

Transnet Capital Projects NMPP Project

Specification for Corrosion Protection / Painting of Above-ground Structures

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1. Purpose

This specification details the requirements for the corrosion protection / painting of structural steelwork, piping, tanks and associated equipment for the above-ground-structures of the New Multi-Products Pipeline (NMPP) Project and covers the selection and application of protective coating systems and the requirements for labour, equipment and quality control.



In addition to the selection and application of the protective coating, this specification also covers the labelling requirement of the project

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

2.1 Design Considerations

- 2.1.1 Steel components should be designed to be accessible for the purposes of applying, inspecting and maintaining the protective coating system.
- 2.1.2 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'.
- 2.1.3 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.

2.2 Qualified Staff

- 2.2.1 The application contractor shall ensure that there are at all times sufficient suitably qualified, experienced and skilled staff to carry out and supervise all activities.
- 2.2.2 Staff shall be qualified in terms of the South African Qualification and Certification Committee for Corrosion {SAQCC(Corrosion)} as follows:

Applicators	General Heavy Duty Coatings Applicator (PA1)
Supervisors:	General Paint Supervisors (PS1)
Inspectors:	Coating Inspectors (Level 2) or NACE CIP 1



- 2.2.3 Alternative qualifications may be considered for approval by the Engineer subject to submission of detailed syllabus for review. Courses submitted for consideration must be examined and have unique certification traceability



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3. References

All national and international standards referred to in this document shall form part of this specification. Where reference is made to a code, specification or standard the reference shall be taken to mean the latest edition of the code, specification or standard, including addenda, supplements and revisions thereto.

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

Codes of Practice



SANS 1186-1:	Symbolic Safety Signs - Part 1: Standard Signs and General requirements
SANS 10140:	Identification and colour marking
SANS 10064:	The preparation of steel surfaces for coating
SANS121(ISO 1461):	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:	Quality Assurance Systems

Specifications

SABS 1091	National colour standards for paint.
SANS 1217	Standard specification for the production of painted and powder coated steel pipes
SANS 1274	Coatings applied by the powder coating process.

Methods

SANS 5769	Cleanliness of blast cleaned surfaces for painting (assessed by freedom from dust and debris)
SANS 5772	Profile of blast cleaned surfaces for painting (determined by a micrometre profile gauge)

3.2 International Organisation for Standardisation

ISO 4624	Paints and varnishes – Pull-off test for adhesion
ISO 4628-3	Paints and Varnishes – Evaluation of Degradation of Paint Coatings – Designation of Intensity, Quantity and Size of Common Types of Defects. Part 3: Designation of Degree of Rusting
ISO 8501-1	Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness
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.



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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

3.3 Hot-Dip Galvanizers Association Southern Africa

SAHDGA 01-1990	Code of Practice for Surface Preparation and Application of Organic Coatings.
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Steel Protection by hot Dip Galvanizing and Duplex Coatings – Chapter 9 – Design for Hot Dip Galvanizing.

3.4 SSPC (Steel Structure Painting Council)

SSPC-PA2	Measurement of Dry Paint Thickness with Magnetic Gauges.
SSPC-SP1	Solvent Cleaning



3.5 Safety, Signage and Building Labelling References



3.5.1 General

OHSAct No. 85 of 1993	Occupational Health and Safety Act
SANS 1186-1:	Symbolic Safety Signs - Part 1: Standard Signs and General requirements
SANS 10089-1:	Part 1: Storage and Distribution of Petroleum Products in above-ground bulk installations
SANS 10142-1:	Part1: Low Voltage Installations
Annexure 3	Other Labelling Requirements (Piping, Equipment, Mechanical, Tanks & Accumulators, Instrumentation)



3.5.2 E&I Equipment, Junction box, Warning Labels

TPL - PL 727	Cabling, Racking, Trenching & Earthing Installation Codes of Practice,
TPL PL711	Specification for Equipment Cabinets to House Electronic Equipment
TPL - PL 631	Specification for Low Voltage Switchgear and Distribution Boards
TPL - PL 632	Specification for Medium Voltage Switchgear



3.5.3 Buildings, Roads, HV Yards, MV & LV Stations:

2684358-TTA-TM2-AR-DL-01748 & 49	VSD Building – Cable Basement & First Floor – Electrical Signage Layout (TM2)
2684358-TTA-TM2-AR-DL-01706	VSD Building (TM2)
2684358-TA-TM2-AR-DL-01707	VSD Building (TM2)
2684358-TTA-TM2-AR-DL-01750 & 51	MV Station Cable & Cable Room – Electrical Signage Layout (TM2)
2684358-TA-TM2-AR-DL-01702 - 03	MV Station (TM2)



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2684358-E-TM2-CI-DL-01524	HV Yard Signage (TM2)
2684358-TTA-TM2-AR-DL-01704	Fire Pump House (TM2)
2684358-TA-TM2-AR-DL-01701	Guard House (TM2)
2684358-TTA-TM2-AR-DL-01708	Control Building (TM2)
2684358-TTA-TM2-AR-DL-01709	Administration Building (TM2)
2684358-TTA-TM2-AR-DL-01710	Testing Facility Building (TM2)
2684358-TTA-TM2-AR-DL-01711	Workshop Building (TM2)
2684358-TTA-TM2-AR-DL-01732 – 46	Internal Building signage's for TM2
2684358-E-TM2-CI-DL-01107	Road Marking & Signage's (TM2)
2684358-E-TM1-CI-DA-004-01 & 02	Road Marking & Signage's (TM1)
2684358-TTA-TM1-AR-DL-01738	Control Building & MV Substation (TM1)
2684358-TTA-TM1-AR-DL-01746	Control Building/MV Substation – Internal Signage Layout (TM1)
2684358-TTA-TM1-AR-DL-01747 & 48	Control Building/MV Sub – Cable Basement & First Floor – Electrical Signage Layout (TM1)
2684358-TTA-TM1-AR-DL-01733	TM1 Island View Building Signage Layout
2684358-TTA-TM1-AR-DL-01734	Guard House (TM1)
2684358-TTA-TM1-AR-DL-01749	Internal Signage Layout Guard House (TM1)
2684358-TTA-TM1-AR-DL-01736	Fire Pump House (TM1)
2684358-TTA-TM1-AR-DL-01750	Fire Foam Pump House Internal Signage Layout (TM1)
2684358-TTA-TM1-AR-DL-01742-44	Fire Shed (TM1)
2684358-TTA-TM1-AR-DL-01739	Compressor House (TM1)
2684358-TTA-TM1-AR-DL-01737	Workshop and Storage (TM1)
2684358-TTA-TM1-AR-DL-01752	Workshop and Storage Internal Signage Layout (TM1)
2684358-TTA-TM1-AR-DL-01740 & 41	Remote Equipment Room (TM1)
2684358-TTA-TM1-AR-DL-01751	Remote Equipment Room Internal Signage Layout (TM1)
2684358-TTA-TM1-AR-DL-01735	Testing Facility Building (TM1)
2684358-TTA-TM1-AR-DL-01745	Internal Testing Facility Building (TM1)

4. EQUIPMENT

4.1 Measuring and Testing Equipment

- 4.1.1 The application 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 psychrometric conditions and the substrate temperature.
- 4.1.2 The electronic dry film thickness gauge shall conform to the requirements of SABS ISO 2808:1997 and shall be calibrated using the smooth calibration disc supplied by the instrument manufacturer.
- 4.1.3 All test equipment shall have current calibration certificates.

