



MATLA POWER STATION
SCOPE OF WORK

Document Identifier	14593	Rev	7
Effective Date	October 2024		
Review Date	October 2027		

PLANT AREA: Matla Power Station WTP and Slurry Plant

TITLE: Vessel and piping rubber lining services for WTP and Slurry Plant for a period of 5 years on an as and when required basis

REF: MEP-051361	Reference Rev No:1	MULTIDISCIPLINARY: Yes	Plant Level: All
COMPILED BY	Name: <i>Yatish Ramkalawan</i> Systems Engineer/End User	Signature:	Date: 04/06/2026
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REVIEWED	Name: <i>Lebo Makhene</i> Occupational Health and Safety	Signature:	Date: 08/06/2026
REVIEWED	Name: <i>Bethuel Moeng</i> Environmental Department	Signature:	Date: 05/06/2026
ACCEPTED	Name: Outage Manager/Maintenance manager	Signature:	Date:
ACCEPTED	Name: AIA	Signature:	Date:

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NB: Do not tamper with the template.

GENERAL

- Data books, reviews, reports, and diagrams/drawings shall be submitted to Engineering after the completion of the work. Engineering to forward the data books to Quality Department (Document Control)
- All QCP's to be submitted to Engineering and Quality for approval prior to outage/project or maintenance work commencement.

	SCOPE OF WORK DESCRIPTION / ACTIVITY	PROCEDURE, SPECIFICATION, ENG. REQUIREMENTS / DOCUMENTATION	HOLD POINTS, WITNESS, REPORTS	RESPONSIBLE PARTY
1.1	Occupational Health and Safety	<ul style="list-style-type: none"> • Health and safety file should be approved by Safety risk management department prior to any work commences on site • All work is to be done in accordance with OHS Act 85 of 1993, Matla plant procedures and Plant Safety Regulations. (240-150642762). • Matla power station SHEQ induction must be done before access to site can be granted • The contractor should ensure that all employees have acquired the required competency for the task they are performing. • The contractor to ensure compliance to updated legal requirements and other requirements. • BUY QUIET: All stakeholders are encouraged to purchase or rent quieter machinery, equipment, and tools to reduce worker noise exposure, contribute towards compliance 	Eskom to witness.	Contractor

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		to OHS&A noise exposure limits and ultimately reduce the risk of noise induced hearing loss.		
1.2	Environmental Management.	<ul style="list-style-type: none"> All activities listed in the National Environmental Act 107 of 1998, EIA Regulations as amended, must have environmental AUTHORISATION before commencement of work. The contractor shall comply with all applicable legal and other requirements. The polluter pays principle will be applied. The contractor manager shall ensure compliance with Eskom Matla Environmental procedures to ensure the prevention of pollution (refer: OMOP 4090 and 4402). The last payment will be processed based on the status of the last housekeeping check sheet (Annexure C: OMOP 4402) of designated area. EMS file based on ISO14001 will be required. 	Eskom to witness.	Contractor
1.3	Quality Management	<ul style="list-style-type: none"> The contractor/executioner of work will be responsible for drawing up all QCP documentation and this must be approved by engineering and authorised by the Quality Department before commencing with the work. Contractors/executioner to adhere to QM 58 and OMOP4497 requirements Number of NCR issued can affect your next tendering process. The QCP shall be signed progressively by the Engineer/Supervisor, Eskom QC Inspector, Contractor QC Inspector and/or AIA. No procuring of outage items without the approval of scopes by quality 	Hold point	Contractor

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		<ul style="list-style-type: none"> All outage scopes creep and scopes addition should be approved by quality No contractor should be in the possession of scopes for execution without the scopes approved by quality The contractor is subjected to quality auditing at any point in time during execution of scope 		
1.4	Inputs from other departments			
1.5	Commissioning reference			

SCOPE OF WORK DESCRIPTION / ACTIVITY	PROCEDURE, SPECIFICATION, ENG. REQUIREMENTS / DOCUMENTATION	HOLD POINTS, WITNESS, REPORTS	RESPONSIBLE PARTY
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1	Opening and closing of vessels and removal of vessel connecting pipework, internals and laterals and support beams and brackets, and erection of scaffolding			Eskom MMD Outside Plant
2	Rubber lining pre-inspection (Visual, hardness, and spark testing)		Hold	Contractor
3	Strip and grind off existing rubber from the affected area on the vessel wall using flapper disk			Contractor
4	Removal of rubber from pipes currently lined pipes	Method statement to be provided		Contractor
5.	Surface preparation of piping	Contractor to provide method statement		Contractor
6	Primer, adhesive and rubber lining application to piping	DN 50, 65, 80, 100, 150, 200, 250, 400 Carbon Steel Pipeline, PN10, flanged as per SANS 1123/BS4504. Pipe to be rubber lined with 4 mm 50-70 IRHD butyl Grade B Rubber Internally Pipe lengths 3, 6 or 9 m lengths. Rubber lining to comply with SANS 1198 and SANS 1201 and Eskom Standard 240-101712128 Standard for the Internal Corrosion Protection of	Hold	Contractor

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		Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings		
7	Grit blasting of vessels to SA3 (or hand grinding for smaller patch repairs)	Abrasive blast clean to Grade Sa 3 (ISO 8501-1). - For localised areas: mechanical clean to Grade St 3 (ISO 8501-1). In both cases the final surface profile shall be as specified by the rubber lining and adhesive Manufacturer's requirements.	Hold	Contractor
8	Primer, adhesive and rubber lining application to vessels and including brackets supports and internals	Rubber lining to comply with SANS 1198 and SANS 1201 and Rubber lining specification in Appendix A and Eskom Standard 240-101712128 Standard for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings. As per point 12 below and bill of material.	Hold	Contractor
9	Vessel rubber lining final inspection (Visual, hardness and spark testing)		Hold	Contractor
10	Piping rubber lining final inspection (Visual, hardness and spark testing)		Hold	Contractor

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11	Rubber lined areas shall be thoroughly washed with a hose pipe to remove loose dirt and debris.			Contractor
12	This scope of work is applicable to the following systems and their operating conditions.	<p><u>6mm Chloroprene rubber (refer to pics in appendix B)</u></p> <p>Slurry plant mixers (3 x 80m²) and AWRSE Ash water pH > 12 240 m²</p> <p><u>4mm Butyl rubber lining 50-70 IRHD</u></p> <p>Carbon Steel Piping, PN10, flanged as per SANS 1123/BS4504, NB 50, 65, 80, 100, 150, 200, 250, 400</p> <p><u>6mm pre cured Butyl rubber lining 40-70 IRHD (refer to pics in appendix B)</u></p> <p>Cation CPR Vessel (3 x 30m² per vessel) • Temperature (maximum) = 60°C</p>		Contractor

