



Toase-ehe Park Sanati Gohar Ofogh
Petrochemical Co.
**CONCEPTUAL, BASIC and DETAIL DESIGN
ENGINEERING OF STYRENE PARK OFFSITE**



Document Title: Surface Preparation and Painting Procedure

Document No.: EI027-FPA-VD-QC-PRO-008

Rev. R0

Page 1 of 17

STYRENE PARK OFFSITE

Document Title:

Surface Preparation and Painting Procedure

R0	02-09-2025	IFA	F.Baviye	N.Abnavi	N.Abnavi
Rev.	Issued Date	DESCRIPTION	PREPARED	CHECKED	APPROVED



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Rev. R0

Page 2 of 17





REVISION RECORD SHEET

Page e Pag e	Revisions							Page	Revisions						
	R0	R1	R2	R3	R4	R5	R6		R0	R1	R2	R3	R4	R5	R6
1	X							41							
2	X							42							
3	X							43							
4	X							44							
5	X							45							
6	X							46							
7	X							47							
8	X							48							
9	X							49							
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14	X							54							
15	X							55							
16	X							56							
17	X							57							
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	<p style="text-align: center;">Toase-eh Park Sanati Gohar Ofogh Petrochemical Co.</p> <p style="text-align: center;">CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE</p>			
	<p>Document Title: Surface Preparation and Painting Procedure</p>			
	<p>Document No.: EI027-FPA-VD-QC-PRO-008</p>		<p>Rev. R0</p>	<p>Page 3 of 17</p>

Contents

1.	Scope.....	4
2.	Reference Code and Standards.....	4
3.	Project Definitions.....	4
4.	Paint Suppliers Obligations.....	4
5.	Design Requirement.....	5
6.	General.....	5
7.	Surface Preparation.....	6
8.	Storage, Mixing and Thinning of Products.....	7
9.	Priming.....	8
10.	Painting.....	9
11.	Inspection.....	10
12.	Quality Control and Testing.....	11
13.	Repair of Defects or Damage.....	14
14.	Paint System.....	14
15.	Attachments.....	14

 	<p style="text-align: center;">Toase-ehe Park Sanati Gohar Ofogh Petrochemical Co.</p> <p style="text-align: center;">CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE</p>		 	
	Document Title: Surface Preparation and Painting Procedure			
	Document No.: EI027-FPA-VD-QC-PRO-008		Rev. R0	Page 4 of 17

1. Scope

The following procedures cover the minimum requirements for surface preparation and paint application of Heat Exchangers and Pressure Vessel that fabricated in Farnikan Co. for **PERSIAN GULF MEHR PETROLEUM Co.**

2. Reference Code and Standards

Painting Specification: Project Spec

3. Project Definitions

Project: CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE.

Owner (Purchaser): TOASE-EHE PARK SANATI GOHAR OFOGJ PETROCHEMICAL CO.

Consultant: HAMIAN SANAT ENERGY.

Vendor: FARNIKAN CO.

Inspector: Person assigned by the Purchaser or Owner to inspect the specified services, equipment or system being provided by the Vendor.

4. Paint Suppliers Obligations

4.1. The vendor shall request paint supplier (the supplier shall be selected according approved sub-order list) to send technical data sheet and test and analysis certificates and submitted to vendor inspector for verification.






4.2. The paint supplier shall state shelf life of all paints and protective coating and shall provide recommendations for storage.

All product containers shall be marked with their batch number and initial supplier date. supplier shall provide a guarantee that no such materials have been reconstituted for any reason what so ever.

4.3. The latest available issue of paint data sheets for the particular batch shall be supplied by paint supplier.

4.4. The vendor shall be responsible for ensuring that he is in possession of the latest available issue of the paint data sheet and product safety data sheets printed by the paint supplier of the particular batch of paint to be applied. Such data shall include specific.

