	<p style="text-align: center;"><b>Scope of Work</b></p>	<p style="text-align: center;"><b>Hendrina Power Station</b></p>
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Title: **Worst case scenario fire protection system** Unique Identifier: **N/A**

Alternative Reference **CGHE0831**  
Number:

Area of Applicability: **Fire Protection System**

Documentation Type: **Scope of work**

Revision: **0**

Total Pages: **40**

Next Review Date: **N/A**

Disclosure Classification: **CONTROLLED DISCLOSURE**

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## **1. INTRODUCTION**

Hendrina Power Station (HPS) is located within the Middleburg Magisterial District, approximately 35 km south-east of the town Middleburg and on the south-western border of the town Pullenshope. The Power Station is located in the south of Optimum Colliery Mine

The scope of work is broken down to the following high level objectives

- a) The Design, supply, install and commission new electrical pump together with base plate, control panels, annunciator panels, switchgear panels, distribution panels, wiring etc
- b) The current fire diesel pump must be decommissioned and removed from the plant and hence be replaced with a new fire diesel pump
- c) Refurbish current water tank
- d) Install fire protection system on fire diesel pumps (WTP) with automatic fuel shut off valve
- e) Completion of the turbine underfloor and turbine bearings fire protection system
- f) Install annunciator system at coal plant shift supervisor office and SOR

## **2. SUPPORTING CLAUSES**

### **2.1 SCOPE**

This document covers the scope of work for the worst case scenario fire protection system at Hendrina Power Station.

#### **2.1.1 Purpose**

The purpose of this document is to provide the worst case scenario fire protection system at Hendrina Power Station.

#### **2.1.2 Applicability**

This document shall apply to Eskom Hendrina Power Station

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

#### **2.2.1 Normative**

- [1] ISO 9001 Quality Management Systems
- [2] Occupational Health and Safety Act 85 of 1993
- [3] National Building Regulations and Building Standards Act 103 of 1977
- [4] EST 32-124 Eskom Fire Risk Management
- [5] 240-54937654 Inspection, Testing and Maintenance of Fire Detection Systems
- [6] 240-54937454 Inspection, Testing and Maintenance of Fire Protection Systems

#### **2.2.2 Informative**

- [7] 240-54937450: Fire Protection & Life Safety Design Standard

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**2.3 DEFINITIONS**

Definition	Description
System	An integrated set of constituent pieces that are combined in an operational or support environment to accomplish a defined objective. These pieces include people, hardware, software, firmware, information, procedures, facilities, services and services and other support facets.
Fire pump	A device that provides the required water flow and pressure for a fire protection system. The fire pump unit itself consists of a pump, a drive, a driver coupling connecting the two, and a base plate.
Pump set	A unit comprised of the driver, pump, control panel and ancillary equipment
Stakeholder	Is considered to be anyone that has an interest in the outcome of the project.
Approve	The functional responsible person determines if the document is fit for purpose and approves the document content and therefore takes responsibility and accountability for the document content.
Authorise	The document authoriser authorises the release and application of the document and is accountable for document implementation.
Risk	Risk is a function of both the likelihood of a specific hazard being realised and the consequence of that realisation.
Unit	It comprised of boiler, turbine and generator set and all its dedicated auxiliaries

**2.4 ABBREVIATIONS**

Abbreviation	Meaning given to the abbreviation
ASIB	Automatic Sprinkler Inspection Bureau
C&I	Control and Instrumentation
FPC	Fire Protection Contractor
FPS	Fire Protection System
ITP	Inspection and Testing Plan
LPS	Low Pressure Services
N/A	Not applicable
NEC	New Engineering Contracts
OHSA	Occupational Health and Safety Act
OPC	Open Platform Communication
HPS	Hendrina Power Station
SAICE	South African Institute of Civil Engineering
P&ID	Piping and Instrumentation Diagram
PSR	Plant Safety Regulations
SANS	South African National Standard
SOR	Switchgear Operating Room

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<b>Abbreviation</b>	<b>Meaning given to the abbreviation</b>
SRD	Stakeholder Requirements Definition
<b>Symbols</b>	<b>Description</b>
V	Volt
m <sup>3</sup>	Cubic meter
K	kilo
l	litre
min	minutes
W	Watt
M	meter
Pa	Pascal

**2.5 ROLES AND RESPONSIBILITIES**

- Auxiliary Engineering – Compilation of the scope of work and technical evaluation criteria for the works
- Auxiliary Maintenance – Managing and expediting the works
- Maintenance Contractor – Executing the tasks as per scope of work

**2.6 PROCESS FOR MONITORING**

N/A

**2.7 RELATED/SUPPORTING DOCUMENTS**

N/A

**3. SCOPE OF WORK**

**3.1 EMPLOYER’S OBJECTIVES AND PURPOSE OF THE WORKS**

The purpose of this technical specification is to describe technical requirements to procure the service of the construction contractor to design, manufacture, supply, install, replace, remove and commission fire protection upgrade to address worst case fire scenario.

**3.2 MANAGEMENT AND START UP.**

**3.2.1 Management meetings**

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

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<b>Title and purpose</b>	<b>Approximate time &amp; interval</b>	<b>Location</b>	<b>Attendance by:</b>
Overall contract progress and feedback	Every second week on a day and time agreed upon by Parties. This is subject to change depending on the requirement.	To be confirmed by the <i>Project Manager</i>	<i>Contractor/s, Supervisor, Project Manager, System Engineer, and Others</i>
Early Warning (Risk reduction) meeting	As and when required	To be confirmed by the <i>Project Manager</i>	<i>Contractor/s, Supervisor, Project Manager, System Engineer, and Others</i>
Kick-off meeting	Third working day after official contract is placed.	To be confirmed by the <i>Project Manager</i>	<i>Contractor/s, Supervisor, Project Manager, System Engineer, and Others</i>
Interfacing meetings	As and when required	To be confirmed by the <i>Project Manager</i>	<i>Contractor/s, Supervisor, Project Manager, System Engineer, and Others</i>
Risk register and compensation events	As and when required	To be confirmed by the <i>Project Manager</i>	<i>Contractor/s, Supervisor, Project Manager, System Engineer, and Others</i>

Meetings of a specialist nature may be convened as specified elsewhere in this Works Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the *works*. Records of these meetings shall be submitted to the *Project Manager* by the person convening the meeting within five days of the meeting.

All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register shall not be used for the purpose of 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.

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### 3.3 DOCUMENTATION CONTROL

All contractual communications will be in pdf format or forms attached to emails and not as a message in the email itself. Letters are typed and signed by the *Contractor*, and delivered either in hardcopy or e-mailed to the *Service Manager*.

The routing of all written communications to be between the *Project Manager* and the *Contractor* only. Any agreements between the *Contractor* and any other person representing the *Employer* which has not been routed via the *Project Manager* to be unacceptable and invalid.

Any instructions written or verbal resulting in any changes to the duration, quality, and cost of the project to only be received from the *Project Manager*.

All reports are compiled in Word format, in English, and submitted electronically as pdf to *Service Manager*. Hardcopy reports (which are deemed originals) are counter signed by the *Contractor's* line of authority for authenticity and quality verification after finalisation for purposes of record keeping.

Copies of all documents relating to the works are retained by the *Contractor* in hardcopy format as well as electronic format (pdf format for signed documents) for 5 years.

### 3.4 HEALTH AND SAFETY RISK MANAGEMENT

The *Contractor* is to:

- Comply with the latest revision of Eskom Hendrina Power Station's Health, Safety and Environmental Specifications for Principal *Contractor's* requirements as mentioned in Section 8
- Perform the works in a safe manner and comply with the *Employer's* Safety, Health and Environmental specifications for Principal *Contractors* (HSPHO/058).
- Maintain a protected environment around the work areas, and control access to the Generator relay room, for the full duration of the works.
- Provide a First Aid service to employees. In the event of serious injury, the *Employer's* Medical centre and facilities will be available. The *Employer* recovers the cost incurred for the use of facilities from the *contractor*.
- Provide a safety file and keep the file up to date for the duration of the Contract
- Do induction courses (given on Mondays, Wednesdays and Fridays at 09:00)
- Supply daily updated copies of: Toolbox Talks, Job Observations and Job risk Assessments
- NB: No personnel may be transported on any open vehicles. Personnel may only travel in a vehicle with SABS seating and safety belts.

#### 3.4.1 Environmental constraints and management

All personnel involved in the implementation of the project are to abide by the SHE requirements of Hendrina PS. These include all the relevant legislations, applicable licences and permits, and environmental procedures and shall be adhered to at all times. All the documents can be obtained from the environmental department.

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- Assessment of impact on operational conditions affecting discharge to atmosphere
- Assessment of impact on operational conditions affecting waste removal and processing
- Assessment of impact of accidental release of pollutants (oils, gases, waste water, etc.)