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		<ul style="list-style-type: none"> • pH = 1 - 6 • Medium = Sulphuric Acid, Concentration (6%) • Pressure = 973kPa. <p>Anion CPR Vessel (3 x 25m² per vessel)</p> <ul style="list-style-type: none"> • Temperature (maximum) = 60°C • pH = 2 - 12 • Medium = Caustic, Concentration (5%) • Pressure = 973kPa. <p>Demin Storage CPR Vessel (3x 25m² per vessel)</p> <ul style="list-style-type: none"> • Temperature (maximum) = 60°C. Operating = 25°C. • pH = 7 • Medium = Demineralised Water. • Pressure = 973kPa. <p>Demin Cation Vessel (3 x 80 m² per vessel)</p> <ul style="list-style-type: none"> • Temperature (maximum) = 60°C • pH = 1 - 6 • Medium = Sulphuric Acid, Concentration (8%) 		
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		<ul style="list-style-type: none"> • Pressure = 600kPa. <p>Demin Strong base Anion Vessel (3 x 60m² per vessel)</p> <ul style="list-style-type: none"> • Temperature (maximum) = 60°C • pH = 2 - 12 • Medium = Caustic, Concentration (8%) • Pressure = 600kPa. <p>Demin Weak base Anion Vessel (3 x 45m² per vessel)</p> <ul style="list-style-type: none"> • Temperature (maximum) = 60°C • pH = 2 - 12 • Medium = Caustic, Concentration (8%) • Pressure = 600kPa. <p>Demin Mixed Bed Vessel (3 x 40m² per vessel)</p> <ul style="list-style-type: none"> • Temperature (maximum) = 60°C • pH = 1 - 12 • Medium = Caustic, Concentration (8%) & Sulphuric Acid, Concentration (8%) 		
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		<ul style="list-style-type: none"> • Pressure = 600kPa. <p>Demin Hot Water Tank (1 x 45m²)</p> <ul style="list-style-type: none"> • Temperature = 100°C • Medium = Demin water • Pressure = 375kPa • pH = 7 <p>CPP Hot Water Tank (1 x 30m²)</p> <ul style="list-style-type: none"> • Temperature = 100°C • Medium = Demin water • Pressure = 375kPa • pH = 7 <p><u>4.8mm precured butyl rubber lining Grade B 50 – 70 IRHD (Refer to pics in appendix B)</u></p> <p>Ammonium Hydroxide Dilution Tanks (2 x 70m² per vessel)</p> <ul style="list-style-type: none"> • Ammonium Hydroxide Solution 2% Concentration 		
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		<ul style="list-style-type: none"> • pH 11 • Design Pressure – Atmospheric • Design Temperature - Ambient – 30°C <p>CPP vessels (18 x 25m² per vessel)</p> <ul style="list-style-type: none"> • Medium: Demineralised (Condensate) Water • pH: 9 • Design Temperature: Ambient to 60 °C • Design Pressure: 1200 kPa 		
13	Removal and disposal of all waste rubber lining and sand blasting grit and provide the waste disposal certificate/s			Contractor
14	Eskom warrants to be able to rubber lining any quantities of the pipelines or vessels listed in the SOW, or any other rubber lining that may be required on site, up to the total value of the contract, utilising the bill of materials.	Eskom warrants to be able to rubber lining any quantities of the pipelines or vessels listed in the SOW, or any other rubber lining that may be required on site, up to the total value of the contract.		

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BILL OF MATERIAL

	Full description of Material/Spares/Equipment	Specifications of Material/Spares/Equipment	Stock No	Part Number	Required Quantity
1	Vessels Full/partial/patch repair rubber lining including primer and adhesives	Pre-cured Butyl Rubber Lining (Grade B): 50 - 70 IRHD, 6mm	N/A	N/A	140m2 (quote per metre square)
2	Vessels Full/partial/patch repair rubber lining including primer and adhesives	Pre-cured Butyl Rubber Lining (Grade B): 50 - 70 IRHD, 4.8mm	N/A	N/A	120m2 (quote per metre square)
3	Vessels Full/partial/patch repair rubber lining including primer and adhesives (Slurry plant mixers and AWRSE tank)	Chloroprene Rubber Lining 6mm	N/A	N/A	240m2 (quote per metre square)
4	Vessels rubber lining for brackets and supports including primer and adhesives	Pre-cured Butyl Rubber Lining (Grade B): 50 - 70 IRHD, 2-3mm	N/A	N/A	26m2 (quote per metre square) *
5	Vessels rubber lining for brackets and supports including primer and adhesives (Slurry plant mixers and AWRSE)	Chloroprene Rubber Lining 2-3mm	N/A	N/A	24m2 (quote per metre square) *
5	Vessel grit blasting	SA 3 (ISO 8501-1), Dust quality rating 1, Blast profile as per rubber system manufacturers recommendations			500m2 (quote per metre square)
6	Vessel hand grinding for (rubber patch repairs)	Grade St 3 (ISO 8501-1),			500m2 (quote per metre square)
7	Piping rubber removal				500m2 (quote per m2)

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8	DN 80 Carbon Steel Rubber Lined Pipeline, PN10, flanged as per SANS 1123/BS4504. Pipe to be rubber lined with 4 mm 40 Shore A butyl Grade B Rubber Internally 3/6.9 m length.	4mm butyl rubber, 40 Shore A			125m (Quote per metre)
9	DN 65 Carbon Steel Rubber Lined Pipeline, PN10, flanged as per SANS 1123/BS4504. Pipe to be rubber lined with 4 mm 40 Shore A butyl Grade B Rubber Internally 3/6.9 m length.	4mm butyl rubber, 40 Shore A			125m (Quote per metre)
10	DN 50 Carbon Steel Rubber Lined Pipeline, PN10, flanged as per SANS 1123/BS4504. Pipe to be rubber lined with 4 mm 40 Shore A butyl Grade B Rubber Internally 3/6.9 m length.	4mm butyl rubber, 40 Shore A			125m (Quote per metre)
11	DN 100 Carbon Steel Rubber Lined Pipeline, PN10, flanged as per SANS 1123/BS4504. Pipe to be rubber lined with 4 mm 40 Shore A butyl Grade B Rubber Internally 3/6.9 m length.	4mm butyl rubber, 40 Shore A			125m (Quote per metre)
12	DN 150 Carbon Steel Rubber Lined Pipeline, PN10, flanged as per SANS 1123/BS4504. Pipe to be rubber lined with 4 mm 40 Shore A butyl Grade B Rubber Internally 3/6.9 m length.	4mm butyl rubber, 40 Shore A			125m (Quote per metre)
13	DN 200 Carbon Steel Rubber Lined Pipeline, PN10, flanged as per SANS 1123/BS4504. Pipe to be rubber lined with 4 mm 40 Shore A butyl Grade B Rubber Internally 3/6.9 m length.	4mm butyl rubber, 40 Shore A			125m (Quote per metre)
14	DN 250 Carbon Steel Rubber Lined Pipeline, PN10, flanged as per SANS 1123/BS4504. Pipe	4mm butyl rubber, 40 Shore A			125m (Quote per metre)

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	to be rubber lined with 4 mm 40 Shore A butyl Grade B Rubber Internally 3/6.9 m length.				
15	DN 400 Carbon Steel Rubber Lined Pipeline, PN10, flanged as per SANS 1123/BS4504. Pipe to be rubber lined with 4 mm 40 Shore A butyl Grade B Rubber Internally 3/6.9 m length.	4mm butyl rubber, 40 Shore A			125m (Quote per metre)
16	Piping Pick up and delivery to and from site	10 ton per load flatbed			50 collection and deliveries
17	Vessel rubber lining pre-inspections	Visual, hardness and spark testing.			10 vessels
18.	Stripping of rubber from inside vessels				500m2 (quote per metre square)

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SCOPE COMPILATION REFERENCES				
SOURCE & Ref No.	Yes	No	N/A	Comments
Previous outage service reports				
Return to service data packages				
Maintenance Strategy with Rev number				
SAP defects (attach list as appendix)				
GHRMS (STEP) reports (Generation Heat Rate Management System)				
Online Condition Monitoring				
Pre-outage performance test results				
Post outage performance test results				
GPSS/ Plant Performance data on UCLF incurred				
OMS / IIRMS recommendations (Audits Reports)				
Risk controls (IRM system)				
Previous audits and reviews (e.g. ERAP)				
Engineering Change Requests (Projects)				
LOPP strategy reports				
URS				

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Philosophy (Outage)				
Condition Monitoring Report				
VA/PHD Viewer trends				
Corrective Actions				
CARAB reports				
Statutory Requirements				
Grid code requirements				
Waivers and Exemptions				
Calibration requirements				
Previous Outage SOW variations				
Post Mortems Actions from previous outages				
Pre-Outage plant walks				
Risk based inspection (RBI) report				
Simulation, TOIs, OON, SI				

COMMENTS

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ATTACHMENTS: DRAWINGS, SKETCHES, DIAGRAMS, INSTRUCTIONS, etc	
1	
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Appendix A – Vessel Rubber lining Specification

1. Background

To account for various conditions, two options such as rubber lining patch repairs or complete rubber lining replacement are considered in this document.