Recommendations and instructions concern. Shelf life, pot life, thinners, directions for thinning and mixing, drying time, curing time, recommended spray equipment, safety equipment, cleaning solvent and any other provisions for application of both primer and finish coats. Product safety data sheets shall include information concerning general

 	<p style="text-align: center;">Toase-eh Park Sanati Gohar Ofogh Petrochemical Co.</p> <p style="text-align: center;">CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE</p>		  	
	Document Title: Surface Preparation and Painting Procedure			
	Document No.: EI027-FPA-VD-QC-PRO-008		Rev. R0	Page 5 of 17

composition, physical data hazards and precautions during and after application, toxicity / first aid, storage, spillage and waste disposal. These recommendations shall be considered inherent part of this specification and followed accordingly.

The vendor shall, if requested, provide the latest original issue of the paint supplier's data sheets with their technical offers for approval.

5. Design Requirement

5.1. Coating for the protection shall be designed and applied for the application over the specified minimum surface preparation standards detailed in this procedure.

5.2. All coating shall be suitable for application and service in salty and corrosive environment conditions.

5.3. The paint system shall be based on the operation temperature of the equipment and reference specification.

6. General

6.1. The vendor shall provide and maintain in good condition all paint, equipment and tools necessary to carry out the work in an efficient manner.

6.2. The vendor shall provide, unless otherwise instructed, all paints and thinners necessary to carry out the work. The vendor shall purchase such paints from approved suppliers. Vendor shall provide touch up painting material to repair damaged areas during shipment and installation.

6.3. The vendor shall provide skilled and experienced personnel to carry out the work together with competent and qualified supervision.



6.4. The vendor shall comply fully with this specification unless otherwise approved by the Purchaser. Additionally, the work will be subject to continuous inspection by the inspector who will be at liberty to check at every stage that the work is being carried out in accordance with all aspects of this specification

6.5. The following surface and material shall require painting:

Insulated stainless steel surfaces within temperature range 450°C-800°C.

6.6. The following surfaces and materials shall not require painting:

- Stainless steel surfaces
- Uninsulated SS surfaces
- Insulated SS surfaces at temperature below 450°C
- Non-metallic surfaces except when required (solar protection)

	<p style="text-align: center;">Toase-eh Park Sanati Gohar Ofogh Petrochemical Co.</p> <p style="text-align: center;">CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE</p>			
	Document Title: Surface Preparation and Painting Procedure			
	Document No.: EI027-FPA-VD-QC-PRO-008		Rev. R0	Page 6 of 17

- Nonferrous surfaces (e.g. aluminum, brass, copper, etc.)
- The following parts of carbon steel and low-alloy steel surfaces:
- Surfaces which should obviously not be painted (e.g., nameplates, mechanically finished surfaces, etc.)
- Bolt /nuts for location to be frequently removed, such as manholes, inspection holes.

7. Surface Preparation

7.1. Paint life depends primarily on surface preparation. Surface preparation should remove foreign bodies to allow the type of priming paint used to wet the surface thoroughly and develop adequate adhesion.

7.2. Selection of abrasive for blast cleaning shall be in accordance with the recommendations given in specification and the recommendation agreed with the individual paint supplier for each type of paint used. In over case we will use approved grit for blast cleaning.






7.3. Selection of abrasive for blast cleaning shall be in accordance with the recommendations given in SSPC-SP-COM and the recommendations agreed with the individual paint vendor for each type of paint used Generally, this shall give a surface profile or anchor pattern within the range 30-50 microns with rough peaks to 100microns (Rz). Expendable grit (from copper slag only) 16-80 mesh; B.S. sieve series hall be used. Grits shall not be recycled.

7.4. Surface preparation shall not take place in the following Conditions:

- a) At temperature below 5° C.
- b) When the relative humidity is greater than 80%
- c) When the metal surface temperature is less than 3°C above the ambient dew point.
- d) Outside daylight hours on exterior locations.
- e) When it is raining or rain is imminent.
- f) During foggy or misty conditions.
- g) Surface preparation operations shall be terminated early enough during the day to permit application of the primer on the prepared surface before the sunsets. In case that paint supervisor allows applying surface preparation at night, the prepared surface shall be wiped the next morning. They shall be freshened with light sand blasting before the primer is applied.