### **3.4.2 Quality assurance requirements**

*Contractor* conforms to the following Quality Management systems:

- Quality requirements as per ISO 9001:2015
- QM 58 and Hendrina Power Station HSSPPA 006 “ Quality requirements for quality related items”
- *Contractor* provides a detailed Quality Control Plan for acceptance within 3 working days of the Contract Date identifying how use of labour, machinery and equipment suffice to successfully execute the required services according to the methodology provided by the *Contractor*. Ultimately the Quality control plan shall be approved by the *Project Manager*.
- Quality control plan is compatible to the site conditions and project constraints. This aligns with the *Employer’s* Quality criteria and adheres to the *Employer’s* Safety, Health, and Environmental requirements.

*Contractor* compiles QIP according to Hendrina Power Station’s standard QIP format (reference no. HSPPA/014).QIP stipulates hold points; witness points and verification points approved and documented before the works commence

### **3.5 PROGRAMMING CONSTRAINTS**

*Contractor* provides a hardcopy and an electronic copy of a pdf Gantt chart programme, identifying how the execution of the works is achieved within the specified project duration.

Programme summarizes the major work activities, estimated durations, and relationships to the other activities of the project. This includes demonstrating how quickly labour, machinery and equipment to execute the required works will arrive and be secured on site. Programme is approved by the *Contract Manager* before the required works commences.

Programme submitted by the *Contractor* shall be compatible with the site conditions and constraints of the project.

### **3.6 CONTRACTOR’S MANAGEMENT, SUPERVISION AND KEY PEOPLE**

*Contractor* submits an organogram to the *Project Manager* with key personnel. *Contractor* appoints qualified and competent Site manager, supervisor, skilled people and safety officer. Resource allocation abides to their respective function. These resources are present for the duration of the works. Daily site register are signed with all the resources specified.

*Contractor* provides the key people required to successfully provide the works. The allocation of the key people is clearly reflected on the activity programme, with the required activities to execute and duration stipulated. During the execution of the works, registers or time sheets of the *Contractor’s* employees is kept for contract records.

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Management as indicated on the *Contractor's* organogram avail themselves immediately when required to resolve matters that may impact on the accomplishment of the works.

Reference is to be made to the technical evaluation criteria for further requirements documenting the control measures to mitigate technical risks.

### **3.7 INVOICING AND PAYMENT**

Within one week of receiving a payment certificate from the *Project 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 *Project Manager's* payment certificate.

The *Contractor* shall address the tax invoice to Eskom Holdings SOC Ltd and include on each invoice the following information:

- Name and address of the *Contractor* and the *Project Manager*;
- The contract number and title;
- *Contractor's* VAT registration number;
- The *Employer's* VAT registration number 4740101508;
- Description of service provided for each item invoiced based on the Price List;
- Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT;
- (add other as required)

Add procedures for invoice submission and payment (e. g. electronic payment instructions)

### **3.8 INSURANCE PROVIDED BY THE EMPLOYER**

As per ECC3 Core Clause 87.1.

### **3.9 CONTRACT CHANGE MANAGEMENT**

*Contractor* provides daily site register/diaries of planned working versus work completed to the *Service Manager*. Following information is stipulated on the daily site diary:

- Task based risk assessments and Toolbox Talks
- Signed time sheets
- Weather conditions
- Site conditions
- Locations where work was being undertaken together with resources being utilised
- Any delays noted (for whatever reason), any notification by people employed by the Contractor regarding difficulties encountered
- Complaints by third parties
- Any work done by Others at the site

No standing time claims will be accepted without relevant proof of presence and activity in the form of these records and the early warning process to be followed

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*Contractor* provides proof of expenses to the *Employer* in the form of a hardcopy as well as a soft copy.

### **3.10 PROVISION OF BONDS AND GUARANTEES**

The form in which a bond or guarantee required by the *conditions of contract* (if any) is to be provided by the *Contractor* is given in Part 1 Agreements and Contract Data, document C1.3, Sureties.

The *Employer* may withhold payment of amounts due to the *Contractor* until the bond or guarantee required in terms of this contract has been received and accepted by the person notified to the *Contractor* by the *Project Manager* to receive and accept such bond or guarantee. Such withholding of payment due to the *Contractor* does not affect the *Employer's* right to termination stated in this contract.

### **3.11 RECORDS OF DEFINED COST, PAYMENTS & ASSESSMENTS OF COMPENSATION EVENTS TO BE KEPT BY THE CONTRACTOR**

Not Applicable to this contract

### **3.12 TRAINING WORKSHOPS AND TECHNOLOGY TRANSFER**

The contractor appoints one person to attend Authorised Supervisors and one person to attend Responsible Person Plant Safety Regulation Course. No work will commence without an Accredited Authorised Supervisor and Authorised Responsible Person on site.

## **4. ENGINEERING AND THE CONTRACTOR'S DESIGN**

### **4.1.1 System description**

There are two diesel emulsifier pumps each rated for 3666.67/min at 1200kPa and both taking suction from the 480m<sup>3</sup> storage tank with suction head of  $\pm 50$ kPa. The diesel pumps discharge at the common manifold of 200mm bore.

To maintain the emulsifier system pressure at 1000kPa, a jockey pump sized is installed at system discharge manifold. To compensate for minor system pressure loses, the jockey pump will cut-in and cut-out between  $\pm 830$ kPa and  $\pm 1000$ kPa respectively.

Should the pressure drop exceeds makeup capability of the jockey pump, then emulsifier pump 1 will cut-in at  $\pm 700$  kPa. A further drop in pressure to  $\pm 550$ kPa will bring in emulsifier pump 2. These diesel pumps are automated but can be operated manually.

It is proposed that the new system will consist of a jockey pump, primary electrical pump (1), a secondary diesel pump (2) and a third diesel pump (3).

### **4.2 SCOPE OF WORK**

#### **4.2.1 Design, supply, install and commission complete new electrical pump**

- a) The *Contractor* manufactures, supplies, installs, tests, and commissions an equivalent fire pump to the existing pump specifications.

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- The pump must be SANS/ASIB approved.
  - Pump must be provided with automatic air release valve on top of casing.
  - The pump produce 3666,7 L/min @ 1200 kPa
  - Recommended that KSB OMEGA 125-500A pump is used
- b) The *Contractor* manufacture, supplies, installs all necessary equipment to run the electrical pump such as base plate, control panels, annunciator panels, switchgear panels, distribution panels, wiring etc
  - c) The control panel must include hour meter to monitor running time of pump.
  - d) The *Contractor* must install flow meter for the electrical pump and associated pipework.
  - e) The *Contractor* supplies and installs data logging system for the electrical pump to track the status of the pumps. The data logging system is to track signals on Table 2.
  - f) The *Contractor* conducts site acceptance test to prove the functionality of the newly installed system.

#### **4.2.2 Extension of pumphouse to accommodate electrical pump**

- a) The *Contractor* must extend the current pumphouse approximately 2-3 m alongside its length to accommodate the new electrical pump.
- b) A new crawl beam is to be installed in the pumphouse which must span the entire length of the pumphouse.
- c) The *Contractor* must provide all relevant certification and load testing for the crawl beam extension

#### **4.2.3 Replace the entire pump skid for fire pump 2 with new unit including pump, diesel engine and all ancillary equipment**

- a) The *Contractor* manufactures, supplies, installs, tests, and commissions an equivalent fire pump to the existing pump specifications.
  - The pump must be SANS/ASIB approved.
  - Pump must be provided with automatic air release valve on top of casing.
  - The pump must produce 3666,7 L/min @ 1200 kPa
  - Recommended that KSB OMEGA 125-500A pump is used
- b) The Contractor must remove the existing pump, diesel engine and control panels for pump 2 and the employer will indicate where it will be stored.
- c) The *Contractor* manufacture, supplies, installs all necessary equipment to run the diesel engine such as batteries, control panels, battery charger including wiring etc.
- d) The engine must include hour meters to monitor the running time and heating elements / heater plugs to improve cold starting.
- e) The *Contractor* must install flow meter for the new diesel pump and associated pipework.
- f) The *Contractor* must supply and install a fuel tank for the new diesel pump.
- g) The *Contractor* supplies and installs data logging system for the diesel engine to track the status of the pumps.
- h) The *Contractor* conducts dynamometer testing of diesel engines for performance, exhaust emissions, surface temperatures and fuel consumption. Eskom representative to be present during dynamometer testing.
- i) The *Contractor* conducts site acceptance test to prove the functionality of the newly installed system.