Rubber lining inspections shall be carried out by the Contractor and Eskom representative and thereafter inspection findings shall be documented. Based on the inspection findings, Eskom with recommendations from the Contractor, will decide upon the suitable rubber lining option (either rubber lining patch repairs or complete replacement).

Option 1 - Rubber Patch Repairs

Assess the condition of the existing rubber lining through detailed visual inspection and pin-hole detection testing (no more than 3 kilovolts per mm). Identify and mark-up the defects or the areas requiring the repairs.

The Contractor shall compile a rubber patch repair procedure and submit to Eskom for approval. As a minimum, the repair procedure shall include the following:

Pin-hole detection testing on the existing rubber lining.

- Cutting out, stripping and removal of the existing rubber in the marked-up areas as per the above inspections.
- Surface preparation of the substrate after removal of the existing rubber. For smaller areas to be patch repaired where abrasive blast cleaning is impractical, the Rubber Liner or Contractor shall propose a suitable cleaning method. The cleaning method shall be submitted to Eskom for review and approval before commencement of the work.
- Provision shall be made for mechanical repairs i.e. welding and grinding where necessary before new rubber patch repairs. The Contractor shall propose substrate repair procedures and submit these to Eskom for approval.
- Care shall be taken during welding and surface preparation to protect the remaining rubber lining from any damage such as mechanical damage, welding/grinding sparks, and welding spatter.
- Once the mechanical repairs and surface preparation are completed then conduct rubber lining patch repair of the affected areas. The total surface area to be rubber lined will be determined by inspection.

Option 2 - Complete Rubber Lining Replacement

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After inspection step in option 1 is completed and inspection findings documented; if the damage covers a large surface area, Eskom with recommendations by the Contractor will decide on complete rubber replacement.

- The Rubber Liner or Contractor shall remove most of the existing rubber lining by initial removal techniques such as cutting out, stripping and flapper disc grinding.
- Subsequent surface preparation shall be by means of abrasive blast cleaning method.
- After the old rubber lining is removed and initial surface preparation is completed, a detailed visual inspection shall be carried out to check for defects of the substrate surface. Where necessary mechanical repairs i.e. welding and grinding shall be carried out before new rubber is installed. The Contractor shall propose substrate repair procedures and submit these to Eskom for approval. The procedure shall be agreed by both parties before commencement of work.
- Corrosion Protection shall only proceed once all mechanical or welding activities on the vessels have been completed and released in terms of the applicable mechanical repair Quality Control Plan (QCP).

2 Specific Project Requirements

2.1 To enable proper inspection as detailed in section 1 above the vessels need to be emptied and all components that are removable shall be removed from the vessel. These components include but are not limited to the laterals, nozzles and distribution pipes.

2.2 Based on the inspection findings it might be necessary to conduct repairs on the vessel before corrosion protection application therefore provision shall be made for mechanical repairs i.e. welding and grinding.

2.3 For these mechanical repairs, it is strongly recommended that the appropriate engineering subject matter experts (welding engineers and NDT subject matter experts) are consulted. The engineering experts in consultation with the Rubber Liner or Contractor and Lining Manufacturer shall compile substrate repair procedures for the works and submit to Eskom for review and approval.

2.4 The Eskom standard 240-101712128 (Section 5 in particular), SANS 1201, SANS 1198 and BS 6374-5 shall apply for the manufacture, selection and installation of rubber lining. The Rubber Liner/ Contractor to take note of the selected type of rubber required in the table above. NOTE: Special Requirements as per SANS 1198, Table 4, Property Column (Special points (I), (III), (V) and (VI)) shall apply.

2.5 The type of rubber for lining shall be one of those given in SANS 1198, as specified by the Rubber Liner, to meet Eskom's requirements namely Pre-cured Butyl rubber (Grade B with 40-70 IRHD) or possibly Grade C strictly based on the requirements in the tables at the top of this document. Only Grade B rubber will be considered at tendering stage.

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2.6 All components in the vessel shall be rubber lined except components constructed from stainless steel or plastic. These components include distribution pipes and nozzle plates. As part of the method statement the Contractor shall consider and propose steps and measures to ensure a leak tight seal between the nozzles and nozzle plate. The measures shall describe how the rubber lining will be applied to the nozzle plate to ensure the rubber is completely flat to facilitate nozzle assembly. The rubber lining on the nozzle plate shall serve a dual purpose of corrosion protection and as a gasket.

2.7 The rubber lining thickness of 6 mm is specified for the shell and 3mm for the beams on condition that this thickness is suitable for the flange arrangement and eventual fitment/re-assembly in terms of existing piping/flange length and alignment. The Rubber Liner or Contractor shall confirm the specified thickness as satisfactory for the application.

2.8 The rubber lining Manufacturer, adhesive Manufacturer and Rubber Liner or Contractor shall select relevant primer and or adhesive system for the type of rubber lining material, substrate and service conditions to ensure compatibility.

2.9 All parts comprising systems i.e. Rubber Lining , in this specification sheet, shall be supplied by the same Manufacturer. Should this not be possible the coating/rubber lining Supplier shall confirm suitability or compatibility of the particular product with his system.

2.10 The solvents used shall be those recommended and manufactured by the Coating Manufacturer. Where the recommended 'solvent' and 'clean-up thinners' for a material differs, the 'clean-up' solvent must not be added to the paint for dilution purposes.

2.11 Surface preparation by abrasive blasting shall be performed by means of blasting equipment capable of removing remaining/residual rubber, rust and suitably preparing the substrate to the required cleanliness of Grade Sa 3 or Sa 2.5 as specified for the internal or external surfaces.

2.12 The requirement for surface preparation of all metallic surfaces for immersion is strictly Grade Sa 3 (ISO 8501-1), in which case the surfaces shall be blast cleaned to white metal where all traces of rust, mill scale and other foreign matter are removed.

2.13 Power and hand tool cleaning is only applicable to the external surface and for localised patch repairs. Hand-tool cleaning for isolated/localised areas may be utilised provided the required standard of finish is achieved. For all external applications and internal patch repair applications final mechanical cleaning shall be by bristle blaster in order to create a surface profile.

2.14 Cleaning by means of hand or power-tools, i.e. wire brushes, chipping hammers, scrapers, grinders, sanders, needle descalers, bristle blasters etc. may only be used where accepted by the Eskom Engineer and where the position and condition of the substrate metal is such that efficient cleaning and surface profile can be achieved.

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2.15 Burnishing of the surface shall not be permitted.

2.16 In all cases, after wire brushing or grinding, all traces of loose material shall be removed from the surface by vacuum cleaning. Cleaned surfaces shall not be contaminated with oil, grease, rust or other deposits before primer application.

2.17 After tender award the Manufacturer shall supply batch certificate for each of the lining/ products. Specifically for rubber lining all tests, parameters, and results shall be as per the requirements of SANS 1198 Table 4. These tests shall be conducted as per SANS 1198 by an ISO 9001 certified independent laboratory. These test results or certificates shall be submitted to Eskom after tender award and before commencement of work to verify mechanical and chemical properties in the product data sheets.

2.18 After tender award and prior to project execution the Manufacturer shall submit test samples of the lining system as proposed in the tender submission. Two samples shall be required for reference purposes. The samples (substrates) shall be prepared as per the requirements of the Manufacturer's datasheet and in compliance with the requirements of this standard. The size of the test sample panels shall be (200 mm X 300 mm X 3 mm), with a rubber lining thickness of 4.6/6 mm as per the vessel being lined. The lining shall be cured as would be in practical situations without any artificial assistance. The Manufacturer shall supply the relevant batch certificate for each of the lining products used in the submitted test sample panels.

2.19 In addition to the panel samples above, representative (considering different batches), loose rubber sheeting 500 mm X 500 mm, with a rubber lining thickness of 4.8/6 mm, as per the vessel being lined, shall be submitted for tensile testing to ensure conformity to SANS 1198.

