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|  | <b>SOW</b> | <b>Camden Power Station</b> |
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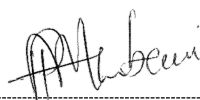


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## **Introduction**

This document details all the work that needs to be done with regards to the ceramic tiling on the mill, classifier internals, PF pipes and PF burner scrolls on the Milling Plant and PF burners at Camden Power Station.

## **1 Scope**

### **1.1 Purpose**

The purpose of this document is to give a clear scope of work with regards to the ceramic tiling of the mill, classifier internals, PF pipes and PF burner scrolls on the Milling Plant and PF burners at Camden Power Station.

### **1.2 Applicability**

This document applies to the contractor who will be doing the actual work of tiling on the mill, classifiers ,internals, PF pipes and PF burner scrolls on the Milling Plant and PF burners at Camden Power Station.

### **1.3 Normative References**

**240-56239143** Ceramic lined pulverised fuel pipe work standard

## **2 Definitions and Abbreviations**

### **2.1 Definitions**

None

### **2.2 Abbreviations**

**GPa** – Giga Pascal

**K** – Kelvin

**MPa** – Mega Pascal

**OHSAS** – Occupational Health and Safety Assessment Series

**QCP** – Quality Control Plan

**PF-** Pulverised fuel

**PTW** – Permit to Work

**QMS** – Quality Management System

**RP** – Responsible person

**SHE-** Safety, Health and Environment

**TRA** – Trunion Roller Assembly

### **3 Scope of Work**

#### **3.1 Description of the works**

The objective of this contract is for the Contractor to provide a service of installation and replacement of ceramic tiles on the mill, classifier internals, PF pipes and PF burners on the Milling Plant and PF burners at Camden Power Station.

The services will be required on as and when required basis. All required services on the mills and PF burners will be pre-scheduled and the work will have to be completed within the scheduled duration. The Milling Plant and PF burners at Camden Power Station is structured as follows:

- Number of Boilers - Eight
- Number Mills per Boiler - Five
- Number of PF pipes per mill - Four
- Number of PF burners per mill Four

The following strategy will be followed on the mill, classifier, PF pipe tiling and PF Burners:

- All mills, classifiers, PF pipes and PF burners will be assessed to determine condition of the existing tiles as well as to identify the areas where tiles are missing.
- In the areas on the specific mills, classifiers, PF pipes and PF burners that will require re-tiling, sectional replacement of tiles will be done to ensure the integrity of the final surface.
- A scope of work or an Engineering instruction will be compiled for each specific mill and burner which clearly states the areas that will be retiled.
- A quality control plan will be drawn up by the Contractor to be supplied to the client for approval before work will be allowed to start.
- No tiling work shall commence without an approved quality control plan, The quality control plan shall be accompanied by the tiling specification/technical data sheet as well as the adhesive specifications/technical data sheet.
- Once all the tile surfaces in the mill, classifier internals, PF pipes and PF burners has been restored, tiles replacement will only be done when:
  - Tiles are found missing or broken.
  - Minimum thickness of tiles is reached as a result of wear.

The contractor shall be responsible for the following:

- Supplying of all wear resistant material, adhesives/grout, tiles and consumables required for installation as per required specification.
- The accurate measuring of the total amount of tiles required per specific area that requires tiling.
- The removal of all old tiles as per SOW or Engineering instruction for specific mill internals, classifier, PF pipes and PF burners.
- The surface preparation before tile installation.
- The installation of tiles as required.
- The ceramic tiles shall be chamfered where necessary so that each tile is in intimate contact with adjacent tiles.
- Gaps between tiles shall be a maximum of 1mm provided that such tiles are in intimate contact at, at least one point.
- Tile edges including plugs shall not protrude into the pulverised fuel flow and shall not be more than 1mm below the preceding/upstream adjacent tile.
- The work shall be conducted by a competent team under the supervision of an experienced supervisor.
- The Contractor shall supply all the necessary equipment and tools required to complete the tiling.
- The Contractor shall ensure that they complied with all the Eskom safety and permit to work procedures.
- The contractor shall ensure that they conform to the ceramic lined pulverised fuel pipe work standard **240-56239143**. If any discrepancies are found the contractor shall communicate with the system engineer prior to planning for the tiling activity.

