

# **FOSKOR RICHARDSBAY**

## **GENERAL PLANT PAINTING LOW TEMPERATURE**

**PAINTING SPECIFICATION  
NUMBER: MC-004**

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# CORROSION PROTECTION SYSTEM

## Specification MC-004 (Rev. 03)

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**This system details the surface preparation and painting of tankage, structural steelwork, piping and related ferrous equipment in a heavy chemical environment.**

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### **SECTION 1: SURFACE PREPARATION**

- 1.1 Remove all oil and grease by solvent wiping or washing with detergent solution and rinsing with clean potable water.
- 1.2 Any and all chemical contamination shall be eliminated by means of neutralization or flushing or both, prior to additional surface preparation. If required High Pressure water wash the entire surface at a pressure of 300-bar minimum to remove all dirt, grime and surface contamination.
- 1.3 Abrasive blast to a COMMERCIAL BLAST in accordance with ISO 8501-1, Grade SA2 to obtain a surface profile of 45 to 65 microns.

### **SECTION 2: PAINTING SYSTEM**

#### **2.1 Primer**

Apply one (1) complete coat of PHENGAURD (Data Bulletin 7435).  
DFT shall be 100 to 125 microns.

#### **2.2 Stripe Coat**

Apply, by brush application, a stripe coat of SIGMAGUARD 730, (Data Bulletin 7459) to all edges, corners, boltholes, bolts, nuts & fasteners and weld seams.

#### **2.3 Intermediate**

Apply SIGMAGUARD 730 (Data Bulletin 7459). DFT shall be 125-150 microns.

#### **2.4 Finish**

Apply SIGMAGUARD 730 (Data Bulletin 7459). DFT shall be 50-75 microns.  
This will apply to general areas and to structural steel, in areas of high spillage eg. Tanks containing phosphoric acid; Sigma Multimastic (Data Bulletin 7430) may be used if so preferred.

#### **2.5 System DFT**

The total dry film thickness (DFT) of the system shall be 350 microns.

### **SECTION 3: SPECIAL REQUIREMENTS**

- 3.1 The Fabricator prior to coating shall pay strict attention to the fettling of surfaces. Welds shall be smooth, continuous and free from projections, weld spatter and slag. Rough welds are to be ground smooth and sharp edges deburred and ground to be a radius of not less than 1½ mm.

### **SECTION 4: GENERAL**

- 4.1 It is the responsibility of the applicator to assure that he can achieve the required DFT of any and all the required coats in a single operation. If multi-coats are required due to method of application, technique, or other, they shall be applied per the instructions of Dulux/Sigma Coatings and all additional labour shall be for the sole account of the applicator.
- 4.2 No work shall be performed until the Engineer/Supervisor approves a Quality Plan.
- 4.3 Finish colour shall be per the Engineer/Supervisor/Foskor Colour Code MC001.
- 4.4 All surface preparation and application shall be in accordance with the relevant product data bulletin this CPS, the general painting specification of the client, SABS 1200 HC and SABS 064. If a conflict exists between the above items, the most restrictive shall be considered the control.
- 4.5 The applicator shall provide for all necessary safety precautions.
- 4.6 If the coating becomes contaminated between coats, it is the responsibility of the applicator to wash the contaminated surface and remove all contamination prior to the application of additional coating.
- 4.7 Should UV resistance be required then SIGMAGUARD 550 is to be used as a final coat.



**FOSKOR**



**RICHARDS BAY**

**CORROSION PROTECTION SPECIFICATION  
NUMBER MC-001**

**COLOUR CODING  
RICHARDS BAY**

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## 1. SCOPE

The specification covers the colour coding required on pipes, machinery etc. to identify in a quickly recognizable way the contents of pipes and potential dangers on the plant to make the plant as safe as possible to operate.

Final painting of all equipment shall include the colours and labels specified.

## 2. CODES AND STANDARDS

All designs, procedures, materials, equipment, tests and analyses shall be in accordance with the latest editions in force at the time of order placement of national and international codes, standards and specifications including all amendments and revisions.

2.1. The following standards are referred to in this specification and shall be complied with:

SABS 1091	– National colour standards for paint.
SABS 1186	– Symbolic safety signs
RAL K7	– Colour Range

## 3. PIPES AND VALVES

### 3.1 Pipes

Pipes, valves and all inline items except vessels shall be painted along their full length with the following colours if not specified in paragraph 3.3.

Ductile Iron	-	Black
Stainless steel-		Unpainted
Other steel	-	White
Polymers	-	Natural

**Note:** Due care shall be exercised to avoid painting over equipment tags, labels, screw threads, shafts, glasses and the like which could interfere with the identification or operation of the equipment.

### 3.2 Colour Bands

Colour bands shall be affixed 10m on a continuously welded line and approximately 300mm from all changes in direction, tees, valve, pumps and all in-line items on all branches of the pipe and each band shall be 50mm wide. They may be painted or applied with vinyl tape provided the colour is correct.

Colour bands shall be in accordance with paragraph 3.3

### 3.3 Pipe Colours

Drinking water	Brilliant green	SABS H10 or RAL 6010
Raw Water	2x Golden Yellow	SABS B49/B49 or RAL 1003/1003
Process/Reclaim water	Golden Yellow	SABS B49 or RAL 1003
Condensate and Demineralised Water	Brilliant Green /Black /Brilliant Green	SABSH10/(-)/H10 or RAL 6010/(-)/6010
Fire Protection	Signal Red (Full Cover)	SABS A11 or RAL 3020
Air – Plant	Arctic Blue	SABS F28 or RAL 5024
Air- Instrument	ArcticBlue with White	SABS F28/G80 or RAL 5024/9016
Steam	Pastel Grey	SABS G54 or RAL 7035
Phosphoric acid	Jacaranda	SABS F18 or RAL 4005
Fluosilicic Acid	Jacaranda/Signal Red/ Jacaranda	SABS F18/A11/F18 or RAL 4005/3020/4005
Oil	Golden Brown	SABS B13 or RAL 8001
Sulphuric Acid	Jacaranda/Golden Yellow	SABS B18/B49 or RAL 4005/1003
Ammonia	White	SABS G80 or RAL 9016
Gypsum slurry	Brilliant Green/Golden Yellow	SABS H10/B49 or RAL 6010/1003
Vacuum systems	Pastel Grey/Arctic blue	SABS G54/F28 or RAL 7035/5024
Heating gas	Golden Yellow (Full cover)	SABS B49 or RAL 1003
Caustic Soda	Black/Aquamarine	(-)/SABS E67 or RAL6019
Lime	Black/Golden Yellow	(-)/SABS B49 or RAL 1003
Polymer	Dark Violet/Golden Yellow	SABS F05/B49 or RAL 4008/1003
De-foamer	Brilliant Green/Artic Blue	SABS H10/F28 or RAL 6010/5024

## 4. PLANT, MACHINERY AND EQUIPMENT COLOURS

### 4.1

Major plant/ducts	Pastel Grey	SABS G54 or RAL7035
Major plant/stacks	Pastel Grey with Red & White Bands 2m wide for the top 2m	SABS G54 or RAL 7035 SABS A11/G80 or RAL 3020/9016
Machine and safety guards	Light Orange	SABS B26 or RAL 2000
Tanks	White	SABS G80 or RAL 9016
Storage Tanks P205	Light Straw	SABS 1091 No C55
Hand rails and Catladders	Golden Yellow	SABS B49 RAL 1003
Structures, conveyors, baseplates, brackets, supports, skirts, handrail stanchions.	Black	(-)

### 4.2 Electric

Motors	2 Pole – Cream	SABS C66 or RAL 1015
	4 Pole – Brilliant Green	SABS H10 or RAL 6010
	6 Pole – Golden Yellow	SABS B13 or RAL 8001
	8 Pole – Mid Grey	SABS G25 or RAL 7001
Panels 400V	Eau-De-nil	SABS H43 or RAL 6019
3.3KV	Light Orange	SABS B26 or RAL 2000
11KV	Pastel Grey	SABS G54 or RAL 7035
Power Factor Correction	Pastel Grey	SABS G54 or RAL 7035

Harmonic Filter Panels	Pastel Grey	SABS G54 or RAL 7035
U.P.S.	Pastel Grey	SABS G54 or RAL 7035
Battery Charger	Mid Grey	SABS G25 or RAL 7001
Lighting & Sub DB's	Light Orange	SABS B26 or RAL 2000
Emergency Lighting DB's	Light Orange	SABS B26 or RAL 2000
Transformers	Mid Grey	SABS G25 or RAL 7001
Diesel Generators	Mid Grey	SABS G25 or RAL 7001
400V Variable Speed Drives	Brilliant Green	SABS H10 or RAL 6010
525V Variable Speed Drives and DB's	Middle Blue	SABS F07 or RAL 5009
525V Terminal Box	Signal Red	SABS A11 or RAL 3020

Signage for Substation  
Emergency Panel Identification

Black Letters on White Background  
White Letters on Red Background

**SPECIFICATIONS/MCOO1**



# **FOSKOR**



## **RICHARDS BAY**

### **INTERNAL PAINTING OF TANKS WITH DEMINERALISED WATER**

**PAINTING SPECIFICATION  
NUMBER: MC-011**

# CORROSION PROTECTION SYSTEM

## Specification MC-011

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**This system details the surface preparation and internal painting of tanks containing demineralised water.**

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### **SECTION 1: SURFACE PREPARATION**

- 1.1 Remove all oil and grease by solvent wiping or washing with detergent solution and rinsing with clean potable water.
- 1.2 Any and all chemical contamination shall be eliminated by means of neutralization or flushing or both, prior to additional surface preparation. If required High Pressure water wash the entire surface at a pressure of 300-bar minimum to remove all dirt, grime and surface contamination.
- 1.3 Abrasive blast to a COMMERCIAL BLAST in accordance with ISO 8501-1, Grade SA2.5 to obtain a surface profile ( $R_z$ ) 50 $\mu$ m to 100 $\mu$ m.

### **SECTION 2: PAINTING SYSTEM**

#### **2.1 Primer**

Apply one (1) complete coat of SIGMA PHENGUARD PRIMER (Data Bulletin 7409). The substrate must be perfectly dry during application. DFT shall be 100 $\mu$ m.

#### **2.2 Stripe Coat**

Apply, by brush application, a stripe coat of SIGMA PHENGUARD COATING, (Data Bulletin 7435) to all edges, corners, boltholes, bolts and weld seams. DFT shall be 100 $\mu$ m.

#### **2.3 Intermediate**

Apply SIGMA PHENGUARD COATING (Data Bulletin 7435). DFT shall be 100 $\mu$ m.

#### **2.4 Finish**

Apply SIGMA PHENGUARD FINISH (Data Bulletin 7436). DFT shall be 100 $\mu$ m.

## **2.5 System DFT**

The individual coats may not exceed 1,5 x the specified DFT.

### **SECTION 3: SPECIAL REQUIREMENTS**

- 3.1 The Fabricator prior to coating shall pay strict attention to the fettling of surfaces. Welds shall be smooth, continuous and free from projections, weld spatter and slag. Rough welds are to be ground smooth and sharp edges deburred and ground to be a radius of not less than 1½ mm.

### **SECTION 4: GENERAL**

- 4.1 It is the responsibility of the applicator to assure that he can achieve the required DFT of any and all the required coats in a single operation. If multi-coats are required due to method of application, technique, or other, they shall be applied per the instructions of Sigma Coatings and all additional labour shall be for the sole account of the applicator.
- 4.2 No work shall be performed until the Engineer/Supervisor approves a Quality Plan.
- 4.3 All surface preparation and application shall be in accordance with the relevant product data bulletin this CPS, the general painting specification of the client, SABS 1200 HC and SABS 064. If a conflict exists between the above items, the most restrictive shall be considered the control.
- 4.4 The applicator shall provide for all necessary safety precautions.
- 4.5 If the coating becomes contaminated between coats, it is the responsibility of the applicator to wash the contaminated surface and remove all contamination prior to the application of additional coating.



# **FOSKOR**



## **RICHARDS BAY**

### **PAINTING OF GRILLAGE BEAMS UNDER TANKS**

**PAINTING SPECIFICATION  
NUMBER: MC-010**

**This specification details the surface preparation and painting of grillage at the bottom of all tanks.**

**1.0 SURFACE PREPARATION**

- 1.1 Remove all oil and grease by solvent wiping or washing with detergent solution/degreasing fluid and rinsing with clean potable water, prior to any additional preparation.
- 1.2 High pressure water wash at a pressure of not less than 300 bar.
- 1.3 Abrasive blast to near white metal in accordance with ISO 8501-1, Grade SA2.5 to obtain an angular blast profile of 40µm to 60µm.

**SURFACE PREPARATION**

**2.0 PAINT SYSTEM**

<b>Coat</b>	<b>Product Name</b>	<b>Data Sheet</b>	<b>DFT Minimum</b>	<b>DFT Maximum</b>
Primer	Sigma TCN 300 Brown	7472	125	150
Final	Sigma TCN 300 Black	7472	125	150

NB: The stripe coat shall be applied to all weld edges, fasteners, corners, sharp edges, bolt holes and any change in contour of the structure.

**3.0 SPECIAL REQUIREMENTS**

- 3.1 It is the responsibility of the applicator to ensure that he can achieve the required DFT of any and all the required coats in a single operation. If multi-coats are required to method of application, technique or other, they shall be applied per the instructions of Sigma Coatings and all additional labour shall be for the sole account of the applicator.
- 3.2 All surface preparation and application shall be in accordance with the relevant product data bulletin, this specification and the general painting specification of Sigma Coatings, SABS 1200HC and SABS 064. If a conflict between the above items exist, the most restrictive shall be considered the control.

# **FOSKOR**



## **RICHARDS BAY**

### **GENERAL PLANT PAINTING IN HIGH CORROSIVE AREAS**

**PAINTING SPECIFICATION  
NUMBER: MC 009**

# CORROSION PROTECTION SYSTEM

## Specification MC-009

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This system details the surface preparation and painting of tankage, structural steelwork, piping and related ferrous equipment in a high acid spillage area.

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### **SECTION 1: SURFACE PREPARATION**

- 1.1 Remove all oil and grease by solvent wiping or washing with detergent solution and rinsing with clean potable water.
- 1.2 Any and all chemical contamination shall be eliminated by means of neutralization or flushing or both, prior to additional surface preparation. If required High Pressure water wash the entire surface at a pressure of 300-bar minimum to remove all dirt, grime and surface contamination.
- 1.3 Abrasive blast to a COMMERCIAL BLAST in accordance with ISO 8501-1, Grade SA2½ to obtain a surface profile of 45µm to 65µm.

### **SECTION 2: PAINTING SYSTEM**

#### **2.1 1<sup>st</sup> Coat**

Apply one (1) complete coat of Denso ST Epoxy (as per Data Bulletin) @ 200µm DFT

#### **2.2 Stripe Coat**

Apply, by brush application, a stripe coat of Denso ST Epoxy @ 200µm, to all edges, corners, bolt holes, bolts, nuts & fasteners and weld seams.

#### **2.3 2<sup>nd</sup> Coat**

Apply one full coat of Archco 701 ESR Resin @ 200µm DFT.

### **SECTION 3: SPECIAL REQUIREMENTS**

- 3.1 The Fabricator prior to coating shall pay strict attention to the fettling of surfaces. Welds shall be smooth, continuous and free from projections, weld spatter and slag. Rough welds are to be ground smooth and sharp edges de-burred and ground to be a radius of not less than 1½ mm.

### **SECTION 4: GENERAL**

- 4.1 It is the responsibility of the applicator to assure that he can achieve the required DFT of any and all the required coats in a single operation. If multi-coats are required due to method of application, technique, or other, they shall be applied per the instructions of Denso SA (PTY) LTD. and all additional labour shall be for the sole account of the applicator.
- 4.2 No work shall be performed until the Engineer/Supervisor approves a Quality Plan.

- 4.3 Finish colour shall be per the Engineer/Supervisor/Foskor Colour Code MC001.
- 4.4 All surface preparation and application shall be in accordance with the relevant product data bulletin this CPS, the general painting specification of the client, SABS 1200 HC and SABS 064. If a conflict exist between the above items, the most restrictive shall be considered the control.
- 4.5 The applicator shall provide for all necessary safety precautions.
- 4.6 If the coating becomes contaminated between coats, it is the responsibility of the applicator to wash the contaminated surface and remove all contamination prior to the application of additional coating.



# **FOSKOR RICHARDSBAY**

## **PIPEWORK AND FLANGES PROTECTION DENSO WRAP SYSTEM**

**CORROSION PROTECTION SPECIFICATION  
NUMBER: MC 008**

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## CORROSION PROTECTION SYSTEM

### Specification MC-008

This system details the surface preparation and protection of pipework and pipework flanges using the Denso Steel Coat 400 System.

#### **SECTION 1: SURFACE PREPARATION**

- 1.1 OLD STEEL: Remove all dirt and salt water deposits by fresh water washing. Allow to dry and remove heavy rust or scale with chipping hammers. Power wire brush to achieve ST2 standard (ISO 8501-1).
- 1.2 NEW STEEL: Abrasive blast cleaning is imperative to remove all millscale.

#### **SECTION 2: COMPONENT AND EQUIPMENT LIST**

- 2.1 Denso Penetrating Primer  
Denso Ultraseal tape  
Denso Acrylic Topcoat
- 2.2 Optional Components  
Denso Ultraseal Mastic  
Denso D14 Scrim  
(Where extra reinforcing is required)

#### **SECTION 3: APPLICATION TO PIPEWORK AND FLANGES**

##### **ULTRASEAL TAPE APPLICATION**

Pipe diameter sizes	Recommended tape width
50 mm to 75 mm	50 mm
100 mm to 150 mm	100 mm
150 mm to 300 mm	150 mm
300 mm upwards	450 mm (Cigarette wrap method – see below)

##### **Spiral wrapping pipework up to 300 mm diameter**

Select appropriate tape width from above table e.g. 100 mm wide for 100 mm diameter pipe. Peel back about 0.5 m of interleaving and apply the adhesive side of the tape firmly to the pipe (see Fig 14). Unroll the tape about 0.5 m, peel back the interleaving and wrap the tape spirally ensuring correct alignment. Do not overstretch the tape but apply sufficient tension to ensure the tape conforms to the pipe surface. Overlap each turn by a minimum of 15 mm (see Fig 15). Start new roll by overlapping the end of the applied roll by 50 mm (see Fig 16).

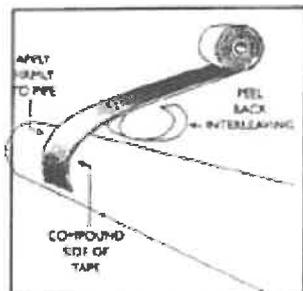


Fig 14. Starting the first roll of tape

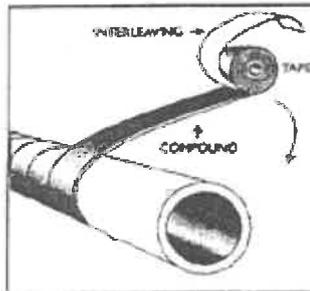


Fig 15. Diagram showing the correct application procedure for wrapping tape

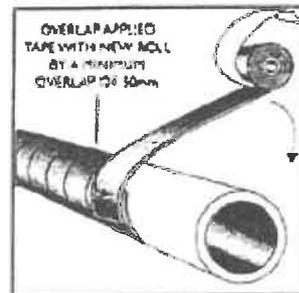
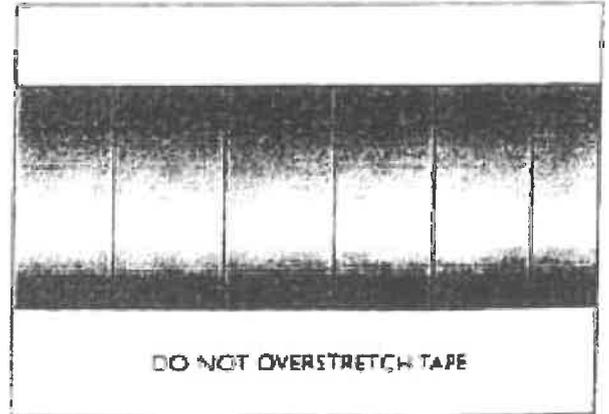
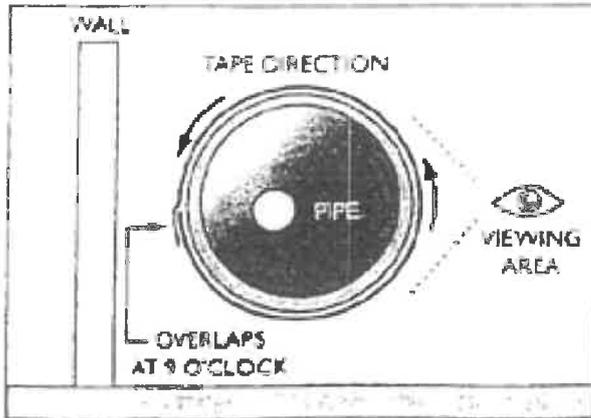


Fig 16. Starting a new roll of tape

Cigarette Wrap method 450 mm wide widths:

Wherever possible the end overlaps of each 450 mm wide strips of tape should face away from the general



Flanges:  
50 mm wide tape is utilised.