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4.2 Spray Equipment

- 4.2.1 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.
- 4.2.2 All spray painting equipment shall be fitted with suitable oil and moisture traps.

4.3 Blast Cleaning Equipment

Effective oil and water separators shall be utilised on all airlines used for abrasive blast cleaning. The separators shall be of the 'cartridge' type.

4.4 Power Mixers

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

5. COATING MATERIALS

- 5.1 Only approved coating materials as detailed in the relevant specifications shall be used.
- 5.2 All coating systems used shall be suitable for the intended service in terms of environmental classifications of ISO 12944
- 5.3 Coating materials from different manufacturers shall not be mixed in the same coating systems.
- 5.4 Coatings shall only be supplied by the approved coating manufacturers. The application 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.
- 5.5 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.
- 5.6 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. The maximum capacity of containers shall be 25 litres.
- 5.7 The coating manufacturer's recommended shelf life and other storage requirements shall be met.
- 5.8 The colours of the paints to be used shall be as specified by the Engineer and shall comply with SANS 1091.
- 5.9 No coated items shall be dispatched to site until they have been inspected and cleared and a certificate issued that the work has been carried out to specification.
- 5.10 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.
- 5.11 The application 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.

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6. GENERAL PAINTING REQUIREMENTS

6.1 Identification of Non-Painted Items

The following items do not require any surface preparation or painting unless otherwise specified:

- Non-metallic items such as concrete, glass, plastic, wood etc.
- Non-ferrous metals such as aluminium, copper, brass, etc
- Insulation weatherproofing
- Stainless steel surfaces

6.2 Items Requiring Protection from Painting

6.2.1 Surfaces which could be damaged by abrasives, dust or paint overspray shall be protected by wrapping, taping, or other means to prevent damage. Such surfaces shall include, by way of example, but not by limitation, the following:

- Alloys (Monel, Incaloy or Hastelloy)
- Bearings
- Conduit
- Control panels
- Control valves
- Couplings
- Equipment nameplates
- Expansion joint bellows
- Fire sprinkler heads
- Flange and nozzle faces
- Glass, rubber, gasket materials etc
- Identification tags
- Instrument glasses and gauge dials
- Wall thickness gauge points
- Machined surfaces (threads, valve stems, pump and cylinder rods, shafts etc)
- Screws
- Spring hanger graduations
- Stainless steel surfaces (except as specified)
- Valve stem and position indicators

Note: Stainless steel surfaces shall be protected from zinc and aluminium rich coatings. Any accidental overspray of zinc and aluminium, including trace amounts, over stainless steel surfaces must be completely removed.

7. COATING MATERIAL REQUIREMENTS

7.1 Coating materials used, and in particular tank linings, shall be compatible with the following list of petroleum products:

- Diesel – LSD & ULSD
- Jet fuel
- Unleaded petrol – LFP 93 & LFP 95

7.2 Unleaded petrol will contain

- Benzene
- Toluene
- Xylene
- Ketones (known in USA as ‘Oxygenated Gasoline’)

7.3 All responsibility shall be placed on the coating manufacturer for ensuring the suitability of the proposed coating materials and their compliance with the guarantee requirements given in clause 18.0.



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- 7.4 The Engineer's approval shall not exonerate the coating manufacturer or coating applicator from any liability, should the linings fail within the guarantee period.
- 7.5 Only those lining materials approved by Air BP – Africa shall be used for the lining of the Jet fuel tanks. The approved coating manufacturer shall provide documentary proof that the internal lining complies with the provisions of US Military specification MIL-C-4556D.

8. SURFACE PREPARATION

8.1 General

- 8.1.1 Sharp edges shall be dressed to a radius of not less than 2mm, but no more than half of the wall thickness. All burrs, rags and weld spatter shall be removed as per the requirements of ISO 12944-3.
- 8.1.2 Welds should be free from imperfections (e.g. asperities, undercutting, blowholes, craters, spatter) which are difficult to cover effectively with a protective paint system.

8.2 Pre-cleaning

- 8.2.1 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.
- 8.2.2 Chemical contamination shall be removed by means of neutralising or flushing or both prior to additional surface preparation.

8.3 Mechanical and Hand Cleaning

- 8.3.1 Mechanical cleaning shall be in accordance with the procedure specified in Clause 4.3 of SANS 10064 (ISO 8540).
- 8.3.2 The standard of surface preparation shall be in accordance with ISO 8501/1 and as specified in the relevant coating system.

8.4 Abrasive Blast Cleaning

- 8.4.1 Abrasive blast cleaning shall be carried out in accordance with Clause 4.3 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.
- 8.4.2 The profile, peak to valley, when measured by SANS 5772 (ISO 8503-4), shall be as specified in the relevant manufacturer's Data Sheet for the primer coating being used.
- 8.4.3 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.

8.5 Surface Cleanliness

- 8.5.1 No coating shall be applied to any surface containing traces of grit, grease, oil, loose rust, millscale, surface contaminants (i.e. dust), chemical fall-out, salt deposits or corrosion products of any kind.
- 8.5.2 The following requirements shall apply prior to coating application:
- 8.5.3 Freedom from dust and debris shall be less than 0.2% when tested in accordance with SANS 5769 (ISO 8502-3).
- 8.5.4 If the blast cleaned surface changes colour, or rust bloom begins to form, the surface shall be reblasted.



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8.6 Soluble Salts

- 8.6.1 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 Engineer.
- 8.6.2 Soluble salts levels shall be measured using Weber Rielly Soluble Salts Test Kits or equivalent approved methods. The level of salts shall not exceed 50 mg/m².



8.7 Stainless Steels

- 8.7.1 The preferred method of surface preparation for coating of stainless steel surfaces is by means of abrasive blasting with ceramic grit. All other requirements of section 8 shall apply to stainless steels.
- 8.7.2 Alternative preparation regimes may be applied (e.g. acid pickling) subject to submission of detailed procedures and approval by the Engineer.

