

Title: **SPECIFICATION FOR CORROSION
PROTECTION OF PLANT AND
EQUIPMENT WITH COATINGS**

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Introduction

Corrosion protection can be achieved in a number of ways including, but not limited to, the following:

1. The use of inherently resistant materials of construction, e.g. stainless steels, 3CR12 (Passivated) etc.
2. The application of protective coatings to mild steel. (carbon steel & iron)
3. Cathodic protection, e.g. the protection of the external surfaces of buried pipelines or the internal surfaces of tanks or water boxes.
4. Changing the environment, e.g. by the use of inhibitors.

1. Scope

1.1 Purpose

This specification focuses on the use of protective coatings as a means of corrosion protection for mild steel substrates. It does not address civil finishes such as concrete, masonry, plaster, wood etc. Similarly it does not address the use of inherently resistant materials such as 3CR12, stainless steel, brass etc.

Generic coating systems for the typical environments and substrate materials have been selected based on past experience, proven case histories and current international practice.

1,2 Applicability

This specification covers general plant and equipment on all power stations including coal fired, nuclear, pumped storage and gas turbine installations.

This specification does not address all critical plant areas; It is recognised that there are numerous critical areas that may require closer scrutiny especially in cases of significantly sized project packages in severally corrosive environments. In these instances the Corrosion Department of ERID must be consulted. ERID will be able to provide recommendations on a case by case basis. These recommendations will be based on project size, severity and uniqueness of the environment as well as life cycle costing issues.

2. References

The following documents contain provisions that, through reference in the text, constitute requirements of this document. At the time of publication, the editions indicated were valid. These documents are subject to revision and users are responsible to ensure that the most recent editions of the documents listed below are used/referenced.

2.1 South African Bureau of Standards (SANS) Codes of Practice, Specifications and Methods

Codes of Practice

SANS 1091:2004	National colour standard
SANS 10064:	The preparation of steel surfaces for coating

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SANS 121(1S01461):	Hot dip galvanized coatings on fabricated iron and steel articles specification and test methods
SANS ISO 2808:	Paints and varnishes – Determination of film thickness.
SANS ISO 9001: 2000	Quality Management Systems – Requirements

Specifications

SANS 1217	Guidelines for internal and external organic coating protection for buried steel pipelines
SANS 1274	Coatings applied by the powder coating process.
SANS 53811	Sherardizing – Zinc diffusion coatings on ferrous products Specification.
SANS 32(En 10240)	Internal and/or External protective coatings for steel tubes – Specifications for hot dip galvanizing in automatic plants

What about continuous galvanized sheeting & Chromadek?

Methods

SANS 5772	Profile of blast cleaned surfaces for painting (determined by a micrometer profile gauge)
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2.2 International Organisation for Standardisation

ISO 4624	Paints and varnishes – Pull-off test for adhesion
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.
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
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.
ISO 8501-4.	Preparation of steel substrates before application of paints and related products – Visual assessment of surface cleanliness – Part 4: Initial surface conditions, preparation grades and flash rust grades in connection with high-pressure water jetting.
ISO 8502-3	Preparation of steel substrates before application of paint and related products – Tests for the assessment of surface cleanliness-Part 3: Assessment of dust on steel surfaces prepared for painting (pressure sensitive tape method).

ISO 8503-4 Preparation of steel substrates before application of paint and related products – Surface roughness characteristics of blast cleaned steel substrates – Part 4: Method for the calibration of ISO surface profile comparators and for the determination of surface profile – stylus instrument procedure.

ISO 8504 Preparation of steel substrates before application of paint and related products – Surface preparation methods.

ISO 12944 Paint and varnishes – Corrosion protection of steel structures by protective paint systems. Parts 1 to 8.

ISO 14713 Protection against corrosion of iron and steel structures – Zinc and aluminium coatings – Guidelines

ISO 9223 Corrosion of Metals & Alloys – Corrosivity of atmospheres
- Classification

2.3 RAL (Reichs Ausschuss fur Lieferbedingungen)

RAL K1 Auxiliary Designation for RAL Colours

2.4 Hot-Dip Galvanizers Association Southern Africa

HDGASA01-1990 – Code of Practice for Surface Preparation and Application of Organic Coatings.

HDGASA02 – 1990 - Specification Performance Requirements of a Coating System

HDGASA03 -2006 – Hot Dip Galvanizing and Duplex Corrosion Protection

Steel Protection by Hot Dip Galvanizing and Duplex Coatings – Chapter 9 – Design for Hot Dip Galvanizing.

2.5 ASTM

ASTM D4414 Standard practice for measurement of wet film thickness by notch gauges.

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

2.6 Eskom

ESKSCAAC6. Specification for the identification of the contents of pipelines and vessels.

3. Definitions and Abbreviations

3.1 approved: Refers to written approval by the Engineer.

3.2 coat/coating/film: Refers to a single layer of a product.

3.3 coating system: "Coating system" is an all embracing term including method and degree of surface preparation, generic type, thickness and number of coats and the method of application of the coats.

3.4 contractor: The coating applicator or contractor having the main contractual responsibility to Eskom.

3.5 manufacturer: The manufacturer of the coating material and associated products such as solvents, cleaners etc.

3.6 generic coating type: Refers to a type of product e.g. epoxy, polyurethane, Hot dip galvanizing, Duplex systems, etc.

3.7 specified: Conditions agreed to at the time of contract award. These may not be altered unless agreed to by the contractor and the Engineer.

4. Requirements

4.1 General Requirements

The requirements of ISO 12944:1998 shall apply as a minimum to all coating application activities. Supplementary requirements are given in this document. In the event of conflict between this document and the ISO standard, the requirements of this document will prevail.

The contractor shall be responsible for ensuring that he is fully conversant with the requirements of this specification and the relevant coating systems.

Any specific queries or requirements not covered by this specification shall be referred to the Engineer

4.1.1 Design Considerations

4.1.1.1 Steel components should be designed to be accessible for the purposes of applying, inspecting and maintaining the protective coating system.

4.1.1.2 The guidelines to ensure accessibility and suitability for painting shall be drawn from ISO 12944-3:1998 Paint and varnishes – Corrosion protection of steel structures by protective paint systems' Part 3 – 'Design considerations'.

4.1.1.3 Steel components that are to be hot dip galvanised shall be designed in accordance with the ISO 14713 'Protection against corrosion of iron and steel structures – Zinc and aluminium coatings – Guidelines' and the 'Design for Hot Dip Galvanizing' guidelines from the Hot-Dip Galvanizers Association Southern Africa.

4.1.1.4 For the internals of circuits or systems containing liquids or gases, the conditions of the coated surfaces should not be detrimental to the full and correct functioning of the circuit or system as envisaged in the applicable design criteria of that circuit or system.

4.2. Contractor Skills and Competency

4.2.1 The Contractor shall ensure that there are at all times sufficient suitably qualified, experienced and skilled staff to carry out and supervise all activities.

4.2.2 Staff shall be qualified in terms of the **South African Qualification and Certification Committee for Corrosion Protection (SAQCC(Corrosion Protection))** as follows:

Has anyone seen the absolute mess that SAQCC has become? It is all but defunct.

Applicators:	General Heavy Duty Coatings Applicator (PA1)
Supervisors:	General Paint Supervisors (PS1)
Inspectors:	Coating Inspectors (Level 1 or Level 2)
	NACE CI P Level 1, 2 or 3
	Hot dip galvanizing inspectors must be qualified on the HDGASA Inspectors Course.

4.2.3 The Contractor shall meet the General Requirements For Qualified Suppliers (See Annexure 1) and shall have been rated in accordance with the Capability Checklist for Corrosion Protection Coating Applicators (See Annexure 2).

4.3 Equipment

4.3.1 Measuring and Testing Equipment

The contractor shall have a blast profile gauge, wet film comb, and a dry film thickness gauge at the shop/site at all times. The contractor shall also have at the shop/site instrumentation to measure the psychometric conditions and the substrate temperature.

The electronic dry film thickness gauge shall conform to the requirements of SASS ISO 2808:1997 and shall be calibrated using the smooth calibration disc supplied by the instrument manufacturer.

Where immersed surfaces are being coated or lined, the contractor shall have the necessary pin-hole detection equipment at the shop or site. The equipment shall be of either the wet sponge low voltage or high voltage spark type as dictated by the type of coating or lining being applied. This instrumentation shall be set up and operated in accordance with the requirements of SANS 1217.

All test equipment and shims shall have current calibration certificates.

4.3.2 Spray Equipment

The spray equipment used shall be capable of properly atomising the material and shall be equipped with suitable pressure regulators and gauges. Air caps, needles and nozzles shall be of the type recommended by the coating manufacturer.

All spray painting equipment shall be fitted with suitable oil and moisture traps.

4.3.3 Blast Cleaning Equipment

Industrial type surface preparation apparatus shall be used to ensure effective and time-efficient cleaning of surfaces. Effective oil and water separators shall be utilised on all airlines used for abrasive blast cleaning. The separators shall be of the 'cartridge' type.

