

|                                                                                   |                      |                             |
|-----------------------------------------------------------------------------------|----------------------|-----------------------------|
|  | <b>Specification</b> | <b>Kusile Power Station</b> |
|-----------------------------------------------------------------------------------|----------------------|-----------------------------|

Title: **Provision of Fabrication, Rolling and Machining services for Kusile Power Station for a period of 5 years during outages**

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## **1. Introduction**

Kusile Power Station requires a service provider for the fabrication, rolling and machining of material for particular plant area equipment/systems as part of the maintenance work that is carried out during outages. This forms part of the scheduled maintenance work for routine preventative maintenance, to ensure the reliable operation of the unit from one outage to the next. This specialised works must be outsourced to a service provider whose expertise will enable us to perform planned (and unplanned) maintenance (refurbishment and/or repairs of plant components/equipment).

This document outlines the detail of the applicable plant areas, scope of work, standards, quality, requirements, specifications, terms & conditions of the works to be carried out, as well as the criteria to qualify for the tender.

## **2. Supporting Clauses**

### **2.1 Scope**

The scope of work (SOW) specifies the required services to be provided by the *Contractor* on an as and when required basis. This includes the necessary technical information relating to the equipment/components to be worked on and the technical requirements to perform the service.

#### **2.1.1 Purpose**

The purpose of this document is to define the specified scope of work activity requirements for Kusile Power Station in relation to the applicable scope of work for the *Provision of Fabrication, Rolling and Machining services for Kusile Power Station for a period of 5 years during outages*. The station is expected to perform at 92% UCF, 6% PCLF, 2% UCLF, and the integrity of the material in the boiler, turbine, common plant/outside plant (PJFFP and DHP) and FGD plant needs to be assured through maintenance at the specified intervals to achieve the aforementioned performance. It is therefore imperative that the successful and suitably qualified Contractor aligns his/her organisation fully to these specified scope activities and processes laid down in this document.

#### **2.1.2 Applicability**

This document is applicable to Kusile Power Station (Generation)

#### **2.1.3 Effective date**

This document will be effective from the date of authorisation.

### **2.2 Normative/Informative References**

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

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### **2.2.1 Normative**

- [1] ISO 9001 Quality Management Systems
- [2] ISO 3832 – 2 Quality Requirements for Fusion welding of metallic materials
- [3] SANS 347 Categorisation and conformity assessment criteria for all pressure equipment
- [4] 240-106963417 Kusile Environmental Management requirements for Contract and Supplier
- [5] 240-105776552 Kusile Power Station Waste Management
- [6] OHSACT Occupational Health and Safety Act, 85 of 1993
- [7] 32-727 SHEQ Policy

### **2.2.2 Informative**

- [8] BS EN 10204 (2004) - Metallic products -Types of Inspection Documents
- [9] 240-106628253 Welding
- [10] 240-54820279: Receive Materials

## **2.3 Definitions**

| Definition | Explanation                                                                                                                                      |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Contractor | Service provider contracted to provide a specific service to Eskom, Kusile Power Station. Referred to as the <i>Contractor</i> on this document. |
| Employee   | Person employed by Eskom, Kusile Power Station or the Contractor                                                                                 |
| Employer   | Eskom, or Eskom Kusile Power Station or representative                                                                                           |
| Site       | All plants and equipment installed in the boundary fences of Kusile Power Station                                                                |
| Workshop   | Contractor Premises with equipment installed for the machining, fabrication and rolling services, external to Kusile Power Station               |

## **2.4 Abbreviations**

| Abbreviation | Description                   |
|--------------|-------------------------------|
| AIA          | Approved Inspection Authority |

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|             |                                                                    |
|-------------|--------------------------------------------------------------------|
| AP          | Appointed Person                                                   |
| FWT         | Feed-water Tank                                                    |
| DHP         | Dust Handling Plant                                                |
| FGD         | Flue Gas Desulphurization                                          |
| PJFFP       | Pulse-Jet Fabric Filter Plant                                      |
| BO          | Black Owned                                                        |
| BOP         | Balance Of Plant                                                   |
| SOW         | Scope of Work                                                      |
| SSC         | Submerged Scrapper Conveyor                                        |
| CO          | Commercial Operation                                               |
| HP          | High Pressure                                                      |
| LP          | Low Pressure                                                       |
| PCM         | Process Control Manual                                             |
| NDT         | Non-Destructive Testing                                            |
| T-18 to T-6 | 18 months prior to outage start, to 6 months prior to outage start |
| KPI         | Key performance Indicator                                          |
| RTS         | Return To Service                                                  |
| SME         | Subject Matter Expert                                              |
| PCLF        | Planned Capability Loss Factor                                     |
| UCF         | Unit Capability Factor                                             |
| UCLF        | Unplanned Capability Loss Factor                                   |
| QA          | Quality Assurance                                                  |
| QC          | Quality Control                                                    |

