GE/MAT/24/089: Duvha Power Station Corrosion Protection Specification for Acid Tank External Surfaces and Bund Structural Steel

Where conflict/contradiction exists between any of the referenced standards, this specification, Contractor Procedures or Product Manufacturer requirements then the more stringent requirement shall apply.	
This specification shall be read in conjunction with "GE/MAT/24/088: Duvha P/S Corrosion Protection Specification for Acid Proofing of Sulphuric Acid Bund" and 240-101712128: Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Coatings [3] and 240-106365693: Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings [4].	
Table 1: Chemically Resistant Coating for Acid Bund Structural Steel	
Environment	Exposure to splash and spill by Sulphuric Acid: Concentration (1.5 – 3.2% and 96%), pH 0.6.
Component	Structural steel surfaces, extending up to 2 m high from plinths, prone to possible accidental spill or splash by sulphuric acid. Corrosion protection of plinths is defined in GE/MAT/24/088 Duvha Power Station (P/S) Corrosion Specification for Acid Proofing of Sulphuric Acid Bund [1]. For details with respect to dimensions and quantities refer to the Scope of Work [2]. All corrosion protection activities shall be performed, off-site at the Contractor's Works.
Internal Immersed (Surface Preparation and coating)	Abrasive blast clean to **Grade Sa 3** (ISO 8501-1). The surface profile as specified by the coating Manufacturer. It is important that the blast profile does not exceed the specified thickness of the primer or first coat. In these cases, an additional or different primer coat may be required.
Generic System	Solvent Free Glass Flake Epoxy.
(First Coat)	Apply by **airless spray**, one coat **Two Component Solvent Free Glass Flake Epoxy,** with a **Dry Film Thickness (DFT) between 0.550 mm and 0.6 mm.** No thinning shall be permitted.
(Stripe Coat)	After allowing sufficient time for the first coat to dry, but not exceeding the maximum overcoating limit for recoating, the Manufacturer's recommendations shall be adhered to in this regard, **apply by brush**, one coat **Two Component Solvent Free Glass Flake Epoxy coating, with a DFT between 0.25 mm and 0.35 mm** to all accessible edges, weld seams, bolt holes and other crucial areas. No thinning shall be permitted.

(Final Coat)	After allowing sufficient time for the first coat and stripe coating to dry, but not exceeding the maximum overcoating limit for recoating, the Manufacturer's recommendations shall be adhered to in this regard, **apply by airless spray**, one coat **Two Component Solvent Free Glass Flake Epoxy, with a DFT between 0.55 mm and 0.6 mm.** No thinning shall be permitted. **The Total System Minimum DFT (excluding stripe coating) shall be between 1.1 mm and 1.2 mm.**
Sealant (All narrow gaps, blind crevices including the joint/interface between the plinth and steel element base plate.)	After erection of structural steel and completion of all coating repairs and all inspection, then all gaps shall be filled with a sufficient bead of sealant to form a continuous gasket/seal. Prior to application of the sealant the joint/gap shall be blown clean using compressed air. Once adequately cleaned apply a gun grade **Two Component Polysulphide Flexible Sealer.**

Requirements for all Corrosion Protection Products and Materials

1. The Contractor and coating Manufacturer shall certify that all paint supplied, conform to all the requirements specified in this specification and Table 1 above or alternatively indicate, in the Tender Returnables, the reasons for not being able to comply.
2. The Contractor and coating Manufacturer shall include in the Tender Returnables, actual Batch Certificates of all coatings above, indicating all tests that are typically performed, as a minimum, viscosity, gel time and hold-up (overhead) minimum thickness.
3. The Contractor and coating Manufacturer shall include in the Tender Returnables a Product Data Sheet for the product as specified in Table 1 above, which shall contain the following as a minimum:
    - A description of the generic polymer type.
    - Confirmation that the intended product is suitable for the method of application, as specified above (Table 1).
    - Confirmation that the product is suitable for the areas/environments as specified above (Table 1).
    - Shelf life at 25°C.
    - Volume Solids.
    - Soluble Salt Testing Method/s and acceptance criteria.
    - Surface preparation requirements; namely blast cleanliness, profile and dust and debris.