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#### 4.2.4 Provide pipework for the new pumping system (Note this also applies to existing pump)

- a) The *Contractor* must provide suction and discharge piping for the new pump to be installed. The *Contractor* must design, supply, install and commission a new discharge manifold. The 4 pumps must be connected to the discharge manifold.
- b) The *Contractor* must design, supply, install and commission a new suction manifold to cater for the suction of 4 pumps that is electrical pump, two diesel pumps and jockey pump.
- c) Bends in the pipework must be kept to a minimum and shall be of a swept long radius type. Radius curvature must not less than one and a half times the diameter of the pipe.
- d) All pipework must be hot dipped galvanized steel specified in SANS 121. All pipes shall conform to SANS 62 and SANS 719.
- e) Pipe supports are to be installed for the pipework in accordance to SANS 10287.
- f) Gaskets used must be full-face flange gaskets made from Aramid fibres bound with Nitrile Butadiene rubber 3mm thick.
- g) The *Contractor* must provide suction and discharge isolation valves and glycerine filled pressure gauges for each pump. An NRV must also be installed on discharge side for each pump.
- h) Butterfly valves are to be used and they must gear operated type. LPC or FM approved butterfly valves are to be used.
- i) Non-return valves, of the flanged and wafer type that comply with the requirements of SANS 1551-1 or SANS 1551-2 are to be used
- j) Fasteners shall conform, as a minimum, to SANS 1700

#### 4.2.5 Implementing new control philosophy for fire pumps

- a) The contractor must provide a new 4-tier auto start arrangement. Each tier must indicate the pump it corresponds to and it must accompanied by diaphragm valves, pressure gauge, sludge traps and pressure switch.
- b) The jockey pump, the electrical driven fire pumps and diesel driven fire pumps will be on auto-starting mode during normal operating conditions.
- c) The jockey pump will cut in automatically through a pressure switch when the fire system pressure drops to 960 kPa and cut out automatically when the system pressure reaches pump churning pressure of 1 200 kPa.
- d) The electrical driven fire pump (primary pump) will cut in automatically through a pressure switch when the fire system pressure drops to 860 kPa
- e) The second diesel driven fire pump (secondary pump) will cut in automatically through a pressure switch when the fire system pressure drops to 660 kPa
- f) The third diesel driven fire pump (third pump) will cut in automatically through a pressure switch when the fire system pressure drops to 610 kPa

#### 4.2.6 Re-furbish current water storage tank

- a) The current fire water tank must be refurbished. Approximately a total of 100 panels must be replaced. There are 12 panels in length, 8 panels in width and 3 panels in height. The employer will advise which panels must be replaced.
- b) The *Contractor* must do an assessment on the following activity proposed by the employer. The activity requests that the current water tank must be upgraded. The length must be increased by 4 panels (2 each side) and height must be increased by 2 panels. The assessment must indicate whether the current civil structure can withstand the increased water capacity.
- c) The tank is designed as per SANS 10329.

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**4.2.7 Supply and Install fire protection system at the water treatment plant fire diesel pumps**

There are currently no fire protection or detection system installed for the water treatment plant fire diesel pumps. The purpose of this modification is to minimize damage to equipment and personnel in the area in the event of a fire. It is also a requirement as per the Eskom Protection and Life Safety Design Standard. There are three fire water diesel pumps at the water treatment which provides fire water to all the station hydrants and each pump will require fire protection.

**4.2.7.1 Requirements**

- The contractor must supply and install a Multi Jet Control (MJC) valve fire protection system for each fire diesel pump
- A deluge control valve will be used
- A flow meter is to be installed which will raise an alarm when the system is activated
- The *Contractor* system must design, supply, install and commission a system to automatically shut off the fuel supply to the fire diesel pumps in the event of a fire.

**4.2.7.2 Fire protection design requirements**

<b>Design Requirements</b>	
Design code	NFPA 850
Type of system	MJC Deluge
Nozzles	HV 26
Detectors	68°C
Design density	10,2l/min/m <sup>2</sup>
System interface	Connected to the service water line
Electrical interface	Flow switch at control valve
Operation	Automatic
Supply Pressure	7 bar
Minimum nozzle pressure	4,8 bar
Nozzle K factor	41.8 L/min/bar <sup>1/2</sup>

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4.2.7.3 System design

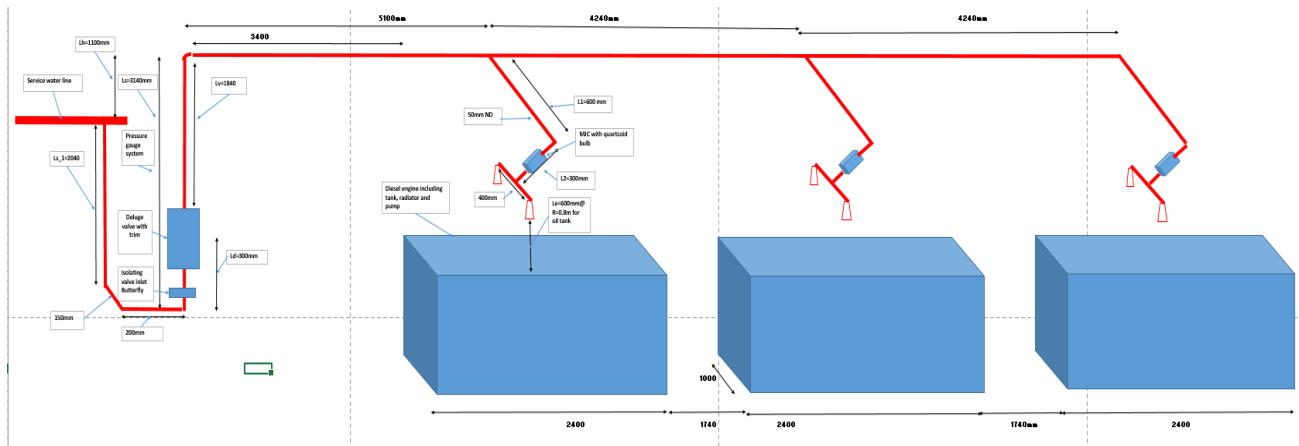


Figure 3: Proposed fire protection system schematic for WTP

There are three identical fire diesel pumps which are 2.1m long and 1m wide. These pumps are shown as the blue rectangular blocks on Figure 3. Each pump consists of a fuel tank, radiator, engine and pump. The space between the pumps on Figure 3 are 1.74 m. Two nozzles are required for each pump with a space of 400 mm between each other and the nozzles must be placed 600 mm above the fuel tank.

Table 1: WTP fire system requirements

Bill of materials		
Pipe	Unit of measurement	Quantity
80NB SABS 62 medium quality black	mm	3000
40NB SABS 62 medium quality black	mm	14000
Nozzles		
HV26	each	6
Valves		
40NB MJC	each	3
80NB Butterfly valves	each	2
80NB Inbal Deluge Valve complete with trim (500D-14L-Q2616)	each	1
Alarm and motor gong	each	1
Pressure gauge 100mm glycerine filled	each	2
Flow switch	each	1

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#### 4.2.7.4 Pipe work and supports

The installation of the pipework must be able to withstand a pressure of 7 bar. The pipes must be supported at intervals not exceeding 2.5m for piping up to 50NB (mm). A test valve must be placed at the most remote sprinkler so that the system can be tested.

#### 4.2.7.5 C&I design

The *Contractor* is responsible for installing and the layout of all C&I Cabling installation required. All cables must be rated 2-hour fire resistant (PH120). The required installed cabling must be from the flow switch to the closest fire detection panel.

#### 4.2.8 Completion of turbine and condenser underfloor fire protection system (10 units)

- The *Contractor* must complete the fire protection systems for the turbine and condenser underfloor.
- There is existing pipework for the condenser underfloor systems and turbine for each unit. The *Contractor* must tie in the existing systems to the fire system mains. The existing piping must be pressure tested and leak tested to determine if they are still in an operating condition.
- The *Contractor* must supply and install the isolating control valve complete with trim, alarm gong, pressure switch, butterfly isolation valves, strainer etc. The equipment used must be FM approved.
- The *Contractor* shall use the existing designs that will be supplied by the employer.

The estimated piping length required for turbine and condenser underfloor fire protection system are as follows. The employer does have piping available and the estimates of this piping is shown on table below.

**Table 2: Turbine bearing and underfloor fire system piping requirements**

Nominal Bore (mm)	Length (m) (as per design)	Length (m) (available on site estimate)
150	646.59	608
100	388	264
80	5	100
65	8	0
50	1337	259
40	185	73
32	470	511
25	618	0

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**4.2.9 Install annunciator panels at Coal Plant Shift Supervisor Office and Switchgear Operating Room**

- The *Contractor* designs, manufactures, supplies, installs, tests and commissions controls, indicators and annunciators in accordance with SANS 10287 for the electrical pump.
- The *Contractor* designs, manufactures, supplies, installs, tests and commissions annunciators in accordance with SANS 10287 **Error! Reference source not found.** for the Switchgear Operating Room (SOR) and Coal Plant Shift Supervisor Room.
- For the mounting of field instruments and junction boxes, the *Contractor* ensures that these comply with Field Instrumentation standard and Junction boxes and Cable Termination Standard
- The *Contractor* provides the following warning alarms on the annunciator panel for the electrical driven pump, diesel driven pump and jockey pump as per. The contractor must also install annunciators for electrical pump at the pump house.

- Pump FAIL refers to a situation when the pump was supposed to start but does not start.