Apply one coat of DENSO PENETRATING PRIMER over entire surface to be wrapped. Profile the pipe joint with DENSO PENETRATING MASTIC so there will be no air gaps under the subsequent tape wrapping. Push the mastic firmly into all cavities and around all bolt heads building up to form a profile suitable for wrapping without forming bridges or voids. The tape is applied by dividing the joint into two halves. Start the tape on the center of the Profile the crown of the joint and wrap away from the center, towards the adjoining pipe, overlapping each turn by at least 15 mm. Finish with at least one circumferential wrap onto the pipe to conclude first half of the application. Start again on the crown of the joint overlapping initial wrap. Wrap towards the pipe on the opposite side of the joint overlapping tape edges as per first wrapping. Smooth finished wrap down well particularly at the tape edges.

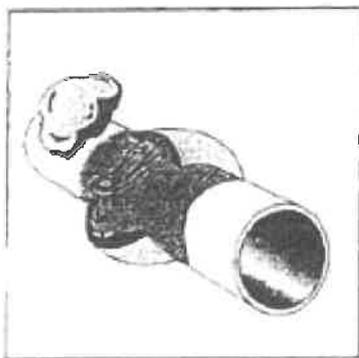


Fig 19. Profiling the joint with DENSO PENETRATING MASTIC.

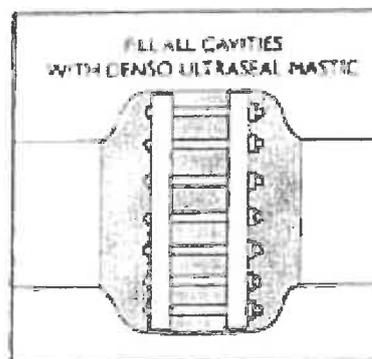


Fig 20. Make sure the mastic is pushed into all crevices and that it forms a smooth profile for wrapping.

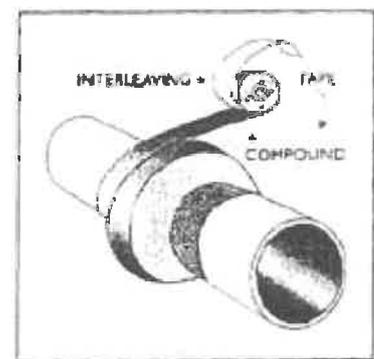


Fig 21. Wrap joint in two halves. Start on crown and work towards pipe then repeat from crown working towards pipe on opposite side of joint

### Damaged Coatings:

Cut away and remove loose coating from damaged area and smooth or chamfer edges. Clean area thoroughly then prime the exposed metal. Repair the damaged area with a patch of tape.



Fig 22. Damaged pipe coating

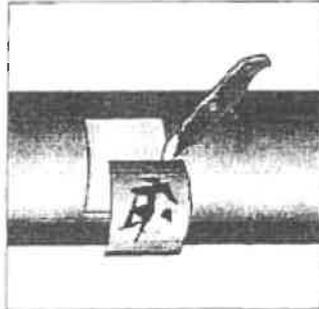


Fig 23. Remove loose or damaged area then clean thoroughly

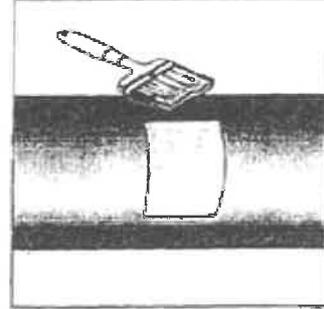


Fig 24. Smooth edges and prime exposed metal

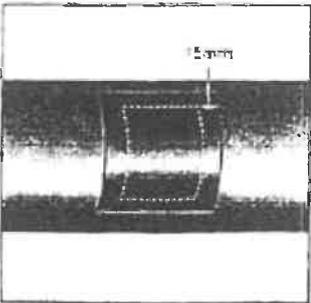


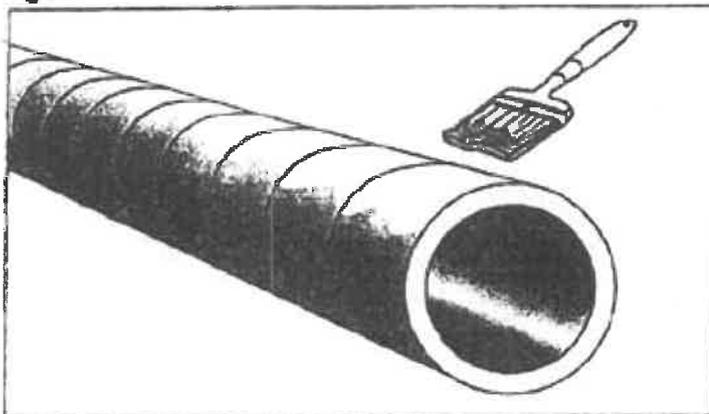
Fig 25. Repair damaged area with a patch of tape overlapping at least 15mm

### Overlapping Denso Acrylic Topcoat at 113 Litre per m<sup>2</sup>

#### Additional reinforcement

When increased mechanical protection is required either Denso D5 Scrim or D10 Scrim can be applied in conjunction with the Denso Acrylic Topcoat. First apply a thick layer of Acrylic Topcoat to approximately 1 metre of tape pipelength. Wrap in Scrim of appropriate width (select the same size as the tape used in wrapping) in similar fashion to the Ultraseal Tape application. Stagger the Scrim overlaps so that they do not coincide with the inner Ultraseal Tape overlaps. Thoroughly saturate the scrim with a suitable brush or roller.

Fig 26.



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**RICHARDS BAY**

**HIGH TEMPERATURE PLANT PAINTING  
RICHARDS BAY**

**PAINTING SPECIFICATION  
NUMBER: MC-005**

# **CORROSION PROTECTION SYSTEM**

## **Specification MC-005**

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**This system details the surface preparation and painting of mild steel subjected to atmospheric exposure and temperatures up to 200 deg. centigrade.**

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### **SECTION 1: SURFACE PREPARATION**

- 1.1 Remove all oil and grease by solvent wiping or washing with detergent solution and rinsing with clean potable water.
- 1.2 Any chemical contamination shall be eliminated by means of neutralization or flushing or both, prior to additional surface preparation.
- 1.3 Abrasive blast clean in accordance with SA 2.5 of the Swedish specification SIS 055900-1967 to obtain a surface profile of 45µm to 65µm.

### **SECTION 2: PAINTING SYSTEM**

#### **2.1 Primer Coat**

Apply Sigmacover CM Mio aluminium to a DFT of 75µm to 100µm. (Data Bulletin 7427).

#### **2.2 Final Coat**

Apply Sigmacover CM Mio aluminium to a DFT of 75µm to 100µm (Data Bulletin 7427).

#### **2.3 System DFT**

The total dry film thickness of the system shall be 150µm minimum and 225µm maximum.

### **SECTION 3: SPECIAL REQUIREMENTS**

- 3.1 Strict attention shall be paid to the fettling of surfaces by the Fabricator prior to coating. Welds shall be smooth, continuous and free from projections, weld spatter and slag. Rough welds are to be ground smooth and sharp edges deburred and ground to be a radius of not less than 1.5 mm.

#### **SECTION 4: GENERAL**

- 4.1 It is the responsibility of the applicator to assure that he can achieve the required DFT of any and all the required coats in a single operation. If multi-coats are required due to method of application, technique, or other, they shall be applied per the instructions of Sigma Coatings and all additional labour shall be for the sole account of the applicator.
- 4.2 No work shall be performed until a Quality Plan is approved by the Engineer/Supervisor as per Foskor Quality Procedure 002.
- 4.3 All surface preparation and application shall be in accordance with the relevant product data bulletin this CPS, the general painting specification of the client, SABS 1200 HC and SABS 064. If a conflict exist between the above items, the most restrictive shall be considered the control.
- 4.4 The applicator shall provide for all necessary safety precautions.



# **FOSKOR RICHARDS BAY**

## **GENERAL MECHANICAL SPECIFICATION**

**STANDARD SPECIFICATION NO: FM 001**

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## **GENERAL MECHANICAL SPECIFICATION**

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1.0 **SCOPE**

This specification covers the requirements for mechanical items.

2.0 **GENERAL**

2.1 **Legal Requirements**

All works shall comply with the South African Occupational Health and Safety Act. (OHS - Act 85 of 1993)

2.2 **General**

This Specification is intended to convey the minimum requirements for mechanical equipment. All equipment shall be designed in accordance with this specification and all the National and International standards listed herein.

The latest edition of the standard at the time of order placement shall be used.

In the event of a contradiction between standards and drawings, the order of precedence for a decision shall be :

1. The specification issued for the particular equipment.
2. The drawing of the particular equipment.
3. The General Mechanical Specification. (This specification)

2.3 **Units**

All dimensions, units, multiples, symbols and prefixes shall be I.S.O. metric, as detailed in the SABS Publication M20.

The units used in this specification and which shall be used in all documentation shall be as indicated in the following table

QUANTITY	UNIT
Length	Millimetre (mm) or metre (m)
Mass	Kilogram (kg), gram (gm) or tons (t) or tonne (t = 1 000kg)
Time	Seconds (s)
Temperature	Degree Celsius (°C)
Force	Newton (N) or kilo Newtons (kN)
Material Stress	Megapascal (MPa)
Torque	Newton-metres (N.m.)
Power	Kilowatt (kW)
Pressure	Megapascals(MPa), or Kilopascals (kPa)
Velocity	Metre per second (m/s)
Shaft Speed	Revolutions per minute (r/min)
Frequency	Hertz (Hz)

For Liquids:-

Flow	Litres per second (l/s) or m <sup>3</sup> /h
Volume	Litres (l) or m <sup>3</sup>
Kinematic Viscosity	Centistokes (cSt) (m <sup>2</sup> /s x 10 <sup>-6</sup> )
Noise	Decibels dB(A)

2.4 **Life, Reliability and Guarantee**

Equipment supplied to this specification shall be designed so that all of its components have a L10 life of at least 65 000 working hours, under specified loading conditions, unless stated otherwise. The operating records of similar plant shall form the basis for estimating the "working" hours per year.

In the case of a newly designed plant, the working hours shall be estimated by the Vendor who shall base his estimate on similar operating plants.

Where components of a machine are supplied and it is known that this life cannot be achieved, such as liners or V belts, the Vendor shall advise this in writing and shall give an estimated life to enable replacements to be held in stock.

The Vendor shall guarantee his equipment in accordance with the General Conditions of Contract.

2.5 **Spares and Interchangeability**

To reduce spares holding, machines and equipment shall be designed to make use of as many common parts as possible. All components to the same design shall be interchangeable.

3.0 **MATERIALS**

3.1 **General**

Foskor will state the material required and the mechanical properties which must be achieved. Any special surface finish or treatment shall be fully specified.

Any material selected for a special purpose or critical service shall comply in every respect with the chemical and physical properties stated in the specifications. The temperature at which impact testing is required together with the minimum acceptable impact value shall be stated.

The acceptable tolerances for inclusions, defects, dimensional accuracy are included in the specifications. If Foskor requires a departure from these it will be stated on the item specification and drawings.

Any request by the Vendor for substituting an alternative material shall be in writing and he shall not proceed until he has received written instructions.

If a substitute material with an improved specification is accepted the allowable stresses shall be those of the originally specified material.

3.2 **Cast Iron**

The following standards shall apply :-  
SABS 1034, SABS 1190, BS 1452, BS 1591.

3.3 **S.G. Iron**

The following standards shall apply :-  
SABS 936/937, BS 2789.

3.4 **Steel - Carbon**

The following standards shall apply for castings :-

BS 3100

Depending on the design of the component, the following standards shall apply for wrought steels :-

SABS 1431, BS 970-PT.1, 2, 3, & 4, BS 2772 - PT.2, & 3; BS EN 10137 (replaces BS 4360); BS 4848-PT.4 & 5.

3.5 **Steel – Stainless**

Commonly used Stainless Steels are:

Alloy 20  
904L  
904HMO  
SANRICO 28  
304L  
316L

The grade of Stainless Steel to be used will be given on the Contract specifications and drawings.

3.6 **Castings**

Castings shall be sound and free from cavities. They shall be fettled and cleaned to remove all foreign material and shall be heat treated to ensure that distortion does not occur after machining.

No painting or filling in of castings shall take place until the casting has been inspected. **No repairs shall be done to castings without the written approval of the Engineer.**

Castings with a weight over 25 kg shall be provided with lifting lugs.

3.7 **Forgings**

Forgings shall be free from inclusions and folds. Where required, sufficient metal shall be allowed for removal and machining of test samples.

3.8 **Copper and Copper Alloys (Brass and Bronze)**

Note: Copper Alloys are not to be used in the Phosphoric Acid Plant.

Depending on the design of the component the following standards shall apply:-

SABS 200; BS 2872 ; BS 2874; BS 2875; BS 1400 .

3.9 **Aluminium**

The following standards shall apply :-

SABS 989/992; BS 1490; BS CP 118; BS 1470; BS 1471; BS 1472; BS 1474; BS 1475.

3.10 **Plastics, Elastomers (Rubbers) and Ceramics**

The use of these materials shall be approved by Foskor.

3.11 **White Metal**

Shall be supplied to SABS 695/703.  
All other material shall be approved by Foskor.

4.0 **BASEPLATES**

The following standards shall apply.  
Material – SABS 1431 – 300 WC or equivalent  
Welding - AWS D1.1

Cast baseplates shall be in grey iron to BS 1452 and shall be N.D. tested before acceptance. The baseplates shall be stress relieved before machining, to minimise distortion.

Fabricated baseplates shall be made of steel to SABS 1431 grade 300 WC, or equivalent. On highly stressed baseplates the material shall be 350WC. The welding shall be to AWS D1.1 and shall be non-destructive tested before acceptance. The baseplates shall be stress relieved before machining.

Baseplates shall be rigidly designed, with cross bracing to withstand all the static and dynamic loads imposed. They shall also be designed to allow for transport forces and for lifting into position. Lifting eyes shall be provided.

They shall be provided with drain holes to ensure that no "damming" can occur when placed on the foundation. Grout holes shall be allowed to facilitate proper grouting.

If it is necessary to drain oil from the supported equipment allowance shall be made for this to be easily done.

Baseplates to be mounted on concrete foundations shall have shear keys on their underside to resist horizontal forces.

Fabricated baseplates shall have welded pads on to which the equipment mounts, these shall be machined after fabrication and stress relieving, when required by the Engineer. Provision shall be made for packing pieces of corrosion resistant material (stainless steel) to be placed between the base and equipment for lining up and levelling. Packing pieces shall be provided by the mechanical erector.

Baseplates shall have permanently bolted on adjusting shims (at least 10 mm thick) for aligning the equipment.

5.0

### **BOLTS AND BOLTING**

The following standards shall apply :-  
SABS 135, SABS 136, SABS 094.

#### **General**

Where design necessitates, fitted bolts shall be used.

"Black" bolts grade 4.6 are preferred for mechanical equipment but in the event of higher grade bolts being required grade 8.8 may be used.

**Before assembly all bolts shall be lubricated with P.T.F.E. oil.**

Unless specified otherwise bolts shall be tightened to the following torques.

BOLT SIZE	GR 4.6 TORQUE		GR 8.8 TORQUE	
	N.m.		N.m.	
	Lubr.	Dry	Lubr.	Dry
M6	2,5	4,1	6,5	11
M8	6	10	16	26
M10	12	20	31	52
M12	20	34	55	91
M14	32	54	87	145
M16	51	85	136	226
M20	99	165	265	441
M22	135	225	360	600
M24	172	286	458	763
M27	251	418	669	1115
M30	340	567	909	1515
M36	596	994	1588	2647
M42	953	1590	2540	4234

Bolts used for attaching mechanical equipment to structures shall be placed so that the nut is on the underside.

Where wing nuts are used for attaching guards etc. the thread shall be minimum 12 mm diameter. Seats for bolt heads or nuts shall be smooth, flat and at right angle to the bolt axis.

The seating for bolts on castings shall be spot faced or machined.

Bolt lengths shall be chosen so that a minimum of 2 threads and maximum of 5 threads shall project beyond the nut.

Overlong bolts shall not have more than one washer used under head or nut to take up excess shank length.

All bolts screwed into tapped holes shall have their heads drilled for wiring by means of stainless steel wire to prevent loosening, or alternatively be secured by tab washers.

Where bolts are subject to vibration the nut shall be prevented from loosening by means of slotted or castle nuts and split pin, or by proprietary deformed nuts, or nylon locking element, or locknuts. Spring washers on their own are not acceptable.

### **Bolt Holes**

Bolt holes shall be drilled so that when the item being affixed is placed in position the bolt will pass through it at a right angle. A tolerance of 2° from the true axis will be permitted for "black" bolts and 1° for H.T. bolts or High Strength Friction Grip (HSFG) bolts. The bolt holes can be marked off from the mechanical item but it shall be removed when drilling in order to prevent damaging it or enlarging its bolt hole.

In no circumstances will it be permitted to ream through to correct an "out of line" bolt hole unless "fitted bolts" are specified.

"Fitted" bolts - the diameter of the hole with its tolerance is to be as stated on the drawing which shall specify:- tolerance, reaming, reaming method, squareness, and tightening torque.

Other bolts - black or HSFG - Final hole size shall be :-

6 mm to 10 mm	- bolt dia. + 1,5 mm
above 10 mm to 16 mm	- bolt dia. + 2,0 mm
above 16 mm	- bolt dia. + 2,5 mm

### **Tapped Holes**

Tapped holes shall be drilled to provide at least 80% of full thread.

They shall be threaded to a depth of at least twice the thread diameter.

### **Washers**

A hardened steel washer shall be placed on each bolt underneath the element being tightened.

Taper washers of the correct angle shall be fitted if bolts pass through taper flange beam, joists etc. Maximum misalignment of face against which bolt head or nut tightens shall be 0,5°.

All bolts through slotted holes shall have a large (at least 2 x slot width) thick (at least 0,5 x bolt dia.) square washer which covers the slot, both in width and length.

6.0

### **GREASE NIPPLES**

The following standards shall apply :-  
BS 1486 - Lubricating Nipples.

The following sizes of grease nipples shall be used for all equipment :  
Type 11B, 1/8 inch B.S.P. (BS 1486 Part 1) or  
Type 21A, 1/4 inch B.S.P. (BS 1486 Part 2) or  
Type 21B, 3/8 inch B.S.P. (BS 1486 Part 2)  
Material - Stainless Steel.

Note: Foskor to confirm type required.

Grease nipples shall be positioned so that they are easily accessible. If necessary they shall be grouped or have extended lines for improved access. Extended lines shall be 3 mm stainless steel tube with stainless steel fittings.

Their location shall be prominently displayed on drawings and maintenance manuals. On equipment they shall be highlighted by painting a red circle of 50 mm diameter around them.

7.0

### **GUARDS**

All moving, rotating, or reciprocating machinery in dangerous or potentially dangerous situations, shall be guarded against free access by barriers or guards in accordance with the following requirements.

Occupational Health and Safety Act No. 85 of 1993, NOSA Data 2.11.04, NOSA Data 2.11.01. BS.5304.

Guards shall be made of carbon steel plate unless their size makes this uneconomical, and shall be made of solid material unless visibility is a requirement. They shall be fitted with gates or doors where frequent access is required for machinery maintenance or inspection and shall be mechanically or electrically interlocked to ensure that the machine cannot be set in motion when the gate is open. Access to lubrication points shall be arranged so that guards do not have to be removed.

Adjustment of pulleys, take up's, and the like, shall be possible without the removal of guards.

Guards shall be easily removable by being mounted on pins or hinges. They shall be made so that one man can lift them from the normal access position. To achieve this it may be necessary to make the guard of several interlocking sections. Guard shall be strong enough to withstand the impact of a broken belt or the weight of a man standing on the guard.

Where guards are required to provide air circulation, or visibility of moving parts, rods, bars, mesh, or expanded metal may be used. Rods or bars shall be fitted parallel to the direction of movement.

Fencing of machinery areas may be provided in lieu of individual guarding, but only when such machinery operates as a single unit and access to the area is provided with a lock up gate. The height of the fencing shall be at least 2.4 m.

In addition to adequate guarding the positioning of starting devices remote from the machine, or automatic devices to sweep the operators hands away from the machine, or automatic feeding to make it unnecessary for the operators to approach the machine, shall be considered. Colour coding on guards and safety doors shall be in accordance with MC 001

## 8.0 **NOISE**

### a) **External Equipment**

All equipment external to buildings shall not exceed 85 dB(A) at 1m. This shall include but not be limited to, such items as Ducting, Turbines, Air Intakes for Blower/Fans/Compressors.