9. COATING APPLICATION

9.1 Approval

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

9.2 Mixing

- 9.2.1 The application contractor shall ensure that all paints are mixed in accordance with the coating manufacturer's instructions.
- 9.2.2 During application, containers shall be agitated often enough to keep pigments in suspension.

9.3 Coating

- 9.3.1 All surfaces shall be coated as specified. Surfaces which do not require coating shall be suitably protected as per clause 6.2
- 1.1.1 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.
- 9.3.2 Successive coats shall be of distinctly different colour to the previous coat to ensure correct coverage. Special attention shall be given to cracks, crevices and edges to ensure complete coverage and paint thickness.
- 9.3.3 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.
- 9.3.4 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.
- 9.3.5 All edges, corners, bolt 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.
- 9.3.6 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.



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9.4 Application

- 9.4.1 Unless otherwise specified, all coatings applied in the shops or on site shall be airless spray applied.
- 9.4.2 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.
- 9.4.3 The application 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 application contractor must take cognisance of this in his tender. If during the course of the project the application 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.
- 9.4.4 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, overcoating times, application 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.
- 9.4.5 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 application 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 18.0.
- 9.4.6 All coatings shall be evenly applied to form a smooth, continuous, unbroken coating free from tears, runs, sags, wrinkles, blisters, mud-cracking, changes in colour or gloss, orange peel, visible pin-holes, dirt, dust or fluff occlusions or any other visible defects.
- 9.4.7 Surfaces which rest on concrete or other floors shall receive the full coating system prior to erection.
- 9.4.8 The application 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.
- 9.4.9 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.
- 9.4.10 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.
- 9.4.11 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.

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9.5 Ambient Conditions

Coatings shall not be applied under the following conditions:

- 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.
- When the ambient air temperature or the steel temperature is outside the coating manufacturer's recommended range.
- When the ambient relative humidity exceeds 85%.

9.6 Galvanizing

- 9.6.1 Hot dip galvanizing shall be in accordance with the requirements of SANS 121 (ISO 1461:1999).
- 9.6.2 Galvanized surfaces that are to receive duplex organic coatings shall not be passivated.

9.7 Patch Repairs to Transport and Erection Damage

- 9.7.1 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.
- 9.7.2 For components that have been fully coated in the shop prior to despatch, patching of the final coat on site may be conducted provided that:
 - a) The end product is aesthetically acceptable and not "patchwork quilt".
 - b) Any further finishing coats required to provide an aesthetically acceptable finish shall be at no cost to the owner.

9.8 Fasteners and Friction Grip Surfaces.

- 9.8.1 All nuts and bolts shall be hot dip galvanized.
- 9.8.2 Friction grip areas shall be left uncoated with the exception of steel work that is either galvanized or primed with inorganic zinc silicate. The uncoated friction grip areas shall be sealed to prevent the ingress of corrodants. 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.

10. SHOP PAINTING

The application contractor shall furnish the coating materials specified and ensure that they are applied in strict accordance with this specification.

The application 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.

Where possible all paint coatings up to the intermediate coat stage shall be applied in the shops.



Note: Check Aconex system for latest revision

Provisions must be made for the repair of handling damage to the coating after erection and before the application of the finishing coats.

Finishing coat may be applied in the shop prior to despatch to site subject to Engineer's approval.

No site welding is permitted after final coat.

10.1 SITE PAINTING

- 10.1.1 The application contractor shall furnish the coating materials specified and ensure that they are applied in strict accordance with this specification
- 10.1.2 All finishing coats shall be applied on site after erection.
- 10.1.3 The finishing coats being applied on site shall be sourced from the same manufacturer as the shop applied primer and intermediate coats.
- 10.1.4 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.
- 10.1.5 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.
- 10.1.6 After cleaning, all areas of damaged coating shall be patch repaired as detailed in 9.7.1.
- 10.1.7 Where more than one coat is being applied on site, washing as per 8.5 shall be carried out between coats.

11. HEALTH, SAFETY AND ENVIRONMENTAL COMPLIANCE

11.1 General

- 11.1.1 The application 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.
- 11.1.2 The application contractor shall provide for all necessary safety precautions and risk assessments.
- 11.1.3 The application contractor shall advise the Engineer of all hazardous materials to be brought on site.

11.2 Safety Plan

The loss control or safety officer shall prepare a safety plan for the area to be worked in, which plan will be adhered to by the application contractor.

11.3 Fire Hazards

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

11.4 Storage of Hazardous Materials

- 11.4.1 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.
- 11.4.2 Solvents and volatile materials shall be stored in designated areas.

Note: Check Aconex system for latest revision

11.6 Scaffolds and Rigging

- 11.6.1 **The application contractor shall provide and erect such scaffolds and rigging as** may be required. All scaffolds and rigging shall comply with the requirements of the Occupational Health and Safety Act.
- 11.6.2 Temporary welded support elements are not permitted except where written approval has been granted by the Engineer.

12. INSPECTION AND TESTING

12.1 Surface Preparation

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

12.2 Visual Inspection

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.

12.3 Dry Film Thickness (DFT)

- 12.3.1 DFT shall be measured in accordance SABS ISO 2808:1997 or SSPC-PA2 and instruments shall be calibrated using the smooth calibration disc supplied by the instrument manufacturer.
- 12.3.2 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 application contractor and the Engineer at the start of the coating applications.
- 12.3.3 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 90% of the specified minimum thickness and not more than 10% of thickness measurements taken shall be less than the specified thickness.
- 12.3.4 Where excessive film thickness can be detrimental to the integrity of the coating, the manufacturer's recommended maximum thickness shall apply.
- 12.3.5 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.
- 12.3.6 All deficient film thicknesses shall be rectified to the approval of the Engineer at the application contractor's expense.
- 12.3.7 Actual readings and not averages shall be recorded.

12.4 Adhesion Tests

- 12.4.1 Random pull-off adhesion tests shall be carried out on the applied coatings using the ISO 4624 test method. No adhesion break to the substrate (A/B) shall be allowed unless pull-off values are 5 MPa or more.
- 12.4.2 The number and location of tests shall be agreed with the application contractor at the start of the works.
- 12.4.3 Repairs to the coating damaged by the tests shall be carried out in accordance with clause 9.7.1.

Note: Check Aconex system for latest revision

13. QUALITY ASSURANCE

13.1 Application Contractor Qualification

- 13.1.1 The Engineer may, at his discretion, require a Quality Audit of the application contractor to ensure that he has the management, facilities and skilled staff to carry out the work in accordance with the specification.
- 13.1.2 The application contractor shall accept 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.