2.20 Specifically for the tensile testing, specimens shall be prepared as per SANS 10037 "Type 1 Dumb-bell". The Rubber Liner or Manufacturer shall provide written commitment to this requirement at the tender stage.

2.21 During rubber lining of the vessels the Rubber Liner shall prepare (200 mm X 300 mm X 3 mm) test panels with a rubber lining thickness of 4.8/6 mm, at the same time and under the same conditions as the vessels. The prepared test panels shall be sent to Eskom for adhesion/peel testing as per the requirements of SANS 1201 section 9.4.

2.22 Corrosion protection shall only proceed once all mechanical repairs or activities i.e. cutting and welding have been completed and released in terms of the fabrication Quality Control Plan (QCP). And under no circumstances shall this work be performed until the corrosion protection QCP and Method Statement have been accepted by the Eskom Engineer.

3 General Requirements

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3.1 Sharp edges shall be dressed to a radius of not less than 3 mm. All burrs and weld spatter shall be removed. Welds shall be free from imperfections (e.g. asperities, undercutting, blowholes, craters, and spatter).

3.2 Weld beads with a surface irregularity exceeding 3 mm or with sharp crests having a radius less than 3 mm shall be ground.

3.3 All welds shall be free of slag, inclusions and pinholes. Adjacent areas shall be free of weld spatter, which shall be removed by grinding or scraping.

3.4 All surfaces shall be completely dry and free from contaminants such as traces of oil, grease, etc., before surface preparation is carried out.

3.5 After initial blasting of representative patches soluble salt testing shall be performed by the Bresle soluble salt test method. If not within acceptable limits (as per the Manufacturer requirement but not exceeding 100 mg/m²), the surfaces shall then be washed/decontaminated by High Pressure (HP) water washing using fresh/clean water (with a conductivity reading of maximum 100 µS/cm) at a minimum pressure of 300 bar. A salt decontamination chemical additive with demonstrated capability of removing salts may be used in conjunction with HP cleaning.

3.6 Soluble salt testing shall be repeated on representative test patches and if acceptable then proceed with blasting and application steps – if not then repeat HP washing until the salt contamination has been removed to within acceptable limits.

3.7 Prior to any surface preparation all surfaces that are or are likely to be contaminated with oil or grease shall be solvent cleaned with a suitable water-soluble biodegradable alkaline cleaner/detergent or with appropriate organic solvents.


3.8 Cleaning may be performed by using rags for small areas, or a spray gun for large areas. The detergent/solvent-cleaned surfaces shall then be thoroughly washed down with fresh/clean water ensuring that the oil-water emulsion formed is completely removed from the metal. Special attention shall be paid to drillings, bolt holes, etc.

3.9 Degreased and water washed surfaces shall be checked for residual oil and grease using the atomized water spray test as per ASTM F21 and further degreasing shall be carried out if residual oil or grease is found to be present. In instances where there is no or poor natural lighting then the interpretation of the ASTM F21 shall be assessed by means of ultraviolet light i.e. back light.

3.10 A black light test shall be used to check for oil contamination. Zero oil and grease contamination are the acceptable limit. Washing with fresh/clean water containing a suitable degreasing agent of partially painted components shall take place between coats, if surfaces are found to be contaminated.

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3.11 During the corrosion protection process on site care shall be taken to ensure adequate protection of the surrounding areas and any parts of the ancillary equipment i.e. pumps, filters, valves seats, drains, inlet and outlet piping from abrasive blasting and spent grit particles, paint.

3.12 No abrasive blasting or lining applications shall take place when conditions are likely to affect these operations. Clauses 4.1.1.2 to 4.1.1.5 of BS 6374-5 shall apply.

3.13 Different grades and types of blasting media exist. It is important that the correct abrasive be used in combination with a specific corrosion protection system to achieve the specified surface profile. The required blast profile height should be carefully considered. The Contractor shall select an appropriate abrasive type and mesh size to attain the specified surface profile.

3.14 Only inert mineral grit or steel grit abrasives shall be used. Sand or silica-based abrasives shall not be used. Abrasive material for blast cleaning shall be used in line with local environmental regulations.

3.15 The abrasive shall be used in accordance with the Manufacturer's specifications and shall be clean, sound, hard particles free from foreign substances such as dirt, oil, grease, toxic substances, organic matter and water-soluble salts. It is important that good quality abrasives are used to minimize the amount of waste grit and dust generated and contamination of the surfaces.

3.16 The use of re-cycled blasting media for the final blast is strictly prohibited.

3.17 All abrasive media shall be stored in an area that is completely dry, covered and protected from weather.

3.18 All compressed air for blasting and /lining activities shall be free from entrained moisture and oil. All traps shall be in a functional condition. The compressed air shall be tested at regular intervals using clean white clothes to assess cleanliness and dryness. This requirement shall be included in the QCP.

3.19 On completion of grit blasting the surface shall be thoroughly vacuumed until no loose dust is evident. The process shall be repeated until the required level of dust and debris removal is achieved.

3.20 The level of cleanliness required shall be less than "dust quality rating" 1 when tested in accordance with ISO 8502-3. It is imperative that all surface dirt and contaminants are completely removed before lining or the adhesion of the lining shall be impaired.

3.21 During the corrosion protection process on site care shall be taken to ensure adequate protection of the surrounding areas and any parts of the ancillary equipment i.e. pumps, filters, valves seats, drains, inlet and outlet piping from abrasive blasting and spent grit particles, paint.

3.22 Cleaned surfaces shall not be contaminated with oil, grease, rust or other deposits before coating application. Unnecessary traffic prior to painting/lining shall be avoided.

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3.23 The Contractor shall ensure that during surface preparation and corrosion protection activities the relative humidity (RH) in open, undercover shop environments is less than 80 % RH and for the vessel internal space is less than 60% RH. Ambient temperatures shall be between 5 °C and 30 °C or as per the Manufacturer recommendations, whichever is the more stringent. The maximum/minimum substrate temperature at the time of coating application shall be strictly in accordance with the product data sheet. During stable weather conditions environmental parameters shall be measured and recorded at least 4 times per shift.

3.24 During periods of inclement or cold weather conditions the environmental parameters shall be measured and recorded hourly. If the latest two readings of any of the parameters indicate a deteriorating trend which would likely exceed parameter/s limit then no final surface preparation or spray application shall be permitted. All measurements shall be recorded at the steel surface. Dew point requirements shall be as per the Product Datasheet or Eskom standards 240-101712128 and 240-106365693.

3.25 To avoid recontamination and flash rusting of the surfaces, the primer shall be applied within 8 hours after final surface preparation of the steel surfaces. Under no circumstances shall the blast be permitted to stand overnight.

3.26 If the pre-cleaned substrate has been exposed for more than 8 hours or the cleanliness grade of the substrate has deteriorated then the substrate will require rework to reinstate the required grade of cleanliness in accordance with ISO 8501-1.

3.27 Individual rubber sheets shall be tailored to fit the surface to be lined. The lining shall be bonded to the manhole flange faces. The mating surface of the flange face to gasket shall be suitably dressed such that the face is acceptably flat to ensure sealing between the liner and the gasket. The application and flange arrangement shall be as per SANS 1201 Figure 7 a) or c) and the Eskom Engineer requirements.

3.28 All joints of lined rubber shall be strapped as per BS 6374-5.

3.29 All surfaces shall be pinhole tested before strapping with the testing starting from the top of the vessel downwards as the scaffolding is being dismantled to ensure the lining is pinhole free and if required additional repairs shall be performed and once cured then the repair areas shall be retested. The process to be repeated until a pinhole free lining is achieved.