- Mains FAIL refers to a situation where there is a power failure

**Table 3: Annunciators for pump system**

Location	Electric pump 1 (To be installed pumphouse as well)	Diesel pump 2	Diesel Pump 3	Jockey pump
SOR	Pump RUN	Pump RUN	Pump RUN	Pump RUN
	Pump FAIL	Pump FAIL	Pump FAIL	Pump FAIL
	Fire ALARM	Fire ALARM	Fire ALARM	
	Mains FAIL	Mains FAIL	Mains FAIL	
	Control Circuit FAIL	Control Circuit FAIL	Control Circuit FAIL	
		Low Oil Pressure FAIL	Low Oil Pressure FAIL	
		Battery Charger FAIL	Battery Charger FAIL	
		Engine over Temperature FAIL	Engine over Temperature FAIL	
		Diesel Engine Tank LOW	Diesel Engine Tank LOW	
Coal Plant Supervisor Office	Pump RUN	Pump RUN	Pump RUN	Pump RUN
	Mains FAIL	Mains FAIL	Mains FAIL	Mains FAIL
	Fire ALARM	Fire ALARM	Fire ALARM	Fire ALARM
		Diesel Engine Tank LOW	Diesel Engine Tank LOW	Diesel Engine Tank LOW

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- The *Contractor* must provide a siren that will run when the fire system is activated. A switch must be provided so that the siren can be switched off when the fire pumps are being tested and switched on when the system is on standby.
- Cable design, manufacturing/procurement, transport, installation, testing and commissioning must be performed by the *Contractor*. The *Contractor* provides Test certificates. The design and implementation of the optimised cable routing must be performed by the *Contractor*. This must cater for cable servitudes and as well as cable racking.
- The cables for the electrical pump, welding sockets, plugs and small power requirements including cables needed for the 220V AC supply to C&I field panels as well as cables needed for earthing requirements must be catered for by the *Contractor*.
- Adhere to the Requirements for Control and Power Cables for Power stations Standard.

#### **4.2.9.1 Earthing and Lightning protection**

The *Contractor* designs, procures, transports, supplies, installs, tests and commissions the earthing and lightning protection system and its components, these must be in line with Earthing and Lightning Protection.

Earth resistance and earth continuity tests of the existing earthing system to determine the status of the earthing point must be performed by the *Contractor*.

The *Contractor* shall propose and implement lightning protection interventions

#### **4.2.9.2 Power supply**

The supply for the electrical pump will come from coal plant board 1B and 2B .The contractor must:

- Supply and install Electrical Distribution Panels for the emulsifier electrical pump with circuit breakers, contactors, isolators, indication lamps, pushbuttons, door interlocking handles, ammeters, selector switch, auto/manual etc.
- Supply and Install and terminate power cables on the new Electrical Distribution Panels and connect incoming cables to emulsifier electrical pump. Distance from substation board to emulsifier pump house is approximately 150m.
- Capacity assessment of the Electrical Distribution Panels to accommodate the new related electrical loads.

The diesel and electrical pumps control panels will be given the bulk power supply points by Employer using the existing voltage levels (400/380V AC) at the station.

The design, testing, installation and commissioning of the control panels of the electrical pumps as supplied by the *Contractor* must adhere to LV Switchgear Control Gear Assembly Associated Equipment for Voltage 1 000V AC and 1 500V Standard .

Breakers must comply with LV Switchgear Control Gear Assembly Associated Equipment for Voltage 1 000V AC and 1 500V Standard.

#### **1.1.1.1 Motors**

The motor will come as a package with the pump and control panel as supplied by the *Contractor*.

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The detailed designs, manufacturing/procurement, delivery, supply, installation, testing and commissioning of the motors must be in line with Procurement of Power Station Low Voltage Electric Motors Specification Standard **Error! Reference source not found.**

#### **1.1.1.2 Cabling, Racking and Routing**

Cable design, manufacturing/procurement, transport, installation, testing and commissioning must be performed by the *Contractor*. The *Contractor* provides Test certificates.

The design and implementation of the optimised cable routing must be performed by the *Contractor*. This must cater for cable servitudes and as well as cable racking.

The cables for the electrical pump, welding sockets, plugs and small power requirements including cables needed for the 220V AC supply to C&I field panels as well as cables needed for earthing requirements must be catered for by the *Contractor*.

Adhere to the Requirements for Control and Power Cables for Power stations Standard.

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

The *Contractor* shall establish a document tracking system to record the dates for the supply and receipt of all design drawings, calculations, requests for information and design documentation.

The *Contractor* shall supply the following documentation as the minimum requirements of this specification in the design package before any manufacturing, construction or commissioning commences:

- Document submittal schedule indicating when all documents shall be submitted
- Drawing Register indicating when drawings shall be submitted
- Complete detailed design file
- Functional Specifications
- Line Sizing Calculations and Material Selection (critical for suction and discharge piping for pumps)
- Final isometric and general arrangements illustrating pipe dimensions, pipeline layouts and showing pipe supports
- General Arrangement Drawing of System and boundaries
- Piping and Instrument Diagrams
- Component material datasheets
- Quality Control Procedures
- Quality Control Plan and Inspection and Test Plan
- Method Statements
- Hydraulic calculations - with design point
- Hydraulic calculations - without design point (utilizing the site input pressure)
- Commissioning procedures
- Assembly procedures
- Technical, Operation and Maintenance Manuals of all plant equipment
- Operating and Control Philosophies
- Maintenance Philosophy

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- Maintenance schedules
- Pipeline Schedule
- Mechanical Hook-up diagrams
- Critical Spares List
- Welding Procedure Specifications
- Welding Procedure Qualification Record
- Operating, Maintenance and Engineering Training Manuals

The *Contractor* shall seek acceptance of the detailed designs from the *Employer*. The detailed design is reviewed internally by Eskom utilizing the Eskom Design Review Procedure. This process can take up to 14 days. Only drawings and designs accepted by the Employer shall be used for construction.

#### **4.3 OTHER REQUIREMENTS OF THE CONTRACTOR'S DESIGN**

##### **4.3.1 Physical Characteristics Requirements**

The *Contractor* shall ensure that the design of the system is consistent throughout. All equipment shall be protected from external ingress, corrosion and explosion proof where applicable.

##### **4.3.2 Corrosion Protection**

Plant and Materials are adequately protected from physical damage and corrosion during storage and erection

##### **4.3.3 Testing and Commissioning**

Testing and commissioning shall include as a minimum:

The services of skilled Engineers to supervise the testing and commissioning and making ready for the operation of the *works* as required for partial and full duty operation as

The *Contractor* shall provide a method for testing the integrity of the piping system for acceptance by the *Project Manager*. The *Contractor* shall make provision for any equipment required to perform the necessary testing

The *Contractor's* preliminary trials and commissioning of the *works* shall be carried out by the *Contractor's* representatives, who shall remain in attendance until such time as the *works* are working to the *Employer's* satisfaction. A requirement of these trials is 2 hour test period to determine that all activities as laid down in the operating manuals are correct and are carried out in the correct sequence and to determine that all the plants have been provided as required in the scope of *work*.

The *Contractor* shall supply all data books with signed (Inspection and Testing Plan) ITPs and as built drawings of the *works*

Commissioning of the system shall be done by the *Contractor's* staff with the *Employer's* dedicated operations/commissioning staff

The *Contractor* shall submit a commissioning schedule and program for acceptance to the *Project Manager* by the contract date

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Before plant and equipment is placed in service the *Contractor* shall certify that it is in a suitable and safe condition.

Prior to the time when commissioning is to commence, the *Project Manager* shall appoint a representative who shall co-ordinate the commissioning of all plant and equipment forming an integral part of the system being commissioned. The *Contractor* shall be responsible for the commissioning of all the plant and materials he/she shall supply to the requirements of this specification to the satisfaction of the *Project Manager* and the *Employer's* representatives. Where various components are already in place, or are supplied by the *Employer* to form an integrated system, the *Contractor* at the time of commissioning, shall carry the responsibility for the correct functioning of the whole system

In the event of incorrect functioning, the *Contractor* shall determine the cause and shall correct the defect if the defect is within plant and equipment of his/her own supply. The *Contractor*, at the time of commissioning, has the agreement, or alternatively, the attendance of the *Project Manager* involved in a particular phase, before proceeding with commissioning. Consequently, the *Contractor* shall assure himself/herself as to the safety of his/her own plant and equipment in respect of any particular commissioning test and in the event of damage accept responsibility for such plant and equipment

The *Contractor* shall commission the *works* and ensures conformance to the *Employer's* performance requirements for the *works*. The *Employer* takes over sections of the system as required once the system performance requirements have been verified by the *Contractor*

#### **4.3.4 Use of Contractor's design**

The completed design shall become property of the *Employer*

#### **4.3.5 Equipment required to be included in the works**

The *Contractor* shall prepare and submit a project ITP for the affected system and materials included in the scope. The project ITP shall detail all elements of the plant and shall itemize the required quality levels for each of these components.

The *Contractor* shall indicate in the project ITP which items are of a proprietary nature where the level of certification is limited to standard documentation and certificates of conformity.

