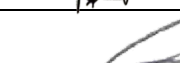
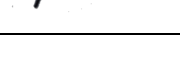


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PLANT AREA: Matla Power Station					
TITLE: Vessel Surface Preparation, Internal & External Corrosion Protection (Coatings and/or Linings), Pressure Testing, Safety Valve Calibration and/or Name Plate Replacement "As-Needed" based on Inspection Findings.					
REF: MEA-06681-1		Reference Rev No: 5		MULTIDISCIPLINARY: No	
Plant Level: 1					
COMPILED BY	Name: Wiets Roos Senior Advisor: Reliability Engineering	Signature:		Date:	2025-01-21
REVIEWED	Name: Ettienne van Zyl Line Manager: Reliability Engineering	Signature:		Date:	2025/01/21
REVIEWED	Name: Noko Pheta Senior Advisor: Metallurgy, Eskom AM	Signature:		Date:	2025/01/24
ACCEPTED	Name: Hlavutelo Nkwinika Turbine System Engineer/End User	Signature:		Date:	2025/01/29
ACCEPTED	Name: Thabiso Khumalo Auxiliary System Engineer/End User	Signature:		Date:	
APPROVED	Name: Zain Karodia Line Manager: Turbine Engineering	Signature:		Date:	27/01/2025
APPROVED	Name: Gavin Phelelo Line Manager: Auxiliary Engineering	Signature:		Date:	
APPROVED	Name: Lindokuhle Ngobese Group Manager: Engineering	Signature:		Date:	
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REVIEWED	Name: <i>Quality Department</i>	Signature:	Date:
REVIEWED	Name: <i>Occupational Health and Safety</i>	Signature:	Date:
REVIEWED	Name: <i>Environmental Department</i>	Signature:	Date:
ACCEPTED	Name: <i>Monyane Mokoena</i> Group Manager: Maintenance	Signature:	Date:
ACCEPTED	Name: <i>Christo Groenewald</i> AIA	Signature:	Date:
ACCEPTED	Name: <i>Gerhard Holtzhausen</i> AIA	Signature:	Date:

NB: Do not tamper with the template.

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1 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 (Refer to 1.4)
- All QCP's to be submitted to Engineering, AIA 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	- 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 OHSA noise exposure limits and ultimately reduce the risk of noise induced hearing loss.		
1.2	Environmental Management.	- 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	- 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.	Hold point	Contractor

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		- No procuring of outage items without the approval of scopes by quality - 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	Documents and Records Management	- The documents and records management work instruction 557-4418 shall be adhered to in managing business documents and records. - Pressure Equipment Records: - Service providers shall submit all final inspection, test, repair, and modification records on statutory pressure equipment to the relevant plant engineering representative within 21 days of completion of the <i>works</i>. - The Engineering representative shall ensure that all inspection, test, repair, and modification records related to statutory pressure equipment as received from the service provider is reviewed and approved / signed-off by the relevant stakeholders. - The following stakeholders must review and approve records relating to pressure equipment in respect to this scope of work:	Hold Point	Contractor, Maintenance, SE, AIA

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		▪ The service provider's operator (e.g. SAQCC qualified applicator). ▪ The service provider's authoriser (Evaluator / Supervisor). ▪ Eskom's Representative / Client (The System Engineer). ▪ Authorised Inspection Authority Representative (AIA). • The Engineering representative shall submit the approved hard copies of all final inspection, test, repair, and modification records to the Document Controller for registration no later than two months after the completion of the inspection, test and/or repair. • Each engineering department is accountable for compliance with records control work instruction regarding the management of department specific records. The engineering representative which receives pressure equipment records from service providers shall be responsible for ensuring that all relevant data is supplied, the records are legible, and the records are submitted to the Eskom Documentation Centre within the above stipulated timeframe. • Contents of Records: ○ All records shall be completed in full, identifiable, item (where necessary) product and the contract/order to which they refer.		
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		○ Records shall be signed if a signature is required, unless the records are computerised, and dated by the originator. ○ Pressure equipment and RBI records, shall as a minimum, include the following: ▪ Unique identification of the item or part of item inspected. ▪ Unique identification of the calibration and reference blocks used. ▪ Unique identification of the equipment and consumable batch numbers. ▪ Personnel qualification levels. ▪ Limitation encountered. ▪ Recording criteria. ▪ Sizing and methodology used. ▪ All flaws detected and the evaluation of such. ▪ The method or procedure and acceptance codes and standards used (e.g. ASME V Article 6 and ASME VIII). ▪ Supplier operator's name and signature. ▪ Date of inspection ▪ Supplier's authorization counter signature. ▪ Eskom Representative's signature.		
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		▪ Authorised Inspection Authority's signature. ○ The content of records shall provide evidence that: ▪ The requirements of ISO 9001, 14001 and 45001 are met. ▪ The product meets contractual requirements. ▪ Personnel are qualified and trained to the appropriate level. ▪ Corrective actions are implemented and effective. ○ The document registration form will be maintained at documentation centre as a proof for all records received for filing or archiving. ○ All records shall be legible, which is a prime requirement and applies to original records and copies.		
1.5	Inputs from other departments	Works provided by the Contractor will be subject to approval by the on-site AIA and Engineering representatives, prior to acceptance.	Hold Point	SE, AIA
1.6	Commissioning reference	• Prior to Commissioning, a Release Note or Certificate of Continuance must be issued by the AIA representative.	Hold Point	Contractor, Maintenance, SE, AIA

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2 DEFINITIONS:

No.	Definition:	Description:
2.1	Accreditation Authority	means the South African National Accreditation System (SANAS) established by section 3 of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act No. 19 of 2006).
2.2	Authorised Person	means a person who is registered as competent within the scope of work for which an organisation approved by the chief inspector has registered that person: a) SAQCC (CP) competent person for in service inspection b) SAQCC (IPE) inspector of pressurised equipment c) SAQCC (Gas) registered gas practitioner in the applicable field d) SAQCC (Fire) registered fire technician
2.3	Calibration of Safety Valves	Process followed to adjust a safety relief valve, for it to lift at a given set pressure. This set pressure (lifting pressure) may never exceed the design pressure of the pressure equipment it protects. This action can be performed with the valve on a test bench (for valves removed from the line / vessel). Butt-welded valves are normally set in situ by means of a Trevi-test. Refer to 240-69258336 Pressure Relieving Safety Devices Standard.
2.4	Certificate of Conformance	means a written declaration of conformance to the Pressure Equipment Regulations (PER).

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No.	Definition:	Description:
		a) For Regulation 17 a Certificate of Conformance (CoC) is issued by a Gas Practitioner that certifies that the gas installation and pressure equipment conform to the PER. Where the gas practitioner is also the manufacturer only one certificate is required. b) Certificate of manufacture means written declaration of conformance by the manufacturer or authorised person to the relevant health and safety standard(s) and to the relevant national legislation
2.5	Certificate of Manufacture	A written declaration of conformance by the Manufacturer of conformance to the Relevant Health and Safety Standard (as listed in OHS Act) and Pressure Equipment Regulations as defined in OHS Act for pressure equipment manufactured.
2.6	Conformity Assessment	Process undertaken by the Manufacturer and / or the Importer verified by the AIA(m) for category II and higher equipment (as applicable) to demonstrate that the statutory requirements are satisfied.
2.7	Construction	includes materials, design, fabrication, modification, repair, installation, examination, inspection, testing and certification.
2.8	Corrective Maintenance	Maintenance carried out after fault recognition and intended to put an item into a state in which it can perform required function.
2.9	Critical Valves	Valves that effect the safe operation of pressurised equipment, such as safety relief valves or critical protection control valves.
2.10	Design Pressure	means the gauge pressure used in the design formulae to determine the dimensions of the component parts of the pressure equipment.

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No.	Definition:	Description:
		a) When equipment is subjected primarily to static head and the applied pressure above the liquid level of the equipment is less than 50 kPa, then such equipment is excluded from the PER. b) PER does not regulate external pressure (vacuum)
2.11	Design Temperature	means the temperature used in the design formulae to determine the dimensions of the component parts of the pressure equipment;
2.12	Equipment	Individual item that is part of a system, equipment is comprised of an assemblage of components. Examples include pressure vessels, pressure relief devices, piping, boilers, and heaters.
2.13	Fluid	means gases, liquids, vapours in pure phase and mixtures thereof and may contain solids in suspension;
2.14	Gas	means gases, liquefied gases, gases dissolved under pressure, vapours, and those liquids whose vapour pressure at design temperature is greater than 50 kPa above normal atmospheric pressure. a) For example: Liquid water at 300°C at elevated pressure is defined as a gas b) When containment is lost and the fluid changes from liquid to gas (flashes), then the fluid is defined as a gas.
2.15	Health and Safety Standard (Code of Construction)	Standard that is approved in terms of Occupational Health and Safety Act by the Department of Employment and Labour, which contains requirements for the design, manufacture, repairs, modification, inspection, testing and certification of pressure equipment.

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No.	Definition:	Description:
2.16	Importer	The Importer is an entity that imports pressure equipment for use and / or re-sale in Republic of South Africa. The Importer must be a juristic person in RSA and the entity shall assume liability of the Manufacturer in terms the PER. The Importer formally declare conformance to the PER in the form of the Importer's Conformity Assessment Review Certificate for all imported pressure equipment Hazard category I to category IV. For steam generators, pressure vessels and assemblies the AIA(m) shall review the conformity assessment package for category II and higher and countersign such document (as applicable). The User will review all conformity assessment documents or category I to IV. The Importer shall ensure that all pressure equipment has been categorised in terms of SANS 347: 2019, Edition 3. Equipment categorised in terms of the PED does not need to be re-categorised under PER where fluid groups are different. Importer shall ensure that a certificate of manufacture is issued and reflect verification by an AIA(m) as defined in PER sub-regulation 4.3. The Importer shall take all reasonable steps as specified in PER Guidance Note 5(i) – with all eleven elements adequately addressed.

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No.	Definition:	Description:
		Importer shall ensure that the foreign inspection and certification bodies meets the requirements of the PER sub-regulation 7.3(b) with respect to ISO 17020, 17021 or higher accreditation and scope of accreditation together with the applicable Health and Safety Standard.
2.17	Inspection	An examination or measurement to verify whether an item or activity complies with specified requirements of the regulation authority and relevant Health and Safety Standard.
2.18	Maintenance	Combination of all technical, administrative, and managerial actions during the life cycle of an item intended to retain it in, or restore it to, a state in which it can perform the required function.
2.19	Manufacturer	Any person who has overall control and is responsible for the construction, (also see repairer / modifier definition), of the pressure equipment in the Republic of South Africa.
2.20	Manufacturer's Data Book	An organised collection of Manufacturer's design, AIA(m) verification report (where applicable), declaration of conformity and inspection / test records for the new equipment components and / or sub-assemblies.
2.21	Modification	means any change to the original design conditions of pressure equipment, including re-rating, or the addition or removal of elements that could affect the integrity of the pressure equipment, and a) Component replacement with different material types is deemed a modification

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<u>No.</u>	<u>Definition:</u>	<u>Description:</u>
		b) Component replacement with different material grades or the replacement of obsolete materials can be deemed as a modification, depending on the rules and requirements of the applicable health and safety standard or in-service health and safety standards.
2.22	Pressure Accessory	means devices with an operation function having pressure bearing housing; a) Some examples included but are not limited to: pressure gauges, bladder and piston type accumulators, level gauges, valves, strainers, bellows, flow meter, magnetic level indicators and instruments.
2.23	Pressure Equipment	means a steam generator, pressure vessel, piping, pressure accessory and safety accessory, transportable gas container, and fire extinguisher and includes, but is not limited to an accumulator, a hot-water geyser, and hyperbaric chambers;
2.24	Pressure Vessel	means a housing designed and manufactured to contain a fluid under a design pressure equal to or greater than 50 kPa; a) Includes but is not limited to storage vessels, beer kegs, plate heat exchangers, mobile pressure vessels, road tankers, rail tankers, intermediate bulk containers (ICB's), ISO containers, accumulators other than bladder or piston type, multi element

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No.	Definition:	Description:
		gas containers, fired heaters, hermetic compressors, etc. but excludes transportable gas containers and fire extinguishers which have their own definitions.
2.25	Preventative Maintenance	Maintenance carried out at predetermined intervals or according to a prescribed criteria and intended to reduce the probability of failure or the degradation of the functioning of an item.
2.26	Repair	means restoration to original design standard by the application of heat or welding to any pressure equipment, or the replacement of expanded tubes, and in the case of non-metallic equipment it means the application of heat, welding, solvent cement, laminate or curing of thermo-set; a) Component replacement with different material grades or the replacement of obsolete material can be deemed as a repair where not changes to the original design are affected. The repair shall be in accordance with the rules and requirements of the applicable health and safety standard or in-service health and safety standards.
2.27	Repairer / Modifier	An entity that performs any work during the in-service period of pressure equipment as defined under definition of “construction”. The entity is deemed to be the Manufacturer for all in-service activities as defined for “construction”. On completion of repair or modification a certificate repair / modification (as applicable) shall be issued by the Repairer / Modifier.
2.28	Safety Accessory	means a device designed to protect pressure equipment.

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No.	Definition:	Description:
		a) For example: pressure relief valves or bursting disks b) This excludes non-pressurised safety accessories
2.29	SANS 10227	means the Standard Specification for the criteria for the operation and inspection authorities performing inspection in terms of the Pressure Equipment Regulations, SANS10227, published by the South African Bureau of Standards;
2.30	SANS 10228	means the Standard Specification for the identification and classification of dangerous goods for transport, SANS 10228, published by the South African Bureau of Standards;
2.31	SANS 347	means the Standard Specification for categorisation and conformity assessment criteria for all pressure equipment, SANS 347, published by the South African Bureau of Standards;
2.32	The Act	means the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);

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3.1 SCOPE OF WORK: SECTION 1 – SANDBLASTING, INTERNAL & EXTERNAL CORROSION PROTECTION (ORGANIC COATING AND/OR RUBBER LINING), PRESSURE TESTING AND CALIBRATION OF SAFETY VALVES.

3.1.1 Normative/Informative References

All parties with vested in this Scope of Work shall ensure they are conversant with the requirements and apply the most recent edition of the documents listed below to all Sections withing this document. In the event of any omission or conflict between this document and the documents listed below, the requirements of the National Regulations, Eskom Manuals and Standards shall prevail and take precedent.

Normative:

- [1.] Guidance Notes to the Pressure Equipment Regulations July 2009, Department of Labour, Occupational Health and Safety Act, 1993 Revision 2.
- [2.] 240-154283718 Pressure Equipment Regulations Compliance Manual.
- [3.] 240-69258336 Pressure Relieving Safety Devices Standard.
- [4.] 240-84513751 Material Specification and Certification Guideline for Power Generation Plant.
- [5.] 240-101712128 Standard for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings.
- [6.] 240-106365693 Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings.
- [7.] 240-145581571 Standard for the Identification of the Contents of Pipelines and Vessels.
- [8.] GAM.MAT.22.234 Matla Rubber Lining Specification.
- [9.] GAM.MAT.22.235 Matla Internal Coating Specification.
- [10.] 240-71432150 Plant Labelling Standard
- [11.] 557-2508 Inspection and Testing of Pressure Vessels.

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NOTE: This Scope of Work does not elaborate on all requirements to the extent of the above listed reference documents, which is why all stakeholders must familiarise themselves with these detailed documents. Examples of details elaborated on in the standards include:

- Specific Requirements relating to internal lining, rubber lining, external coating, etc.
- General Requirements which include Equipment Design Considerations for supplied equipment such as Safety Valves.
- Contractor Skill Requirements.
- Requirements for the Contractor's Measuring and Test Equipment, Spray Equipment, Blast Cleaning Equipment, Powe Mixers etc.
- Paint Material requirements.
- Surface preparation.
- Paint Application.
- Safety Precautions.
- Inspection and Testing Requirements.
- Quality Assurance to be provided by the Contractor.
- Specific Rubber Lining Requirements.
- Maintenance Painting and Touch-ups by the Contractor.
- Guarantees to be provided by the Contractor.
- Handling and Storage Requirements.
- Record keeping and documents to be made available to Eskom.

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3.1.2	Conduct Internal and/or External Surface Preparation on Vessels prior to Corrosion Protection on an “As Needed” Basis which is determined by Eskom Engineering and the On-Site AIA representative.	Areas on or entire Vessels that require surface preparation (sandblasting, etc.) and internal and/or external corrosion protection will be explicitly stated on individual task orders issued by Maintenance on an "As Required Basis" as determined by Eskom Engineering and the On-Site AIA(is) on specific Pressure Vessels as listed in Appendix I. Internal surface preparation shall meet the requirements of the project specific specifications (Refer to Appendix IV) as well as Section 4.7 of 240-101712128: Standard for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings. The following project specific internal corrosion protection specifications are provided in Appendix IV of this document: - GAM.MAT.22.234: Matla Rubber Lining Specification - GAM.MAT.22.235: Matla Internal Coating Specification	Hold	<i>Contractor, Eskom MMD, AIA, Eskom Eng.</i>

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		External surface preparation shall meet the requirements of the project specific specification (Refer to Appendix V) as well as Section 4.6 of 240-106365693: Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings. In addition to the requirements for surface preparation from the Standard, the <i>Contractor</i> will also be responsible to adhere to the requirements as stated in the project specific specifications and to: - Photograph and record all nameplate data and ensure vessel name plates are protected prior to any surface preparation or application of corrosion protection systems. - Certain vessels may need to be sandblasted in-situ. Vessels that cannot be done in-situ, will be, removed by the <i>Contractor</i> and taken to the sandblasting workshop on site for the contractor to re-instate or repair the corrosion protection system. - The <i>Contractor</i> will ensure that all sandblasting grid is appropriately contained to prevent damage to, or foreign material ingress into any adjacent equipment.		

