


							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY		
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items		
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.			
SDHT	TG0004	ME	VPRC	0405	010	04			PAGE 1 of 18

Surface Preparation, Painting and Coating Procedure for Air Cooler for all items

Code1	<input type="checkbox"/> Approved: Vendor shall issue "AFC"/ "FIN" status.				
Code2	<input type="checkbox"/> Approved as noted: Vendor to amend and submit the "Issued for Approval" status.				
Code3	<input type="checkbox"/> Commented: Vendor to amend and submit the "Issued for Approval" status.				
Code4	<input type="checkbox"/> Rejected: (vendor to resubmit with same revision)				
The above checking result by Purchaser shall in no way relieve Vendor of any liability, obligation and responsibility out of the purchase order and the mutual agreement in writing					
<div style="display: flex; justify-content: space-between; align-items: center;">  <div> Date: Dept.: Signature: </div> </div>					
Only for internal review					
CV	PI	EL	IN	ME	MA
ST	MC	PR	SF	HV	TC

04	21-Apr-2021	ISSUED FOR APPROVAL	M. Fararooie	M. Abbaszadeh	P. Karimizadeh
03	06-Mar-2021	ISSUED FOR APPROVAL	M. Fararooie	M. Abbaszadeh	P. Karimizadeh
02	09-Feb-2021	ISSUED FOR APPROVAL	M. Fararooie	M. Abbaszadeh	P. Karimizadeh
01	25-Agu-2020	ISSUED FOR APPROVAL	A. Tayebi	M. Abbaszadeh	P. Karimizadeh
00	15-JUNE -2020	ISSUED FOR APPROVAL	A. Tayebi	M. Abbaszadeh	P. Karimizadeh
REV.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED



DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY



DOCUMENT NO.

Surface Preparation, Painting and Coating Procedure for Air Cooler for all items



PAGE 2 of 18

[illegible]









 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 3 of 18

TABLE OF CONTENT

1. Scope.....	4
2. Reference	4
3. General Requirement.....	4
4. Surface Preparation	5
5. PREPARATION OF PAINT BEFORE USE.....	8
6. Painting Application	9
7. QUALITY CONTROL AND TESTING.....	10
8. PAINT SYSTEM	14

 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 4 of 18

1.scope

The following procedure covers the minimum requirements for all painting activities include surface preparation, paint system, application procedure and inspection tests for air cooler, that is based on SDHT-0000-ED-MC-SP-8002 (Job Specification for Painting) and will be applied to "Shiraz Oil Refinery Company (SORC) - distillate hydrotreating project (DHT)", with the following content.

2. Reference

SDHT-0000-ED-MC-SP-8002" Job Specification for Painting"

3. GENERAL REQUIREMENTS

3.1. All surfaces shall receive an appropriate paint system as specified according to the requirements of job specification for painting SDHT-0000-ED-MC-SP-8002 with reference to Appendix (A) with the following exceptions:

- Any equipment furnished completely painted by the manufacturer unless it is specially required to match a color scheme or to repair damage to the paint film;
- Weathering steel, monel, brass, copper, aluminum jacketing, unless it is specially required;
- Nameplates, code stampings and push-buttons;
- Surfaces to be fireproofed with cement mortar;
- Concrete, brickwork, tile, glass and plastics, unless specially required;
- Machined surfaces;
- Insulation weatherproofing material or jacketing;
- Rubber, hoses, belts, flexible braided connectors, stainless steel tubing and fittings, gages, valves, and motor shafts;
- And any surface particularly indicated as not to be painted.

3.2. All materials shall be supplied in the manufacturer's original containers, durably and legibly marked according to relevant Material Specification.

3.3. All mechanical activities include Fabrication, welding, PWHT, bolting... shall be completed before surface preparation begins.

3.4. All painting shall be carried out in full conformity with this Specification. Particular attention shall be paid to Manufacturer instructions on storage, mixing, thinning, induction period, pot life, application conditions, application technique and recommended time intervals between coats.

3.5. Neither paint is allowed to be used after its pot life nor shall the new material be added to any of old material left in the pot.