## 2.5 Roles and Responsibilities

Table below outlines the line of responsibility, accountability, and relevant stakeholders to be consulted and informed.

| Responsible                       | Accountable     | Consult                                                                                                                                                                                                                              | Inform                                                           |
|-----------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| Contract Supervisor<br>(Employer) | Service Manager | <ul style="list-style-type: none"> <li>- Aux System Engineer</li> <li>- Boiler System Engineer</li> <li>- Turbine System Engineer</li> <li>- FGD System Engineer</li> <li>- Quality Controller</li> <li>- MMD Technicians</li> </ul> | Risk & Assurance,<br>Procurement,<br>Operating and<br>Production |

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|                                          |                      |                                                                                                 |                                                               |
|------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Contractor<br>Supervisor<br>(Contractor) | Site/Project Manager | - Contract Supervisor<br>- Service Manager<br>- Outage Execution<br>Manager<br>- Outage Planner | System Engineer(s)<br>Quality Controller<br>Ops Commissioning |
|------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------|

### **2.5.1 The Employer**

- a) Inform and issue the Contractor with the updated outage plan in accordance to the outage planning timelines (T-18 to T-6). Inform the contractor of any outage movements as soon as possible.
- b) Issue the SOW to the Contractor timeously to allow planning for the Outage
- c) Arrange clarification meetings with the contractor to align on the technical, commercial, contractual, quality and OHS requirements
- d) Issue a task order/instruction to commence the work with a predetermined start and end date
- e) Issue performance measures against the scope to be executed (KPI's) to the contractor. Performance is measured by the Employer against those areas which contribute to the Employer's business and the Contractor shall be compensated accordingly as per the agreed contract clauses. (E.g. Reliability, Availability and Safety).
- f) Employer to provide SHE Specifications and all OHS and environment requirements for Eskom Kusile power station, required for the contractor to access site and perform their duties on site.
- g) Provide the RP for any site related work (Inspections, measurements, testing, etc.)
- h) Issue the relevant material (where applicable) to the contractor.
- i) Employer shall provide training for PSR, ORHVS, FFFR and any other training as deemed necessary by the Employer in line with the scope requirements.
- j) The Employer and Contractor in this SOW is committed towards the following.
  - i. Retention of critical skills
  - ii. Continuous cost reduction
  - iii. Health & Environment Safety
  - iv. Transfer of operational experience and skills

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## **2.5.2 The Contractor**

- a) Receive the outage scope and plan, and plan for execution of their duties as per the scope issued
- b) Attend all clarification and schedule challenge meeting during the planning phase of an outage
- c) Ensure that they comply and adhere to all the SHEQ requirements as outlined in the SHE Specification for the respective scope. Contractor shall further ensure that their safety file is approved for every outage where they will be executing work.
- d) The contractor shall Issue a quotation for each outage where work shall be executed as per the agreed scope.
- e) The contractor shall supply the employer with the relevant outage deliverables during the planning and execution phases of the outage (i.e. schedules/programs, manpower curves, quality control plans, method statements, findings reports, service reports, material certificates, etc.)
- f) The Contractor shall compile improvement programmes to enhance plant performance and achieve cost reductions, and the Employer will approve such programmes.
- g) The Contractor shall collect the material for the purpose of machining, rolling, forging and other forms of manipulation as per the issued SOW.
- h) The contractor shall ensure that their workshop (premises) equipment are maintained in a serviceable condition and the works executed are as per the technical requirements.
- i) The Contractor shall issue the relevant tools, PPE, transportation and equipment to their employees to perform their duties on site and off site.
- j) The contractor shall adhere to the quality requirements for scope execution and not bypass key intervention points as outlined in the approved QCP.
- k) The contractor shall issue a handover certificate for acceptance by the employer after completion of the scope.
- l) The following complementary services to improve Plant and labour performance can be defined as follows;
  - i. Project management
  - ii. Value engineering
  - iii. Procedure and documentation writing
  - iv. Compile and improve task lists