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		- The <i>Contractor</i> may be held liable for any damages arising from the sandblasting conducted on the specified vessels or surrounding equipment. - The <i>Contractor</i> will be responsible for cleaning and environmentally friendly disposal of all grit out of the workplace. - Vessels removed to the sandblasting workshop is to be re-installed by the <i>Contractor</i>.		
3.1.3	Conduct External Corrosion Protection with Coatings on an “As Needed” Basis determined by Eskom Engineering and the On-Site AIA representative. Estimated Surface Areas and	Areas on or entire Vessels that require surface preparation (sandblasting, etc.) and internal and/or external corrosion protection will be explicitly stated on individual task orders issued by Maintenance on an “As Required Basis” as determined by Eskom Engineering and the On-Site AIA(is) on specific Pressure Vessels as listed in Appendix I. The Colour of the External Corrosion Protection shall meet the requirements of 240-145581571: Standard for the Identification of the Contents of Pipelines and Vessels as detailed in Appendix III for the specific vessels.	Hold	<i>Contractor, Eskom MMD, AIA, Eskom Eng.</i>

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	Volumes provided in Appendix II.	The External Corrosion Protection shall meet all the requirements of the project specific corrosion protection specification (CPS) as detailed in Appendix V, as well as 240-106365693: Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings. The approximated external surface areas for each vessel is provided in Appendix II.		
3.1.4	Conduct Internal Corrosion Protection with Coatings or Rubber Lining on an "As Needed" Basis determined by Eskom Engineering and the On-Site AIA.	Areas on or entire Vessels that require surface preparation (sandblasting, etc.) and internal and/or external corrosion protection will be explicitly stated on individual task orders issued by Maintenance on an "As Required Basis" as determined by Eskom Engineering and the On-Site AIA(is) on specific Pressure Vessels as listed in Appendix I. Internal Corrosion Protection and Rubber Lining shall meet all the requirements of the project specific corrosion protection specification (CPS) as provided in Appendix IV, as well as the requirements of 240-101712128: Standard for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings.	Hold	Contractor, Eskom MMD, AIA, Eskom Eng.

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		Appendix I (Design Information), Appendix II (Surface Areas and Volumes) and Appendix III (Colour Identification & Corrosion Protection Specifications) is provided as an alternative to Annexure C of the Standard 240-101712128 because of the number of vessels and different operating environments.		
3.1.5	Conduct Hydrostatic Pressure Testing on All Portable Compressors and on an "As Needed" Basis determined by Eskom Engineering and the On-Site AIA representative.	Hydrostatic Pressure Testing to the specified pressures may be required on portable compressors as indicated in Appendix I (Item 49 to Item 55). Additional vessels that require hydrostatic pressure testing will be explicitly stated on individual task orders issued by Maintenance on an "As Required Basis" and as determined by Eskom Engineering and the On-Site AIA(is) on specific Pressure Vessels. NOTE: Where in-service statutory hydraulic pressure testing is required, such testing shall be performed to a minimum 1.25 times the design pressure as defined in PER sub-regulations 11.1(c) or 11.1(d).	Hold	<i>Contractor, Eskom MMD, AIA, Eskom Eng.</i>

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		- Adherence to 240-154283718 Pressure Equipment Regulations - Compliance Manual. - Contractor to submit an ITP and method statement for pressure testing the specified vessel for approval by Engineering and the AIA. - Contractor to supply and utilise a Low Flow rate of 2.6 Litres / Min Max mobile pressure raising pump. - Minimum water temperature = 16°C for pressure testing. - The Eskom Representative, Contractor, and the AIA(is) shall ensure that the stipulated test pressure is reached or marginally exceeded (2% of test pressure value or 50 kPa whichever is the higher) during a pressure test and that the pressure gauge used in the test is of the correct range (test pressure to be achieved shall be within 40-70% of the indicated scale range). - The Eskom MMD shall supply the pressure gauges and calibration certificates during the Hydrostatic Pressure Test. The pressure gauge latest calibration date as stated on the calibration certificate shall not be older than 12 months prior to the date of pressure test. Calibration test shall be performed by a SANAS accredited Test Laboratory.		

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		- The pressure equipment shall hold / maintain test pressure for at least 30 minutes or in case of the large vessels at least sufficient time to perform a full visual inspection. The <i>Contractor</i> will log the pressures at intervals as agreed with the AIA(is). - A shorter time frame may be agreed to by the System Engineer and AIA(is) in cases where the pressure decay is due to a passing isolating valve or blocking device. - Blanks / Cover Plates and gaskets to be provided by Eskom MMD department and installed / removed by Contractor.		
3.1.6	Conduct Safety Valve Calibration / Trevi-Testing of Safety Valves.	Safety Valves listed in Appendix VI require calibration / trevi-testing and may require refurbishment. The exact requirement will be explicitly stated on individual task orders issued by Maintenance on an "As Required Basis" and as determined by Eskom Engineering and the On-Site AIA(is) on specific Safety Valves and will adhere to the requirements of 240-69258336 Pressure Relieving Safety Devices Standard.	Hold	<i>Contractor, Eskom MMD, AIA, Eskom Eng.</i>

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		- All valves will be removed from the vessel and taken to the <i>Contractor's</i> (by the <i>Contractor</i>) workshop for overhaul, testing and setting. - Valve lift setting will be witnessed by an Eskom Engineer representative and the AIA(is) - A formal report will be issued by the <i>Contractor</i> detailing the condition of the components as found AND after refurbishment, as a minimum, i.e. - Initial pressure setting - spring - bellows - seat - set screw - spindle - body - spring washer - guide bush		

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		- The seat may be dye penetrant tested on assessment. (contractor to budget for every seat to be tested) - The seat will be “blue checked” to verify seating. - the seat will be lapped - the seat will be fully blued to be acceptable. - After valve setting the safety valve is to be sealed/ tagged to prevent unauthorised adjustment. Tag to detail date, set pressure, serial number, and lead seal number. - A SANAS approved safety valve calibration certificate will be submitted for approval, by the AIA(is), indicating: - Safety Valve Serial Number - Date of Calibration - Set Pressure - Test Method (Pneumatic or Hydraulic) - Pressure Gauge Serial Number - Lock Nut and Screw Heights		

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		○ Contractor's Supervisor's signature and acceptance ○ The safety valve make, model, accessories fitted, Inlet and Outlet Sizes • A refurbishment certificate will be issued <u>prior to installation</u> on each valve refurbished stating: ○ Valve description and KKS/AKZ. ○ Valve make, model and serial number. ○ repaired components. ○ and initial (as found) and final set pressure. NOTE: In instances where Safety Valves cannot be refurbished, and replacement is required refer to Section 3.2.1		

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3.2 SCOPE OF WORK – SECTION 2: REPLACEMENT OF SAFETY VALVES AND VESSEL NAME PLATES ON “AS-NEEDED” BASIS.

ITEM NO.	SCOPE OF WORK DESCRIPTION / ACTIVITY	PROCEDURE, SPECIFICATION, ENG. REQUIREMENTS / DOCUMENTATION	HOLD POINTS, WITNESS, REPORTS	RESPONSIBLE PARTY
3.2.1	Replace Safety Valves on an “As Needed” Basis determined by Eskom Engineering and the On-Site AIA Representative.	In instances where Safety Valves require replacement, this will be explicitly stated on individual task orders issued by Maintenance on an “As Required Basis” and as determined by Eskom Engineering and the On-Site AIA(is) on specific Safety Valves of Appendix VI. Replacement Safety Valves shall meet the requirements of: 240-69258336 Pressure Relieving Safety Devices Standard. 240-154283718: Pressure Equipment Regulations Compliance Manual, 240-84513751 Material Specification and Certification Guideline for Power Generation Plant - Department of Labour Guidance Notes to the Pressure Equipment Regulations July 2009, Occupational Health, and Safety Act, 1993 Revision 2. Safety Valves are pressure accessories as defined in PER. All imported valves need to be subjected to a conformity assessment review by the Importer, to declare conformance to the	Hold	Contractor, Importer and/or Supplier, AIA(m), AIA(is), Eskom Engineering

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	national legislation. The South African (local) AIA(m) is not required to counter-sign this declaration. This conformity assessment review certificate shall be issued to Eskom for acceptance. The conformity assessment shall clearly indicate the Health and Safety Standard (including year of issue), pressure testing and material certification in accordance with EN 10204, and the conformity assessment module used during the manufacture. Valves shall be manufactured and designed in accordance with an accredited valve manufacturing Health and Safety Standard such as ASME B16.34, EN 12516 or an international accepted valve design Health and Safety Standard. The User will ensure that the selected valve complies with the temperature and body pressure rating for applicable Valve body rating as stated in the applicable Health and Safety Standard and is suitable for the design conditions of the piping system. Valves will be supplied complete with material certificates in accordance with EN 10204 Type 3.1 certification for low alloy materials and basic carbon steel or stainless steel. For complex materials the requirements of 240-84513751 will apply. Batch produced valves shall be supplied with EN10204 2.2 certification.		
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		For new safety / relief valves a full sizing certificate of valve capacity must be issued. Certificates must include the maximum flow rates and media as well as the Health and Safety Standard that the flow capacity is based on.		
3.2.2	Manufacture and Install Replacement Pressure Vessel Name Plates on an “As Needed” Basis determined by Eskom Engineering and the On-Site AIA representative.	In instances where nameplates require replacement, this this will be explicitly stated on individual task orders issued by Maintenance on an “As Required Basis” and as determined by Eskom Engineering and the On-Site AIA(is). - All manufactured name plates shall meet the requirements of 240-71432150 Plant Labelling Standard. - All manufactured nameplates shall contain the minimum information as stated in the Pressure Equipment Regulations, Regulation 9: - Name of manufacturer. - Country of origin. - Year of manufacture. - Manufacturer’s serial number. - Reference number, date and edition of the health and safety standard. - Design pressure in units of Pascal. - Design temperature for both minimum and maximum in degrees Celsius.	Hold	Contractor, Eskom AIA(is), Eskom Engineering
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		○ Capacity in cubic metres. ○ Unique mark of an approved inspection authority as applicable; and ○ The hazard category in accordance with the requirements of SANS 347. • Nameplate size and lettering will be confirmed for each specific vessel. • The <i>Contractor</i> will cut the plate to size and engrave the lettering into then nameplate, as well machine and rivet the plate to the vessel in an appropriate manner. • Nameplate material: Stainless Steel, Make provision of Approximately 4m² of 2mm thick stainless-steel plate. • <i>Contractor</i> to make provision for the equivalent of 140 Nameplates. • Contractor to price for 42 000 characters (equivalent to 140 nameplates of 300 characters each).		
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4 APPENDIX I: OUTSIDE PLANT VESSELS DESIGN INFORMATION

Appendix I provides the design information for a list of vessels on the outside plant that may require surface preparation, internal and/or external corrosion protection with coatings and/or or rubber lining, depending on inspection findings. NOTE: This pressure vessels list is live document and updated as required. Additional vessels may be added as and when needed.

No.	Vessel Description:	Design Standard:	Quantity:	Serial No's:	Location:	Shell Design Temperature (°C):	Shell Design Pressure (kPa):	In-Service Hydrostatic Test Pressure (kPa):	Design Volume (m³):	Operating Fluid:	SANS347 Category:	AIA Involvement:
1	Diesel Generator Air Receivers	ASME VIII 1977	8	IA 825 IA 7088 IA 3024 IA 5305 IA 5306 IA 7089 IA 7092 IA 7093	Unit 1 Unit 1 Unit 3 Unit 4 Unit 4 Unit 5 Unit 6 Unit 6	40.000	4000.000	5000.000	0.1650	Compressed Air (Non-Dangerous Gas)	IV	Yes
2	Diesel Generator Air Receivers	PD5500 Cat.2 - 2006	2	2009-0320CDR-002 2009-0320CDR-001	Unit 2 Unit 2	40.000	6000.000	7500.000	0.1920	Compressed Air (Non-Dangerous Gas)	IV	Yes
3	Diesel Generator Air Receivers	PD5500 Cat.2 - 2006	2	19339 19340	Unit 3 Unit 5	40.000	6000.000	7500.000	0.1920	Compressed Air (Non-Dangerous Gas)	IV	Yes
4	Generator 20kV Breaker	Lloyds Rules, Recertified to PD5500 - 2009	10	201713 201714 201958	Unit 1 Unit 1 Unit 2	50.000	22000.000	27500.000	0.3000	Compressed Air (Non-Dangerous Gas)	IV	Yes

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No.	Vessel Description:	Design Standard:	Quantity:	Serial No's:	Location:	Shell Design Temperature (°C):	Shell Design Pressure (kPa):	In-Service Hydrostatic Test Pressure (kPa):	Design Volume (m³):	Operating Fluid:	SANS347 Category:	AIA Involvement:
	Air Receivers (20MPa)			201712 201954 201955 201710 201959 201957 201711	Unit 3 Unit 4 Unit 4 Unit 4 Unit 5 Unit 5 Unit 6							
5	Generator 20kV Breaker Air Receivers (20MPa)	Lloyds Rules, Recertified to PD5500 - 2009	2	201709 201956	Unit 1 Unit 1	50.000	22000.000	27500.000	0.3000	Compressed Air (Non-Dangerous Gas)	IV	Yes
6	Generator 20kV Breaker Air Receivers (15MPa)	Lloyds Rules	4	8407/1/11/76 75/47011V 75/47006V 8407/1/14/76	Unit 1 Unit 1 Unit 4 Unit 4	80.000	21574.600	26968.250	0.0470	Compressed Air (Non-Dangerous Gas)	IV	Yes
7	Unitized H2 Dryers	ASME VIII Div.1 - 2010/A'11	12	Unknown Unknown Unknown F194942 F194943 F192957 F192958 F194946 F194947	Unit 1 Unit 1 Unit 2 Unit 2 Unit 3 Unit 3 Unit 4 Unit 4 Unit 5 Unit 5	232.222	1034.214	1292.767	0.0275	Hydrogen (Dangerous Gas)	III	Yes

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No.	Vessel Description:	Design Standard:	Quantity:	Serial No's:	Location:	Shell Design Temperature (°C):	Shell Design Pressure (kPa):	In-Service Hydrostatic Test Pressure (kPa):	Design Volume (m³):	Operating Fluid:	SANS347 Category:	AIA Involvement:
				55466-A 55466-B	Unit 6 Unit 6							
8	Unitized Air Dryers	ASME VIII Div.1 - 2010	12	Unknown Unknown Unknown 712406 712410 712411 712414 712407 712408 719198 719200	Unit 1 Unit 1 Unit 2 Unit 2 Unit 3 Unit 3 Unit 4 Unit 4 Unit 5 Unit 5 Unit 6 Unit 6	232.222	1378.951	1723.689	0.0387	Compressed Air (Non-Dangerous Gas)	II	Yes
9	Hydrogen Storage Vessels	BS5500 - 1976	3	G47/1 G47/2 G47/3	H2 Plant	40.000	3030.000	3787.500	19.2570	Hydrogen (Dangerous Gas)	IV	Yes
10	Diesel / Standby Compressor 1 Desiccant Dryers	RSA/CIF-81-2001A2001	2	ILP 4565 ILP 4572	LP Pump House (Internal)	50.000	2000.000	2500.000	0.6900	Compressed Air (Non-Dangerous Gas)	IV	Yes
11	Diesel / Standby Compressor 2	ASME VIII Div.1 - 1980	2	1413 1414	LP Pump House (Internal)	50.000	700.000	875.000	0.5000	Compressed Air (Non-Dangerous Gas)	IV	Yes