7.5. Surface preparation on new steel surface shall remove all surface irregularities and mill-scale, together with all rust and surface contamination such as grease, dirt and solid pollution.

7.6. All abrasives shall be free of dust, dirt and other foreign matter. They shall be kept dry all time and shall not be recycled, unless permitted by client authorized inspector.

 	<p style="text-align: center;">Toase-e Park Sanati Gohar Ofogh Petrochemical Co.</p> <p style="text-align: center;">CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE</p>		  	
	Document Title: Surface Preparation and Painting Procedure			
	Document No.: EI027-FPA-VD-QC-PRO-008		Rev. R0	Page 7 of 17

7.7. Coating may be applied by brush, roller, conventional spray or airless spray methods as approved or specified by the coating supplier. The compressed air supply used for blasting shall be free from water and oil. Adequate separators and traps shall be provided and these shall be kept emptied of water and oil.

Accumulations of water and oil shall be removed from the air receiver by regular purging. This clause shall also apply to air used for the dusting of cleaned surfaces. The pressure and the volume of compressed air supply for blast cleaning shall meet the work requirements. Nozzles shall be of the correct size and provide the most suitable spray shape for the most effective & economical application of the coating without excessive overspray.

7.8. Surface preparation shall result clean surface compatible to SA-2 ½ as per ISO-8501-1 and sspc. Vis-1-degree sp 10.

7.9. Chipping, scraping and steel wire brushing using manual or sand paper (if applicable) or power-driven tools shall only be used where blast cleaning is impractical, with the approval of Purchaser authorized inspector.

7.10. During surface preparation, care shall be taken not be damaged or alter identification plates, machined surface and parts coated in the factory, these parts shall be properly protected.

7.11. Any oil, grease, dust or foreign body present on the surface after surface preparation shall be removed before painting. If rust reappears on the surface, the surface shall be reblasted.

7.12. During the surface preparation we should protect name plate and machined from sandblasting.

8. Storage, Mixing and Thinning of Products

8.1. Storage Condition

8.1.1. All paints and thinner containers shall be kept closed before use and stored under shelter.

8.1.2. Any paint, which has gelled or settled during storage, shall not be used.

8.1.3. Any paint for which the shelf life is expired shall not be used.



8.2. Mixing

8.2.1. All the ingredients in each container shall be thoroughly mixed and homogenized. Mechanical mixing shall be such that all pigments or other agents are held in solution during application. Manual mixers are not authorized for quantities greater than 5 liters.

8.2.2. Paint mixed in the original container shall not be transferred until all settled particles have been remixed with the medium to facilitate mixing.

8.2.3. Paint shall not mix or held in solution with air bubbles.

8.2.4. If a skin has formed in the container and skin is thicker than 1mm, the paint shall not be used.

	<p style="text-align: center;">Toase-ehe Park Sanati Gohar Ofogh Petrochemical Co.</p> <p style="text-align: center;">CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE</p>			
	<p>Document Title: Surface Preparation and Painting Procedure</p>			
	<p>Document No.: EI027-FPA-VD-QC-PRO-008</p>		<p>Rev. R0</p>	<p>Page 8 of 17</p>

8.2.5. All the pigmented products shall be strained after mixing unless applicator equipment is provided with adequate strainers. Strainers must allow all pigments to pass through, but not any skin.

8.3. Thinning

8.3.1. No thinners are to be added unless necessary for proper application, thinning must never exceed supplier recommendations.

8.3.2. Thinners used must be those suggested by the supplier.

8.3.3. When use of thinner is authorized by the supplier, it shall be added during mixing. Applicators shall not be adding consistency. Thinners must be added under the guidance of the specialist who is thoroughly familiar with the quantity and type of added thinner.

8.3.4. Adding a small percentage of thinner will give no measurable difference in the film thickness. There are cases, however, when a higher degree of thinning is necessary and justified. It should then be kept in mind that adding thinner increases the quantity of liquid paint without contributing to the solids content. Consequently, a proportionally higher wet film thickness must be applied when adding any significant amount of thinner in order to obtain the specified dry film thickness.