The *Contractor* shall use only ISO 9001 accredited suppliers for these products. Evidence of ISO 9001 certification shall be supplied with the delivery documentation. Failure to include this certification at the time of delivery shall result in rejection of the plant and materials by the *Employer*

### **4.4 AS-BUILT DRAWINGS, OPERATING MANUALS AND MAINTENANCE SCHEDULES**

All as-built drawings shall be available to the *Employer* as soon as the plant is ready for commissioning. All drawings and reports compiled for the *works* are to become the property of the *Employer* on completion of the *works*.

The *Contractor* shall ensure the following:

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- Makes use of a system compatible with the *Employer's* Microstation (Version 7/8 SE 2D) CAD for all drawings supplied to the Employer in electronic medium (e.g. disks) in addition to prints. Additionally, all drawings shall be supplied in Adobe PDF format.
- All drawings shall be originally created in the required format which is Microstation version 7/8 SE 2D, according to the specified drawing format and standards 36-945, 36-945, 36-946 available from DO on request .
- No conversion from other format will be accepted. Accompanying the new drawings will be the item list with full component descriptions.
- Implements and maintains an updated drawing register, the format of which shall be submitted to the Project Manager for acceptance. Updates are submitted on a regular basis or when significant changes are made.

The *Contractor* shall submit detailed drawings of all the separate items of the *works* included in the specification for acceptance once the general arrangement drawings have been accepted. If *works* or materials are supplied before such acceptance has been given, the *Contractor* shall modify or replaces such *works* or material at his own expense if called upon by the *Project Manager* to do so.

Submit four prints of all "as built" drawings with approval signatures at completion by the ECSA registered professional engineer accountable for the design, backed up on the electronic medium, without delay on request by the *Project Manager*.

#### **4.4.1 TECHNICAL, OPERATING AND MAINTENANCE MANUALS**

The *Contractor* shall provide good quality operating and maintenance manuals prepared by suitably experienced personnel. The maintenance manuals shall state explicitly the maintenance requirements for each piece of equipment. Copies of the first draft manuals as well as all "as built" drawings are submitted to the *Project Manager* for review and acceptance. Manuals are in English and each manual is complete with the Power Station's name, contract number and index. The *Contractor* shall also provide an electronic copy of these documents.

The manuals should indicate the level of responsibility of the operating personnel for each action in the procedures. Included in these manuals are the following:

- a) Design data including descriptions of control philosophy with alarms, set-points, interlocks and logics clearly explained.
- b) Range, calibration factors, calibrations certificates, data sheets, etc., for all control and instrumentation equipment.
- c) General arrangement and installation drawings and instructions.
- d) Operating procedures and instructions for normal and emergency conditions, including flow diagrams.
- e) Maintenance procedures and instructions for specific plant and equipment.
- f) All drawings required for component location, dismantling and re-assembly for maintenance.
- g) Equipment details such as make, model, type, specifications, etc
- h) Detailed parts lists and ordering instructions pertaining to storage of spare parts or to their shelf life.
- i) Exploded view type drawings clearly detailing the part and uniquely identifying it, technical descriptions of the equipment and component parts.

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- j) Catalogues, schedules and other product support documents.
- k) Troubleshooting and fault finding guide.
- l) Safety procedures and instructions.
- m) All special tools and equipment required for maintaining and operating the works.

The technical manuals shall include fully detailed descriptions, as-built drawings, diagrams, illustrations, schedules and data for use by Eskom technical staff to evaluate performance, trace faults, adjust, maintain and fully understand the plant and to allow satisfactory training of junior staff in conjunction with the operating manuals.

The operating manuals shall be set out in simple terms in ordinal, tabular or pictorial form to provide factual and concise descriptions of:

- i. How to carry out start-up, shut-down, and service operation of the plants by automatic, semi-automatic and by manual control.
- ii. What happens when the plants are operated, e.g. where does the water, etc. flow when a sequence is initiated or a valve is operated.
- iii. What an alarm condition implies and how it is corrected.
- iv. What problems can occur and how they are overcome.
- v. A routine visual plants inspection procedure.

The operating manuals are intended for daily use and therefore shall be separated from the technical and maintenance manuals. Bold print, diagrams, illustrations, etc. shall be used.

The maintenance instruction manuals shall include schedules to cover plant inspection procedures, fully detailed maintenance programs for plant and plant equipment services at daily, monthly, three monthly, six monthly, yearly and any other necessary intervals, and contain manufacturer's and supplier's detailed maintenance and lubrication instructions, diagrams, sectional drawings giving part numbers, descriptions etc. Where spare parts have been provided these should be coloured in, scheduled, and their filling procedure described. The manual shall also include minimum surveillance requirements for the plant.

Detailed maintenance procedures, covering removal, dismantling, replacement of parts, re-erection, checking, and reassembly and re-commissioning shall be included for all equipment. The re-commissioning shall be included for all equipment. The maintenance manual shall be fully comprehensive and cover all plant and materials installed. As the manuals shall be frequently used for training and maintenance, they shall be prepared similarly to those described for the operating instruction manuals for use by operating personnel.

## **4.5 PROCUREMENT**

### **4.5.1 People**

#### **4.5.1.1 Minimum requirements of people employed on the Site**

- The *Contractor* provides sufficient personnel with the required experience, expertise and skills to provide the Works.
- The *Employer* considers the provision of sufficient supervisory staff to be an essential part of the responsibilities of the *Contractor* and requires the *Contractor* to appoint a suitably qualified Site Supervisor who is also authorised as a Responsible Person (appointed in term

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of the Plant Safety Regulations), to permanently manage all aspects of the *Contractor's* activities and responsibilities on site for the duration of the contract.

#### **4.5.1.2 BBBEE and preferencing scheme**

As per SDL & I requirements

#### **4.5.1.3 Accelerated Shared Growth Initiative – South Africa (ASGI-SA)**

The *Contractor* shall keep accurate records and provide the *Project Manager* with reports on the *Contractor's* actual delivery against the above stated ASGI-SA criteria. [Elaborate on access to and format of records and frequency of submission etc.]

The *Contractor's* failure to comply with his ASGI-SA obligations constitutes substantial failure on the part of the *Contractor* to comply with his obligations under this contract.

### **4.6 SUBCONTRACTING**

#### **4.6.1 Preferred subcontractors**

*Contractor* submits conditions of subcontracting contract to the *Project Manager* for approval.

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

The use of NEC document is compulsory. Specified constraints on how the *Contractor* prepares subcontract documentation and how subcontract tenders are to be issued, received, assessed (using joint report) and awarded.

#### **4.6.3 Limitations on subcontracting**

*Contractor* obtains approval from the *Project Manager*. *Employer* permits *Contractor* to subcontract other works, but not more than a specialised proportion of the whole contract. *Contractor* provides the majority of the works with own resources and all the necessary documentation for the works carried out by subcontracting is submitted to the *Project Manager* for approval

#### **4.6.4 Attendance on subcontractors**

The main *Contractor* is responsible for the management of the duties and performance of the *Subcontractor*.

### **4.7 PLANT AND MATERIALS**

#### **4.7.1 Quality**

The *Employer* places emphasis on the provision of a comprehensive Quality Management System (QMS) for all phases of the project in accordance with 240-1105658000. Supplier Quality Management Specification. The QMS shall comply with the requirements of ISO 9001.

The *Contractor* and all of the *Contractors'* suppliers shall hold a valid certificate of compliance for their QMS to the requirements of ISO 9001:2008. The *Employer* may at his sole discretion carry out

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an audit any supplier or sub-supplier QMS for compliance.

Documents shall be submitted for review and acceptance by the *Project Manager* prior to the commencement of work.

No work is allowed on Site unless the *Employer* accepts the Quality Control Plan.

The *Contractor* shall utilize the *Employer's* quality documentation forms for requesting access, erection checks etc. These request forms *are* to be submitted to the *Supervisor* at least one week prior to the requested activity. or as agreed to by the *Project Manager*.

Apart from any statutory data packages required, the *Contractor* shall also compile a data package of the relevant drawings, test certificates etc. for each section of work which is to be reviewed and signed off by the *Supervisor* at erection stage prior to the commencement of the commissioning phase.

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

No "free issue" items shall be supplied. All Plant and Materials are to be provided by the *Contractor*.

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

The *Contractor* shall procure all Plant and Materials required for constructing, installing and commissioning the *works*.

The *Contractor shall:*

- Advise the *Project Manager* in advance of all major shipments of Plant and Material and co-ordinates with the *Employer* the arrival, off-loading and release of such. The *Contractor* shall promptly unload shipments and promptly releases carrier equipment.
- Notifies the *Project Manager* of being unable to promptly unload any shipment not less than 5 (five) days prior to arrival. The *Project Manager*, at his/her option, off-loads or makes arrangements for others to off-load such shipments for the account and risk of the *Contractor*. Costs incurred in respect of off-loading shall be for the *Contractor's* account.
- Ensures that all the Plant and Materials are inspected. The *Contractor* shall notify the *Project Manager* who instructs designated *Employer's* representatives to inspect the Plant and Materials at the factory, or the *Contractor's* premises, before it is transported to the Site.
- Ensures that all relevant factory tests are witnessed and accepted by the designated *Employer's* representatives. Any deviations from accepted drawings, standards or specifications are noted and reported to the *Contractor* by the above mentioned representatives. A copy of the deviations is forwarded to the *Project Manager* for record keeping. The *Project Manager* follows up with the *Contractor* to ensure that deviations are successfully corrected.