13.2 Quality Control

- 13.2.1 The application contractor shall have the necessary equipment and qualified staff to carry out the quality control required to ensure compliance with the specification.
- 13.2.2 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.
- 13.2.3 The application contractor shall keep at least the following records
 - Material batch records
 - Product Data Sheets
 - Psychrometric records (including steel temperatures)
 - Records of surface preparation
 - Records of dates and times of the application of each coat
 - Dry film thickness measurements per coat
 - Records of specific tests as required by the Engineer
- 13.2.4 These records shall be kept in a format that meets the approval of the Engineer.
- 13.2.5 The cost of quality control shall be included in the application contractor's tender price.
- 13.2.6 Before the commencement of the contract, the application contractor shall prepare a Quality Plan detailing each activity to be carried out during the execution of the works. Each activity shall be supported by a detailed Coating Procedure Specification 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.
- 13.2.7 The application contractor shall provide the necessary documentation to be used during these inspections. Such documentation shall be reviewed and approved by the Engineer beforehand.

13.3 Quality Surveillance

- 13.3.1 The Engineer may 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.
- 13.3.2 For the purpose of carrying out quality surveillance, the Engineer or his authorised representative shall be granted access to any part of the application contractor's premises relevant to the work being carried out, at any reasonable time. The application contractor shall provide, at his own cost, any equipment or labour necessary to gain access to surfaces which are coated, to be coated or are in the process of being coated.
- 13.3.3 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



Note: Check Aconex system for latest revision

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.

- 13.3.4 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 application contractor to the satisfaction of the Engineer at no additional cost.
- 13.3.5 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 application contractor results in a fruitless trip, in which cases the cost of surveillance shall be carried by the application contractor.
- 13.3.6 A report shall be compiled by the surveyor for each visit. A copy of the report will be given to the application contractor on completion of each surveillance visit.

13.4 Release Certificate

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

13.5 Data Book

- 13.5.1 Upon completion of the works, the application contractor shall provide the Engineer with a Data Book containing all the relevant Quality Control documents and records pertaining to the works.
- 13.5.2 This data book shall contain, as a minimum, the following:
 - The Quality Plan
 - Copies of the relevant coating specifications
 - Copies of all Batch Release Certificates, Product Data Sheets and Material Safety Data Sheets from the paint manufacturer
 - All relevant QC Records listed in clause 14.2.3
 - All release certificates
- 13.5.3 The application contractor shall submit to the Engineer the number of copies of the Data Book as required by the contract. In addition, the application contractor shall keep a copy of the Data Book for his own records.

14. CORROSION PROTECTION SYSTEM SELECTION

The Corrosion Protection systems relevant to the respective areas of the installation are given in Annexure 1. Annexure 2 provides summary specifications for each system together with the approved coating product brands.



Note: Check Aconex system for latest revision

15. ALTERNATIVE COATING MATERIALS

Should the application contractor or coating manufacturer wish to propose alternative products or coating materials he shall submit a detailed motivation to the Engineer. The motivation shall include, but not be limited to, the following:

- 15.1 Benefit to the client;
- 15.2 Product licensor and technical back-up available;
- 15.3 Location, experience and ISO quality rating of the production facility;
- 15.4 Detailed case histories;
- 15.5 Performance guarantee offered;
- 15.6 Manufacturer's data sheets for each product.

16. COLOURS

16.1 Identification Colours for Pipelines



- 16.1.1 The identification for piping systems shall be in accordance with SANS 10140-3 for the pipeline and tank contents

TPL Designation Code	Contents of Pipeline	Fluid Designation	Basic Finish Colour (External)	SANS 1091 Code	Single Band Colour	SANS 1091 Code	Second Band Colour	SANS 1091 Code
H	95 Octane Unleaded Petrol	P95UL1	French Grey	H30	Lime Green		None	
I	93 Octane Unleaded Petrol	P93UL1	French Grey	H30	Lime Green	H41	Canary Yellow	C61
E	Low Sulphur Diesel	DLS1	French Grey	H30	Middle Buff	B33	None	
T	Ultra Low Sulphur Diesel	DULS1	French Grey	H30	Middle Buff	B33	Darkviolet	F06
K	Avtur (Jet)	JET1	French Grey	H30	Black		None	
V	Drain (Product)	DR01 & DR02	French Grey	H30	None		None	
V	Relief line (Product)	RV01	French Grey	H30	None		None	
U	Multi product pipe	MP01 & MP02	French Grey	H30	None		None	
U	Intermix product pipe	INT & INT2	French Grey	H30	None		None	
B	Fire Water	FW	Signal Red	A11	None		None	
R	Fire Foam Premix	FMP	Signal Red	A11	White		None	
S	Fire Foam Concentrate	FC	Midnight Blue	G611				
A	Potable/Municipal Water	WM	Brilliant Green	H10	Cornflower	F29	None	
N	Utility Air (Compressed)	UA01	Arctic Blue	F28	None		None	
V	Oily Water Sewer	OW	French Grey	H30	None		None	

- 16.1.2 Colour bands shall not be less than 300 mm wide and shall be applied at either side of valves or flanges and at intervals not exceeding 50 m along the length of the pipelines. Two coats of silicone acrylic paint shall be used.



Note: Check Aconex system for latest revision

16.1.3 For all other piping and utility lines not mentioned in the above table, reference is made to SANS 10140-3 for appropriate colour selection.

16.1.4 All insulating flanges shall be painted Signal Red (SANS 1091: A11). Thereafter flanges shall be coated with an insulating varnish such as Insuldyn – Glyptol Red colour.

16.1.5 Plant piping shall be labelled when specified as defined in the Annexure – 3 of this document.



16.2 Identification Colours for Storage Tanks and Equipment.

16.2.1 All tanks shall be painted in Cloud White (SANS 1091: G80).

16.2.2 It shall be noted that no product colour banding is required on storage tanks.

16.2.3 All equipment shall be painted French Grey (SANS 1091: H30) unless otherwise specified by the Engineer.

16.2.4 All equipment and storage tanks shall be properly labeled as defined in the Annexure – 3 of this document.



16.3 Colours for Structural Steel

16.3.1 Structures shall be colour coded to warn personnel of potential physical hazards. Such colour coding shall be in accordance with SANS 10140: Part II.