3.6. Unless otherwise defined by Client /Contractor, Paint shall not be applied under the following conditions:





- When the air temperature and/or substrate temperature is less than 3°C above the dew point (DP) of the surrounding air, and/ or the relative humidity (RH%) is higher than 90%;
- When the temperature is below 4°C;
- When the surface temperature is higher than 40°C;
- When there is the likelihood of an unfavorable change in weather conditions within two hours after coating;
- When there is a deposition of moisture in the form of rain, condensation, frost, etc., on the surface.

Each layer of paint shall be allowed to dry for a period of time within the limits prescribed by the paint manufacturer, before the next layer is applied.

3.7. Subsequent layers of a paint system shall have a difference in tint or color.

3.8. Sharp edges of metal, e.g. burrs and nibs, should be removed before painting, in accordance with BS 7079-A3 and strip coat shall be applied to the corners, edges, welds, etc. especially with respect to the specified minimum dry-film thickness.

3.9. During both application and drying, adequate ventilation shall be provided if the work area is

 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 5 of 18

enclosed.

3.10. All surface inaccessible after assembly shall be fully painted before assembly.

3.11. It shall be the responsibility of the vendor to coordinate work so that shop primed items are primed and painted with compatible coating, as specified according to Appendix A.

3.12. Coatings shall be applied by conventional and/ or airless spray in exact accordance with this Specification and/ or the manufacturer's instructions.

3.13. Paints include skins, sand or any foreign matters are not allowed to be used.

3.14. Two pack paints shall be carefully mixed in strict accordance with this Specification and/ or manufacturer's instructions. The pot life of such paints shall be carefully noted and any mixed paint which has exceeded its pot life must be discarded irrespective of its apparent condition

3.15. The application shall leave no sags, runs, wrinkles, orange peels, marks or other defects.

3.16. Drying and application time between coats shall adhere to the coating manufacturer's recommendations with temperature and humidity conditions taken into account, and shall generally be kept to the minimum in order to prevent contamination between coats. Where contamination occurs between coats, this must be completely removed, generally be washed per manufacturer's recommendation or otherwise with suitable detergent solution and rinsed with clean water. The paint surface shall be dry before over-coated application.

3.17. The greatest precaution shall be taken in the spraying of inorganic zinc primers to ensure proper cohesion and adhesion permitted care shall be take not to exceed the maximum film thickness. Inorganic zinc-rich paints shall be applied by airless spray. If the zinc powder is packaged separately, mix with the vehicle just before use. They shall be applied at a coverage rate recommended by Appendix A. Prior to top coating, a barrier or tie coat may be required for over coating with certain generic coatings. The manufacturer's recommendations shall be followed. Complete curing of the zinc-rich primer is necessary before top coating. Over spray shall be removed with a stiff bristle brush or wire screen. Popping will be eliminated by

scrapping the painted surface with a soft sand paper before over coating.

3.18. Any and all holes and surface imperfections shall be cleaned and filled in an approved manner before painting.

3.19. All equipment shall be maintained in good working order. Equipment shall be thoroughly cleaned daily. Worn parts shall be replaced. Effective oil and water separators shall be used and serviced regularly.

3.20. All points of damage to paintwork incurred at any stage of the work including site welding operations, shall be re-prepared to the original standard and recoating with the specified priming coat and finish coat to restore the film thickness. In all such instances preparation shall extend 25 mm into the sound paintwork and a further 25 mm of sound paintwork shall be lightly blasted to etch the surface. Repainting shall then cover the prepared surface and the etched paintwork.

3.21. Unless otherwise specified the minimum allowable time before application of intermediate or finish coat shall be three hours.





3.22. Maximum allowable time between application of intermediate and finish coat shall be as recommended by the paint manufacturer but shall not be less than eight hours.

3.23. Prior to any surface preparation and painting, dew point (DP) and relative humidity (RH %) shall be measured using whirling/sling hygrometer and DP calculator (or similar). The results obtained shall meet the requirements of the article 3.5. 3.23 Prior to any cleaning, surface preparation and painting, the contractor shall protect and mask equipment and areas in need of protection by suitable materials. Typical items to be masked are fire protection equipment, weld end preparations, atmosphere sensing head, vent on control equipment, spray head, lubrication points and flame traps.