4.3.4 Power Mixers

All coatings shall be mixed with power mixers. Low speed mixers which do not induce air into the coating shall be utilised.

4.4 Coating Materials

4.4.1 Only approved coating materials supplied by approved coating manufacturers as detailed in clause 4.14 shall be used.

4.4.2 All materials, i.e. paint, solvents and cleaning agents for a specific paint system shall be supplied by the same manufacturer.

4.4.3 Coatings shall only be supplied by the approved coating manufacturers. The contractor shall obtain a copy of the coating Batch Certificate, the Product Data Sheet and the Material Safety Data Sheet from the coating manufacturer prior to using the material.

4.4.4 The solvents used shall be those recommended and manufactured by the coating manufacturer. Where the recommended 'solvent' and 'clean-up thinners' for a material differ, the 'clean-up' solvent must not be added to the coating for dilution purposes.

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- 4.4.5 Excessive dilution of paints is not permitted. Solvent additions for application purposes shall be in strict accordance with the coating manufacturer's Product Data Sheet.
- 4.4.6 The maximum capacity of containers shall be 25 litres. Where required, the coating containers shall be of a size large enough to allow mixing in the containers themselves.
- 4.4.7 The coating manufacturer's recommended shelf life and other storage requirements shall be met.
- 4.4.8 The colours of the paints to be used shall be as specified by the Engineer and shall comply with SANS 1091:2004: 'National colour standards for paints' or RAL **KI: 'Auxiliary Designation for RAL Colours'**. Colours for the identification of the contents of pipes and tanks shall be in accordance with ESKSCAAC6.
- 4.4.9 All paints and coatings shall be brought to site in new unopened containers. All containers shall be clearly marked with the manufacturer's material batch numbers and other relevant information.
- 4.4.10 The contractor shall ensure that the colour selection of the coat immediately prior to the finishing coat shall be suitable for complete obliteration by the finishing coat.

4.5 Surface Preparation

4.5.1 General

- 4.5.1.1 Sharp edges shall be dressed to a radius of not less than 2 mm, but no more than half of the section thickness. All burrs, rags and weld spatter shall be removed as per the requirements of ISO 12944-3:1998.
- 4.5.1.2 Welds should be free from imperfections (e.g. asperities, undercutting, blowholes, craters, spatter) which are difficult to cover effectively with a protective paint system. The onus is on the contractor to ensure that the surfaces are ready for coating.
- 4.5.1.3 It is extremely important that the contractor endeavours to achieve the best surface preparation possible by using the latest technology when it comes to surface preparation apparatus and materials. The minimum degree of surface preparation shall be as stipulated in the detailed coating specifications.

4.5.2 Pre-cleaning

- 4.5.2.1 Oil and grease shall be removed by high pressure water washing with detergent solution and rinsing with clean water prior to abrasive blast cleaning and application of coatings.
- 4.5.2.2 Chemical and cleaning contamination shall be removed by means of neutralising or flushing or both. It is important that clean potable water is used for cleaning, or the surfaces will be left contaminated after washing. The surfaces shall thereafter be allowed to dry completely prior to coating or before continuing with the rest of the surface preparation process.

4.5.3 Mechanical and Hand Cleaning

- 4.5.3.1 Mechanical and hand cleaning shall be in accordance with the procedure specified in Clause 5.4 of SANS 10064 (ISO 8540).
- 4.5.3.2 The standard of surface preparation shall be in accordance with ISO 8501/1 and as specified in the relevant coating system.

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4.5.3.3 Cleaning by means of hand or power-tools, i.e. wire brushes, chipping hammers, scrapers, grinders, sanders, needle descalers etc. may only be used where specified in the generic coating specification and the condition of the substrate metal is such that efficient cleaning can be achieved and where the protective system is designed for application to brushed or ground surfaces, e.g. in the case of surface tolerant coatings.

4.5.4 Abrasive Blast Cleaning

4.5.4.1 Abrasive blast cleaning is by far the preferred method for surface preparation and shall always be considered first before any other cleaning method is used.

4.5.4.2 Abrasive blast cleaning shall be carried out in accordance with Clause 5.3 of SANS 10064 (ISO 8504) and the degree of cleanliness achieved shall be in accordance with ISO 8501/1 as specified in the relevant coating system.

4.5.4.3 The profile, peak to valley, when measured by SANS 5772 (ISO 8503-4), shall be as specified in the relevant manufacturer's Product Data Sheet for the primer coating being used.

4.5.4.4 In general an anchor profile height of 25 to 751.1µm is recommended for most industrial coating systems up to a dry film thickness of about 250 micron. However, in the case of heavy-duty thicker film systems, the anchor profile needs to be increased in order to cope with the mounting stresses exerted by the coating.

4.5.4.5 The required blast profile height shall be carefully considered and be within the range of the specified coating system, and as recommended in the Product Data Sheets. It is important that the blast profile does not exceed the specified thickness of the primer or first coat, especially where delays in overcoating are expected or encountered. Any primed or coated surfaces showing signs of "measle" corrosion shall be considered defective and shall be re-blasted.

4.5.4.6 Good quality abrasives shall be used in order to minimise the amount of waste grit being generated and contamination of the surfaces.

4.5.4.7 The abrasive may be any abrasive material (except silica sand) which meets the following requirements. It shall be composed of clean, sound, hard particles free from foreign substances such as dirt, oil, grease, toxic substances, organic matter and water soluble salts. It shall be capable of producing the surface profile as specified for the relevant coating system. The use of re-cycled blasting media is not allowed for the final blast.

4.5.4.8 The Contractor shall satisfy himself that the abrasive materials used conform to all national health and safety standards such as NOSA and the OHS Act.

4.5.4.9 All abrasive media shall be stored in an area that is completely dry and covered to allow for good preservation of the materials.

4.5.4.10 In all cases, after blast cleaning, all traces of blasting media and dust shall be removed from the surface by vacuum cleaning. Cleaned surfaces shall not be contaminated with oil, grease, rust or other deposits before coating.

4.5.5 Surface Cleanliness

4.5.5.1 No coating shall be applied to any surface containing traces of grit, grease, oil, loose rust, mill scale, surface contaminants (i.e. dust), chemical fall-out, salt deposits or corrosion products of any kind.

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4.5.5.2 The following requirements shall apply prior to coating application:

4.5.5.2.1 Freedom from dust and debris shall be less than 'dust quantity rating' 1 when tested in accordance with ISO 8502-3.

4.5.5.2.2 If the blast cleaned surface changes colour, or rust bloom begins to form, the surface shall be reblasted.

4.5.6 Soluble Salts

4.5.6.1 Soluble iron salts such as ferrous chloride and ferrous sulphate are found on surfaces in marine and industrial environments. As these salts are soluble in water they can cause osmotic blistering of coatings which are applied to the steel and must be removed prior to painting.

4.5.6.2 Soluble salts shall be removed by cleaning and flushing with fresh potable water. Persistent salt deposits may be removed by proprietary solutions with the prior approval of the coating manufacturer and the Engineer.

4.5.6.3 Soluble salts levels shall be measured using Weber Reilly Soluble Salts Test Kits or equivalent approved methods. The acceptable level of salts shall be as specified by the coating manufacturer.

4.5.7 Sweep Blasting (Micro Blasting) of Galvanized Surfaces

4.5.7.1 Sweep blasting shall be carried out only where stipulated in the generic coating system and shall be in accordance with clause 4.3.3 of HDGASA 01-1990 – Code of Practice for Surface Preparation and Application of Organic Coatings.

4.5.7.2 The sweep blasting must not damage the galvanized surface or remove any of the zinc layer.

4.6 Coating Application

4.6.1 Approval

4.6.1.1 No work shall be performed until the Quality Control Plan is approved by the Engineer.

4.6.2 Mixing

4.6.2.1 The contractor shall ensure that all paints are mixed in accordance with the manufacturer's instructions.

4.6.2.2 In the case of two pack materials, the splitting of kits as supplied from the factory is not permitted. The contractor either has to make use of smaller kits or needs to plan the work in such a way that any unnecessary wastage of paint is avoided.