#### **4.7.4 Spares and consumables**

The *Contractor* shall supply, on acceptance by the *Project Manager*, a set of spares considered to be essential as part of the *works*.

The *Contractor* shall submit, on completion of the design, a detailed listing of the recommended spares and prices for the *Project Manager's* acceptance to comply with the aforementioned requirement. The prices quoted shall include for packing, delivery to and off-loading at site,

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inspection and testing and adequate protection against corrosion, damage and weathering during transit and storage.

#### **4.8 TESTS AND INSPECTIONS BEFORE DELIVERY**

The *Employer* carries out quality inspections at his discretion.

All inspections and testing to be performed in accordance with the Quality Control Procedure developed by the *Contractor*.

The *Employer* shall be provided access to the *Contractor's* premises for the purpose of:

- Establishing compliance with the contractual requirements by means of inspections, surveillance and audits.
- Witnessing the performance of any tests.

The *Contractor* shall obtain clearance from the *Employer* or the *Employer's* agent before dispatching of the equipment. This factory release inspection does not release the *Contractor* of any of his obligations under the contract.

No Plant shall be released for dispatch without the AS MANUFACTURED documentation and drawings accompanying them.

#### **4.9 MARKING PLANT AND MATERIALS OUTSIDE THE WORKING AREAS**

All equipment to be safely stored as per the OHS Act.

All plant and equipment to be removed from the designated area can only be removed with the permission of the *Contractor* and *Project Manager*.

#### **4.10 CONTRACTOR'S EQUIPMENT (INCLUDING TEMPORARY WORKS).**

The *Contractor* shall be liable for all plant and equipment in the designated area under his control.

The *Employer* shall not take any responsibility for any loss or damage to the equipment.

#### **4.11 CATALOGUING REQUIREMENTS BY THE CONTRACTOR**

The *Contractor* to provide a list of all material and component used in the project with full description or specification.

#### **4.12 CONSTRUCTION**

##### **4.12.1 Temporary works, Site services & construction constraints**

##### **4.12.2 Employer's Site entry and security control, permits, and Site regulations**

*Employers* Site entry and security control, permits, and Site regulations

All the *Contractor's* employees shall be required to attend a safety induction course before they shall be allowed to work on the Site. It shall be the responsibility of the *Contractor* to ensure that all employees have attended the safety induction. The *Contractor* shall compile his safety file for

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approval at the safety officer. The safety officer shall first approve this file, before the *Contractor* can attend the safety induction course.

A list of employees requiring safety induction shall be submitted at least 2 days in advance of arrival on site with the date and time of arrival so that safety induction can be arranged.

Site access control to HPS shall be arranged with the *Project Manager* after successfully completing the safety induction course.

Alcohol testing shall be conducted at any time on all employees entering the HPS premises. All staff that tested positive for alcohol abuse shall not be allowed on site.

All vehicles shall comply with the Road Traffic Act.

Vehicle inspections shall be conducted on a daily basis and check sheets shall be kept at the *Contractor's*

#### **4.12.3 Restrictions to access on Site, roads, walkways and barricades**

Restrictions to access on Site, roads, walkway and barricades shall be observed.

#### **4.12.4 People restrictions on Site; hours of work, conduct and records**

Working hours at *Employer* are 07:00 -16:15 on Mondays to Thursdays and 07:00 -12:00pm on Fridays. Collection and delivery of any plant or equipment would be within working hours.

During the execution of the *works*, Contractor keeps records of signed registers or time sheets of the *Contractor's* specific employees on site, including subcontractors. *Contractor* keeps the records, and avail it to the *Project Manager* upon request.

#### **4.12.5 Health and safety facilities on Site**

The Medical Centre is used by all individuals on site for injuries and first aid related issues, however cost to perform Medical services is covered by the *Contractor*. The fire department is also available for fire and other related emergencies. Their respective contact details to be provided during induction. However, the *Contractor* must have their own medical facilities available and appointed safety supervisor.

#### **4.12.6 Environmental controls, fauna & flora, dealing with objects of historical interest**

Contractor refers to section 4.2, of the issued Part C31 ECC3 Employer's Work Information, for environmental compliance to be adhered to during execution of this contract.

#### **4.12.7 Title to materials from demolition and excavation**

*Employer* has the title deeds to the waste accumulated from conducting the works. *Contractor* complies with the following waste disposal requirements:

- i. Construction rubble is disposed at the landfill site.

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- ii. Hazardous waste is disposed at a permitted landfill. Contractor submits disposal certificate to *Project Manager* for approval.

#### **4.12.8 Cooperating with and obtaining acceptance of Others**

Site access is granted by *Project Manager*. During contract period, *Contractor* works in parallel with other contractors.

The routing of all written communications is between the *Project Manager* and the *Contractor* only. Any agreement between the *Contractor* and any other person representing the *Employer* which has not been routed via the *Project Manager* is unacceptable and invalid.

*Contractor* takes charge of the work site and ensures no interference from other parties which may hinder the progress and completion of the works in the stipulated time frame.

#### **4.12.9 Publicity and progress photographs**

No pictures of anything on site are taken by the *Contractor* without prior approval by the *Project Manager*

#### **4.12.10 Contractor's Equipment**

The *Contractor* shall provide all Equipment that is required to complete the *works*.

The *Contractor's* Equipment shall not impair the operation or access to the plant.

The *Contractor* shall provide all or any temporary or expendable materials required for the storage of material.

Any Equipment, or appliances used by the *Contractor* shall conform to the applicable OHS Act safety standards and is maintained in a safe and proper working condition. The *Project Manager* has the right to stop the *Contractor's* use of any Equipment which, in the opinion of *Project Manager*, does not conform to the foregoing.

Off-loading and material handling Equipment such as cranes and fork lifts are available on Site (within the station's security fence) and shall be arranged with the *Project Manager* if required by the *Contractor*. Off-site requirements for cranes and fork lifts are not provided by the *Employer* and shall be arranged by the *Contractor* at his own expense.

The *Contractor* shall submit a list of all tools and equipment entering site. Equipment and tools not declared shall become the *Employer's* property.

On completion of the project, all tools and equipment shall be removed only with permission from the

*Project Manager* on the applicable approved *Employer* documents.

**4.12.11 Equipment provided by the Employer**

*Employer* provides scaffolding during the execution of the works. *Contractor* notifies *Project Manager* within 3 days for scaffolding requests.

**4.12.12 Site services and facilities**

Item	Date by which it will be provided
Safety file review	Before commencement of the project
Induction for Contractor’s Employer’s	Before commencement of the project
Power supply at the site-establishment area	At commencement of the project
Potable water	At commencement of the project
Waste disposal area	At commencement of the project

**1.1.1.3 Supply of electricity**

All points of supply requested by the *Contractor* are provided in terms of quantity and location at the discretion of the *Project Manager*.

There is no energy charge for electricity used for construction purposes.

No connection is made to the permanent installation at the Power Station without the prior approval by the *Project Manager*.

No guarantees of power supply quality are given and power supply breaks of some duration may occur without warning. Planned outages are also a possibility. The *Contractor* shall make arrangements at his own expense to improve continuity and quality of power where necessary for any reason and no claim of any nature relating to power failures is considered.

All electrical work shall have a valid Certificate of Compliance (COC).

**4.12.13 Roads**

Main access roads are surfaced and complete and may be used by the *Contractor* with the necessary care. The *Employer* maintains the Site roads, described above, to a fair condition. Any costs incurred by the *Project Manager* from damage caused to underground services, structures, etc. as a result of the *Contractor* not using the prescribed routes is recovered from the *Contractor*

**4.12.14 .First Aid and Fire Fighting**

The *Contractor* in cases of emergencies or accidents shall call upon the services of the first aid and firefighting resources at the HPS.

#### **4.12.15 Sanitary Facilities**

The *Employer's* sanitary facilities are used as directed by the *Project Manager*.

#### **4.12.16 Facilities provided by the Contractor**

*Contractor* provides:

- i. All the necessary machinery/equipment and facilities to provide the *Works*. This includes machinery/equipment and facilities not issued by the *Employer*
- ii. Their own resources to secure security of machinery and equipment that may be stored on site. *Employer* is not liable to account for any costs related to damages or theft of machinery and equipment.

*Contractor* keeps comprehensive records of the *Contractor's* equipment bought on and removed from site. *Contractor* complies with the *Employer's* site access procedures.

#### **1.1.1 Lay Down Areas**

No Plant, Material and Equipment lay down areas are permitted on the terrace. The *Contractor* shall *deliver* all Plant, Materials and Equipment to the point of erection as and when needed. Plant, Materials and Equipment not used within 14 days are removed from the terrace and stored in the site yard.