4.SURFACE REPARATION

4.1. Pre-blasting Preparation

4.1.1. Prior to any cleaning, surface preparation or painting vendor shall protect and mask equipment and areas in need of protection. Care shall be taken with use of masking material

 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 6 of 18

to prevent possible malfunction of the plant. Typical items to be masked are fire protection equipment, weld end preparations, atmospheric sensing head, spray heads, vents and control equipment, flame traps, lubricated point and name plates.

4.1.2. Hard surface layers (e.g. resulting from flame cutting) shall be removed by grinding prior to blast cleaning. Sharp edges, fillets, corners, and welds shall be rounded or smoothened by grinding (minimum radius 2 mm)

4.1.3. The surfaces shall be free from any foreign matter such as weld flux, residue, rogue picks, oil, grease; salt etc. prior to blast cleaning. Where specified by Client /Contractor, all surfaces should be washed with clean fresh water and thoroughly dried prior to blast cleaning.

4.1.4. Any oil and grease contamination shall be removed in accordance with SSPC/SSPM Volume 2, grade SP1, prior to blast operations.

4.1.5. Any major surface defects, particularly surface laminations/ sliver, hackle, Surface pores, cavities and scabs detrimental shall be reported to Client /Contractor / engineer for the more assessment by NDT tests. Suitable agreed dressing shall be performed where allowed by Client /Contractor /engineer. Where such defects have been revealed during blast cleanings, and dressing has been performed, the dressed area shall be re-blasted to the specified standard. All welds shall be inspected and if necessary repaired prior to final blast cleaning of the area.

4.2. Blast Cleaning

4.2.1. Blasting operations shall never be allowed in the vicinity of painting work or near to a wet paint surface or anywhere that blast abrasive, grit or fall-out shall impinge on a freshly painted surface, or on any uncovered primed surface.

4.2.2. Blast cleaning operations shall not be conducted on surfaces that will be wet after blasting and before coating, when the surfaces temperature is less than 3°C above the dew point, when the relative humidity of the air is greater than 90%, or when the ambient temperature is below 3°C.

4.2.3. The maximum particle size of the abrasives used in blast cleaning shall not be larger than that passing through a 14-mesh screen B.S 410 Sieve Series. All abrasives shall be free from dust, moisture and salt. Blasting shall be continued till a uniform white metal surface is achieved.

4.2.4. Blast cleaning is permitted only during the day light.

4.2.5. Where rectification has been necessary on blast-cleaned surface, the particular area shall be re-blasted to remove all rust and slag, and to provide adequate paint adhesion.

4.2.6. Blast cleaning shall overlap by a minimum of 25 mm into any adjacent coated areas. Any steel work not primed and/or wetted by rain or moisture shall be re-blasted prior to being painted if rust develops.

4.2.7. Unless otherwise defined by Client /Contractor, all surfaces of steel works shall have a roughness (profile) within 30 to 75 microns. The profile shall be measured using testex replica tape or needle profile gauge in accordance with ISO 8503.





4.2.8. A qualified well trained operator shall be employed for the blast-cleaning job. The qualification of operator must be approved by Client.

4.2.9. Residual shot, grit and dust shall be completely removed after blasting, preferably by vacuum cleaning, but otherwise by oil and water free air blast or fiber brush.

4.2.10. Prepared surfaces shall be primed generally within four hours or before visible re-rusting occurs.

4.2.11. Sand is prohibited due to safety considerations. An alternative abrasive such as copper slag, garnet, shot, grit or similar shall therefore be used. It should be noted that all materials furnished and/or used by the vendor in connection with his blasting work shall be subject to inspection and approval by the Client/**Contractor** in order to assure the use of material of the type and quality meet the requirements of SSPC Vol. 1

4.2.12. All surfaces, after completion of the surface preparation and immediately prior to painting, shall be cleaned by air blasting using clean, dry, oil-free air or vacuum cleaner to ensure that all traces of abrasives and corrosion product are removed.

 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 7 of 18

5. PREPARATION OF PAINT BEFORE USE

5.1. Storage and Appearance

5.1.1. Paint shall be stored in a good ventilated room, free from excessive heat or direct rays of the sun and maintained at a temperature recommended by manufacturer in accordance with the appropriate fire regulations.

5.1.2. The maximum storage time for paints shall be as recommended by relevant Material Specification. Paints shall not be stored in open containers, even for a short time.