### b) **Absolute Limit**

All equipment shall be limited to an instantaneous peak sound pressure of 20 Pa (120 dB) at 1 m under any operating condition. This shall include, but not be limited to, such items as Pneumatic System exhausts and gas pressure relief systems.

## 9.0 **IDENTIFICATION LABELS**

It is the Vendor's responsibility to attach one identification label to each item of equipment supplied.

The material for each label shall be stainless steel, 1 mm thick.

The appropriate Foskor Equipment number, and direction of rotation, for rotating equipment, shall be permanently marked on each label i.e. engraved or stamped with 10 mm high characters.

The labels shall be permanently attached i.e. tack welded or screwed (stainless steel self tapping screws are acceptable).

## 10.0 **MANHOLES**

Where applicable, access to a manhole shall not be by cat ladder only. An access platform at the manhole shall be provided. All manholes shall have a minimum diameter of 500 mm.

Hinges or davits shall be provided for manhole covers.

Inspection doors for equipment handling dusty materials shall be dustproof.

Inspection doors for pipes or chutes shall be of a sufficient size to facilitate the de-clogging operation.

11.0

**LUBRICATION**

Lubricators/grease points shall be placed in common easily accessible places. For hooded equipment (sound insulation hood or other), the lubrication points shall be placed outside the hood.

Any 2 or more parts which move relative to each other shall be lubricated unless they are specially designed to be "dry". It shall be possible to re-lubricate at regular intervals. Where "lubricated for life" components are used the loads and life shall be specified and shall be agreed to by Foskor in writing.

Lubrication can be by oil or grease. The type shall be given and the details shall be stated i.e. viscosity, additives, flash point, base, etc. The frequency of re-lubrication shall be stated and shall not have to be interpreted from a general catalogue. It shall be the responsibility of the Vendor to provide this and failures due to inadequate information shall be to his account.

Containers of lubricant oil or grease shall not be opened or left exposed in a room or area in which grinding of any kind, shot blasting or spray painting, is taking place.

All lubrication points shall be marked on a General Arrangement drawing which clearly identifies them with full details of type and frequency of lubrication.

All lubrication points, filler caps, grease nipples etc. shall be identified on the equipment by a red band or circle at least 50 mm wide.

Greases and oils used, must be to the plant standards system, unless specifically approved otherwise by Foskor.





FOSKOR LIMITED

# ENGINEERING SPECIFICATION

DOC NO: GM 3  
REVISION: 7  
NOSA REF: ALL  
ISO 9001 REF: 7.1  
ISO 14001 REF: 4.4.6

**TITLE: SURFACE PREPARATION AND PROTECTION SPECIFICATION: PAINT**

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**REVISIONS**

PARAGRAPH	REVISION	CHANGE	DATE
All	7	Total review of specification	09/04/03

**ENDORSEMENT**

	DESIGNATION	DATE	SIGNATURE & PERSONNEL NUMBER
COMPILED BY			
APPROVED BY			

## **1. INTRODUCTION AND SCOPE**

### **1.1 SPECIFICATION NAME**

This specification shall be called:

#### **GENERAL ENGINEERING SPECIFICATION**

GM-3 Revision 7

Foskor Surface Protection System - FSPS

It specifies the surface preparation, painting and surface protection requirements for new and maintenance applications

### **1.2 SCOPE OF THIS SPECIFICATION**

The specification consists of 2 documents:

PART A - Explanatory Document

PART B - User Specification Document

Each part has its own main function, but in all contracting applications they must be used in conjunction together as one integrated document.

#### **1.2.1 Explanatory Document – Part A**

This document contains contracting issues and background detail for the use of the specification. The content of Part A is:

The name and scope of the specification;  
The background of the specification;  
The environment at Foskor;  
The surface types to be protected;  
Quality assurance issues;  
Contractor requirements;  
Surface preparation details;  
Supplier details.

#### **1.2.2 User Specification Document - Part B**

This document is an easy retrieval system for finding the correct specification for the required surface. It contains:

Tabular format of a protective coating specification codes in matrixes;  
Protective Coating specification with suitable suppliers and products (C- Codes).

### 1.3 DEFINITIONS & ABBREVIATIONS

The following terms are defined as applied in the specification and will be relevant to any contractual documentation between Foskor and any potential supplier or applicator of surface protection systems.

Approved	Approved in writing by the Foskor Support Services Engineer or FQCR for the project.
Approved coatings	A coating product that is specified in this specification or that has been evaluated and approved by the Foskor Support Services Engineer.
Coat	A film of product applied to a substrate to provide corrosion protection.
Contractor Site Manager (CSM)	The person appointed to manage the project on behalf of the contractor on the Foskor project.
Dry Film Thickness (DFT)	The thickness of coat of paint, when cured.
Foskor Quality Control Representative (FQCR)	A person appointed on Foskor's behalf to a specific project to audit quality of the system being applied.
FSPS	Foskor Surface Protection System, in accordance with the specification.
Shop	The physical location of a contractor's business, not located on Foskor property.
Site	A location on Foskor property where performances of the Foskor contract can be executed.
Stripe coat	A coat applied to edges of steelwork.
This (or The) Specification	The Foskor GENERAL ENGINEERING SPECIFICATION GM-3
Wet Film Thickness (WFT)	The thickness of one coat of paint at the time of application.
SHEQ	Safety, Health, Environment & Quality

### 1.4 LIST OF APPLICABLE AND RELATED DOCUMENTS

Act 29 of 1996	Mines Health and Safety Act.
FOSKOR SHEQ Compendium GV1	Set of documents reflecting Foskor Standards with regard to SHEQ General Engineering Specification-Mine Health & Safety Act for Contractors and Consultants.
ISO 8501-1	Pictorial surface preparation standards for painting steel surfaces (Formally SIS 05 5900 - Swedish Standards)
ISO 9000/1/4:2000	International Quality Management System (former SABS 0157)
SABS 064:1960	The preparation of steel surfaces for coating

SABS 630:1972	High gloss enamel.
SABS 681:1972	Undercoats for paints.
SABS 673 :1976	Mixtures of copper-chromium-arsenic compounds for timber preservation.
SABS 901:1973	Paint and Varnish Brushes (flat type)
SABS SM 141:1975	DFT of paint coatings by means of Electromagnetic or Eddy current type gauges.
SABS/ISO 2808:1991	Profile of blast cleaning steel surfaces for painting.

NOTE: The requirements of this specification shall take precedence over all the above documents; except for Acts of the Government of South Africa.

#### **1.5 USE OF THE SPECIFICATION**

This specification deals with the protection of the following surfaces for both new and maintenance applications:

Steel (piping and plate work) Surfaces  
Galvanised Sheeting (including waterproofing)  
Concrete and Plaster surfaces  
Mechanical and Electrical equipment  
Interior of Potable Water Pipe Lines

#### **1.6 USE OF THE SPECIFICATION**

This document will be used by:

- a. Foskor Designers;
- b. Foskor Purchasing Department;
- c. Foskor Support Services
- d. Foskor Quality Assurance Representative;
- e. Foskor Maintenance Departments;
- f. Contractors to Foskor.
- g. Foskor Contracts Department.

Each will use it for his own specific needs.

These tables/matrixes list of the plant together with applicable surface preparation and coating specifications, for both new and maintenance surfaces.

The tables are used as the access point to all specific FSPS systems.

## **2. PART A: QUALITY CONTROL AND ASSURANCE**

### **2.1 SCOPE OF QUALITY REQUIREMENTS**

The broader umbrella of the quality management as regards the requirements of Foskor project management and the Contractor site manager will be developed from ISO 9000/1/2/3/4 standards, with specific emphasis on ISO 9001/1/4. Only certain issues will be extracted here, but total quality management approach is required. It would be ideal if it were possible that all coating suppliers and applicators were registered for ISO 9000. Foskor nevertheless aim at coercing potential suppliers and applicators for major and important surface protection projects to become registered if they wish to contract with Foskor in the long term.

The scope of quality control and assurance covered in this document is:

The FQCR;  
The Quality Plan;  
Quality and Guarantees.

### **2.2 THE FOSKOR QUALITY CONTROL REPRESENTATIVE - FQCR**

When a project for corrosion protection is defined Foskor will appoint an officer responsible for the task. This person will be responsible for all issues in the execution of the project, including Quality. As such he is the designated FQCR. He may delegate this function to an appointed FQCR.

The function of the FQCR is to ensure that the quality of the finished project meets the specified requirements, involving planning, organising, leading and controlling.

### **2.3 THE QUALITY PLAN**

A quality plan is required from any successful tenderer before he may commence work on a Foskor project.

When a tender has been conditionally awarded (on condition of an acceptable Quality Plan the FQCR assigned to the project will meet with the contractor to develop and accept a quality plan that meets the requirements of this specific project.

Foskor must approve the QUALITY PLAN before the contractor comes onto site, award of contract or approval to commence work.

The Quality Plan will consist of a set of documents prepared by the tenderer and is to include the following five components:

- (i) Specifications for each surface;
- (ii) Contract staffing;
- (iii) Project schedule, inspection and budget activities;
- (iv) Nominated person responsible for the weekly progress report.
- (v) Programme

### 2.3.1 **Specifications Agreement**

The specification for surface preparation and protective coatings as specified in the Request to Tender need to be confirmed and formally documented and signed.

This section implies agreement by the contractor to meet quality requirements for surface preparation and application of the protection coatings.

### 2.3.2 **Materials Issues**

The contractor will specify at the tender stage the material supplier and products to be used.

The method of certifying receipt and quality of materials will be specified, including suppliers batching certificate, ensuring tractability of any product.

The contractor will specify how he will store and control material on site.

### 2.3.3 **Contract Staffing**

The names and relevant experience of the Contractor Site Manager (CSM), and approved qualified operators and labourers will be specified. (Changes will be by approval of the FQCR in advance of the event).

The Contractor Site Manager will attend a Foskor General Plant Supervisors course and a copy of his certificate will be handed in at Foskor Support Services prior to commencing work on Foskor site.

The contractor will have an acceptable number of qualified operators on the job.

A nominated person shall always be in charge of the workers and site in the absence of the CSQM. The FQCR shall always be informed of changes of control in advance.

The contractor will comply with the Foskor SHEQ Procedures as documented. Particular attention shall be paid to safety, cleanliness, hygiene, ablution and environmental factors. The MHS Act shall obviously apply.

The FQCR is entitled to veto any person from working on the project if he can satisfy the Foskor Head of Support Services as to just cause. Such a step will be communicated to the CSM in writing, but the reason need not be divulged to the contractor.

The CSM will be the Contractors official communications person on site.

### 2.3.5 **Project Schedule**

A project schedule shall be supplied by the contractor indicating:

- a) When he is to establish on site
- b) When he will tackle each area of the project
- c) How long he will be on each section
- d) When each stage of the project will be ready for inspection by the FQCR
- e) At what milestone (actual sections of work 100% complete) date he will be requesting payment. It is to be noted that the date will not imply right of payment, but actual approved completion of that section of work is the criterion for right of payment.

The project schedule must meet Foskor operational and policy requirements before the FQCR will accept it or the quality control plan (QCP).

### **2.3.6 Format of Weekly Progress Report and Communication Requirements**

The contractor for approval signature by the FQCR will compile a weekly progress report, relating to the project schedule. On this report a provision is required for material suppliers representative to make comments relevant to their guarantee. This report is not a progress certificate for payment authority, but serves as the official summary of project highlights. The FQCR requires a copy. The onus for keeping the signed copy rests with the contractor.

The Quality Plan must specify the time and day of the weekly site meeting where CSM and FQCR can discuss and approve this report.

It is essential that the contractor keep a signed record of all inclement weather or conditions affecting his progress on the project.

The contractor will keep an official diary and shall communicate in writing timeously all problems, additions and requirements to the FQCR.

Prior to a pending inspection the CSM will fill in a "Request for Inspection" form (RFI) available from the FQCR. This form will indicate the specific inspection required and will imply that the CSM has already inspected the work himself and has satisfied himself that the work is to standard. The CSM shall under no circumstances waste the time of the FQCR with unprepared inspections. The FQCR or material supplier may nevertheless do unannounced inspections to suit their own needs. Environment & Quality as well as Loss Control will also do inspections.

The format of the weekly report and agreement to compliance with the communication requirements will be part 5 of the Quality Plan.

## **2.4 GUARANTEES FROM CONTRACTORS**

The contractor who receives the order for the execution of work in respect of this specification will be responsible and accountable for all guarantees and quality of work. The contractor will be required to have guarantees underwritten by the approved supplier of the material for the execution of the work in respect of this specification. The contractor will be required to have guarantees underwritten by the approved supply company. These guarantees are based on a 5-year period with a degree of rusting measured in accordance to ISO 4628/3 ASTM D 610 Re 2. Any disputes over preparation, problems, and application methods of any nature shall be settled between the contractor and the supplier, at no inconvenience (or cost) to Foskor. (Site management matters remain between the contractor and Foskor.

## **2.5 GUARANTEES FROM SUPPLIERS**

The coating or material supplier needs to indicate life expectancies for his products in the specified system. Such estimates will have been used in analysing the life cycle cost of the protection system for the specific surface. Hence tenderers are bound to stick to agreed system when tenders are awarded.

## **2.6 SUPPLIER GUARANTEES**

The following are the indicators of the scope of guarantee by the approved suppliers (see list in paragraph 4.5). It is to be noted that suppliers may also tender and thus possibly be the contractor.

### **2.6.1 Stoncor Africa (Pty) Ltd**

The coating system will be guaranteed for the prescribed system for a specified period subject to:

- a) The right to propose at the tender stage, a contractor who is to apply their products. (Foskor approved preferential application contractors)
- b) Access at all times to the site where preparation and application are being done. Any irregularity that has an effect on the suppliers guarantee will be noted in the weekly progress report. If such irregularity is not included in the weekly report (in the week of the problem occurring), it shall be deemed not to have occurred and the guarantee shall remain in tact.
- c) The system as specified in the specification must be applied to the letter. Stoncor Africa retains the right to insist on re-work at contractors cost if not satisfied with preparation or application by contractor.
- d) The cost of re-work, wastage or discrepancies is for the account of the contractor, at no inconvenience or negative impact to the programme or cost to Foskor.
- e) Maintenance of mechanical damage.

### **2.6.2 Sigma (Pty) Ltd**

- a) The right to propose at the tender stage, a contractor who is to apply their products. (Foskor approved preferential application contractors)
- b) Access at all times to the site where preparation and application are being done, Any irregularity that has an effect on the suppliers guarantee will be noted in the weekly progress report. If such irregularity is not included in the weekly report (in the week of the problem occurring), it shall be deemed not to have occurred and the guarantee shall remain in tact.
- c) The coating system as specified in the specification must be applied to the letter. Sigma retains the right to insist on re-work if not satisfied with preparation or application by contractor.
- d) The cost of re-work, wastage or discrepancies is for the account of the contractor, at no inconvenience negative impact to the programme or cost to Foskor.
- e) The right to inspect a plant after commissioning. Damage to surface coatings to be made good in less than 2 months.
- f) The right to do 6 monthly inspections and require mechanical damage to be made good in less than 2 months.
- g) Excluding change in condition in the plant, which results, is an increase in the aggression of the environment.
- h) Individual guarantees

### **2.6.3 O'Grady Coatings Manufacturers (Pty) Ltd**

The coating system will be guaranteed for the prescribed period subject to:

- a) The signing of a mutually agreed contractual document between Foskor and O'Grady Coatings Manufacturers including details of the job and its environment, such as, but not limited to:

- b) Environmental factors;
- c) Contractors appointment;
- d) Site and inspection access; etc.
- e) Maintenance of mechanical damage.

**2.7 FORMS**

These are to be designed by the contractor to the satisfaction of the FQCR, in accordance with the requirement of the quality plan.

**SUPPLIERS DATA CERTIFICATE**

Supplier: **STONCOR AFRICA (Pty) Ltd**

On behalf of STONCOR AFRICA (Pty) Ltd, I \_\_\_\_\_ the \_\_\_\_\_ of Stoncor Africa, confirm that the products and system specified in this GM-3 specification, Revision 7, as from Stoncor Africa, will serve the defined protective purpose for each specified application.

\_\_\_\_\_  
STONCOR AFRICA (Pty) Ltd

Supplier: **O'GRADY COATINGS MANUFACTURERS (Pty) Ltd**

On behalf of O'GRADY COATINGS MANUFACTURERS (Pty) Ltd, I \_\_\_\_\_ the \_\_\_\_\_ of O'Grady Coatings Manufacturers, confirm that the products and system specified in this GM-3 specification, Revision 7, as from O'Grady Coatings Manufacturers, will serve the defined protective purpose for each specified application.

\_\_\_\_\_  
O'GRADY COATINGS MANUFACTURERS (Pty) Ltd

Supplier: **SIGMA (Pty) Ltd**

On behalf of SIGMA (Pty) Ltd, I \_\_\_\_\_ the \_\_\_\_\_ of Sigma, confirm that the products and system specified in this GM-3 specification, Revision 7, as from Sigma, will serve the defined protective purpose for each specified application.

\_\_\_\_\_  
SIGMA (Pty) Ltd

### **3. SURFACE PREPARATION**

#### **3.1 INTRODUCTION**

This chapter outlines the general principles to be applied for the surface preparation in accordance with the detailed specification as given in this document. These general principles are to be seen as an essential part of the specifications. Should they appear to contradict each other, the FQCR shall provide written clarity to the contractor within 24 hours of being requested to do so. The onus of obtaining clarity is on the contractor.

The Support Services Office will subsequently investigate such cases of contradiction and if so required suitable amendments will to be made to this specification.

This chapter contains four parts:

- The Definition of Surface Preparation as applied;
- The Format of the Surface Preparation Specifications;
- Description and Detail of Preparation Methods;
- Details of Neutralising solution, Foskor specific.

This chapter is the preamble to all the surface preparation specification in Part B.

#### **3.2 SURFACE PREPARATION DEFINITION**

The surface is defined as PREPARED when:

“All dirt, grease, oil, chemicals (including salts); loose surface and or foreign material (including previous paint or other coatings), and rust, have been removed from the surface to be coated so that the specified coating can be applied without any risk of chemical or mechanical failure. “This shall be to the specified requirement per the ISO 1805-1 definitions for the surface specification in question.

#### **3.3 DESCRIPTION AND DETAILS OF PREPARATION METHODS**

##### **3.3.1 Overview**

This sub-paragraph deals with specific preparation methods and their detailed requirements. The following specific methods are explained in detail for contractor's application:

- A. General
- B. Degrease
- C. Neutralise
- D. Wash & Dry
- E. Mechanically clean
- F. Blast Clean
- G. Acids Etch
- H. Acid Pickle

## I. Bonding/Adhesion test

### 3.3.2 (A) General

- a) In all cases where different steps are to be carried out, the steps shall be carried out in the following sequence:
- Degrease
  - Neutralise
  - Wash & Dry
  - Mechanically clean
  - Blast clean
- b) All areas (mechanical and Electrical) not to be prepared for coating will be effectively screened at the contractors cost and masked so as to prevent any damage to Foskor property.
- c) In highly chemical corrosive environments (specifically Gaseous) the FQCR may prescribe intercoat washing requirements for in site work.
- d) All new steel shall have:
- All mill scale removed to the prescribed Swedish Standards by blast cleaning before any coatings may be applied.
  - All sharp edges dressed to a radius of not less than 2mm.
  - All burrs, rags and weld spatter removed (also applies to steel being maintained).
- e) All surfaces shall be dry before preparation is technically complete (water based coatings are excluded from this requirement).
- f) The primer coat shall be applied within 4 hours after completion of the preparation of the specific area in question. (Excluding areas to be welded after painting).

### 3.3.3 (B) Degrease

Where degreasing is specified, it implies the washing down of the surface with a suitable solvent or detergent, immediately followed by washing, or neutralising. Application of the degreasing liquid shall be by brush or broom with bristles.

### 3.3.4 (C) Neutralise

Where corrosive acids, alkalis or residual salts are present on the surface being prepared shall be neutralised using suitable neutralising solutions. A list of Foskor approved neutralising solutions is given in paragraph 3.5.

Washing shall immediately follow neutralising.

Application of the neutralising solution shall be by brush or broom with bristles.

### **3.3.5 (D) Wash**

The surface must be washed down with bristle brushes or brooms; practical a high-pressure water gun with a min pressure of 300 Bar is to be used.

### **3.3.6 (E) Mechanically Clean**

- a) Remove all traces of loose rust, loose mill scale, corrosion products, old flaking paint, general surface contaminant by using:

Mechanical wire brushing; (using brushes with bristle material compatible with the surface to be cleaned).

Needle descaling; and/or Angle Grinder where approved/required by FQCR; and/or sand paper in order to provide the specified surface finish in accordance with the specification.

- b) Blast cleaning shall be done in accordance with the ISO 1805-1 standard (formerly Swedish code of Practice SIS 05 5900). Abrasives used shall comply with SABS 064:1980 (Clause 4.3). The supplier shall certify blasting material supplied as conforming to the required specifications. The certification shall be the responsibility of the Foskor contractor.
- c) The FQCR shall designate an area where blast cleaning shall be carried out.
- d) Blasting can only be carried out after obtaining environmental clearance.