- Mixing instructions.
- Recommended method of coating application.
- Requirements with respect to spray nozzle/tip sizes.
- Minimum Dust Dry Time at 15°C & 25°C.
- Minimum Overcoating Time at 15°C & 25°C.
- Maximum Overcoating Time at 15°C & 25°C (without special surface preparation between coats).
- Minimum and maximum recommended DFT per coat.
- If applicable, induction time.
- Pot life at 15°C & 25°C.
- Recommended minimum and maximum ambient and steel surface temperatures during application.
- Recommended maximum Relative Humidity (RH)% during application.
- Curing times required before pinhole testing.
- Pinhole detection method of testing and parameters and acceptance criteria.
- For immersion, the curing times required before immersion.
- Maximum and Minimum DFTs for each of the different methods of application.
- Maximum and Minimum DFTs for each coat in the system and complete system.
- All relevant information the Manufacturer deems relevant for the product.

4. The Manufacturer Product Datasheet for the system shall be submitted as a Tender Returnable. The Product Data Sheet shall be signed by the Manufacturer and Contractor, clearly indicating the signatory's name and date of signature. 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.
5. The signed Product Data Sheet 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 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 the Eskom Engineer.
6. During the project, batch certificates, expiry dates, dates of manufacture, of the product shall be provided to the Eskom Engineer.
7. All coating materials shall be delivered in the Manufacturer's original containers, clearly marked with the following:
    - Manufacturer's name.
    - Product brand and reference number.

- Batch number which shall incorporate the date of manufacture.
- Instructions for storage and use of material, which shall include mixing ratios of multi-component materials, minimum and maximum temperature of application and the method of application.
- The South African Bureau of Standards (SABS) mark or a SANS 9001 certificate where applicable.

8. All coating materials shall be supplied in sealed, robust containers of a size large enough to allow mixing in the containers and labelled with all the information necessary to ensure coating storage, application and traceability.
9. The containers shall be kept in approved stores which are dry, enclosed, covered and kept at a temperature compatible with the required preservation of their contents.
10. If any container shows traces of leakage before use on site, the contents of that container shall not be used.
11. All painting materials at the Contractor's Works shall be stored in designated areas in storage facilities that meet the storage and temperature control requirements of the paint Manufacturer.
12. For site applications the Contractor shall be responsible for the provision of appropriate storage/shipping containers. 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.
13. Store containers in cool well-ventilated areas away from the sun, heat, sparks, and open flames. The ideal storage temperature is between 10 to 30ºC. The temperature shall not drop below 0°C nor exceed 40°C.
14. Store containers away from oxidising agents and other incompatible substances.
15. 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 Contractor 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.
16. The individual coats and final 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.
17. The DFTs of the complete coating system 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 of components.
18. Where excessive film thicknesses can be detrimental to the integrity of the coating, the Manufacturer's recommended maximum shall apply. In this situation the Contractor continues to assume complete responsibility for the application and performance of the coating system.