4.6.2.3 During application, containers shall be agitated often enough to keep pigments in suspension.

4.6.3 Coating

4.6.3.1 All surfaces shall be coated as specified. Surfaces which do not require coating shall be suitably protected.

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- 4.6.3.2 The primer coat shall be applied as soon as possible after the surface preparation operation and at least during the same shift as the blast cleaning operation, but under no circumstances may the primer be applied over rust bloom or over surfaces that have changed colour due to humidity or other contamination.
- 4.6.3.3 Coating application and cleaning shall not take place when site conditions are likely to negatively affect these operations. The Contractor shall ensure that the necessary protective equipment is used to prevent contamination of the coatings and to minimise delays due to such site conditions
- 4.6.3.4 Successive coats shall be of distinctly different colour to the previous coat to ensure correct intercoat coverage. However, two finishing coats of the same colour may be applied to achieve complete colour uniformity. If required, zinc rich primers shall be tinted to provide a colour that contrasts with the abrasive blast cleaned substrate. Special attention shall be given to cracks, crevices and edges to ensure complete coverage and paint thickness. All finishing colours shall be to the Engineer's approval.
- 4.6.3.5 On pre-coated surfaces all traces of soluble salts and other corrosive airborne contaminants shall be removed with potable water and surfaces shall be allowed to dry prior to further paint application.
- 4.6.3.6 Concealed surfaces shall be completely coated. Suitable sponges may be used for application of coating to concealed surfaces or back to back angles. in the case where it is impractical to coat the concealed surface, the opening shall be sealed utilising an approved mastic material.
- 4.6.3.7 All edges, corners, bolt holes, mouse holes, cut ends and weld beads shall be stripe coated by brush application, prior to the application of the intermediate coat. The stripe coating shall be an additional coat of the specified intermediate coat. In order to assist in its identification, the stripe coat shall be a different colour to both the specified intermediate coat and finishing coat. Under no circumstances shall stripe coating be carried out by roller or spray-application.
- 4.6.3.8 The stripe coat is not intended to increase the overall specified dry film thickness of the system but to ensure that the minimum thicknesses required are actually achieved at edges.
- 4.6.4 Application
- 4.6.4.1 Unless otherwise specified, all coatings applied in the shops or on site shall be applied by airless spray techniques.
- 4.6.4.2 In instances where spray application is considered not to be possible, practical or feasible, this must be brought to the attention of the Engineer at the time of tendering.
- 4.6.4.3 The contractor should note that many of the high build coatings specified in the relevant systems are only capable of achieving their recommended film thicknesses by spray application. Other application methods such as brush and roller can result in lower film builds being achieved per coat. The contractor must take cognisance of this in his tender. If during the course of the project the contractor is instructed to change his method of application any labour cost implications must be brought to the attention of the Engineer before any such costs are incurred.
- 4.6.4.4 Unless otherwise specified, all application work shall be carried out in strict accordance with the recommendations and instructions given in the most current Product Data Sheet supplied by the coating manufacturer. This includes required climatic conditions, methods of surface preparation, substrate temperatures, blast profiles, over coating times, application

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equipment and methods to be utilised and pertinent requirements not listed in this specification. The Product Data Sheet shall be deemed to be part of this specification.

- 4.6.4.5 Prior to the application of any coating material, the selected manufacturer's Product Data Sheet for the material being used shall be obtained by the contractor. A copy of the data sheet shall be signed by the coating manufacturer. This is to ensure that the latest product data sheet has been provided to the contractor, that the coating manufacturer is aware of the relevant coating specification and the conditions under which the material will be applied and to allow for technical back-up where required in support of the joint guarantee as detailed in Section 4.18.
- 4.6.4.6 In the case of equipment manufacturer's proprietary finishes on items such as pumps, motors, valves etc, these systems may only be used if prior approval has been obtained from the Corrosion Department at ERID.
- 4.6.4.7 All coatings shall be evenly applied to form a smooth, continuous, unbroken coating free from tears, runs, sags, wrinkles, blisters, mud-cracking, change in colour or gloss, orange peel, visible pin-holes, dirt, dust or fluff occlusions or any other visible defects. Each coat shall provide complete coverage.
- 4.6.4.8 Surfaces which rest on concrete or other floors shall receive the full coating system prior to erection.
- 4.6.4.9 The contractor shall take adequate precautions to protect areas being painted against contamination and fall-out from adjoining sections of the structure during painting operations, should this become necessary.
- 4.6.4.10 Coated steel to be embedded in concrete or soil shall be painted so that the coated areas extend at least 100 mm into the concrete or soil, unless otherwise specified.
- 4.6.4.11 Where surfaces are to be welded, no paint shall be applied within 50 mm of the weld and the subsequent intermediate and finishing coats (where applicable) shall be stepped at 25 mm intervals to produce a feathered edge for patch repairs after welding. The steps may be achieved by using masking tape at the time of surface preparation and coating applications. The masking tape on the blast cleaned surface adjacent to the weld area shall be left in place to provide temporary protection until the welding is carried out.
- 4.6.4.12 The contractor shall apply the full painting system specified on the bearing surfaces of catwalks before the gratings or relevant floor sections are put in place.
- 4.6.5 Ambient Conditions
- 4.6.5.1 Coatings shall not be applied under the following conditions:
- 4.6.5.1.1 When the surface may become damaged by rain, air borne dust, chemical fall-out, fog or condensation. When it is anticipated that these conditions will prevail during the drying period, suitable enclosures shall be provided to protect the surfaces.
- 4.6.5.1.2 When the ambient air temperature or the steel temperature is outside the coating manufacturer's recommended range.
- 4.6.5.1.3 When the ambient relative humidity exceeds 85%.
- 4.6.5.1.4 Using the above data, the dew point shall be determined by means of a suitable dew point calculator. During coating application, the ambient temperature shall be at least 3°C above the dew point.

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- 4.6.6 Hot Dip Galvanizing (No zinc electroplating or the so called "Cold Galvanizing")
- 4.6.6.1 Hot dip galvanizing shall be in accordance with the requirements of SANS 121 (ISO 1461).
- 4.6.6.2 Steel suitable for hot dip galvanizing shall contain the following additions to the steel specification.
- Aluminum killed steel: Silicon (Si) = 0.01 to 0.04%
- Silicon killed steel: Silicon (Si) = 0.15 to 0.25%
- Phosphorous (P) in both steel types = 0.02% maximum
- 4.6.6.3 Galvanized surfaces that are to receive duplex organic coatings shall **not be passivated**. This is a function of when the paint system is to be applied. Immediately after HDG (2 to 6 hours), then no passivating, but if longer, especially in a moist humid environment, then passivation is required to prevent White Rust.
- 4.6.6.4 Repairs to damaged galvanizing shall be carried out in accordance with clause 6.3 of SANS 121 (ISO 1461), i.e. either by zinc metal spray or or capable of giving sacrificial protection to the steel. The zinc rich epoxy shall be 'Zincfix' as approved by the Hot Dip Galvanizing Association Southern Africa or equivalent approved.
- 4.6.7 Powder Coating
- 4.6.7.1 When powder coating is specified, both the fabrication of items for powder coating as well as the powder coating application shall comply with SANS 1274
- 4.6.7.2 Textured or 'structured' powder coatings will not be acceptable due to variations in film thicknesses.
- 4.6.8 Patch Repairs to Transport and Erection Damage
- 4.6.8.1 Following erection, 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. When the damage extends to the steel substrate, 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 mechanically cleaned to grade St 3 of ISO 8501/1. All edges of existing coatings shall be feathered back to a hard edge. The patch primer used shall be in accordance with the requirements of the relevant coating system.

4.7 Fasteners and Friction Grip Surfaces.

- 4.7.1 All nuts and bolts shall be either 'black' or zinc coated as specified. HDG fasteners to be in terms of SANS 121 (ISO) 1461 up to grade 8.8 and friction grip fasteners shall be in accordance with SANS 10094
- 4.7.2 Friction grip areas shall be left uncoated with the exception of steel work that is either HD galvanized, primed with inorganic zinc silicate or zinc thermal sprayed. The uncoated friction grip areas shall be sealed to prevent the ingress of corrosive elements. The sealer used shall be recommended by the coating manufacturer as being suitable for the environment and compatible with the protective coating system. The sealing material shall be applied either by gun or spatula after erection. Where possible the sealant should be the same colour as the finishing coat.

4.8 Shop Painting

- 4.8.1 The contractor shall furnish the materials specified and ensure that they are applied in strict accordance with this specification.
 - 4.8.2 The contractor shall be wholly responsible for surface preparation and coating application. The coated surfaces shall meet the minimum dry film thickness required by this specification.
 - 4.8.3 The number of coats to be applied in the shops shall be as specified by the Engineer.
 - 4.8.4 Provisions must be made for the repair of handling damage to the coating after erection and before the application of the finishing coats.
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4.9 Site Painting

- 4.9.1 The contractor shall furnish the materials specified and ensure that they are applied in strict accordance with this specification.
- 4.9.2 Unless otherwise specified, all finishing coats shall be applied on site after erection.
- 4.9.3 The finishing coats being applied on site shall be sourced from the same manufacturer as the shop applied primer and intermediate coats.
- 4.9.4 All shop coated surfaces shall be inspected and examined for mechanical damage on arrival on site. If the damage is excessive it may be preferable to repair this transport damage before erection whilst access is easier. Alternatively all repairs may be carried out after erection. Repairs shall be carried out in accordance with clause 4.6.8.
- 4.9.5 If site respraying is necessary, labels and all other areas not to be painted shall be carefully masked. Any overspray which occurs despite this masking shall be removed by the contractor.
- 4.9.6 The shop applied coats must be thoroughly washed to remove all traces of dust, dirt, grease, salts or any other forms of surface contamination. Where deemed necessary, detergent cleaners, as recommended by the respective coating manufacturers, may be used.
- 4.9.7 After cleaning, all areas of damaged coating shall be patch repaired as detailed in 4.6.8.
- 4.9.8 Where more than one coat is being applied on site, washing as per 4.9.6 shall be carried out between coats.
- 4.9.9 Where paint is allowed to age before finishing, the coating manufacturer may require that the surface shall be prepared by light sanding, scrubbing with potable water using a bristle brush and drying before overcoating.
- 4.9.10 All coatings shall be given adequate time for curing prior to service. On average, for most organic coating systems, full cure is achieved after 7 days at 25°C providing good ventilation is maintained.