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		Review Date	October 2027		

No.	Vessel Description:	Design Standard:	Quantity:	Serial No's:	Location:	Shell Design Temperature (°C):	Shell Design Pressure (kPa):	In-Service Hydrostatic Test Pressure (kPa):	Design Volume (m³):	Operating Fluid:	SANS347 Category:	AIA Involvement:
	Desiccant Dryers											
12	Diesel / Standby Compressor 2 After Filter (Tegnon)	ASME VIII Div.1	1	1356	LP Pump House (Internal)	50.000	1000.000	1250.000	0.0600	Compressed Air (Non-Dangerous Gas)	II	Yes
13	Atlas Copco Compressor Filter 1	ASME VIII Div.1	1	ARF 513654	LP Pump House (Internal)	150.000	1600.000	2000.000	0.0360	Compressed Air (Non-Dangerous Gas)	II	Yes
14	Atlas Copco Compressor Filter 2	EN 286: Part 1 - 2001	1	ARF 511096	LP Pump House (Internal)	120.000	1600.000	2000.000	0.0365	Compressed Air (Non-Dangerous Gas)	II	Yes
15	Atlas Copco Compressor Filter 3	ASME VIII Div.1	1	ARF 514150	LP Pump House (Internal)	150.000	1600.000	2000.000	0.0360	Compressed Air (Non-Dangerous Gas)	II	Yes
16	Centac Compressor Desiccant Dryers (1000kPa)	RSA/CIF 81 9500	4	ILP 5819 ILP 5820 ILP 5576 ILP 5577	LP Pump House (Internal)	50.000	1000.000	1250.000	1.2000	Compressed Air (Non-Dangerous Gas)	IV	Yes
	Centac Compressor Desiccant Dryers	RSA/CIF 81 9500	2	ILP 5574 ILP 5575	LP Pump House (Internal)	50.000	1000.000	1250.000	1.2000	Compressed Air (Non-Dangerous Gas)	IV	Yes

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	(1000kPa, Galvanized)											
17	Centac Compressor Desiccant Dryers (De-Rated)	ASME VIII Div.1 2010	2	ILP 5818 ILP 5821	LP Pump House (Internal)	50.000	735.000	918.750	1.2000	Compressed Air (Non-Dangerous Gas)	IV	Yes
18	Centac Compressor 1 After Filter (Tegnon)	Not Available	1	Not Available	LP Pump House (Internal)	50.000	1200.000	1500.000	0.0600	Compressed Air (Non-Dangerous Gas)	II	Yes
19	Centac Compressor 2 After Filter (Tegnon)	RSA/CIF-81-07A08	1	26057	LP Pump House (Internal)	50.000	1200.000	1500.000	0.0600	Compressed Air (Non-Dangerous Gas)	II	Yes
20	Centac Compressor 3 After Filter (Zander)	PD5500 Cat.3 - 2011	1	22928	LP Pump House (Internal)	50.000	1600.000	2000.000	0.0230	Compressed Air (Non-Dangerous Gas)	II	Yes
21	Control Air Receivers	BS 1515 Part I - 1965 + Rev	4	A9566-1 A9566-2 A9566-3 A9566-4	LP Pump House (External)	50.000	720.000	900.000	23.0000	Compressed Air (Non-Dangerous Gas)	IV	Yes

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22	Service Air Receivers	BS 1515 Part I - 1965 + Rev	1	A9567	LP Pump House (External)	50.000	720.000	900.000	23.0000	Compressed Air (Non-Dangerous Gas)	IV	Yes
23	Hydrobin Air Receivers	RSA-CIF-81-95A96	4	13437 11224 13652 13651	Hydrobins	50.000	750.000	937.500	0.1500	Compressed Air (Non-Dangerous Gas)	II	Yes
24	Wet Ash Slurry Receiver	ASME VIII 1989 Div.1	1	KE360-0115	Slurry Plant	100.000	700.000	875.000	3.2300	Compressed Air (Non-Dangerous Gas)	IV	Yes
25	Dust Conveying Centac After Coolers	RSA/CIF 8-1 2001	5	354/800/1 354/800/2 354/800/3 354/800/4 354/800/5	Blower House (External)	65.000	550.000	687.500	0.3300	Compressed Air (Non-Dangerous Gas)	III	Yes
26	Dust Conveying Centac After Filters (Dryer Inlets)	RSA/CIF 81 2007/A2008	5	42472 42103 43091 42593 41593	Blower House (External)	50.000	1000.000	1250.000	0.2210	Compressed Air (Non-Dangerous Gas)	III	Yes
27	Dust Conveying Centac After Filters (Dryer Outlets)	RSA/CI/OHSA - 8.1-2017	5	32707 32709 32710 32711 32708	Blower House (External)	100.000	1000.000	1250.000	0.2210	Compressed Air (Non-Dangerous Gas)	III	Yes

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28	Dust Plant Instrument Air Dryer IR D13500IN (External)	Not Available	1	2200181475	Blower House (External)	65.000	1200.000	1500.000	0.2950	Compressed Air (Non-Dangerous Gas)	IV	Yes
29	Dust Plant Instrument Air Dryer Filter (External)	DGRL 97/23/E6 - EN13445	1	110695/06	Blower House (External)	250.000	1600.000	2000.000	0.2000	Compressed Air (Non-Dangerous Gas)	IV	Yes
30	Dust Plant Instrument Air Dryer Cooler IR (External)	AD 2000	1	398239850001	Blower House (External)	65.000	900.000	1125.000	0.3300	Compressed Air (Non-Dangerous Gas)	III	Yes
31	Dust Plant Instrument Air Desiccant Dryers (Inside)	EN 13445 - 2009	2	130850/01 130850/02	Blower House (Internal)	250.000	1200.000	1500.000	1.7500	Compressed Air (Non-Dangerous Gas)	IV	Yes
32	Dust Plant Instrument Air Filters 1 - 3 (Inside)	PED 97/23 ED EN 13445 (2009)	3	130452/08 130452/09 130452/10	Blower House (Internal)	250.000	1600.000	2000.000	0.1100	Compressed Air (Non-Dangerous Gas)	III	Yes
33	Dust Plant Control Air Receiver U1	RSA/CIF 81-89A89	1	ILP 1852	Unit 1 Dust Plant	50.000	760.000	950.000	2.5800	Compressed Air (Non-Dangerous Gas)	IV	Yes

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34	Dust Plant Control Air Receiver U4	RSA/CI/OHSA-8-1-10A11	1	AG 1884	Unit 4 Dust Plant	100.000	700.000	875.000	2.0000	Compressed Air (Non-Dangerous Gas)	IV	Yes
35	Dust Plant Control Air Receiver U5	RSA/CI/OHSA-8-1-10A11	1	AH 1883	Unit 5 Dust Plant	100.000	700.000	875.000	2.0000	Compressed Air (Non-Dangerous Gas)	IV	Yes
36	Dust Plant Control Air Receiver U6	RSA/CIF 81-10A00	1	AG 9921	Unit 6 Dust Plant	100.000	700.000	875.000	2.0000	Compressed Air (Non-Dangerous Gas)	IV	Yes
37	North Water Treatment Plant Air Receiver	BS 5500 1979	1	K046	North Water Treatment Plant	50.000	720.000	900.000	20.0000	Compressed Air (Non-Dangerous Gas)	IV	Yes
38	South Water Treatment Plant Air Receiver	BS 1515 Part I - 1965 + Rev	1	A9568	South Water Treatment Plant	50.000	720.000	900.000	23.0000	Compressed Air (Non-Dangerous Gas)	IV	Yes
39	Ammonium Hydroxide Re-use Tank	BS 1515	1	515	South Water Treatment Plant	40.000	185.000	231.250	22.0000	Ammonium Hydroxide (Dangerous Liquid)	I	No
40	Caustic Bulk Storage Vessel No.1 (G001)	BS 1515 Part I - 1965	1	504	South Water Treatment Plant	50.000	200.000	250.000	40.0000	Caustic Soda Solution (Dangerous Liquid)	I	No

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41	Caustic Bulk Storage Vessel No.2 (G002)	BS 1515 Part I - 1965	1	505	South Water Treatment Plant	50.000	200.000	250.000	40.0000	Caustic Soda Solution (Dangerous Liquid)	I	No
42	Caustic Re-use Tank	BS 1515 Part I - 1965	1	495	South Water Treatment Plant	60.000	185.000	231.250	7.4000	Caustic Soda Solution (Dangerous Liquid)	I	No
43	Hot Water Tank No.1 (G002)	BS 1515 Part I - 1965	1	506	South Water Treatment Plant	120.000	500.000	625.000	14.3000	Steam (Dangerous Gas)	IV	Yes
44	Hot Water Tank No.2 (G001)	BS 1515 Part I - 1965	1	507	South Water Treatment Plant	120.000	500.000	625.000	6.5000	Steam (Dangerous Gas)	IV	Yes
45	Sulphuric Acid Re-Use Tank	BS 1515 Part I - 1965	1	520	South Water Treatment Plant	50.000	185.000	231.250	9.8000	Sulphuric Acid (Dangerous Liquid)	I	No
46	Sulphuric Acid Bulk Storage Vessel No.1 South	BS 1515 Part I - 1965	1	509	South Water Treatment Plant	50.000	170.000	212.500	22.0000	Sulphuric Acid (Dangerous Liquid)	I	No
47	Sulphuric Acid Bulk Storage Vessel No.2 South	BS 1515 Part I - 1965	1	508	South Water Treatment Plant	50.000	170.000	212.500	22.0000	Sulphuric Acid (Dangerous Liquid)	I	No

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48	Sulphuric Acid Bulk Storage Vessel North	BS 1515 Part I - 1965	1	8437	North Water Treatment Plant	50.000	268.000	335.000	22.0000	Sulphuric Acid (Dangerous Liquid)	I	No
49	Portable Air Receiver for Plater Shop	Not Available	1	500779/061	Suspect this to be a rented compressor trailer	N/A	N/A	N/A	N/A	N/A	N/A	N/A
50	Portable Compressors with Receiver Model CQ092X	CODAP Ed. 2010	4	474 100169 818 85926	Air Conditioning Central Tool Store Fire Station PTM	100.000	1100.000	1375.000	0.0900	Compressed Air (Non-Dangerous Gas)	II	Yes
51	Portable Compressors with Receiver Model NN200X	CODAP Ed. 2000	4	85918 63952 L017440- 85LZ309 L017868- 85LZ309	Garage Horticulture Sewage Plant (New) Sewage Plant (New)	100.000	1100.000	1375.000	0.2000	Compressed Air (Non-Dangerous Gas)	III	Yes
52	Portable Compressors with Receiver Model NN270X	CODAP Ed. 2000	3	41009 40972 40985	Garage MMD Fitters MMD Welders	100.000	1100.000	1375.000	0.2700	Compressed Air (Non-Dangerous Gas)	III	Yes

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53	Portable Compressor with Receiver Model 5H500	CODAP Ed. 2000	1	15963	MMD Welders	120.000	1100.000	1375.000	0.5000	Compressed Air (Non-Dangerous Gas)	IV	Yes
54	Portable Air Receiver for Welding Shop	RSA/CI/OHSA81-2013	1	ITL 2896	Welding Shop	40.000	1400.000	1750.000	0.5000	Compressed Air (Non-Dangerous Gas)	IV	Yes
55	Portable Compressors with Receiver Model NF200X	CODAP Ed. 2000	2	68018 68023	Sewage Plant (Old) Sewage Plant (Old)	100.000	1100.000	1375.000	0.2000	Compressed Air (Non-Dangerous Gas)	III	Yes
TOTAL NO. VESSELS:			139									

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5 APPENDIX II: OUTSIDE PLANT VESSEL SURFACE AREAS AND VOLUMES

Appendix II provides the calculated / approximated inner and outer surface areas as well as the volumes for the vessels located on the outside plant, which may require surface preparation, internal and/or external corrosion protection with coatings and/or or rubber lining depending on inspection findings as needed basis.

No.	Vessel Description:	Quantity:	Shell Length (mm):	Shell OD (mm):	Shell Nominal Wall (mm):	Shell Corr. Allow. (mm):	Head Design:	Head Nominal Wall (mm):	Head Wall A/F (mm):	Head Corr. Allow. (mm):	Calc. Volume per Vessel (m³):	Calc. Inner Surface Area per Vessel (m²):	Calc. Outer Surface Area per Vessel (m²):	Total Volume for Quantity (m³):	Total Inner Surface Area (m²):	Total Outer Surface Area (m²):
1	Diesel Generator Air Receivers	8	1271.000	406.400	9.530	1.000	2:1 Semi Ellipsoidal	9.520	Not Available	1.000	0.165	1.873	1.982	1.320	14.980	15.852
2	Diesel Generator Air Receivers	2	1500.000	406.400	9.530	1.000	2:1 Semi Ellipsoidal	9.520	Not Available	1.000	0.192	2.151	2.274	0.384	4.302	4.547
3	Diesel Generator Air Receivers	2	1500.000	406.400	9.530	1.000	2:1 Semi Ellipsoidal	9.520	Not Available	1.000	0.192	2.151	2.274	0.384	4.302	4.547
4	Generator 20kV Breaker Air Receivers (20MPa)	10	1670.000	521.000	30.000	0.000	Ellipsoidal Cap	20.000	15.000	0.000	0.319	2.994	3.393	3.195	29.940	33.925
5	Generator 20kV Breaker Air	2	1550.000	523.550	33.000	0.000	Ellipsoidal Cap	20.000	15.000	0.000	0.296	2.803	3.209	0.591	5.607	6.417

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	Receivers (20MPa)															
6	Generator 20kV Breaker Air Receivers (15MPa)	4	1321.000	229.000	9.000	0.000	Hemispherical	15.000	9.000	0.000	0.051	1.008	1.124	0.203	4.030	4.497
7	Unitized H2 Dryers	12	1549.400	171.450	7.112	1.600	Flat Covers	25,4 (Top) 9,4234 (Bottom)	N/A	1.600	0.029	0.787	0.857	0.347	9.448	10.278
8	Unitized Air Dryers	12	1193.800	203.200	2.692	0.000	2:1 Semi Ellipsoidal	2.692	2.388	0.000	0.039	0.827	0.851	0.465	9.922	10.214
9	Hydrogen Storage Vessels	3	6930.000	1878.000	25.000	1.600	2:1 Semi Ellipsoidal	28.000	25.000	1.600	19.787	47.053	48.543	59.360	141.158	145.630
10	Diesel / Standby Compressor 1 Desiccant Dryers	2	1880.000	662.000	8.000	0.000	2:1 Semi Ellipsoidal	8.000	6.400	0.000	0.687	4.721	4.852	1.374	9.443	9.704
11	Diesel / Standby Compressor	2	1800.000	580.000	6.000	Not Available	2:1 Semi Ellipsoidal	6.000	4.500	Not Available	0.504	3.912	4.003	1.008	7.825	8.005

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	2 Desiccant Dryers															
12	Diesel / Standby Compressor 2 After Filter (Tegnon)	1	1200.000	260.000	5.000	Not Available	2:1 Semi Ellipsoidal & Flanged	5.000	Not Available	Not Available	0.061	1.063	1.134	0.061	1.063	1.134
13	Atlas Copco Compressor Filter 1	1	1000.000	212.000	2.000	Not Available	2:1 Semi Ellipsoidal	2.000	Not Available	Not Available	0.036	0.747	0.764	0.036	0.747	0.764
14	Atlas Copco Compressor Filter 2	1	1000.000	212.000	2.000	Not Available	2:1 Semi Ellipsoidal	2.000	Not Available	Not Available	0.036	0.747	0.764	0.036	0.747	0.764
15	Atlas Copco Compressor Filter 3	1	1000.000	212.000	2.000	Not Available	2:1 Semi Ellipsoidal	2.000	Not Available	Not Available	0.036	0.747	0.764	0.036	0.747	0.764
16	Centac Compressor Desiccant Dryers (1000kPa)	4	1850.000	862.000	6.000	0.000	2:1 Ellipsoidal	6.000	4.500	0.000	1.211	6.509	6.612	4.842	26.035	26.447
	Centac Compressor Desiccant	2	1850.000	862.000	6.000	0.000	2:1 Ellipsoidal	6.000	4.500	0.000	1.211	6.509	6.612	2.421	13.017	13.224

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No.	Vessel Description:	Quantity:	Shell Length (mm):	Shell OD (mm):	Shell Nominal Wall (mm):	Shell Corr. Allow. (mm):	Head Design:	Head Nominal Wall (mm):	Head Wall A/F (mm):	Head Corr. Allow. (mm):	Calc. Volume per Vessel (m³):	Calc. Inner Surface Area per Vessel (m²):	Calc. Outer Surface Area per Vessel (m²):	Total Volume for Quantity (m³):	Total Inner Surface Area (m²):	Total Outer Surface Area (m²):
	Dryers (1000kPa, Galvanized)															
17	Centac Compressor Desiccant Dryers (De-Rated)	2	1850.000	862.000	6.000	0.000	2:1 Ellipsoidal	6.000	3.920	0.000	1.211	6.509	6.608	2.421	13.017	13.215
18	Centac Compressor 1 After Filter (Tegnon)	1	1200.000	260.000	5.000	Not Available	2:1 Semi Ellipsoidal & Flanged	5.000	Not Available	Not Available	0.061	1.063	1.134	0.061	1.063	1.134
19	Centac Compressor 2 After Filter (Tegnon)	1	1200.000	260.000	5.000	Not Available	2:1 Semi Ellipsoidal & Flanged	5.000	Not Available	Not Available	0.061	1.063	1.134	0.061	1.063	1.134
20	Centac Compressor 3 After Filter (Zander)	1	1000.000	168.300	2.000	Not Available	2:1 Semi Ellipsoidal & Flanged	2.000	Not Available	Not Available	0.022	0.575	0.590	0.022	0.575	0.590
21	Control Air Receivers	4	4800.000	2316.000	8.000	1.500	2:1 Ellipsoidal	10.000	Not Available	1.500	23.128	46.168	46.610	92.513	184.672	186.440
22	Service Air Receivers	1	4800.000	2316.000	8.000	1.500	2:1 Ellipsoidal	10.000	Not Available	1.500	23.128	46.168	46.610	23.128	46.168	46.610

