 1500 °C.

Furthermore, the pyrometers have an interface to the Unit Control Air System. From this system, the pyrometers draw purge air which is used for cooling as well as lens cleaning.

### **2.1.2 Plant Information**

- (1) The *Employer* provides the documentation and information, as per Annexure C – C&I Documentation Requirements from Vendors, to the *Contractor*.
- (2) After receiving the documentation provided by the *Employer*, the *Contractor* is responsible for updating and maintaining the documentation.

- (3) Should the *Contractor* require any additional information from the Employer for his design, the *Contractor* submits a formal request through correspondence with the *Project Manager*.

## **Parts of the works which the *Contractor* is to design**

### **2.1.3 Extent of the works**

The *Contractor* provides for:

- (4) The detailed design, engineering, drawings, procurement, manufacture, quality control & assurance, supply, delivery, installation, commissioning, testing, handing over, and maintenance during the guarantee period of all Plant, Materials and equipment necessary for the pyrometer replacement at Majuba Power Station.
- (5) The removal of the existing pyrometers from the plant, packaging of the instruments to prevent them from being damaged and handing them over to Majuba for future use.
- (6) The removal of the lineariser cards from the junction box, packaging of the devices to prevent them from being damaged and handing them over to Majuba for future use.
- (7) 36 new spectral pyrometers, are installed as part of the works and three (6) are handed over to Majuba Power Station as spares.
- (8) The whole of the works, as defined in clause (3) of the Works Information, except where explicitly stated otherwise.

### **2.1.4 General**

- (1) The *Contractor's* design and the works comply with the codes and standards listed in clause 1.4 of the Works Information.
- (2) The *Employer* does not provide national or international standards required to complete the works.
- (3) The *Contractor* provides for national or international standards, required to complete the works, as part of the works.
- (4) The *Contractor's* design and engineering is carried out at site, Majuba Power Station.
- (5) The *Contractor* provides the Equipment and services necessary to fulfil the requirements defined in this Works Information.
- (6) The works complies with professional engineering practice and standards for fossil fuel power plants, and is designed for the environmental conditions prevailing at Majuba Power Station Site.

### **2.1.5 Control and instrumentation design**

#### **2.1.5.1 General**

- (1) The *Contractor* performs a risk assessment on site prior to the commencement of installation, commissioning and testing.
- (2) The *Contractor* provides pyrometers that have life-cycle support, from the OEM, for a minimum of 15 years from the date that the last pyrometer installation is handed over to the *Employer*.
- (3) The pyrometers are tested under normal operating conditions which include vibrations. The pyrometers provided adhere to BS EN 13611-2015 Section 7.7.2.2 Vibration Test

#### 2.1.5.2 Instrument Schedule

- (1) The *Contractor* provides for instrumentation as per Annexure A - Control & Instrumentation Instrument Schedule.
- (2) The Instrument Schedule lists the instrumentation that is provided as part of the *works*. Key information regarding this instrumentation is provided by the *Employer*, however, any missing fields are populated by the *Contractor* prior to commissioning.
- (3) The *Contractor* amends the Instrument Schedule as necessary, or where an error or omission is made by the *Employer*, to fulfil the requirements of the *works*.
- (4) Where an error or omission is made by the *Employer*, the *Contractor* submits amendments to the Instrument Schedule to the *Project Manager* for approval prior to design work commencing.

#### 2.1.5.3 C&I Documentation Requirements from Vendors

- (1) The *Contractor* provides and submits documentation as per – C&I Documentation Requirements from Vendors
- (2) The *Contractor* provides and maintains a Master Register of Documents
- (3) The *Contractor* submits the Master Register of Documents to the *Project Manager* fortnightly, or after each revision.
- (4) The *Contractor* may add documentation not shown

#### 2.1.5.4 Design criteria

The pyrometers provided by the *Contractor*:

- (1) Are of the fibre-optic type (as defined in clause 1.3.1 of the Works Information).
- (2) Have an analogue output of both 0-20 mA and 4-20 mA, which is user selectable.
- (3) Utilise USB 2.0 and/or RS232, preferably both, as the programming/fault finding interface to the pyrometers.
- (4) Are able to withstand continuous operating temperatures of between 0 and 100 °C without measurement errors or failure.
- (5) Are IP65 rated or better.
- (6) Have a response time of no more than 2 ms for measured temperatures greater than or equal to 1000 °C.
- (7) Have a measurement range of at least 350 °C to 2000 °C with the span user programmable, in the field, to any values within the devices' measurement range.
- (8) Are SIL 2 compliant or are suitable for use in safety applications.
- (9) The pyrometers provided are failsafe devices that fail low as they are used as part of the BPS.

- (10) The outputs of the pyrometers provided are driven to 20.5 mA when the electronics overheat. A user selectable response (high or low output) to overheating is preferable. Preferred option is to fail low (0mA)
- (11) All new instruments and devices provided are immune to electromagnetic interference.
- (12) The pyrometers provided support an input voltage of 24 VDC.
- (13) Have an average availability of 99.999% or greater, measured annually, throughout the life of the instrument.
- (14) Calibration certificates to be provided for all instruments supplied. Calibration to be carried out at SANAS approved/accredited suppliers.
- (15) New cables utilise existing conduits between the pyrometers and the junction box. Where conduits are not in a serviceable state the *Contractor* installs new conduits according to the Majuba standard
- (16) Supply Mean Well power supplies (Model MDR - 20-24) Input 220VAC and input current rating 0.55A
- (17) The Contractor to supply in conjunction with the Power Supplies, 10 m lengths of DIN-rail, and 550 terminal blocks. The compatibility of the terminal blocks, the power supplies to the Din-rail is of utmost importance. The Contractor is to supply terminal block numbers from 1-8. There should be 15 of these number sets
- (18) The Contractor supplies casing to house the lens. The housing to fit into the existing Boiler inspection attachments on the Boiler. [The Contractor can do a site visit to ensure adherence to the scope of work required. The Contractor will be held liable for all non-adherence to the intended scope at no extra charge to the Employer]

#### **2.1.5.5 Control system**

- (1) The Contractor makes no changes to the existing DCS. This includes hardware and software changes.
- (2) The Contractor makes no changes to the interface between the pyrometers and the DCS.
- (3) The Contractor makes no changes to the existing cabling between from the pyrometer junctions boxes and the DCS, as well as the terminations at the DCS.
- (4) The existing operating, control and protection philosophies remain unchanged by the works.

#### **2.1.5.6 Field, cabling and associated infrastructure**

- (1) The existing boiler flame failure protection system employs a previous generation of pyrometers M250A range which provide a millivolt output. The millivolt signal is fed to a Lineariser card which contains a millivolt input (0-33mV) to milliamp output (0-20mA) converter, the output of which is sent to the control system. The card has a

requirement of 220VAC supply. This is fed from the electrical switchgear. The signal is routed to the control system to the alarm and trip temperatures (900°C and 600°C, respectively).

- (2) The scope of instrument cabling is defined as being all cabling or groupings of field cables between the instrument and junction boxes and between junction boxes and local control panels.
- (3) The Contractor provides for all cabling required to complete the works as part of the works.
- (4) The fibre-optic head fits into a robust aluminium housing. This housing is installed onto the existing sighting tubes that are installed on the boiler structure at the 31.65 m and 53.76 m level of each Unit.
- (5) The fibre-optic cables provided are steel-clad and are of a standard, customer selectable length that can be purchased off-the-shelf from the OEM. The Contractor supplies a cable that is wired from the electronic housing to the junction box in the plant.
- (6) The fibre-optic cables are routed from the fibre-optic heads to the pyrometers in the junction boxes using suitable cable racking.
- (7) The Contractor installs cabling on existing cable racking if practical to do so and if the cable racking is in a good condition.
- (8) Where cable racking is deemed to be in a poor condition, the Contractor notifies the Project Manager prior to designing or installing any new cable racking.
- (9) Where new cable racking is required, the Contractor advises the Employer on the best racking routes and provides the new cable racking as required to fulfil the requirements of the works.
- (10) The Contractor allows for sufficient slack in the fibre-optic cable to allow the fibre-optic head to be removed and safely stored in a position that will allow maintenance activities, such as lens cleaning, to be carried out without the fibre-optic head, fibre-optic cable or pyrometer being subject to damage by such activities. The cable routing and racking design facilitates easy removal of the pyrometers for calibration activities.
- (11) The Contractor standardises pyrometer installation position, arrangement and module placement across the pyrometers and Units in conjunction with the Eskom standards and requirements.
- (12) Upon completion of the installation on the last Unit, modifications, optimisations and upgrades made during the project are retrofitted to the completed Units and all documentation are updated to the latest version.

### 2.1.5.7 Junction Boxes

- (1) The Contractor installs the pyrometers in the existing junction boxes and ensures that they are securely fixed in place and protected from vibrations.
- (2) Any modification made by the Contractor to junction boxes does not negate or compromise the IP rating or corrosion protection of the junction box.
- (3) The pyrometers are terminated to the existing terminal strips in their respective junction boxes, which are already interfaced to the DCS.
- (4) The Contractor installs the power supply converters, provided under clause 2.1.6.2 of the Works Information, inside the existing pyrometer junction boxes.
- (5) The junction boxes and equipment within the junction boxes are clearly labelled to identify each component, signal and power supply and rating.

