

**GAM/MAT/22/105: Kriel Power Station Raw and CW Piping Galvanising Corrosion
Specification**

<p>To be considered as Annexure D of 240-101712128 and 240-106365693: Specifications for the Internal & External Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Coatings</p>	
Component/s	Piping & Piping Fittings in the range from 25NB – 400NB.
<u>Internal & External</u> (Material/Substrate)	New steel (mill scale)
<u>Internal Immersed</u> (Environment)	<ul style="list-style-type: none"> • Operating Temperature: 25°C – 65°C • pH: 8 to 8.6 • Medium: Raw or Cooling Water (CW) • Conductivity (K) < 4000 µS • Chloride < 400 mg.kg⁻¹ as Cl • Sodium < 500 mg.kg⁻¹ as Na • Sulphate < 1000 mg.kg⁻¹ • Calcium Carbonate Precipitate Potential (CCPP) 80 to 160mg.kg⁻¹ as CaCO₃
<u>External Atmosphere</u> (Environment)	<ul style="list-style-type: none"> • Occasional spill & splash by Cooling, Raw and rain water. • Outdoor/indoor exposure.
<u>NOTE:</u>	Steel to be hot dip galvanised should not contain more than 0.02% phosphorous or more than 0.25% silicon.
Design	<p>All items item to be protected by means of hot dip galvanising shall be designed in accord with ISO 14713 and the “Design for hot dip galvanizing” from HDGASA.</p> <p>In order to ensure proper hot dip galvanising of the steel surfaces, the Contractor shall ensure that the steel to be used for galvanising shall comply with the requirements of SANS 121 (ISO 1461).</p>
Surface Preparation	All weld areas shall be abrasive blast-cleaned to Grade Sa 2,5 ISO 8501-1. Following abrasive blast cleaning of the welds, all items shall be suitably pickled, rinsed, dried and fluxed.

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Galvanising	<p>All items shall be hot dip galvanised in accordance with SANS 121 (ISO 1461), to a minimum coating thickness as laid down in the appropriate tables of SANS 121 (ISO 1461).</p> <p>All nuts, bolts, clips and other items required for the fixing of galvanised articles shall be hot dip galvanised in accordance with this specification sheet.</p> <p>Electro-galvanised items will not be acceptable</p>
Tolerances	<p>Tolerances on all threaded articles shall be according to SANS 121 (ISO 1461). Threaded items shall be spun in a Centrifuge during the galvanising process.</p>
<p align="center">In addition to the requirements of SANS 121 (ISO 1461), the following criteria with respect to white rust and passivating treatments shall apply.</p>	
White Rust	<p>All material shall be free from excessive white rust and black staining.</p>
	<p>To assist in meeting this requirement, close attention shall be paid to the manner in which the material is stacked and stored at the galvaniser's works and also during its subsequent handling until such time as it is handed over to Eskom.</p>
	<p>Material which has been inspected at the galvaniser's or manufacturer's works and passed by Eskom's appointed inspectors will still be liable to rejection if it has been found that excessive white rust has developed between the date of inspection and the date when the material is handed over to Eskom.</p>
	<p>If the material is affected by excessive white rust and /or black staining the Contractor may clean it using a stiff bristle (non-metallic brushes) brush and cleaning solution.</p>

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	<p>Cleaning solutions can be either 5% ammonia or acidified sodium dichromate.</p> <p>The cleaning solution must be thoroughly rinsed off and the pipe must be allowed to dry.</p> <p>The material will only be accepted on provision that the weight of zinc coating still meets the requirements specified in the appropriate tables of the SANS 121 (ISO 1461).</p>
<p align="center">Passivation</p>	<p>All items shall be passivated. The passivating coating shall be applied to the material immediately after galvanising to afford temporary protection to the galvanising surfaces. This coating shall be even, and shall be sufficiently transparent to enable Eskom's appointed inspectors to examine the underlying surfaces for any defects.</p>
<p align="center">It is recommended that all colour-coding, markings, etc. for galvanised piping be performed by means of adhesive tape. Should this not be possible then the procedure below may be used for localised colour coding bands.</p>	
<p align="center">Procedure for colour coding</p>	<p>All detailed and specific aspects and requirements of 240-106365693: Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings shall apply.</p> <p>The colour of the final/finishing coat shall be as per the requirements of 240-145581571: Standard for the Identification of the Contents of Pipelines and Vessels.</p>
<p align="center">Surface Preparation</p>	<p>The band to be coded shall be masked off and lightly abraded. Galvanised and zinc metal-sprayed surfaces shall be scrubbed prior to painting to provide a water break-free surface, using a solvent detergent degreaser specifically formulated by the supplier of the paint system, for cleaning new galvanising or zinc-metal sprayed surfaces.</p>