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		Review Date	October 2027		

No.	Vessel Description:	Quantity:	Shell Length (mm):	Shell OD (mm):	Shell Nominal Wall (mm):	Shell Corr. Allow. (mm):	Head Design:	Head Nominal Wall (mm):	Head Wall A/F (mm):	Head Corr. Allow. (mm):	Calc. Volume per Vessel (m³):	Calc. Inner Surface Area per Vessel (m²):	Calc. Outer Surface Area per Vessel (m²):	Total Volume for Quantity (m³):	Total Inner Surface Area (m²):	Total Outer Surface Area (m²):
23	Hydrobin Air Receivers	4	412.000	1060.000	6.000	Not Available	2:1 Ellipsoidal	6.000	6.000	Not Available	0.150	1.679	1.741	0.600	6.718	6.962
24	Wet Ash Slurry Receiver	1	2400.000	1228.000	8.000	1.500	2:1 Ellipsoidal	8.000	8.000	1.500	3.235	12.327	12.533	3.235	12.327	12.533
25	Dust Conveying Centac After Coolers	5	1349.000	520.000	4.500	0.000	2:1 Ellipsoidal	4.500	3.000	0.000	0.312	2.733	2.784	1.558	13.663	13.920
26	Dust Conveying Centac After Filters (Dryer Inlets)	5	1200.000	468.000	5.000	0.000	2:1 Ellipsoidal & Flanged	6.000	4.700	0.000	0.210	2.126	2.257	1.051	10.632	11.284
27	Dust Conveying Centac After Filters (Dryer Outlets)	5	1200.000	468.000	5.000	0.000	2:1 Ellipsoidal & Flanged	6.000	4.800	0.000	0.210	2.126	2.257	1.051	10.632	11.284
28	Dust Plant Instrument Air Dryer IR D13500IN (External)	1	3390.000	1150.000	6.000	Not Available	2:1 Ellipsoidal	6.000	Not Available	Not Available	3.834	14.931	15.107	3.834	14.931	15.107

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No.	Vessel Description:	Quantity:	Shell Length (mm):	Shell OD (mm):	Shell Nominal Wall (mm):	Shell Corr. Allow. (mm):	Head Design:	Head Nominal Wall (mm):	Head Wall A/F (mm):	Head Corr. Allow. (mm):	Calc. Volume per Vessel (m³):	Calc. Inner Surface Area per Vessel (m²):	Calc. Outer Surface Area per Vessel (m²):	Total Volume for Quantity (m³):	Total Inner Surface Area (m²):	Total Outer Surface Area (m²):
29	Dust Plant Instrument Air Dryer Filter (External)	1	1200.000	468.000	5.000	Not Available	2:1 Ellipsoidal & Flanged	5.000	Not Available	Not Available	0.210	2.126	2.259	0.210	2.126	2.259
30	Dust Plant Instrument Air Dryer Cooler IR (External)	1	1325.000	540.000	4.500	Not Available	2:1 Ellipsoidal	4.500	Not Available	Not Available	0.333	2.822	2.897	0.333	2.822	2.897
31	Dust Plant Instrument Air Desiccant Dryers (Inside)	2	1900.000	1012.000	6.000	Not Available	2:1 Ellipsoidal	6.000	Not Available	Not Available	1.754	8.140	8.254	3.508	16.280	16.507
32	Dust Plant Instrument Air Filters 1 - 3 (Inside)	3	680.000	440.000	4.000	Not Available	2:1 Ellipsoidal & Flanged	4.000	Not Available	Not Available	0.110	1.278	1.346	0.331	3.833	4.039
33	Dust Plant Control Air Receiver U1	1	3000.000	1012.000	6.000	0.000	2:1 Ellipsoidal	6.000	4.500	0.000	2.618	11.596	11.748	2.618	11.596	11.748

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34	Dust Plant Control Air Receiver U4	1	2210.000	506.000	6.000	Not Available	2:1 Ellipsoidal	6.000	6.000	Not Available	1.998	9.114	9.250	1.998	9.114	9.250
35	Dust Plant Control Air Receiver U5	1	2210.000	506.000	6.000	Not Available	2:1 Ellipsoidal	6.000	6.000	Not Available	1.998	9.114	9.250	1.998	9.114	9.250
36	Dust Plant Control Air Receiver U6	1	2210.000	506.000	6.000	Not Available	2:1 Ellipsoidal	6.000	6.000	Not Available	1.998	9.114	9.250	1.998	9.114	9.250
37	North Water Treatment Plant Air Receiver	1	4800.000	2316.000	8.000	1.500	2:1 Ellipsoidal	8.000	Not Available	1.500	23.128	46.168	46.570	23.128	46.168	46.570
38	South Water Treatment Plant Air Receiver	1	4800.000	2316.000	8.000	3.000	2:1 Ellipsoidal	10.000	Not Available	3.000	23.128	46.168	46.610	23.128	46.168	46.610
39	Ammonium Hydroxide Re-use Tank	1	5200.000	2200.000	10.000	3.000	2:1 Ellipsoidal	10.000	7.000	2.000	22.121	45.931	46.390	22.121	45.931	46.390
40	Caustic Bulk Storage Vessel No.1 (G001)	1	5200.000	2900.000	10.000	1.000	2:1 Ellipsoidal	12.000	7.000	1.000	40.129	65.056	65.558	40.129	65.056	65.558

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41	Caustic Bulk Storage Vessel No.2 (G002)	1	5200.000	2900.000	10.000	1.000	2:1 Ellipsoidal	12.000	7.000	1.000	40.129	65.056	65.558	40.129	65.056	65.558
42	Caustic Re-use Tank	1	5200.000	1315.000	10.000	0.000	2:1 Ellipsoidal	10.000	7.000	0.000	7.418	24.796	25.202	7.418	24.796	25.202
43	Hot Water Tank No.1 (G002)	1	3250.000	2150.000	8.000	2.000	2:1 Ellipsoidal	8.000	7.000	2.000	14.168	31.675	31.969	14.168	31.675	31.969
44	Hot Water Tank No.2 (G001)	1	3250.000	1500.000	10.000	2.000	2:1 Ellipsoidal	10.000	7.500	2.000	6.440	19.867	20.168	6.440	19.867	20.168
45	Sulphuric Acid Re-Use Tank	1	5200.000	1500.000	10.000	0.000	2:1 Ellipsoidal	10.000	7.000	0.000	9.794	28.933	29.350	9.794	28.933	29.350
46	Sulphuric Acid Bulk Storage Vessel No.1 South	1	5200.000	2200.000	10.000	3.000	2:1 Ellipsoidal	12.000	7.000	3.000	22.121	45.931	46.390	22.121	45.931	46.390
47	Sulphuric Acid Bulk Storage	1	5200.000	2200.000	10.000	3.000	2:1 Ellipsoidal	12.000	7.000	3.000	22.121	45.931	46.390	22.121	45.931	46.390

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No.	Vessel Description:	Quantity:	Shell Length (mm):	Shell OD (mm):	Shell Nominal Wall (mm):	Shell Corr. Allow. (mm):	Head Design:	Head Nominal Wall (mm):	Head Wall A/F (mm):	Head Corr. Allow. (mm):	Calc. Volume per Vessel (m³):	Calc. Inner Surface Area per Vessel (m²):	Calc. Outer Surface Area per Vessel (m²):	Total Volume for Quantity (m³):	Total Inner Surface Area (m²):	Total Outer Surface Area (m²):
	Vessel No.2 South															
48	Sulphuric Acid Bulk Storage Vessel North	1	5200.000	2200.000	10.000	3.000	2:1 Ellipsoidal	12.000	7.000	3.000	22.121	45.931	46.390	22.121	45.931	46.390
49	Portable Air Receiver for Plater Shop	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
50	Portable Compressors with Receiver Model CQ092X	4	744.000	374.800	2.400	0.300	2:1 Ellipsoidal	2.350	2.350	0.300	0.093	1.158	1.179	0.371	4.634	4.718
51	Portable Compressors with Receiver Model NN200X	4	1136.000	451.700	2.850	0.400	2:1 Ellipsoidal	2.800	2.800	0.400	0.201	2.024	2.055	0.803	8.094	8.219
52	Portable Compressors with	3	1190.000	509.700	2.850	0.400	2:1 Ellipsoidal	2.800	2.800	0.400	0.266	2.412	2.446	0.799	7.236	7.337

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	Receiver Model NN270X															
53	Portable Compressor with Receiver Model 5H500	1	1601.600	600.000	4.000	Not Available	2:1 Ellipsoidal	3.500	3.500	Not Available	0.495	3.740	3.798	0.495	3.740	3.798
54	Portable Air Receiver for Welding Shop	1	1601.600	600.000	4.000	Not Available	2:1 Ellipsoidal	3.500	Not Available	Not Available	0.495	3.740	3.798	0.495	3.740	3.798
55	Portable Compressors with Receiver Model NF200X	2	1136.000	451.700	2.850	0.400	2:1 Ellipsoidal	2.800	2.800	0.400	0.201	2.024	2.055	0.401	4.047	4.110
Totals:		139												474.775	1205.708	1230.653
															2436.361	

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6 APPENDIX III: COLOUR IDENTIFICATION & CORROSION PROTECTION SPECIFICATIONS

Appendix III provides the Eskom Colour Identification Codes as per Eskom's Standard 240-145581571: Standard for the Identification of the Contents of Pipelines and Vessels, the External Corrosion Protection Specification (CPS) as per Eskom's Standard 240-106365693: Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings, as well as the Internal Corrosion Protection Specification as per Eskom's Standard: 240-101712128 Standard for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings for the vessels on the Outside Plant.

NOTE: Corrosion Protection Systems as developed by Eskom Asset Management shall be used. Any corrosion protection system proposed by the Contractor shall be subject to the approval from Eskom Asset Management as detailed in the above-mentioned Standards.

General					External Corrosion Protection Spec						Internal Corrosion Protection Spec						
No.	Vessel Description:	Quantity:	External Insulation:	Fluid & Function	Eskom External CPS:	Basic Colour & Code:	Primary Colour & Code:	Secondary Colour & Code:	Eskom Colour Identification Standard:	Eskom External Corrosion Protection Standard:	Internal Rubber Lining	Internal CPS:	Basic Colour & Code:	Primary Colour & Code:	Secondary Colour & Code:	Eskom Colour Identification Standard:	Eskom Internal Corrosion Protection Standard:
1	Diesel Generator Air Receivers	8	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-145581571	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-145581571	240-101712128
2	Diesel Generator Air Receivers	2	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-145581571	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-145581571	240-101712128

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General					External Corrosion Protection Spec						Internal Corrosion Protection Spec						
No.	Vessel Description:	Quantity:	External Insulation:	Fluid & Function	Eskom External CPS:	Basic Colour & Code:	Primary Colour & Code:	Secondary Colour & Code:	Eskom Colour Identification Standard:	Eskom External Corrosion Protection Standard:	Internal Rubber Lining	Internal CPS:	Basic Colour & Code:	Primary Colour & Code:	Secondary Colour & Code:	Eskom Colour Identification Standard:	Eskom Internal Corrosion Protection Standard:
3	Diesel Generator Air Receivers	2	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
4	Generator 20kV Breaker Air Receivers (20MPa)	10	None	Electrical Air	CPS 03	Arctic Blue Code: F28	Maroon Code: A01	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Maroon Code: A01	N/A	240-1455815 71	240-101712128
5	Generator 20kV Breaker Air Receivers (20MPa)	2	None	Electrical Air	CPS 03	Arctic Blue Code: F28	Maroon Code: A01	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Maroon Code: A01	N/A	240-1455815 71	240-101712128
6	Generator 20kV Breaker Air	4	None	Electrical Air	CPS 04	Arctic Blue Code: F28	Maroon Code: A01	N/A	240-1455815 71	240-106365693	None	N/A - 34CrMo4	N/A	N/A	N/A	N/A	N/A

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General					External Corrosion Protection Spec					Internal Corrosion Protection Spec							
No.	Vessel Description:	Quantity:	External Insulation:	Fluid & Function	Eskom External CPS:	Basic Colour & Code:	Primary Colour & Code:	Secondary Colour & Code:	Eskom Colour Identification Standard:	Eskom External Corrosion Protection Standard:	Internal Rubber Lining	Internal CPS:	Basic Colour & Code:	Primary Colour & Code:	Secondary Colour & Code:	Eskom Colour Identification Standard:	Eskom Internal Corrosion Protection Standard:
	Receivers (15MPa)																
7	Unitized H2 Dryers	12	None	Hydrogen	CPS 05	Light Stone Code: C37	Poppy Red Code: A14	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Light Stone Code: C37	Poppy Red Code: A14	N/A	240-1455815 71	240-101712128
8	Unitized Air Dryers	12	None	Electrical Air	CPS 05	Arctic Blue Code: F28	Maroon Code: A01	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Arctic Blue Code: F28	Maroon Code: A01	N/A	240-1455815 71	240-101712128
9	Hydrogen Storage Vessels	3	None	Hydrogen	CPS 03	Light Stone Code: C37	Poppy Red Code: A14	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Light Stone Code: C37	Poppy Red Code: A14	N/A	240-1455815 71	240-101712128
10	Diesel / Standby Compress or 1 Desiccant Dryers	2	None	Service Air	CPS 03	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128

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General					External Corrosion Protection Spec						Internal Corrosion Protection Spec						
No.	Vessel Description:	Quantity:	External Insulation:	Fluid & Function	Eskom External CPS:	Basic Colour & Code:	Primary Colour & Code:	Secondary Colour & Code:	Eskom Colour Identification Standard:	Eskom External Corrosion Protection Standard:	Internal Rubber Lining	Internal CPS:	Basic Colour & Code:	Primary Colour & Code:	Secondary Colour & Code:	Eskom Colour Identification Standard:	Eskom Internal Corrosion Protection Standard:
11	Diesel / Standby Compress or 2 Desiccant Dryers	2	None	Service Air	CPS 03	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128
12	Diesel / Standby Compress or 2 After Filter (Tegnon)	1	None	Service Air	CPS 03	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128
13	Atlas Copco Compress or Filter 1	1	None	Service Air	CPS 04	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128
14	Atlas Copco Compress or Filter 2	1	None	Service Air	CPS 04	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128

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			Review Date	October 2027		

General					External Corrosion Protection Spec						Internal Corrosion Protection Spec						
No.	Vessel Description:	Quantity:	External Insulation:	Fluid & Function	Eskom External CPS:	Basic Colour & Code:	Primary Colour & Code:	Secondary Colour & Code:	Eskom Colour Identification Standard:	Eskom External Corrosion Protection Standard:	Internal Rubber Lining	Internal CPS:	Basic Colour & Code:	Primary Colour & Code:	Secondary Colour & Code:	Eskom Colour Identification Standard:	Eskom Internal Corrosion Protection Standard:
15	Atlas Copco Compress or Filter 3	1	None	Service Air	CPS 04	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128
16	Centac Compress or Desiccant Dryers (1000kPa)	6	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
17	Centac Compress or Desiccant Dryers (De-Rated)	2	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
18	Centac Compress or 1 After	1	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
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	Filter (Tegnon)																
19	Centac Compress or 2 After Filter (Tegnon)	1	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
20	Centac Compress or 3 After Filter (Zander)	1	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
21	Control Air Receivers	4	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
22	Service Air Receivers	1	None	Service Air	CPS 03	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128

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23	Hydrobin Air Receivers	4	None	Service Air	CPS 03	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128
24	Wet Ash Slurry Receiver	1	None	Service Air	CPS 04	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128
25	Dust Conveying Centac After Coolers	5	None	Pneumatic conveying	N/A - SA240 316L (Stainless Steel)	N/A	N/A	N/A	N/A	N/A	None	N/A - SA240 316L (Stainless Steel)	N/A	N/A	N/A	N/A	N/A
26	Dust Conveying Centac After Filters (Dryer Inlets)	5	None	Pneumatic conveying	CPS 03	Light Grey Code: G29	N/A	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Light Grey Code: G29	N/A	N/A	240-1455815 71	240-101712128