3.30 The rubber lining Manufacturer and Rubber Liner or Contractor shall specify the test voltage and the length of spark (no less than 2 kilovolts per mm). If the rubber Manufacturer cannot comply then a detailed motivation describing the reasons why this requirement can't be met shall be submitted for review, acceptance or rejection

3.31 The installed lining shall present a smooth appearance and be free of voids, blisters, pinholes, cracks, open seams, entrapped air or any other defects which will impair its use. Defective areas shall be cause for rejection of the lining.

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3.32 For all inspections of all surface preparation and coating/lining activities the surfaces shall be clean allowing unhindered visual access to the surface. The Contractor shall provide sufficient and adequate lighting (Cool White) to enable inspections. Cell phone lighting is not acceptable

3.33 Prior to commencement of rubber lining/coating the Applicator shall submit detailed repair procedures in accordance with BS 6374-5. Any defects such as mechanical damage, cuts, blisters, lack of adhesion and poor joints shall be marked up and repaired according to BS 6374-5 Clause 5.2.4.

3.34 Application of subsequent coats shall be in accordance with the specified system. The required over-coating intervals as mentioned in the latest Product Data Sheet shall be observed and adhered to.

3.35 The supply and cost of all testing, inspection and specialized testing equipment shall be the Contractor’s responsibility. QC shall be performed by the Applicator and the Quality Assurance inspection shall be conducted by Eskom. A series of witness and hold points shall be agreed such that Eskom may witness any of the above tests. Eskom may elect to carry out its own tests at these times.

4 Safety Requirements and Considerations

4.1 During the application of all coatings/lining systems, care shall be taken to ensure adequate ventilation and lighting, to avoid/minimise health and safety risks.

4.2 Special care needs to be taken when working with all organic coatings/linings. Prior to the use of any coating material, the Material Safety Data Sheets shall be obtained from the relevant Coating Manufacturer.

4.3 A confined spaces (CSs) may be defined as an enclosed, restricted, or limited space in which, because of its construction, location or contents, or any work activity carried on therein, a hazardous substance may accumulate and/or an oxygen-deficient atmosphere may occur, and/or in which a dangerous liquid or dangerous concentration of gas, vapour, dust or fumes may be present. It includes any chamber, tunnel, pipe, pit, sewer, container, valve, pump, sump, chute, bunker, silo, gearbox, tank, receiver, drum or any similar construction, equipment, machinery or object.

4.4 Flammable Atmospheres: Gases, vapours and dusts can become trapped in CSs and create flammable or explosive atmospheres, and include combustibles e.g. Hydrogen, Acetylene, Rubber and thinning/cleaning solvents, etc.

4.5 The Contractor shall be familiar with the contents of the safety data sheets and ensure that the necessary safety precautions are taken in order to comply with local and national safety and health requirements such as the OHS Act.

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4.6 Any solid waste materials or liquids stripped or generated during the coating operations shall be discarded in accordance with the requirements of the appropriate national and/or local authorities or the requirements of Eskom.

4.7 The Contractor shall ensure compliance with all statutory regulations, municipal by-laws, etc. concerning pollution and the health and safety of personnel and/or members of the public who may be affected by the work. The Contractor shall provide the personnel with the appropriate required PPE.

4.8 The Contractor shall advise Eskom of all hazardous materials to be brought on site.

4.9 The Contractor's Safety File shall address all the hazardous activities of abrasive blast cleaning and spray painting. The Contractor shall verify that the personnel carrying out these activities are suitably qualified.

4.10 The Contractor shall ensure that the abrasive materials used conform to all National Health and Safety Standards.

4.11 All materials shall be stored in designated areas in storage facilities that meet the storage requirements of the coating/rubber Manufacturer. The Contractor shall be responsible for the provision of appropriate storage/shipping containers as required. These containers shall include the appropriate refrigeration/conditioning systems for temperature control. This requirement shall be dependent on where the container will be located (indoors/outdoors), typical ambient temperature for the particular season of the year and the maximum storage temperature limits as per the Manufacturer's recommendations.

4.12 The Contractor shall provide for all necessary safety precautions and risk assessments.

5 Reference Documents

The latest revision of the referenced standards shall apply. Where conflict exists between any of these documents the more stringent requirement shall apply.

5.1 240-101712128: Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Coatings.

5.2 240-106365693: Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings.

5.3 240-145581571: Standard for the Identification of the Contents of Pipelines.

5.4 ASTM D4414: Standard practice for measurement of wet film DFT by notch gauges.

5.5 ASTM D4541: Standard Method for Pull-off Strength of Coatings using Portable Adhesion Testers.

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5.6 ASTM D5162: Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates.

5.7 ASTM E376: Measuring coating DFT by magnetic field or eddy current electro-magnetic test Methods.

5.8 ASTM F21: Standard Test Method for Hydrophobic Surface Films by the Atomizer Test.

5.9 BS 6374-5: Lining of equipment with polymeric materials for the process industries.

5.10 ISO 2409: Paints and varnishes – Cross cut test

5.11 ISO 4624: Paints and varnishes – Pull-off test for adhesion.

5.12 ISO 4628 – 1: Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 1: General introduction and designation system.

5.13 ISO 4628 – 3: Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 3: Assessment of degree of rusting.

5.14 ISO 8501-1: Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.

5.15 ISO 8502-3: Preparation of steel substrates before application of paint and related products – Test for the assessment of surface cleanliness – Part 3: Assessment of dust on steel surfaces prepared for painting (pressure sensitive tape method).

5.16 ISO 8502-6: Preparation of steel substrates before application of paint and related products – Test for the assessment of surface cleanliness – Part 6: Extraction of soluble contaminants for analysis – The Bresle method.

5.17 ISO 8503-4: Preparation of steel substrates before application of paint and related products – Surface roughness characteristics of blast-cleaned steel substrates - Part 4: Method for the calibration of ISO surface profile comparators and for the determination of surface profile – Stylus instrument procedure. (May be used as an alternative to SANS 5772).

5.18 ISO 9001: Quality Management Systems - “is defined as the international standard that specifies requirements for a quality management system (QMS). Organizations use the standard to demonstrate the ability to consistently provide products and services that meet customer and regulatory requirements.”

5.19 ISO 9223: Corrosion of metal and alloys – Corrosivity of atmospheres – Classification.

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5.20 ISO 12944-3: Paint and varnishes – Corrosion protection of steel structures by protective paint systems. Part 3: Design considerations.

5.21 SANS 1198: The manufacture of rubber sheeting for rubber lining.

5.22 SANS 1201: The application of rubber linings to pipes, pipe fittings and vessels.

5.23 SANS / ISO 2808: Paints and Varnishes: Determination of film DFTs (Can be used as alternative to ASTM E376).

5.24 SANS 5770: Preparation of steel substrates before the application of paints and related products – Test for the assessment of cleanliness of blast-cleaned steel surface – Freedom from certain soluble salts.

5.25 SANS 5772: Preparation of steel substrates before the application of paints and related products – Surface roughness characteristics of blast-cleaned steel surfaces – Profile of blast-cleaned surfaces determined by a micrometre profile gauge (Can be used as alternative to ISO 8503-4).