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- m) The contractor is to ensure that any service rendered does not interfere with the Employer's scheduled work and should align himself with the Employer's work control management process.
- n) Should the Employer become aware of any changes to the activity schedule (programme of notifications), the Employer may issue the Contractor with a revised programme.
- o) The contract entered with the Contractor is non-exclusive and work against this contract can only be performed upon receipt of a task order.
- p) The Contractor shall employ a competent person who is accredited and responsible to perform all statutory plant and material testing and certification with regards to this SOW.
- q) The contractor shall adhere with the requests to test and provide technical documentation as outlined by the AIA
- r) All works will be subject to anytime inspection by the Employer and or the AIA.
- s) The Contractor shall take cognisance of the fact that the contract start date can deviate.
- t) The Contractor to provide resources required to execute this scope and any changes to the crew must be negotiated and agreed upon with the Employer.
- u) This contract is for outage SOW and any other breakdowns that the Contractor will be required to perform within the scope boundaries of this contract.
- v) The Contractor must ensure they have LAR training to perform the necessary inspections/material measurements and verification on site.
- w) The Contractor shall participate in improvement programs as stipulated by the employer.
- x) Contractor vehicles to comply with Eskom Vehicle Standards and Procedures.
- y) During Outages it is expected that the contractor will provide on-site representation on a 24 hour basis, seven days a week if required. Shift times: 07h00 to 19h00, 19h00 to 07h00 or whichever times that will be agreed between two parties.
- z) All additional personnel and scope of work to be clarified with the Employer prior to work being done.

### **2.5.3 Management and Reporting**

- a. The type of reports, level of detail and frequency of reporting will be mutually agreed by the Employer and the Contractor during the contract negotiation phase of this agreement. These may change from time to time on request by the Employer.
- b. The Contractor to be represented at all Outage related meeting which may be daily, weekly or monthly.
- c. The Contractor to be represented at all Employer safety meetings.
- d. The Contractor to be represented at any ad-hoc meetings that may arise in order to address any outage planning, execution, finalisation or safety related matters.
- e. Liaison meetings shall be held with the Employer's Representative or his/her delegate on as and when required basis to discuss any technical details, or concerns.

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#### **2.5.3.1 Contractor's Management, Meetings and Key People**

- a. Before work starts on site and off site, an inaugural meeting is held with the Contractor and the Employer, to outline in detail, all requirements of the Site Regulations.
- b. The Contractor is issued with a file of current Site Regulations on arrival. The file remains the property of the Employer and the Contractor is responsible for its maintenance and updating to include new or revised regulations as issued by the Employer.
- c. The Contractor must ensure that all personnel operating mobile equipment and vehicles are authorised, this includes but not limited to;
  - i. LDV's
  - ii. Mobile Cranes and crane trucks
  - iii. Cherry Pickers
- d. The Contractor shall be responsible for the regular inspections and daily equipment checks of the mobile equipment and vehicles including record keeping while onsite.
- e. The Contractor must ensure that all personnel performing work on the plant are authorised, this includes but not limited to;
  - i. Confined space locations
  - ii. Working at heights
  - iii. Heat stress areas
  - iv. Scaffolding Compliance
  - v. Hazardous substances

#### **2.5.4 Project Implementation**

- a. The Contractor shall supply an outage execution plan per outage including at least the following in Primavera or any other project plan acceptable to the Employer:
  - i. Site establishment
  - ii. Activities with critical path
  - iii. Interphase management plan
  - iv. Inspection points
  - v. Manpower plan (Resource loaded)
  - vi. Organogram
  - vii. Skills required and associated cost per skill (e.g. artisan, site manager, etc)

#### **2.5.5 Manpower Requirements**

- a. The number of personnel required to execute the works is to be proposed by the Contractor after his/her assessment of the scope of work and submitted to the Employer for approval.
- b. The successful Contractor shall utilise/provide skilled and suitably qualified staff with experience in the technical aspects of this SOW and supporting teams.