16.3.2 For this project the following colours have been selected for the structural steel items:

- Eau-de-nil *Green* (SANS 1091: H43), for all of the following structural steel items:
 - Exposed columns, beams, pipe bridges and general structural shapes, including fixings.
 - Inside workshops, stores and clad buildings located outside process areas for structural members (e.g. beams)
 - Column bases
- *Black Night* (BS381C: 642) for all of the following structural steel items:
 - Pipe hangers, platforms, ladders, handrail stanchions, toe plates, stairways and cages, including vessel platform supports, clips and davits.
- *Light Grey* (SANS 1091: G29) for all of the following structural steel items:
 - Miscellaneous field supports, cradles, shoes, guides, etc.
- *Golden Yellow* (SANS 1091: B49) for all of the following structural steel items:
 - All horizontal handrail sections.

16.4 Labelling – Electrical & Instrumentation, Miscellaneous Panel / JB's

All electrical and instrumentation, Security / Telecom including cable rack, cables Etc., shall be labelled as per the respective specification. Refer section 3.5 for more details.



Note: Check Aconex system for latest revision

17. GUARANTEES

- 17.1** The Engineer requires performance guarantees for the applied coating systems. Such guarantees shall be provided jointly by the coating manufacturer and application contractor at the time of tender.
- 17.2** The minimum guarantee period will be 15 years for coating system with a polysiloxane finishing coat and 10 years for all other systems. The criteria for failure must not exceed Ri 3 of ISO 4628-3.
- 17.3** 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.
- 17.4** At the end of the coating work a performance guarantee document shall be developed by the application contractor and coating manufacturer and co-signed by the Engineer and client.
- 17.5** Guarantee Reference Areas
- 17.5.1** The guarantee shall be subjected to the application of Reference Areas as described in Annex B of ISO 12944-8 to assess the performance of the coating at any time after completion.
- 17.5.2** The Reference Areas shall be selected and agreed by the Engineer, the coating manufacturer and the coating applicator as being fully representative of the operating environment.
- 17.5.3** The coatings applied to the Reference Areas shall be the same as those specified and from the same manufactured batches of coatings used for the project. If more than one batch of coating is used, the Reference Area coatings shall be from the same manufactured batches as the initial batches supplied at the start of the project.
- 17.5.4** The coatings in the Reference Areas shall be applied either by the coating manufacturer or the coating applicator under the strict supervision of the manufacturer. Where the coatings are applied under supervision by the coating applicator, the manufacturer shall issue a certificate confirming that the coatings have been applied under in strict accordance with the manufacturer's product data sheets.
- 17.5.5** In the event of defect areas occurring during the period of the guarantee, the Reference area and rest of the defect areas shall be inspected by the coating applicator and the manufacturer.
- 17.5.6** If defect areas have occurred in the Reference Area, the remedial costs for both material and application under this guarantee shall be recovered from the manufacturer.
- 17.5.7** If defect areas have not occurred in the Reference Area but occurred in the rest of the coated areas, the remedial costs for both material and application under this guarantee shall be recovered from the coating applicator.

18. HANDLING AND STORAGE

The following precautions shall be taken for the site storage of coated items.

18.1 Handling

All coated components shall be handled using soft slings.

18.2 Loading

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

18.3 Off-loading

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

18.4 Cover

Coated items shall be stored under cover where possible.

Items not stored under cover shall be stored in such a manner as to avoid retention of water and allow good air circulation.

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

18.5 Stacking

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.



19. Records

Refer to 2684358-P-A00-DC-PO-001 Records and Retention Procedure for detailed records and record requirements



Note: Check Aconex system for latest revision

1 Annexure – CORROSION PROTECTION SYSTEM INDEX

System	Description
1	Structural steelwork and piping located inside and outside of buildings in marine environments.
2	Structural steelwork and piping located inside and outside of buildings in inland environments.
3	Internal surfaces of multi-product storage tanks
4	Internal surfaces of Jet Fuel tanks
5	Optional holding primer for the external surfaces of platework for site erected storage tanks.
6	Proprietary Equipment such as pumps, motors, gearboxes etc.
7	Transformers
8	Hand-railing and stanchions.
9	Stair treads and open grid floor grating and fixing systems.
10	Cable ladders, cable trays and associated support structures.
11	Control panels, switchgear cabinets, power and lighting distribution boards internal to buildings.
12	External surfaces of site erected storage tanks
13	Underside of above ground accumulator and intermix tank bottom plates
14	Internal of carbon steel fire water piping Internal and external of fire hydrant risers
15	UV protection of above-ground linepipe
16	Coating of 304/L stainless steel in marine environments



Note: Check Aconex system for latest revision

2 Annexure – PROTECTIVE COATING SPECIFICATIONS

System 1			
Environment	Atmospheric – Marine – ISO 12944 C5-M		
Material	Mild steel		
Temperature	Ambient to 50°C		
Typical Applications	Structural steelwork and the external surfaces of tanks and piping located inside and outside of buildings.		
New Works Surface Preparation	Abrasive blast clean to Grade Sa 2½ Surface profile as specified by the primer coating manufacturer		
	Primer	Intermediate	Finishing
Generic System	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 475HS	Interfine 878
Jotun	Barrier	Jotamastic Plus	Hardtop Optima
Sigma	Sigmazinc 109 HS	Sigmacover 435S	Ameron PSX 700
Stoncor	Carbozinc 859	Carboguard 893	Carboxane 2000
Notes: <ol style="list-style-type: none"> 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 9.3.6 3. All site repairs to handling and erection damage shall be carried out in accordance with Clause 9.7.1. 4. Finishing coat to be applied on site after erection in accordance with Clause 11. 5. All nuts and bolts to be patched with intermediate coat prior to the application of the finishing coat. 			

System 2		
Environment	Atmospheric – Inland – ISO 12944 C3	
Material	Mild steel	
Temperature	Ambient to 50°C	
Typical Applications	Structural steelwork and the external surfaces of tanks and piping located inside and outside of buildings.	
New Works Surface Preparation	Abrasive blast clean to Grade Sa 2½ Surface profile as specified by the primer coating manufacturer	
	Primer	Finishing
Generic System	two component recoatable epoxy zinc phosphate primer 75 – 100 micron	two component polyurethane acrylic finishing coat 50 – 75 micron
International Paints	Intergard 251 or Intercure 200	Interthane 990
Jotun	Penguard Express ZP	Hardtop AS / Flexi
Sigma	Sigmacover 256	Sigmadur 550
Stoncor	Carboguard 893	Carbothane 134
Notes: <ol style="list-style-type: none"> 1. Primer coat to be applied in the shops. 2. Stripe coating to be carried out in accordance with Clause 9.3.6 using the primer. 3. All site repairs to handling and erection damage shall be carried out in accordance with Clause 9.7.1. 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 11. 6. All nuts and bolts to be patched with intermediate coat prior to the application of the finishing coat 		