### 2.1.6 Electrical design

#### 2.1.6.1 General

#### 2.1.6.2 Power requirements

- (1) The existing pyrometer power supplies are fed from the Unit 380V Distribution Board (\*BFP).
- (2) Each of the existing pyrometer junction boxes has a dedicated 220V<sub>AC</sub> feeder. This remains unchanged for the new pyrometers and installation.
- (3) The *Contractor* provides power converter modules similar to the Mean Well MDR 20-24 currently used at Majuba. [Din Mounted]
- (4) The power converter modules provided comply with 240-53114248.
- (5) The power converter modules convert the existing 220 V<sub>AC</sub> supply to a DC supply suitable for the provided pyrometers.
- (6) The *Contractor* terminates the power converter modules within the existing pyrometer junction boxes. The power converter module must comply to DIN standards/installations.
- (7) The power converter modules are suitably rated such that the pyrometers do not exceed the maximum continuous current rating of the converter.

#### 2.1.6.3 Earthing and lightning protection

- (1) The *Contractor* implements earthing, where required, on all Plant and Materials for reliable and safe operation and maintenance of the pyrometers and power converter modules.
- (2) The *Contractor* ensures that the new pyrometer installations are immune from electromagnetic interference which may arise from such devices as portable radio transmitters, cell phones and/or any other equipment used on site.

### 2.1.7 Mechanical design

- (1) The existing pyrometer sighting tubes remain as is and are re-used for the pyrometer installation. The new pyrometer lenses fit securely onto the existing sighting tubes. The current air gap between sight tube and pyrometer will remain as is to create a draught for lens cleaning and limiting the accumulation of PF in the sighting tubes as per the current design.
- (2) The existing air gap between the sighting tubes and pyrometers remain as is to create a draught for lens cleaning and limiting the accumulation of pulverised fuel in the sighting tubes.
- (3) The *Contractor's* flame scanners will be tested under plant conditions which include vibrations. The Contractors flame scanners must adhere to BS EN 13611-2015 Section 7.7.2.2 Vibration Test.
- (4) The supplier should provide the detailed installation plan, lens specification and drawings for acceptance before the pyrometers are installed on the units.

#### **2.1.8 Low pressure services design**

- (1) The existing purge air supplied to the pyrometers (from the Control Air compressors) for lens cleaning and cooling will be retained.

#### **2.1.9 Plant coding and labelling**

- (1) The *Contractor* provides KKS labels for all new Plant.
- (2) The *Contractor* replaces existing KKS labels if modifications to the Plant, caused by the execution of the works, require a change in KKS coding.
- (3) The *Contractor* installs all KKS labels provided as part of the *works*.
- (4) The *Contractor* removes all KKS labels replaced or removed as part of the *works*.
- (5) All KKS labels are installed in a similar location for each similar item of Plant across all 6 Units at Majuba Power Station.
- (6) The *Employer* provides KKS coding as per the codes and standards in clause 1.4.

#### **2.1.10 Testing and commissioning**

##### **2.1.10.1 General**

- (1) The *Contractor* provides a testing procedure for acceptance by the *Employer*,
- (2) The *Contractor's* test procedure contains testing criteria as defined in Section 2.1.10.3 as a minimum.
- (3) Testing is done in compliance with 240-105249370 Operating and Maintenance Requirements for Coal Fired Boiler Flame Failure Protection Devices Standard.
- (4) The *Contractor* is available for testing after normal working hours.
- (5) The *Employer* reserves the right to waive any test/s without consulting the *Contractor*.



- (6) Tests that are required to be performed on a test bench are done so on a test bench provided by the *Contractor*.

#### **2.1.10.2 Pilot installation**

Prior to the new pyrometers being procured and installed on all six Units at Majuba PS, a pilot installation is tested on site to verify the accuracy, performance and capability of the proposed pyrometer.

- (1) Prior to procuring and installing the pyrometers on all six (6) Units at Majuba Power Station, the *Contractor* tests the proposed pyrometer according to the test procedure outlined in section.
- (2) The *Contractor* compiles a test report containing the test results from the pilot installation and submits this report to the *Project Manager* for acceptance.
- (3) Upon acceptance of the test report, the *Contractor* may procure the pyrometers to fulfil the requirements as set out in the *works*.
- (4) The *Contractor* uses the pilot installation to verify the accuracy, performance and capability of the proposed pyrometer in relation to the pyrometers currently installed at Majuba Power Station
- (5) The *Contractor* submits proposals for the installation position of the test pyrometer/s to the *Project Manager* for acceptance prior to installation taking place. However, the proposed position is the left hand side of the Boiler, bottom row, position two (2).
- (6) The pilot installation is tested for a duration of no less than two (2) weeks.
- (7) The pilot installation test date and duration is chosen to include, as a minimum:
  - i. load ramps (both up and down) from various load set-points,
  - ii. at least one (1) light-up and one (1) shut down and,
  - iii. soot-blowing.
- (5) The *Contractor* submits the proposed test dates and duration to the *Project Manager* for acceptance.
- (8) The *Contractor* provides the pyrometer/s required to complete the testing outlined in the section below.
- (9) The pyrometer used for testing is of the same type and model as the proposed, and ultimately the provided, pyrometers.
- (10) The *Contractor* provides the power supply module/s required for the test pyrometer.
- (11) The *Contractor* provides the cabling required for the test pyrometer.
- (12) The *Contractor* installs the test pyrometer/s and provides the consumables required for installation

- (13) The *Contractor* removes the test pyrometer/s if the instrument is not accepted by the *Project Manager*
- (14) The *Contractor* provides temporary labelling for the pilot installation
- (15) The *Contractor* maintains the pyrometer for the entire test duration of the pilot installation.
- (16) The *Contractor* amends the installation of the accepted test pyrometer/s such that at completion of the works, all pyrometer installations and configurations at Majuba Power Station are identical

### 2.1.10.3 Testing Procedure

- (1) The *Contractor* provides and submits a testing procedure to the *Project Manager* for acceptance.
- (2) As a minimum, the *Contractor's* testing procedure contains the following data:
  - i. Performance criteria,
  - ii. Reliability criteria,
  - iii. Test duration,
  - iv. Test conditions,
    - Unit status,
    - Dynamic response captured (i.e. load ramp, soot blowing, light-up or shut-down),
  - v. Unit and installation location of test pyrometer/s,
  - vi. Instrument KKS',
  - vii. Instrument technical specifications,
  - viii. DCS and instrument configuration (calibration ranges/spans etc.),
  - ix. Monitoring requirements (frequency of measurement, instrument output, dust, accumulation, ambient temperatures etc.),
  - x. Process trends and logs of all pyrometer signals for the entire duration of the test,
  - xi. Maintenance requirements during testing,
  - xii. Availability/reliability of test pyrometer/s over test period,
- (2) For the pilot installation, the data in 2.1.10.3 (2) is provided for the test pyrometer and all pyrometers in the same row as the test pyrometer,
- (3) For the performance test during commissioning, the data in 2.1.10.3 (2) is provided for all the pyrometers on each Unit.

### 2.1.10.4 Commissioning Procedure

- (1) The *Contractor* provides and submits a commissioning procedure to the *Project Manager* for acceptance.

- (2) As a minimum, the *Contractor's* commissioning procedure includes the following:
  - i. Loop checks for each instrument provided,
  - ii. Calibration certificate for each instrument provided,
  - iii. Verification of the functionality and performance of each provided pyrometers using simulated light sources,
  - iv. Verification of all alarm signals associated with the pyrometers,
  - v. Verification of the Flame Failure Boiler Protection functions during start-up and on-load operation,
  - vi. Performance testing, on each Unit, for a minimum of two weeks with the relevant Boiler on-load.
  - vii. The procedure for the performance test is the testing procedure in 2.1.10.3.
- (3) The *Contractor* compiles a test report containing the commissioning results and submits this report to the *Project Manager* for acceptance.
- (4) The checks in items i, ii, iii, iv, are performed prior to verification of the Flame Failure Boiler Protection functions and conducting performance testing.

#### **2.1.10.5 Certification**

- (1) The *Contractor* provides certification, through a third party certification authority such as TUV or EXIDA, for all pyrometers provided.
- (2) The certification process requires, as a minimum, that the pyrometers undergo FMEA/FMECA studies to certify that the pyrometers provided are suitable for use in flame failure safety applications.

#### **2.1.10.6 Factory Acceptance Testing (FAT)**

- (1) The *Contractor* performs factory acceptance testing to verify the suitability and performance capability of the pyrometers provided before they are released for shipment to site.
- (2) The FAT may be performed as part of the certification process with both the *Employer* and the third party certification authority witnessing such tests.
- (3) The *Employer* witnesses the *Contractor's* acceptance testing.
- (4) The *Contractor's* factory acceptance testing is performed at its premises, or the third party certification authority's premises, in South Africa.
- (5) The *Contractor* compiles a factory acceptance test procedure and submits it to the Project Manager for acceptance 28 days prior to the FAT commencing.
- (6) The *Contractor* submits all documentation required for the FAT to the *Project Manager*, for acceptance, 28 days prior to the FAT commencing.

- (7) Upon completion of factory acceptance testing, the *Contractor* submits a FAT report detailing all tests performed, the outcome of the tests and defects identified during testing.
- (8) The FAT report is submitted to the *Project Manager* for acceptance

## **2.2 Procedure for submission and acceptance of *Contractor's* design**

### **2.2.1.1 Testing Milestone**

- (1) The *Contractor* cannot commence any of the installation work until the test setup design is complete and accepted by the *Employer*. This shall be indicated as a milestone in the Project Execution Programme.
- (2) A detailed implementation plan must be completed and accepted by the *Employer*.
- (3) The field work cannot commence without official access from the *Employer*.

### **2.2.1.2 Commissioning Completion Milestone**

- (1) Commissioning is complete when all Plant is successfully put into service and is performing as per criteria stated in the Works Information.

### **2.2.1.3 Project Completion Milestone**

- (1) The *Contractor* removes test plant and reverts any changes made during commissioning.
- (2) The *Contractor* submits documentation to fulfil the project complete milestone as per Appendix 01 – Vendor Document Submittal Schedule.