### **3.3.7 (G) Acid Etch**

- a) Remove all dirt and foreign matter from concrete floor by sweeping with a broom and chiselling unwanted matter away.
- b) Apply a solution of hydrochloric acid and water on the surface, using bristle brooms (resistant to HCl).
- c) Control run-off acid with sawdust.
- d) Wash copiously to remove all acid.

### **3.3.8 (H) Acid Pickling**

- a) Degrease and mechanically clean items first
- b) Use procedures and controls as recommended by suppliers of the pickling agent.
- c) Wash and dry thoroughly
- d) Adhere to time restraints prescribed between pickling and coating application.
- e) All fluids used are to be disposed after use in accordance with environmental procedure.

### **3.3.9 (I) Bonding/Adhesion Test**

Before preparing can be considered as complete, it is necessary to know whether the first coat to be applied from the specific coating system will bond and adhere to the prepared surface adequately. This is done in advance of the general preparation operation, by preparing and coating a test portion of the surface, to the specification requirements. Where the test is not satisfactory after a 48 hour curing period, the supplier of the system to be applied will be approached for a remedial solution. This may imply additional preparation.

This is especially required where the specification of the old protective coating is unknown.

### 3.4 NEUTRALISING SOLUTION FOR FOSKOR CHEMICALS

Where chemicals are part of the every day process, it is essential to clean the surface effectively, so that the chemical residue will not adversely effect the new coatings. When tendering for surface protection system it is essential that the application contractor is aware of the specific process in the immediate vicinity of the job. He can then effectively cost the required neutralising chemicals required.

The various chemicals used at Foskor are listed below together with the suitable neutralising liquid.

Substance	Symbol	Neutralising	Solution
Hydrochloric Acid	HCl	Conc.	Water
Nitric Acid	HNO <sub>3</sub>	Conc.	Water
Nitrogen oxide	NO		Water
Nitrogen dioxide	NO <sub>2</sub>		Water
Sulphuric Acid	H <sub>2</sub> SO <sub>4</sub>	Conc.	Water
Sulphur dioxide	SO <sub>2</sub>		Water
Fatty Acid (chain)		20% Teepol sol. in Ehtanol	
TEB			Water
PGE			Water
Caustic Soda			Water
Water glass	NaSiO <sub>2</sub>		Water
Ammonium	NH <sub>4</sub> FHF		Water
Neg Fluoride ions	F-		Much Water
Zanthate		20% Teepol sol. in Ehtanol	
Various Flocculants			Not required

## **4. COATING SYSTEM AND APPLICATIONS**

### **4.1 INTRODUCTION**

This chapter outlines the general principle applicable to coating systems and their application. The detailed coating specifications and applicable products are given in Table B on this specification.

These general principles are to be seen as an essential part of the specifications. Should there be ambiguity between any requirements of this document, the FQCR shall provide written clarity to the contractor within 24 hours of being requested to do so in writing. The onus of obtaining clarity is on the contractor.

The Support Services Office will subsequently investigate such cases of contradiction and suitable amendments are to be made to this specification.

This chapter contains four parts:

- The Definition of Surface protection System as applied;
- The format of the (Protection System Specification;
- Description and Detail of Application Methods
- Detail of Approved manufacturers

This chapter is the preamble to the surface protection coating specification ("C" codes) in Part B.

### **4.2 SURFACE PROTECTION SYSTEM DEFINITION**

The surface is defined as PROTECTED when the coating system has been applied in accordance with this specification.

### **4.3 FORMAT OF SURFACE PROTECTION SYSTEM SPECIFICATION**

The specification matrices given as Table B of this specification list, a column called "Surface Coating Specification".

To find the correct specification and use it, the following steps are necessary:

- Find the plant and type of equipment applicable in Table A;
- Note the coating code;
- Refer to the coating application and product details in the specific coating specification in Part B.
- Read the requirement, with reference to application methods in paragraph 4.4 of this chapter. The product data sheet forms an integral part of the specific specification.
- Do the Specific work.

#### **4.4 DESCRIPTION AND DETAIL OF COATING SYSTEM APPLICATION**

##### **4.4.1 Overview**

This sub-paragraph deals with specific application methods, and their detailed requirement. The following specific methods are explained in detail for contractor's application:

- a) General
- b) Coating Thickness Measurement
- c) Masking, Taping and Protection
- d) Primer Application
- e) Patch Primer
- f) Waterproof
- g) High Build or Intermediate Coat
- h) Top or Final Coat
- i) Holiday Detection

##### **4.4.2 (A) General**

- a) No coating shall be applied over any surface containing traces of grit, grease, oil, loose rust or mill-scale. All surfaces shall be passed as "prepared in accordance with the Foskor specification" by the FQCR before any coating may be applied.
- b) Surface to be coated shall be dry. Coating may not be applied with the humidity above 85%.
- c) Coatings shall not be applied when air temperature is below 5°C or when the steel surface to be coated is hotter than 52°C.
- d) Except otherwise stipulated, all specified coating materials shall be supplied by the contractor. The contractor will plan the required quantities.
- e) Coatings shall be applied smoothly and evenly either by brush or spray, with no sags, runs or other paint defects. Cutting-in may not be done by freehand methods and should follow relief of the mechanical details of the surface where possible. (A darker colour is always to cut in over a lighter colour).
- f) All coatings shall be thoroughly mixed before use, using a flat bladed spatula, or an approved, properly designed paint stirrer on an electric drill. It will also be agitated often enough during application to keep pigments and ingredients in suspension.

- g) All edges, corners, boltholes and cut ends, which are to be painted, shall receive the recommended DFT. All welds and site modifications shall be effectively striped, to ensure full surface protection.
- h) All brushes and rollers used shall be suitable for the specific purpose, and in accordance with SABS 901.
- i) Spray equipment used shall be suitable for high quality work, be maintained and protected as prescribed by the manufacturers, with suitable pressure regulator and gauges. Experienced operators will be used only. Nozzles, air caps and needles shall be those as prescribed by the manufacturer of the coating being sprayed.
- j) Coating manufacturers recommendations, per product data sheets, with respect to over coating times, curing cycles and any other application/technical requirement shall be strictly adhered to.
- k) Approval, in writing shall be obtained from the FQCR before any deviations from preparation, coating or general specification will be allowed.
- l) No coatings or thinners may be watered down or diluted without the written permission of the FQCR, except where a specification expressly required it.
- m) Only the specified manufacturers products may be used, and no manufacturers system shall be mixed by using different coats or coatings from different manufacturers unless compatibility is certified by the manufacturers.

#### 4.4.3 (B) Coating Thickness Measurement

Coating shall be applied to recommended (data sheet and specification) WFT, in order to ensure the required DFT is achieved. (Measurements done at the WFT stage will prevent embarrassment at the DFT stage).

The DFT measurements done at FQCR inspection phase will only pass if at least 90% of readings (DFT) done exceed the minimum recommended DFT. Only approved and recognised DFT testing methods will be taken into account. (Such as SABS method 151).

#### 4.4.4 (C) Masking Taping and Protection

All areas equipment, nameplates etc. that are not to be coated, shall be suitably protected by means of drop sheets, taping, masking, wrapping or other suitable means. These are to be supplied at the contractors cost.

#### 4.4.5 (D) Primer Application

Within 4 hours of the completion of the surface preparation of a specific area, crevice filling will be done, the primer coat as specified will be applied by Airless Spray, Conventional Spray or brush as approved by the manufacturers of the prime coat. DFT shall be to

specified requirement. Crevice filling after construction will be done before applying final coat.

#### 4.4.6 **(E) Patch Prime**

As for Primer Application above, Patch Prime to be applied only to prepared areas of the surface. Damage during transportation or erection or, where specified in the tender request.

#### 4.4.7 **(F) Waterproof**

In the case of galvanised sheeting, steel fittings and to a degree concrete roof type surfaces where a part of the objective is waterproofing, the following procedures are to be carried out. (For concrete ignore reference to fasteners and rust).

- a) All roof or sheet fasteners, ridge caps and flashing are to be tightened and secured or replaced as required, prior to applying the waterproofing coating.
- b) After a rust inhibiting primer (or for concrete a suitable bonding primer) has been applied to the surface in question, all potential leaks or holes are to be covered with a specified waterproofing coating, reinforced by a fibre matting or other suitable material. Where holes are greater than 5mm diameter, or where cracks are found, it is essential to ensure thorough soaking of reinforcing material with the waterproofing coating.

#### 4.4.8 **(G) High Build or Intermediate Coat**

- a) Allow the specified drying time for the previous coat.
- b) Apply the intermediate or high build coat(s) to manufacturers technical specifications. This applies to drying time, curing time, application mode and DFT.

#### 4.4.9 **(H) Top of Final Coat**

- a) Allow the specified drying time for the previous coat.
- b) Apply the final or topcoat to manufacturers technical specifications. This, amongst other requirements, specifically applies to drying time, curing time, application mode and DFT.

#### 4.4.10 **(I) Holiday Detection**

- a) All surfaces will be inspected after each coating application for holidays and if located shall be made good by the contractor, prior to continuing with new coatings.
- b) Where pipes are to be lined internally, the contractor shall specify a suitable holiday detection method at time of tendering.

#### **4.5 DETAIL OF APPROVED MANUFACTURERS**

Only those products, relating to their specific manufacturers, listed for each specification in Part B coating specification will be considered for tendering purpose. If a product or manufacturer, other than these, is to be proposed, the proposer will be required to satisfy Foskor, or their agents, at no cost to Foskor, in advance of tendering, as to the applicability, quality and guarantee of such products. Should such an application be successful, the additional products may be added to the specification list.

The current approved manufacturers are:

**Stoncor Africa (Pty) Ltd**, Chloorkop

Phone (011) 254-5500 Fax: (011) 310-1847

**O'Grady Coating Manufacturers (Pty) Ltd**, Mpumalanga

Phone: (013) 246 2570 Fax: (013) 246 2573 (Orders)  
(013) 246 1797 (Admin)

**Sigma (Pty) Ltd**, Alrode

Phone: (011) 861-1000 Fax: (011) 905-5202

#### **5. CONTRACTOR REQUIREMENTS**

##### **5.1 INTRODUCTION**

This chapter outlines the minimum general requirements expected of any contractor to Foskor on surface protection system projects.

It is expected that the contractor be a professional in his field and is fully au fait with the equipment, surface preparation, application techniques, suppliers, site control, material control and product requirements. His staff shall be qualified to the required levels of operation and be competent.

##### **5.2 SYSTEM AND SPECIFICATION KNOWLEDGE**

The contractor shall study this GM3 specification to the point that he will be able to fully comply with all aspects, before a tender is submitted. The contractor will take special note of approved suppliers and their product data sheets.

##### **5.3 QUALITY REQUIREMENT**

Chapter 2 of this specification gives the minimum requirements for total management of a Foskor surface protection project, with special reference to the need for a Quality Plan.

##### **5.4 SHEQ AND SAFETY**

The contractor shall comply with the requirements of the Mines Health and Safety Act 29/1996 as amended from time to time; Foskor Sheq Cop's as found in the Foskor SHEQ Procedure manual. Special notice shall be taken of the following:

1. The contractor shall erect a standard contractors board on the premises. (Drawing 65-152 from Foskor Drawing Office).
2. The contractor shall supply all safety equipment, portable fire extinguishers, first aid boxes and safety signs.
3. The contractor as applicable shall provide adequate ventilation.
4. No coating shall be done adjacent to fire hazards such as welding.
5. Oily or solvent rags are kept to a minimum and in closed containers.
6. Any volatile spillage shall be wiped up immediately, or reported for investigation and cleanup purposes.
7. Scaffolds and rigging shall meet safety specifications.
8. All waste and empty containers shall be removed from site on a regular basis. No waste burning shall be allowed on site.
9. Only grit blasting medium of the correct grade will be used.
10. The work area will be suitably protected to prevent injury to personnel.

**6. CONTRACTOR REQUIREMENTS**

**6.1 INTRODUCTION TO COLOUR CODES**

The colour codes required at Foskor are required for safety reasons and as such follow the NOSA proposals. Steelwork and plant shall be painted in accordance with SABS 0140 and 1091. Where these differ from colours already found in the plant, the FQCR must give a ruling in writing, at the written request of the contractor. The following colour proposals are the Foskor interpretation of the requirements.

**6.1.1 Safety Colours (C.O.P. 50)**

<b>RED</b>	Code A11	<ul style="list-style-type: none"> <li>a. Danger</li> <li>b. Fire protection equipment and apparatus other than fire extinguishers.</li> <li>c. Stopping device on electrical equipment as used for the control of machinery.</li> <li>d. Emergency devices for stopping machinery.</li> </ul>
<b>ORANGE</b>	Code B26	<ul style="list-style-type: none"> <li>a. Electrical switchgear. All electrical switchgear including motors (other than starting and stopping device and emergency stop controls).</li> <li>b. Electrical services. All conduit and allied fittings.</li> <li>c. Exposed and rotating machine parts. The inside surface of casings and guards of equipment and machinery constitute hazards. The surfaces of protruding shafts, faces of exposed gearwheels and any exposed rotation part of a machine.</li> <li>d. Chemicals (in piping). Describe the content by name, in full and the flow direction.</li> </ul>

<b>YELLOW</b>	Code B49	<ul style="list-style-type: none"> <li>a. Industrial locomotives and other forms of mobile equipment that may constitute a hazard.</li> <li>b. Barricades and temporary construction that define the limits of an area in which caution should be exercised.</li> <li>c. Low headroom caused by presence of structures, pipes etc.</li> <li>d. Crane beams and lifting hooks.</li> <li>e. Change in floor level and other similar tripping hazard.</li> <li>f. Demarcation of "no parking" areas, on the floors below fire equipment and electrical switchgear panels.</li> <li>g. Location of explosive substances.</li> <li>h. Rooms and areas where radioactive materials are stored or handles, or that has been contaminated with radio active material.</li> <li>i. Definition of walkways etc.</li> <li>j. Demarcation of clear areas.</li> <li>k. Cat ladder cage (horizontal straps), hand and knee rails.</li> <li>l. Handrail piping.</li> </ul>
<b>GREEN</b>	Code H29	<ul style="list-style-type: none"> <li>a. Location of safety and first aid equipment.</li> <li>b. Emergency exits and safety areas.</li> <li>c. Information signs.</li> <li>d. Starting devices on electrical equipment.</li> <li>e. Miscellaneous safe conditions.</li> <li>f. Industrial water.</li> <li>g. Outside of safety guards.</li> </ul>
	Code H10	<ul style="list-style-type: none"> <li>a. Gearboxes (speed reducers).</li> <li>b. Reclaimed water.</li> <li>c. Walkways on floors.</li> </ul>
	Code H65	<ul style="list-style-type: none"> <li>a. Drinking water.</li> </ul>
<b>BLUE</b>	Code E18	<ul style="list-style-type: none"> <li>a. Structural steel.</li> <li>b. Walkways on floors.</li> </ul>
	Code F29	<ul style="list-style-type: none"> <li>a. Instrumentation equipment.</li> </ul>
	Code F09	<ul style="list-style-type: none"> <li>a. High pressure gland water piping.</li> </ul>
<b>BROWN</b>	Code B13	<ul style="list-style-type: none"> <li>a. Oil</li> </ul>
<b>GREY</b>	Code E46	<ul style="list-style-type: none"> <li>a. Pulp tanks, pipes etc.</li> <li>b. Dust suppression ducting.</li> <li>c. Storage areas for material on floors.</li> <li>d. 11kV transformers and switchgear.</li> </ul>

<b>ALUMINIUM</b>	<ul style="list-style-type: none"> <li>a. Pulp and water pumps.</li> <li>b. Insulated steam piping.</li> <li>c. Insulated surfaces</li> <li>d. Hot air ducting and stacks.</li> <li>e. Crane rails.</li> <li>f. Sewer and drainage equipment and piping.</li> </ul>
<b>WHITE</b>	<ul style="list-style-type: none"> <li>a. Compressed air and vacuum equipment and piping.</li> </ul>

Complete coverage shall be effective with no undercoat flashing through on light colours.

**7. SURFACE AND COATING SPECIFICATION AS PER AREA**

**7.1 NEW AND MAINTENANCE PAINTING**

**TABLE A**

<b>1. MINING DEPARTMENT</b>	Mobile equipment; Haul trucks, Loaders, Cranes etc.	<b>C-01</b>
<b>2. PRIMARY CRUSHER</b>	Structural steel, Overhead Cranes, Feeders, Conveyors etc.	<b>C-02</b>
<b>3. PRIMARY AND SECONDARY ORE STOCKPILES</b>	Structural Steel, Reclaimers, Trippers etc.	<b>C-02</b>
<b>4. SECONDARY CRUSHERS</b>	Structural steel, Overhead cranes, Crusher, Chutes etc.	<b>C-02</b>
<b>5. CONVEYORS AND TRANSFER TOWERS</b>	Structural steel, Overhead cranes, Chutes, Idlers, Pulleys, Guards etc.	<b>C-02</b>
<b>6. MILL BUILDING</b>	Structural steel, Mills, Pipe supports, Sumps etc.	<b>C-02</b>
<b>7. G AND I BANK FLOTATION</b>	Structural steel, Sumps, Pipe supports etc.	<b>C-02</b>
	Flotation cells, Cells support steel (All damp areas)	<b>C-04</b>
<b>8. A-F BANK FLOTATION</b>	Structural steel, Sumps, Pipe supports etc.	<b>C-02</b>
	Flotation cells, Cells support steel (All damp areas)	<b>C-04</b>
<b>9. MAGNETIC SEPARATION PLANT</b>	Structural steel, Cranes, sumps etc.	<b>C-02</b>
	Separator launders and supporting steel (All damp areas)	<b>C-04</b>

10.	<b>PMC RECEIVING STATION AND CYFOS</b> Structural steel, cranes, sumps etc.	C-02
11.	<b>FILTER PLANT</b> Structural steel, Sumps, Cranes etc.	C-02
	Filter Structure and Filter Support Steel	C-04
12.	<b>BOSPOMPE</b> Structural steel, Mills, Sumps etc.	C-02
13.	<b>THICKENERS</b> Walkways, Bridges, Rakes etc.	C-04
14.	<b>DRYING OVENS</b> Structural steel, Cyclone support steel etc.	C-02
	Cyclones and Oven Discharge Chute and Ducting	C-05
	Oven, Oven inlet ducting/chute, Furnace etc.	C-06
15.	<b>BADD LEACH PLANT</b> Structural steel, Leach cats, Overhead Cranes etc.	C-07
16.	<b>BADD BAGHOUSE AND DRYING PLANT</b> Structural steel, Overhead Cranes, sumps etc.	C-02
17.	<b>GRAVITATION PLANT</b> Structural steel, Sumps etc.	C-04
18.	<b>300vt PUMPSTATION AND CYCLONE PUMPSTATION</b> Structural steel, Sumps, Overhead Cranes etc.	C-02
	Cyclone support steel (Damp areas)	C-04
19.	<b>RECLAIM WATER PUMPSTATION</b> Structural steel, Sumps etc.	C-02
20.	<b>TTPS AND RWPS</b> Structural steel, Sumps etc.	C-02
21.	<b>PSZ PLANT</b> Structural steel, Launderers, Overhead Cranes etc.	C-02
	Furnaces, Hoods, Ducting etc.	C-06
	Baghouse etc.	C-05
22.	<b>WORKSHOPS</b> Structural steel, Overhead Cranes etc.	C-03
	Concrete Floors	C-08

23.	<b>WET CONCENTRATE STOCKPILES</b> Structural steel, Reclaimers, Conveyors etc.	<b>C-02</b>
24.	<b>REAGENT PLANT</b> Structural steel, pump house, conveyors etc.	<b>C-02</b>
	Acid areas, pumps, pipes etc.	<b>C-07</b>
25	<b>EXT 8</b> Structural steel, pump house, conveyors etc.	<b>C-02</b>
	Acid areas, pumps, pipes etc.	<b>C-07</b>
25.	<b>GENERAL</b> Pipes, Valves, Sumps etc. (External)	<b>C-02</b>
	Pipe - Water Internal (Not Slurry)	<b>C-12</b> <b>C-13</b>
	Pipe - Water Underground External	<b>C-11</b>
	Sheeting - External – Roof	<b>C-09</b>
	Sheeting - External – Roof and sides	<b>C-10</b>
	Stores - Structural steel	<b>C-03</b>
	Car Ports	<b>C-02</b>
	Pumps	<b>C-14</b>
	Electrical Equipment	<b>C-03</b>
	Handrail piping and Stanchions	<b>C-02</b>
	Floor Grating	<b>C-19</b>
	Fuel tanks – External	<b>C-16</b>
	Fuel tanks – Internal	<b>C-15</b>
	Crevice Filling	<b>C-20</b>
	Roads	<b>C-21</b>
	Galvanised Piping	<b>C-18</b>

## 7.2 OFFICES/HOUSES AND ABLUTIONS

See O'Grady and Sigma data sheets.