19. The coating shall be applied evenly to form a smooth, continuous, unbroken layer free from misses, sags, runs, tears, and other defects that could affect the integrity of the coating.
20. All materials, i.e., paint, solvents and cleaning agents for a specific paint system shall be supplied by the same Manufacturer. Clean-up solvents shall not be added to the paint for dilution purposes.
21. All corrosion protection materials shall be manufactured in accordance with ISO 9001 and all relevant South African National Standards (SANS) standards.
22. Usage of materials shall be on a first in, first out basis and no materials shall be used that have exceeded the shelf life recommended by the Manufacturer.
23. Each component of the paint shall be thoroughly mixed. The two components shall then be mixed in the proportions in accordance with the Manufacturer's technical data until the mixture is completely homogeneous.
24. The use of part of the contents (split packs) is strictly forbidden.
25. The use of squish packs is permitted provided mixing of the squish pack produces adequate cure polymerisation. **The use of squish shall be limited ONLY for small or repair areas i.e.,** typically the equivalent of a A4 sheet of paper, 0.05 m^2, approximately 25 cm x 25 cm.
26. During application, coating materials shall be agitated regularly to keep the solids in suspension. The preparation time and pot life of these materials shall be adhered to.
27. Only power mixing is permitted for all coating materials. Only low speed power mixers, which do not introduce air into the coating material being mixed, shall be permitted.
28. For small external coating repairs and touch ups, mixing with a flat paddle by hand is only permissible for small volumes below 5 litres. Mixing with a rod is not permitted.

Table 2: Non-Metallic Abrasive Blasting Grit

Property	**Requirement**	**Applicable Standard**
Hardness	**> 6**	Moh's Scale
ph Value	**< 6.2**	ASTM C566-13
Conductivity (uS/cm)	**< 25**	ASTM D4940/ISO 11127
Sulphate (mg/l)	**< 20**	ASTM D4940/ISO 11127
Nitrate (mg/l)	**< 20**	ASTM D4940/ISO 11127
Chloride (mg/l)	**< 5**	ASTM D4940/ISO 11127
Oil Content	**Nil**	ASTM D7393-16
Moisture content (%)	**< 0.2**	ASTM C566 - 13
Free Silica (crystalline silica) - (%)	**< 0.8**	X-Ray Diffraction - NIOSH 7602

Individual abrasive particles shall be angular in shape and suitable to achieve the specified blast profile as per the requirements in the Coating Manufacturers Product Datasheets.

Requirements for Abrasive Blasting Grit

1. The abrasive material supplier shall certify that all products supplied, conform to all the requirements specified in this specification and Table 2 above or alternatively indicate, in the Tender Returnables, the reasons for not being able to comply.
2. Manufacturer Product Datasheets for all abrasive products shall be submitted as a Tender Returnable. The Product Data Sheet/s shall be signed by the Manufacturer and Contractor, clearly indicating the signatory's name and date of signature. 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.
3. 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 the Eskom Engineer.
4. The abrasive material supplier shall include, in the Tender Returnables, actual Batch Certificates indicating all tests that are typically performed.
5. Only new grit shall be used. The use of re-cycled blasting media for the final blast is strictly prohibited.
6. Sand or silica-based abrasives shall not be used. Abrasive material for blast cleaning shall be used in line with local environmental regulations.
7. The blast-cleaning abrasive shall be composed of clean, sound hard particles free from foreign substances such as dirt, oil, grease, toxic substances, organic matter, water soluble salts and foreign metals. The abrasive material shall be washed, screened, "air washed" and graded for size. The blasting abrasive type shall meet the requirements as specified in ISO 11127 for Non-Metallic abrasives.
8. 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 Contractor shall select an appropriate abrasive type and mesh size to attain the specified surface profile. It is important that quality abrasives are used to minimize the amount of waste grit and dust generated and contamination of the surfaces.
9. All grit particles shall be angular in shape and suitable to achieve the specified blast profile.

10. At the beginning of each shift the Contractor shall sample the grit, to be used for the shift, for hydrocarbon contamination. The sample shall be placed in a beaker to which de-ionised water is added. The beaker shall then be sealed and shaken vigorously. Once the grit has settled the surface of the water shall be examined for signs of hydrocarbon contamination. If any signs are found, all the abrasive intended for use shall be rejected and quarantined and all blasting operations immediately suspended until such time that the Contractor informs the Eskom Engineer and proposes acceptable remedial measures and actions to ensure all other grit on site is acceptable according to this specification. The proposal shall be accepted or rejected or may require clarification. The Contractor shall be responsible for all cost and time impacts due to the suspension of work and the supply of new abrasive grit.
11. At the same time absence of moisture shall be verified by placing a sample of abrasive on a clean, dry sheet of absorbent paper.
12. All abrasive media shall be stored in an area that is completely dry, covered and protected from weather.