5.26 SANS 10037: Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties

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Appendix B – Drawings

Slurry plant mixers

ORIENTATION OF NOZZLES FOR TANK MK1
FOR TANK TOPS MK 2 & 3 REFER C11397/01/1 to 2 REV H

MIXER SPECIFICATION		TANK INFORMATION	
MODEL TYPE	SERIES 2000	TANK SIZE	3600 x 725 H
MODEL NO	2295	TOP FLAT	ROTORUM FLAT
POSITION	TOP CENTRE	BAFFLES	30" 120 WIDE
KW RATING	20.3	MIN TANK VENTING RECD	500V
OUTPUT S D	48 RPM	SEALING	VAPOUR SEAL
SERVICE FACTOR	1.85	TYPE	BUSH & PIPE PACKING
SERIAL NO	2000-237/8/9	PRESSURE	ATMOS
NUMBER OF UNITS	3	TEMPERATURE	60° C
CLIENTS ORDER NO	2243-0331	TANK LOADS	
CLIENTS TAG NO		MIXER MASS	822 K
		BENDING MOMENT	1251 Nm
		TORQUE	1771 Nm
MOTOR DETAILS		TANK CONTENTS	
MOTOR KW	11	PRODUCT	PFA SLURRY
MOTOR VOLTAGE	380	S G	1.38
MOTOR ENCLOSURE	IP55	WETTED PARTS	
FRAME SIZE	DXX 160 MD	GLAND SEAL HOUSING	
MOUNTING	V1	CAST IRON	
SPEED	1445 RPM	COUPLING	
SUPPLIED BY	MIXTEC	CAST IRON	
OTHER INFORMATION		SHAFT	
MIXER	DCS 1551	TURBINES	
MOTOR	DCS 1551	ROGLAST	
PAINTING TO SPEC	NO 9 (AGITATOR)	NOTE	
PACKING		TESTING	
TESTING	SHOP RUN		

PARTS LIST

- (A) ELECTRIC MOTOR 11kW 380V
- (B) GEARBOX 48RPM
- (C) CAST IRON MOUNTING STOOL
PART NO C11397/01/02
- (D) CAST IRON COUPLING
PART NO C11397/01/03
- (E) CAST IRON GLAND PLATE & FOLLOWER
PART NO'S C11397/01/04 & 05
- (F) TANK TOP
PART NO T1 OR T2
- (G) AGITATOR SHAFT
PART NO C11397/01/06
- (H) 1220 x 45° PITCHED BLADE TURBINE ROGLAST BOLTED BLADES
PART NO C11397/01/07
- (J) 180° x HYDRO OIL FLARED 10° ROGLAST BOLTED BLADES
PART NO C11397/01/08
- (K) TANK
PART NO C11397/01/01
- (L) 8 THK ROGLAST

NOTES

- FOR AGITATOR ARRANGEMENT SEE C11397/01/12
- FOR MANWAY DAWL DETAILS SEE C11397/01/01 to 2 REV H
- 6mm THK RUBBER LINING TO CORROTECH SPEC KERAPREN NS

MOD #	DATE	BY	CHK	DESCRIPTION
1	31/7/90	JHN	RWK	UNDERFLOW BAFFLE EXTENDED
2	25/10/90	JHN	RWK	ORDER NO ADDED
3	16/01/90	JHN	RWK	ORDER NO ADDED
4	28/9/90	JHN	RWK	ITEM L ADDED
5	10/6/92	JHN	RWK	ITEM L ADDED
6	10/6/92	JHN	RWK	ITEM L ADDED
7	3/22/93	JHN	RWK	ORIENTATION & NOTES ADDED

ESKOM CONTRACT NO: 0F012092
 ESKOM ORG NO: 0-474-0301
 ST FULLER CONTRACT NO: 2243-0331
 ST FULLER ORG NO: 070-90-6-0035

MIXTEC C.C.
 P.O. Box 8220
 EDEN GLEN 1613

PROJECT: MATLA PS NEW ASH HANDLING PLANT
 TITLE: ARRANGEMENT OF PFA MIXING TANK AND AGITATOR
 DRAWING NUMBER: C 11397/01 REV F

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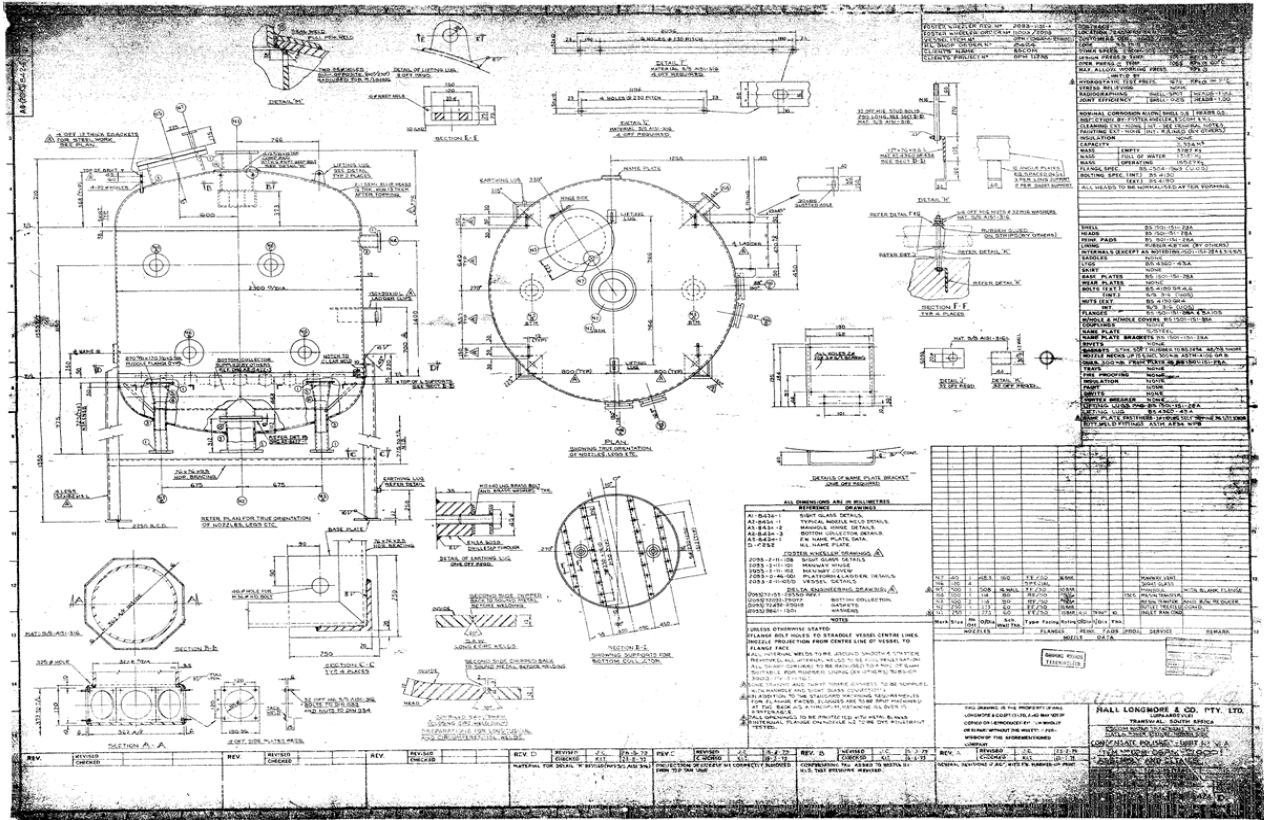
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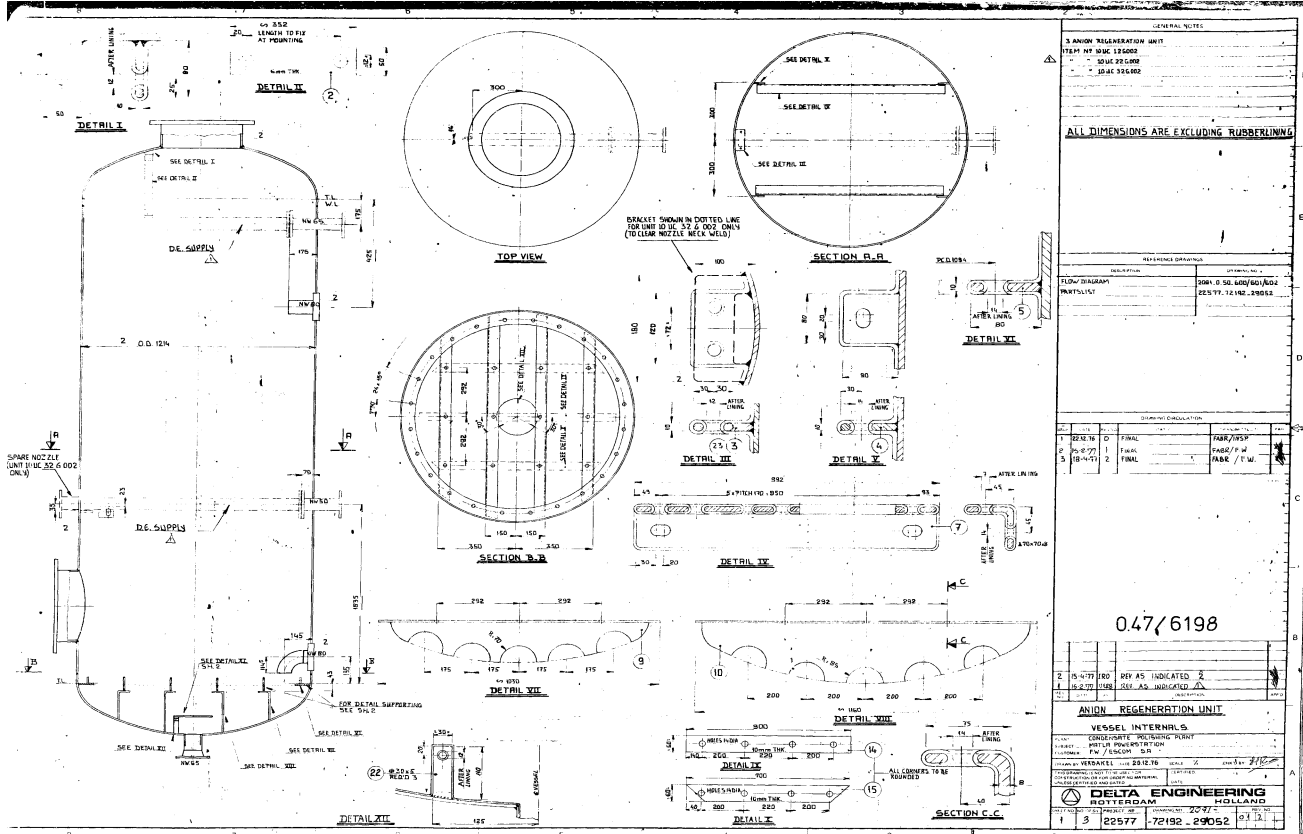
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CPR Anion