4.10 Safety Precautions

- 4.10.1 General
 - 4.10.1.1 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 familiarize himself 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 NOSA and the ORSAct.
 - 4.10.1.2 During the application of all coatings, 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.

4.10.1.3 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 the Engineer.

4.10.1.4 The contractor shall ensure that he complies with all statutory regulations, municipal by-laws, etc. concerning pollution and the health and safety of his personnel and members of the public who may be affected by his work.

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4.10.1.5 The contractor shall provide for all necessary safety precautions and risk assessments.

4.10.1.6 The contractor shall advise the Engineer of all hazardous materials to be brought on site.

4.10.1.7 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.

4.10.2 Contractors Safety File

4.10.2.1 The Contractor's safety officer shall prepare a Safety File for the area to be worked in.

4.10.2.2 This Safety File shall address the hazardous activities of abrasive blast cleaning and spray painting. The contractor shall verify that the personnel carrying out these activities are suitably qualified in accordance with the requirements of 4.2.2

4.10.3 Fire Hazards

4.10.3.1 The contractor shall ensure that adequate precautions are taken to avoid fire hazards.

4.10.4 Storage of Hazardous Materials

4.10.4.1 Oily or solvent rags shall be kept segregated in closed containers and in minimum quantity. Any spillage of volatile material shall be wiped up immediately.

4.10.4.2 Solvents and volatile materials shall be stored in designated areas.

4.10.5 Environmental

4.10.5.1 The Contractor shall ensure that any solid waste materials or liquids stripped or generated during the surface preparation and coating processes are discarded in accordance with all statutory and regulatory requirements, or as governed by Eskom Power Station's Environmental Management Procedures.

4.10.6 Scaffolds and Rigging

4.10.6.1 The contractor shall provide and erect such scaffolds and rigging as may be required. All scaffolds and rigging shall comply with the requirements of the OHSAct.

4.10.6.2 Temporary welded support elements are not permitted except where written approval has been granted by the Engineer.

4.11 Inspection And Testing

4.11.1 Surface Preparation

4.11.1.1 The blast profile shall be measured in accordance with SANS 5772 (ISO 8503-4).

4.11.2 Visual Inspection

- 4.11.2.1 Visual inspection for paint film defects shall be performed after each coat is applied. All defects including pinholes, runs, sags, dry spray etc shall be corrected before the next full coat is applied.
-

4.11.3 Dry Film Thickness (DFT)

- 4.11.3.1 DFT shall be measured in accordance SABS ISO 2808:1997 and instruments shall be calibrated using the smooth calibration disc supplied by the instrument manufacturer.
- 4.11.3.2 The frequency of dry film thickness readings shall be a minimum of one reading per square metre of coated surface or as agreed between the contractor and the Engineer at the start of the coating applications.
- 4.11.3.3 The DFT is given in a range for each coat in the relevant coating system, these are the required minimum and acceptable maximum thicknesses. No individual thickness shall be less than 80% of the specified minimum thickness and not more than 20% of thickness measurements taken shall be less than the specified thickness.
- 4.11.3.3.1 Where excessive film thickness can be detrimental to the integrity of the coating, the manufacturer's recommended maximum thickness shall apply.
- 4.11.3.3.2 The increase in thickness created by the application of the stripe coat shall not be used to justify recorded thicknesses that are in excess of the maximum specified thickness of the system.
- 4.11.3.3.3 All deficient film thicknesses shall be rectified to the approval of the Engineer at the contractor's expense.
- 4.11.3.3.4 Actual readings and not averages shall be recorded.
- 4.11.3.4 Adhesion Tests
- 4.11.3.4.1 Random pull-off adhesion tests shall be carried out on the applied coatings using the ASTM D4541 test method. Adhesion (pull-off) values of the coating to the substrate (A/B) shall be a minimum of 5 MPa with no intercoat adhesion or cohesion failures.
- 4.11.3.4.2 The number and location of tests shall be agreed with the applicator at the start of the works.
- 4.11.3.4.3 Repairs to the coating damaged by the tests shall be carried out in accordance with clause 4.6.8.
- 4.11.3.5 Pin-Hole Detection (EID) Tests
- 4.11.3.5.1 All coatings intended for immersion service shall be tested for continuity in accordance with SANS 1217, either low voltage 'wet sponge' or high spark techniques, depending upon the coating being used.

4.12 Quality Assurance

4.12.1 Contractor Qualification

- 4.12.1.1 The Engineer may, at his discretion, require a Quality Audit of the painting contractor to ensure that he has the management, facilities and skilled staff to carry out the work in accordance with the specification.
- 4.12.1.2 The contractor shall retain full responsibility for the quality of his work and of materials used, irrespective of any quality surveillance that may be carried out by the Engineer.

4.12.2 Quality Control

4.12.2.1 The contractor shall have the necessary equipment and qualified staff to carry out the quality control required to ensure compliance with the specification.

4.12.2.2 Quality control shall be carried out by a qualified inspector who is independent of the application activities. Quality control cannot be carried out by the site supervisor or any member of staff involved in production and programming.

4.12.2.3 The contractor shall keep at least the following records

- 4.12.2.3.1 Material batch records
- 4.12.2.3.2 Signed Product Data Sheets
- 4.12.2.3.3 Psychometric records (including steel temperatures)
- 4.12.2.3.4 Records of surface preparation
- 4.12.2.3.5 Records of dates and times of the application of each coat
- 4.12.2.3.6 Dry film thickness measurements per coat
- 4.12.2.3.7 Records of specific tests as required by the Engineer

4.12.2.4 These records shall be kept in a format that meets the approval of the Engineer.

4.12.2.5 The cost of quality control shall be included in the contractor's tender price.

4.12.2.6 Before the commencement of the contract, the contractor shall prepare the following:

(i) A Quality Plan detailing each activity to be carried out during the execution of the works. Each activity shall be supported by a detailed Works Procedure for that activity. The Quality Plan will also detail the inspection requirements of each specific activity, listing whether it be a review, witness or hold point, and defining the responsibilities of the various parties at each stage of the works.

(ii) The Safety File as required in 4.10.2.

(iii) The joint guarantee with the coating manufacturer as required in 4.18.

4.12.2.7 The contractor shall provide the necessary documentation to be used during all quality control inspections. Such documentation shall be reviewed and approved by the Engineer beforehand.

4.12.2.8 The contractor shall produce evidence that he has copies of, and understands, all reference documents listed under Section 2 'References'

4.12.3 Quality Surveillance

4.12.3.1 The Engineer may either carry out Quality Surveillance of the work or employ an independent technically qualified organisation to carry out Quality Surveillance of the work on his behalf. In the event of dispute, the decision of the Engineer shall be final.

4.12.3.2 For the purpose of carrying out quality surveillance, the Engineer or his authorised representative shall be granted access to any part of the contractor's premises relevant to the work being carried out, at any reasonable time. The contractor shall provide, at his own cost, any equipment or labour necessary to gain safe access to surfaces which are coated, to be coated or are in the process of being coated.

4.12.3.3 The Engineer or his authorised representative may remove any reasonable samples of materials to be used in the coating application. Rejection of the samples will place a hold on the use of material of the same batch number and may lead to rejection of all that batch of

material and the reworking of any components that have already been coated with rejected material.

4.12.3.4 The Engineer or his authorised representative may carry out reasonable destructive tests to ascertain compliance with the specification. Areas thus damaged shall be repaired by the contractor to the satisfaction of the Engineer at no additional cost.

4.12.3.5 The cost of quality surveillance will be borne by the Engineer, except where surveillance results in rejection of the work or when notice by the contractor results in a fruitless trip, in which cases the cost of surveillance shall be carried by the contractor.

4.12.3.6 A report shall be compiled by the surveyor for each visit. A copy of the report will be given to the contractor on completion of each surveillance visit.

4.12.4 Release Certificate

4.12.4.1 The coatings applied in the shops will be inspected by the Engineer or his authorised representative at the contractor's premises before releasing the coated items for delivery. A clearance certificate will be issued authorising the release.

4.12.4.2 The contractor shall notify the Engineer or his authorised representative at least 48 hours in advance of the date on which the coating activities will be complete and ready for inspection.

4.12.4.3 The coatings applied on site will be inspected by the Engineer or his authorised representative. A final acceptance certificate will be issued after the completion and final inspection and acceptance of each area of the structure.

4.12.4.4 On completion of the total structure, plant, equipment or contract a final inspection shall be carried out by the Engineer or his authorised representative and a Contract Completion Certificate issued. Final payments will not be made until this Contract Completion Certificate has been issued. This final 'completion' inspection should be carried out just prior to the commissioning of the plant.

4.13 Records

4.13.1 On completion of the works, the contractor shall provide the Engineer with a Data Book containing all the relevant Quality Control documents and records pertaining to the works.