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27	Dust Conveying Centac After Filters (Dryer Outlets)	5	None	Pneumatic conveying	CPS 04	Light Grey Code: G29	N/A	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Light Grey Code: G29	N/A	N/A	240-1455815 71	240-101712128
28	Dust Plant Instrument Air Dryer IR D13500IN (External)	1	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
29	Dust Plant Instrument Air Dryer Filter (External)	1	None	Control Air	CPS 05	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
30	Dust Plant Instrument Air Dryer	1	None	Control Air	CPS 03	Arctic Blue	Salmon Pink	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue	Salmon Pink	N/A	240-1455815 71	240-101712128
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	Cooler IR (External)					Code: F28	Code: A40						Code: F28	Code: A40			
31	Dust Plant Instrument Air Desiccant Dryers (Inside)	2	None	Control Air	CPS 05	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
32	Dust Plant Instrument Air Filters 1 - 3 (Inside)	3	None	Control Air	CPS 05	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
33	Dust Plant Control Air Receiver U1	1	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
34	Dust Plant Control Air Receiver U4	1	None	Control Air	CPS 04	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
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35	Dust Plant Control Air Receiver U5	1	None	Control Air	CPS 04	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
36	Dust Plant Control Air Receiver U6	1	None	Control Air	CPS 04	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	None / Alternative by Eskom RT&D	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
37	North Water Treatment Plant Air Receiver	1	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
38	South Water Treatment Plant Air Receiver	1	None	Control Air	CPS 03	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-106365693	None	GAM/MAT /22/235	Arctic Blue Code: F28	Salmon Pink Code: A40	N/A	240-1455815 71	240-101712128
39	Ammonium Hydroxide	1	30mm Fibreglass &	Alkalis	CPS 06	Dove Grey	N/A	N/A	240-1455815 71	240-106365693	None according to drawing	None / Alternative	Dove Grey	N/A	N/A	240-1455815 71	240-101712128
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	Re-use Tank		Aluminium Cladding			Code: G22						by Eskom RT&D	Code: G22				
40	Caustic Bulk Storage Vessel No.1 (G001)	1	30mm Fibreglass & Aluminium Cladding	Alkalis	CPS 06	Dove Grey Code: G22	N/A	N/A	240-1455815 71	240-106365693	None according to drawing	None / Alternative by Eskom RT&D	Dove Grey Code: G22	N/A	N/A	240-1455815 71	240-101712128
41	Caustic Bulk Storage Vessel No.2 (G002)	1	30mm Fibreglass & Aluminium Cladding	Alkalis	CPS 06	Dove Grey Code: G22	N/A	N/A	240-1455815 71	240-106365693	None according to drawing	None / Alternative by Eskom RT&D	Dove Grey Code: G22	N/A	N/A	240-1455815 71	240-101712128
42	Caustic Re-use Tank	1	30mm Fibreglass & Aluminium Cladding	Alkalis	CPS 06	Dove Grey Code: G22	N/A	N/A	240-1455815 71	240-106365693	GAM/MAT /22/234	None / Alternative by Eskom RT&D	N/A	N/A	N/A	240-1455815 71	240-101712128

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43	Hot Water Tank No.1 (G002)	1	50mm Fibreglass & Aluminium Clad	Demineralized Water	CPS 06	Strong Blue Code: F11	White Code: No Number	N/A	240-1455815 71	240-106365693	GAM/MAT /22/234	None / Alternative by Eskom RT&D	N/A	N/A	N/A	240-1455815 71	240-101712128
44	Hot Water Tank No.2 (G001)	1	50mm Fibreglass & Aluminium Clad	Demineralized Water	CPS 06	Strong Blue Code: F11	White Code: No Number	N/A	240-1455815 71	240-106365693	GAM/MAT /22/234	None / Alternative by Eskom RT&D	N/A	N/A	N/A	240-1455815 71	240-101712128
45	Sulphuric Acid Re-Use Tank	1	30mm Fibreglass & Aluminium Cladding	Acids	CPS06	Jacaranda Code: F18	N/A	N/A	240-1455815 71	240-106365693	GAM/MAT /22/234	None / Alternative by Eskom RT&D	N/A	N/A	N/A	240-1455815 71	240-101712128
46	Sulphuric Acid Bulk Storage Vessel No.1 South	1	30mm Fibreglass & Aluminium Cladding	Acids	CPS06	Jacaranda Code: F18	N/A	N/A	240-1455815 71	240-106365693	None according to drawing	None / Alternative by Eskom RT&D	Jacaranda Code: F18	N/A	N/A	240-1455815 71	240-101712128
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47	Sulphuric Acid Bulk Storage Vessel No.2 South	1	30mm Fibreglass & Aluminium Cladding	Acids	CPS06	Jacarana Code: F18	N/A	N/A	240-1455815 71	240-106365693	None according to drawing	None / Alternative by Eskom RT&D	Jacarana Code: F18	N/A	N/A	240-1455815 71	240-101712128
48	Sulphuric Acid Bulk Storage Vessel North	1	30mm Fibreglass & Aluminium Cladding	Acids	CPS06	Jacarana Code: F18	N/A	N/A	240-1455815 71	240-106365693	None according to drawing	None / Alternative by Eskom RT&D	Jacarana Code: F18	N/A	N/A	240-1455815 71	240-101712128
49	Portable Air Receiver for Plater Shop	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
50	Portable Compressors with Receiver	4	None	Service Air	CPS 04	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	No Access - Request from RT&D if Needed	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128
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	Model CQ092X																
51	Portable Compressors with Receiver Model NN200X	4	None	Service Air	CPS 04	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	No Access - Request from RT&D if Needed	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128
52	Portable Compressors with Receiver Model NN270X	3	None	Service Air	CPS 04	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	No Access - Request from RT&D if Needed	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128
53	Portable Compressor with Receiver Model 5H500	1	None	Service Air	CPS 04	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	No Access - Request from RT&D if Needed	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128

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54	Portable Air Receiver for Welding Shop	1	None	Service Air	CPS 03	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	No Access - Request from RT&D if Needed	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128
55	Portable Compressors with Receiver Model NF200X	2	None	Service Air	CPS 04	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-106365693	None	No Access - Request from RT&D if Needed	Arctic Blue Code: F28	N/A	N/A	240-1455815 71	240-101712128
Totals:		139															

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APPENDIX IV: SECTION 1 - GAM/MAT/22/234 INTERNAL CORROSION PROTECTION SPECIFICATION RUBBER

GAM/MAT/22/234: Matla Power Station Statutory Pressure Vessels Corrosion Protection Rubber

To be considered as Annexure D of 240-101712128: “Standard for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings”	
Vessel/Components	Various Existing Rubber Lined Statutory Pressure Vessels including Vessel Piping attachments and Flange Faces. These vessels include: - Hot Water Tanks - Sulphuric Acid Re-use Tank - Caustic Re-use Tank NOTE: For any statutory pressure vessels that are not mentioned above but are rubber lined by design, it is recommended that before this specification is used, Eskom Material Plant & Integrity, Corrosion Section shall be consulted. For detailed data with respect to type, sizes, quantities, access, manholes sizes and quantity, manufacturing standards etc. refer to Scope of Work section of the enquiry document.
Material/Substrate	Existing steel - Internally rubber lined (aged rubber).
Environment (Internal Immersed)	Aqueous Solution/Mixture - Hot Water/Steam - Sulphuric Acid Solution - Caustic Soda Solution Design Pressure 100 – 500 (kPa) Design Temperature Ambient – 120 (°C) NOTE: In terms of the high temperatures it is imperative that the Tenderer consult/consider and then comply with the requirements in section 4.2.1 especially with respect to the proposed product’s recommended service/operating temperature limits. NB – refer to more specific details in the Scope of Work document.
Generic System (Internal Surface): Pre-cured Butyl Rubber Lining (Grade B): 40 - 70 IRHD as per SANS 1198. The adhesion of the rubber lining to substrate shall be ≥ 3.5 N	

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Rubber Lining Thickness	Lining thickness shall be 5 mm.
Rubber Lining Options	Rubber lining options shall be determined by inspection findings: - Rubber Lining Patch Repairs. - Complete Rubber Lining Replacement.
Surface Preparation	Internal Surface – Steel Material: - 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.
The corrosion protection of the vessels and associated piping will be performed in situ at Matla Power Station	
1. Rubber Lining Patch Repairs The scope of work for Option 1 (Rubber Lining Patch Repairs) shall include the following: 1.1. Conduct a detailed visual inspection and pin-hole detection testing (no more than 3 kilovolts per mm) on the existing rubber to check the condition of the rubber lining and identify the defects. Identify and mark-up the defects or the areas requiring the repairs. Eskom shall witness all aspects of the inspection and be responsible for the selection of repair areas or complete relining. 1.2. The piping supports and nozzles inside the vessels may require removal in order to allow access inside the vessel. 1.3. 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 existing rubber in the marked-up areas. For smaller areas to be patch repaired where abrasive cleaning is impractical the Rubber Liner or Contractor shall propose suitable cleaning method/s. The cleaning method/s shall be submitted to Eskom for review and approval before commencement of the work.	

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- 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 to Eskom for approval. 1.4. Power and hand tool cleaning is only applicable to localised patch repairs. Hand-tool cleaning for isolated/localised areas may be utilised provided the required standard of finish is achieved. For all internal applications final mechanical cleaning shall be by bristle blaster in order to create a surface profile. 1.5. 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. 1.6. Burnishing of the surface shall not be permitted. 1.7. 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. Unnecessary traffic prior to painting/lining shall be avoided. 1.8. 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. 1.9. Once the above activities have been completed conduct rubber lining patch repairs of the affected areas. In the event that the pre-cleaned substrate has been exposed for more than 4 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. 2. Complete Rubber Lining Replacement The scope of work for option 2 (Complete Rubber Lining Replacement) will include the following: 2.1. Internal parts such as piping supports and nozzles that are removable shall be removed from the vessel, the old rubber stripped out and replaced with butyl rubber grade B with 40-70 IRHD. 2.2. All components in the vessel shall be rubber lined except components constructed from stainless steel or plastic. 2.3. 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.

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2.4. Inspect and assess the extent of possible pitting and corrosion of the underlying steel substrates, it may be necessary to determine the need for possible mechanical repairs i.e. welding. Should these repairs be required the Contractor shall propose substrate repair procedures and submit these to Eskom for approval. 2.5. Proceed with rubber lining operation once the above inspections and welding repairs have been completed. 2.6. Subsequent surface preparation shall be by means of abrasive blast cleaning method. Abrasive blast cleaning to grade Sa 3 in accordance with ISO 8501-1. 3. General Requirements 3.1. The Eskom standard 240-101712128 (Section 5 in particular), SANS 1201, SANS 1198 and BS 6374-5 shall apply for the Manufacturer, selection and installation of rubber lining. 3.2. The Rubber Liner or 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 (III), (V) and (VI)) shall apply. 3.3. Surface preparation by abrasive blasting shall be performed by means of conventional handheld blasting equipment capable of removing remaining/residual rubber, corrosion product, rust and suitably preparing the substrate to the required cleanliness - Grade Sa 3 in accordance with ISO 8501-1. 3.4. After the old rubber lining is removed and surface preparation complete, a detailed visual inspection shall be carried out to check for defects on steel substrates. Unfortunately, this inspection can only be carried out once the surfaces have been prepared for lining. Based on the damage on the vessel it may be required to conduct mechanical and repairs before rubber lining. 3.5. The Contractor shall submit the above repair procedures to Eskom for the review and approval. Repair procedures for the works shall include the welding and non-destructive testing requirements on the steel surfaces. 3.6. Rubber lining processes, whether patch or complete relining, shall only proceed once all mechanical repairs or activities on the vessels have been completed and released in terms of the applicable manufacturing/fabrication Quality Control Plan (QCP). 3.7. Pre-cured Butyl rubber grade B with 40-70 IRHD is the specified material for the internal surfaces. Pre-cured rubber lining sheet is typically inflexible (not pliable) relative to other rubbers. The Rubber Liner or Contractor shall propose the application method to ensure the correct bond and adhesion strength between the vessel support geometries and rubber lining.
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3.8. The rubber lining thickness of 5mm is specified. The Rubber Liner or Contractor shall confirm the specified thickness as satisfactory for the application. 3.9. The Manufacturer/s of the rubber lining material and adhesive or Contractor shall select the relevant primer and or adhesive systems for the type of rubber lining (butyl rubber) material, substrate and service conditions to ensure compatibility. All the products to be used in the system shall be supplied by the same Manufacturer. 3.10. All parts comprising corrosion protection systems required in the table above shall be supplied by the same Manufacturer. Should this not be possible the rubber lining Supplier shall confirm suitability or compatibility of the particular product with his system. 3.11. The responsibility for selecting the type of rubber system required by Eskom for the application above rests solely with the Applicator and his material (primer, compound and adhesive) Suppliers. 3.12. Prior to rubber lining installation the Contractor shall supply test sample panels of about 200 mm X 300 mm X 3 mm with a rubber lining thickness of 5 mm. Properties such as hardness and adhesion will be tested by Eskom to ensure compliance to both the product data sheet and the above-mentioned standard (SANS 1201), including all the Normative references contained therein. 3.13. In addition to the panel samples above, representative (considering different batches), loose rubber sheeting 500 mm X 500 mm X 5 mm shall be submitted for confirmation of correct rubber type (by Fourier Transform Infrared Spectroscopy) and tensile testing before the commencement of any lining in order to ensure compliance to both the product data sheet and the standard (SANS 10037), including all the Normative references contained therein. 3.14. 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. 3.15. During corrosion protection application of the vessel the Rubber Liner shall prepare (200 mm X 300 mm X 3 mm) test panels with a rubber lining thickness of 5 mm at the same time and under the same conditions as the vessel. The prepared test panels shall be sent to Eskom for adhesion/peel testing as per the requirements of SANS 1201 section 9.4. 3.16. The Corrosion Protection Applicator or Contractor shall supply the relevant batch certificates for each of the lining products used. 3.17. It is strongly recommended that engineering subject matter experts (welding engineers and NDT subject matter experts) are consulted for mechanical repair activities.

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3.18. The engineering experts in consultation with the Rubber Liner or Contractor and Lining Manufacturer shall compile detailed application procedures for the works. The procedure shall be submitted to Eskom for review and approval. The Contractor shall be wholly responsible for the surface preparation and lining application. 3.19. Weld beads with a surface irregularity exceeding 3 mm or with sharp crests having a radius less than 3 mm shall be ground. 3.20. All welds shall be free of slag, slag inclusions and pinholes. Adjacent areas shall be free of weld spatter, which shall be removed by grinding or scraping. 3.21. All surfaces shall be completely dry and free from contaminants such as traces of oil, grease, etc., before surface preparation is carried out. 3.22. 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. 3.23. 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. 3.24. 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. 3.25. Prior to any surface preparation all surfaces that are, or are likely to be contaminated with oil or grease as a result of the fabrication or repair process shall be solvent cleaned with a suitable water-soluble biodegradable alkaline cleaner/detergent or with appropriate organic solvents. 3.26. 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. 3.27. 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.

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3.28. 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. 3.29. The Contractor shall ensure that during surface preparation and rubber lining activities the relative humidity (RH) in open, undercover shop environments 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 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. 3.30. During periods of inclement or cold weather conditions the environmental parameters shall be measured and recorded hourly. In the event that 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 240-101712128. 3.31. 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. 3.32. Different grades and types of blasting media exist. It is important that the correct abrasive be used in combination with a specific rubber lining 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. 3.33. Only inert mineral grit or steel grit abrasives shall be used. Steel grit is preferred in sensitive plant areas such as Water Treatment Plants in order to ensure no contamination of plant. Sand or silica-based abrasives shall not be used. Abrasive material for blast cleaning shall be used in line with local environmental regulations. 3.34. 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 in order to minimize the amount of waste grit and dust generated and contamination of the surfaces. 3.35. The use of re-cycled blasting media for the final blast is strictly prohibited. 3.36. All abrasive media shall be stored in an area that is completely dry, covered and protected from weather.
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- 3.37.

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.
- 3.38.

All compressed air for blasting 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.
- 3.39.

After surface preparation, all dust, grit blasting media or any other deleterious matter shall be removed from the surfaces by vacuuming. The process shall be repeated until the required level of dust and debris removal is achieved. It is imperative that all surface dirt and contaminants are completely removed before primer or the adhesion of the rubber shall be impaired.
- 3.40.

On completion of grit blasting the surface shall be thoroughly vacuumed until no loose dust is evident. The level of cleanliness required shall be less than “dust quality rating” 1 when tested in accordance with ISO 8502-3.
- 3.41.

In order to avoid recontamination and flash rusting of the surfaces, the primer shall be applied within 4 hours after final surface preparation of the steel surfaces. Under no circumstances shall the blast be permitted to stand overnight.
- 3.42.

The profile height of the blasted surfaces should be within the range of the specified system. Refer to the Manufacturers Product Data Sheets.
- 3.43.

It is important that the blast profile does not exceed the specified DFT of the primer. Blast cleaning of severely corroded surfaces may result in high profiles i.e. > than 100 microns.
- 3.44.

In these cases, the primer shall be applied by brush/roller to ensure complete wet-out of the pitted/jagged surface. However, agreement should be reached between the Applicator and primer Manufacturer as to the most suitable profile range, with due consideration of the application method, for the specific primer.
- 3.45.

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.
- 3.46.

All joints of lined rubber shall be strapped as per BS 6374-5.
- 3.47.