Note: Check Aconex system for latest revision

System 3				
Environment	Immersion			
Material	Mild steel			
Temperature	Ambient to 50°C			
Typical Applications	Internal surfaces of multi-product storage tanks for LSD, ULSD, LFP 93 and LFP 95			
New Works	Abrasive blast clean to Grade Sa 3			
Surface Preparation	Surface profile as specified by the primer coating manufacturer			
	Primer	Top Coat/s	Minimum System Thickness	Maximum Critical System Thickness
Generic System (coating thicknesses as per manufacturer's recommendations)	Epoxy holding primer	Two component epoxy polyamide or epoxy phenolic coat/s	Micron	micron
Hempel	Hempadur 15590	Hempadur 35760	1250	1550
International Paints	Intergard 982	2 x interline 850 Or Intergard 984	215 315	660 N/A
Jotun	Tankguard holding primer	2 x Tankguard Storage Or Tankguard SF	340 440	400 1000
Sigma	Sigmacover 280	Sigmaguard CSF 650	350	750
Stoncor	Phenoline 311	Plasite 4500-SF	550	1600
Notes: <ol style="list-style-type: none"> 1. All coats to be applied on site after erection of the tank. 2. Prior to any application activities the coating manufacturer shall compile a detailed Coating Procedure Specification for approval by the Engineer. 3. Minimum and maximum thickness requirements shall be strictly adhered to. Coatings exceeding the maximum critical system thickness requirements shall be totally stripped and re-applied. 4. Stripe coating to be carried out in accordance with clause 9.3.6 5. After the coating has cured sufficiently, it shall be tested for Electrical Insulation Defects (pin-holes) in accordance with SANS 1217 Clause 8.12.1 (NACE RP0188-8). 6. Any defects found shall be patch repaired and retested. 7. The coating shall not be put into immersed service until it has fully cured and has been tested and certified by the coating manufacturer. 				



Note: Check Aconex system for latest revision

System 4				
Environment	Immersion			
Material	Mild steel			
Temperature	Ambient to 50°C			
Typical Applications	Internal surfaces of Jet Fuel tanks			
New Works	Abrasive blast clean to Grade Sa 3			
Surface Preparation	Surface profile as specified by the primer coating manufacturer			
	Primer	Top Coat/s	Minimum System Thickness	Maximum Critical System Thickness
Generic System (coating thicknesses as per manufacturer's recommendations)	Epoxy holding primer	Two component epoxy polyamide or epoxy phenolic coat/s	Micron	micron
Hempel	Hempadur 15590	Hempadur 35760	1250	1550
International Paints	Intergard 982	2 x interline 850	215	660
		Or Intergard 984	315	N/A
Jotun	Tankguard holding primer	2 x Tankguard Storage	340	400
Sigma	Sigmacover 280	Sigmaguard CSF 650	350	750
Stoncor	Carboline 193	3 x Carboguard 187	350	660
Notes: <ol style="list-style-type: none"> 1. All coats to be applied on site after erection of the tank. 2. Prior to any application activities the coating manufacturer shall compile a detailed Coating Procedure Specification for approval by the Engineer. 3. Minimum and maximum thickness requirements shall be strictly adhered to. Coatings exceeding the maximum critical system thickness requirements shall be totally stripped and re-applied. 4. Stripe coating to be carried out in accordance with cause 9.3.6 5. After the coating has cured sufficiently, it shall be tested for Electrical Insulation Defects (pin-holes) in accordance with SANS 1217 Clause 8.12.1 (NACE RP0188-8). 6. Any defects found shall be patch repaired and retested. 7. The coating shall not be put into immersed service until it has fully cured and has been tested and certified by the coating manufacturer. 				



Note: Check Aconex system for latest revision

System 5 (Optional)	
Environment	Atmospheric
Material	Mild steel
Temperature	Ambient to 50°C
Typical Applications	Holding primer for the external surfaces of platework for site erected storage tanks.
New Works Surface Preparation	Abrasive blast clean to Grade Sa 2½ Surface profile as specified by the primer coating manufacturer
	Primer
Generic System	two component zinc filled inorganic weldable holding primer 15 – 25 micron
International Paints	Interplate 937
Jotun	Muki Z 2001
Sigma	Sigmaweld 199
Stoncor	Carboweld 11
Notes: <ol style="list-style-type: none"> 1. The holding primer is to be applied in the shops. 2. After blast cleaning the plate edges to be welded shall be masked off for a distance of 50 mm. 3. This masking shall be removed just prior to welding on site. 4. After welding, the weld areas shall be blast cleaned in accordance with the Clause 8.2 and the holding primer cleaned in accordance with Clause 8.4 prior to the application of System 12 to the external surfaces of the tanks. 	

System 6		
Environment	Atmospheric	
Material	Mild steel	
Temperature	Ambient to 50°C	
Typical Applications	Proprietary Equipment such as pumps, motors, gearboxes etc. (To be applied over the manufacturer's proprietary coating system where this is deemed inadequate for the site environment).	
New Works Surface Preparation	Hand clean, abrade and degrease as per coating manufacturer's recommendations	
	Primer	Finishing
Generic System	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	Penguard Primer	Hardtop AS / Flexi
Sigma	Sigmacover 230	Sigmadur 550
Stoncor	Carbomastic 186	Carbothane 134
Notes: <ol style="list-style-type: none"> 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. All upgrade coatings to be applied at suppliers shops prior to shipment to site and installation unless otherwise instructed in the equipment order. 3. All site repairs to handling and installation damage shall be carried out in accordance with Clause 9.7.1. 		



Note: Check Aconex system for latest revision

System 7	
Environment	Atmospheric
Material	Mild steel
Temperature	Ambient to 50°C
Typical Applications	Transformers
New Works	Transformers shall be coated in accordance with SANS 780. Inland: Clause 4.17.3 'Coating of exterior surfaces of transformers for use in non-corrosive environments', i.e. phenolated alkyd/alkyd gloss flow coating system or epoxy/polyurethane sprayed system. Marine: Clause 4.17.4 'Coatings of exterior surfaces of transformers for use in corrosive environments', i.e. hot dip galvanizing in accordance with SANS 121 (ISO 1461) or zinc metal spray in accordance with BS EN 22063 followed by phenolated alkyd/alkyd gloss flow coating system or epoxy/polyurethane sprayed system.
Notes:	
1. The transformer supplier must submit his particular detailed Coating Procedure Specification to the Engineer for approval.	

System 8		
Environment	Atmospheric	
Material	Mild steel	
Temperature	Ambient to 50°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.	
	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 AS / Flexi
Sigma	Sigmacover 280	Sigmadur 550
Stoncor	Carboguard 193	Carbothane 134
Notes:		
1. The galvanized surface shall not be passivated.		
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.		