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- c. All staff brought onto site in connection with this work scope should be able to fluently speak, understand and write in English.
- d. Proof of qualification is to be supplied on request by the Employer for specific key resources.
- e. All machining, fitting and turning personnel are to be qualified stated in the Eskom Standard which is stipulated in the reference documents.
- f. All welding personnel are to be qualified as stated in the Eskom Standard which is stipulated in the reference documents.
- g. The Contractor shall employ the services of a qualified welding & fabrication inspector, to inspect the works.
- h. The Contractor ensures that all staff being brought onto Kusile site has a valid fitness certificate based on the specified plant man-job specification.
- i. Provide daily supervision of all related plant through trained and competent personnel to ensure that inspections & work activities are conducted daily during execution of the outage.

## **2.6 Process for Monitoring**

This process will be agreed by both parties as per purchase order and according to Outage process control manuals and the specific outage SOW

## **2.7 Related/Supporting Documents**

- a. 240-56355225 Welding of High-Pressure Temperature Tube and Pipework Standard
- b. 240-56241933 Control of Welding during Construction, Repair and Maintenance
- c. 240-83539994 Standard for the Execution of NDT on Eskom Plant
- d. 240-84979413 Maintenance and repair of high temperature and pressure valves and fittings standard

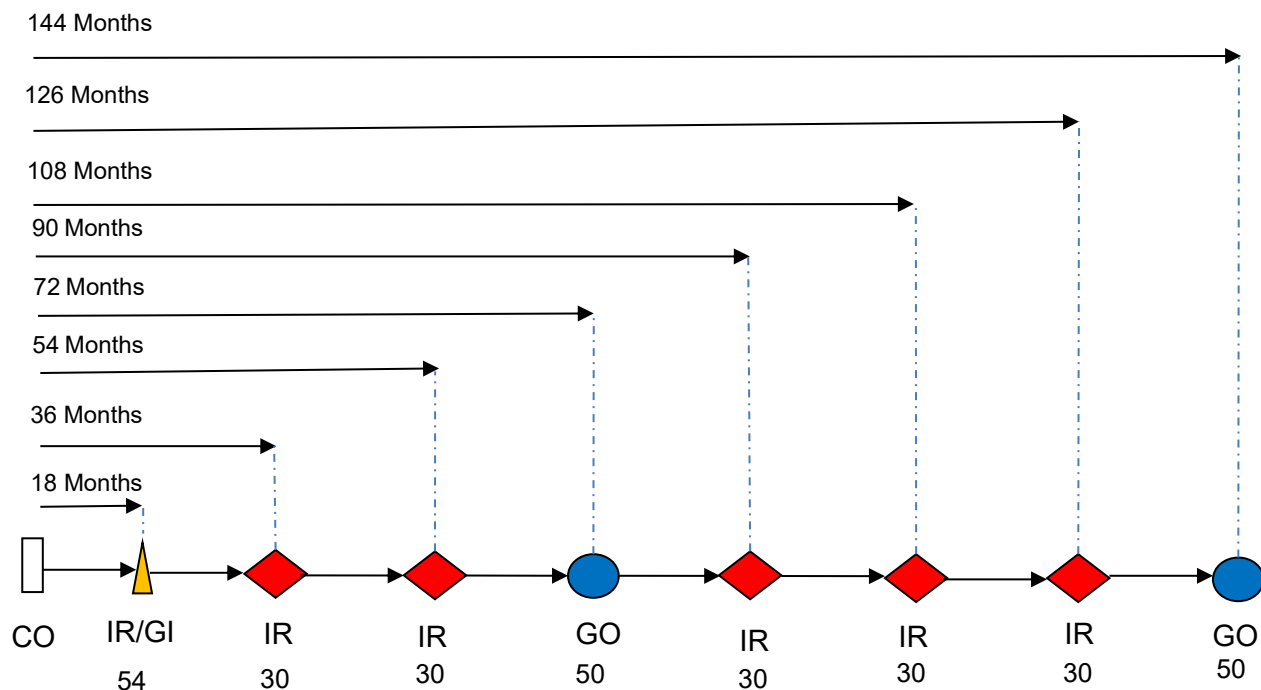
## **3. Fabrication, Rolling and Machining services for Kusile Power Station**

### **3.1 Scope of Work Requirements**

The scope of work is applicable to Fabrication, Rolling and Machining services for Kusile Power Station for a period of 5 years during outages. The scope is applicable to the Turbine, Turbine Auxiliaries, Generator, Generator auxiliaries, Turbine and Boiler Valves, Sootblowers, SSC, Ducting, PJFFP, FGD and DHP plant areas components and material where material fabrication, rolling, machining of components and equipment on and off site is required.