4.13.2 This data book shall contain, as a minimum, the following:

4.13.2.1 The Quality Plan

4.13.2.2 Copies of all Batch Release Certificates from the paint manufacturer

4.13.2.3 Copies of the signed paint manufacturer's data sheets

4.13.2.4 All relevant QC Records listed in clause 4.12.2.3

4.13.3 The contractor shall submit to Eskom the number of copies of the Data Book as required by the contract. In addition, the contractor shall keep a copy of the Data Book for his own records.

4.14 Corrosion Protection System Selection

- 4.14.1 The index to the Corrosion Protection Systems relevant to the respective environmental and operating areas of the plants are given in Annexure 3.
- 4.14.2 The generic summary details of each Corrosion Protection System is given in Annexure 4. It should be noted that certain of the specifications have been presented as 'engineering notes' guiding the user to seek further information and technical assistance.

4.15 Alternative Coating Materials

- 4.15.1 Should the applicator or manufacturer wish to propose alternative products or coating materials he shall submit a detailed motivation to the Corrosion Department of ERID. The motivation shall include, but not be limited to, the following:
- 4.15.1.1 Benefit to Eskom
- 4.15.1.2 Product licensor and technical back-up available
- 4.15.1.3 Location, experience and ISO quality rating of the production facility
- 4.15.1.4 Detailed case histories
- 4.15.1.5 Performance guarantee offered
- 4.15.1.6 Manufacturer's data sheets for each product
- 4.15.2 Should the proffered case histories be deemed insufficient or inconclusive, additional testing may be required to confirm the adequacy of the alternative coating materials. The costs of such testing will be borne by the applicator or manufacturer.

4.16 Maintenance Painting

- 4.16.1 Maintenance painting covers the repainting of plant and equipment that has been previously painted.
- 4.16.2 Maintenance painting is carried out when either the original coating system has been damaged or has reached the end of its effective service life, i.e. it has reached a degree of degradation equivalent to Ri 2 of ISO 4628-3.
- 4.16.3 It is imperative that the coatings used for maintenance painting are either the same materials as originally applied or are compatible with those originally applied. If the new and existing systems are not generically compatible, coating failures will occur.
- 4.16.4 The degree of maintenance painting required is dependant upon the degree of degradation that has taken place.
- 4.16.5 The area requiring maintenance painting needs to be carefully assessed to determine the generic type of the existing coating and the extent of maintenance required. This assessment should be carried out by suitably qualified personnel from the Corrosion Department of ERID.
- 4.16.6 Maintenance painting specifications must be compiled on a case-by-case basis.

4.17 Nuclear Facilities

- 4.17.1 Conventional Island

4.17.1.1 The plant and equipment on the 'conventional island' are protected in the same manner as the equivalent plant and equipment on a coal fired station.

4.17.2 Nuclear Island

4.17.2.1 The protective coatings used on the 'nuclear island' are multi-functional, i.e. they provide corrosion protection as well as other important functions such as being decontaminable or resistant to a 'design base accident'. These specialised coatings therefore have to meet stringent nuclear requirements.

4.17.2.2 Nuclear Island protective coatings must be compiled on a case-by-case basis by suitably qualified personnel from the Corrosion Department of ERID.

4.18 Guarantees

4.18.1 The Engineer requires performance guarantees for the applied coating systems. Such guarantees shall be provided jointly by the coating manufacturer and coating applicator at the time of tender. The typical minimum guarantee period will be 15 years for coating systems with a polysiloxane finishing coat and 8 years for other systems. The criteria for failure will not exceed Ri 2 of ISO 4628-3.

4.18.2 For coatings used for immersion service, the guarantee requirements (both time and degree of degradation) will be specified on a case-by-case basis by suitably qualified personnel from the Corrosion Department of ERID.

4.18.3 Although visible coating defects such as blistering, cracking, flaking and peeling are not always associated with visible rusting, they indicate defects that could either lead to substrate corrosion or are shielding substrate corrosion that has already taken place beneath the coating. Any such defects noted during the guarantee period shall be repaired.

What criteria shall be applied to hot dip galvanizing and Duplex systems? Normally 5% surface rust is the point of first maintenance and not when the steel is perforated.

4.19 Handling and Storage

4.19.1 Handling

4.19.1.1 All coated 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 coating systems.

4.19.2 Loading

4.19.2.1 All coated components to be transported shall be loaded with support blocks, packing between pieces and tight lashing to avoid chafing.

4.19.3 Off-loading

4.19.3.1 Off-loading at site shall be conducted using the same care and precautions for on-loading. Components shall not be tipped off the transportation.

4.19.4 Cover

4.19.4.1 Coated items shall be stored under cover where possible.

4.19.4.2 Items not stored under cover shall be stored in such a manner as to avoid retention of water and allow good air circulation. This is necessary with hot dip galvanizing in order to avoid (prevent) White Rust and Wet Storage Staining.

4.19.4.3 Items shall be stored on baulks of timber to raise the lowest level above the rain splash

zone.

4.19.5 Stacking

4.19.5.1 Items shall be stacked using timber packings or other approved means to avoid coating to coating contact. Sufficient bearing area of packing shall be used to avoid damage to coatings. The steelwork shall be placed in such a manner as to ensure adequate drainage of rainwater and condensation.

5. Records

The management process of records generated by this document is discussed in Annex 1 - 4.

6. Annexes

Annexure 1: General Requirements for Corrosion Protection Coating Applicator

Annexure 2: Capability Checklist for Corrosion Protection Coating Applicators

Annexure 3: Index of Protective Coating Specifications

Annexure 4: Protective Coating Specifications

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ANNEXURE 1

	Generation Commercial Business Development	Level 1 & 2 Class Code: General Requirements For Qualified Suppliers
Class Code Classification	Corrosion Protection Coating Applicators Level Two	
Compiled By: K. Northcott Senior Consultant		
Date		
General Requirements for Corrosion Protection Coating Applicators,		
1. Quality Assurance Fully operational Quality Management System that meets the intent of 1509001:2000. Required documentation to include: o Quality Control check sheets to record paint batch numbers, psychometric conditions, surface preparation, coating application and special tests as required. o Works Procedures o Daily Activity Reports o Quality Control Plans o Inspection and Test Plans o ContractNVorks Programmes o Non-Conformance Reports o Release Certificates o Certificates of Conformance o Data Books		
2. Personnel and Skills o Appointed Site Manager / representative with project management skills. o Competent site supervisors qualified to SAQCC(Corrosion Protection) Module PS1 'General Painting Supervisors'. See previous comment on SAQCC o Coating applicators/painters qualified to SAQCC(Corrosion Protection) Module PM 'General Heavy Duty Coatings Applicator'. o Coating inspectors qualified to SAQCC(Corrosion Protection) 'Coating Inspectors' Level 1 (shop inspections) or Level 2 (site inspections) or NACE Coating Inspection Programme (CIP) o Sufficient personnel must be available to carry out the work within the required time frame. • Inspection of hot dip galvanizing to be undertaken by Inspectors qualified in terms of the HDGASA Inspector's Course		
3. Safety o Appointed safety officer. o Fully comprehensive Safety File satisfying both the OHS Act as well as Construction Regulations.		

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SPECIFICATION FOR CORROSION

Unique Identifier:

36-1126

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4. Facilities and Equipment

Rating	Activity Type	<u>E q u i p m e n t</u>
1	On-site patch repairs and top coats. Maintenance painting where abrasive blast cleaning and spraying not required or possible.	Mechanical Cleaning: needle guns, power wire brushes etc. Hand cleaning: wire brushes, scrapers, sand paper etc. Paint Applications: brushes and rollers.
2	Rating 1 activities + Abrasive blast cleaning and priming at fabricator's works or on site. Spraying of any or all coats.	Rating I equipment + Surface preparation: compressors, blast pots. Paint Applications: conventional and/or airless spray equipment.
3	Rating 1 & 2 activities + Working in confined areas such as tank linings, Cooling Water duct linings, penstock linings etc.	Rating 1 & 2 equipment + Blast media removal equipment, vacuum cleaners, high pressure water washers, dehumidifiers. Lighting and ventilation equipment. Additional qualified staff required when time constraints require night shifts.

5. Quality Control Testing Equipment

- o Hygrometer
- o Wet film thickness (WFT) gauge.
- o Depth profile gauge.
- o Surface temperature gauge.
- o Electronic dry film thickness (DFT) gauge.
- o Pin-hole detection equipment (low voltage wet sponge or high spark as required).

6. Case Histories

- o Records of completed successful contracts.
- o List of major clients.