Note: Check Aconex system for latest revision

System 9	
Environment	Atmospheric
Material	Mild steel
Temperature	Ambient to 50°C
Typical Applications	Stair treads and open grid floor grating and fixing systems.
New Works	Stair treads and open grid flooring shall be hot dip galvanized to SANS 121 (ISO 1461)
Notes: <ol style="list-style-type: none"> 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 galvanising. 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). 	

System 10	
Environment	Atmospheric
Material	Mild steel
Temperature	Ambient to 50°C
Typical Applications	Cable ladders, cable trays and associated support structures.
New Works	<p>Inland: All components to be hot dip galvanised to SANS 121 (ISO 1461)</p> <p>Marine: All components to be hot dip galvanised to SANS 121 (ISO 1461) followed by powder coating with an approved powder coating system in accordance with SABS 1274. The thickness of the powder shall be a minimum of 100 to 120 micron</p>
Notes: <ol style="list-style-type: none"> 1. 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. 2. Textured or 'structured' powder coatings will not be acceptable due to variations in film thicknesses. 3. Fixing systems shall be either hot dip galvanized or sherardized. 4. All site repairs to handling and installation damage and the coating of the fixing systems shall be carried out in accordance with Clause 9.7.1. 	

System 11	
Environment	Atmospheric (internal)
Material	Mild steel
Temperature	Ambient to 50°C
Typical Applications	Control panels, switchgear cabinets, power and lighting distribution boards internal to buildings.
New Works	Control panels, switchgear cabinets, power and lighting distribution boards shall be powder coated with an approved powder coating system in accordance with SABS 1274. The thickness of the powder shall be a minimum of 100 micron.
Notes: <ol style="list-style-type: none"> 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 9.7.1. 	



Note: Check Aconex system for latest revision

System 12			
Environment	Atmospheric – Marine / inland – ISO 12944 – C5-M / C3		
Material	Mild steel		
Temperature	Ambient to 50°C		
Typical Applications	External surfaces of site erected storage tanks		
SITE Surface Preparation	Abrasive blast clean welds to Grade Sa 2½ Surface profile as specified by the primer coating manufacturer Shop primer to be solvent cleaned in accordance with SSPC SP1		
	Primer	Intermediate	Finishing
Generic System	Two component inorganic zinc silicate primer 75 – 100 micron	Two component aluminium flake filled epoxy mastic intermediate coat 125 – 200 micron	Two component aluminium flake filled epoxy mastic finishing coat 125 – 200 micron
International Paints	Interzinc 687	Interseal 670 HS	Interseal 670 HS
Jotun	Resist 86	Jotamastic Aluminium	Jotamastic Aluminium
Sigma	Sigmazinc 160	Sigmacover 630 Al	Sigmacover 630 Al
Stoncor	Carbozinc 11	Carbomastic 1.5	Carbomastic 15
Notes: <ol style="list-style-type: none"> See system 5 for optional prefabrication primer for tank platework. If used, the prefabrication primer shall be completely removed by blast cleaning prior to the application of the inorganic zinc primer Stripe coating to be carried out in accordance with Clause 9.3.6 All coats to be applied on site after erection with due cognisance being taken of the curing and overcoating time requirements between the various coats. Inorganic zinc shall be tested for full cure in terms of ASTM D4752 prior to overcoating. 			

System 13		
Environment	Buried – under cathodic protection	
Material	Mild steel	
Temperature	Ambient to 50°C	
Typical Applications	Underside of above ground accumulator and intermix tank bottom plates	
New Works Surface Preparation	Abrasive blast clean to Grade Sa 2½ Surface profile as specified by the primer coating manufacturer	
	Primer	
Generic System	two component inorganic zinc silicate primer 75 – 100 micron	
International Paints	Interzinc 687	
Jotun	Resist 86	
Sigma	Sigmazinc 160	
Stoncor	Carbonzinc 11	
Notes: <ol style="list-style-type: none"> Primer coat to be applied in the shops Primer coat left back 50mm from the plate edges The provisions of section 17 – Guarantees do not apply to this coating system. 		



Note: Check Aconex system for latest revision

System 14		
Environment	Atmospheric	
Material	Mild steel	
Temperature	Ambient to 50°C	
Typical Applications	Internal of carbon steel fire water piping Internal and external of fire hydrant risers	
New Works	Abrasive blast clean to Grade Sa 3	
Surface preparation	Surface profile as specified by the primer coating manufacturer	
	Primer	Finishing
Generic System	Glass flake reinforced epoxy / phenolic 400 – 500 micron Total DFT	Glass flake reinforced epoxy / phenolic 400 – 500 micron Total DFT
International Paints	Interzone 1000	(single coat)
Jotun	Marathon 460	Marathon XHB
Sigma	Sigmashield 460	(single coat)
Stoncor	Phenoline 1205	Phenoline 1205
Corrocoat	Zip E	(single coat)
Notes: <ol style="list-style-type: none"> 1. Total DFT required is 400 – 500 microns. Depending on coating manufacturer, this may require 1 or 2 coats. 2. After the coating has cured sufficiently, it shall be tested for Electrical Insulation Defects (pin holes) in accordance with SANS 1217 Clause 8.12.1 (NACE RP0188-8) 3. Any defects found shall be patch repaired and retested. 4. The coating shall not be put into immersed service until it has fully cured and has been tested and certified by the coating manufacturer. 5. For colour coding of the fire hydrant risers above ground, refer to system 2 finishing coat. 		

System 15			
Environment	Atmospheric / Buried Interface		
Material	3LPE or Liquid epoxy coated steel pipe		
Temperature	Ambient to 50°C		
Typical Applications	Line pipe at terminals and pump stations between buried location and IJ		
SITE	Solvent clean in accordance with SSPC SP1		
Surface Preparation	Hand / Power tool clean to St2		
	Primer	Intermediate	Finishing
Generic System	Solvent based polymer modified bitumen 20µm	Polymer modified bitumen / acrylic tape 1250µm	Pure Acrylic 3m ² /l
Denso	Primer D	Steelcoat 500	Acrylic Topcoat
Notes: <ol style="list-style-type: none"> 1. Tape wrapping application shall be conducted in accordance with section 9 of 2684358-J-PL0-SP-004[00] 2. Tape overlap minimum 25mm 3. Tape wrapping system to be extended minimum 300 mm below soil surface 4. All application in accordance with manufacturer's recommendations 			