### **2.2.1.4 Shipment**

Shipment involves functions surrounding preparation of items of plant and materials for Installation on site. These functions include but are not limited to:

- Packaging of materials and items of plant for transportation to site
- Transport and delivery of materials and items of plant for Installation to site
- Storage of materials and items of plant on site

The *Contractor* is responsible for the proper co-ordination and execution of the various functions involved in providing the items of plant, materials and equipment required to provide the *works*.

### 2.3 Other requirements of the *Contractor's* design

- (1) The *Contractor* provides temporary labelling for the temporary installation.
- (2) The *Contractor* follows the existing **Majuba PS** plant codification philosophy as per 240-64550692 **Majuba PS** Label Specification and Plant Codification Procedure.
- (3) The *Contractor* follows the existing **Majuba PS** plant labelling philosophy as per 240-64550692 **Majuba PS** Label Specification and Plant Codification Procedure.
- (4) The *Contractor* provides a list of equipment which needs to be removed during the *works*.
- (5) The *Contractor* provides for all scaffolding required to complete the *works*.

### 2.4 -Year Outage Plan

The 5-year outage plan is documented in the table below. Due to rescheduling performed on a continuous basis, the plan might change from time-to-time. The latest updates can be obtained from the Service Manager when required.

### 2.5 The *Contractor's* plan for the service

1. The *Contractor* submits a program in MS Project / Primavera format (confirmation required upfront)
2. The program includes:
  - a. Activities
  - b. Durations in hours
  - c. Predecessors
  - d. Successors
  - e. Total float
  - f. No constraints (linking to be done properly)
  - g. No resources
  - h. No unnecessary calendars (remove all)
  - i. No empty lines
3. Daily feedback on progress required for duration of each task order program
4. The *Contractor* draws up a Quality Control Plan prior to commencement of the work, for approval by the Employer. The *Employer* and the *Contractor* agrees on hold and witness points.

## 2.6 Management meetings

1. Regular meetings of a general nature may be convened and chaired by the *Service Manager* as follows:

- 1.

**Table 1**

<b>Title and purpose</b>	<b>Approximate time &amp; interval</b>	<b>Location</b>	<b>Attendance by:</b>
Scope clarification meetings	From 18 months before start-date of an outage	Majuba Power Station, Specific conference room TBA	Site Manager, System Engineer, Outage coordinator and Quality Inspectors
Outage Kick-off meeting	Just before start-date of an outage	Majuba Power Station, Specific conference room TBA	Site Manager, Outage Co-ordinator
Overall Outage contract progress and feedback	Daily at 08:30	Majuba Power Station, Specific conference room TBA	Employer, Contractor and <i>Supervisors</i>
Daily outage meeting	Daily at 09:30 or 10:00	Majuba Power Station, Production boardroom (U4 16m level)	Site Manager, System Engineer, Outage coordinator and Quality Inspectors
Risk register and compensation events	Weekly on Thursday at 10h00	Majuba Power Station, Specific conference room TBA	Employer, <i>Contractor</i>
Safety meeting	Weekly on Wednesday at 14h00	Majuba Power Station, Production boardroom (U4 16m level)	Safety Officer
Assessment meetings	After completion of each task order	Majuba Power Station, Specific conference room TBA	Site Manager, Supervisor, System Engineer, Outage coordinator
Post mortem meeting	After outage completion	Majuba Power Station, Specific conference room TBA	Site Manager, Supervisor, System Engineer, Outage coordinator and Quality Inspectors

Title and purpose	Approximate time & interval	Location	Attendance by:
Maintenance Opportunity planning meetings	Just before start-date of an opportunity	Majuba Power Station, Specific conference room TBA	Site Manager, Maintenance Supervisor

2. Meetings of a specialist nature may be convened at times and locations to suit the Parties.
3. Records of these meetings shall be submitted to the *Service Manager* by the person convening the meeting within five days of the meeting.
4. All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting.
5. Such minutes or register shall not be used for confirming actions or instructions under the contract as these shall be done separately by the person identified in the *conditions of contract* to carry out such actions or instructions.

2.

## 2.7 Contractor's management, supervision and key people

### 2.7.1 The key persons

**Table 2**

Key persons of <i>Contractor</i>				
Designation				
Name				
Experience				
Tel				

1. The *Contractor's* Site Manager ensures that only competent persons be allowed to work on plant. The Employer's Service Manager is entitled to verify the qualifications of the *Contractor*.
2. The *Contractor's* supervisors must be knowledgeable about the conditions and scope of work contained in this contract and capable of executing the scope of work.
3. The Employer may, having stated reasons, instruct the *Contractor* to remove a key person. The *Contractor* then arranges that, after one day, the key person have no further connection with the work included in this contract.
4. The *Contractor* may not replace any of the key persons, without prior written request and approval thereof from the Employer.

3.

## 2.8 Police clearance

1. All *Contractor* personnel to undertake Police clearance
2. Certificates to be provided to the Service Manager at least 2 weeks before commencement of work



3. The Service Manager reserves the right to refuse entry to all persons whose criminal records indicate that their presence on site might create an unsafe and insecure environment to Majuba Power Station.
4. The following website can be used to guide the process.  
[http://www.saps.gov.za/services/applying\\_clearance\\_certificate.php](http://www.saps.gov.za/services/applying_clearance_certificate.php)

## **2.9 Supplier Development and Localisation Requirements**

### **2.9.1 Recruitment of General Labour**

1. The *Contractor* recruits 100% of all new recruits, of general labour from Dr Pixley Ka Seme local municipality, using the recruitment form provided by the department of labour. Contact details and application forms will be provided by the Service Manager on request
2. In an event that new recruits are not from the defined Dr Pixley Ka Seme municipality, the *Contractor* needs to provide proof that the local municipality could not provide such individual.
3. The *Contractor* needs to update the employer as well as the department of labour, in the event that there is a change in the staff compliment e.g. dismissal, resignation, etc
4. The *Contractor* submits an updated monthly job statistics on the 1<sup>st</sup> day of each month, using the reporting template that is provided by the Service Manager.

### **2.9.2 Transporting of Staff**

1. The *Contractor* use transportation sourced from the Dr Pixley Ka Seme local taxi association.
2. Contact details of the Chairpersons of the different associations will be provided by the Service Manager on request.

### **2.9.3 Small, Micro, Medium Enterprises**

The *Contractor* supports local Small, Micro and Medium Enterprises by purchasing your material locally where such material is available

### **2.9.4 Supplier Development and Localisation Plan**

“Local to site “means all areas that fall within the Dr Pixley Ka Seme Municipal area.

The *Contractor* is required

1. To provide a high level Supplier Development & Localisation implementation plan which stretches for the duration of the contract within one month after contract award.
2. To provide an explanation and action plan for deviation from the proposed plan
3. The *Contractor* is also required to submit its Human Resource Plans indicating the number of new jobs that would be created or retained due to this project.
4. The *Contractor* is required to procure general labour from Dr Pixley Ka Seme. Only skilled and professionals would be procured from outside of Dr Pixley Ka Seme Municipality Area.
5. The Candidates for Skills Development would be sourced from Dr Pixley Ka Seme first, then Mpumalanga, before the rest of RSA.
6. The candidates may be developed directly by the supplier, through the suppliers' own supply network or through the SETA accredited training providers.

7. Candidates are to be currently unemployed graduates from FET (Further Education and Training) colleges, universities or matriculates. These candidates shall also be representative of the population demographics of Mpumalanga province
8. The *Contractor* submits proposals to the Employer for acceptance on how he will employ and train local labour in the following positions:

## 2.10 Management of work done by Task Order

1. Task Orders are issued per outage one month prior to the start of an outage The Task Order includes the scope of work for the specific outage.
2. A Task Order is the instruction to commence work.
3. No work shall commence until a Task Order is issued and has been finalised, accepted and signed by both the *Employer* and *Contractor*.
4. All work will be issued on a Task Order system. The Work Order, Purchase Requisition and Purchase Order will be created via the SAP PM system.
5. Task orders will be raised for all additional items. Assessments will be done after completion of the work for a specific outage or Maintenance opportunity. If the Outage duration exceeds 30 days, progressive assessments for actual hours worked and actual cost incurred will be performed
- 4.

## 2.11 Contract change management

1. The *Service Manager* issues a Task order to the *Contractor* to authorise the execution of work.
2. In the event where it is identified that there is additional work to be done outside the scope of work on the Task Order, the *Contractor* will give the *Service Manager* an early warning with a written quotation.
3. If agreed, the *Service Manager* issues a revised Task Order or additional Task Order.
4. The *Contractor* starts the work on the starting date of the task order.
5. The Task Order is signed by both the *Service Manager* and the *Contractor* before work commences.

## 2.12 Low Service Damages

1. The low service damages will be applicable if the performance of the plant, where repair work was inadequately done, causes partial or full load losses. The following process and damages will apply:
  5.
    - a. The defect(s) will be reported to the *Contractor* as soon as the Employer becomes aware of the defect(s).
    - b. An opportunity will be arranged by the Employer for the repair and the *Contractor* will be notified at least 24 hours in advance of the opportunity to repair the defect(s).
    - c. The *Contractor* is to be notified immediately of the Unit trip. An opportunity will be arranged by the Employer for the repair and the *Contractor* will be notified at least 12 hours in advance of the opportunity to repair the defect(s).

- d. If the inspection confirms that, the defect(s) is/are because of poor quality from the *Contractor's* work performed during an outage, a 0.5% damage of the total value of task orders raised for that outage per day will apply, until the defect(s) is/are resolved. The damages are capped at a maximum of 10% of the total of the task orders raised for that outage/maintenance breakdown.
- e. If the inspection confirms that, the defect(s) is/are because of poor quality from the *Contractor's* work performed during a maintenance opportunity, a 2% damage of the total value of task orders raised for that opportunity in which the defect occurred, per day will apply, until the defect(s) is/are resolved. The damages are capped at a maximum of 15% of the total of the task orders raised for that opportunity.