### **3.2 *Approximation of tiled surface areas and tile type for mill internals, classifier, PF pipes and burners***

The following is an approximation of the tiled areas in the mill and classifier internals and the description of the tiles used in the specific areas. Note this is only an approximation of the total area that requires tiling on mill internals and classifier and tiling in most cases will be done on a lesser area depending on the inspection of the tiles as tiles are to be replaced if their thickness is out of spec or tiles are damaged.

| <b>Description</b>                    | <b>Quantity 40 mills</b> | <b>Quantity per mill</b> | <b>UNIT</b>    |
|---------------------------------------|--------------------------|--------------------------|----------------|
| PF pipe tiling: 12mm tile             | 250                      | 6.25                     | m <sup>2</sup> |
| TRA/Mill door: 12mm tile              | 33.70                    | 0.84                     | m <sup>2</sup> |
| Inner cone and Chinese hat: 12mm tile | 264                      | 6.6                      | m <sup>2</sup> |
| Outer cone: 6mm tile                  | 258.8                    | 6.47                     | m <sup>2</sup> |
| Supporting pillars: 12mm tile         | 76                       | 1.90                     | m <sup>2</sup> |
| Burner: 12mm tile                     | 199.36                   | 4.984                    | m <sup>2</sup> |

### **3.3 *Approximate total area per tile thickness***

| <b>Tile size</b> | <b>Area (m<sup>2</sup>)</b> |
|------------------|-----------------------------|
| 6 mm tile        | 258.8                       |
| 12mm tile        | 823.1                       |

### **3.4 Specification of ceramic tiles**

The ceramic tile used in the mill internals, PF pipes and PF burners must meet the following minimum specifications:

| PROPERTIES            | QUANTITY | UNIT                                     |
|-----------------------|----------|------------------------------------------|
| Alumina content       | 92       | %                                        |
| Density               | 3600     | kg/m <sup>3</sup>                        |
| Porosity              | 0        | %                                        |
| Modulus of rupture    | 270      | MPa                                      |
| Modulus of elasticity | 260      | GPa                                      |
| Fracture Toughness    | 3        | MNm <sup>-3/2</sup>                      |
| Hardness (Vickers)    | 1023     | kg/mm <sup>2</sup>                       |
| Abrasion resistance   | 0.3      | cm <sup>3</sup> /h                       |
| Thermal expansion     | 6.66     | 10 <sup>-6</sup> K <sup>-1</sup> (400°C) |
| Thermal conductivity  | 15       | W/mK                                     |

Any deviation from the above tiling specification properties shall be communicated to the milling plant and PF burner Engineer in writing. A tile that does not meet the above tabled specifications shall not be bought unless permission has been given in writing by the milling plant and PF burner Engineer.

### **3.5 Applicable specifications and requirements**

The following specifications shall apply:

- ISO 13918 – Welding studs and ceramic ferrules for arc stud welding
- OHSAS 18001, ISO 18001 or a SHE management system that complies with the above.
- ISO 9001:2008 certification covering the intended scope of supply or objective evidence of a QMS that complies with ISO 9001:2008 requirements that covers the intended scope of supply.
- All bonding material, grouting and adhesives used shall be rated for a minimum operating temperature of 300°C.
- All weld-on tiles will be stud welded.
- A maximum gap of 2mm will be allowed between tiles.

### 3.6 PF pipe tiling

Tiling on the PF pipes is done on high wear areas this is usually before a bend, on the bend, after the bend, before expansion join and after the expansion joint.

- Note tiling on the PF pipes is to be done as per conditions in **section 3.2**.
- On the bends tiling is usually done for a distance of 1m before the bend, on the bend and a distance of 1m after the bend.
- The PF pipes have an approximate internal diameter of 438 mm.
- Tiling is to be done as per SOW or an engineering instruction.
- The contractor shall ensure that they conform to the ceramic lined pulverised fuel pipe work standard **240-56239143**. If any discrepancies are found the contractor shall communicate with the system engineer prior to planning for the tiling activity.
- The approximate tiling area will be based on inspection.

## 4 Records

None

## 5 Annexes

None

## 6 Figures

None

## 7 Acceptance

8 This document has been seen and accepted by:

- Raymond Rampedi
- Velaphi Vilakazi
- Nkosinathi Khumalo

## Summary of Revision Changes

| Date      | Rev. | Remarks/ Changes | Reasons                           |
|-----------|------|------------------|-----------------------------------|
| June 2026 | 01   | Updated issue    | Developed for new tiling contract |