$VS\% \text{ after thinning} = (VS\% \times 100) / (\% \text{ thinner added} + 100)$ above calculation is necessary to determination of wet film thickness that be used for obtaining of required dry film thickness.

9. Priming

9.1. Prepared surface should be primed generally within four hours or before visible re-rusting occurs. Cleaned surface shall never be left overnight prior to coating; in such case re-blasting or re-cleaning is necessary.

9.2. In order to minimize contamination between successive coat of paint, over coating of the preceding coat shall be done as soon as it is permitted by the particular specification, and not delayed beyond the period specified. When delays are unavoidable, the painted surface shall be thoroughly cleaned and dried to the satisfaction of company before over coating may take place.

9.3. Any primed surface which has been exposed for more than a few days will have become contaminated and should be cleaned down with fresh water and allowed to dry before over coating.





9.4. Although zinc rich primer is very effective in preventing rusting, extended exposure develops a surface contaminated of zinc corrosion products which rich impair the adhesion of subsequent coats. Zinc rich primers, both organic and inorganic which have been exposed long enough to develop white surface staining, should be prepared for over coating by one of the following methods.

-Light blast cleaning and dust removal.

-Wire brushing, followed by water washing.

-Scrubbing with fresh water, using bristle brushed.

9.5. The primer and finishing coat paint shall be from the same supplier for each system to ensure compatibility.

 	<p style="text-align: center;">Toase-eh Park Sanati Gohar Ofogh Petrochemical Co.</p> <p style="text-align: center;">CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE</p>		 	
	Document Title: Surface Preparation and Painting Procedure			
	Document No.: EI027-FPA-VD-QC-PRO-008		Rev. R0	Page 9 of 17

10. Painting

10.1. All painting shall be carried out in conformity with the specification and with the paint supplier's recommendation. Paint application shall also follow procedures covered SSPC-PA1"shop, field and maintenance painting.

10.2. Particular attention shall be paid to the supplier's instructions on storage, mixing, thinning and pot life, the paint shall only be applied in the manner detailed by the supplier, e.g. brush. Roller, conventional or airless sprays and shall be applied under the supplier's recommended condition.

Minimum and maximum time intervals between coats shall be closely followed.

10.3. Hand mixing of paints shall only be permitted for containers up to 5 liters. All larger containers shall be mixed by mechanical agitators and brought to a uniform consistency. Where pigment separation readily occurs, provision shall be made for continuous mixing during application.

10.4. Two-pack paints shall be mixed in strict accordance with supplier's instruction. The pot life such paints shall be specifically noted and any mixed paint, which has exceeded its pot life, shall be discarded irrespective of its apparent condition.






10.5. Painting shall not take place under adverse weather conditions:

- a) In particular rain, fog, snow or when such conditions are likely to occur before the paint has become dry.
- b) At temperature below 5° C.
- c) When the relative humidity is greater than 80%
- d) When the metal surface temperature is less than 3° C above the ambient dew point or above the manufacturer's limit.
- e) Outside daylight hours on exterior location.

10.6. The method of application shall be selected to ensure that the paint is applied in a uniform manner to the prescribed film thickness without any runs, sags or other blemishes. The pressure and volume of the compressed air used for spray application shall meet the work requirements and be free from oil and water contamination. Traps, separators and filters shall be emptied and cleaned regularly. Application of primers on wire brushed surface shall be by brush.

10.7. To ensure that the minimum thickness is achieved all angles, corner, bulkheads, weld, etc. such edges shall be stripe painted separately before applying the main system. Holding primers shall only have permitted where they are obtained from the same supplier source as the main priming coats and where the supplier is able to provide a full guarantee that satisfactory inter coat adhesion will occur.