5.1.3. On operational sites, the storage methods and area shall be approved by Client /Contractor.

5.1.4. All paint materials consigned to the coating site shall be properly stored in accordance with the manufacturer instructions at all times to prevent damage and deterioration prior to use.

5.1.5. Paint shall not be used beyond the manufacturer's stated shelf life.

5.1.6. All containers of paint shall remain unopened until required for use. Those containers which have been previously opened shall be used first. The label information shall be legible and shall be checked at the time of use.

5.1.7. Paint which has settled, skinned, or otherwise deteriorated during storage shall not be used.

5.1.8. The oldest paint of each kind shall be used first.

5.1.9. All paints shall be prepared adjacent to the location where the painting work is to be carried out.

5.2. Preparation of Paint for Application

5.2.1. Mixing

5.2.1.1. All paints shall be mixed by powered mixers and/or mechanical agitator to ensure that no sediment is left. For 5 –liter containers or less hand mixing with the strong metallic paddle can be considered. In all cases, the manufacturer's instructions shall be followed. Paint shall not be mixed or kept in suspension by means of an air stream bubbling under the paint surface.

5.2.1.2. The condition of the paint shall be checked before preparation begins and any unsatisfactory materials shall be discarded.

5.2.1.3. All paints shall be prepared adjacent to the location where the painting work is to be carried out.

5.2.1.4. Any paint includes unusual skins; stiff past and solid settled portion shall not be used.

5.2.1.5. Mixing in open containers shall be done in a good ventilated area away from sparks or flames.

5.2.1.6. Multi components paint shall be mixed in accordance with manufacturer instruction manual/data sheets. Induction period and pot life shall be considered as restricted by manufacturer.





5.2.1.7. Multi component paints have a limited pot life which reflected in manufacturer data sheet. Paints of this type shall not be used after the stated pot life.

5.2.1.8. When a multi-component paint is being used, new material shall not be added to any of the old material left in the pot.

5.2.1.9. Paint which does not have a limited pot life (time interval) or does not deteriorate on standing may be mixed at any time before using, but if settling has occurred it shall be remixed immediately before using.

5.2.1.10. Paint shall not be used beyond the manufacturer's stated shelf life. 8.2.1.11 Catalysts, curing agents, activator or hardeners which are separately packaged shall be added to the base paint only after the latter has been thoroughly mixed. The proper volume of the catalyst shall then be slowly poured into the required volume of base with constant agitation. Where specified, special continuous mixing equipment shall be used in accordance with the manufacturer directions.

5.2.1.11. Paint's drums shall be rolled on its side for some minutes before opening. The entire paint content shall be poured into an empty clean drum or can, ensure that no heavy paste remains in the original container. If paste remains, some of paint shall be poured back and the mixture again stirred thoroughly and returned to the bulk.

 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 8 of 18

5.2.1.12. When mixing two-component paints, check and re-mixes each component individually. Then blend the two components at low speed until the mixture is completely uniform in color. Often, the two components are supplied in different colors so that a good mix can be readily determined. Unless stated by Client /Contractor, four or more components paints are not allowed to use.

5.2.1.13. Do not add thinner (solvent) to the paint unless permitted by manufacturer in specified percentage. When thinning the paint, first be sure that it is well mixed before adding the thinner. Then thinner shall be added slowly to paint during the mixing process.

5.2.1.14. Safety considerations shall be taken with the low flash point solvents according to the manufacturer MSDS.

6. APPLICATION OF PAINT

6.1. General

6.1.1. Paints shall be applied in accordance with Manufacture instruction, this Specification and good industrial practice.

6.1.2. Paint shall not be applied under the conditions described in 3.6. The paint film shall not be exposed to moisture and contamination before it has dried. Priming and painting under controlled condition in the shop is preferred.

6.1.3. The number of coats applied after priming and the total dry film thickness of paint will be determined by the requirement in respect to paint system and conditions with reference to Appendix A. The paint total thickness shall never be above 200% of the specified thickness.

6.2. Priming of Ferrous Metals

6.2.1. General

6.2.1.1. Prepared surfaces shall be primed generally within four hours or before visible re-rusting occurs.

6.2.1.2. In order to minimize contamination between successive coats of paint, over coating of the preceding coat shall be done within the period of time specified by the manufacturer and shall not delayed beyond the period specified. When delays are unavoidable, the painted surface shall be thoroughly cleaned and dried to the satisfaction of the Client /Contractor before over coating may take place.