QUALITY ASSURANCE-GENERATION COMMERCIAL

ANNEXURE 2

		SUPPLIER ASSESSMENT		Document No.	Rev No. 1
		Capability Checklist for Corrosion Protection Coating Applicators			
Supplier Name:					
Supplier Contacts:				Report No:	
Date Of Evaluation:				Vendor Number:	
Purpose: Assessment of Applicator against general requirements as per General Requirements For Qualified Suppliers – Corrosion Protection Coating Applicators.				Scope: QMS compliance, facilities, equipment, skills & general rating.	
Requirements			General Comments		
1. Quality Assurance					
Is a Quality Management System in place					
QC check sheets					
Works Procedures					
Daily Activity Reports					
Quality Control Plans					
Inspection & Test Plans					
Contract/Works Programmes					
Non-Conformance Reports					
Release Certificates					
Certificates of Conformance					
Data Books					
Requirements					
2. Personnel Skills					
Number of Site Managers on staff					
Number of Site Supervisors on staff					
Number of Site Supervisors qualified to SAQCC					
Number of Coating Applicators on staff					
Number of Coating Applicators qualified to SAQCC					
Number of Coating Inspectors on staff					
Number of Coating Inspectors qualified to SAQCC					
Sufficient personnel to carry out the contract					

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Requirements		General Comments
3. Safety		
Is there an appointed Safety Officer		
Is there a comprehensive Safety File		
Requirements		General Comments
4. Facilities & Equipment		
Surface Preparation Equipment:		
Hand Cleaning:		
Wire brushes		
Scrapers		
Sand paper		
Chipping hammers		
Power Cleaning: (electrical or pneumatic)		
Needle guns		
Power wire brushes		
Power sanders		
Abrasive Blast Cleaning:		
Compressors		
Blast pots		
Hoses and nozzles		
Water Cleaning:		
High Pressure cleaning equipment 68 - 680 bar (1 000 — 10 000 psi)		
Ultra High Pressure cleaning equipment 2 000 — 2 500 bar range (30 000 — 36 000 psi)		
Coating Application		
Brushes		
Rollers		
Conventional spray equipment		
Airless spray equipment		
Specialised Equipment		
Media removal equipment (conveyors etc)		
Vacuum cleaners		
Dehumidifying equipment		
Lighting equipment		
Ventilation equipment		
Rating		
Does the applicator qualify for rating 1, 2 or 3		

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SPECIFICATION FOR CORROSION
PROTECTION OF PLANT AND EQUIPMENT
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Requirements		General Comments	
5. Quality Control Testing Equipment	7.	8.	9.
Hygrometer			
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 s p a r k)			
Requirements		General Comments	
10. Case Histories	12.	13.	14.
Record of completed successful contracts			
List of major clients			
QUALITY ASSURANCE GENERATION COMMERCIAL DEPARTMENT			

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ANNEXURE 3

INDEX OF PROTECTIVE COATING SPECIFICATIONS

Specification No	Typical Applications
CPS 01	Steel work, conveyor structures, plate work, the external surfaces of piping, the internal and external surfaces of ducting with wall thickness greater than 2mm internal and external to buildings operating at temperatures up to 80°C in marine environments.
CPS 02	Steelwork and conveyor structures internal and external to buildings operating at temperatures up to 80°C in marine environments. Only applicable to steel sections that are less than 18 m in length and are less than 1.8 m in width and are able to be hot dip galvanized. (This is not an alternative to CPS 01, but replace with a Duplex System if the environment dictates.
CPS 03	Steel work, conveyor structures, plate work, the external surfaces of piping, the internal and external surfaces of ducting with wall thickness greater than 2mm internal and external to buildings operating at temperatures up to 80°C in inland environments.
CPS 04	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.
CPS 05	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.
CPS 06	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.
CPS 07	Lagged steel work, plate work, piping and ducting with wall thickness greater than 2mm internal and external to buildings operating at temperatures greater than 150°C.
CPS 08	Nuts, bolts, fasteners, flat washers and spring washers in marine environments.
CPS 09	Lining of the internal surfaces of tanks, cooling water ducts and penstocks. Coating of gates, stop logs, screens etc. (engineering note)
CPS 10	Proprietary Equipment such as pumps, motors, gearboxes etc.
CPS 11	Hand-railing and stanchions.
CPS 12	Open grid floor grating, stair treads and fixing systems.
CPS 13	Cable ladders, cable trays and associated support structures
CPS 14	Control panels, switchgear cabinets, power and lighting distribution boards
CPS 15	Transformers
CPS 16	Sheeting and cladding (engineering note)
CPS 17	External coating of pipework (engineering note)
CPS 18	Cathodic protection (engineering note)

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ANNEXURE 4
PROTECTIVE COATING SPECIFICATIONS

CPS 01			
Environment	Atmospheric – Marine – ISO 12944 C5-M & ISO 9223 C5		
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, the internal 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 2'A Surface profile as specified by the primer coating manufacturer		
	Primer	intermediate	Finishing
Generic System What quantity of Zn in the paint, by weight or Volume?	two component epoxy zinc primer (min 80% zinc in the dry film) 75 –100 micron	two component recoatable epoxy micaceous iron oxide intermediate coat 125 – 200 micron	two component polysiloxane finishing coat 50 – 75 micron
International Paints	Interzinc 52	Intergard 475 HS MIO	Interline 878
Jotun	Barrier 80	Penguard Express MIO	Hardtop Polysiloxane
Sigma	Sigmazinc 109HS	Sigmacover 435S	PSX 700
Stoncor	Carbozinc 859	Carboguard 893 MIO	Carboxane 2000

Notes:

1. Primer and intermediate coats to be applied in the shops with due cognisance being taken of the overcoating time requirements between the various coats.
2. Stripe coating to be carried out in accordance with Clause 4.6.3.7
3. All site repairs to handling and erection damage shall be carried out in accordance with Clause 4.6.8
4. Finishing coat to be applied on site after erection in accordance with Clause 4.9.
5. Nuts, bolts and washers shall be hot dip galvanized.
6. All nuts and bolts to be patched with intermediate coat prior to the application of the finishing coat.
What about Duplex system repairs.

Also replace Zinc primer with hot dip galvanizing as the “best primer for paint”, and I am not joking! We have tests that conclusively prove the point.

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CPS 02		
Environment	Atmospheric — Marine — ISO 12944 C5-M & ISO 9224 C5	
Material	Mild steel	
Temperature	Ambient to 80°C	
Typical Applications	Steelwork and conveyor structures internal and external to buildings operating at temperatures up to 80°C. Only applicable to steel sections that are less than 18 m in length and less than 1.8 m in width and are able to be hot dip galvanised. (This is an not alternative to CPS 01)	
New Works Surface Preparation	Sweep blast or, Galvanized iron pre-cleaner	
	Intermediate	Finishing
Generic System	two component recoatable epoxy micaceous iron oxide intermediate coat 125 — 200 micron	two component polysiloxane finishing coat 50 — 75 micron
International Paints	Intergard 475 HS MIO	Interfine 878
Jotun	Penguard Express MIO	Hardtop Polysiloxane
Sigma	Sigmacover 435S	PSX 700
Stoncor	Carboguard 893 MIO	Carboxane 2000

Notes:

1. Galvanizing to be un-passivated. Not correct, see previous comments
2. The intermediate coat to be applied in the shops with due cognisance being taken of the requirements to preparation of the hot dip galvanized surfaces.
3. Stripe coating to be carried out in accordance with Clause 4.6.3.7 WHY??
4. All site repairs to handling and erection damage shall be carried out in accordance with SANS 121 (ISO 1461) and Clause 4.6.8
5. Finishing coat to be applied on site after erection in accordance with Clause 4.9.
6. Nuts, bolts and washers shall be hot dip galvanized in terms of SANS 121 or SANS 10094 as applicable.
7. All nuts and bolts to be patched with intermediate coat prior to the application of the finishing coat.
8. Refer to the Corrosion Department at ERID if this system is being used as an alternative to

CPS 03		
Environment	Atmospheric — Inland — ISO 12944 C3 & ISO 9223 C3, C2 & C1	
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, the internal 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 2 ^{1/2} Surface profile as specified by the primer coating manufacturer	
	Primer	Finishing
Generic System	What about hot dip galvanizing on its own, which is totally adequate? two component recoatable epoxy zinc phosphate primer 75 — 100 micron	two component polyurethane acrylic finishing coat 50 — 75 micron
International Paints	Intergard 251	Interthane 990
Jotun	Penguard Express ZP	Hardtop
Sigma	Sigmacover 256S	Sigmadur 550
Stoncor	Carboguard 893	Carbothane 134
Notes:		
1. Primer coat to be applied in the shops. 2. Stripe coating to be carried out in accordance with Clause 4.6.3.7 using the primer. 3. All site repairs to handling and erection damage shall be carried out in accordance with Clause 4.6.8. 4. Where the primer has weathered, chalking shall be removed by water washing and drying. 5. Finishing coat to be applied on site after erection in accordance with Clause 4.9. 6. All 'black' nuts and bolts to be patched with the primer and intermediate coats prior to the application of the finishing coat. 7. All galvanized nuts and bolts to be patched with intermediate coat prior to the application of the finishing coat.		