### 7.3 MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES – MOBILE EQUIPMENT

<b>MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES</b>	<b>C-01</b>
<b>MOBILE EQUIPMENT</b>	
<b>SURFACE PREPARATION</b>	<b>APPROVED DEGREASER</b>
1. Mask and protect all non treatment areas	
2. Degrease	
3. Chemically neutralise.	STONCOR : Aerowash
4. Wash	O'GRADY : Corroclean
5. Blast clean to SA 2.5 standard	SIGMA : Ferrokleen

<b>STONCOR</b>			
<b>COAT</b>	<b>PRIMER COAT</b>	<b>INTERMEDIATE COAT</b>	<b>FINAL COAT</b>
GENERIC TYPE	EPOXY POLYAMIDE		ACRYLIC POLYURETHANE
CODE			
TRADE NAME	CARBOLINE 888		CARBOLINE 134 FINISH
COLOUR	GREY/RED		FOSKOR COLOUR CODE
BLAST PROFILE	25-50 MICRONS		
DRY FILM THICKNESS	75 MICRONS		40 MICRONS
OVERCOATING TIME	4 HRS @ 25°C		

<b>O'GRADY</b>			
<b>COAT</b>	<b>PRIMER COAT</b>	<b>INTERMEDIATE COAT</b>	<b>FINAL COAT</b>
GENERIC TYPE	EPOXY POLYAMIDE		ACRYLIC POLYURETHANE
CODE			
TRADE NAME	CORPRO 200		CORROPRO 800
COLOUR	GREY		FOSKOR COLOUR CODE
BLAST PROFILE	30-50 MICRONS		
DRY FILM THICKNESS	50-75 MICRONS		25-40 MICRONS
OVERCOATING TIME	Min: 48 HRS Max: No limit		Min: 4 HRS Max: No limit

<b>SIGMA</b>			
<b>COAT</b>	<b>PRIMER COAT</b>	<b>INTERMEDIATE COAT</b>	<b>FINAL COAT</b>
GENERIC TYPE	EPOXY POLYAMIDE		ACRYLIC POLYURETHANE
CODE	7413		7528
TRADE NAME	SIGMA COVER PRIMER		SIGMADUR GLOSS
COLOUR	GREEN		FOSKOR COLOUR CODE
BLAST PROFILE	30-50 MICRONS		
DRY FILM THICKNESS	60-80 MICRONS		40 MICRONS
OVERCOATING TIME	10 HRS		

Note:

1. Overcoating times are given at 25°C ambient temp.
2. All coating to be applied in strict accordance with relevant Product Data Sheets.
3. Safety precautions: Refer to Material Safety Data Sheet (MSDS).

7.4 MAINTENANCE AND NEW PAINTED SURFACES - STRUCTURAL STEEL

<b>MAINTENANCE AND NEW PAINTED SURFACES STRUCTURAL STEEL</b>		<b>C-02</b>
<b>SURFACE PREPARATION</b>		<b>APPROVED DEGREASER</b>
1. Mask and protect all non treatment areas		
2. Degrease		
3. Chemically neutralise.	STONCOR : Aerowash	
4. Wash	O'GRADY : Corroclean	
5. Blast clean to SA 2.5 standard	SIGMA : Ferrokleen	

<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE 5COAT	FINAL COAT
GENERIC TYPE	EPOXY POLYAMIDE		ACRYLIC POLYURETHANE
CODE			
TRADE NAME	CARBOLINE 888		CARBOLINE 134 FINISH
COLOUR	GREY/RED		FOSKOR COLOUR CODE
BLAST PROFILE	25-50 MICRONS		
DRY FILM THICKNESS	75 MICRONS		40 MICRONS
OVERCOATING TIME	4 HRS @ 25°C		

<b>O'GRADY</b>			
COAT	PRIMER COAT	FINAL COAT (INTERIOR)	FINAL COAT (EXTERIOR)
GENERIC TYPE	EPOXY	EPOXY	ACRYLIC POLYURETHANE
CODE			
TRADE NAME	CORPRO 600	CORPRO 200	CORROPRO 800 PU
COLOUR	DARK GREY	FOSKOR COLOUR CODE	FOSKOR COLOUR CODE
BLAST PROFILE	30-50 MICRONS		
DRY FILM THICKNESS	100-150 MICRONS	100-150 MICRONS	25-40 MICRONS
OVERCOATING TIME	Min: 8 HRS Max: No Limit	Min: 8 HRS Max: No Limit	Min: 4 HRS Max: No Limit

<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY POLYAMIDE		ACRYLIC POLYURETHANE
CODE	7413		7528
TRADE NAME	SIGMA COVER PRIMER		SIGMADUR GLOSS
COLOUR	GREEN		FOSKOR COLOUR CODE
BLAST PROFILE	30-50 MICRONS		
DRY FILM THICKNESS	60-80 MICRONS		40 MICRONS
OVERCOATING TIME	10 HRS		

Note:

- Overcoating times are given at 25°C ambient temp.
- All coating to be applied in strict accordance with relevant Product Data Sheets.
- Safety precautions: Refer to Material Safety Data Sheet (MSDS).

**7.5 MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES - WORKSHOP STRUCTURAL STEEL**

<b>MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES</b>		<b>C-03</b>
<b>WORKSHOP STRUCTURAL STEEL</b>		
<b>SURFACE PREPARATION</b>		<b>APPROVED DEGREASER</b>
1. Mask and protect all non treatment areas 2. Degrease 3. Chemically neutralise. 4. Wash 5. Blast clean to SA 2.5 standard		STONCOR : Aerowash O'GRADY : Corroclean SIGMA : Ferrokleen

<b>STONCOR</b>			
<b>COAT</b>	<b>PRIMER COAT</b>	<b>INTERMEDIATE COAT</b>	<b>FINAL COAT</b>
GENERIC TYPE	EPOXY		EPOXY
CODE			
TRADE NAME	CARBOLINE 888		CARBOLINE 890
COLOUR	GREY/RED		FOSKOR COLOUR CODE
BLAST PROFILE	40-75 MICRONS		
DRY FILM THICKNESS	75 MICRONS		125 MICRONS
OVERCOATING TIME	4 HRS		

<b>O'GRADY</b>			
<b>COAT</b>	<b>PRIMER COAT</b>	<b>FINAL COAT (INTERIOR)</b>	<b>FINAL COAT (EXTERIOR)</b>
GENERIC TYPE	EPOXY	EPOXY	ACRYLIC POLYURETHANE
CODE			
TRADE NAME	CORPRO 600	CORPRO 200	CORROPRO 800 PU
COLOUR	DARK GREY	FOSKOR COLOUR CODE	FOSKOR COLOUR CODE
BLAST PROFILE	30-50 MICRONS		40-75 MICRONS
DRY FILM THICKNESS	100-150 MICRONS	100-150 MICRONS	25-40 MICRONS
OVERCOATING TIME	Min: 8 HRS Max: No Limit	Min: 8 HRS Max: No Limit	Min: 4 HRS Max: No Limit

<b>SIGMA</b>			
<b>COAT</b>	<b>PRIMER COAT</b>	<b>INTERMEDIATE COAT</b>	<b>FINAL COAT</b>
GENERIC TYPE	EPOXY POLYAMIDE		EPOXY
CODE	7413		7456
TRADE NAME	SIGMA COVER PRIMER		SIGMA COVER CM COATING
COLOUR	GREEN		FOSKOR COLOUR CODE
BLAST PROFILE	30-50 MICRONS		
DRY FILM THICKNESS	60-80 MICRONS		75-100 MICRONS
OVERCOATING TIME	4 HRS		

Note:

- Overcoating times are given at 25°C ambient temp.
- All coating to be applied in strict accordance with relevant Product Data Sheets.
- Safety precautions: Refer to Material Safety Data Sheet (MSDS).

## 7.6 MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES – DAMP AREAS

MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES DAMP AREAS		C-04
<b>SURFACE PREPARATION</b> 1. Mask and protect all non treatment areas 2. Degrease 3. Chemically neutralise. 4. Wash 5. Blast clean to SA 2.5 standard	<b>APPROVED DEGREASER</b>  STONCOR : Aerowash O'GRADY : Corroclean SIGMA : Ferrokleen	

<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY AMINE		EPOXY AMINE
CODE			
TRADE NAME	CARBOLINE DAMPCOAT 1208		CARBOLINE DAMPCOAT 1208
COLOUR	GREY/WHITE		GREY/WHITE
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	75-100 MICRONS		75-100 MICRONS
OVERCOATING TIME	24 HRS		
<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY AMIDE		EPOXY AMIDE
CODE			
TRADE NAME	CORPRO 300		CORPRO 300
COLOUR	GREY		GREY
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	75-100 MICRONS		75-100 MICRONS
OVERCOATING TIME	24 HRS		
<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE	7413		7456
TRADE NAME	SIGMA COVER PRIMER		SIGMA COVER CM COATING
COLOUR	GREEN		FOSKOR COLOUR CODE
BLAST PROFILE	40-60 MICRONS		
DRY FILM THICKNESS	75-100 MICRONS		75-100 MICRONS
OVERCOATING TIME	4 HRS		

**Note:**

- Overcoating times are given at 25°C ambient temperature.
- All coatings to be applied in strict accordance with the relevant Product Data Sheets.
- Safety precautions: Refer to Material Safety Data Sheet (MSDS).

7.7 MAINTENANCE AND NEW PAINTED - SURFACES TEMP. 0-200°C

<b>MAINTENANCE AND NEW PAINTED SURFACES TEMP. 0-200°C</b>		<b>C-05</b>
<b>SURFACE PREPARATION</b>	<b>APPROVED DEGREASER</b>	
1. Mask and protect all non treatment areas		
2. Degrease		
3. Chemically neutralise.	STONCOR : Aerowash	
4. Wash	O'GRADY : Corroclean	
5. Blast clean to SA 2.5 standard	SIGMA : Ferrokleen	

<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	INORGANIC ZINC		ACRYLIC
CODE			
TRADE NAME	CARBO ZINC 11		CARBOLINE 1248
COLOUR	GREEN		ALUMINIUM
BLAST PROFILE	25-75 MICRONS		
DRY FILM THICKNESS	75 MICRONS		40 MICRONS
OVERCOATING TIME	10 HRS		
<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	ORGANIC ZINC		ACRYLIC POLYURETHANE
CODE			
TRADE NAME	CORPRO 100		CORPRO 800
COLOUR	GREY		ALUMINIUM
BLAST PROFILE	30-50 MICRONS		
DRY FILM THICKNESS	50-100 MICRONS		30-50 MICRONS
OVERCOATING TIME	Min: 8 HRS Max: No limit		Dry to Handle 6 HRS
<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	INORGANIC ZINC		EPOXY
CODE	7560		7427
TRADE NAME	SIGMA MC 60		SIGMA COVER CM M10
COLOUR	GREEN		ALUMINIUM
BLAST PROFILE	40-60 MICRONS		
DRY FILM THICKNESS	75 MICRONS		50-60 MICRONS
OVERCOATING TIME	12 HR		

Note:

- Overcoating times are given at 25°C ambient temp.
- All coating to be applied in strict accordance with relevant Product Data Sheets.
- Safety precautions: Refer to Material Safety Data Sheet (MSDS).
- The paint reservoir must be equipped with a mechanical agitator.

**7.8 MAINTENANCE AND NEW PAINTED SURFACES - TEMP. 0-200°C + CHEMICAL EXPOSURE**

<b>MAINTENANCE AND NEW PAINTED SURFACES</b>		<b>C-05B</b>
<b>TEMP. 0-200°C + Chemical exposure</b>		
<b>SURFACE PREPARATION</b>	<b>APPROVED DEGREASER</b>	
1. Mask and protect all non treatment areas		
2. Degrease		
3. Chemically neutralise.	STONCOR : Aerowash	
4. Wash	O'GRADY : Corroclean	
5. Blast clean to SA 2.5 standard	SIGMA : Ferrokleen	

<b>STONCOR</b>			
<b>COAT</b>	<b>PRIMER COAT</b>	<b>INTERMEDIATE COAT</b>	<b>FINAL COAT</b>
GENERIC TYPE	THERMALINE 400 PRIMER		THERMALINE 400 FINISH
CODE			
TRADE NAME			
COLOUR			
BLAST PROFILE	25-75 MICRONS		
DRY FILM THICKNESS	125 MICRONS		125 MICRONS
OVERCOATING TIME	10 HRS		

<b>O'GRADY</b>			
<b>COAT</b>	<b>PRIMER COAT</b>	<b>INTERMEDIATE COAT</b>	<b>FINAL COAT</b>
GENERIC TYPE	EPOXY		ACRYLIC POLYURETHANE
CODE			
TRADE NAME	CORPRO 600		CORPRO 500
COLOUR	DARK GREY		FOSKOR COLOUR CODE
BLAST PROFILE	50-70 MICRONS		
DRY FILM THICKNESS	100-125 MICRONS		30-50 MICRONS
OVERCOATING TIME	Indefinite		Indefinite

<b>SIGMA</b>			
<b>COAT</b>	<b>PRIMER COAT</b>	<b>INTERMEDIATE COAT</b>	<b>FINAL COAT</b>
GENERIC TYPE	EPOXY		EPOXY
CODE	7427		7427
TRADE NAME	SIGMA COVER CM M10		SIGMA COVER CM M10
COLOUR	ALUMINIUM		ALUMINIUM
BLAST PROFILE	60-70 MICRONS		
DRY FILM THICKNESS	120-130 MICRONS		120-130 MICRONS
OVERCOATING TIME	Min: 3 HRS		Min: 3 HRS Max: Indefinite

- Note:
- Overcoating times are given at 25°C ambient temp.
  - Stoncor – Use only agitator pressure pot for application of primer.

7.9 MAINTENANCE AND NEW PAINTED SURFACES TEMP 0-500°C

<b>MAINTENANCE AND NEW PAINTED SURFACES TEMP 0-500°C</b>	<b>C-06</b>
SURFACE PREPARATION <span style="float: right;">APPROVED DEGREASER</span> 1. Mask and protect all non treatment areas 2. Degrease 3. Chemically neutralise. <span style="margin-left: 150px;">STONCOR : Aerowash</span> 4. Wash <span style="margin-left: 150px;">O'GRADY : Corroclean</span> 5. Blast clean to SA 2.5 standard <span style="margin-left: 150px;">SIGMA : Ferrokleen</span>	

<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	INORGANIC ZINC		ACRYLIC
CODE			
TRADE NAME	CARBO ZINC 11		CARBOLINE 4631
COLOUR	GREEN		ALUMINIUM
BLAST PROFILE	25-75 MICRONS		
DRY FILM THICKNESS	75 MICRONS		40 MICRONS
OVERCOATING TIME	18 HRS		

<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	SILICONE		SILICONE
CODE			
TRADE NAME	HEAT RESISTANT		HEAT RESISTANT
COLOUR	GREEN		ALUMINIUM
BLAST PROFILE	30-50 MICRONS		
DRY FILM THICKNESS	50-75 MICRONS		50-75 MICRONS
OVERCOATING TIME	Min: 24 HRS Max: No Limit		Dry to Handle 24 HRS

<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	INORGANIC ZINC		SILICATE ZINC
CODE	7560		7555
TRADE NAME	SIGMA TORNUSIL MC 60		SIGMATHERM SILICATE
COLOUR	GREEN		ALUMINIUM
BLAST PROFILE	40-60 MICRONS		
DRY FILM THICKNESS	75 MICRONS		40 MICRONS
OVERCOATING TIME	12 HRS		

Note:

1. Overcoating times are given at 25°C ambient temp.
2. All coating to be applied in strict accordance with relevant Product Data Sheets.
3. Safety precautions: Refer to Material Safety Data Sheet (MSDS).
4. Heat resistant coating – the full properties of this product only develop after heating to 300°C.

7.10 MAINTENANCE AND NEW PAINTED SURFACES ACID AREAS

<b>MAINTENANCE AND NEW PAINTED SURFACES ACID AREAS</b>		<b>C-07</b>
<b>SURFACE PREPARATION</b>	<b>APPROVED DEGREASER</b>	
1. Mask and protect all non treatment areas		
2. Degrease		
3. Chemically neutralise.	STONCOR : Aerowash	
4. Wash	O'GRADY : Corroclean	
5. Blast clean to SA 2.5 standard	SIGMA : Ferrokleen	

<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY	PHENOLIC	PHENOLIC
CODE			
TRADE NAME	CARBOLINE 888		PHENOLINE 305
COLOUR	GREY/RED		FOSKOR COLOUR CODE
BLAST PROFILE	50-75 MICRONS		50-75 MICRONS
DRY FILM THICKNESS	100-150 MICRONS		100-125 MICRONS
OVERCOATING TIME	Min: 4 HRS Max: No Limit		Min: 24 HRS Max: No Limit

<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		ACRYLIC POLYURETHANE
CODE			
TRADE NAME	CORPRO 300		CORPRO 300
COLOUR	GREY		FOSKOR COLOUR CODE
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	150-200 MICRONS		150-200 MICRONS
OVERCOATING TIME	24 HRS		

<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	PHENOLIC EPOXY		EPOXY
CODE	7409		7448
TRADE NAME	SIGMA PHENGAURD		SIGMAGAURD HS
COLOUR	OFF-WHITE		GREY/GREEN
BLAST PROFILE	60-80 MICRONS		
DRY FILM THICKNESS	100-120 MICRONS		200-250 MICRONS
OVERCOATING TIME	30 HRS		

Note:

- Overcoating times are given at 25°C ambient temp.
- All coating to be applied in strict accordance with relevant Product Data Sheets.
- Safety precautions: Refer to Material Safety Data Sheet (MSDS).

7.11 MAINTENANCE AND NEW PAINTED SURFACES WORKSHOP FLOORS

MAINTENANCE AND NEW PAINTED SURFACES WORKSHOP FLOORS		C-08
<b>SURFACE PREPARATION</b> 1. Mask and protect all non treatment areas 2. Degrease 3. Chemically neutralise. 4. Wash 5. Blast clean to SA 2.5 standard	<b>APPROVED DEGREASER</b>  STONCOR : Aerowash O'GRADY : Corroclean SIGMA : Ferrokleen	

<b>CHEMRITE</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	POLYURETHANE		POLYURETHANE
CODE			
TRADE NAME	CARBOLINE 1345		CARBOLINE 1345
COLOUR	FOSKOR COLOUR CODE		FOSKOR COLOUR CODE
BLAST PROFILE			
DRY FILM THICKNESS	50 MICRONS		50 MICRONS
OVERCOATING TIME	6 HRS		
<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE			
TRADE NAME	CORPRO 200		CORPRO 200
COLOUR	FOSKOR COLOUR CODE		FOSKOR COLOUR CODE
BLAST PROFILE			
DRY FILM THICKNESS	100-125 MICRONS		100-125 MICRONS
OVERCOATING TIME	Min: 8 HRS Max: No Limit		Hard Dry 7 Days
<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE	7456		7456
TRADE NAME	SIGMA COVER CM COATING		SIGMA COVER CM COATING
COLOUR	VARIOUS		FOSKOR COLOUR CODE
BLAST PROFILE			
DRY FILM THICKNESS	100 MICRONS		100 MICRONS
OVERCOATING TIME	Min: 3 HRS		

Note:

- Overcoating times are given at 25°C ambient temp.
- All coating to be applied in strict accordance with relevant Product Data Sheets.
- Safety precautions: Refer to Material Safety Data Sheet (MSDS).
- For extra heavy duty floors and chemical resistant floors: Corpro 300 is recommended.

**7.12 MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES ROOF SHEETING EXTERNAL**

<b>MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES ROOF SHEETING EXTERNAL</b>	<b>C-09</b>
<p><b>SURFACE PREPARATION</b></p> <ol style="list-style-type: none"> <li>1. Mask and protect all non treatment areas</li> <li>2. Degrease</li> <li>3. Chemically neutralise.</li> <li>4. Wash</li> <li>5. Blast clean to SA 2.5 standard</li> </ol>	<p style="text-align: center;"><b>APPROVED DEGREASER</b></p> <p>STONCOR : Aerowash  O'GRADY : Corroclean  SIGMA : Ferrokleen</p>

<b>CHEMRITE</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE			EPOXY
CODE			
TRADE NAME			CARBOMASTIC 186
COLOUR			FOSKOR COLOUR CODE
BLAST PROFILE			ALUMINIUM
DRY FILM THICKNESS			125 MICRONS (Min)
OVERCOATING TIME			

<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		ACRYLIC POLYURETHANE
CODE			
TRADE NAME	CORPRO 200		CORPRO 800
COLOUR	RED OXIDE		FOSKOR COLOUR CODE
BLAST PROFILE			
DRY FILM THICKNESS	50-75 MICRONS		40-75 MICRONS
OVERCOATING TIME	Min: 8 HRS Max: No Limit		Min: 8 HRS Max: No Limit

<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		ACRYLIC POLYURETHANE
CODE	7413		7528
TRADE NAME	SIGMA COVER PRIMER		SIGMADUR GLOSS
COLOUR	GREEN		FOSKOR COLOUR CODE
BLAST PROFILE			
DRY FILM THICKNESS	50-60 MICRONS		30-40 MICRONS
OVERCOATING TIME	4 HRS		

**Note:**

1. Overcoating times are given at 25°C ambient temp.
2. All coating to be applied in strict accordance with relevant Product Data Sheets.
3. Safety precautions: Refer to Material Safety Data Sheet (MSDS).
4. A water break free surface has to be obtained before painting commences.