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The system is also aligned to Kusile Power Station Outage Philosophy depicted as follows and gets reviewed annually. The Kusile Outage philosophy is a maintenance regime where the units are taken off-load for planned maintenance and provides an opportunity to correct the defects that could not be attended to on load. The current philosophy runs over an 18-month period for each unit, and the diagram below indicates the 12-year cycle for each unit.



**Figure 1: Interim Outage Philosophy (1st 12 Year Cycle)**

| Symbol                                                                              | Outage type | Interval Years | Interval Hours | Duration (days) | Main activities                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|-------------|----------------|----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | IR/GI       | 1.5            | 13 140         | 54              | Boiler and Draught Group inspection (Guarantee Inspections)<br>Mill bin inspection<br>PJFFP Bag replacement<br>Absorber, Inlet & Outlet Duct, Emergency Quenching Nozzles, Mist Eliminators, Oxy-Blower and Reaction Tanks - Cleaning, Inspection and Refurbishment |
|  | IR          | 3              | 26 280         | 30              | Boiler and turbine auxiliaries inspection and repairs (Interim Repairs)<br>PJFFP Bag replacement                                                                                                                                                                    |

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|                                                                                   |    |   |        |    |                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------|----|---|--------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |    |   |        |    | Absorber, Inlet & Outlet Duct, Emergency Quenching Nozzles, Mist Eliminators, Oxy-Blower and Reaction Tanks - Cleaning, Inspection and Refurbishment                                                                                                                                       |
|  | GO | 6 | 52 560 | 50 | LP cylinder and Valves overhaul<br>Boiler statutory inspections<br>Generator stator and rotor inspections<br>PJFFP Bag replacement<br>Absorber, Inlet & Outlet Duct, Emergency Quenching Nozzles, Mist Eliminators, Oxy-Blower and Reaction Tanks - Cleaning, Inspection and Refurbishment |

**Table 1: Kusile Outage Philosophy**

### **3.2 Applicable SOW**

The scope of work covered by this contract is for the provision of Fabrication, machining and rolling of material, components and equipment as defined in the individual plant area scope of work, on site and off-site at the contractor's premises.

### **3.3 Scope of Work Per Plant Area**

#### **3.3.1 Boiler Pressure Parts**

The contractor is required to fabricate, machine and supply the following components on the boiler pressure parts plant:

- Stainless Steel 310 shields as per the required specification
- Stainless Steel 310 bangle style half-moon shields, Draught Group (Gas Airheaters and Boiler Fans)
- Evaporator Hopper Access doors
- Evaporator inspection ports, sootblower ports and manholes
- Superheater vertical wall dust arrestors
- Superheater access doors (Lower and Upper)
- Superheater 1.2 Support Lugs

#### **3.3.2 Draught Group**

The contractor is required to fabricate, machine and supply the following components on the Gas Airheater, PA, FD and ID Fans:

- Hot End expansion joint straight sections
- Cold End expansion joint straight sections
- Hot End expansion joint bends (14, 45 and 90 degrees)

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- FD Fan keys for regulation arms
- FD Fan spindles and retaining discs
- FD Fan Bushes for the outer port of the fan hub
- PA Fan RVC Shims and circlips
- PA Fan RVC Control bushes and outer bearing bushes
- GAH Keys and pinions
- GAH Radial plate rings
- GAH Axial Seal plunger plates and stainless-steel seals
- Axial stainless steel flat bars
- GAH Door liner plates – Hardox material 400/500

### **3.3.3 Ducting and Dampers**

The contractor is required to fabricate, machine and supply the following components on the Ducting and Dampers:

- Square Metal Plates of various dimensions and thickness, EN10028; GRADE: 16MO3 (1.5415); Chrome Molybdenum Steel Alloy.
- Square Metal Plates of various dimensions and thickness, SANS 1431; GRADE: 300WA/350WC; Stainless Steel
- Hardox 500 Plates; various dimensions and thickness, EN 10029; High Abrasion-Resistant Steel; Nominal Hardness: 500 HBW
- Damper seats liners; Vertical Sealing Edge with slotted holes; Mild Steel
- Damper seats liners; Horizontal Sealing Edge with slotted holes; Mild Steel
- Damper plates; Rectangular shape, 350WA SANS 1431
- Ducting patch plates; Square, 350WA SANS 1431
- Actuating damper cylinder shafts and spindles (various sizes)
- Pulse solenoid valve membranes, solenoid valve spindles and covers
- PJFFP hopper outlet knife gate valve gates