Requirements for Compressed Air

1. The air pressure shall be a minimum of 600 KPa at the nozzle, measured with a needle pressure gauge. Both the volume and the pressure of the air shall be sufficient to achieve the required blast cleanliness, blast profile standard, and pumping and atomising the paint. Contractor shall be responsible for any deficiency and/or productivity loss in this regard.
2. All compressed air for blasting and coating activities shall be free from entrained moisture and oil. All traps shall be in a functional condition. At least one oil and one water trap shall be fitted at the compressor and one water trap at the blast pot.
3. The compressed air shall be tested at regular intervals or at any time or interval required by the Eskom Engineer, to assess cleanliness and dryness by means of clean white clothes. No indication of moisture or oil is acceptable. This requirement shall be included in the QCP.

Requirements for Precleaning and Surface Preparation

1. The Contractor 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 the applicable referenced documents.
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. 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.
3. Weld beads with a surface irregularity exceeding 3mm or with sharp crests having a radius less than 3mm shall be ground.

4. 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.
5. Pre-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.
6. For small local areas the use of bristle blasting equipment is acceptable in terms of this specification provided that both the specified cleanliness standard as well as the minimum blast roughness profile is achieved. Bristle blasting does not remove weld spatter and all other steel finish requirements such as radius on sharp edges, weld bead height etc. and must be removed by other methods to conform to the specifications.
7. When using bristle blasting, measurement of the roughness profile is mandatory for quality control purpose.
8. Bristle blasting is only to be used for small areas and conventional grit blasting shall be used for large areas. Conventional blasting provides a more angular anchor pattern compared to bristle blasting.
9. Small areas are the equivalent of a A4 sheet of paper, 0.05 m^2, approximately 25 cm x 25 cm.
10. NOTE: Bristle blasting shall not be confused with the use of a needle gun. A needle gun provides a peened surface and is not a suitable profiled surface.

Requirements for the Removal of Soluble Salt Contamination

1. Prior to coating, soluble salt testing shall be performed by the Bresle soluble salt test method. Details regarding sampling size shall be included in the Method Statement.
2. The maximum acceptable limits using the test method above are as follows: Chlorides - Max 70 mg/m^2, soluble Ferrous ion - Max 100 mg/m^2, Sulphates - Max of 170 mg/m^2.
3. If not within the acceptable limits above, then 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 350 bar. A salt decontamination chemical additive with demonstrated capability of removing salts may be used in conjunction with HP water washing.
4. Soluble salt testing shall be repeated on representative test patches which shall be blast cleaned. For the purposes of soluble salt testing, Grade Sa 2.5 is acceptable.
5. If acceptable then final blasting and application steps may proceed – if not, then repeat HP washing until the salt contamination has been removed to within acceptable limits.

Requirements for the Removal of Oil Contamination

1. In instances where surfaces are inadvertently contaminated with oil then these surfaces shall be solvent cleaned with a suitable water-soluble biodegradable alkaline cleaner/detergent or with appropriate organic solvents.

2. 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.
3. 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.
4. A black light test shall be used to check for oil contamination. Only 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.
5. After successful removal of oils and greases the affected area will require re-blasting.