**Table 3**

<b>Low Service Damage Description</b>	<b>Value of Low Service Damages</b>	<b>Limit of Low Service Damage</b>
1. Service delaying the Outage Critical Path agreed schedule or Delaying other <i>Contractor(s)</i> from starting/completing their work or delaying the RTS of the unit	2% per total value of the Task orders for the Outage / maintenance opportunity per day	Limited to 15% of the total value of the Task Order(s) for the outage
2. Service delays not finishing as per agreed upon project plan submitted and approved by the <i>Service Manager</i>	0.5% per total value of the Task Order(s) for the Outage / maintenance opportunity per day	Limited to 10% of the total value of the Task Order(s) for the outage
3. Failure to submit documents as per agreed upon Contract Document Submittal Schedule in this service agreement	0.5% per total value of the Task Order(s) for the Outage / maintenance opportunity per day	Limited to 10% of the total value of the Task Order(s) for the Outage / maintenance opportunity
4. Failure to comply to hold and witness points on QCP's	0.5% per total value of the Task Order(s) for the Outage / maintenance opportunity per day	Limited to 10% of the total value of the Task Order(s) for the Outage / maintenance opportunity
5. Failure to update Daily Progress Report/program	0.5% per total value of the Task Order(s) for the Outage / maintenance opportunity per day	Limited to 10% of Task Order Value
6. Failure to respond to an NCR within 3 days	0.5% per total value of the Task Order(s) for the Outage / maintenance opportunity per day	Limited to 10% of the total value of the Task Order(s) for the Outage / maintenance opportunity
7. Failure to resolve an NCR within 30 days	0.5% per total value of the Task Order(s) for the Outage / maintenance opportunity per day	Limited to 10% of the total value of the Task Order(s) for the Outage / maintenance opportunity

Low Service Damage Description	Value of Low Service Damages	Limit of Low Service Damage
8. Failure to Handover completed data books per outage within 14 days from outage completion.	0.5% per total value of the Task Order(s) for the outage per day	Limited to 10% of the total value of the Task Order(s) for the outage
9. Using Personnel which are not Qualified as per this service agreement	0.5% per total value of the Task Order(s) for the Outage / maintenance opportunity per day	Limited to 10% of the total value of the Task Order(s) for the Outage / maintenance opportunity
10. Defect(s) is/are because of poor quality from the <i>Contractor's</i> work performed as per paragraph 3.13 during outages	0.5% per total value of the Task Order(s) for the outage per day	Limited to 10% of the total value of the Task Order(s) for the outage
11. Defect(s) is/are because of poor quality from the <i>Contractor's</i> work performed as per paragraph 3.13 during the maintenance opportunity	2% per total value of the Task Order(s) for the maintenance opportunity per day	Limited to 15% of the total value of the Task Order(s) for the outage
12. <i>Contractor</i> sustains a First Aid or Medical Incident	0.5% per total value of the Task Order(s) for the Outage / maintenance opportunity per incident	0.5% per total value of the Task Order(s) for the Outage / maintenance opportunity per incident
13. <i>Contractor</i> sustains a Lost Time Incident	1% per total value of the Task Order(s) for the Outage / maintenance opportunity per incident	1% per total value of the Task Order(s) for the Outage / maintenance opportunity per incident
14. <i>Contractor</i> not reporting safety incidents within the same shift to the Eskom Coordinator and Contract Service Manager	0.5% per total value of the Task Order(s) for the Outage / maintenance opportunity per incident	0.5% per total value of the Task Order(s) for the Outage / maintenance opportunity per incident
15. Failure to keep the Safety File up to date and audited on a monthly basis to cater for maintenance opportunities	R10 000 once-off and then a further R10 000 per day until the file is audited and approved	R50 000

## 2.13 Documentation control

1. Safety files to be submitted and approved before maintenance and outage work commence as per client requirements, two weeks in advance for outages.
2. The *Contractors* Outage safety file will be handed over to the *Service Manager* after each outage

3. The *Contractor's* Maintenance Safety File will be kept up to date and audited on a monthly basis to cater for maintenance opportunities. It is the *Contractor's* responsibility to arrange the appointments with the Majuba Safety officers.
4. All NEC standard forms should be used eg. Task orders, Early Warnings, Defect certificates and Assessments.
5. The *Contractor* is responsible to plan the supply of the documentation during the various project stages and to provide the documentation in accordance with the *Contractor* Document Submission Schedule (CDSS). A document is thus any written or pictorial information describing, defining, specifying or certifying activities, requirements, procedures or results.
6. The *Contractor* submits all documentation on a formal transmittal form to the *Service Manager*.
7. All manuals, documents, drawings and engineering documentation shall be presented in British English in both software and hardware.
8. All Communications will be filed and kept on site as it is crucial to have the correct communication structures. These communication documents are to adhere to the NEC 3 Term Service Contract communication requirements.
9. Planned Outage Scope of work to be issued to *Contractor* from the client five months in advance
10. Budget quotation for outage work to be submitted one week after SOW submission/SOW clarification
11. Compensation for Occupational Injuries and Diseases (COID) Certificate and letter of good standing must be valid at all times and submitted to the *Service Manager* at each anniversary of the contract. These documents are to be submitted to the Eskom vendor database by the Contractor, before they expire.
12. Two hard copies of the completed data packs submitted to the Service Manager. An Electronic copy of all reports to be provided on CD/ DVD

### 2.13.1 Contractor Document Submission Schedule (CDSS)

**Table 4**

Document Name/Description	Date/Time documents to be submitted
Supplier Localisation plan	Two weeks after contract award
Supplier Localisation report	Quarterly at the 2 <sup>nd</sup> of each 4 <sup>th</sup> month after the contract start date
A programme in Primavera or MS Project format as referred to document number (240-85065548)	One week after receipt of Task Order for Outages, 8 hours after receipt of a Task Order for Maintenance opportunities
Baseline risk assessment	One week after receipt of Task Order for Outages, 8 hours after receipt of a Task Order for Maintenance opportunities
QCP's	One week after receipt of Task Order for Outages, 8 hours after receipt of a Task Order for Maintenance opportunities
<i>Contractor's</i> Safety file	Two weeks before start of work in case of outages Two weeks after contract award for maintenance work and to be Audited every 30 days

Document Name/Description	Date/Time documents to be submitted
Safety file Audit	<ul style="list-style-type: none"> <li>Outages: Every 30 days after approval of initial file until work for specific outage is complete.</li> <li>Maintenance: Every 30 days after approval of initial file till end of the contract for maintenance opportunities</li> </ul>
Inspection report	24 hours after inspection activity
Progress report	After Every Shift during Outages, every 6 hours or less as per the Maintenance Supervisor agreement
Time clocking reports	Two weeks together with a forecast for future invoicing for outages. After completion of the work for maintenance opportunities
Technical report and data pack	Within 14 days of completion of the services (per outage) Within 3 days of completion of the services per maintenance opportunity
Updated monthly safety job statistics	1 <sup>st</sup> day of each month, using the reporting template that is provided by the Service Manager
Compensation for Occupational Injuries and Diseases (COID) Certificate and letter of good standing	At each anniversary of the contract or before current expiry dates on the documents.

## 2.14 Invoicing and payment

Within one week of receiving a payment certificate from the *Service Manager* in terms of core clause 51.1, the *Contractor* provides the *Employer* with a tax invoice showing the amount due for payment equal to that stated in the *Service Manager's* payment certificate.

The *Contractor* shall address the tax invoice to  
Accounts Payable Services  
Eskom Holdings SOC Limited  
Majuba Power Station  
Private Bag 9001  
Volkstrust  
2470

and include on each invoice the following information:

1. Name and address of the *Contractor* and the *Service Manager*;
2. The contract number and title;
3. *Contractor's* VAT registration number;

4. The *Employer's* VAT registration number 4740101508;
5. Description of service provided for each item invoiced based on the Price List;
6. Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT;

### **3 Health and safety, environment and quality assurance**

#### **3.1 Health and Safety Risk Management**

1. The *Contractor* complies with the health and safety requirements contained in the General Works Information.
2. Eskom is a national key point and therefore strikes are not permitted. Strikes are to be managed by the *Contractor* at his/her own cost.
3. The *Contractor* to have a dedicated Safety Officer on site at all times when work is performed. The Safety Officer to preferably have a National Diploma, but at least have a SAMTRAC or equivalent qualification.

##### **3.1.1 Statutory Safety**

- 3.1.1.1 Site and or Workshop establishments involved in the execution of welding projects shall meet  
the mandatory statutory health requirements as contained in the OSH Act and regulations 85 of 1993.

##### **3.1.2 Reporting of Incidents**

1. The Employer follows an incident prevention policy; refer to 32-95, Environmental, Occupational Health and Safety Incident Management Procedure, which includes the investigation of all incidents involving personnel and property. This is done with the intention of introducing control measures to prevent a recurrence of the same incident. The *Contractor* is expected to co-operate fully to achieve this objective. The Employer's Representative must be informed immediately of any incident before the end of the shift.  
6.
2. **NOTE:** The reporting of the incident to the Employer's Representative, does not relieve the *Contractor* of his legal obligation to report incidents to the Department of Labour, or to keep records in terms of the Occupational Health and Safety Act, and Compensation for Occupational Injuries and Diseases Act.

##### **3.1.3 Work Stoppages**

1. The Employer takes safety serious and therefore lessons learned from other safety lost time incidents are shared with the whole workforce. These stoppages are compulsory and the *Contractor* will not be allowed to claim additional compensation for these stoppages.
2. If the *Contractor* experiences a LTI, he/she might be expected to prepare a presentation and present it at a work stoppage that will be arranged by the Employer. The presentation content/template will be provided by the Employer.  
7.