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	Water rinsing after cleaning is essential to remove all traces of the cleaner. This is best achieved by hosing with a high-pressure water spray. Allow drying.
Primer Coat	As soon as the surfaces are dry, apply by airless spray, one coat Two-Pack Polyamide or Polyamine Cured Epoxy Primer specifically formulated for zinc surfaces. Dry Film Thickness (DFT) from 50 to 80 microns.
Final Coat	Apply by airless spray, one coat Two Component High Solids Polyurethane Acrylic Coating from 50 to 60 microns. Total DFT of coating system from 100 to 140 microns.
This specification is applicable to the hot dip galvanising of demineralised, potable, storm, raw and sewage reticulation piping.	
General Requirements:	
<ol style="list-style-type: none"> 1. The Galvaniser shall be a member of Southern African Hot Dipped Galvanisers Association (SAHDGA). 2. Galvanising 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). 3. When repairs are required and depending on the size of the repair the substrate shall either be abrasive blast cleaned to Grade Sa 2.5 or prepared by mechanical means to Grade St 2 (ISO 8501-1). The contractor shall propose the method and grade of surface cleanliness for review, acceptance/rejection by the Eskom engineer. 4. Power and hand tool cleaning is only applicable to very localised touch ups or patch repairs. Hand-tool cleaning for isolated/localised areas may be utilised provided the required standard of finish is achieved. For all immersion applications, as a minimum, final mechanical cleaning shall be by bristle blaster in order to create a profile to ensure a suitable mechanical key for adhesion. 	

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5. All areas of internal damage shall be patch repaired by a means of a twin pack, solvent free, surface tolerant epoxy coating system. For areas of damage on the external surfaces i.e. mechanical damage, delamination, welding after galvanising etc., patch repairs shall be performed with the final finishing coating in grey to match the colour of the galvanising. All requirements (including external surface repairs) of referenced documents **(1, 2, 3, 6, 10 & 11)** shall apply.

Pre-job Quality Documentation review and acceptance:

1. The contractor shall submit a detailed, project specific QCP. The QCP shall contain all intervention points, frequencies of test and relevant criteria as per referenced documents **(9, 10 & 11)**. Eskom reserves the right to request further revision, clarification or additions in accordance with or as required by this specification sheet.
2. The Galvanising QC inspector shall be qualified as per referenced documents **(9, 10 & 11)**.
3. Under no circumstances shall any work be performed until the QCP has been accepted by the Eskom engineer.

Reference Documents:

The following list of references shall apply in addition to the requirements of 240-106365693 and 240-101712128. The latest revision of the referenced standards shall apply. Where conflict exists the more stringent requirement shall apply.

1. 240-101712128: Standard for the internal corrosion protection of water systems, Chemical Tanks and Vessels and Associated Piping with Coatings.
2. 240-106365693: Standard for the External Corrosion Protection of Plant, Equipment and Associated Piping with Coatings.
3. 240-145581571: Standard for the Identification of the Contents of Pipelines.
4. ASTM E376: Measuring coating DFT by magnetic field or eddy current electro-magnetic test Methods.
5. EAPP0357: Kriel Power Station Pre-treatment Plant Refurbishment Scope of Work.

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6. 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."
7. 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.
8. ISO 9223: Corrosion of metal and alloys – Corrosivity of atmospheres – Classification.
9. ISO 14713: Protection of iron and steel structures – Zinc and aluminium coatings – Guidelines.
10. SANS 121 (ISO 1461): Hot-dip galvanised coating on fabricated iron and steel articles - Specification and test methods.
11. SAHDGA 01-1990 – Code of practice for surface preparation and application of organic coatings.
12. SAHDGA - "Design for hot dip galvanizing"

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