#### **4.12.17 Security**

The *Contractor* shall provide security necessary for the protection of the *works* at all times until the completion of the whole of the *works*.

The *Contractor* shall be informed of the access procedures through Site Regulations and note that such procedures may change depending on the prevailing security situation.

All persons entering the site pass through the control points at the main access gate and shall be required to have temporary permits that are issued to *Contractor's* staff on request. If it is necessary to bring Equipment onto site a list is submitted which is verified by security staff prior to Equipment entering the security area.

No firearms, weapons, alcohol, illegal substances and cameras (including cell phones with cameras) are permitted on Site.

The generator area and the other units are barricaded and out of bounds and only authorised persons are permitted. Areas outside the Site are out of bounds to the *Contractor's* staff.

#### **4.12.18 Giving Notice of Work to be Covered Up**

All intended activities shall be captured in the scope of *work* and also on the project schedule. The project schedule shall be reviewed and updated weekly.

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#### **4.12.19 Existing premises, inspection of adjoining properties and checking work of Others**

Inspection with the owners of adjacent buildings and properties, before commencing with the works, are required that have the potential to damage surrounding buildings and property. *Contractor* inspects the work of Others to which he/she is required to connect but he/she inspects in the presence of Others.

#### **4.12.20 Survey control and setting out of the works**

*Contractor* provides all the necessary equipment and facilities to execute the works.

#### **4.12.21 Excavations and associated water control**

*Contractor* ensures all excavations are barricaded and sufficient signage placed around excavated areas

#### **4.12.22 Underground services, other existing services, cable and pipe trenches and covers**

The station has underground piping for fire system, potable range, sewage system and cables. For any excavation to be undertaken cable detection to be conducted prior.

Any damage to these systems due to negligence shall be repair by the contractor at his or her cost. Any challenges with regarding the existing system shall be communicated with the Project Manager.

#### **4.12.23 Control of noise, dust, water and waste**

*Contractor* disposes waste as per waste management procedure. Misuse of water is not tolerated. Usage of noisy machinery is tested by the Occupational Hygienist to assess if noise level is acceptable

#### **4.12.24 Sequences of construction or installation**

*Contractor* refers to

- i. NEC ECC3 Employer's Work Information.
- ii. Sequence of executing the works and interfacing requirements is discussed during kick-off meeting.

#### **4.12.25 Giving notice of work to be covered up**

*Contractor* notifies *Project Manager* within 3 days of works to be covered up

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#### **4.12.26 Hook ups to existing works**

*Contractor* complies with working at heights requirements, of hook up heights above or below 2m during the execution of the *works*.

### **4.13 COMPLETION, TESTING, COMMISSIONING AND CORRECTION OF DEFECTS**

#### **4.13.1 Work to be done by the Completion Date**

The entire *works* shall be completed by the agreed upon completion date including commissioning and testing.

#### **4.13.2 Use of the works before Completion has been certified**

Take-over is after Completion through QIP/QCP assessment and authorization of every task, final approval and authorization of reports.

#### **4.13.3 Materials facilities and samples for tests and inspections**

The *Contractor* to provide material facilities and samples for tests as stipulated in the scope of work.

#### **4.13.4 Commissioning**

Take-over and/or commissioning is after Completion through QIP/QCP assessment and authorization of every task, final approval and authorization of reports.

#### **4.13.5 Start-up procedures required to put the works into operation**

The plant shall be put in operation after safety clearance of certain parts of the plant and systems

Sign off shall be scheduled as per the project schedule on completion of each activity

#### **4.13.6 Take over procedures**

Take-over or hand over shall be scheduled as per completion

#### **4.13.7 Access given by the Employer for correction of Defects**

The defects period is 52 weeks from completion of the entire works. Any defects shall be rectified within this period at the expense of the Contractor and at the convenience of the Project Manager.

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#### 4.13.8 Performance tests after Completion

Acceptance tests shall be carried out to prove all the plant guarantee figures provided by the *Contractor* in the technical schedules. The *Contractor* shall provide his own testing equipment.

- Pipework shall be fully flushed to ensure no debris is left inside the pipework.
- Newly installed pipework shall be hydraulically tested in accordance with NFPA 15 **Error! Reference source not found.**
- If any fault, such as permanent distortion, rupture or leakage, is disclosed by the hydraulic test, the fault shall be corrected and the test shall be repeated.
- A commissioning certificate is to be issued to Eskom for acceptance once the commissioning of a system is completed.
- The contractor is to supply commissioning procedure, pipe flush and pressure test procedure for acceptance when QCPs are submitted.

Where the results of the performance tests performed don't correlate with expected results (flow rates, pressures etc.) and/or the control functions as per the operating philosophy do not meet the specifications guaranteed, then the *Contractor*, at his own expense, shall carry out all necessary adjustments and modifications to the works required to obtain the stated tolerances. Fully detailed proposals are submitted in writing to the Project Manager for acceptance before any adjustments and modifications are made and work in this respect is carried out when convenient to the Project Manager. All adjustments and modifications are subject to inspection and approval by the Project Manager.

When adjustments and modifications are completed, the *Contractor* shall advise the *Project Manager* in writing to this effect and applies for a further acceptance test. From the results obtained, and provided that the *Employer* is satisfied that it shall be lasting, the *works* shall be finally accepted by *Project Manager*.

#### 4.13.9 Training and technology transfer

The *Contractor* shall provide training to the operating, maintenance and engineering departments of the *Employer*. All Operating and Maintenance requirements must be included in the training manuals

#### 4.13.10 Operational maintenance after Completion

The contractor shall provide Eskom with the maintenance and operating procedure for the fire protection systems. The procedure shall include the recommended maintenance intervals and maintenance to be carried out on the fire system and components, test procedure and list of recommended spares to ensure reliable operation of the fire protection system.

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#### 4.14 PLANT AND MATERIALS STANDARDS AND WORKMANSHIP

##### 4.14.1 Investigation, survey and Site clearance

*Contractor* refers to NEC ECC3 Employer's Work Information.

*Contractor* site de-establishes once take-over is completed through QIP/QCP assessment and sign off, final approval and authorization of reports. *Project Manager* approves *Contractor's* site de-establishment.

#### 4.15 BUILDING WORKS

The *Contractor* shall be responsible for the design, erection, maintenance and removal of all temporary bracing or propping required for the execution of the *works*.

The *Contractor* shall adhere to the Eskom Standards and should these be unavailable, the relevant SANS standard shall apply.

The *Contractor* shall provide all relevant welding procedures for acceptance to the *Project Manager*. The *Contractor's* welding procedures shall comply with Eskom Standard 240- 106628253 **Error! Reference source not found.** (Standard for Welding Requirements on Eskom Plant) and Eskom Standard for Quality 240-1105658000 **Error! Reference source not found.**

#### 4.16 CIVIL ENGINEERING AND STRUCTURAL WORKS

All *works* shall be performed in accordance with the *Contractor's* accepted Quality Control Plan. All construction and erection work conducted on the site shall be subject to inspection by the Supervisor.

The construction and erection of the *works* shall be performed under the supervision of the Supervisor. An acceptance/test schedule shall be compiled by the *Contractor* and approved by the Supervisor.

All equipment required for the erection and completion of the *works* shall be supplied by the *Contractor*. This Equipment shall be in good condition and subject to the *Employer's* safety requirements.

The *Contractor* shall supply all Plant and Materials where new Plant and Materials are required for the completion of the *works*.

All Plant and Materials used shall comply with the requirements regarding quality, method of manufacturing, testing and performance specification as given in the relevant SASS/SANS specification, or where such a specification does not exist, the requirements of the relevant British or ISO standard. All plant and materials shall be suitable for use or operation under the operating conditions applicable to the system.

#### 4.17 RESTRICTED WORKING CONDITIONS

The erection of any temporary *works* such as formwork is subject to acceptance of the *Supervisor*.

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The *Contractor* shall take all necessary precautions to ensure that no damage to any existing plant and equipment takes place during the *works*. The *Contractor* shall supply all equipment necessary for the construction of the *works*. The *Contractor* shall take cognizance of existing plant and equipment as well as safety and housekeeping constraints. It is the *Contractor's* responsibility to overcome any issues that may arise due to space constraints with prior consent from the *Project Manager* and no extra payment or claim of any kind shall be allowed on account of difficulties of access to the *works*.

#### **4.18 ELECTRICAL & MECHANICAL ENGINEERING WORKS**

*Contractor* refers to NEC ECC3 Employer's Work Information.

#### **4.19 PROCESS CONTROL AND IT WORKS**

N/A

#### **4.20 DOCUMENTATION AND CONFIGURATION MANAGEMENT**

##### **4.20.1 Document Management**

All documents supplied by the Contractor shall be subject to Eskom's approval. The language of all documentation shall be in English. The Contractor shall include the Employer's drawing number in the drawing title block. This requirement only applies to design drawings developed by the Contractor and his Sub-contractors. Drawing numbers will be assigned by the Employer as drawings are developed. All documentation shall be controlled and managed in accordance with Document and Records Management Procedure (32-6).