7.13 SIDE SHEETING – EXTERNAL AND INTERNAL

**SIDE SHEETING – EXTERNAL AND INTERNAL** **C-10**

<p><b>SURFACE PREPARATION</b></p> <ol style="list-style-type: none"> <li>1. Mask and protect all non treatment areas</li> <li>2. Degrease</li> <li>3. Chemically neutralise.</li> <li>4. Wash</li> <li>5. Blast clean to SA 2.5 standard</li> </ol>	<p style="text-align: center;"><b>APPROVED DEGREASER</b></p> <p>STONCOR : Aerowash          O'GRADY : Corroclean          SIGMA : Ferrokleen</p>
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<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE			EPOXY
CODE			
TRADE NAME			CARBOLINE 890
COLOUR			FOSKOR COLOUR CODE
BLAST PROFILE			
DRY FILM THICKNESS			125 MICRONS (Min)
OVERCOATING TIME			

<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		POLYURETHANE
CODE			
TRADE NAME	CORPRO 200		CORPRO 800
COLOUR	RED OXIDE		FOSKOR COLOUR CODE
BLAST PROFILE			
DRY FILM THICKNESS	50-75 MICRONS		40-75 MICRONS
OVERCOATING TIME	Min: 8 HRS Max: No Limit		Min: 8 HRS Max: No Limit

<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		ACRYLIC POLYURETHANE
CODE	7413		7528
TRADE NAME	SIGMA COVER PRIMER		SIGMADUR GLOSS
COLOUR	GREEN		FOSKOR COLOUR CODE
BLAST PROFILE			
DRY FILM THICKNESS	50-60 MICRONS		30-40 MICRONS
OVERCOATING TIME	4 HRS		

Note:

1. Overcoating times are given at 25°C ambient temp.
2. All coating to be applied in strict accordance with relevant Product Data Sheets.
3. Safety precautions: Refer to Material Safety Data Sheet (MSDS).
4. A water break free surface has to be obtained before painting commences.

7.14 MAINTENANCE AND NEW PAINTED SURFACES UNDERGROUND PIPING – EXTERNAL

MAINTENANCE AND NEW PAINTED SURFACES UNDERGROUND PIPING – EXTERNAL		C-11
<b>SURFACE PREPARATION</b>	<b>APPROVED DEGREASER</b>	
1. Mask and protect all non treatment areas		
2. Degrease		
3. Chemically neutralise.	STONCOR : Aerowash	
4. Wash	O'GRADY : Corroclean	
5. Blast clean to SA 2.5 standard	SIGMA : Ferrokleen	

<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY TAR		EPOXY TAR
CODE			
TRADE NAME	CARBOMASTIC 200		CARBOMASTIC 200
COLOUR	BROWN		BLACK
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	200 MICRONS		200 MICRONS
OVERCOATING TIME			

<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY COAL TAR		EPOXY COAL TAR
CODE			
TRADE NAME	CORPRO 400		CORPRO 400
COLOUR	BROWN		BLACK
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	100-150 MICRONS		100-150 MICRONS
OVERCOATING TIME	Min: 26 HRS Max: 7 Days		Hard Dry Full Cure: 7 Days

<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY TAR		EPOXY TAR
CODE	7472		7472
TRADE NAME	SIGMA TCN 300		SIGMA TCN 300
COLOUR	BLACK		BLACK
BLAST PROFILE	100-120 MICRONS		100-120 MICRONS
DRY FILM THICKNESS	400 MICRONS		400 MICRONS
OVERCOATING TIME	5 HRS		5 HRS

- Note:
- Overcoating times are given at 25°C ambient temp.
  - All coating to be applied in strict accordance with relevant Product Data Sheets.
  - Safety precautions: Refer to Material Safety Data Sheet (MSDS).

**7.15 MAINTENANCE AND NEW PAINTED SURFACES PIPING INTERNAL – WATER 300NB AND LARGER**

**MAINTENANCE AND NEW PAINTED SURFACES PIPING INTERNAL – WATER 300NB AND LARGER C-12**

<b>SURFACE PREPARATION</b>	<b>APPROVED DEGREASER</b>
1. Mask and protect all non treatment areas	
2. Degrease	
3. Chemically neutralise.	STONCOR : Aerowash
4. Wash	O'GRADY : Corroclean
5. Blast clean to SA 2.5 standard	SIGMA : Ferrokleen

<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE			
TRADE NAME	CARBOLINE 891		CARBOLINE 891
COLOUR	RED OXIDE/WHITE/BLUE		RED OXIDE/WHITE/BLUE
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	125 MICRONS		125 MICRONS
OVERCOATING TIME	8 HRS		

<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE			
TRADE NAME	CORPRO 500		CORPRO 500
COLOUR	WHITE		RED OXIDE
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	100-150 MICRONS		100-150 MICRONS
OVERCOATING TIME	Min: 8 HRS Max: No Limit		Hard Dry: 18 HRS Full Cure: 7 Days

<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE	7433		7433
TRADE NAME	SIGMA GUARD EHB		SIGMA GUARD EHB
COLOUR	GREEN		GREEN
BLAST PROFILE	60-80 MICRONS		
DRY FILM THICKNESS	120-130 MICRONS		120-130 MICRONS
OVERCOATING TIME	8 HRS		5 HRS

**Note:**

1. Overcoating times are given at 25°C ambient temp.
2. All coating to be applied in strict accordance with relevant Product Data Sheets.
3. Safety precautions: Refer to Material Safety Data Sheet (MSDS).
4. Corpro 500 – Airless Spray application is preferred. For brush and roller application thin with thinner and this will necessitate multiple coats to achieve the specified dry film thickness.
5. Pinhole detection must be carried out prior to service.

7.16 MAINTENANCE AND NEW PAINTED SURFACES PIPING INTERNAL – WATER

<b>MAINTENANCE AND NEW PAINTED SURFACES PIPING INTERNAL – WATER</b>	<b>C-13</b>
<p><b>SURFACE PREPARATION</b></p> <ol style="list-style-type: none"> <li>1. Mask and protect all non treatment areas</li> <li>2. Degrease</li> <li>3. Chemically neutralise.</li> <li>4. Wash</li> <li>5. Blast clean to SA 2.5 standard</li> </ol>	<p><b>APPROVED DEGREASER</b></p> <p>STONCOR : Aerowash  O'GRADY : Corroclean  SIGMA : Ferrokleen</p>

<b>STONCOR</b>			
	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE			
TRADE NAME	CARBOLINE 891		CARBOLINE 891
COLOUR	RED OXIDE/WHITE/BLUE		RED OXIDE/WHITE/BLUE
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	125 MICRONS		125 MICRONS
OVERCOATING TIME	8 HRS		
<b>O'GRADY</b>			
	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE			
TRADE NAME	CORPRO 500		CORPRO 500
COLOUR	WHITE		RED OXIDE
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	100-150 MICRONS		100-150 MICRONS
OVERCOATING TIME	Min: 8 HRS Max: No Limit		Hard Dry: 18 HRS Full Cure: 7 Days
<b>SIGMA</b>			
	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE	7433		7433
TRADE NAME	SIGMA GUARD EHB		SIGMA GUARD EHB
COLOUR	GREEN		GREEN
BLAST PROFILE	60-80 MICRONS		
DRY FILM THICKNESS	120-130 MICRONS		120-130 MICRONS
OVERCOATING TIME	8 HRS		

**Note:**

1. Overcoating times are given at 25°C ambient temp.
2. All coating to be applied in strict accordance with relevant Product Data Sheets.
3. Safety precautions: Refer to Material Safety Data Sheet (MSDS).
4. Corpro 500 – Airless Spray application is preferred. For brush and roller application thin with thinner and this will necessitate multiple coats to achieve the specified dry film thickness.
5. Pinhole detection must be carried out prior to service.

7.17 MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES PUMPS

MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES PUMPS		C-14
<b>SURFACE PREPARATION</b> 1. Mask and protect all non treatment areas 2. Degrease 3. Chemically neutralise. 4. Wash 5. Blast clean to SA 2.5 standard	<b>APPROVED DEGREASER</b>  STONCOR : Aerowash O'GRADY : Corroclean SIGMA : Ferrokleen	

STONCOR			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE			
TRADE NAME	CARBOLINE 888		CARBOLINE 890
COLOUR	RED OXIDE/GREY		FOSKOR COLOUR CODE
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	125 MICRONS		125 MICRONS
OVERCOATING TIME	4 HRS		

O'GRADY			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE			
TRADE NAME	CORPRO 200		CORPRO 200
COLOUR	WHITE		FOSKOR COLOUR CODE
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	100-150 MICRONS		100-150 MICRONS
OVERCOATING TIME	Hard Dry: 8 HRS Max: No Limit		Hard Dry: 8 HRS Full Cure: 7 Days

SIGMA			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE	7414		7414
TRADE NAME	SIGMA COVER ALU PRIMER		SIGMA COVER ALU PRIMER
COLOUR	ALUMINIUM		ALUMINIUM
BLAST PROFILE			
DRY FILM THICKNESS	70 MICRONS		70 MICRONS
OVERCOATING TIME			

Note:

- Overcoating times are given at 25°C ambient temp.
- All coating to be applied in strict accordance with relevant Product Data Sheets.
- Safety precautions: Refer to Material Safety Data Sheet (MSDS).

7.18 MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES FUEL TANK INTERNAL

MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES FUEL TANK INTERNAL		C-15
<b>SURFACE PREPARATION</b>	<b>APPROVED DEGREASER</b>	
1. Mask and protect all non treatment areas		
2. Degrease		
3. Chemically neutralise.	STONCOR : Aerowash	
4. Wash	O'GRADY : Corroclean	
5. Blast clean to SA 2.5 standard	SIGMA : Ferrokleen	

<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE			
TRADE NAME	CARBOLINE 187 PRIMER		CORBOLINE 187 FINISH
COLOUR	GREY/WHITE		GREY/WHITE
BLAST PROFILE	25-75 MICRONS		
DRY FILM THICKNESS	125 MICRONS		125 MICRONS
OVERCOATING TIME	24 HR		24 HRS

<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE			
TRADE NAME	CORPRO 300		CORPRO 300
COLOUR	WHITE		RED OXIDE
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	100-150 MICRONS		100-150 MICRONS
OVERCOATING TIME	Hard Dry: 8 HRS Max: No Limit		Hard Dry: 8 HRS Full Cure: 7 Days

<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE	7433		7433
TRADE NAME	SIGMAGUARD EHB		SIGMAGUARD EHB
COLOUR	GREEN		CREAM
BLAST PROFILE	60-80 MICRONS		
DRY FILM THICKNESS	120-130 MICRONS		120-130 MICRONS
OVERCOATING TIME	6 HRS		

Note:

1. Overcoating times are given at 25°C ambient temp.
2. All coating to be applied in strict accordance with relevant Product Data Sheets.
3. Safety precautions: Refer to Material Safety Data Sheet (MSDS).
4. Pinhole detection must be carried out prior to service.

7.19 MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES FUEL TANK EXTERNAL

MAINTENANCE PAINTING FOR PREVIOUSLY PAINTED SURFACES FUEL TANK EXTERNAL		C-16
<b>SURFACE PREPARATION</b>	<b>APPROVED DEGREASER</b>	
1. Mask and protect all non treatment areas		
2. Degrease		
3. Chemically neutralise.	STONCOR : Aerowash	
4. Wash	O'GRADY : Corroclean	
5. Blast clean to SA 2.5 standard	SIGMA : Ferrokleen	

<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		EPOXY
CODE			
TRADE NAME	CARBOLINE 888		CARBOLINE 890
COLOUR	RED/GREY		ALUMINIUM
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	75 MICRONS		125 MICRONS
OVERCOATING TIME	4 HRS		
<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY	ACRYLIC	POLYURETHANE
CODE			
TRADE NAME	CORPRO 600		CORPRO 800
COLOUR	DARK GREY		ALUMINIUM
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	100-150 MICRONS		25-40 MICRONS
OVERCOATING TIME	Hard Dry: 8 HRS Max: No Limit		
<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		ACRYLIC POLYURETHANE
CODE	7433		7524
TRADE NAME	SIGMA COVER PRIMER		SIGMADUR FINISH
COLOUR	GREEN		ALUMINIUM
BLAST PROFILE	60-80 MICRONS		
DRY FILM THICKNESS	120-130 MICRONS		40-60 MICRONS
OVERCOATING TIME	6 HRS		

Note:

1. Overcoating times are given at 25°C ambient temp.
2. All coating to be applied in strict accordance with relevant Product Data Sheets.
3. Safety precautions: Refer to Material Safety Data Sheet (MSDS).

7.20 MAINTENANCE AND NEW PAINTED SURFACES ROAD MARKING

<b>MAINTENANCE AND NEW PAINTED SURFACES ROAD MARKING</b>	<b>C-17</b>
<b>SURFACE PREPARATION</b> 1. Wash	<b>APPROVED DEGREASER</b>  STONCOR : Aerowash O'GRADY : Corroclean SIGMA : Ferrokleen

<b>STONCOR</b>			
	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE			
code			
TRADE NAME			
COLOUR			
BLAST PROFILE			
DRY FILM THICKNESS			
OVERCOATING TIME			

<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	ACRYLIC		
CODE			
TRADE NAME	TRAFFIC LINE		
COLOUR	FOSKOR COLOUR CODE		
BLAST PROFILE			
DRY FILM THICKNESS	1 COAT		
OVERCOATING TIME	10 min		

<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	ENAMEL		
CODE			
TRADE NAME	ROAD MARKING		
COLOUR	FOSKOR COLOUR CODE		
BLAST PROFILE			
DRY FILM THICKNESS	1 COAT		
OVERCOATING TIME			

- Notes:
1. Overcoating times are given at 25°C ambient temp.
  2. Traffic line is indefinitely overcoatable once dry.

7.21 MAINTENANCE AND NEW PAINTED SURFACES GALVINIZED PIPING

MAINTENANCE AND NEW PAINTED SURFACES GALVINIZED PIPING		C-18
<b>SURFACE PREPARATION</b>		<b>APPROVED DEGREASER</b>
1. Mask and protect all non treatment areas		
2. Degrease		
3. Chemically neutralise.	STONCOR : Aerowash	
4. Wash	O'GRADY : Corroclean	
5. Blast clean to SA 2.5 standard	SIGMA : Ferrokleen	

<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		ACRYLIC POLYURETHANE
CODE			
TRADE NAME	CARBOLINE 888		CARBOLINE 134
COLOUR	GREY/RED		FOSKOR COLOUR CODE
BLAST PROFILE	N/A		
DRY FILM THICKNESS	75 MICRONS		40 MICRONS
OVERCOATING TIME	4 HRS		
<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	VINYL PHENOLIC	ACRYLIC	POLYURETHANE
CODE			
TRADE NAME	ETCH PRIMER		CORPRO 800
COLOUR	RED OXIDE		FOSKOR COLOUR CODE
BLAST PROFILE	N/A		
DRY FILM THICKNESS	20-30 MICRONS		25-40 MICRONS
OVERCOATING TIME	Hard Dry: 1 HR		Hard Dry: 8 HRS
<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		ACRYLIC POLYURETHANE
CODE	7413		7528
TRADE NAME	SIGMA COVER PRIMER		SIGMADUR GLOSS
COLOUR	GREEN		FOSKOR COLOUR CODE
BLAST PROFILE	N/A		
DRY FILM THICKNESS	50 MICRONS		30-40 MICRONS
OVERCOATING TIME	4 HRS		

Note:

1. Overcoating times are given at 25°C ambient temp.
2. All coating to be applied in strict accordance with relevant Product Data Sheets.
3. Safety precautions: Refer to Material Safety Data Sheet (MSDS).

7.22 MAINTENANCE AND NEW PAINTED SURFACES FLOOR GRATING MILD STEEL

<b>MAINTENANCE AND NEW PAINTED SURFACES FLOOR GRATING MILD STEEL</b>	<b>C-19</b>
<b>SURFACE PREPARATION</b>	<b>APPROVED DEGREASER</b>
1. Mask and protect all non treatment areas	
2. Degrease	
3. Chemically neutralise	STONCOR : Aerowash
4. Wash	O'GRADY : Corroclean
5. Blast clean to SA 2.5 standard	SIGMA : Ferrokleen

<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	CROSS LINKED EPOXY		CROSS LINKED EPOXY
CODE			
TRADE NAME	CARBOLINE 891		CARBOLINE 892 ARL
COLOUR	RED OXIDE		GREY
BLAST PROFILE	40-75 MICRONS		
DRY FILM THICKNESS	125 MICRONS		125 MICRONS
OVERCOATING TIME			

<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	CORPRO 400		CORPRO 400
CODE			
TRADE NAME			
COLOUR			BLACK
BLAST PROFILE	40-75 MICRONS		
DRY FILM THICKNESS	100 MICRONS		100 MICRONS
OVERCOATING TIME	12 HRS		Hard Dry: 16 HRS

<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE			EPOXY TAR
CODE			7472
TRADE NAME			SIGMA TCN300
COLOUR			BLACK
BLAST PROFILE			100-120 MICRONS
DRY FILM THICKNESS			200 MICRONS
OVERCOATING TIME			

Note:

4. Overcoating times are given at 25°C ambient temp.
5. All coating to be applied in strict accordance with relevant Product Data Sheets.
6. Safety precautions: Refer to Material Safety Data Sheet (MSDS).

7.23 MAINTENANCE AND NEW PAINTED SURFACES EPOXY FILLER TO STEEL CREVICE FILLING

**MAINTENANCE AND NEW PAINTED SURFACES EPOXY FILLER TO STEEL CREVICE FILLING** **C-20**

**SURFACE PREPARATION**

**APPROVED DEGREASER**

1. Mask and protect all non treatment areas
2. Degrease
3. Chemically neutralise.
4. Wash
5. Blast clean to SA 2.5 standard

- STONCOR : Aerowash  
 O'GRADY : Corroclean  
 SIGMA : Ferrokleen

<b>STONCOR</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		See relevant
CODE			
TRADE NAME	CARBOLINE 165		Specification
COLOUR	GREY		
BLAST PROFILE	75-100 MICRONS		
DRY FILM THICKNESS	3mm min.		
OVERCOATING TIME	See data sheet		
<b>O'GRADY</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	AMIDE CURED SOLVENTLESS GROUT		
CODE			
TRADE NAME	CORPRO 900		
COLOUR	GREY		
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	3-5mm		
OVERCOATING TIME	Min: 36 HRS Max: No Limit Hard Dry: 7 Days		
<b>SIGMA</b>			
COAT	PRIMER COAT	INTERMEDIATE COAT	FINAL COAT
GENERIC TYPE	EPOXY		See relevant
CODE	7491		
TRADE NAME	ARMOUR COMPOUND		Specification
COLOUR	GREY		
BLAST PROFILE	75-100 MICRONS		
DRY FILM THICKNESS	3mm min.		
OVERCOATING TIME	See data sheet		

Note:

1. Overcoating times are given at 25°C ambient temp.
2. All coating to be applied in strict accordance with relevant Product Data Sheets.
3. Safety precautions: Refer to Material Safety Data Sheet (MSDS).

**7.24 MAINTENANCE AND NEW PAINTED SURFACES EXTERNAL PAINTING OF INTERNALLY RUBBER LINED PIPING (TAILINGS PIPING & PUMPS)**

<b>MAINTENANCE AND NEW PAINTED SURFACES EXTERNAL PAINTING OF INTERNALLY RUBBER LINED PIPING (TAILINGS PIPING &amp; PUMPS)</b>		<b>C-21</b>
<b>SURFACE PREPARATION</b>	<b>APPROVED DEGREASER</b>	
1. Mask and protect all non treatment areas		
2. Degrease		
3. Chemically neutralise.	STONCOR : Aerowash	
4. Wash	O'GRADY : Corroclean	
5. Blast clean to SA 2.5 standard	SIGMA : Ferrokleen	

<b>STONCOR</b>			
<b>COAT</b>	<b>PRIMER COAT</b>	<b>INTERMEDIATE COAT</b>	<b>FINAL COAT</b>
GENERIC TYPE	EPOXY		ACRYLIC POLYURETHANE
CODE			
TRADE NAME	CARBOLINE 888		CARBOLINE 134
COLOUR	GREY/RED		FOSKOR COLOUR CODE
BLAST PROFILE	50-75 MICRONS		
DRY FILM THICKNESS	75-100 MICRONS		40-50 MICRONS
OVERCOATING TIME			
<b>O'GRADY</b>			
<b>COAT</b>	<b>PRIMER COAT</b>	<b>INTERMEDIATE COAT</b>	<b>FINAL COAT</b>
GENERIC TYPE	HYDROCARBON RESIN		HYDROCARBON RESIN
CODE			
TRADE NAME	CROME ALUMINIUM		CROME ALUMINIUM
COLOUR	ALUMINIUM		ALUMINIUM
BLAST PROFILE	50-75 MICRONS		50-75 MICRONS
DRY FILM THICKNESS	75-100 MICRONS		75-100 MICRONS
OVERCOATING TIME	1 HR		
<b>SIGMA</b>			
<b>COAT</b>	<b>PRIMER COAT</b>	<b>INTERMEDIATE COAT</b>	<b>FINAL COAT</b>
GENERIC TYPE			
CODE	P-CODE SIGMA COVER		D-CODE SIGMA DUR HB ALUMINIUM
TRADE NAME			
COLOUR	ALUMINIUM		ALUMINIUM
BLAST PROFILE	50-75 MICRONS		50-75 MICRONS
DRY FILM THICKNESS	75-100 MICRONS		40-60 MICRONS
OVERCOATING TIME			

**Note:**

- Overcoating times are given at 25°C ambient temp.
- All coating to be applied in strict accordance with relevant Product Data Sheets.
- Safety precautions: Refer to Material Safety Data Sheet (MSDS).