CPS 04		
Environment	Atmospheric	
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 2 ^{1/2} Surface profile as specified by the primer coating manufacturer	
	Primer	Finishing
Generic System See previous comment on Zn quantity	two component zinc ethyl silicate primer (min 85% zinc in the dry film) 75 —100 micron	ambient temperature curing silicone acrylic 50 — 75 micron
International Paints	Interzinc 687	Plascotherm Silicone Acrylic 200 T
Jotun	Resist 86	Solvalitt
Sigma	Sigmazinc 160	Sigmatherm 350
Stoncor	Carbozinc 11	Thermaline 1248
Notes: 1. Primer coat to be applied in the shops. 2. Stripe coating to be carried out in accordance with Clause 4.6.3.7 using the finishing coat. 3. All site repairs to handling and erection damage shall be carried out in accordance with Clause 4.6.8. 4. Finishing coat to be applied on site after erection in accordance with Clause 4.9. 5. All 'black' nuts and bolts to be patched with the epoxy zinc primer prior to the application of the finishing coat. 7. 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		
Environment	Atmospheric	
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 21/2 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) 75 --100 micron	ambient temperature curing heat resisting silicone aluminium 25 — 50 micron
International Paints	Interzinc 887	Plascotherm Silicone 540 Aluminium
Jotun	Resist 86	Solvalitt
Sigma	Sigmazinc 160	Sigmatherm 520/540
Stoncor	Carbozinc 11	Thermaline 4631
Notes: 1. Primer coat to be applied in the shops. 2. Stripe coating to be carried out in accordance with Clause 4.6.3.7 using the finishing coat. 3. All site repairs to handling and erection damage shall be carried out in accordance with Clause 4.6.8. 4. Finishing coat to be applied on site after erection in accordance with Clause 4.9. 5. All nuts and bolts to be patched with the finishing coat prior to the application of the full finishing coat.		

CPS 06		
Environment	Atmospheric	
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 2%	
Surface Preparation	Surface profile as specified by the primer coating manufacturer	
	Primer	Finishing
Generic System	two component heat resisting epoxy phenolic primer 100 --120 micron	two component heat resisting epoxy phenolic finishing coat 100 --120 micron
International Paints	Intertherm 228	Intertherm 228
Jotun	Epoxy HR	Epoxy HR
Sigma	Sigma Phenguard 930	Sigma Phenguard 935
Stoncor	Thermaline 400 Primer	Thermaline 400 Finish
Notes:		
1. Both coats to be applied in the shops.		
2. Stripe coating to be carried out in accordance with Clause 4.6.3.7 using the primer.		
3. All site repairs to handling and erection damage shall be carried out in accordance with Clause 4.6.8.		
4. All nuts and bolts to be patched with the primer prior to the application of the finishing coat.		

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CPS 07	
Environment	Atmospheric
Material	Mild steel – lagged
Temperature	Greater than 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 greater than 150°C.
New Works Surface Preparation	Wire brush to Grade St 3
Generic System	Primer polyvinyl butyral holding primer 15 – 26 micron
International Paints	Plascoprime PA10 Etch Primer
Jotun	Muki PVB
Sigma	Sigma Etch Primer
Stoncor	EP10 Etch Primer
Notes:	
1. Coating to be applied in the shops.	

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CPS 08					
Environment	Atmospheric – Marine – ISO 12944 C5-M				
Material	Mild steel				
Temperature	Ambient to 540°C				
Typical Applications	Nuts, bolts, fasteners, flat washers and spring washers.				
New Works	All nuts, bolts, fasteners (including holding down bolts), flat washers and spring washers used in marine environments shall be either hot dip galvanized or sherardized.(Define it as Eskom has had some experience with Distek) Hot dip galvanizing to be in accordance with SANS 121 (ISO 1461) & SANS 10094 as applicable: Minimum zinc thicknesses shall be as follows: <table><tr><td>Articles of diameter less than 12 mm</td><td>45 micron</td></tr><tr><td>Articles of diameter of 12 mm or greater</td><td>55 micron</td></tr></table>	Articles of diameter less than 12 mm	45 micron	Articles of diameter of 12 mm or greater	55 micron
Articles of diameter less than 12 mm	45 micron				
Articles of diameter of 12 mm or greater	55 micron				

Notes:

1. After installation all nuts and bolts shall be degreased, and shall be fully coated in accordance with the specification for the respective area of the plant.
2. Contact the Corrosion Department of ERID with respect to approved suppliers for sherardizing.

High friction grip bolts, torque procedures and lubrication should be highlighted.

CPS 09	
Environment	Immersed
Material	Mild steel
Typical Applications	Lining of the internal surfaces of tanks, cooling water ducts and penstocks. Coating of gates, stop logs, screens etc. (engineering note)
New Works	Abrasive blast clean to Grade Sa 3
Surface Preparation	Surface profile as specified by the primer coating manufacturer
1. Introduction The selection of coating or lining materials used for immersed service is directly dependant upon the properties of the liquid in contact with the coating or lining. Each specific liquid will require a specific coating or lining and it must never be assumed that similar liquids are in fact the same. For example there are many different types of water, each of which will affect the organic lining differently. 2. Required Information The following information is required to assist in the selection of the most appropriate procedure and coating system. 2.1 Type of work - new works (clean original steel) - maintenance (previously coated/corroded steel) 2.2 Acids/alkalis - t^{pe} - pH - concentration 2.3 Organics - organic acids - fats - oils - solvents 2.4 Water - potable water - raw water (containing micro-organisms) - industrial water - sea water - distilled/demineralised/de-ionised water 2.5 Temperature 3. Coating Selection The information listed in 2. above must be collated and submitted to the Corrosion Department at ERID for the compilation of the required specification. 4. Special Requirements 4.1 Stripe coating to be carried out in accordance with Clause 4.6.3.7 4.2. After the coating has cured sufficiently, it shall be tested for Electrical Insulation Defects (pin-holes) in accordance with SANS 1217. 4.3 Any defects found shall be patch repaired and retested. 4.4 The coatint shall not be 'tit into immersed service until it has full cured.	

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CPS 10		
Environment	Atmos • heric	
E MIMZIMITIIIIIMIII Typical Applications	Mild steel	
	Ambient to 80°C	
	Proprietary Equipment such as pumps, motors, gearboxes etc. Refer to clause 4.6.4.6. If the manufacturer's coating system is deemed inadequate for the site environment but is considered upgradeable, the following s stem ma be a. flied over the ori• Ina! s stem.	
New Works Surface Preparation	Hand clean, abrade and degrease as per coating manufacturer's recommendations.	
	Primer	•
	two component epoxy barrier/tie coat 50 - 75 micron	two component polyurethane acrylic finishing coat 50 – 75 micron
International Paints	Interseal 670 HS Aluminium	Interthane 990
Jotun	Pen • uard Tie coat 100	Hardto.
•	Si, macover 630	Si, madur 550
Stoncor	Carbomastic 186	Carbothane 134
Notes:		
1. Conduct an adhesion test on the proprietary coating in accordance with SANS 5159. If the adhesion coefficient is less than 8, return item to manufacturer for replacement. If the adhesion coefficient is 8 or 10, apply upgrade system as above. 2. Confirm compatibility between the proposed tie-coat and proprietary coating. 3. All upgrade coatings to be applied at suppliers shops prior to shipment to site and installation unless otherwise instructed in the equipment order. 4. All site repairs to handling and installation damage shall be carried out in accordance with Clause 4.6.8.		

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CPS 11		
Environment	Atmospheric	
Material	Mild steel	
Temperature	Ambient to 80°C	
Typical Applications	Hand-railing and stanchions.	
New Works	The hollow tubing hand-railings and stanchions shall be hot dip galvanized in accordance with SANS 121 (ISO 1461) and then duplex coated as detailed below. Include SANS 32 (En10240) for tubing and pipes.	
	Primer	Finishing
Generic System	galvanising tie-coat/ primer 35 - 50 micron	two component polyurethane acrylic finishing coat 50 – 75 micron
International Paints	Intergard 269	Interthane 990
Jotun	Penguard Primer	Hardtop
Sigma	Sigmacover 280	Sigmadur 550
Stoncor	Carboguard 893	Carbothane 134
Notes:		
1. The galvanized surface shall not be passivated. Not So, see previous detailed comments		
2. Any transport and erection damage to the hot dip galvanized coating shall be repaired in accordance with SANS 121 (ISO 1461).		
3. Surface preparation shall be by means of sweep blasting or a suitable galvanized iron cleaner as recommended by the coating manufacturer.		

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CPS 12	
Environment	Atmospheric
Material	Mild steel
Temperature	Ambient to 80°C
Typical Applications	Open grid floor grating, stair treads and fixing systems.
New Works	Stair treads and open grid flooring shall be hot dip galvanized to SANS 121 (ISO 1461)
Notes: 1. The zinc coating thickness shall be as specified for the section thickness. 2. The design and fabrication of the grating shall be appropriate for the process of hot dip galvanizing. 3. The fixing systems shall be either hot dip galvanized or sherardized. 4. The flooring sections shall be made to measure before hot dip galvanizing so that modifications that damage the galvanizing are not necessary. 5. All site repairs to handling and installation damage shall be carried out in accordance with SANS 121 (ISO 1461). 6. For severely corrosive environments such as coastal stations or water treatment plants, refer to the Corrosion Department at ERID for alternative systems.	