##### **4.20.2 Document Identification**

The Contractor is required to submit the Vendor Document Submission Schedule (VDSS) as per agreed dates to the delegated Eskom Representative. Eskom will pre-allocate document numbers on the VDSS and send back to the Contractor through the delegated Eskom Representative. The VDSS is revisable and changes must be discussed and agreed upon by all parties. Changes in the VDSS can be additional documentation to be submitted, changes in submission dates or corrections in documentation descriptions, document numbers, etc. The Contractor's VDSS shall indicate the format of documents to be submitted.

##### **4.20.3 Document Submission**

All project documents must be submitted to the delegated Eskom Representative with transmittal note according to Project / Plant Specific Technical Documents and Records Management Work Instruction (240-76992014 **Error! Reference source not found.**). In order to portray a consistent image it is important that all documents used within the project follow the same standards of layout, style and formatting as described in the Work Instruction. The Contractor is required to submit documents as electronic and hard copies and both copies must be delivered to the Eskom

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Representative with a transmittal note.

In addition, the Contractor shall be provided with the following standards which must be adhered to:

- Documentation Management Review and Handover Procedure for Gx Coal Projects 240-66920003 [35].
- Project Documentation Deliverable Requirement Specification 240-65459834 **Error! Reference source not found..**
- Technical Documentation Classification and Designation Standard 240-54179170 **Error! Reference source not found..**
- Project/ Plant Specific Technical Documents and Records Management Work Instruction 240-76992014 **Error! Reference source not found..**

#### **4.20.4 Email Subject**

The Contractor shall submit all documentation to the Eskom Representative as well as the Project's Documentation Centre in the following media:

Electronic copies shall be submitted to Eskom Representative through the email that will be specified. The email subject shall as a minimum have the following: (Project Name, Discipline and Subject). Electronic copies that are too large for email will be delivered on CD/DVD, large file transfer protocol and/or hard drives to the Project Documentation Centre. A notification email, with the transmittal note attached, shall be sent to the Eskom Representative. Hard copies shall be submitted to the Eskom Representative accompanied by the Transmittal Note.

#### **4.20.5 Engineering Change Management**

All Design change management shall be performed in accordance to the latest revision of the Eskom Engineering Change Management Procedure 240-53114002 **Error! Reference source not found.** and the Employer shall ensure that Contractor is provided with latest revisions of this procedure. Any uncertainty regarding this procedure should be clarified with the Employer. All design reviews will be conducted according to the Design Review Procedure 240-53113685.

#### **4.20.6 Drawings Format and Layout**

The creation, issuing and control of all Engineering Drawings will be in accordance to the latest revision of Engineering Drawing Standard 240-86973501 **Error! Reference source not found..** Drawings issued to Eskom will be a minimum of one hardcopy and an electronic copy that is editable. All Contractors are required to submit electronic drawings in Micro Station (DGN) format, and scanned drawings in "PDF" format. No drawings in TIFF, AUTOCAD or any other electronic format will be accepted. Drawings issued to Eskom may not be "Right Protected" or encrypted. The Employer reserves the right to use these drawings to meet other contractual obligations.

### **4.21 CONFIGURATION MANAGEMENT**

#### **4.21.1 General Requirement**

The *Contractor* includes the Employer's drawing number in the drawing title block. This requirement

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only applies to design drawings developed by the *Contractor* and his *Subcontractors*. It does not apply to drawings developed by manufacturers for equipment and material such as valves, instruments, etc. Drawing numbers will be assigned by the Employer as drawings are developed.

The project name shall be listed on all drawings, including manufacturers' drawings. Tag numbers and equipment names shall be listed on all manufacturers' drawings. A separate sheet may be attached to the submittal if needed to adequately list all tag numbers associated with the drawings such as valves which may have numerous tag numbers associated with it.

The language of all documentation shall be in the English language. The units of measure shall be metric.

The *Contractor* retains project design calculations and information for the entire life cycle of the plant and provides these to the Employer on prior written notice at any time notwithstanding the expiry or termination of the contract.

#### **4.21.2 Configuration Management**

The *Contractor* supplies a comprehensive configuration management program according to ISO 10007 (2nd Edition) to ensure that plant structures, components and computer software conform to approved design requirements. However a project specific Configuration Management Plan document will be developed which will be aligned to ISO 10007. In addition, the Works as-built physical and functional characteristics shall be accurately reflected in selected documents and databases, including those for design, procurement, construction, operation, testing and training. The configuration program shall be applicable for use throughout all phases of the project life cycle, including management of spare parts, replacement parts and product upgrades, and shall form part of deliverables for hand-over to the Employer for use during the operation and maintenance phases of the plant.

#### **4.21.3 Change Management**

All Design change management shall be performed in in line with the Eskom Project Change Management Procedure 240-53114002 **Error! Reference source not found.** and the Employer ensures that *Contractor* is provided with latest revisions of this procedure. Any uncertainty regarding this procedure should be clarified with the Employer and clarification updates should be reflected in updated versions of this procedure.

#### **4.21.4 Design Review Documentation**

The *Contractor* conducts design reviews as per the *Contractors* official design review procedure. *Contractor* further takes note of the Employers Design Review Procedure 240-53113685 **Error! Reference source not found.** and participates in all design reviews as specified by the Employer. The Employer may "Accepted"; "Accept with Comments" or "Rejected". If required, the *Contractor* makes the necessary revisions on the documentation and ensures acceptance is obtained from Employer. The *Contractor* includes these design reviews as part of the schedule and suggests appropriate timing for such reviews

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## 4.22 NORMATIVE/INFORMATIVE REFERENCES

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

### 4.22.1 Normative

- [8] ISO 9001 Quality Management Systems
- [9] 240-54937450 Fire Protection and Life Safety Design Standard
- [10] 240-55714363 Coal Fired Power Stations Lighting and Small Power Installation Standard
- [11] 240-56227443 Requirements for Control and Power Cables for Power Stations Standard
- [12] 240-56355754 Field Instrument Installation Standard
- [13] 240-56355815 Field Instrument Installation Standard: Junction Boxes and Cable Termination
- [14] 240-56356396 Earthing and Lighting Protection Standard
- [15] 240-56364545 Structural Design and Engineering Standard
- [16] 240-107981296 Constructability Assessment Guidelines
- [17] 240-57617975 Procurement of Power Station Low Voltage Electric Motors Specification Standard
- [18] SANS 10142 The Wiring of Premises Part 1: Low-voltage Installations
- [19] SANS 10114-1 Interior Lighting Part 1: Artificial Lighting of Interiors
- [20] 240-105020315 Standard for Low Pressure Valves.
- [21] 240-123801640 Standard for Low Pressure Pipelines
- [22] 240-106628253 Standard for Welding Requirement on Eskom
- [23] 240-106365693 Standard for External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings.
- [24] 240-101712128 Standard for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels And Associated Piping With Linings
- [25] 240-85549846 Standard for Design Drainage and Sewerage Infrastructure
- [26] 240-56356376 On-Site Commission for Low Pressure Systems Standard
- [27] SANS 10100-2 The Structural Use of Concrete
- [28] 25.1523521 Hendrina Power Station Common Plant Fire Water System P&ID (Sheet2)
- [29] OTSU8C2-25 Hendrina Power Station Operating Technical Specifications – Normal Plant Operating Conditions – Fire Fighting System
- [30] SANS 121 Hot Dip Galvanized Coatings on Fabricated Iron and Steel Articles - Specifications and Test Methods
- [31] SANS 62 Steel Pipes

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- [32] SANS 719 Electric Welded Low Carbon Steel Pipes For Aqueous Fluids (Large Bore) Bore)
- [33] SANS 10287 Automatic Sprinkler Installations For Fire-Fighting Purposes
- [34] 240-86973501 Engineering Drawing Standard – Common Requirement
- [35] SANS 1476 Fabricated Flanged Steel Pipework
- [36] NFPA 15 Standard for Water Spray Fixed Systems for Fire Protection
- [37] 240-65459834 Project Documentation Deliverable Requirement Specification
- [38] 240-54179170 Technical Documentation Classification and Designation Standard
- [39] 240-53114002 Engineering Change Management Procedure
- [40] 240-53113685 Design Review Procedure
- [41] 240-56227516 LV Switchgear and Control Gear Assemblies and Associated Equipment For Voltage Up To and Including 1 000V AC and 1 500V AC

**4.22.2 Informative**

- [42] SANS 10140 Identification Colour Marking: Identification of Hazards and Equipment In Work Situations
- [43] 240-71432150 Plant Labelling Standard
- [44] 240-105658000 Supplier Quality Management Specification
- [45] 240-76992014 Project Plant Specific Technical Documents and Records Management Work Instruction

**5. AUTHORISATION**

This document has been seen and accepted by:

Name & Surname	Designation

**6. REVISIONS**

Date	Rev.	Compiler	Remarks

**7. DEVELOPMENT TEAM**

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

KK Dharamraj

**8. ACKNOWLEDGEMENTS**

N/A

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