6.2.1.3. The primer is applied by spray, except when the Client /Contractor prefers another method of application or required by the job and/or material.

6.2.1.4. Primed steelwork, especially if it has been exposed for a lengthy period, shall be examined carefully before further coats of paint are applied. If the primer has been deteriorated, e.g. is perished, eroded or poorly adhering, or has been damaged, so allowing corrosion to develop, the affected areas shall be re-prepared and primed. If there is evidence of widespread corrosion beneath the primer, it shall be removed and the surface again prepared and primed.

6.2.1.5. Paints shall not be applied when conditions in the working zone are such that the prepared surface is likely to become moist during the painting operation.

6.2.1.6. Stripe coating is necessary at edges, weld beads each where specified by Client /Contractor.





6.2.2. Priming of steel prepared by blasting

6.2.2.1. Unless otherwise specified by the Client /Contractor with reference to Appendix A, it is essential that the total film thickness of the priming coats (blast or pre-fabrication primer plus second primer) shall meet the prescribed thickness of 75 micron minimum in all area.

6.3. Shop Painting of Steel

6.3.1. Damage resulting from handling in the shop following painting, such as during storage or loading, is to be repaired as a part of the field painting operations. If the shop coat is damaged in fabrication, it shall be repaired before leaving the shop.

6.3.2. Contact surfaces shall be painted or left unpainted as specified in the procurement documents. Painting shall be performed by vendor in shop.

 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 9 of 18

6.4. Field and Touch-Up Painting of Steel

6.4.1. All shop coated items which have deteriorated as a result of transshipment to the extent that either crumbling or white staining of the coating is evident shall receive. A superficial sweep blast cleaning sufficient to remove the degradation and to re-prepare exposed degraded metal substrate and dust.

6.4.2. Surface preparation and painting shall be performed completely in shop and will be erected in field.

6.4.3. Surfaces (other than contact surfaces) of fabricated assemblies those are accessible before erection but which will not be accessible after erection shall receive all field coats of paint before erection.

6.4.4. All surface defects, such as surface lamination or inclusion must be referred to the Client /Contractor before any dressing is undertaken. All paints shall be applied in such a manner as to ensure a firmly adherent film, free from misses, tears, runs, sags, etc.

6.4.5. Wet paint shall be protected against damage from dust or other detrimental foreign matter as much as is practical.

6.4.6. Steel stored pending erection shall be kept free from contact with the ground and so positioned as to minimize water-holding pockets, soiling, contamination, and deterioration of the paint film. Such steel shall be cleaned and repainted or touched-up with the specified paint whenever it becomes necessary to maintain the integrity of the film.

6.5. Painting of Specific Surfaces

6.5.1. Contact surfaces

Unless otherwise specified by the Client /Contractor, the following practice shall be followed regarding painting of contact surfaces:

6.5.1.1. Steel to be completely enclosed in brick or other masonry shall be given at least one coat of shop paint.

6.5.1.2. The areas of steel surfaces to be in contact with wood shall be painted as indicated in 6.5.1.4.

6.5.1.3. Surfaces to be in contact only after field erection shall be painted as provided in 6.5.1.4, except where the paint interferes with assembly or where indicated in 6.5.1.6.

6.5.1.4. Steel surfaces not in direct bonded contact, but inaccessible after assembly shall receive the full specified paint system before assembly.

6.5.1.5. Bearing-type joints may be painted as required in 6.5.1.4.

6.5.1.6. Contact surfaces of members to be joined by high strength bolts in friction-type joints are a special case. Unless specifically authorized to the contrary, they shall be left unpainted and free of oil, grease, and coatings.





6.5.2. Edges

All sharp edges shall be coated to the same film thickness as the adjacent steelwork to prevent premature breakdown from this area. Corners, services, bolt heads and rivet heads require similar attention. Where there is any doubt that these areas have received adequate film thickness the Client /Contractor may direct that an additional strip coat of paint, be applied to ensure the full film thickness, without any additional cost to the Client /Contractor.