Requirements for Surface Preparation & Abrasive Blast Cleaning

1. Corrosion Protection activities shall only proceed once all mechanical, fabrication, manufacturing activities i.e., cutting and welding have been completed and released in terms of the manufacturing/fabrication Quality Control Plan (QCP).
2. The method of surface preparation and coating application of the structural steel shall be by conventional hand help equipment.
3. Surface preparation by abrasive blasting shall be performed by means of conventional handheld blasting equipment with a minimum nozzle pressure of 600 KPa and capable of removing mill scale, old coating, rust and suitably preparing the substrate to the required cleanliness of Grade Sa 3.
4. For site activities, 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 and every effort shall be taken to prevent grit, water and other dirt entering drain systems or tank/vessel inlet/outlet piping.
5. 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.
6. The requirement for surface preparation of all metallic 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.
7. After surface preparation, all dust, grit blasting media, or any other deleterious matter shall be removed from the surfaces only by vacuuming and not blown off by compressed air. 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. Only industrial vacuum machines are acceptable. Domestic machines shall not be permitted.
8. Cleaned surfaces shall not be contaminated with oil, grease, rust or other deposits before coating application. Unnecessary traffic prior to painting shall be avoided.
9. Immediately before coating, blast cleaned steel shall not exhibit more than “dust quantity rating” 1 and “Dust Size Class” 3 when tested in accordance with ISO 8502-3.

10. Blast quality inspections only to take place after completed vacuuming.
11. Immediately after QC acceptance of the final blast, these areas shall be coated within 4 hours.

Requirements for Environmental Conditions

1. The Contractor shall ensure that during surface preparation and coating activities the relative humidity (RH) at ground level is less than 80% RH. In the ducts the maximum RH shall not exceed 60%. Both ambient and substrate temperatures shall be between 10°C and 30°C or as per the Manufacturer recommendations, whichever is the more stringent. The application of coatings shall not be permitted when the substrate temperature is less than 3°C above the dew point. During stable weather conditions environmental parameters shall be measured and recorded at least 4 times per shift.
2. During periods of inclement or cold weather conditions the environmental parameters shall be measured both at ground level and within the ducts 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.

Requirements for Coating Application

1. The spray operator shall ensure application in a smooth and controlled manner.
2. The Contractor shall ensure the use of spray nozzles/tips as per the Manufacturers recommendation in the product datasheet.
3. The spray operator shall be equipped with a “wet comb” and frequently monitor the wet film thickness to prevent/reduce a wide spread of DFT’s.
4. Multiple coats shall be applied as per the table at the top of this specification sheet. Single coat systems are not permissible.
5. 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.
6. Where more than one coat is being applied on external surfaces exposed to the elements then surface preparation and 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 surface shall be prepared by light sanding, scrubbing with potable water using a stiff bristle brush and drying before over-coating.
7. 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.
8. The Contractor 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.
9. Plural spray equipment shall not be permitted.

Handling and Storage

1. All lined components shall be handled using soft slings. Large components shall have sufficient lifting/support points to avoid flexing or bending that could damage the applied lining systems.
2. All coated components to be transported shall be loaded with support blocks, packing between pieces and tight lashing to avoid chafing.
3. Off-loading at site shall be conducted using the same care and precautions for on-loading. Components shall not be tipped off the transportation.
4. Coated items shall be stored under cover where possible.
5. Shop applied linings that require site finishing and are sensitive to weathering must be shielded and protected to prevent degradation.
6. Items not stored under cover shall be stored in such a manner as to avoid retention of water and allow good air circulation.
7. Items shall be stored on baulks of timber to raise the lowest level above the rain splash zone.
8. Items shall be stacked using timber packings or other approved means to avoid surface to surface contact. Sufficient bearing area of packing shall be used to avoid damage to the lining. The steelwork shall be placed in such a manner as to ensure adequate drainage of rainwater and condensation.

Requirements for Localised Patch Repairs

1. For corrosion protection activities at the Contractor's Works, it is imperative that coating QC activities and the required testing such as DFTs and pinhole detection, be performed timeously within the overcoating time to allow sufficient time for possible application of additional coats i.e., below specification DFTs and/or patch repairs, i.e., pinholes and mechanical damage, before final cure of the coating system.
2. For corrosion protection activities on site and after installation, the Contractor shall repair all areas of coating damage 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. For small areas surface preparation shall be by Bristle Blaster. 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.
3. All coats in the system shall be re-instated. Areas to be repaired shall be cleaned of dust, dirt, grease, salts or other deleterious matter and all edges of the 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. 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. The repair area shall be masked off before application of the coating. Specifics of such instances shall be assessed on a case-by-case basis.