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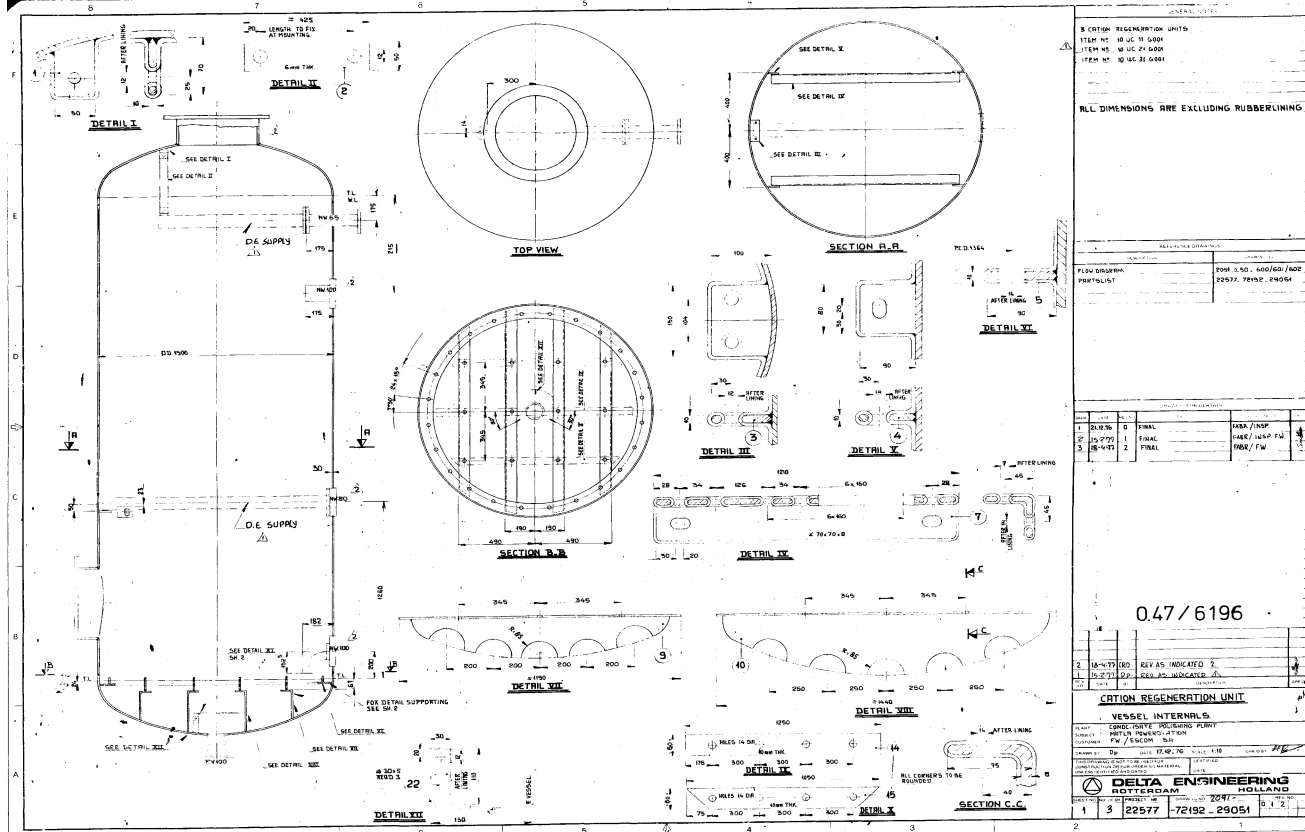
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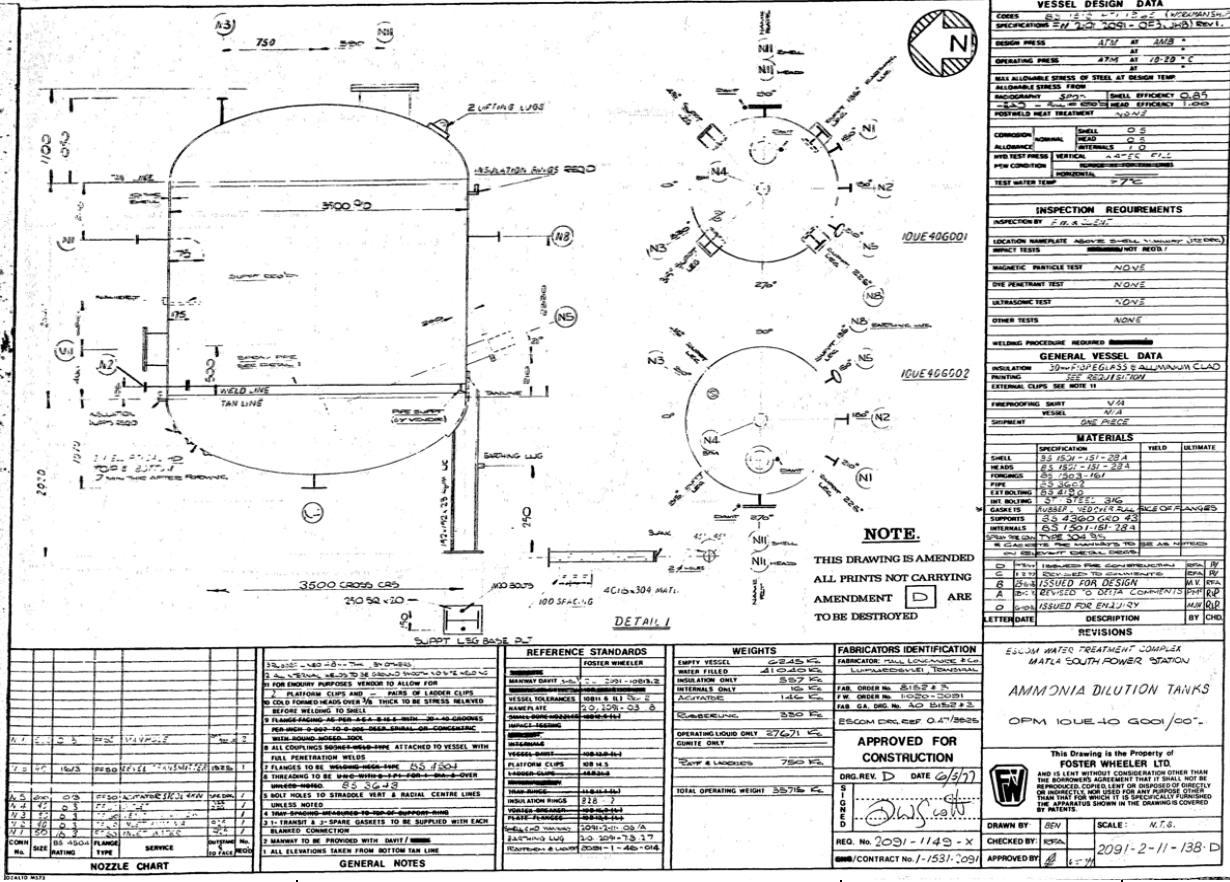