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CPS 13	
Environment	Atmospheric
Material	Mild steel
Temperature	Ambient to 80°C
Typical Applications	Cable ladders, cable trays and associated support structures.
New Works	Inland: All components to be hot dip galvanized to SANS 121 (ISO 1461) Marine: All components to be hot dip galvanized to SANS 121 (ISO 1461) followed by powder coating with an approved powder coating system in accordance with SANS 1274. The thickness of the powder shall be a minimum of 100 to 120 micron.
Notes: - The duplex coating shall comprise a minimum of two coats, i.e. either two coats of powder or a wet applied primer followed by the powder coating. (Refer Duplex requirements) - Textured or 'structured' powder coatings will not be acceptable due to variations in film thicknesses. - Fixing systems shall be either hot dip galvanized or sherardized. (Distek?) - All site repairs to handling and installation damage and the coating of the fixing systems shall be carried out in accordance with Clause 4.6.8. - For severely corrosive environments such as coastal stations or water treatment plants, refer to the Corrosion Department at ERID for alternative systems.	

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CPS 14	
Environment	Atmospheric
Material	Mild steel
Temperature	Ambient to 50°C
Typical Applications	Control panels, switchgear cabinets, power and lighting distribution boards.
New Works	Inland internal and external to buildings and marine internal to buildings: Control panels, switchgear cabinets, power and lighting distribution boards shall be powder coated with an approved powder coating system in accordance with SANS 1274. The thickness of the powder shall be a minimum of 100 micron. Marine external to buildings: Control panels, switchgear cabinets, power and lighting distribution boards shall be fabricated from stainless steel.

Notes:

1. Textured or 'structured' powder coatings will not be acceptable due to variations in film thicknesses.
2. All site repairs to handling and installation damage shall be carried out in accordance with Clause 4.6.8.
3. For severely corrosive environments such as coastal stations or water treatment plants, refer to the Corrosion Department at ERID for alternative systems.

Continuous galvanized and Chromadek appears to be missing?

CPS 15	
Environment	Atmospheric
Material	Mild steel
Temperature	Ambient to 80°C
Typical Applications	Transformers
New Works	Transformers shall be coated in accordance with the latest revisions of Eskom Specifications SCSSCAAP9 or 62 S 2 460, depending upon the type and size of transformer being supplied.
Notes:	
1. The transformer supplier must submit his particular detailed Coating Procedure Specification to the Corrosion Department at ERID for approval.	

CPS 16	
Environment	Atmospheric
Material	Mild steel
Temperature	Ambient to 80°C
Typical Applications	Sheeting and cladding (Engineering Note)
1. Introduction This engineering note is a guide to the selection of sheeting and cladding materials. There are a number of sheeting and cladding materials available from various suppliers. As cladding is difficult to maintain it is preferable to select a material that will last for the service life of the power station with minimum or no maintenance. All suppliers offer guidance as to initial material selection with respect to the corrosivity of the micro-environment and required service life. It is therefore recommended that cladding requirements are discussed with the supplier at the design stage of the power station. 2. General Considerations Cladding is deemed to have failed when the sheet or membrane is perforated and allows access of the external environment, e.g. rain. The longevity or service life of a cladding material is therefore the sum of the life of the coating and the life of the base metal to perforation. Include 5% red rust to 1ST maintenance requirements. Obviously, once the coating is spent, corrosion of the substrate metal is unsightly and although the cladding membrane has not perforated, it is considered to have failed. This point must be taken into account when selecting a material for a corrosive environment where aesthetics are also of concern. Where a performance guarantee is offered by the suppliers, clarification on the interpretation of the guarantee must be sought before purchase. 3. Fasteners Fasteners should have equal or better corrosion resistance than the cladding materials which they support and care should be taken to avoid galvanic effects between the two materials. Zinc Electroplated coatings should be avoided as they are generally too thin to provide effective long term protection in aggressive environments. When inherently resistant materials such as stainless steel fasteners are used, due regard to galvanic corrosion should be given. Quite often stainless steel fasteners used with less noble metals such as aluminium fail due to the galvanic corrosion of the aluminium around the hole in contact with the stainless steel causing enlargement of the hole and lifting of the sheeting. In aggressive environments where protective coatings have been applied to the structural steelwork, hook-bolts rather than screws that pierce the steelwork should be considered. These latter fasteners damage the coating on the steelwork and create isolated areas of corrosive attack to the steelwork. 4. Sealing of Laps The areas of overlap created at the ends and sides of the sheets provide ideal sites for accelerated crevice corrosion. These areas are narrow enough to draw in moisture by capillary action but not wide enough to allow ventilation. The concentration effects caused by alternative wetting and drying create highly corrosive environments that lead to rapid corrosion and perforation of the sheets. Such areas should be protected by sealants or coatings applied to both of the mating surfaces. When sealing beads only are used, these beads should be positioned at the external edge of the lap in order to prevent moisture ingress. If they are incorrectly positioned they can actually create crevice areas.	

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5. Corrosion At Cropped Ends

The coil coated cladding materials suffer from corrosion at cropped ends where the coated sheet has been cut or cropped. This operation exposes the steel to the corrosive environment. In the milder inland environments the galvanized zinc layer does afford some protection. However in aggressive marine environments this protection is short lived. I do not agree, we have many examples that shows something different. To avoid the necessity of patch repairing cut ends, the cladding should be rolled to length so that end laps are eliminated.

5.1 Material Selections

Stainless Steel — coated

Stainless Steel — uncoated

Aluminium — coated

Aluminium — uncoated

Mild Steel — galvanized — coated

Mild Steel — galvanized —

uncoated

Chromadek Where is it

considered?

CPS 17																					
Environment	Buried																				
Material	Mild steel																				
Temperature	Ambient to 80°C																				
Typical Applications	External coating of pipework (engineering note)																				
1.General This engineering note details the selection of the wrapping or coating systems for the external protection of buried pipework. The type of wrapping or coating system selected is governed by the corrosivity of the soil, the pipe diameter and the method of jointing e.g. flanges, spigot and socket or VJ couplings. If the pipeline is to be cathodically protected, provision must be made for the electrical continuity bonding of the pipeline across the couplings. 2. Tape Wrapping Systems <table> <tr> <td>Material</td><td>Factory or field applied polyethylene film laminated to a pressure sensitive, non-hardening thermoplastic adhesive.</td></tr> <tr> <td>Thickness</td><td>1,0 mm</td></tr> </table> 3. Spray Applied Coating <table> <tr> <td>Material</td><td>Factory applied polyurethane, polyester or vinyl ester coating</td></tr> <tr> <td>Thickness</td><td>1 mm</td></tr> </table> 4. Fusion Bonded Epoxy <table> <tr> <td>Material</td><td>Factory applied fusion bonded epoxy pipe coating</td></tr> <tr> <td>Thickness</td><td>250 to 400 micron</td></tr> </table> 5. Fusion Bonded Medium Density Polyethylene <table> <tr> <td>Material</td><td>Factory applied fusion bonded medium density polyethylene</td></tr> <tr> <td>Thickness</td><td>1,6 to 3,5 mm depending upon pipe diameter</td></tr> </table> 6. 3LP (3 layer or '0-nominate' polyethylene system) <table> <tr> <td>Material</td><td>Factory applied fusion bonded epoxy/polyethylene adhesive/high density polyethylene top coat</td></tr> <tr> <td>Thickness</td><td>2 to 3 mm</td></tr> </table>		Material	Factory or field applied polyethylene film laminated to a pressure sensitive, non-hardening thermoplastic adhesive.	Thickness	1,0 mm	Material	Factory applied polyurethane, polyester or vinyl ester coating	Thickness	1 mm	Material	Factory applied fusion bonded epoxy pipe coating	Thickness	250 to 400 micron	Material	Factory applied fusion bonded medium density polyethylene	Thickness	1,6 to 3,5 mm depending upon pipe diameter	Material	Factory applied fusion bonded epoxy/polyethylene adhesive/high density polyethylene top coat	Thickness	2 to 3 mm
Material	Factory or field applied polyethylene film laminated to a pressure sensitive, non-hardening thermoplastic adhesive.																				
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CPS 18	
Environment	Buried
Material	Mild steel
Temperature	Ambient to 80°C
Typical Applications	The cathodic protection of buried pipework (engineering note)
This engineering note details the activities that must be carried out before, during and after the installation of buried pipework that requires cathodic protection. A suitable external protection system must be selected in accordance with CPS 17. 1.0 Activities Before Installation 1.1 Soil resistivity survey along the pipeline route or a grid survey of the plant area. 1.2 Provisional cathodic protection design using either an impressed current system or sacrificial anodes. 2.0 Activities During Installation 2.1 Progressive continuity bond installation at all joints. 2.2 Installation of progressive temporary cathodic protection if required. 3.0 Activities After Installation 3.1 Stray current survey 3.2 Current drainage test 3.3 Final design of cathodic protection system 3.4 Installation of cathodic protection system 3.5 Commissioning of the cathodic protection system 3.6 Direct Current Voltage Gradient (DCVG) survey of the buried pipeline to verify the condition of the external coating. Defects to be repaired by the pipework installation contractor.	

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7. Revision Information

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