Note: Check Aconex system for latest revision

System 16		
Environment	Atmospheric – Marine – ISO 12944 C5-M	
Material	304 / 304 L Stainless Steel	
Temperature	Ambient to 50°C	
Typical Applications	Exterior of flush Tanks	
New Works Surface Preparation	Blast Clean with Alumina or garnet to remove weld tarnish and roughen the surface. Surface profile as specified by the primer coating manufacturer	
	Primer	Finishing
Generic System	Special two – component epoxy primer for stainless steel 40 – 60 microns	two component polysiloxane finishing coat 50 – 75 micron
International Paints	Interguard 269	Interfine 878
Jotun	Penguard Primer	Hardtop Optima
Sigma	Sigmacover 280	Ameron PSX 700
Stoncor	Carboguard 193	Carboxane 2000
Notes: <ol style="list-style-type: none"> 1. The stainless steel shall be de-greased and washed prior to blast cleaning. 2. Primer to be applied in the shops with due cognisance being taken of the overcoating time requirements between the various coats 3. Stripe coating to be carried out in accordance with Clause 9.3.6 4. All site repairs to handling and erection damage shall be carried out in accordance with Clause 9.7.1 and 9.7.2 5. Finishing coat may be applied in the shop or on site in accordance with Section 10 6. All nuts and bolts to be patched with primer prior to the application of the finishing coat. 		



Note: Check Aconex system for latest revision



3 Annexure – LABELLING REQUIREMENTS

All the plant piping, Equipment / Mechanical, Process, Electrical, Instrumentation, Telecom Security shall be labelled as per the following when specified:

1 Piping:

Pipe marking labels must effectively communicate the contents of the pipes and give additional detail if special hazards (such as extreme temperatures or pressure) exist. The legend shall be short in length and easy to understand. An arrow shall be used in conjunction with the legend to show with direction the material flows. If flow can be in both directions, arrows in both directions shall be displayed.

1.1 Position and Location:

Labels shall be positioned on the pipes so they can be easily visible from the indicative walkways as per the plant layout. Proper label placement as follows:

- a) On the lower side of the pipe if the person has to look up to the pipe.
- b) On the upper side of the pipe if the person has to look down towards the pipe; or
- c) Directly facing the person if on the same level as the pipe.
- d) Labels shall be painted with a brush utilising a stencil and shall contrast with the piping colour in order to ensure high visibility, and should be of UV resistant paint.
(Example in silver pipe line the stencilled label would be black; on a black pipe line the stencilled label would be yellow)

Labels shall be located in the following places:

- a) Near valves and branches
- b) Where a change in direction occurs
- c) On the entry / re-entry points through walls or floors
- d) And on straight segments with spacing between labels that allows for easy identification. Such as between flanges.

1.2 Legend:

Labels shall bear the following legend:

- a) If the pipeline carries multiple products
 - The company name *
 - Emergency telephone number and *
 - Direction of flow
 - Pipeline operating pressure in Kilo Pascal
 - All other pipeline identification is to be followed in terms of SANS 10140-3: 2003 (Edition 3)

Note * - Applicable in the case where external parties connects to the Transnet plant (e.g. Sapref, Natref, Total & Vopak)

- b) If the pipeline carries dedicated products
 - The company name *

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- Emergency telephone number *
- Name of the product
- Direction of flow
- Pipeline operating pressure in Kilo Pascal
 - All other pipeline identification is to be followed in terms of SANS 10140-3: 2003 (Edition 3)
- c) For pipes of less than 19mm in diameter the pipe shall be identified by means of a permanently legible tag.
- d) All labelling shall be maintained on a regular basis to ensure legibility

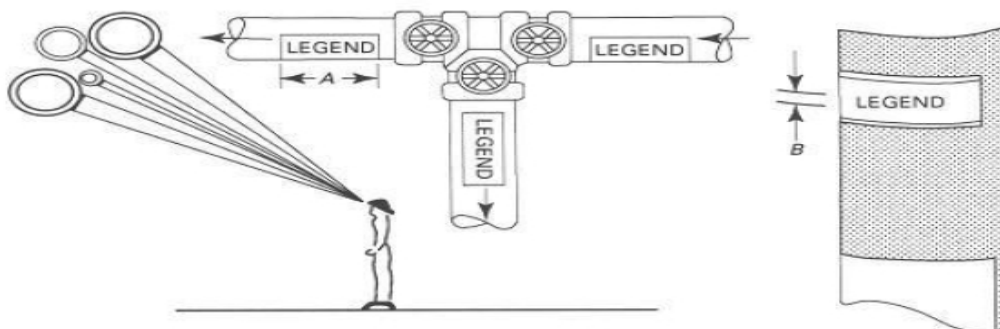
Note * - Applicable in the case where external parties connects to the Transnet plant (e.g. Sapref, Natref, Total & Vopak)

1.3 Identification Colours For Pipeline & Bands:

The colour coding and width of bands shall be as per Section 16 of this specification.

1.4 Size Of Legend Letters:

Outside Diameter of pipe covering (mm)	Size of Letters
19mm to 32 mm	13mm
38mm to 51mm	19mm
64mm to 150mm	32mm
200mm to 250mm	64mm
Over 250 mm	89mm



2 Equipment and Mechanical :

The name, tag number and service are required to be indicated.

2.1 Letter Size

The size of lettering used for code indications on insulated and un-insulated equipment's shall be as indicated below. The following are suggested sizes only and may be varied by Transnet.

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2.2 Process Equipment:

Labelling should be legible for all equipment from the indicative walkway / access point.

Equipment below 2m height & Pumps: Follow the equivalent pipe size refer to annexure 3 section 1.4

Equipment above 2m and below 3m: 100mm

Equipment above 3m and below 4m: 200mm

Equipment above 4m and below 6m: 300mm

2.3 Underground Equipment:

Mounting bracket(s) to be provide on the ground level where the equipment are not accessible and buried underground.

Mounting bracket should be standard size and 304 SS inland and 316 SS coastal material, to be located suitable as per approved drawings at Site.

2.4 Utility Equipment:

Labelling should be legible for all equipment from the indicative walkway and access points. For the generators and compressors it will be close to the entrance.

- MV Generators: 300mm Letters
- LV Generators: 300mm Letters
- Air Compressors and Receivers: 200mm Letters

3 Accumulators and Tanks:

For accumulators and Storage Tanks the labelling should be legible from the access roads, Roof top and at an interval of 50 M in circumference. The labelling should be clear from the stairs, Cable trays and tank piping.

Accumulators & Vertical storage Tanks (Above 12M diameter) : 1000 mm letters

Storage tanks (Below 12m diameter) Interval as required : 300 mm letters

4 Electrical & Instrumentation, Telecom and Security

Electrical & Instrumentation equipment's shall be labelled as per the respective specification of Transnet Pipelines and General Standards & Acts refer section 3.5.