All surfaces shall be pinhole tested (only after completion of all handling, moving and equipment and scaffolding removal) 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.

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3.48. For all inspections of all surface preparation and 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. 3.49. The installed lining shall present a smooth appearance and be free of voids, blisters, pinholes, cracks, open seams, excessive squeeze out of adhesive at the joints (>10 mm on either side), entrapped air or any other defects which will impair its use. Defective areas shall be cause for rejection of the lining. 4. Tender Returnables 4.1. Mandatory Tender Returnables 4.1.1 At the time of tender verifiable evidence shall be submitted, clearly indicating, that the Rubber Liner has experience in the application of rubber lining systems in comparable environments i.e. tanks/confined spaces. In this regard the experience shall, as a minimum, be equal to the surface area (m²) as defined in enquiry and Scope of Work (SOW) documents. This verifiable evidence shall be for projects where vessels have been successfully lined by the Contractor, within the last five years. The verifiable evidence shall include formal signed off QCP's or release certificates and contact details for the listed reference projects. 4.2. Tender Returnables for Evaluation 4.2.1 The System Supplier or Rubber Liner or Applicator or Contractor shall supply individual product datasheets and material safety datasheets (MSDS) for all products comprising the system i.e. rubber lining, adhesives, tack coats and solvents. As a minimum the following shall be submitted: • A description of the generic type of rubber lining. • Physical and chemical properties as per Table 4 of SANS 1198. • Recommended and non-recommended uses. • Surface preparation requirements. • Maximum recommended service temperature which shall be a minimum of 30 % greater than the maximum temperatures as is indicated in the table at the top of this specification sheet.
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Service temperatures and chemical resistance limits. For the chemical resistance, special property (I), (III), (V) and (VI) as per SANS 1198 Clauses 4.2.2 (d), 4.2.3 (b) in conjunction with the environment and operating conditions in the table above in this specification sheet shall apply. Confirmation that the lining shall not contaminate the system/process fluid to be handled. Special property (V & VI) as per 240-101712128 and SANS 1198. The approved test results or certificates from the independent laboratory shall be written in English.
4.2.2 A detailed procedures/method statements shall be submitted to Eskom at the time of tender detailing all steps, procedures and activities of the lining application process. The steps to be considered includes: - The methods, steps, sequence and equipment required for ventilation and dust mitigation. - Grease decontamination and washing. - Soluble salt decontamination. - Methods for dust and debris removal, maintaining and ensuring cleanliness between adhesives and lining shall be described. - The Method Statement shall detail the precise sequence and breakdown of work areas/activities in order to apply the system with due consideration of dust contamination. - The Method Statement shall also consider the most efficient methods and sequencing to avoid unnecessary delays that may have an impact i.e. time required for removal of spent abrasive grit and dust/debris. - All inspection interventions during and after completion of rubber installation shall be considered and included. - The Method Statement shall describe all measures and details for establishing and maintaining: - The environmental conditions as required by this specification. - The required ventilation for the prevention and/or management of fumes and dust build-up. The number of extraction fans; mounting diameters, sizes and mounting methods of fans to manholes; power rating of fans; positioning of fans and direction of intended air flow shall be described and detailed.

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4.2.3 A detailed Quality Control Plan (QCP) shall be submitted at the tender stage and shall detail all inspections and tests with acceptance criteria during lining application. Inspections during lining application shall at least cover a compressed air blotter test for blasting, surface preparation, environmental parameters, rubber thickness, hardness, adhesion, continuity and visual tests. Tests for continuity shall be carried out using the high frequency spark test method. 4.2.4 List of deviations or exclusions from this specification. If there are none then there shall be a definitive written statement to such effect. This mentioned list of deviations or definitive written statement shall be used as part of the contract. In addition to this statement the Contractor, Rubber Liner or Manufacturer shall also provide a definitive statement of the submission of samples as prescribed above. 4.2.5 The applied lining shall be guaranteed jointly by the rubber lining manufacture and Rubber Liner or Contractor. This guarantee with proposed terms and conditions shall be submitted at the time of tender. The applied rubber lining system shall perform in the given environment for a minimum of 10 years. 5. Safety Requirements and Considerations 5.1. During the application of rubber lining, care shall be taken to ensure adequate ventilation and lighting, to avoid/minimise health and safety risks. 5.2. 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. 5.3. 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. 5.4. Walking / Working Surfaces and Visibility: Poor lighting may add to hazards caused by an irregular, sloped, or constricted working surface. 5.5. Any solid waste materials or liquids stripped or generated during the lining operations shall be discarded in accordance with the requirements of the appropriate national and/or local authorities or the requirements of Eskom.

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5.6. Special care needs to be taken when working with all coatings/linings. Prior to the use of any coating/lining material, the Material Safety Data Sheets shall be obtained from the relevant Manufacturer. The Contractor shall be familiar with the contents of these 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. 5.7. 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. 5.8. The Contractor shall provide for all necessary safety precautions and risk assessments. 5.9. All materials shall be stored in designated areas in storage facilities that meet the storage requirements of the Rubber Liner 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. 5.10. The Contractor's Safety File for the area to be worked it 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. 5.11. The Contractor shall ensure that the abrasive materials used conform to all National Health and Safety Standards. <i>Specifically with respect to CSs and based on the descriptions and definitions of safety risks as per the above points it is <u>imperative</u> that the Contractor's Method Statement shall describe in <u>detail</u>, the measures and mitigation steps for the risks and hazards as identified in this specification sheet.</i> <i>It is compulsory that these safety risks/mitigation measures and any others as identified by the Contractor be included in the Method Statement. Prior to the commencement of any work the Method Statement shall be submitted for review, acceptance/rejection by the respective Power Station Risk and Safety office/department.</i>
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6. 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. 6.1. 240-101712128: Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Coatings. 6.2. 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". 6.3. SANS 1198: The manufacture of rubber sheeting for rubber lining. 6.4. BS 6374-5: Lining of equipment with polymeric materials for the process industries. 6.5. SANS 1201: The application of rubber linings to pipes, pipe fittings and vessels. 6.6. SANS 10037: Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties. 6.7. ASTM D5162: Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates. 6.8. ASTM E376: Measuring coating DFT by magnetic field or eddy current electromagnetic test Methods. 6.9. ASTM F21: Standard Test Method for Hydrophobic Surface Films by the Atomizer Test. 6.10. 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. 6.11. 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). 6.12. 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. 6.13. 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).

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6.14. SIS 055900: Swedish Code of Practice - Pictorial surface preparation standard for painted steel surfaces. (Can be used as alternative to ISO 8501 – 1).	
Submitted by: 	Accepted by: 
Name: N. Pheta Title: Senior Advisor Date: 12 December 2022	Name: K. Northcott Title: Senior Consultant Date: 12 December 2022

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**APPENDIX IV: SECTION 2 - GAM/MAT/22/235 INTERNAL CORROSION PROTECTION
SPECIFICATION ORGANIC LINING**

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Table 1a. Generic Internal System for low temperatures < 50°C = Solvent Free Epoxy.	
Primer (Optional)	Should a primer be required for holding the blast then the use of a suitable epoxy primer may be considered and then proposed by the Manufacturer/Contractor. The primer as selected by the manufacturer shall be compatible with the subsequent top coats and shall be a primer system that is normally used for immersion. Note: The thickness of the primer shall consider complete "Wetting" of the surface with due consideration of blast profile height.
First Coat	After allowing sufficient time (as recommended by the coating Manufacturer) for the primer coat to cure, then immediately prior to spray application of the first intermediate coat all accessible edges, weld seams, bolt holes and other crucial areas shall be stripe coated by brush using the first/intermediate coating. Regardless of whether a primer is used or not, stripe coating shall be performed. Apply by airless spray, one coat Two Component Solvent Free Amine Cured Epoxy coating from 350 - 450 micron. Thinning in excess of 5% shall not be permitted.
Final Coat	After allowing sufficient time for the first coat and stripe coating to cure, the Manufacturer's recommendations shall be adhered to in this regard, apply by airless spray, one coat Two Component Solvent Free Amine Cured Epoxy coating from 350 - 450 micron. Thinning in excess of 5% shall not be permitted. Total System Minimum Dry Film Thickness (DFT), excluding Primer = 700 – 900 microns.
Table 1b. Generic Internal System for temperatures of 50 - 65°C = High Solids Flake Filled Vinyl Ester or Epoxy/Novolac Epoxy.	
Primer (Optional)	Should a primer be required for holding the blast then the use of a suitable epoxy primer may be considered and then proposed by the Manufacturer/Contractor.

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	The primer as selected by the manufacturer shall be compatible with the subsequent top coats and shall be a primer system that is normally used for immersion. Note: The thickness of the primer shall consider complete "Wetting" of the surface with due consideration of blast profile height.
First Coat	After allowing sufficient time (as recommended by the coating Manufacturer) for the primer coat to cure, then immediately prior to spray application of the first intermediate coat all accessible edges, weld seams, bolt holes and other crucial areas shall be stripe coated by brush using the first/intermediate coating. Apply by airless spray, one coat Two Component High Solids Flake Filled Vinyl Ester or Epoxy/Novolac from 400 – 500 microns. Thinning in excess of 5% shall not be permitted.
Final Coat	After allowing sufficient time for the first coat and stripe coating to cure, the Manufacturer's recommendations shall be adhered to in this regard, apply by airless spray, one coat Two Component High Solids Flake Filled Vinyl Ester or Epoxy/Novolac from 400 – 500 microns. Thinning in excess of 5% shall not be permitted. The colour of the final coat or repairs shall be different from the first coat. Total System Minimum Dry Film Thickness (DFT), excluding Primer = 800 – 1000 microns.
With respect to aspects not mentioned in the above coating specification table (e.g. mixing ratios, pot life, straining, thinning, induction times, over-coating and curing times), the Manufacturer's recommendations shall be strictly adhered to.	
This specification sheet caters for, and is applicable to new vessels, old vessels, off-site, on-site, in-situ corrosion protection <u>by organic coatings</u>. The applicable requirements for each of the above cases as included in this sheet shall apply. This specification sheet also caters for coating of new steel, repair to existing coatings or complete removal and recoating. The appropriate specific clause/section for each case/scenario shall apply. If so required, the Corrosion Section should be contacted on a case-by-case basis for input into the possible scenarios and appropriate system selection described above.	

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1. Specific Requirements 1.1. The detailed scope of work; vessel sizes and quantities are specified in the Scope of Work document for this project. 1.2. The vessels are new steel or previously epoxy coated and corroded. Corrosion protection shall be by abrasive grit blasting (surface preparation) followed by coating. 1.3. A detailed visual inspection shall be carried out by the Eskom engineer to identify and mark-up all areas that need to be repaired/reinstated OR completely recoated. Based on the inspection (section 4.13 of 240-101712128 can assist in providing guidance) as well as NDT results. The Eskom Engineer will instruct the Applicator whether to perform patch repairs of the coating or complete recoating. 1.4. Corrosion Protection shall only proceed once all mechanical repairs, fabrication, manufacturing activities i.e. cutting and welding have been completed and released in terms of the manufacturing/fabrication Quality Control Plan (QCP). 1.5. The more stringent requirement shall apply in cases where there may be contradictory or conflicting requirements between this specification sheet and referenced standards in Section 6. 1.6. The Applicator shall take cognisance of the fact that after initial surface preparation as above, Eskom may require further inspection and assessment to determine the need for possible mechanical repairs i.e. welding. Unfortunately, this inspection can only be carried out once the surfaces have been blast cleaned in preparation for coating. The depth and morphology of corrosion damage, extent of component wall thickness loss and pitting needs to be considered. For steel, the following guide (obviously dependent on installed wall thickness) can be applied to all areas of extensive deep pitting: - All pits less than 2mm in depth and all edges and weld seams shall be stripe coated after application of the primer/first coat. - All pits in excess of 2mm and up to 5 mm in depth shall be filled using a compatible two component solvent free epoxy filler. The filler to be used shall be supplied by the same supplier as the rest of the coating system and confirmed to be compatible to the specified coating system. - If accessible, severely grooved/corroded welds shall be filled by welding (repair procedure shall be submitted to Eskom for approval). Perforations and defects, pitting etc. which are close to approaching the wall thickness shall be repaired by welding in steel plate. The plate shall be welded onto the internal/immersed surface. 1.7. At all times care shall be taken to ensure adequate protection of any surfaces and parts of components or systems not requiring blast cleaning and coating (as an example valve seats/trim, pump inlets) and every effort shall be taken to prevent grit, water and other dirt entering drain systems, tank/vessel inlet/outlet piping or settling on isolating valves seats, shafts etc.

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1.8.	Equipment name plates and identification plates shall be protected from coatings. No coatings shall be applied over any surfaces where these will adversely affect the performance of the item or component.
1.9.	All materials, i.e. paint, solvents and cleaning agents for a specific paint system shall be supplied by the same Manufacturer. The solvents used shall be those recommended and manufactured by the paint 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.
1.10.	The technique/method of application shall be agreed between the Applicator and coating Manufacturer and presented in the Method Statement as required further below. The Method Statement shall be reviewed by Eskom for acceptance prior to commencement of any work.
1.11.	In cases of refurbishment/recoating of existing components which have been exposed to air that has been contaminated with raw or cooling water, the steel substrate shall be tested for chloride contamination, according to ISO 8502-6.
1.12.	Casting substrates which may be pitted and/or rough and porous are inherently susceptible to soluble salt contamination. Testing shall be performed prior to final surface preparation.
1.13.	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 100mg/m²), the surfaces shall 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.
1.14.	Soluble salt testing shall be repeated on representative test patches which shall be blast cleaned to Grade Sa 3. 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.
1.15.	Prior to any surface preparation all surfaces that are, or are likely to be contaminated with oil or grease as a result of the service conditions or fabrication/manufacturing process shall be solvent cleaned with a suitable water-soluble biodegradable alkaline cleaner/detergent or with appropriate organic solvents.
1.16.	Cleaning may be performed by using rags (for small areas), an immersion tank (for small items) 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.
1.17.	Degreased and water washed surfaces shall be checked for residual oil and grease using the atomized water spray test as per reference 6.8 and further degreasing shall be carried out if residual oil or grease is found to be present.

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1.18. A black light test shall be used to check for oil contamination. Zero oil and grease contamination is 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. 1.19. Freedom of dust and debris shall be checked as far as is accessible to perform the test. The level of cleanliness required shall be less than "dust quality rating" 1 when tested in accordance with ISO 8502-3. 1.20. With regards to specifically patch repairs, the compatibility between the existing aged coating and the subsequent coating, as per the above table in this specification shall first be checked prior to proceeding with large scale repairs. 1.21. The new/repair system shall be applied to a test area. If no softening of the existing coating occurs, then full scale repair can proceed.
2. General Requirements 2.1. The Applicator shall be wholly responsible for the surface preparation and coating application. The coated surfaces shall meet the DFT as required by this specification sheet and aspects thereof in referenced documents. 2.2. Rounded edges are required in order to be able to apply the protective coating uniformly and to attain adequate coating DFTs on sharp edges, refer to ISO 12944-3 should more detail be required. 2.3. All sharp edges from the original fabrication shall be rounded or chamfered and burrs around holes and along other cut edges shall be removed. All edges to be rounded off with a grinder to a radius of 3mm or more. 2.4. Weld beads with a surface irregularity exceeding 3mm or with sharp crests having a radius less than 3mm shall be ground. 2.5. Power and hand tool cleaning is only applicable to very localised touch ups or patch repairs. Specific requirements for patch repairing a coating system are defined in section 4.8.6 of 240-101712128. 2.6. Hand-tool cleaning for isolated/localised areas may be utilised provided the required standard of finish is achieved. For all immersion applications final mechanical cleaning shall be by bristle blaster in order to create the required surface profile.

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2.7.	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 and where the protective coating system is designed for application to brushed or ground surfaces i.e. specifically formulated surface tolerant coatings.
2.8.	All welds shall be free of slag, slag inclusions and pinholes. Adjacent areas shall be free of weld spatter, which shall be removed by grinding or scraping.
2.9.	Oil and grease deposits shall be removed prior to cleaning as detailed earlier in this specification. Special attention shall be paid to drillings, bolt holes, etc.
2.10.	Burnishing of the surface shall not be permitted.
2.11.	In all cases, after wire brushing or grinding, all traces of loose material shall be removed from the surface by compressed air or vacuum cleaning. Cleaned surfaces shall not be contaminated with oil, grease, rust or other deposits before coating.
2.12.	Different grades and types of blasting media exist. It is important that the correct abrasive be used in combination with a specific coating system to achieve the specified surface profile. The required blast profile height should be carefully considered. The Applicator shall select an appropriate abrasive type and mesh size to attain the specified surface profile.
2.13.	Only inert mineral grit or steel grit abrasives shall be used. Steel grit is preferred in sensitive plant areas such as Water Treatment Plants in order to ensure no contamination of plant processes due to excessive dust.
2.14.	Sand or silica-based abrasives shall not be used. Abrasive material for blast cleaning shall be used in line with local environmental regulations.
2.15.	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 in order to minimize the amount of waste grit and dust generated and contamination of the surfaces.
2.16.	The use of re-cycled blasting media for the final blast is strictly prohibited.
2.17.	All abrasive media shall be stored in an area that is completely dry, covered and protected from weather.
2.18.	The profile height of the blasted surfaces should be within the range of the specified coating system. Refer to the Manufacturers Product Data Sheets. Unless otherwise specified by the coating Manufacturer, a profile height of 25 microns to 75 microns is recommended for most coatings systems.