##### **3.1.4 Health and Safety Arrangements**

1. The *Contractor* must ensure that all his personnel attend a Health and Safety Induction Course prior to starting with the works. A one- (1) hour course will be provided by the Employer and will be valid for the duration of one- (1) year.
2. The *Contractor* shall comply with the guidelines set out in the Majuba Standard BIA/RM/STD/01 titled "Safety, Health and Environmental specifications to be met by Contractors"
3. Safety Risk Management has the right and authority to visit and inspect the Contractor's workplace or site establishment to ensure that tools, machinery and equipment comply with the minimum safety requirements.
4. The Employer's Representative shall be entitled to instruct the *Contractor* to stop work, without penalty to the Employer, where the Contractor's personnel fail to conform to safety standards or contravene health and safety regulations. The Employer's Representative is entitled to instruct the *Contractor* to discipline his employees and to enforce disciplinary action, and submit a report to the Employer's Representative. The *Contractor* shall implement additional health and safety precautions where necessary.
5. The following Health & Safety requirements should be complied with:
  - a. The *Contractor* must supply a Certificate of Competency of his/her employees to work under the following conditions:
    - i. Confined Spaces
    - ii. Heights
    - iii. Heat stresses
    - iv. Cold stresses
  - b. The *Contractor* to provide the Employer with proof of free issue of adequate Personal Protective Equipment (PPE) to be used by his/her employees (preferably SABS approved). All PPE to comply with the Eskom PPE specification 240-44175132
  - c. Noisy equipment and tools - no equipment or tools > 105db (A) may be supplied/utilised by the Contractor.
  - d. Sub-contractors - the principal *Contractor* must state if a sub-*Contractor* is going to be used and who the sub-contractor/s are. Proof must be given to Eskom that the sub-contractor/s has/ve the necessary competence and resources to carry out the work safely and to ensure that due care of the environment will be exercised.
  - e. Medical examination processes must be complied with.

### 3.1.5 Vehicle and driver safety

1. All drivers, passengers and pedestrians must obey vehicle safety requirements in terms of the National Road Traffic Act, Act No 93 of 1996, as amended, including other relevant provincial or local requirements.
2. Transportation of passengers: open LDV's:

With effect from 31 May 2006, no Eskom employee or *Contractor* would be allowed to transport passengers on the back of open light delivery vehicles (LDV's). It is a legal requirement to provide safe transportation of Eskom and *Contractor* employees – therefore the following will be enforced:

  - a. Ensure that no employee, including *Contractor* employees or any other person, when on an Eskom site and/or performing work for Eskom, is allowed to be transported in the back of open vehicles.



- b. There will be cases where this may not be reasonable or practicable, namely where vehicles are used during line inspections on sites or on private roads, or similar cases, and in these cases such vehicles must be driven at less than 30km per hour or at a speed suitable to the prevalent conditions. In such cases, the carrying of passengers in the back of such open vehicles could be explicitly allowed, after:
  - i. a risk assessment has been carried out, indicating a very low risk;
  - ii. mitigating factors have been identified to control any risk identified;
  - iii. proper seating and handrails have been provided on the back of the open vehicle;
  - iv. These measures have been discussed at the relevant Health and Safety Committee Meeting and approved by the *Employer*.
  - v. is defined and contained in a formal written division's or BU's policy, including the appropriate mitigating factors;
  - vi. Such a policy has been communicated to all employees and contractors.

The above risk assessment findings/outcomes must be available at all times for audit purposes.
- c. Tools and equipment must be properly secured.
- d. Only authorised drivers may transport passengers.
- e. Proof must be submitted on request in terms of valid roadworthiness of the vehicle/s.
- f. The above must apply to on site and off site transportation of passengers.
- g. No person may be transported in the back of vehicles closed by means of canopies, unless provided with factory-fitted or manufactured-approved, proper seating and safety belts, i.e. Crew cabs.
- h. The driver must ensure that no employees are transported in the back of open vehicles unless it is allowed in terms of a divisional or BU-specific policy as referred to in paragraph b above. This also applies to *Contractor* and *Contractor* employees when performing work for Eskom.
- i. The driver must ensure that all canopies are being properly fitted and secured and that all loose tools and objects in vehicles are properly secured.
- j. The driver must ensure that their passengers are seated and wear seatbelts at all times.

8.

### 3.1.6 Vehicle Standard minimum specifications

1. *Contractor* vehicles are to comply with the requirements specified in the Eskom Vehicle Safety Specification 32-345.
2. The standard minimum specifications are applicable to all Eskom-owned vehicles and vehicles used when performing work for Eskom Holdings SOC Limited and its subsidiaries, including contractors (subsidised transport, contractors, consultants, and any person insured directly or indirectly by Eskom, driving a vehicle within or beyond the borders of South Africa). This includes vehicles owned, hired or leased by Eskom or its subsidiaries or any vehicle an employee makes available for Eskom-related business purposes.
3. All vehicles used for Eskom business shall meet the following requirements:
  - a. Factory-fitted antilock braking system (ABS) for all vehicles.
  - b. Factory-fitted driver and passenger air bags.
  - c. Alarm/immobiliser, factory-fitted, and if not available by the manufacturer, it shall be fitted at approved fitment centres.
  - d. Factory-fitted power steering.

- e. Tyres as per the manufacturer's specifications for the intended purpose.
- f. Two emergency warning triangles.
- g. Factory-fitted air conditioner.
- h. Reverse beeper shall be standard on all heavy commercial vehicles, buses and construction equipment or vehicles being used on construction sites.
- i. Refer to the standard for specific requires for Light Delivery Vehicles (LDVs), Heavy Commercial Vehicles, Minibuses, Midi-buses and buses, Trailers and caravans, Construction vehicles and Other requirements.

### 3.1.7 Hot Work

The *Contractor* to comply with Eskom's Hot Work procedure.

1. The Hot Work Monitor must be in possession of the following qualifications and training:
  - a. Basic fire extinguisher training
  - b. Hot work monitor training
  - c. Broad knowledge of welding, cutting, brazing, grinding, soldering and other hot work activities
  - d. Must be able to read and write English

2. Hot work approval

Before hot work operations begin in a non-designated location, a hot work approval is required. Before the hot work approval is issued, the following conditions are to be verified by the Hot Work Monitor:

- a. Hot work equipment to be used shall be in satisfactory operating condition and in good repair.
- b. Where combustible materials, such as paper clippings, wood shavings, or textile fibres are on the floor, the floor shall be swept clean for a radius of 11m. Combustible floors (except wood on concrete) shall be kept wet, be covered with damp sand, or be protected by non-combustible or fire retardant shields.
- c. Where floors have been wet down, personnel operating arc-welding equipment shall be protected from possible shock.
- d. All combustibles shall be relocated at least 11m horizontally from the work site. If relocation is impractical, combustibles shall be protected with fire retardant covers or otherwise shielded with metal or fire retardant guards or curtains. Edges of covers at the floor shall be tight to prevent sparks from going under them, including where several covers overlap when protecting a large pile.
- e. Openings or cracks in walls, floors, or ducts within 11m of the site shall be tightly covered with fire retardant or non-combustible material to prevent the passage of sparks to adjacent areas.
- f. Conveyor systems that might carry sparks to distant combustibles shall be shielded.
- g. If hot work is done near walls, partitions, ceilings, or roofs of combustible construction, fire retardant shields or guards shall be provided to prevent ignition.
- h. If hot work is to be done on a wall, partition, ceiling, or roof, precautions shall be taken to prevent ignition of combustibles on the other side by relocating combustibles. If it is impractical to relocate combustibles, a fire watch on the opposite side from the work shall be provided.
- i. Hot work shall not be attempted on a partition, wall, ceiling, or roof that has a combustible covering or insulation, or on walls or partitions of combustible sandwich type panel construction.

- j. Hot work that is performed on pipes or other metal that is in contact with combustible walls, partitions, ceilings, or other combustibles shall not be undertaken if the work is close enough to cause ignition by conduction.
  - k. Fully charged and operable fire extinguishers that are appropriate for the type of possible fire shall be available immediately at the work area. If existing hose reels are located within the hot work area defined by the permit, they shall be ready for service, but shall not be required to be unrolled or charged. (Loan extinguishers are available from the Fire Department)
  - l. If hot work is done in close proximity to a sprinkler head, a wet rag shall be laid over the head and then removed at the conclusion of the welding or cutting operation. During hot work, special precautions shall be taken to avoid accidental operation of automatic fire detection or suppression systems (for example, special extinguishing systems or sprinklers)
  - m. Nearby personnel shall be protected against heat, sparks, slag, and so on
  - n. All welding machines and cutting torch trolleys are to be equipped with at least a 2,5kg dry powder fire extinguisher.
  - o. If hot work has to be done in high-risk areas where fire systems cannot be impaired, a welding tent should be built around the object to be worked on i.e. Bulk Fuel Oil Plant.
3. Appointment of Hot Work Monitors
- a. Eskom and each *Contractor* Company that is required to perform hot work shall appoint in writing at least one (1) hot work monitor for normal day-to-day maintenance related hot work/ outage related hot work. Additional hot work monitors may be appointed if the workload requires such appointments.
4. Hot Work Approval
- a. The hot work monitor must complete a hot work approval form (Form Part 1). as per 32-681 Plant Safety Regulations

Refer to the procedure for further information.