10.8. Intervals between coats shall comply with supplier's recommendation and should generally, be kept to the absolute minimum in order to prevent contamination between coats. Where contamination occurs between coats,

 	<p style="text-align: center;">Toase-eh Park Sanati Gohar Ofogh Petrochemical Co.</p> <p style="text-align: center;">CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE</p>		   <p>Farnikan Engineered Solutions</p>	
	Document Title: Surface Preparation and Painting Procedure			
	Document No.: EI027-FPA-VD-QC-PRO-008		Rev. R0	Page 10 of 17

this shall be completely removed, generally by washing with a suitable detergent solution and rinsing with clean freshwater.

10.9. All points of damage to paint work incurred at any stage of work, shall be re-prepared

by blast cleaning or wire brushing to original standard and recoating with the specified priming coat to restore the film thickness.

10.10. The primed surfaces having mechanical damages or rusting inclusive of weld seam,

shall be prepared and treated by a powerful wire brushing to the degree St3 per standard ISO 8501-1:1988. The touch-ups shall than is done, using two pack epoxy zinc-rich primer in two coats, d.f.t.30 microns for each coat.

10.11. All points of damage to paint work incurred at any stage of the work, including shop

welding operation, shall be re-prepared by blast cleaning to the original standard and recoating with the specified priming coat to restore the film thickness. In all such instances preparation shall extend 25 mm into the sound paintwork and a further 25mm of sound paintwork shall be lightly blasted to etch the surface. Repainting shall then over the prepared surface and the etched paintwork. Where blast cleaning cannot be carried out, surface preparation of damage by scraping and power wire brushing is acceptable provided specific Purchaser gives approval. In such instance, modification of the originally specified primer may be necessary to suit the change method of surface protection.

Primer to finish layer paint material shall be supplied from same manufacturer. Subsequent coats shall be of a distinctly different shade. In case of using light colors for finish coat, the intermediate coat shall be selected with a proper color, in order to avoid any darkness in finish coat.

11. Inspection



11.1. Vendor shall advise the Purchaser Client / TPI inspector before commencing specific paint applications, and technical data sheet of paint supplier shall be available to inspector during paint application as well as this procedure.

11.2. Inspector shall have the right to inspect the paintwork at all stages and to reject any and all tools, instruments, material, staging or equipment of work which do not conform to the specification.

11.3. Each coat paint shall be free from defects and damage. Finished paint shall have the correct shade, degree of gloss and evens and be free from tack ness after drying/curing and free from cracks, holidays, runs, sags, wrinkles, patchiness brush or roller marks or any defects that may be deleterious to the quality of the coating.

11.4. Prior final acceptance of completed work, a joint inspection shall be made by vendor and Purchaser inspector and

an agreed inspection report to be signed by both parties.

	<p style="text-align: center;">Toase-eh Park Sanati Gohar Ofogh Petrochemical Co.</p> <p style="text-align: center;">CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE</p>			
	Document Title: Surface Preparation and Painting Procedure			
	Document No.: EI027-FPA-VD-QC-PRO-008		Rev. R0	Page 11 of 17

11.5. Before commencement of shop preparation and painting, a meeting between the coating supplier, vendor and responsible inspector (as per approved ITP) shall be convened, to establish and agree, when necessary, visible blast standard, blast profile, satisfactory application the coating and agreement and calibration of inspection equipment.

11.6. Each coat shall be inspected prior to application of the next coat, Areas found to contain runs, over spray, roughness, cracks or other signs of improper application shall be repaired or recoated in accordance with the authorized inspector recommendation.

12. Quality Control and Testing

12.1. Vendor shall submit to company for approval, his proposed quality control and testing procedures covering all phases of surface preparation and paint application.

12.2. suppliers of all materials shall supply test certificates of all tests performed and certificate of compliance stating that the material meets the requirements of the applicable specification.

12.3. Before paint application the prepared surface shall be inspected visually (checked by roughness gauge if needed) by Quality control inspector and if the result is satisfactory the parts can be released for painting.

12.4. Following test to be done after paint application.

-Visual check

-Thickness check

-Adhesion test

12.5. Thickness Check

- Dry paint thickness shall be measured with a magnetic probe, such as micro test of Elcometer or equivalent. It is imperative that the magnetic probe be calibrated for each thickness of coating steel support with a non-magnetic block whose thickness is as close as possible to the coating being checked.