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2.19.	It is important that the blast profile does not exceed the specified DFT of the primer or first coat. Blast cleaning of severely corroded surfaces may result in high profiles i.e. > than 100 microns. In these cases, the primer or first coat shall be applied by brush/roller to ensure complete wet-out of the pitted/jagged surface. In addition a different primer or first coat may be required. However, agreement should be reached between the Applicator and coating Manufacturer as to the most suitable profile range, with due consideration of the application method, for a specific coating system.
2.20.	The Applicator shall consider and detail these potential scenarios or eventualities in the required Method Statement which shall be reviewed by Eskom for acceptance/rejection prior to any work. Ultimately, the Applicator shall be responsible for any risk that could arise or be attributed to this choice.
2.21.	The requirement for surface preparation of all metallic surfaces for immersion conditions or internal surfaces 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.
2.22.	All compressed air for blasting 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.
2.23.	After surface preparation, all dust, grit blasting media or any other deleterious matter shall be removed from the surfaces by vacuuming. In The process shall be repeated until the required level of dust and debris removal is achieved. It is imperative that all surface dirt and contaminants are completely removed before coating or the adhesion of the coating shall be impaired.
2.24.	Cleaned surfaces shall not be contaminated with oil, grease, rust or other deposits before coating. Unnecessary traffic prior to painting shall be avoided.
2.25.	The Applicator shall ensure that during surface preparation and coating activities the relative humidity (RH) in open, undercover shop environments is less than 80% RH and for tank/vessels (confined spaces) 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.
2.26.	During periods of inclement or cold weather conditions the environmental parameters shall be measured and recorded hourly. In the event that 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 240-101712128.

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- 2.27.

For all inspections of all surface preparation and coating activities the surfaces shall be clean allowing unhindered visual access to the surface. The Applicator shall provide sufficient and adequate lighting (Cool White) to enable inspections. Cell phone lighting is not acceptable.
- 2.28.

In order to avoid recontamination and flash rusting of the surfaces, the primer or first coat shall be applied within 4 hours after final surface preparation of the steel surfaces. Under no circumstances shall the blast be permitted to stand overnight.
- 2.29.

Many modern organic coatings can be applied without the use of a primer. However, should a primer coat be required for holding of the blast, or otherwise, the Applicator shall indicate/describe the reasoning for the need of such a primer i.e. as a holding primer or as a means of enhancing adhesion of the system? Details shall be provided in the Method Statement for the type of primer, generic resin, solvent borne or free, maximum DFT and compatibility with subsequent coats. The detailed Method Statement shall be submitted and reviewed by Eskom for acceptance/rejection prior to any work. Ultimately, the Applicator shall be responsible for any risk that could arise or be attributed to this choice.
- 2.30.

All edges, weld seams, bolts and nuts, and other crucial areas shall be stripe coated by brush immediately before spray application, with the same material as the first sprayed coat.
- 2.31.

Multiple coats shall be applied as per the tables at the top of this specification sheet. Single coat systems are not permissible.
- 2.32.

Where more than one coat is applied, the colour of each coat shall be different from the previous coat. In the case where aesthetic requirements are secondary, repairs after final testing shall be carried out using a different colour.
- 2.33.

Where the first coat has been contaminated with dust washing shall be carried out between coats. Where the coating has completely cured or allowed to age before finishing, before application of a subsequent coat the internal surface shall be sweep blasted to establish a profile to provide a key/mechanical bond for the subsequent coat/s.
- 2.34.

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.
- 2.35.

The number of coats and DFT per coat required to achieve the total film DFT shall be agreed between the Applicator and coating Manufacturer and will be dependent upon the method of application chosen.
- 2.36.

The total DFT of the applied coating system shall comply with the recommended minimum and maximum DFT limits as recommended in the latest Product System Data Sheet and this specification.

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2.37. The range of DFTs of each coat shall be as follows; 90% of random readings shall be equal to or greater than the minimum specified DFT. No individual reading shall be less than 80% of the specified DFT. In the case of solvent borne coatings no individual reading shall be greater than 150% of the Manufacturer's maximum specified DFT. All deficient film DFTs shall be rectified prior to release. 2.38. The coating shall be evenly applied to form a smooth, continuous, unbroken layer free from misses, sags, runs, tears and other defects that could affect the integrity of the coating. 2.39. Unless otherwise instructed by the Eskom engineer for flange surfaces at least one coat of the coating system shall be brought around onto a third of the surface area of the flange face. In the case of flange face (gramophone surface finish) with compressed fibre gaskets, blasting and coating is not permitted. 2.40. The Applicator shall perform pinhole detection using appropriate "spark" testing equipment at a voltage setting as per the coating Manufacturer's requirements. Wet sponge testing shall not be acceptable. 2.41. It is imperative that wherever possible pinhole detection and general patch repairs are to be performed before final cure of the coating system. 2.42. With the exception of access limitations or as instructed by the Eskom engineer all areas of coating damage shall be patch repaired by brush application. The extent of the damage shall be carefully inspected to assess which coats in the system have been damaged and which surface preparation methods are most suitable and appropriate. The Eskom engineer shall accept/reject the Applicator's recommended method of surface preparation i.e. mechanical power and hand tool cleaning. When more widespread repairs are required and when the damage extends to the steel substrate abrasive blast cleaning to Grade Sa 3 (ISO 8501-1) is required. 2.43. All coats in the system shall be re-instated. Areas to be primed shall be cleaned of dust, dirt, grease, salts or other deleterious matter and all edges of existing paint shall be feathered back to a hard edge. The patch primer used shall be in accordance with the requirements of the relevant coating system. 2.44. The over-coating onto an existing coating by subsequent intermediate and finishing coats (where applicable) shall be stepped at 25 mm intervals to produce a feathered edge. Specifics of such instances shall be assessed on a case-by-case basis. 2.45. All shop coated surfaces shall be inspected and examined for coating damage on arrival at site. If the damage is excessive it may be preferable to repair the transport damage before installation/assembly/erection whilst access is easier. 2.46. Provision shall also be made for the repair of handling damage to the coating after installation/assembly/erection/scaffolding removal. Spot repairs shall reinstate each of the previous coats and shall commence directly after surface preparation.
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- 2.47.

All immersed surfaces shall be pinhole tested (only after completion of all handling, moving and equipment and scaffolding removal) to ensure the coating 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 coating is achieved.
- 2.48.

After completion of the coating activities sufficient curing time of the coating system shall be given prior to operation "immersion" as per the requirements of the Product Data Sheet. Accelerated curing is not permitted. All coated surfaces shall be adequately ventilated until full cure has been achieved. At the end of the curing period and before immersion the full cure of the applied coating shall be verified by the Applicator and/or coating Manufacturer.
3.

Tender Returnables

Note that the returnables as detailed below shall be returned as part of the Contractor's Tender document/submission.
- 3.1.

Mandatory Tender Returnables

3.1.1.

At the time of tender the Contractor shall provide verifiable evidence of relevant experience in the application of coating of vessels similar sized projects in comparable environments. In this regard the experience shall, as a minimum, be equal to the surface area (m²) as defined in this enquiry and Scope of Work (SOW) documents.

This verifiable evidence shall be for projects where vessels has been successfully coated/lined by the Contractor, within the last eight years. The verifiable evidence shall include formal signed off QCP's or release certificates and contact details for the listed reference projects.
- 3.2.

Tender Returnables for Evaluation

3.2.1.

The coating system Manufacturers shall have a Quality Management System that meets or exceeds the requirements of ISO 9001. A valid and current certification to be provided with the tender.

3.2.2.

The coating Manufacturer/Contractor shall supply individual product data sheets and material safety datasheets (MSDS) for all products comprising the system. The Product Data Sheet/s shall be signed by the Manufacturer and Contractor. This is to ensure that the Manufacturer is aware of this specification, the conditions under which it will be applied and to allow for technical back-up where required.

- A description of the generic type of product.
 - Confirmation that the corrosion protection system is suitable for the intended method of application.
 - Recommended and non-recommended uses.

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- Maximum recommended service temperature which shall be a minimum of 30% greater than the maximum temperatures as is indicated in the table at the top of this specification. The particular system rating shall consider the above temperatures as continuous service i.e. not intermittently. - Chemical resistance limits. - Surface preparation. - Application conditions and details including but not limited to: application temperatures, dilutions, pot-life, application techniques and DFT for the particular application method, over-coating intervals, and curing times required before immersion. The signed Product Data Sheet/s shall be deemed to be a binding reference document (as part of the QCP). It shall be specific to this project any further/other subsequent revisions of the Product Data Sheet/s shall be submitted to Eskom for reacceptance clearly stating the variations/deviations. No further use/application of the related product, for this project, is permitted until acceptance is granted by Eskom. 3.2.3. A detailed Method Statement explaining all required steps as specified in this specification sheet shall be provided at the time of tender. The steps to be considered includes: - The methods, steps, sequence and equipment required for ventilation and dust mitigation. - Grease decontamination and washing. - Soluble salt decontamination. - Methods for dust and debris removal, maintaining and ensuring cleanliness between coats shall be described. - The Method Statement shall detail the precise sequence and breakdown of work areas/activities in order to apply the system with due consideration of dust contamination, and possible overspray onto adjacent surfaces still requiring additional coats. - The Method Statement shall also consider the most efficient methods and sequencing to avoid unnecessary delays between coats that may have an impact i.e. time required for removal of spent abrasive grit and dust/debris, delay due to material handling, time required to handle, rig and move the component etc. - All inspection interventions during and after completion of final coats shall be considered and included.
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3.2.4. The project specific QCP shall be submitted. The QCP shall be based on the detailed Method Statement and shall contain all intervention points and relevant criteria as per the information as described in the Product Data Sheet/s and this specification sheet. Eskom reserves the right to request further revision, clarification or additions in accordance with or as required by this specification sheet. 3.2.5. At the time of tender the Contractor/coating Manufacturer shall provide a definitive statement with respect to exclusions or deviations from this specification. If there are none then the statement needs to reflect this. If no exclusions or qualifications are submitted at the time of tender, the requirements as prescribed in this specification and all other referenced standards shall apply.
4. Handling, Transportation, Storage and Erection of Vessels 4.1. Every precaution must be taken to correctly support and protect the vessels during handling, transportation, storage and erection. 4.2. Prior to commencement of any work the Contractor shall submit a procedure for handling, transportation, storage and erection for Eskom's approval.
5. Safety Requirements and Considerations 5.1. During the applications of all coatings/lining, care shall be taken to ensure adequate ventilation, to allow for good visibility and proper curing of the coatings and to avoid/minimise health and safety risks. 5.2. Special care needs to be taken when working with all organic coatings. Prior to the use of any coating material, the Material Safety Data Sheets shall be obtained from the relevant coating Manufacturer. 5.3. The Applicator shall be familiar with the contents of these 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. 5.4. 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. 5.5. The Applicator 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 Applicator shall provide the personnel with the appropriate required PPE.

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5.6. The Applicator shall provide for all necessary safety precautions and risk assessments. 5.7. The Applicator shall advise Eskom of all hazardous materials to be brought on site. 5.8. All painting materials on site shall be stored in designated areas in storage facilities that meet the storage requirements of the paint Manufacturer and the safety requirements of the specific site. The Contractor shall be responsible for the provision of appropriate storage/shipping containers as required. 5.9. 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 Manufacturers recommendations. 5.10. The Applicator's Safety File for the area to be worked it shall address all the hazardous activities of abrasive blast cleaning and spray painting. The Applicator shall verify that the personnel carrying out these activities are suitably qualified. 5.11. The Applicator shall ensure that the abrasive materials used conform to all National Health and Safety Standards.
6. 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. 6.1. 240-101712128: Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Coatings. 6.2. BS EN ISO 16961: Petroleum, petrochemical and natural gas industries — Internal coating and coating of steel storage tanks. 6.3. 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." 6.4. ASTM D4414: Standard practice for measurement of wet film DFT by notch gauges. 6.5. ASTM D4541: Standard Method for Pull-off Strength of Coatings using Portable Adhesion Testers.

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6.6. ASTM D5162: Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates.
6.7. ASTM E376: Measuring coating DFT by magnetic field or eddy current electro-magnetic test Methods.
6.8. ASTM F21: Standard Test Method for Hydrophobic Surface Films by the Atomizer Test.
6.9. ISO 2409: Paints and varnishes – Cross cut test.
6.10. ISO 4624: Paints and varnishes – Pull-off test for adhesion.
6.11. 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.
6.12. 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.
6.13. 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.
6.14. 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).
6.15. 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.
6.16. ISO 8503-4: Preparation of steel substrates before application of paint and related products – Surface roughness characteristics of blast-cleaned steel substrates.
6.17. 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).
6.18. ISO 12944-3: Paint and varnishes – Corrosion protection of steel structures by protective paint systems. Part 3: Design considerations.
6.19. ISO 9223: Corrosion of metal and alloys – Corrosivity of atmospheres – Classification.

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6.20. SANS / ISO 2808: Paints and Varnishes: Determination of film DFTs (Can be used as alternative to ASTM E376). 6.21. 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. 6.22. 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 micrometer profile gauge (Can be used as alternative to ISO 8503-4). 6.23. SIS 055900: Swedish Code of Practice - Pictorial surface preparation standard for painted steel surfaces. (Can be used as alternative to ISO 8501 – 1).	
Submitted by:  	Accepted by: 
Name: N. Pheta Title: Senior Advisor Date: 09 December 2022	Name: K. Northcott Title: Senior Consultant Date: 12 December 2022

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APPENDIX V: EXTERNAL CORROSION PROTECTION SPECIFICATIONS

CPS 03 - Non-Aggressive External Environment - < 80°C		
Environment	Atmospheric – Inland – ISO 12944 C3	
Material	Mild steel	
Temperature	Ambient to 80°C	
Typical Applications	This system is applicable to all steel work, conveyor structures, plate work, the external surfaces of piping and external surfaces of ducting with wall thickness greater than 2mm internal and external to buildings operating at temperatures up to 80°C.	
New Works Surface Preparation	Abrasive blast clean to Grade Sa 2½ Surface profile as specified by the primer coating manufacturer	
	Primer	Finishing
Generic System	two component recoatable epoxy zinc phosphate primer DFT was per manufacturers technical data sheet	two component polyurethane acrylic finishing coat DFT was per manufacturers technical data sheet
Notes: 1. Stripe coating to be carried out in accordance with Clause 4.7.3 (h). using the primer. 2. All site repairs to handling and erection damage shall be carried out in accordance with Clause 4.7.6. 3. Finishing coat applied on site after erection in accordance with Clause 4.7.9 (g). 5. All 'black' nuts and bolts to be patched with the primer and intermediate coats prior to the application of the finishing coat. 6. All galvanized nuts and bolts to be patched with intermediate coat prior to the application of the finishing coat.		

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CPS 04 - Internal or External Environment - 81°C to 200°C - Un-Lagged		
Environment	Atmospheric – Inland, Marine and Industrial – ISO 12944 C1 to C5-M/I	
Material	Mild steel – un-lagged	
Temperature	81°C to 200°C	
Typical Applications	This system is applicable to all un-lagged steel work, plate work, the external surfaces of piping and ducting with wall thickness greater than 2mm internal and external to buildings operating at temperatures from 80°C to 200°C.	
New Works Surface Preparation	Abrasive blast clean to Grade Sa 2½ Surface profile as specified by the primer coating manufacturer	
	Primer	Finishing
Generic System	two component zinc ethyl silicate primer (min 85% zinc in the dry film) DFT was per manufacturers technical data sheet	ambient temperature curing silicone acrylic DFT was per manufacturers technical data sheet
Notes: 1. Stripe coating to be carried out in accordance with Clause 4.7.3 (h). using the finishing coat. 2. All site repairs to handling and erection damage shall be carried out in accordance with Clause 4.7.6. 3. Finishing coat to be applied on site after erection in accordance with Clause 4.7.9 (g). 4. All 'black' nuts and bolts to be patched with the epoxy zinc primer prior to the application of the finishing coat. 5. All galvanized nuts and bolts to be patched with finishing coat prior to the application of the full finishing coat.		