FOSKOR LIMITED

# ENGINEERING SPECIFICATION

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REVISION: 2  
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TITLE: GENERAL MECHANICAL

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**REVISIONS**

PARAGRAPH	REVISION	CHANGE	DATE
All	2	Total review of specification	09/04/03

**ENDORSEMENT**

	DESIGNATION	DATE	SIGNATURE & PERSONNEL NUMBER
<b>REVIEWED BY</b>	SUPERINTENDENT CONFIGURATION MANAGEMENT		
<b>APPROVED BY</b>	SNR MANAGER TECHNICAL SUPPORT SERV		
<b>APPROVED BY</b>	SNR MANAGER PRODUCTION		
<b>APPROVED BY</b>	SNR MANAGER MINING		

## 1. SCOPE

This specification covers the requirements for design, manufacture and supply of all mechanical equipment. The specification applies to all machinery equipment and plant for which mechanical requirements have not been covered by individual mechanical specifications.

## 2. GENERAL

### 2.1 Approval

Where reference is made in this specification to approval, this shall mean written approval FOSKOR Limited or its appointed consultants.

All work carried out in terms of this specification shall be subject to inspection and approval and shall be performed in accordance with the established time requirements.

#### Governing Codes and Regulations....

2.2.1 All work carried out in terms of this specification shall conform to the requirements of the Mines health and Safety Act (No. 29 of 1996, as amended) and the related Regulations.

#### General (Governing codes and regulations) . . .

2.2.2 The latest editions of all standards and Codes of Practice herein stated shall establish the minimum requirements for design, materials, fabrication, etc. unless otherwise approved.

2.2.3 In the case of different codes, standards or regulations specifying different parameters, the most stringent code will be the ruling code.

2.2.4 In the absence of an applicable South African Standard the British Standards and S.I. Codes will be applicable.

2.2.5 Manufacturer's installation instructions for bought out items shall form part of this specification.

2.2.6 Where the term "or equal" is used herein, "equal" shall be subject to approval.

### 2.3 Design

All equipment shall be designed:

2.3.1 To facilitate inspection, maintenance cleaning and repairs.

2.3.2 To ensure satisfactory operation under the conditions Prevailing at the site.

2.3.3 To operate without undue vibration and/or excessive noise.

2.3.4 To prevent undue stresses being produced by expansion due to temperature changes.

2.3.5 To keep maintenance cost to a minimum.

2.3.6 To fulfil all FOSKOR requirements with regards to safety.

### 2.4 Standardization.

Corresponding Parts should be made to such limits and tolerances, as will permit interchange ability wherever possible.

### 2.5 Dimensional Units.

The equipment shall be designed to Systems International (S.I.) metric units. All dimensions, standards, tolerances and documentation shall be consistent with this system as it is used in the R.S.A.

### 3. MATERIALS.

#### 3.1 Cast irons shall be in accordance with the following standards:

S.A.B.S. 1034	Grey iron castings.
S.A.B.S. 936/937	Spheroidal graphite iron castings and austenitic spheroidal graphite iron castings.

#### 3.2 Steels shall be in accordance with the following standards:

<b>SABS 1431</b>	Weld able structural steels
BS 4360	<del>Weld able structural steels.</del>
S.A.B.S. 222	<del>Rolled carbon steel structural sections.</del>
BS 4M8 : Part 4	<del>Hot rolled structural steel sections, equal and unequal angles.</del>
BS 970	<del>Bars, billets and forgings.</del>
BS 3100	<del>Steel castings for general engineering Purposes.</del>
Iscon or Highveld Steel	<del>Commercial Quality Steel plate, sheet and strips.</del>

#### 3.3 Non-ferrous metals shall be in accordance with the following standards:

S.A.B.S. 989/992	Aluminium and aluminium alloy ingots and castings.
S.A.B.S. 200	Copper alloy ingots and castings.
B.S. 2872	Copper and copper alloys. Forging stock and forgings.
B.S. 2874	Copper and copper alloys. Rods and sections.
S.A.B.S. 695/703	White metals.

#### 3.4 Corrosion preventatives to be used during transportation and storage shall be in accordance with the following standards:

S.A.B.S. CKS 419	Removable corrosion preventative compounds.
B.S. 1 133	Temporary prevention of corrosion of metal surfaces during transportation and storage.

### 4. DESIGN SERVICE FACTORS.

#### 4.1 Service Factors Specified:

Where special requirements exist, these shall be stated in the individual equipment specifications and design service factors shall equal or exceed these values.

#### 4.2 Service Factors unspecified:

For continuous duty and heavy shock loads, service factors shall be individually considered and shall be approved. For medium duty and light shock loads, the following service factors shall generally apply:

Design Service Factors (Service Factors unspecified):

- (a) In selecting the capacity of electric motors, gears gearboxes, Power transmissions, couplings Pulleys, shafts, belts, etc. , the design theoretical kilowatt ratings shall be increased by 20%.
- (b) In selecting the capacity of electric motors, couplings, shafts, vee-belts, and vee-belt drives, etc.. for pumps the designed theoretical kilowatt rating shall be increased by 25%, and for agitators (not stirrers) by 50%, to allow for the possible overloading Produced by Pumps delivering larger quantities than those expected, or at gravities higher than expected.

The factors of 25% and 50% shall be additional to the design factors used to obtain the theoretical Horse Power rating.

- (c) Machine cut gears: Service factors as included in the applicable British Standard Specification.

**4.3 Overload Capacities:**

Machinery and equipment, excluding motors, shall be designed to withstand 100% momentary overload, 50% for 15 minutes and 25% for period not exceeding two hours. Refer to individual equipment specifications for variations.

**5. TRANSMISSION.****5.1 Chain drives.**

5.1.1 Chain drives shall be in accordance with British Standard 228r Transmission Roller Chains, Chain Wheels and Cutters.

5.1.2 Sufficient take up allowance on the motor shall be allowed to take up two full chain links. Where take up allowance is not possible due to fixed wheel centres an adjustable chain wheel idler shall be incorporated.

Transmission (Chain Drives)

5.1.3 All chain drives shall be adequately guarded and lubricated.

**5.2 V-belt drives.**

5.2.1 Unless otherwise specified, V-belt drives shall be standard sections and of the Space-Saver type, Endless V-belt Drives for Industrial Purposes. Belts shall be furnished in matched sets. Sheaves shall be accurately balanced and fitted with "Taper Lock" bushings.

5.2.2 Driving motors shall be mounted on slide or pivoted bases allowing sufficient adjustment for correct belt tensioning. Bases shall incorporate jack screws with lock nuts. All V-belt drives shall be adequately guarded.

**5.3 Gears.**

Gearing shall be in accordance with the following British Standards:

B.S. 436	Machine Cut Gears. Helical and straight spur.
B.S. 545	Bevel Gears (machine cut).
B.S. 721	Worm Gearing.

Gearing not enclosed in an oil bath shall be adequately guarded and provision made for safe and sufficient lubrication.

**5.4 Reduction Units.**

5.4.1 Speed reduction units shall be of approved design and manufacture. Allowance for efficiency, cooling and lubrication shall conform to the manufacturers recommendation.

Transmission (Reduction Units)

5.4.2 Gear Boxes shall be mounted on a common bedplate with the prime mover and accurately dowelled with the base except for shaft mounted gearboxes that shall be mounted according to the manufacturers recommendation.

5.4.3 All rotating equipment shall be clearly marked with an arrow showing the direction of rotation.

**5.5 Bearings:**

5.5.1 Bearings shall be in accordance with the following British Standards:

B.S. 292	Dimensions of ball bearings and Parallel-roller bearings.
B.S. 1131	Plain bearing metal. Parts 1 to 5.
B.S. 1642	Ball and roller bearings plunger blocks (general purpose series).
B.S. 3134	Dimensions of tapered roller bearings

- 5.5.2 Anti-friction bearings not covered by standard specifications shall be equivalent to SKF manufacture. Split roller bearings of any type shall not be used unless specifically approved beforehand. The basic rated life for all anti-friction bearings shall be 100,000 hours. ( $L_{10h}$  as defined by S.K.F.).
- 5.5.3 Where required by design considerations, well lubricated non-ferrous bushings and bearings may be used. Self-lubricating graphite or compound bearings shall not be used unless specifically requested and approved.
- 5.5.4 For heavy duty and continuous service Plummer blocks shall be of heavy duty, anti-friction spherical roller type with split housing. All plumber blocks shall be fully self-aligning with one fixed and one floating type for each shaft assembly. With parallel shafts, inner ring adapter sleeves may be used.

Transmission (Bearings):

For lighter duty, 80 mm diameter and less, ball bearing Plummer blocks may be used. The basic rated life for all anti-friction bearings shall be 100 000 hours ( $L_{10h}$  as defined by S.K.F.).

- 5.5.5 Plummer blocks shall be mounted on accurately machined sole plates and provided with lugs and jack screws with lock nuts for proper horizontal alignment. Allowance is to be provided for vertical shimming. All plumber blocks shall be installed such that the loads pass through the base and not the cap.
- 5.6 Shafts:
- 5.6.1 Heavy duty shafting shall be forged carbon steel turned, ground and polished. For design stress a safety factor of 5 shall be used, based on the yield stress for steel in the normalized condition.

For example:

STEEL	YIELD STRESS	DESIGN STRESS(5)
O7M20 (Previously EN 3A, 3C)	201 Mpa	40 Mpa
O80M40 (Previously EN8)	247 Mpa	49 Mpa
O70M55 (Previously EN9)	309 Mpa	62 Mpa

- 5.6.2 Design allowance shall be made for keyways and combined bending and torsion stress. Suitable fillet radius shall be provided at changes in diameter and at shaft ends.
- 5.6.3 Light duty shafting shall be hot rolled polished mild steel or cold rolled mild steel. Cold rolled shafting shall be subject to approval.

Transmission (Shafts):

- 5.6.4 All shafts to be metric or if unavailable inch shafts turned down at the bearing seats to the following diameters with tolerances appropriate to the particular bearings employed.
- 5.6.5 All shafts will be supplied with key seats, keys and feathers unless fastening method other than keyway is used. Any such fastening shall be approved.

**5.7 Couplings:**

- 5.7.1 In general couplings shall be as follows. High speed non-slip "Fenaflex Tyre" type or equal applications. Low speed non-slip "Falk" Steelflex type or equal applications. High speed slip Up to 40 kW : Fluid traction applications couplings 'Voith' Turbo or equal. Above 40 kW : Torque Limiting fluid couplings 'Voith' Turbo or equal. Rigid couplings shall generally not be used.
- 5.7.2 Method of alignment of couplings and setting of allowable gaps shall be as recommended by the coupling manufacturer.
- 5.7.3 Radial and angular alignment shall be checked on the coupling at top dead centre then to 90 degrees on either side of this point. Alignment tolerances shall be as follows:

	<b>Radial Alignment</b>	<b>Angular Alignment</b>
Less than 1500 RPM	0,05 mm	
1500 to 3000 RPM	0,050 mm	0,04 mm
Over 3000 RPM	Manufacturer to specify Transmission (Couplings)	

- 5.7.4 All couplings and exposed shafts shall be fitted with a removable guard unless the machine is already guarded in such a manner as to make a separate guard unnecessary

**5.8 Brakes**

- 5.8.1 Brakes shall be adequately sized for load characteristics and heat dissipation. For general use on motor couplings, "Dupar" Thruster or approved equal shall be used.
- 5.8.2 For hoisting or where the brake is holding back a continuous applied load, thruster releasing shoe brakes shall be used with weight actuated operation, failing to safety. Generally, band type brakes shall not be used.
- 5.8.3 All brakes shall be fitted to the input shaft of the reduction unit, if possible to the coupling.

**5.9 Retainers**

Retainer plates taking bearing thrust loads shall be bolted to shaft ends with a minimum of two high tensile screws drilled through the head and securely locked with steel wire. Self locking type Unbrako screws may be used. Light duty rotary applications without undue horizontal thrust may be fitted with spring type retaining rings and grooves.

**5.10 Shaft fittings:**

All shaft mounted pulleys, gears sheaves, sprockets, etc., shall be fitted to shafts by means of tapered lock devices.  
Transmission ...

**5.11 Fits:**

Limits and fits for engineering shall be in accordance with the following British Standards:

B.S. 1916 Part 1 and 2 Limits and Tolerances

**6. LUBRICATION**

- 6.1 Lubricants and lubrication fittings shall be in accordance with the following standards:

S.A.B.S. 053	Viscosity classification of industrial lubricating oils.
S.A.B.S. 344	Calcium base lubricating grease.
S.A.B.S. 406	Lithium base lubricating grease.
S.A.B.S. 351	Sodium base lubricating grease.

S.A.B.S. 1014	Utility-Purpose lubricating grease.
B.S. 1486	Lubricating nipples Part 1 and 2.
B.S. 1399	Rotary shaft oil seal units.

- 6.2 All equipment suppliers shall submit a specification of the lubrication required for their equipment.
- 6.3 All plumber blocks shall be sealed against the intrusion of moisture or dirt by means of a felt seal. Where wet or extremely dirty conditions occur a thrower shall be used in addition to seals. For vertical shafts a thrower shall be installed above the upper bearing seal.

Lubrication:

- 6.4 Lubrication of equipment such as gearboxes, compressors etc. shall conform to the recommendations of the equipment manufacturer. All equipment, which normally contains lubricant and is dispatched without such lubricant shall have their interior sprayed with a suitable moisture inhibitor to prevent corrosion during transport and storage.

All machinery and equipment shall be checked for cleanliness and lubrication prior to testing or start-up. Such equipment shall carry clear legible tagging indication that there is no lubricant contained therein.

- 6.5 Gearing and chain drives shall have fully enclosed oil bath lubrication except where a low peripheral velocity requires grease lubrication. Where the peripheral velocity of gearing exceeds 750 m/min., forced feed lubrication shall be provided.
- 6.6 As far as is practical a centralised lubrication system should be considered for multiple items of equipment supplied. Such centralised system shall have the approval of the equipment supplier.

**7. BASEPLATES**

- 7.1 Base plates shall be rigidly constructed, generally of cast steel or fabricated steel. For light duty cast iron bases may be used.
- 7.2 Where practical the prime mover and the gears bearings or other equipment shall be mounted on a common base plate.
- 7.3 Mounting Pads and base plate feet shall be machined true and parallel. Allowance shall be made on the prime mover mounting pad to allow for 5 mm maximum and 1 mm minimum shimming.
- 7.4 Where base plates are fabricated they must be stress relieved before machining base plates.
- 7.5 Base plates shall incorporate jack screws with lock nuts to assist with aligning of the prime mover in relation with the gearbox bearings or other equipment.

**8. BINS, CHUTES, LINERS AND SKIRTS.**

- 8.1 Chutes shall be so designed to allow for the free smooth flow of the discharged material and avoid abrupt changes of direction, which invite material build-up and subsequent plugging.

Chutes shall be designed with minimum throat constriction and must be firmly supported the plate thickness shall be at least 6 mm.

Valley angle of chutes shall be 65 degree minimum, trajectories shall be plotted for all conveyor discharge points to C.E.r J.A. formulae. The chute design must be integrated with the trajectory of the material leaving the belt, so that the material will fall on the sloping bottom of the chute or material contained by a rock box and not on a succeeding conveyor belt.

Where material flow is in contact with the chute, suitable liner plates shall be specified. Where equipment like rappers and squeezers spray units etc. are housed within chutes these must be able to be removed without disturbing the main chute assembly.

8.2 Chute and bin liners shall be so designed to allow for interchange ability and be dimensioned so that they do not exceed 30 kg in mass. Plate liners must be fastened to the chute or bin plate with nib headed countersunk bolts and water proofed where necessary. Liners must be staggered.

8.3 Where high wear areas occur with coarse material rail mats may be used if approved.

## 9. DUCTING AND SHEET METAL WORK

9.1 Dust Collection and Ventilation.

Ducting flanges sates, etc. shall be designed and conform to modern practice.

9.2 Ducting shall be checked after fabrication to ensure that:-

- (a) No pin holes or slag inclusion are present in any welds, which would cause leaks during service.
- (b) Inside diameters are to drawing and that ducts are concentric within 5 mm on diameter.

9.3 Supports shall be designed and spaced so that visual sagging does not occur allowing for a normal dust load, and shall be structurally adequate allowing for a dust filled plugged duct.

9.4 After erection of ducting and the installation of dust extraction units the complete system shall be tested balanced and blast locked or tack welded in place.

9.5 All ducting shall be manufactured from mild steel with a minimum thickness of 2 mm and all bends shall be of from 3 mm mild steel.  
All ducting shall have flanges welded to each end of each piece such flanges shall be a minimum of 2 mm thick.

9.6 Heavy Gauge sheet metal work and plate work shall conform to the requirements contained in Specification GS-1 pertaining to Structural Steel.

## 10. WIRE ROPE, CHAINS AND FITTINGS

10.1 Wire rope, rope fittings, chains and chain fittings shall be in accordance with:

B.S. 183	General purpose galvanised steel wire strand.
B.S. 236	Stranded wire ropes for mine hoisting (winding) purposes.
B.S. 302	Wire ropes for cranes excavators and general engineering purposes.
B.S. 3530	Small wire ropes.
B.S. 463 - Part 2	Sockets for wire ropes.
S.A.B.S. 811	Thimbles for wire ropes.
S.A.B.S. 813	Clamps for wire ropes.
S.A.B.S. 189	Short link chain for lifting purposes.
S.A.B.S.CKS366	Forged steel hooks for chain slings, blocks and general engineering purposes.
B.S. PD 6464	Slings Practice.

10.2 Rope fittings will be securely fitted to the ropes preferably with terminal splicing standard spelter fittings or approved swaged fittings. All rope slings shall be tested to twice the required working strength.

Spelter fittings shall not be used for high temperature application. Where rope clips are specified not less than three rope clips and a thimble shall be correctly fitted to make the connection.

10.3 All lifting tackle shall be supplied with test certificates.

10.4 Rope slings for general use shall be fitted with a metal tab indicating the safe working load.

- 10.5 Sockets thimbles rigging screws stretching screws eyebolts etc., shall have a safe working load of not less than the attached rope or chain.
- 10.6 Wire rope that is a stationary part of a machine and fixed guys shall be galvanized.
- 10.7 Only alloy steel eyebolts, shackles, hammerlocks and other such rope fittings shall be used. mild steel galvanized fittings will NOT be accepted. Use HERC-ALLOY or equal.
- 10.8 Chains shall comply with all Acts and Statutory Regulations and shall be stamped indicating the safe working load.

## 11. ACCESS PLATFORMS AND WALKWAYS

- 11.1 All platforms and walkways shall be fitted with handrails in accordance with Specification GS-1 .
- 11.2 Platform and walkway construction shall conform to the requirements contained in Foskor Engineering Specification GS1 pertaining to Structural Steel.
- 11.3 Platforms and walkways shall be provided wherever access is required for regular inspection, lubrication or operation of machinery or equipment.

## 12. SAFETY GUARDS AND GUARD RAILS

- 12.1 Safety guards shall be in accordance with the following B.S. and S.A.B.S standards and the Mines Health and Safety Act 29/1996 of the Republic of South Africa.

B.S. 53M	Code of Practice for Safeguarding of machinery.
B.S. CP 30N	Guarding of machinery.
S.A.B.S. 0104	Hand and Guard Rails (Safety Aspects)
	All NOSA and FOSKOR requirements.