### 3.1.8 Confined Spaces

Such As Vessels, Mills, Culverts, Flues, Furnaces, Ducts, Pits, Sewers, Tunnels and Underground Chambers (Refer General Safety Regulation 5 of the OHS Act)

1. At least one door or manhole giving access to each confined space must be provided with a means to lock such door or manhole in the open position. A confined space warning sign must also be attached next to such entrance of a confined space when entry into this area will be required.
2. The door or manhole concerned must be locked in the open position and a confined space warning sign attached before any person is allowed to enter such confined space. The locking, or other preventative measure, must constitute an integral part of the isolation required before the permit to work is issued. Where such a door or manhole cover must be removed by a maintenance person, provisos similar to those stipulated under (section 17.2 c and 7.11.2 b) must apply.
3. Before any door giving access to a confined space is closed, the person closing such door must ensure that there are no persons inside the confined space, and that all tools, equipment and debris have been removed.

4. Where a confined space can be isolated and adequately ventilated, this must be done before the space is environmentally tested and certified clear of all dangerous gases. Thereafter a gas test certificate and an environmental certificate must be issued before any person is allowed to enter. In addition:
    - a. Adequate ventilation, gas monitoring and thermal stress monitoring (heat stress – WBGT index - cold stress) must be maintained while persons remain in the space.
    - b. Only approved lighting and portable electrical tools shall be allowed, (Refer Electrical Machinery Regulation 10 of the Act.
    - c. A permit to work must be issued.
  5. Where there is a possibility of dangerous substances being present in a confined space which cannot be effectively isolated and adequately ventilated, the following measures must be taken before any person is allowed to enter that space:
    - a. All practical steps must be taken to prevent the ingress of dangerous substances.
    - b. Every person who enters the confined space must wear approved self-contained breathing apparatus and must have competency for the equipment.
    - c. Every person who enters the confined space must wear a safety harness to which a rescue line is attached.
    - d. A rescuer must remain on duty outside the confined space and this person must maintain communication with those inside the confined space. The rescuer must control the rescue line(s) attached to the safety harness (es) and must assist in the removal of any person from the confined space in the case of an emergency. An additional set of breathing apparatus must be available for the use of the rescuer.
    - e. Adequate steps must be taken to ensure that all persons wearing breathing apparatus are withdrawn from the confined space before the end of the specified working duration of the breathing apparatus.
    - f. A permit to work must be issued.
  6. Where it is not possible to reduce the WBGT index to be below 30 for manual work, access shall only be allowed, if relevant training has been done and a local procedure is in place that explains in detail the access control and health and safety precautions as described in the environmental regulations. (Refer Environmental Regulations for Workplaces 2(4) of the Act).
  7. If the original scope of work changes, a new permit to work must be issued, or if hazardous substances are used, the risk assessment, pre-work checklist, the environmental certificate, gas test certificate shall be re-evaluated and re-issued as required.
- 9.

### 3.1.9 Working on Heights

#### General

1. Wherever reasonably practicable, preference is given to the performance of work at ground level as opposed to in an elevated position.
2. Where work in an elevated position is necessary, preference is given to fall prevention measures such as, but not limited to, effective barricading and the use of work platforms.
3. Persons may only work from a fall risk position if a site-specific fall protection plan is in place and correctly implemented and consists of the following:
  - a. All appointments for the fall protection plan developer and implementer are in place.

- b. One risk assessment, which is specific and incorporates the working at height risk assessment, as well as the site-specific risk assessment, has been completed for the work to be conducted.
- c. Safe working procedure/task analysis and work instructions, approved by a competent person, are in place.
- d. A fall rescue plan, along with necessary equipment and trained rescuers, is in place.
- e. Appropriate training, as determined by the risk assessment, has been provided.
- f. Appropriate height safety equipment and personal protective equipment have been issued to the individual.
- g. There are equipment inspection procedures and up-to-date inspection records.
- h. Individuals are medically fit to work at height, and records of this are kept.
- i. A site-specific risk assessment is performed.
- 4. While work is in progress, adequate warning signs and/or barricades shall be used in all areas where there is a risk of persons being injured by materials or equipment falling from the work area. Barricades should be continuous and easily visible.
- 5. A drop zone shall be established with appropriate warning signs and barrier tape or barricading, warning personnel below of workers above and potential falling objects.
- 10.

### **3.1.10 Risk Assessment**

- 1. A risk assessment allows for careful examination of what could cause harm to people because of a work activity, and it allows one to take the necessary precautions to prevent the harm from occurring.
- 2. The following hierarchy of controls has to be observed.
  - a. When considering work at height, a risk assessment must be conducted, form part of the health and safety plan to be applied on site and must include;
    - i. the identification of the risks and hazards to which persons may be exposed to;
    - ii. an analysis and evaluation of the risks and hazards identified based on a documented method;
    - iii. a documented plan and applicable safe work procedures to mitigate, reduce or control the risks and hazards that have been identified;
    - iv. a monitoring plan; and
    - v. a review plan
  - b. Working at height risk assessments shall take into account factors such as:
    - i. the necessity for the work to be done in an elevated position as opposed to on the ground;
    - ii. barricading and other fall prevention measures;
    - iii. requirements of the safe work procedure;
    - iv. restrictions in fall distances and clearances;
    - v. mobility required for the task, for example, degree of vertical or horizontal movement;
    - vi. height being worked at;

- vii. possible injuries;
  - viii. duration of exposure;
  - ix. frequency of performing these activities;
  - x. type of work and ergonomic considerations;
  - xi. work site/area congestion;
  - xii. potential/likelihood/causes of a fall occurring;
  - xiii. endurance of workers;
  - xiv. risk control measures;
  - xv. electrical hazards and safe clearances from overhead power lines;
  - xvi. structure (ease of access, secure footing, and compatibility with fall prevention and/or fall arrest equipment);
  - xvii. terrain;
  - xviii. restrictions with reference to working alone (a rescue must always be executable);
  - xix. falling objects; and
  - xx. suitable anchor points.
- c. Develop approved written safe work procedures/task analysis and work instructions for all elevated work and make them available to all persons carrying out the work. Standard procedures may be suitable for most work; however, unusual conditions or architectural features may require additional site-specific procedures. The person supervising the work must ensure that safe work procedures/task analysis and work instructions are followed at all times.
- d. In the design phase, consider fall risks with regard to minimising risk, ease of access, anchor points, and avoidance as far as reasonably practicable.
- e. The risk assessment will determine the selection of suitable work at height equipment and systems for the work to be performed safely.
- f. Be aware of hazards resulting from adverse weather conditions, and where necessary, modify the work method accordingly.
- g. Determine the content and intervals of planned job observations during the risk assessment.
- h. The risk assessment must include the rescue plan.
- i. Persons working alone should have a practical way of performing a rescue in the event of an incident.
- j. Risk assessments must be performed and documented by competent persons. The mitigation process from the risk assessments must influence the content of the fall protection plan.
- k. In the case of live work, work has to be conducted according to standards and procedures while maintaining minimum safe working clearance.

- I. Take into account the risks associated with objects falling from heights. Tools and equipment must be safely secured and attached to the body or structure.

### **3.1.11 Fall Protection Plan**

1. A task-/job-specific fall protection plan shall be developed and approved by a competent person for any activity where there is a risk of a fall.
2. A competent fall protection plan developer must be appointed according to 10(1)(a) of the Construction Regulations.
3. The fall protection plan shall include a task-/job-specific risk assessment and requirements relating to the following:
  - a. Training programme for employees working from a fall risk position
  - b. Appointments and authorisations
  - c. The procedure addressing the inspection, testing, and maintenance of all fall protection equipment
  - d. A risk assessment that is site-specific with regard to fall risks for work to be performed
  - e. The processes for evaluation of the employees' medical fitness necessary to work in a fall risk position and the records of this (medical surveillance programme)
  - f. Equipment use and specification
  - g. Fall prevention, fall arrest, and fall rescue
  - h. Method statements or safe work procedures/task analysis/work instructions.
4. The fall protection plan and its requirements shall be integrated into the health and safety plan.
5. Adherence to the fall protection plan is mandatory. An induction on the fall protection plan must be carried out for all relevant employees.
6. The fall protection plan must be suitably amended in accordance with the risk assessment, equipment technology, standards, and legislation.
7. The fall protection plan must be monitored and reviewed as required by the work performed and changes in hazards.

### **FAS Training (Fall Arrest System)**

1. All users of height safety equipment for working at height must be trained, assessed and declared competent for the specific height safety equipment and associated structures.
2. Only service providers accredited by Eskom to present the basic Fall Arrest System and Rescue Course as per the working at heights procedure will be accepted and recognised as competent to provide competency for working at heights training. A list of the Eskom Accredited Service providers can be obtained from the Service Manager.
3. Validity of FAS and rescue training
  - a. There shall be no expiry date on official training, but at least one job observation on each user per annum, for example by a peer.
  - b. There shall be no expiry date on the certificate, but only the date of training.
  - c. Evaluation to be conducted every three years by an accredited trainer.
4. The need for refresher training is determined by the employer, taking into account factors such as period of inactivity and changing circumstances as determined by risk assessments and job observations.

5. Refresher training/workshops for rescue need to be run on a regular basis, at least six-monthly.
6. At least two persons per team have to be able to perform rescues if work at height is involved.
7. All personnel trained to perform rescues will be trained to first aid Level 2.
8. Documented training records for all work at height training must be maintained.