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Ammonia dilution tanks



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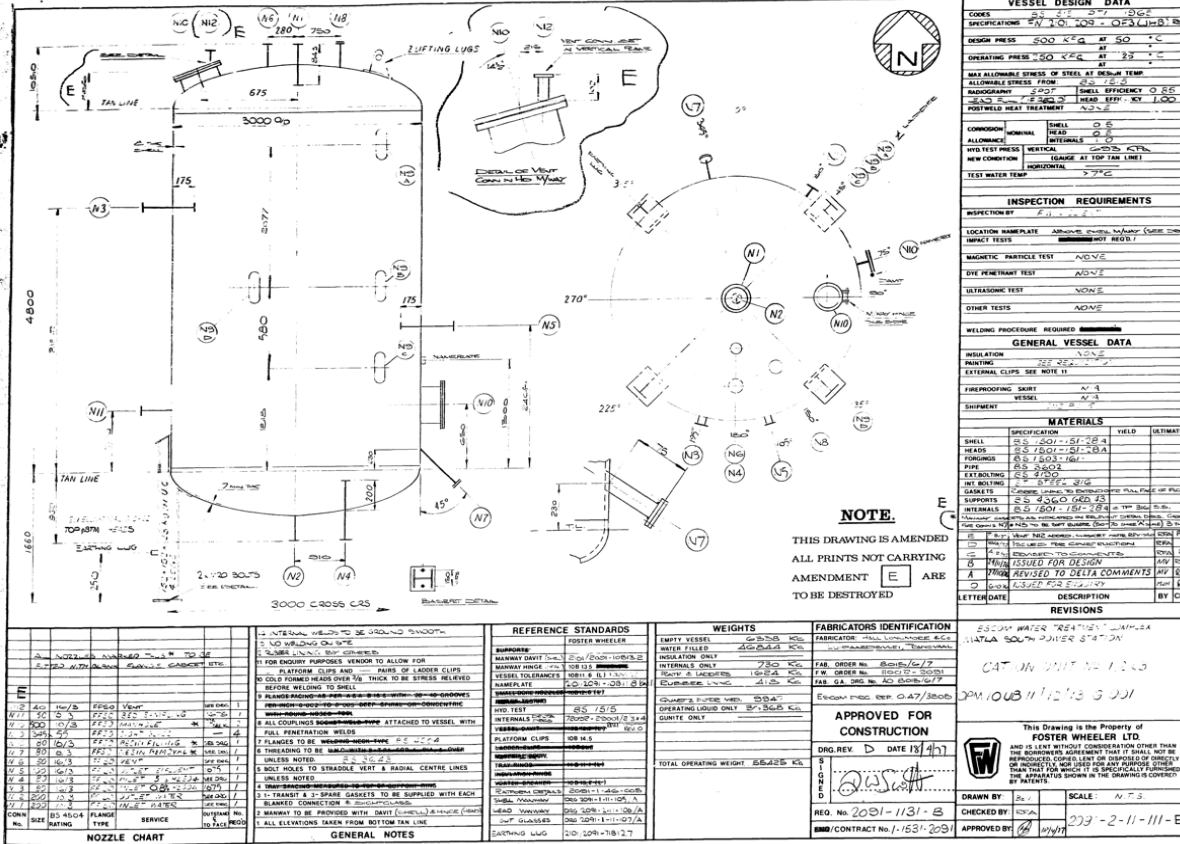
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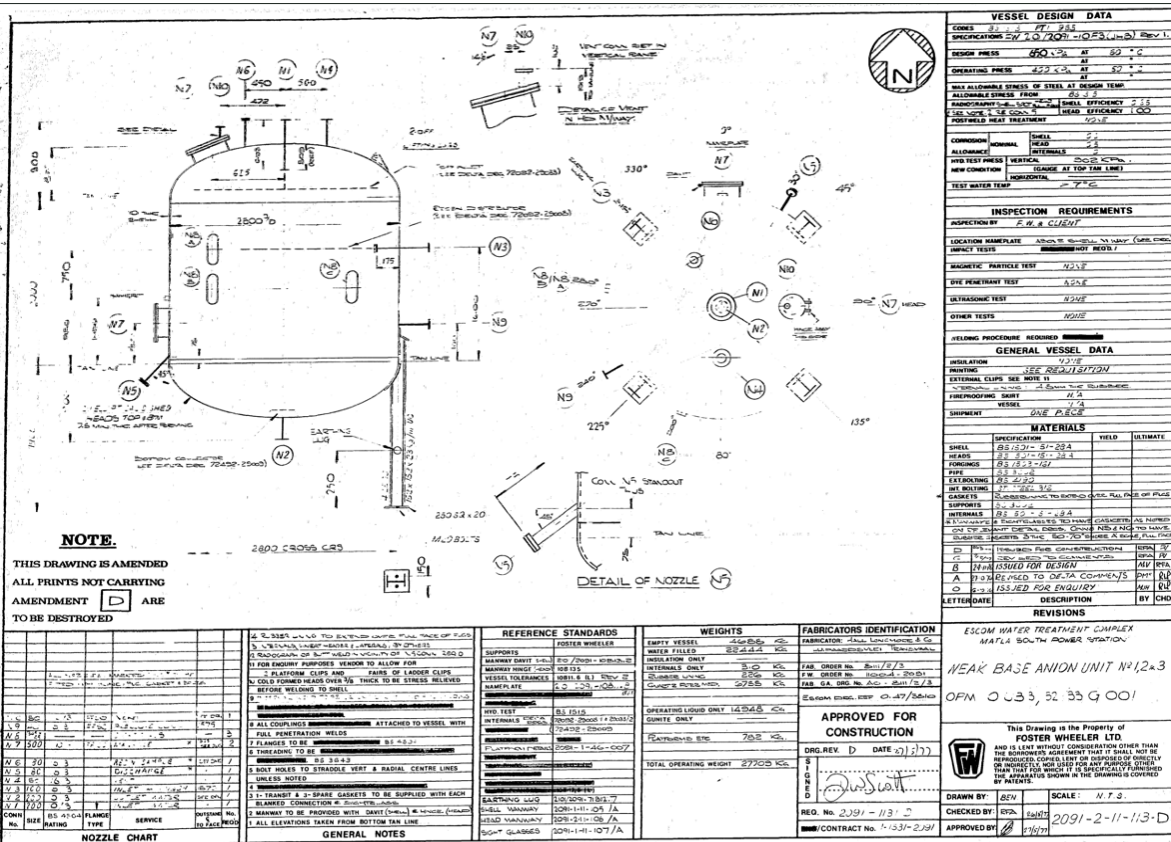
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Weak base anion



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