- For the determination of dry film thickness, 22 measurements shall be taken in the respective area. The lowest and highest value shall be disregarded.

NOTE: Average of spot measurements \geq specified DFT

All individual measurements \geq 80% of specified DFT.

- For each successive coat, the minimal allowable thickness shall be at least 100% of the specified thickness; the maximum thickness shall not exceed 120% of the specified thickness. If the paint remains soft or shows mud crack or orange skin or wrinkling, the paint shall be rejected and request for new application.

In order to achieve the specified dry film thickness, frequent checks of wet film thickness shall be carried out during the paint application with film thickness gauges such as the Elcometer wheel or comb type.

	<p style="text-align: center;">Toase-ehe Park Sanati Gohar Ofogh Petrochemical Co.</p> <p style="text-align: center;">CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE</p>			
	Document Title: Surface Preparation and Painting Procedure			
	Document No.: EI027-FPA-VD-QC-PRO-008		Rev. R0	Page 12 of 17

12.6. Adherence Check

a) For final coating paint adherence shall be checked as per ASTM method D3359.

Method A (x cut) shall be-used for paint film thicker than 125 microns; Method B (Lattice pattern) shall be used for paint film up to 125 microns.

Test Method A: An X-cut is made in the film to the substrate.

Pressure-sensitive tape is applied over the cut and then removed. Acceptable rating is 5A (No peeling or removal) or 4A (Trace peeling or removal along incisions or at their intersections.)

Test Method B: A lattice pattern with either six or eleven cuts in each direction (cross cut) is made in the film to the substrate; Pressure-sensitive tape is applied over the lattice and then descriptions and illustrations. Spacing between the cut lines shall be 1mm for film thickness up to 50 microns and 2 mm for film thickness from 50 to 125microns.

Acceptable results are rate 5B (the edges of the cuts are completely smooth, none of the squares of the lattice is detached) or 4B (small flakes of the coating are detached at intersections; less than 5% of the area is affected). According to below table:

-If the test is unsatisfactory, the entire surface shall be blast cleaned and repainted.

-Adhesion of the total paint system shall not be less than 1.5 Mpa (15 kg/cm²) measured by pull off test. (As defined in ASTM D4541.






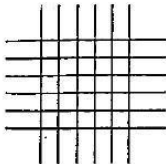
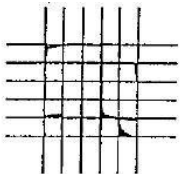
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	Document Title: Surface Preparation and Painting Procedure		Rev. R0	Page 13 of 17
	Document No.: EI027-FPA-VD-QC-PRO-008			

Table 1

CLASSIFICATION OF ADHESION TEST RESULTS ACCORDING TO ASTM D3359-02		
CLASSIFICATION	PERCENT AREA REMOVED	SURFACE OF CROSS-CUT AREA FROM WHICH FAKING HAS OCCURRED FOR SIX PARALLEL CUTS AND ADHESION RANGE BY PERCENT
5B	0% None	
4B	Less than 5%	

12.7. Inspection Results

All quality control results shall be written up into reports.

All reports shall be submitted to Purchaser / client for approval



12.8. Humidity Check

The relative humidity of the air shall be measured with a Psychomotor (according to ASTM E337). Surface preparation and/or paint applications operations shall not commence until relative humidity is more than 85%. Relative humidity shall be measured and recorded a minimum of six times a day whence two times before commencement of work. Moisture on the surface being prepared or painted shall be measured every day with a surface moisture indicator before beginning surface preparation operations or applying a coat of paint.

12.9 Roughness Check

Total angular roughness of the surface shall be measured and recorded after surface preparation. A minimum of two measurements or impression shall be made per square meter of prepared surface.