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CPS 05 - Internal or External Environment - 201°C to 540°C - Un-Lagged		
Environment	Atmospheric – Inland, Marine and Industrial – ISO 12944 C1 to C5-M/I	
Material	Mild steel – un-lagged	
Temperature	201°C to 540°C	
Typical Applications	This system is applicable to all un-lagged steel work, plate work, the external surfaces of piping and ducting with wall thickness greater than 2mm internal and external to buildings operating at temperatures from 200°C to 540°C.	
New Works Surface Preparation	Abrasive blast clean to Grade Sa 2½ Surface profile as specified by the primer coating manufacturer	
	Primer	Finishing
Generic System	two component zinc ethyl silicate primer (min 85% zinc in the dry film)	ambient temperature curing heat resisting silicone aluminium
Notes: 1. Primer coat to be applied in the shops. 2. Stripe coating to be carried out in accordance with Clause 4.6.3 (h) using the finishing coat. 3. All site repairs to handling and erection damage shall be carried out in accordance with Clause 4.7.6. 4. Finishing coat to be applied on site after erection in accordance with Clause 4.7.9 (g). 5. All nuts and bolts to be patched with the finishing coat prior to the application of the full finishing coat.		

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CPS 06 - Internal or External Environment - < 150°C - Lagged Works		
Environment	Atmospheric – Inland, Marine and Industrial – ISO 12944 C1 to C5-M/I	
Expected Durability	ISO 12944 High	
Material	Mild steel - lagged	
Temperature	Ambient to 150°C	
Typical Applications	This system is applicable to all lagged steel work, plate work, piping and ducting with wall thickness greater than 2mm internal and external to buildings operating at temperatures from ambient to 150°C.	
New Works	Abrasive blast clean to Grade Sa 2½	
Surface Preparation	Surface profile as specified by the primer coating manufacturer	
	Primer	Finishing
Generic System	two component heat resisting epoxy phenolic primer DFT was per manufacturers technical data sheet	two component heat resisting epoxy phenolic finishing coat DFT was per manufacturers technical data sheet
Notes: - Both coats to be applied in the shops. - Stripe coating to be carried out in accordance with Clause 4.6.3 (h) using the primer. - All site repairs to handling and erection damage shall be carried out in accordance with Clause 4.7.6. - All nuts and bolts to be patched with the primer prior to the application of the finishing coat.		

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APPENDIX VI:
SAFETY VALVE INFORMATION

Vessel Information			Safety Valve (SV) Information								
No.	Vessel Description:	Vessel Quantity:	SV Manufacturer:	SV Model No.	SV Inlet:	SV Outlet:	SV Accessories:	SV Set Pressure (kPa):	Safety Valve(s) per Vessel:	Total Safety Valve Quantity:	Comment:
1	Diesel Generator Air Receivers	8	LESER	4590.2522	20mm BSP Male	40mm BSP Female	H2 Top	4000	1	8	Safety V/V on Vessel
2	Diesel Generator Air Receivers	4	LESER	4373.2602	20mm BSP Male	20mm BSP Female	H2 Top	4000	1	4	Safety V/V on Vessel
3	Generator 20kV Breaker Air Receiver (20MPa)	2	LESER	4373.2612	15mm BSP Male	15mm BSP Female	H2 Cap	22000	1	2	Safety V/V on Vessel
4	Generator 20kV Breaker Air Receivers (20MPa)	10	LESER	4594.2162	20mm BSP Male	25mm BSP Female	H2 Cap	22000	1	10	Safety V/V on Vessel
5	Generator 20kV Breaker Air Receivers (15MPa)	4	LESER	4592.2502	25mm BSP Male	25mm BSP Male	H2 Cap	19617	1	4	Safety V/V on Vessel
6	Unitized H2 Dryers	12	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Vessels not Equipped with S/V's
7	Unitized Air Dryers	12	Nugen Technologies	Nugen Part No. DA0320P35	1" / 25,4mm Male	N/A	N/A	1000	1	12	Safety V/V on Vessel

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Vessel Information			Safety Valve (SV) Information								
No.	Vessel Description:	Vessel Quantity:	SV Manufacturer:	SV Model No.	SV Inlet:	SV Outlet:	SV Accessories:	SV Set Pressure (kPa):	Safety Valve(s) per Vessel:	Total Safety Valve Quantity:	Comment:
8	Hydrogen Storage Vessels	3	LESER	Not Available	20mm BSP Male	25mm BSP Female	Not Available	3000	1	3	Safety V/V on Vessel
9	Diesel / Standby Compressor 1 Desiccant Dryers	2	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Service and Control Air Receivers 1 - 4
10	Diesel / Standby Compressor 2 Desiccant Dryers	2	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Service and Control Air Receivers 1 - 4
11	Diesel / Standby Compressor 2 After Filter (Tegnon)	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Service and Control Air Receivers 1 - 4
12	Atlas Copco Compressor Filter 1	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Service and Control Air Receivers 1 - 4
13	Atlas Copco Compressor Filter 2	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Service and Control Air Receivers 1 - 4
14	Atlas Copco Compressor Filter 3	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Service and Control Air Receivers 1 - 4
15	Centac Compressor Desiccant Dryers (1000kPa)	6	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Service and Control Air Receivers 1 - 4

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Vessel Information			Safety Valve (SV) Information								
No.	Vessel Description:	Vessel Quantity:	SV Manufacturer:	SV Model No.	SV Inlet:	SV Outlet:	SV Accessories:	SV Set Pressure (kPa):	Safety Valve(s) per Vessel:	Total Safety Valve Quantity:	Comment:
16	Centac Compressor Desiccant Dryers (De-Rated)	2	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Service and Control Air Receivers 1 - 4
17	Centac Compressor 1 After Filter (Tegnon)	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Service and Control Air Receivers 1 - 4
18	Centac Compressor 2 After Filter (Tegnon)	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Service and Control Air Receivers 1 - 4
19	Centac Compressor 3 After Filter (Zander)	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Service and Control Air Receivers 1 - 4
20	Control Air Receivers & Service Air Receiver	5	LESER	Not Available	65mm Flanged to BS 4505 Table 16/3	Not Available	Not Available	720	1	5	Safety V/V on Vessel
21	Hydrobin Air Receivers	4	Bailey Birkett	3376	32mm BSP Screwed Male	32mm BSP Screwed Female	None	750	1	4	Safety V/V on Vessel
22	Wet Ash Slurry Receiver	1	Bailey Birkett	Not Available	20mm BSP Male	40mm BSP Female	Not Available	700	1	1	Safety V/V on Vessel

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Vessel Information			Safety Valve (SV) Information								
No.	Vessel Description:	Vessel Quantity:	SV Manufacturer:	SV Model No.	SV Inlet:	SV Outlet:	SV Accessories:	SV Set Pressure (kPa):	Safety Valve(s) per Vessel:	Total Safety Valve Quantity:	Comment:
23	Dust Conveying Centac After Coolers	5	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Blower House Centac 1 - 5
24	Dust Conveying Centac After Filters (Dryer Inlets)	5	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Blower House Centac 1 - 5
25	Dust Conveying Centac After Filters (Dryer Outlets)	5	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety V/V's on Blower House Centac 1 - 5
26	Dust Plant Instrument Air Dryer IR D13500IN (External)	1	Not Available	Not Available	Not Available	Not Available	Not Available	1200	0	0	Protected by Safety Valve on Instrument Air Compressor?
27	Dust Plant Instrument Air Dryer Filter (External)	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety Valve on Instrument Air Compressor?
28	Dust Plant Instrument Air Dryer Cooler IR (External)	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety Valve on Instrument Air Compressor?
29	Dust Plant Instrument Air Desiccant Dryers (Inside)	2	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety Valve on Instrument Air Compressor?
30	Dust Plant Instrument Air Filters 1 - 3 (Inside)	3	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Protected by Safety Valve on Instrument Air Compressor?

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Vessel Information			Safety Valve (SV) Information								
No.	Vessel Description:	Vessel Quantity:	SV Manufacturer:	SV Model No.	SV Inlet:	SV Outlet:	SV Accessories:	SV Set Pressure (kPa):	Safety Valve(s) per Vessel:	Total Safety Valve Quantity:	Comment:
31	Dust Plant Control Air Receiver U1	1	Bailey Birkett	Not Available	76.2mm	101.6mm	Not Available	760	1	1	Safety V/V on Vessel
32	Dust Plant Control Air Receiver U4	1	Not Available	Not Available	Not Available	Not Available	Not Available	700	1	1	Safety V/V on Vessel
33	Dust Plant Control Air Receiver U5	1	Not Available	Not Available	Not Available	Not Available	Not Available	700	1	1	Safety V/V on Vessel
34	Dust Plant Control Air Receiver U6	1	Not Available	Not Available	Not Available	Not Available	Not Available	700	1	1	Safety V/V on Vessel
35	North Water Treatment Plant Air Receiver	1	TUV	Not Available	65mm Flanged to BS 4505 Table 16/3	Not Available	Not Available	720	1	1	Safety V/V on Vessel
36	South Water Treatment Plant Air Receiver	1	LESER	Not Available	50mm Flanged to BS 4505 Table 16/3	Not Available	Not Available	720	1	1	Safety V/V on Vessel
37	Ammonium Hydroxide Re-use Tank	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Vessels not Equipped with S/V's

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Vessel Information			Safety Valve (SV) Information								
No.	Vessel Description:	Vessel Quantity:	SV Manufacturer:	SV Model No.	SV Inlet:	SV Outlet:	SV Accessories:	SV Set Pressure (kPa):	Safety Valve(s) per Vessel:	Total Safety Valve Quantity:	Comment:
38	Caustic Bulk Storage Vessel No.1 (G001)	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Vessels not Equipped with S/V's
39	Caustic Bulk Storage Vessel No.2 (G002)	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Vessels not Equipped with S/V's
40	Caustic Re-use Tank	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Vessels not Equipped with S/V's
41	Hot Water Tank No.1 (G002)	1	PIER	Not Available	25.4mm	Not Available	Not Available	500	1	1	Safety V/V on Vessel
42	Hot Water Tank No.2 (G001)	1	PIER	Not Available	25.4mm	Not Available	Not Available	500	1	1	Safety V/V on Vessel
43	Sulphuric Acid Re-Use Tank	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Vessels not Equipped with S/V's
44	Sulphuric Acid Bulk Storage Vessel No.1 South	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Vessels not Equipped with S/V's
45	Sulphuric Acid Bulk Storage Vessel No.2 South	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Vessels not Equipped with S/V's

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Vessel Information			Safety Valve (SV) Information								
No.	Vessel Description:	Vessel Quantity:	SV Manufacturer:	SV Model No.	SV Inlet:	SV Outlet:	SV Accessories:	SV Set Pressure (kPa):	Safety Valve(s) per Vessel:	Total Safety Valve Quantity:	Comment:
46	Sulphuric Acid Bulk Storage Vessel North	1	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Vessels not Equipped with S/V's
47	Portable Air Receiver for Plater Shop	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
48	Portable Compressors with Receiver Model CQ092X, NN200X, NN270X, 5H500 & NF200X	14	Padovan Valerio	Not Available	9.525mm BSP	N/A	None	1100	1	14	Safety V/V's on Vessel
49	Portable Air Receiver for Welding Shop	1	Not Available	Not Available	15mm	N/A	None	1600	1	1	Safety V/V's on Vessel
50	Safety Valves on Blower House Centac / Conveying Air Compressors	5	LESER	4411.4423	DN 65 PN 16 Flanged	DN 100 PN 16 Flanged	H3 Cap	550	1	5	Safety V/V's for Slurry Cooler and Filters are on Compressors
Totals:		139								77	

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APPENDIX VII: TYPICAL RESOURCE REQUIREMENTS

No.	Applicable Scope of Work Section:	Qualification Requirement and Description:	Minimum National Qualification Framework Level:	Recommended Number of Personnel:
1.	General Works	Safety Officer	NQF 4 (Matric / Grade 12) – Umalusi National Senior Certificate + Programmes in Occupational Health & Safety / CHSO Registration	1
2.	General Works	Artisans	NQF 4 (Matric / Grade 12) – Umalusi National Senior Certificate	6
3.	General Works	Semi-Skilled Labourers	ABET Level 5 - Written exam equivalent Schooling (Standard 8 / Grade 10) / NQF 2 - Umalusi Elementary Certificate.	6
4.	Corrosion Protection	Site Manager with Project Management Skills	NQF 6: Council on Higher Education (CHE) - Diploma / Advanced Certificate + Project Management Qualification	1
5.	Corrosion Protection	Site Supervisors qualified to SAQCC (Corrosion Protection) Module PS1: General Painting Supervisor	ABET Level 4 - 8 Years Schooling (Standard 6 / Grade 8) / NQF 1 - Umalusi General Certificate of Education + SAQCC PS1	1

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No.	Applicable Scope of Work Section:	Qualification Requirement and Description:	Minimum National Qualification Framework Level:	Recommended Number of Personnel:
6.	Corrosion Protection	Coating Applicators / Painters qualified to SAQCC (Corrosion Protection) Module PA1: General Heavy Duty Coatings Applicator	ABET Level 2 - Literacy / 4 Years Schooling (Standard 3 / Grade 5) / NQF 1 - Umalusi General Certificate of Education +SAQCC PA1	4
7.	Corrosion Protection	Coating Inspectors Qualified to SAQCC (Corrosion Protection) Coating Inspector Level 1 (Shop Inspector), Level 2 (Site Inspector) or NACE Coating Inspection Programme (CIP)	ABET Level 5 - Written exam equivalent Schooling (Standard 8 / Grade 10) / NQF 2 - Umalusi Elementary Certificate + SAQCC Level 1 / 2 or NACE CIP	2
8.	Safety Valve Overhaul & Calibration	Trained Safety Valve Artisans	NQF 4 (Matric / Grade 12) – Umalusi National Senior Certificate / N4 National Diploma in Mechanical Engineering (Fitting & Turning), Completed Four Year Apprenticeship, N3 Certificate for Fitter and Turner Courses. Certificates and Certification in Valve Maintenance, PSV Calibration and Testing.	2
9.	Safety Valve Overhaul & Calibration	Safety Valve Supervisor	NQF 4 (Matric / Grade 12) – Umalusi National Senior	1

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No.	Applicable Scope of Work Section:	Qualification Requirement and Description:	Minimum National Qualification Framework Level:	Recommended Number of Personnel:
			Certificate / N4 National Diploma in Mechanical Engineering (Fitting & Turning), Completed Four Year Apprenticeship, N3 Certificate for Fitter and Turner Courses. Certificates and Certification in Valve Maintenance, PSV Calibration and Testing. PER and SANS 347.	

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APPENDIX VIII: TYPICAL FACILITIES & EQUIPMENT REQUIREMENTS

No.	Applicable Scope of Work Section:	Equipment Description:
1.	Mechanical Works – Removal and Installation of Pressure Vessels	Mechanical Fitter's Toolbox
2.	Corrosion Protection	Hand Cleaning Equipment: • Wire Brushes • Scrapers • Sandpaper • Chipping Hammers
3.	Corrosion Protection	Power Cleaning Equipment (Electrical or Pneumatic): • Needle Guns • Power Wire Brushes • Power Sanders
4.	Corrosion Protection	Abrasive Blast Cleaning: • Compressors • Blast Pots • Hoses and Nozzles
5.	Corrosion Protection	Water Cleaning: • High Pressure Cleaning Equipment 68 – 680 bar (1000 – 10 000 psi) • Ultra-High Pressure Cleaning Equipment 2000 – 2500 bar (30000 – 36 000 psi)
6.	Corrosion Protection	Lining Application: • Brushes • Rollers • Conventional Spray Equipment and/or

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No.	Applicable Scope of Work Section:	Equipment Description:
		Airless Spray Equipment
7.	Corrosion Protection	Specialised Equipment: - Media Removal Equipment (Conveyors, etc.) - Vacuum Cleaners - Dehumidifying Equipment - Lighting Equipment - Ventilation Equipment
8.	Corrosion Protection	Quality Control Testing Equipment: - Hydrometer - Wet Film Thickness (WFT) Gauges - Depth Profile Gauge (or Testex Tape) - Surface Temperature Gauge - Electronic Dry Film Thickness (DFT) Gauge - Pin-hole Detection Equipment (Wet Sponge / High Spark)
9.	Safety Valve Overhaul & Calibration	Facility / Dedicated Premises / Workshop for the stripping, refurbishment, calibration and testing of Safety Valves, including ISO 9001 accreditation.
10.	Safety Valve Overhaul & Calibration	Equipment Register including SANAS Calibration Certificates where applicable for: - Pressure Sources - Test Pressure Gauges - Test Rigs - Load Cells - Online Testing Equipment - Chart Recorders

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

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SCOPE COMPILATION REFERENCES				
SOURCE & Ref No.	Yes	No	N/A	Comments
URS			X	
Philosophy (Outage)			X	
Condition Monitoring Report			X	
VA/PHD Viewer trends			X	
Corrective Actions			X	
CARAB reports			X	
Statutory Requirements	X			
Grid code requirements			X	
Waivers and Exemptions			X	
Calibration requirements	X			
Previous Outage SOW variations			X	
Post Mortems Actions from previous outages			X	
Pre-Outage plant walks	X			
Risk based inspection (RBI) report	X			
Simulation, TOIs, OON, SI		X		

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COMMENTS

ATTACHMENTS: DRAWINGS, SKETCHES, DIAGRAMS, INSTRUCTIONS, etc	
1	
2	
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