4. All coated surfaces shall be tested by the High Spark method, there shall be no electrical insulation defects. Should pinholes be identified then repairs shall be performed and once these repair areas sufficiently cured then the repair areas shall be retested. The process to be repeated until a pinhole free coating is achieved.
5. Repeated high voltage spark testing is permissible provided the material does not suffer from di-electric fatigue.
6. Use ASTM D5162 (Standard Practice of Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates) and check for compliance with procedures covering the determination of discontinuities.
7. After completion of the coating activities sufficient curing time of the coating system shall be 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 the full cure of the applied coating shall be verified by the Contractor and/or coating Manufacturer.

Requirements for Inspections

1. For all inspections of all surface preparation and coating 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.
2. Suitably powerful ultraviolet light equipment shall be used under darkened conditions to detect oil contaminated surfaces that fluoresce.
3. The frequency and method of testing shall be pre-agreed in the master quality control documentation.
4. The frequency of measuring DFT shall be as per [11], unless changed at the discretion of the Eskom Engineer.
5. All test instruments shall have current calibration certification.
6. Dry film thickness gauges shall be calibrated daily, using shims, on a flat surface, provided that the surface profile is in accordance with the specification.
7. The Contractor shall have the following measuring instruments, off site and on site, at all times:

   a) Climatic condition testing and measuring instruments:

   - Ambient air temperature gauge.
   - Steel surface temperature.
   - Relative humidity gauge.
   - Dew point measurement gauge.
   - Climatic condition monitoring station that incorporates all of the above.

b) Pre-preparation followed by blasting:

- Radius gauge.
- Weld finish comparator.
- Weld height measurement gauge.
- UV light.

c) Surface preparation:

- Blast surface profile gauge.
- Cleanliness comparator.
- Soluble salt test equipment.
- Dust and debris test tape.

d) Application & Inspection:

- Wet film thickness gauge.
- Dry film thickness gauge.
- Electrical insulation defects tester.
- Curing test Methyl Ethel Ketone (MEK)

Requirements for Corrosion Protection Supervisors & Inspectors

1. Supervisors shall have a minimum SAQCC examined Paint Supervisors Certification, ICORR (UK) or equivalent formal qualification and at least 3 years relevant involvement and documented experience.
2. Inspectors shall have a minimum SAQCC Level 2 Paint Applicators Certification or equivalent formal qualification at the discretion of the Eskom Engineer.

Requirements for Corrosion Protection QCP

1. The Contractor shall prepare and submit a detailed, project specific Quality Control Plan (QCP), in matrix form, of all the tests to be conducted during the execution of this project. For each test, the schedule shall state at least the following information:

    - Test name/type.
    - Duration.
    - Conditioning parameters.
    - Contractor’s in-house procedure reference.

- Reference standard.
- Start date and time, planned and actual.
- Test result.
- Compliance/Non-compliant.
- Space for sign off by the Contractor when testing is complete.
- Space for sign off by an Independent Coating Inspector once testing is complete.
- Space for sign off by the Eskom Engineer. (Note: this will not signify acceptance by the Engineer of the test result).
- Remarks.

2. The QCP shall contain all intervention points and relevant criteria as per the information as described in the Product Data Sheet 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. Under no circumstances shall any work be performed until the QCP and Method Statement have been accepted by the Eskom Engineer.
4. The Contractor shall ensure at least one qualified (as defined previously) dedicated QC resources independent of production pressures. One inspector for day and the other for night.
5. All inspection interventions during and after completion of final coats shall be considered and included.
6. The coating Manufacturer shall provide technical surveys during the execution of the project.
7. The Contractor shall mark up all activities on a drawing of the system at least daily for Eskom to monitor project progress and to suitably ensure sufficient Eskom inspector are available, ahead of time.
8. At the bottom of the QCP the Contractor shall have a specific step for site cleaning of the bund and surrounding areas for grit, dust, empty coating containers. Regular housekeeping and clean up shall take place both during coating operations and at the end of the project before final handover.