### 3.1.12 Lifting and Rigging

1. General Rigging Practices (applicable to critical and non-critical lifts)
  - a. A pre-job brief shall be conducted prior to every rigging activity and shall include operating experience.
  - b. A visual inspection of all lifting equipment shall be done prior to each use.
  - c. Softeners shall be used on sharp corners and edges.  
CAUTION: Failure to properly protect the lifting equipment from sharp edges can result in damage, to the lifting equipment and dropped loads.
  - d. No personnel are allowed directly below the suspended weight.
  - e. Loads shall not remain suspended without a qualified rigger or crane driver present.
  - f. Where a load cell is utilised, a load cell observer shall be appointed who shall stop the lift if the Pre-agreed load limit is likely to be reached.
  - g. The load path and lay down area shall be identified and walked down prior to the lift and barricaded to ensure :
    - i. The lay down area is capable of carrying the load (Weight and volume) .
    - ii. The lifting equipment can follow the load path while respecting the SWL of lifting equipment.
    - iii. No personnel shall be below the load at any stage on the load path.
    - iv. The load path is suitably barricaded and sign-posted.
  - h. Guide ropes may be used to guide loads however, at no stage shall a guide rope be tied to a person. A suspended load may only be handled by hand when the load is below shoulder height and there is no risk of slipping or there is a confined space between the handler and the load.
  - i. When lifting concrete blocks or floor plugs, the following practices shall be observed:
    - i. Verify connections installed are intended as rigging points.
    - ii. Inspect the condition of the lifting points prior to the lift for corrosion, wear, cracks or deformation.
    - iii. Inspect the condition of the concrete block of floor plugs to the lift for cracks or physical damage.
    - iv. Verify load markings and the presence of hold down mechanisms.

NOTE: If wear is noted or in doubt, request non-destructive testing to be performed and / or visual inspection by the civil engineer.
  - j. Load cells shall be used under the following conditions:
    - i. It is a critical lift
    - ii. The load cannot be reliably determined due to possible binding of other reasons.



NOTE: If a load cell cannot be used, then approval from the Technical Support Manager or his delegate shall be obtained to proceed with the lift.

- k. A post lift inspection of lifting equipment shall be performed and tagged if any damage is noted and the lifting equipment store man informed.
- l. The hoist chain or hoist rope shall be free from kinks and twists and shall not be wrapped around the Load.
- m. The load shall only be lifted high enough to clear obstructions, where, multiple obstructions exist along the load path, the load shall be lifted high enough to clear the highest obstruction unless specifically noted otherwise in the critical lift plan.

NOTE: The use of a guide rope is mandatory in these circumstances.

2. Load Weight Determination

- a. The load weight shall be determined using one or more of the following methods:
  - i. Official design documentation or technical manuals provided by the manufacturer.
  - ii. Data plates, labels.
  - iii. Use of measuring equipment (dynamometer, spring balance or other load measurement tools).
  - iv. Calculation using the method in Appendix 3

3. Non Power Driven Lifting Equipment Inspection and Maintenance

- a. Lifting equipment shall be inspected in accordance with the inspection and Maintenance program for lifting equipment.
- b. The inspection program shall comply with the requirements of the occupational health and safety Act and its regulations with particular reference to the driven machinery regulations.
- c. The inspection shall be conducted taking into consideration the manufacturers design standards.
- d. Lifting equipment conforming SANS standards is preferred. Approval shall be obtained from the manager for lifting equipment complying with alternative standards.
- e. Personnel conducting lifting equipment inspections shall be trained and authorised to perform such Inspections.
- f. *Contractor* lifting equipment shall be inspected prior to use by a person qualified to inspect the lifting equipment.

4. Power Driven Lifting Equipment Inspection Maintenance

- a. Lifting equipment shall be inspected in accordance with the inspection and Maintenance program for power driven lifting equipment.
- b. The inspection program shall comply with the requirements of the occupational health and safety Act and its regulations with particular reference to the driven machinery regulations.
- c. The inspection shall be conducted taking into consideration the manufacturers standards.
- d. Lifting equipment conforming to SANS standards is preferred. Approval shall be obtained from the Manager for lifting equipment complying with alternate standards.
- e. Personnel conducting lifting equipment inspections shall be trained and authorised perform such Inspections.

5. Lifting Equipment Modification, Construction and Design Limits

- a. Lifting equipment shall not be operated outside its design limits unless a detailed design assessment is conducted by engineering and presented to the SME and the Common Plant Area Manager for approval.

- b. Waiver applications or lifting equipment design changes shall be supported by the Common Plant Area Manager prior to submission to the legislative authority (department of labour).
  - c. Design of lifting beams and structures carried out on-site shall be carried out in Accordance with an accepted design standard, which shall be indicated in the documentation utilising the station design process.
  - d. Lifting from supports that are not designated as lifting supports (e.g. Cable trays, Pipes, pipe supports and other plant structures) shall not be performed unless approved by the structural engineer prior to the lift.
6. Lifting Equipment and Operations Personnel Training, Qualifications and Fitness
- a. Lifting equipment and operations personnel shall be trained in accordance with the training of lifting Equipment.
  - b. All lifting personnel shall undergo a medical exam annually to ensure that they are medically fit to perform lifting and rigging operations.
7. Personnel Lifting
- a. The use of a Crane to hoist Employees on personnel platforms is prohibited except When the erection, use and dismantling of conventional means of reaching the worksite , such as a Personnel hoist, ladder, stairway, work platform or scaffold would be more hazardous or is not possible because of structural design or worksite conditions .
  - b. A documented pre-job brief is required to be performed with the Crane Operator, Signal person, Person-in-charge and the Employee(s) being lifted prior to the beginning of the task.
  - c. A trial lift is required to be performed prior to lifting personnel as follows:
  - d. Load the personnel platform to a weight equal to the anticipated live loaded weight the platform. Travel the personnel platform to each location that work is to be performed.
  - e. Just prior to hoisting Personnel, lift the platform a few millimetres off the surface and inspect the rigging for deficiencies.
  - f. The personnel platform may only be used to lift Personnel and not for other purpose such as handling materials.
  - g. All materials and tools for use during a personnel lift are required to be secured to prevent dropping.
  - h. It is important to evenly distribute materials and tools for use during personnel lift to prevent and unbalanced load.
  - i. Employees should keep all parts of the body inside the platform during hoisting and positioning of the platform.
  - j. The personnel platform should be tied off secured when entering or exiting a suspended platform.
  - k. Tag lines are required unless their use creates an unsafe condition.
  - l. Fall protection is required (except over water) for personnel working out of the platform. The lanyard(s) for the fall protection should be connected to the load block or to a structural member of the platform capable of supporting a fall impact.
  - m. Exiting of the personnel platform is required to be performed in a slow, cautious manner.
8. Scrapping Of Lifting Equipment
- a. Lifting equipment that cannot be used due to it is not passing an inspection of load test must be taken out of service and scrapped.
  - b. The lifting equipment must be physically destroyed by cutting rope wire sling with an oxy acetylene-cutting torch, so that it cannot be used again.

- c. This process of destroying unsafe lifting equipment must be witnessed by the GMR 2.1 who will record all destroyed equipment, and here then removed from the lifting equipment register.

## **3.2 Foreign Material Exclusion**

The following controls and practices comply:

1. All system openings or access is covered except when the work is being carried out under a specific procedure.
2. The specific opening is being monitored.
3. Work, inspection, testing, sampling or surveying is in progress that requires the removal of the FME device.

FME devices shall:

1. Prevent the introduction of foreign material into the component or system during the cover's installation and removal.
2. The cover must be clearly marked as an FME device, clean, sturdy and free from debris.
3. Be secured so that they will not be sucked in or blown away by a pressure drop or surge of the system. The use of paper, plastic bags, rags or any other unauthorised materials are not permitted to be used as FME devices.
4. Not be capable of damaging any critical surface and not show evidence of chemical decomposition during service or result in corrosive action.
5. Internal FME devices, which seal off an opening from inside the system, must be used wherever practical to isolate the component or system opening.
6. Where practical a removed component such as a valve bonnet, flange, and junction box cover should be used as an FME device.
7. Internal closure devices shall be attached internally whenever possible to avoid their inadvertent loss into the system during work activities. Special consideration should be given during installation and removal of such devices.
8. Inspect internal devices for damage prior to installation.
9. FME devices should be clearly marked to prevent inadvertent removal or damage. Bright colours are recommended.
10. All FME devices are to be recorded in a register.

## **4 Procurement**

### **4.1 People**

#### **4.1.1 Minimum requirements of people employed**

1. All Artisans are qualified and in possession of a valid trade test certificate

2. Welding Supervisors have at least one of the following qualifications as a minimum– refer to 7.4 of 240-106628253
  - a. International welding specialist (IWS) in line with IIW document IAB-252R2-14 or
  - b. International welding practitioner (IWP) in line with IIW document IAB-252R2-14
3. Welders are all qualified according to ISO 9606 – refer to 7.2 of 240-106628253. Proof of Qualification of at least 5 employed welders to be supplied with tender. The rest of the welders' qualifications that will be utilised during an outage will be required 2 weeks before the start of the specific outage.
4. For maintenance opportunities, the *Contractor* ensures that proof of qualifications of the welders that will perform the work is provided with the return of the signed task order for the specific opportunity.
5. Semi-skilled personnel are in possession of valid school senior certificate.
6. All project managers, site managers and project leaders must have undergone training in contracts management (e.g. NEC3), any technical discipline diploma (e.g. construction, civil, mechanical, electrical, C&I), managerial course (e.g. project management, etc.) from reputable institutions.
7. General Supervisors are qualified and in possession of a valid diploma, and must have undergone supervisory training from a reputable institution.
8. Safety officers will have a minimum of SAMTRAC or equivalent qualification, HIRA and incident investigation training.
9. The *Contractor* will provide trained personnel for the implementation of all work.
10. The *Contractor* remunerates his employees at not less than the proclaimed statutory wage (Minimum Wages Act). Failure in this regard will result in non-performance and therefore immediate termination of the contract.

In order to fully evaluate a tender, the *Contractor* is to submit an organogram, which is to include the relevant skills levels.