- 12.2 All exposed machinery which when in motion may be dangerous to persons shall be securely fenced off. Efficient guards shall be provided to such parts of machinery, as may be a source of danger to persons. Such guards shall be subject to approval.
- 12.3 Electrical Equipment shall be protected in accordance with the Mines Health and Safety Act 29/1996 of Republic of South Africa and Specification GE-1.
- 12.4 Safety guards shall be provided for all rotating shafts and couplings driving chains and chain wheel Sears driving belts and pulleys etc.
- 12.5 Guards shall enclose totally all moving parts or should as far as practicable prevent access to the part.
- 12.6 Guards shall be securely fixed in position but should, for the purpose of maintenance be capable of removal and replacement without dismantling any other part, while the plant is at rest. To permit access, removable sections should where possible, be hinged or be of pin and socket type in preference to bolts.
- 12.7 Access to lubrication points shall be arranged so that guards do not have to be removed.
- 12.8 Where the clearance underneath a conveyor or other potentially dangerous piece of machinery is greater than 600 mm and less than 2000 mm, access should be prevented by placing suitable guard rails.
- 12.9 Where access is allowed underneath a conveyor the latter should be guarded at the top and on all sides providing not less than 2200 mm headroom.

- 12.10 Where there would be a danger of trapping a person between a moving tripper or shuttle conveyor and any fixed object other than its tracks there should be a minimum clearance of 450 mm.
- 12.11 Conveyor drive, head and tail pulleys shall be fitted with rolled steel angles parallel to the pulley centre lines in close proximity to the nip points. Guards shall be fitted to ensure cover for at least 1000 mm back from these nip angles.
- 12.12 No headroom shall be less than 2200 mm except at doors and individual clearance points, which should be not less than 2000 mm.
- 12.13 All guards around which an operator can put his arm should extend at least 1000 mm from the nipping point.
- 12.14 Guards at floor level shall be stopped off 300 mm above floor to permit cleaning. Under certain conditions the guards will be required down to ground level with hinged panels to permit cleaning.
- 12.15 All gravity take-ups shall be completely enclosed with removable panels for maintenance and stopped off at 300 mm from ground or as per 12.14.
- 13. FASTENERS**
- 13.1 When bolting between parallel surfaces all nuts shall be fitted with plain parallel washers except where the machinery is subject to vibration or movement when spring washers nylon insert locknuts or tack welding shall be used as indicated by the design consideration. Where nut adjustment is required (e.g. bearing take up) castellated nuts with split cotter pins shall be used. For 10 mm and under the use of tab washer is permitted.
- 13.2 High strength friction grip bolts shall be installed in accordance with:
- |              |  |
|--------------|--|
| S.A.B.S. 094 | Bolted friction grip joints in structural steelwork (metric units) |
|--------------|--|
- 13.3 Precision bolts and nuts shall be supplied in accordance with:
- |              |  |
|--------------|--|
| S.A.B.S. 646 | Precision bolts, screws and nuts.  |
| S.A.B.S. 136 | ISO metric precision hexagon-head bolts, screws and nuts (metric units). |
- 13.4 Black bolts and nuts shall be supplied in accordance with:
- |                |  |
|----------------|--|
| S.A.B.S. 61    | Black bolts and nuts (Hexagon and square).                   |
| S.A.B.S. 135   | ISO metric black bolts, screws and nuts (Hexagon and square) |
| S.A.B.S. CKS3N | Black cup and countersunk bolts and nuts (metric units).     |
| S.A.B.S. 1143  | Mushroom and Countersunk head bolts and nuts.                |
- 13.5 Black bolts shall be installed in accordance with the following assembly requirements: All bolt heads and nuts must make contact bearing on parallel plane surfaces perpendicular to the bolt axis. A tapered washer shall be correctly positioned under the bolt head or the nut whenever the surfaces contacted are not parallel and perpendicular to bolt axis. It shall be used against the tapered surface.
- A flat washer or a tapered washer shall be used under the bolt head or nut whichever is to be rotated during tightening operations.
- After assembly and proper tightening, all bolts shall project through the nut for a minimum distance of one (1) full thread.
- 13.6 When being assembled all H.S.F.G. bolted joint surfaces shall be free of dirt loose scale burrs and other defects that would prevent solid seating of the parts.  
All contact surfaces shall be free of oil Paint, lacquer or galvanizing.
- All H.S.F.G. bolts shall be torqued on load indicating washers of an approved type to ensure correct tension is achieved.

- 13.7 Plate liners unless otherwise specified shall be fitted with nib headed countersunk bolts and spring washers shall be used under the nuts.
14. **WELDING**
- 14.1 Welding shall be performed only by operators who have been previously qualified by test, and evidence of such qualification shall be submitted for approval on request. An operator shall require re-qualification if he has not been engaged in metal welding for a period of three months or more or when changing type of material or if there is a specific reason to question the welder's ability.
- 14.2 All qualification re-qualification shall be in accordance with the portion(s) of:
- B.S. 4872 Part 1 and 2 Approval testing of welders when welding Procedure approval is not required.  
AND/OR  
S.A.B.S. M4 Parts III Testing of Welders, which are to [t] applicable to the type of welding required.
- 14.3 All welding shall be by electric arc or oxy-acetylene process as appropriate and shall be in strict accordance with the design details as to type size technique and sequence. No welding will be permitted for connections carrying stress unless called for on the plans or otherwise approved. Weld design details shall be prepared in accordance with
- S.A.B.S. M4 Code of Practice for Welding Parts I and II, and welds shall be made as per these details.
15. **PAINTING**  
Refer to Specification Painting and surface protection of steel GM-3
16. **ERECTION**  
Refer to Specification Mechanical Erection GM-2 and to Specification GS-1 Structural Steelwork and Plate work fabrication and erection.



**RICHARDS BAY**

**GENERAL ENGINEERING QUALITY  
REQUIREMENTS**

**TECHNICAL SPECIFICATION NO: FQ-001**



## GENERAL QUALITY REQUIREMENTS

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1.0 **INTRODUCTION**

This document defines the Quality requirements with which Vendor/Contractor shall comply to demonstrate their ability to provide quality goods, equipment, stores, material and spares, hereafter referred to as "material", and "services". This document is to be read in conjunction with the applicable code/specification requirements.

2.0 **QUALITY SYSTEM**

The Vendor/Contractor shall maintain an effective quality system which meets the ISO 9000 Series or equivalent standard, to ensure and demonstrate that material or services provided conform to the specified requirements. This document is applicable unless otherwise specified in the Contract / Purchase Order / Request for Tender (R.F.T). The onus is placed on the Vendor/Contractor to highlight any section not applicable to the scope of supply. The section requirements of form QA-1 (Attachment B). are detailed in this document

3.0 **DEFINITIONS**

Unless otherwise noted, all terms and definitions shall be in accordance with ISO 8402.

3.1 **Authorised Inspection Authority (AIA)** - an independent organisation which has received accreditation by the South African Bureau of Standards as an Inspection Authority under the auspices of the South African Bureau of Standard's Code of Practice SABS 0227, and has been duly appointed by the Department of Labour as an Inspection Authority in terms of the Occupational Health and Safety Act No. 85 of 1993 as amended, for Vessels Under Pressure. This requirement is subject to verification by the employer.

3.2 **Vendor/Contractor** - For the purpose of this document the term Vendor/Contractor has the same meaning as applied to the Sub-Vendor/Sub-Contractor.

3.3 **Engineer** - Individual acting for and behalf of Foskor.

4.0 **PROJECT QUALITY PLAN**

The Vendor/Contractor, if required, shall within two (1) week of contract award submit a Project Quality Plan to Foskor Quality Management.

4.1 The Project Quality Plan shall as a minimum contain the following information:

- a) Purchase Order No., Contract No., Contract Description.
- b) Organigram with nominated personnel, including names and initials.
- c) Project Communication: Contact name/address/phone/fax no.
- d) Reference to codes/specifications applicable to the contract.
- e) List of Sub-vendors
- f) Quality Control dossier/code data book index.
- g) Contract review report.

5.0 **QUALITY CONTROL PLAN**

5.1 The Vendor/Contractor shall provide a Quality Control Plan (Inspection and Test Plan) specifying proposed quality control activities for the scope of supply. The Quality Control Plan shall identify Foskor Specific Engineering requirements identified in the Contract/Purchase Order.

- 5.2 The Quality Control Plan shall contain a column for intervention points by Foskor. The plan shall contain a section for Foskor to sign off the document for use as approved. An example of the typical format required is included (Attachment C).
- 5.3 A detailed Quality Control Plan, fully satisfying the requirements in clause 5.1 above, shall be submitted to Foskor for review and acceptance in accordance with the Document Requirements Schedule, or as agreed with the Engineer and approved or the Quality Control Representative.
- 5.4 Deviations from the agreed Quality Control Plan, will only be permitted after acceptance in writing by the Engineer/AIA (where applicable).
- 5.5 The Vendor/Contractor shall not undertake any work in advance of the review and acceptance of the Quality Control Plan, without the written consent of the Engineer.
- 5.6 The Vendor/Contractor shall ensure that any work sub-contracted, will be covered by Quality Control Plans generated by the relevant Sub-Vendor. The controls to be exercised over these sub-contracted activities shall be as detailed for the prime Vendor/Contractor in accordance with the above mentioned clauses.
- 6.0 **PRE-INSPECTION MEETING**  
A pre-inspection meeting may be held at the discretion of the Engineer, to clarify and agree on quality monitoring activities.
- 7.0 **VENDOR/CONTRACTOR MONITORING**
- 7.1 **Vendor/Contractor's Inspection**  
The Vendor/Contractor shall, as a minimum, carry out the inspections detailed in the agreed Quality Control Plan and maintain the required records for verification by the Engineer/AIA. For sub-contracted material or services, the Vendor/Contractor shall ensure that controls are effective, including, where necessary, monitoring at the Sub-Vendor's works and retention of the necessary records.
- 7.1.1 Updating the Quality Control Plan progressively by all relevant parties is a mandatory requirement following the indicated inspection activities.
- 7.2 **Readiness for Inspection**  
Material or services shall be deemed ready for inspection by the Engineer only when:-
- a) Vendor/Contractor has firstly carried out his own inspection at the stage identified in the relevant Quality Control Plan and is satisfied that the activities performed meet the specified requirements. Documented evidence of the inspection shall be maintained by the Vendor/Contractor, which includes signing off of the Quality Control Plan.
  - b) All applicable certificates and quality documents are available for review at the inspection location and have been verified and endorsed by the Vendor/Contractor.
- 7.3 **Notification of Readiness for Engineer's Inspection**
- 7.3.1 Notification by E mail/fax is required for both Hold and Witness points where applicable in advance of "readiness of inspection" or as agreed. Request for final inspection must include a copy of the Vendor/Contractors final release certificate.
- 7.3.2 The point of contact for this notice will be the person nominated in the Purchase Order unless otherwise agreed at the Pre-inspection meeting.

- 7.3.3 The Vendor/Contractor shall ensure that the latest revisions of approved drawings/codes/standards and/or specific procedures with evidence of acceptance by Engineer/AIA are available at the inspection location.
- 7.3.4 Vendor/Contractors are advised that in accordance with the Terms and Conditions of the Purchase Order that all costs of the Engineers representative and/or AIA will be passed on to the Vendor/Contractor for the cost of any aborted inspection visits. A visit is considered aborted if:-
- a) the Vendor/Contractor advises readiness for inspection and upon arrival of the Engineer's Inspector or AIA, the material or services and/or the associated documentation is not ready for inspection, or,
  - b) if the Engineer's Inspector or AIA identifies that material or services are not to specification such that the Vendor/Contractor's Inspector should have identified the non conformity prior to advising readiness for Engineer's or AIA inspection.
- NB. A report detailing the aborted visit shall be generated and countersigned by the Vendor/Contractors representative. This report shall form the basis of back charges.
- 7.4 **Inspection Waiver**  
Any Engineer inspection witness or hold point may, at the sole discretion of the Engineer, be waived. This waiver shall be confirmed in writing.
- 7.5 **Inspection Facilities**  
Should it be deemed necessary by the Engineer, the Vendor/Contractor shall be required to provide suitable inspection facilities for the Engineers Inspector/AIA.
- 7.6 **Inspection, Measuring and Test Equipment**  
The Vendor/Contractor shall be responsible for ensuring that all the Inspection, Measuring and Test equipment deemed necessary to confirm that goods meet the specified requirements are available and are appropriately calibrated.
- 7.7 All jigs and fixtures which are used before and during manufacture, are to be verified and re-checked at prescribed intervals. The Vendor/Contractor shall maintain a register of such checks as evidence of control.
- 8.0 **AUTHORISED INSPECTION AUTHORITY (AIA)**
- 8.1 Material or services subject to the Occupational Health and Safety Act (OHS Act 85/1993) or equivalent as amended, may require AIA input.
- 8.2 AIA design review, inspection and witness test requirements shall be in accordance with the requirements as specified in the contract.
- Note:** Where a Vendor/Contractor appoints an AIA, the AIA is subject to approval by the Engineer.
- 8.3 Vendor/Contractors will be notified either during bid clarification meetings or immediately after acceptance of the Purchase Order, which AIA is relevant to their supply and the appropriate document routing.
- 8.4 After issue and acceptance of a Purchase Order the nominated AIA will liaise with the Engineer to agree a listing of design and quality documentation required. This listing will be transmitted to the Vendor/Contractor.
- 9.0 **VENDOR/CONTRACTOR DOCUMENTATION SUBMISSIONS**

- 9.1 Vendor/Contractor documentation submittal requirements shall be in accordance with Specification Number, forming part of the Enquiry/Purchase Order Documentation, or as agreed with the Engineer.
- 10.0 **ASSESSMENT / AUDIT / SURVEILLANCE**
- 10.1 The Engineer may wish to conduct a Quality Assessment, prior to the award of any Purchase Order, to verify that the Vendor/Contractor's quality system complies with the relevant quality standard. Additionally, the Engineer may conduct Quality Assurance Audits and/or Surveillances at any time after the award of a Purchase Order. Four (4) working days notification of a QA Audit and twenty four hours (24 hours) notification of a QA Surveillance will be given by facsimile to the Vendor/Contractors nominated QA/QC representative.
- 10.2 Should the Vendor/Contractor's quality system be found deficient during either assessments, audits or surveillances, the Vendor/Contractor will be given the opportunity to carry out corrective action within a defined period of time and to revise the system to the required standard. A follow-up audit or surveillance may be carried out to verify that the Vendor/Contractor has carried out the necessary corrective actions.
- 10.3 If during a follow-up audit or surveillance it is identified that required corrective actions have not been carried out, the Engineer reserves the right to take such actions as necessary to rectify the deficiencies.
- 10.4 Surveillances, may also be employed by the Engineer, as an alternative method of monitoring the Vendor/Contractor's quality control. This will normally take the form of a verification of a Section of the agreed Quality Control Plan where physical and documentary evidence will be required to verify compliance with the Quality Control Plan.
- 11.0 **DEVIATIONS TO PURCHASE ORDER**
- 11.1 **Technical Exceptions**  
All deviations and/or exceptions to any Foskor provided technical documentation, shall be clearly stated in the proposal document. In addition, each and every individual deviation shall reference the appropriate Foskor document and (where relevant), the affected specification paragraph from which the deviation will occur.
- 11.2 **Concession**
- 11.2.1 All deviations from specified requirements will, unless classed as engineering queries by the Engineer, be required to be documented in the form of an application for concession.
- 11.2.2 The Vendor/Contractor is advised that the Engineer's policy is that concession requests will not be entertained. In the event of a concession being considered; back charges may be levied by the Engineer.
- 11.2.3 Any approved concessions shall be included within the Quality Control Dossier / Code Data Book.
- 11.3 **Non Conformity**
- 11.3.1 A Non-Conformity is defined as a deficiency in characteristic, documentation or procedure which renders the quality of an item of material or service unacceptable or indeterminate in accordance with specified requirements.
- 11.3.2 The index of the Vendor/Contractors own Non-Conformance Reports generated shall be made

available on request to the Engineer/Employer. Associated documentation shall be reviewed to verify satisfactory close-out prior to work completion.

12.0 **QUALITY CONTROL DOSSIER**

12.1 **Quality Control Dossier Content**

Vendor/Contractor shall submit to the Engineer, within the period identified in the Purchase Order/Contract a proposed Quality Control Dossier Index. The Engineer will review the submission against the Purchase Order requirements. Following acceptance, the Engineer's Inspector shall require the Dossier to be compiled in accordance with the accepted index (Attachment A is a typical example of a content list).

12.2 **Quality Control Dossier/Code Data Book Compilation**

12.2.1 A "master edition" of the Quality Control Dossier/Data Book shall be compiled PROGRESSIVELY during manufacture. At all times the master must contain those documents, which relate to the relevant stages of production, in order that, at completion of manufacture, the Quality Control Dossier/Data Book is also complete.

12.2.2 Quality Control Dossiers will be reviewed progressively and at any intervention point where the contents of the Dossier do not reflect the stage of fabrication at that intervention point, the Engineer's/AIA's inspector is authorized to issue a Non Conformance Report. The inspection will then be considered aborted under Clause 7.3 hereof.

12.2.3 All documents, i.e. Material Test Certificates shall be legible and if possible original or verified copies. Documents contained in the Quality Control Dossier/Data Book shall be determined by the approved index.

12.2.4 Immediately following the inspection release identified in Clause 12.2.5 hereof, the Vendor/Contractor shall ensure that the "master edition" of the Quality Control Dossier/Data Book is compiled in accordance with the contents list, the index and that all pages are correctly referenced, numbered etc and contains the Purchase Order number and item/equipment number.

12.2.5 At final inspection and acceptance, the Engineer's/and AIA's inspector shall ensure that all necessary certification and other required documents are included within the "master copy" of the Quality Control Dossier/Data Book before endorsing it and issuing the Engineers Inspection/AIA's Release Note.

12.2.6 Approval by the Engineer/AIA that the Quality Control Dossier/Data Book has been compiled in accordance with the Purchase Order shall be signified by the Engineer's Inspectors/AIA's unique stamp on the index sheet of each volume of the Dossier. After receipt of the confirmation of acceptance, the Vendor/Contractor shall prepare the contractually required additional copy of the completed Quality Control Dossier/Data Book as identified within the Purchase Order and transmit them both to the Engineer, via Document Control.

13.0 **CODE DATA BOOK**

13.1 Code Data books will be required for all equipment classified in accordance with the Occupational Health and Safety Act (OHS Act 85/1993) as amended, for Vessels under Pressure.

13.2 The requirements for the compilation and submission of these Code Data Books shall be as

detailed in Clause 12 of this document as well as in accordance with the engineering requisition (Attachment A is an example of a contents list).

14.0 **INSPECTION RELEASE**

All material supplied shall be subject to an Inspection Release Certificate issued by the Engineer's Inspector. The Inspection Release Certificate Number shall be marked on the Vendor/Contractor's Delivery Note. A copy of the Inspection Release Certificate shall accompany the material together with the Delivery Note/Packing List on despatch from the Vendor/Contractors Works. A further copy of the Inspection Release Certificate shall be submitted with the Vendor/Contractor's Invoice forwarded to the Engineer for payment.

15.0 **ASSOCIATED FORMS (ATTACHED)**

Attachment A : Typical Manufacturers QC Dossier/Data Book Index

Attachment B : General Quality Requirements Conformance Sheet (QA-1) (Sample)

Attachment C : Typical 'Quality Control Plan'

**ATTACHMENT A**

**FOSKOR**

**TYPICAL QUALITY  
CONTROL DOSSIER/  
DATA BOOK INDEX**

<b>VENDOR/CONTRACTOR NAME:</b>		<b>P.O. NO.:</b>		<b>DESCRIPTION:</b>	
<b>IDENTIFICATION NUMBER AND DESCRIPTION OF EQUIPMENT/MATERIALS:</b>					
<b>TABLE OF CONTENTS</b>					
SECTION	DESCRIPTION Applicable to Mechanical/Electrical/Civil/Instrumentation Disciplines	DOCUMENT INCLUDED			
		YES	NO		
1.	Approved Quality Control Plan/Inspection and Test Plan				
2.	Approved Design Calculations				
3.	Approved As-built drawing(s)/Certified Dimensional Drawings				
4.	Materials Map				
5.	Material Certificates (include consumables)				
6.	Approved NDT Procedure Summary				
7.	Non-destructive testing reports (NDT)/Maps				
8.	NDT Technicians Certificates for Qualifications				
9.	Test reports				
10.	Weld Procedure Specification(s) and Welder Summary				
11.	Weld Map Depicting WPS's				
12.	Production Weld Test Plate Results (As Applicable)				
13.	Inspection/Test Certificates and Reports				
14.	Insulation Certification for insulation/Oil				
15.	Physical Test Reports (Mechanical/Electrical)				
16.	Corrosion Protection Reports				
17.	Cleaning Reports (Pickle and Passivation)				
18.	Weld Repair Procedures and Reports (As Applicable)				
19.	Certification for calibration of test equipment				
20.	Heat Treatment Reports and Charts				
21.	Hydraulic/Pressure Test Certification				
22.	Nameplate Rubbing/Facsimile				
23.	NCR Summary				
24.	Concessions				
25.	Specification Index				
26.	Certificates of Compliance				
27.	Manufacturers Data Report				
28.	AIA's Certificate of Construction				
29.	All Inspection Release Certificates				