Requirements for Method Statement

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:

1. Grease decontamination and washing.
2. Soluble salt decontamination.
3. The parameter setup for blasting and coating operations. This shall be informed by the abrasive grit and corrosion protection product datasheets.
4. Methods for dust and debris removal, maintaining and ensuring cleanliness between coats shall be described.
5. All inspection interventions during and after completion of final coats shall be considered and included.

6. Specifically for confined spaces on site, the Method Statement shall describe all measures for establishing and maintaining the environmental conditions as required by this specification.
7. The Contractor shall submit a repair procedure based on the section above “Requirements for Localised Patch Repairs”.
8. The Contractor shall detail the most effective and 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 spent grit.
9. The detailed Method Statement shall be submitted to Eskom for review and acceptance/rejection prior to the commencement of any work. Eskom reserves the right to request further revision, clarification or additions in accordance with or as required by this specification sheet.
10. The coating Manufacturer shall provide technical surveys during the execution of the project. The Contractor shall commit to this requirement in the Method Statement.

Safety Requirements and Considerations:

1. 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 bund, chamber, tunnel, pipe, pit, sewer, container, valve, pump, sump, bund, chute, bunker, silo, gearbox, tank, receiver, drum or any similar construction, equipment, machinery or object.
2. Flammable Atmospheres: Gases, vapours and dusts can become trapped in CSs and create flammable or explosive atmospheres, and include combustibles e.g., Hydrogen, Acetylene, Paint, and thinning/cleaning solvents, etc.
3. The Flash Point for any solvent borne products such as adhesives, cleaning solvents shall be > 30 ºC.
4. Walking / Working Surfaces and Visibility: Poor lighting may add to hazards caused by an irregular, sloped, or constricted working surface.
5. 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. 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.
6. The Contractor shall provide for all necessary safety precautions and risk assessments.
7. The Contractor shall provide Whip-End protection devises for all blasting and airless spray hosing.

8. 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.
9. The Contractor shall ensure that the abrasive materials used conform to all National Health and Safety Standards.

Specifically with respect to CSs and based on the descriptions and definitions of safety risks as per the above points it is imperative that the Contractor's/Contractor's Method Statement shall describe in detail, the measures and mitigation steps for the risks and hazards as identified in this specification sheet.

It is compulsory that these safety risks/mitigation measures and any others as identified by the Contractor to 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.

Requirements for Tender Returnables

Unless otherwise indicated in the SOW and Enquiry documents, all returnables as detailed below shall be returned as part of the Contractor's Tender document/submission. The SOW and Enquiry document shall be consulted for more detailed and specific requirements.

Mandatory Tender Returnables

At the time of tender the Contractor shall be required to demonstrate competence and to provide verifiable evidence of experience in the application of coatings for similar sized projects, using the same preparation and application processes and products as per this Specification.

Tender Returnables for Evaluation

1. The coating Manufacturer/Contractor shall supply individual product data sheets and material safety datasheets (MSDS) for abrasive blasting media and all products comprising the systems i.e., coating, cleaning solvents and other products. The specific requirements are detailed in the section, **"Requirements for all Corrosion Protection Products and Materials" and "Requirements for Abrasive Blasting Grit"**, in this specification.
2. A detailed Method Statement shall be submitted, as defined in this specification section namely, **"Requirements for Method Statement".**
3. A project specific QCP shall be submitted. The QCP shall be based on the detailed Method Statement as per the point above and shall contain all intervention points and relevant criteria as per the information as described in the Product Data Sheet/s and detailed in this specification namely, **"Requirements for Corrosion Protection QCP"**.
4. At the time of tender the Contractor/coating Manufacturer shall provide a definitive statement with respect to exclusions, deviations or qualifications from this specification. If there are none then the statement needs to reflect this. If no exclusions, deviations or qualifications are submitted at the time of tender, the requirements as prescribed in this specification and all other referenced standards shall apply. No further exclusions, deviations or qualifications shall be permitted and will not receive any consideration by Eskom after Contract Award.