According to the SKILLS DEVELOPMENT ACT 97 OF 1998, the following definition for artisans and trades are emphasised:

- **artisan** means a person that has been certified as competent to perform a listed trade in accordance with this Act. (Definition of “artisan” inserted by section 1(a) of Act 37 of 2008)
- **trade** means an occupation for which an artisan qualification is required in terms of section 26B. (section 1(i) of Act 37 of 2008)

Section 26C section 2 (a) states the following – “No person, whether employed or self-employed, may hold themselves out to be qualified as an artisan in a listed trade unless that person is registered as an artisan in terms of subsection (1)”

With reference to the Act, all personnel are adequately qualified for the task to be performed. Qualifications of all staff to be submitted to the Service Manger two weeks prior to commencement of work and approval of qualifications of staff to be granted within one week of receipt of qualifications.

The *Contractor* submits requests to change any pre-approved staff together with proof of qualifications for approval prior to changing the staff.



#### 4.1.2 Supervision

1. The *Contractor* provides Authorised Supervisor(s) in terms of the Plant Safety Regulations.
2. The *Contractor* trains enough staff to cover for leave periods as well as night shifts, if required.
3. Training will be provided by Eskom Majuba and is done according to a schedule, thus arrangements need to be made with the Service Manager well in advance.
4. *Contractor* to have a Supervisor on site at all times

#### 4.1.3 Key Competencies and Experience

1. Supervisors and/or Project Managers/Supervisors:
  - a. Knowledge of PSR
  - b. Capability to read and interpret drawings
  - c. Ability to read and understand scopes of work
  - d. Technically competent on the use Microsoft Packages (excel, outlook, Microsoft word). Proof of training required
  - e. Knowledge of how to generate inspection/ refurbishment reports
  - f. Maintain high standards despite pressing deadlines
  - g. Demonstrates knowledge of the WRB and related procedures
  - h. Is alert in a high-risk environment; follows detailed procedures and ensures accuracy in documentation and data
  - i. At least 2 years welding and Supervisory/Project management experience
  - j. At least 2 years power plant experience, preferably Eskom plant
- 11.
2. Welders/Boiler Makers/Inspectors
  - a. Knowledge of PSR
  - b. Capability to read and interpret drawings
  - c. Ability to read and understand scopes of work
  - d. Knowledge of how to complete inspection/ refurbishment reports
  - e. Demonstrates knowledge of WRB and related procedures
  - f. Ability to use/operate the required equipment/tools
  - g. Ability to use the correct tools for the service
  - h. Maintain high standards despite pressing deadlines
  - i. At least 2 years welding experience
  - j. At least 2 years power plant experience, preferably Eskom plant
3. Semi-Skilled
  - a. Ability to use/operate the required equipment/tools
  - b. Maintain high standards despite pressing deadlines
  - c. At least 1 year relevant experience

4. Safety officer
  - a. Communicational skills
  - b. Pro-active in preventing incidents
  - c. Safety awareness training presentation
  - d. Ability to perform incident investigations and risk assessments
  - e. At least 2 years relevant experience, preferably Eskom plant or construction sites

## **4.2 Subcontracting**

### **4.2.1 Preferred subcontractors**

All subcontractors need to be approved by the Service Manager before the subcontractor gets to site.

### **4.2.2 Subcontract documentation, and assessment of subcontract tenders**

The *Contractor* prepares subcontract documentation. The use of the NEC system is recommended on how subcontract tenders are to be issued, received, assessed and awarded.

## **4.3 Skills Development**

The *Contractor* complies with the skills development requirements contained in the SDL requirements section.

## **4.4 Plant and Materials**

### **4.4.1 Specifications**

1. The *Contractor* to ensure that the material certificates are available for all material used in the repair/welding work
  2. No material to be used without material certification
- 12.

### **4.4.2 Plant & Materials provided “free issue” by the *Employer***

1. All materials will be supplied by the *Employer* unless requested otherwise
2. Scaffolding, lagging removal and replacement of lagging will be provided by the Employer.

### **4.4.3 Contractor’s procurement of Plant and Materials**

1. All tools and equipment used in the *Works* are supplied by the Contractor.

## 5 Working on the Affected Property

### 5.1 *Employer's* site entry and security control, permits, and site regulations

The Entry to site is only approved once the following is adhered to:

1. The Contractors Safety file is to be approved by the Employer's Safety department.
2. All personnel must undergo screening for Criminal records and outstanding warrants
3. Site-specific induction is to be done by all personnel.

Refer to the General Works information

#### 5.1.1 Permits

1. The *Contractor* will ensure that he/she is informed of all the requirements of Eskom's Plant Safety Regulations and ORHVS and that he/she at all times comply to the requirements of these Regulations.
2. The *Contractor* ensures that at least two of his supervisors are trained and authorised as Authorised Supervisors in terms of the Plant Safety Regulations.
3. Training is provided by Eskom Majuba and is done according to a schedule, thus arrangements need to be made with the Service Manager well in advance.
4. At least two supervisors should be authorised within 3 months of contract award.

### 5.2 People restrictions, hours of work, conduct and records

#### 5.2.1 Time Clocking

- 1 The *Contractor* uses a biometric time clocking system
  - 2 No clocking will result in non-payment. If a person clocked in but not out or did not clock in, but clocked out, the person will not receive payment for that specific day.
  - 3 Proof of clocking to be submitted to the Employer from files directly generated from the clocking system (no manual intervention)
  - 4 During GO's, MGO's and IR's costing with supporting timesheets is provided every two weeks together with a forecast for future invoicing.
- 13.

#### 5.2.2 Hours of work

1. Normal working hours is Eskom working hours:
  - a. Monday to Thursday **07:30 - 16:45**
  - b. Fridays 07:30 - 12:30
2. Outage or maintenance opportunities working hours are :
  - a. Monday to Sunday **07:00 - 19:00 or as required by the SOW** (might require 24 hour shifts)
3. Overtime rules are adhered to as determined by the Department of Manpower.
4. All Timesheets are to be kept for records purposes i.e. man-hours worked safely etc.
5. Other hours will be determined as per critical path activities during outages and maintenance opportunities.
6. Overtime to be approved by the *Service Manager* or the *Maintenance Supervisor*
7. Daily time sheet must be kept up to date of normal and overtime worked at all times.



14.

### **5.3 Health and safety facilities on the Affected Property**

#### **5.3.1 Waste Disposal:**

Refer to the General Works Information

#### **5.3.2 Medical Facilities:**

Refer to the General Works Information

### **5.4 Records of *Contractor's* Equipment**

15. The *Contractor* to declare all equipment and tools via a pre-set up list at the main entrance, where removal permit will be issued by Security personnel.
16. *Contractor* need to have a list of inventory of their equipment on site.
17. Proof of site entrance needs to be provided before equipment can be removed from site.
18. The *Contractor* keeps these records. If the records are lost, the Employer does not have the responsibility to issue a gate release permit and the *Contractor* might have to leave the equipment behind on site.

### **5.5 Equipment provided by the *Employer***

1. Overhead cranes
2. The Employer is entitled to withdraw use of the said Equipment, should proper care not be ensured.
- 19.

### **5.6 Site Services and Facilities**

#### **5.6.1 Provided by the *Employer***

1. Toilets at the four corners of the power station
2. Power points where available **own cables to be routed**
3. Water points, where available
4. Compressed air (Service air), where available
5. NDT Services, requests to be approved by the Service Manager of the NDT service provider
6. Scaffolding, lagging and cladding removal and installation

## 5.6.2 Provided by the *Contractor*

1. Containers, for dressing rooms, office and dining.
  - a. Containers to be in an acceptable condition, well maintained, no major dents, no rust on exterior walls.
  - b. Floors of containers to be in a good condition, no rust excepted as this poses a safety risk.
  - c. The only acceptable exterior colours allowed are blue, white or grey or any of the corporate Eskom colours (chart can be obtained from the Service Manager)
2. Office furniture, equipment and stationary
3. Tools, equipment and consumables
4. Portable 380V electrical distribution boards, and supply cables to and from the boards for all his power supply requirements to execute the services.
  - a. *Contractors'* Electrical Distribution Boards complies with OHSA as referred to in the Electrical Installation Regulations and the Electrical Machinery Regulations. Each board brought on site has a certificate of compliance issued by an accredited person.
  - b. The *Contractors'* Electrical Distribution Boards must be installed at a time negotiated with the Electrical Maintenance Manager, or prior to the possession date. Distribution boards will be connected to a 380V three phase AC power supply by the *Employer*, only after the *Contractor* has submitted the valid certificate of compliance.
  - c. All *Contractors'* Electrical Distribution Boards are earthed to the steel structure of the plant.
5. Accommodation
6. Transport
7. Meals. The *Contractor* or any of his employees or subcontractors may buy take away meals from the fast food outlet on site, if available.
8. Telecommunications
9. Everything else necessary for providing the Service.

## 6 List of drawings

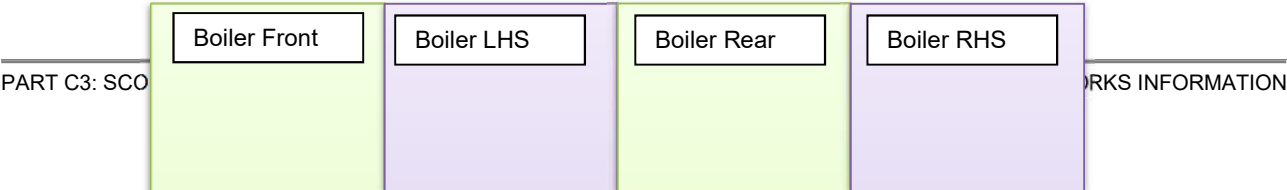
### 6.1 Drawings issued by the *Employer*

This is the list of drawings issued by the *Employer* at or before the Contract Date and which apply to this contract.

Note: Some drawings may contain both Works Information and Site Information.

Drawing number	Revision	Title

Figure 1 – Boiler layout



## PART C3: SCOPE OF WORK