### **3.3.4 Boiler and Turbine Valves**

The contractor is required to fabricate, machine and supply the following components on the Boiler and Turbine Valves:

- Brass Stem nuts and Ring seals for condensate reserve system valves
- Brass Stem nuts and Ring seals for LP Heater drain valves
- Seats and Discs for CER NRV Internals
- Turbine Extraction 5 swing check valve Seats, Bushes, keys and seals
- Spraywater valves Stems (with discs), and yoke sleeves

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- Spraywater valves profiling rings
- Aux steam valves profiling rings
- Boiler drain and vent valves drive nuts and spindles

### **3.3.5 Turbine Centreline**

- Temperature Control valve governor inserts
- Oil vapor exhauster coupling alloy expanded metal, Aluminium
- Emergency oil pump parallel keys
- Screw parts coupling expansion sleeves
- Rotor turning gear retaining rings
- Rotor turning gear shafts
- LP Bypass valves burst discs
- Spraywater ring nozzle holders
- Main LP Bypass valves sealing rings
- Main LP Bypass valves piston rings
- IP-LP1 Coupling sleeves (Coupling sleeve D80 (D80 with 2 mm machining allowance))
- LP1-LP2 Coupling sleeves (Coupling sleeve D90 (D90 with 2 mm machining allowance))

### **3.3.6 Feedheating and HP Heating**

- Feedwater tank support steam rakes, SABS 1431 GR300A, S355JR
- HP Heaters nozzle piping supports

### **3.3.7 FGD**

- Flue gas ducts absorber inlet expansion joints
- Absorber reclaim valves stems and spindles
- Absorber recirc pump valves stems and spindles

## **3.4 Exclusions**

- Scaffolding and Insulation
- Unauthorised modifications
- Civil Maintenance

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### 3.5 Equipment Specifications

The contractor is required to have heavy engineering machining facilities in order to execute the scope of work outlined in this document. Below is a list of the machinery required.

| Equipment/Machine            | Specifications                                                                                                                              |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| CNC Lathe                    | Swing 300mm x 3000mm between centres, 1 ton load                                                                                            |
| CNC Lathe                    | Swing 525mm x 4000mm between centres,                                                                                                       |
| Horizontal floor Boring Mill | CNC, X-axis - 8000mm, Y-axis - 3500mm, z – axis 780mm, W-axis – 780mm complete with rotary table. 25 ton table load, 2500mm x 2500mm table. |
| Vertical Boring Mill         | CNC Swing 5000mm x 3000mm (Height)                                                                                                          |
| Portal Milling CNC           | Mimax – Z-axis – 3000mm, x-axis – 8000mm, Y-axis – 3000mm                                                                                   |
| Machining Centre             | 5-axis centre with drill tap function, x-axis – 510mm, Y-axis – 420mm, Z-axis – 350mm                                                       |
| Overhead cranes              | 1x 35 Ton Crane and 1x 10 Ton Crane                                                                                                         |
| Sandblasting facility        | Min. 100 m <sup>2</sup> blasting both and spray area with roof light sheet metal workshop                                                   |
| Fitting shop (section)       | Min. 100m <sup>2</sup> workshop with benches, and laydown area                                                                              |
| Welding shop (section)       | Min. 50m <sup>2</sup> workshop with benches, and laydown area                                                                               |

### 4. Acceptance

This document has been seen and accepted by:

| Name | Designation |
|------|-------------|
|      |             |
|      |             |
|      |             |
|      |             |
|      |             |
|      |             |

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## **5. Revisions**

| <b>Date</b>   | <b>Rev.</b> | <b>Compiler</b> | <b>Remarks</b>         |
|---------------|-------------|-----------------|------------------------|
| January 2024  | 2           |                 | 1 <sup>st</sup> review |
| November 2019 | 1           |                 | 1 <sup>st</sup> issue  |

## **6. Development Team**

## **7. Acknowledgements**

Not Applicable

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