All surfaces shall be blast cleaned to obtain a total angular roughness as below:

	<p style="text-align: center;">Toase-eh Park Sanati Gohar Ofogh Petrochemical Co.</p> <p style="text-align: center;">CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE</p>			
	Document Title: Surface Preparation and Painting Procedure			
	Document No.: EI027-FPA-VD-QC-PRO-008		Rev. R0	Page 14 of 17

- Between 30 and 50 microns when total thickness of the coat of paint applied is less than 400 microns.
- Between 50 and 80 microns when total thickness of the coat of paint applied is greater than 400 microns.

Note: relevant test method is ASTM D 4417.

12.10 MEK Test

Test method for resistance of ethyl silicate (primer coating): in this method we use a solvent rub technique for assessing the MEK resistance of ethyl silicate zinc-rich primers the MEK resistance of some two-component ethyl silicate zinc-rich primers has been shown to correlate well with the cure of the primer as determined by diffuse reflectance infrared spectroscopy. the technique can be used in the fabricating shop.

13. Repair of Defects or Damage

13.1. Any defect of damage that may occur shall be repaired before the application of further coats and where necessary the particular surfaces made paint free. Remedial work shall be carried out prior to packing for shipment.

13.2. Areas where due to inadequately prepared surface solvent entrapment, excessive application of prime and/or finish coats, etc.

The tested paint system consistently fails to meet the required test standards for adhesion; the vendor shall remove the affected area by blast cleaning and shall reapply the full paint system to meet the required standard.

13.3. Area, which is to be over coated, shall be thoroughly cleaned free from grease, oil and other foreign matter and shall be dry. The surface shall then be prepared to the standard as originally specified (for large damaged areas), or prepared to the highest possible standard using mechanically operated tools (for small local damaged spots to 1 m²).

14. Paint System

- Paint system applicable shall be in accordance with tables 2,3

15. Attachments

Attachment 1.: Painting Inspection Report










 	Toase-eh Park Sanati Gohar Ofogh Petrochemical Co. CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE		  	
	Document Title: Surface Preparation and Painting Procedure			
	Document No.: EI027-FPA-VD-QC-PRO-008		Rev. R0	Page 15 of17

Table 2. ITEMS DESCRIPTION

Item No.	Operating Temperature °C		Insulation		Painting System		RAL No.
	Shell Side	Tube Side	Shell Side	Tube Side	Shell Side	Tube Side	
CHILLER	1.24 / 1	15.2 / 5	YES	YES	P1	P1	7038

Table 3. PAINTING SYSTEM FOR EQUIPMENT AND LEG

Painting System No.	Surface Preparation	Insulation	Coating	Painting Code	Paint type	No. of Layers	DFT (µm)	Total DFT (µm)
Painting System 1	SA 2 1/2	YES	Primer	-	Zinc Rich Epoxy	1	75	225
			Intermediate	-	Epoxy polyamide MIO filled	1	100	
			Top Coat	-	Aliphatic Polyurethane	1	50	

 				CONCEPTUAL, BASIC and DETAIL DESIGN ENGINEERING OF STYRENE PARK OFFSITE								 				Report No.:			
				PAINTING INSPECTION REPORT												Date:			
Req. No.:												MR.No.:							
Project No.:						Item No.:				Paint Specification No.:									
Paint Layer		As per Spec:			Humidity (%)	Amb. temp. °C		Surface Temp. °C		Dew Point (°C)	MEK.Test:		Adhesion		Total DFT µm	Measured DFT µm			Manufacture Batch No.
		Paint Type	DFT µm	Ral No.		Min.	Max.	Min.	Max.		Acc.	Rej.	Acc.	Rej.		Min.	Max.	Ave.	
Primer:																			
Inter.:																			
Finish :																			
JUDGEMENT: SATISFACTORY <input checked="" type="checkbox"/> UNSATISFACTORY <input type="checkbox"/>																			
FPA QC.					OWNER					TPI									
NAME:					NAME:					NAME:									
DATE:					DATE:					DATE:									
SIGNATURE:					SIGNATURE:					SIGNATURE:									



SURFACE PREPARATION INSPECTION REPORT



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