Reference Documents:

The following list of references shall apply in addition to the requirements of 240-101712128. The latest revision of the referenced standards shall apply.

1. GE/MAT/24/088: Duvha P/S Corrosion Specification for Acid Proofing of Sulphuric Acid Bund.
2. 382-171332: Scope of work for Replacement of the North bulk sulphuric acid tank at Duvha Power Station.
3. 240-101712128: Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Coatings.
4. 240-106365693 Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings.
5. 240-145581571: Standard for the Identification of the Contents of Pipelines.
6. ASTM C566: Moisture Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying.
7. ASTM D4414: Standard practice for measurement of wet film DFT by notch gauges.
8. ASTM D4541: Standard Method for Pull-off Strength of Coatings using Portable Adhesion Testers.
9. ASTM D4940 Grit Standard Test Method for Conductimetric Analysis of Water-Soluble Ionic Contamination of Blasting Abrasives.
10. ASTM D5162: Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates.
11. ASTM D7393: Standard Practice for Indicating Oil in Abrasives.
12. ASTM E376: Measuring coating DFT by magnetic field or eddy current electro-magnetic test Methods.
13. ASTM F21: Standard Test Method for Hydrophobic Surface Films by the Atomizer Test.
14. ISO 2409: Paints and varnishes – Cross cut test.
15. ISO 4624: Paints and varnishes – Pull-off test for adhesion.
16. ISO 8502-6: Preparation of steel substrates before application of paint and related products – Test for the assessment of surface cleanliness – Part 6: Extraction of soluble contaminants for analysis – The Bresle method.
17. 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.”
18. ISO 11127: Preparation of steel substrates before application of paints – Non-Metallic blast cleaning abrasives.
19. NIOSH 7602: Free Silica (crystalline silica) Respirable crystalline silica by IR Spectroscopy.
20. SANS 1091: National colour standard.

21. SANS 1344: Medium duty solvent detergent.
22. SANS 2808: Determination of film thickness.
23. SANS 5502-3: Preparation of steel substrate before the application of paints and related products – Test for the assessment of surface cleanliness – Part 3: Assessment of dust of steel surfaces prepared for painting (pressure sensitive tape method).
24. SANS 5770: Preparation of steel substrate before the application of paints and related products – Test for the assessment of cleanliness of blast-cleaned steel surfaces for painting - Freedom from certain soluble salts.
25. SANS 5772: Preparation of steel substrate before the application of paints and related products – Surface roughness characteristics of blast-cleaned steel surfaces - Profile of blast-cleaned steel surfaces by a micrometre profile gauge.
26. SANS 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 un-coated steel substrates and of steel substrates after overall removal of previous coatings.
27. SANS 8501-3: Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 3: preparation grades of welds, edges, and other areas with Surface imperfections.
28. SANS 8502-3: Preparation of steel substrates before application of paints and related products – Test for the assessment of cleanliness Part 3: - Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method).
29. SANS 8504-2: Preparation of steel substrates before application of paints and related products – Surface preparation methods – Part 2: Abrasive blast cleaning.
30. SANS 10064: The preparation of surfaces for coating.
31. SANS 12944-3: Paints and varnishes – Corrosion protection of steel structures by protective paint systems. Part 3: Design considerations.

Submitted by:	**Accepted by:**
 ……..	 ……..
Name: K. Northcott Title: Senior Consultant Date: 18 October 2024	Name: N. Pheta Title: Senior Advisor Date: 18 October 2024