6.5.3. Welds

As rolled steel may be blast-cleaned and protected with blast primer before fabrication and welding. This prevents the serious development of rust, which would be difficult to remove after fabrication. The use of steel that has rusted heavily during storage should be avoided for the same reason. When welding metal coated or zinc-dust painted steel, it is necessary to remove the coating near the weld area, or mask-off the weld area before coating. Most painted steel can be cut and welded satisfactory provided that the coating thickness is less than 25 microns. After welding, scale and heat-damaged coating shall be removed by local blast-cleaning and the area renovated by repainting the original coating.

6.5.4. Zinc rich paints

 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 10 of 18

Inorganic zinc-rich paints shall not apply to the substrates have a service temperature above 60 ° C. Paint containing metallic zinc (Zinc rich paints) are not allowed to:

- ☐ Contaminate the stainless steel as this can cause embrittlement.
- ☐ Apply within 75 mm of any weld end preparation to avoid vaporization of the zinc during welding.

7. QUALITY CONTROL AND TESTING

7.1. Manufactures of all materials shall supply test certificates of all tests performed and a certificate of compliance stating that the material meets the requirements of the applicable specifications.

7.2. Test shall ensure that the quality of the surface coating is in accordance with that specified and shall include, but shall not be limited to, thickness testing, adhesion testing, holiday testing, abrasion testing, solvent testing, etc.

7.3. Humidity Check

The air's relative humidity and dew point shall be measured with a sling/whirling hygrometer or aspirated psychrometer and DP calculator. Surface preparation and/or paint application operations shall not commence until relative humidity is less than the limits set in paragraphs 3.6. Relative humidity shall be measured and recorded a minimum of six (6) times a day and two (2) 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.

7.4. Roughness Check

Testex replica tape or needle profile meter shall be used in determining anchor pattern of abrasive blasted surfaces (30-75 micron), or when a fixed anchor pattern rang is required by a specific painting system.

7.5. Thickness Check





Dry paint thickness (DFT) shall be measured by the nondestructive methods using capable electronic or nonelectronic gauge. 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. Special gauge may need for measuring of the nonferromagnetic coat thickness containing magnetic particles (e.g. MIO). Each coat's thickness and total thickness shall be checked. Make five (5) separate spot measurements spaced evenly over each section of the structure 10 square meters in area (divide the entire surface in 10 square meter areas). On each spot, make 3 readings by moving the probe a short distance for each new gage reading. Discard any unusually high or low gage reading that cannot be repeated consistently; Take the average of the three (3) gage readings as spot measurement. When specified by Client /Contractor, paint thickness shall be measured by destructive test using P.I.G or similar. Tested area shall be subsequently touched up as mentioned before.

Inorganic Zinc Silicate:

Before over coating it shall be checked, with the solvent recommended by the paint manufacturer, that the hydrolysis is complete by soaking the surface with a rag impregnated with the recommended solvent. Thickness checking shall be made after the application of the zinc silicate coat. Thickness shall be in the range 50 to 90 microns. For each successive coat, the minimal allowable thickness shall be least 80% of the specified thickness; the maximum thickness shall not exceed 150% of the specified thickness. For the total system, the minimal allowable thickness shall be at least 80% of the specified thickness, the maximum thickness shall not exceed 150% of the specified thickness unless the paint remained soft or shows mud crack or orange skin or wrinkling pinhole and inter coat delaminating which cause rejection of the paint. Surfaces with coat thickness out of tolerance shall:

- Be abrasive blasted if too thick and repainted.
- Receive and additional paint coat to obtain specified thickness.

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

 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 11 of 18

7.7. In the event of the film thickness not meeting the specified requirements, additional coat (s) of the paint concerned shall be applied in compliance with the specified requirements.

7.8. The degree of curing of epoxy resin based paint systems shall be checked by the determination of the resistance of the coating to methyl ethyl ketone (MEK). After rubbing the coating for one minute with a rag soaked in MEK, the coating shall not be softened and shall resist scraping with a fingernail. Coating integrity shall be checked with a direct current holiday detector. Continuity of the internal coating (lining) with a thickness up to 500 microns shall be checked using a low voltage pinhole detector. The electrode shall consist of an suitable cellulose sponge soaked in a 1% detergent solution in potable water.

The instrument shall be calibrated and checked every hour to indicate a coating porosity of 80 000 ohms under a voltage of 67.5 volts between the ground and wet sponge a resistance of 90 000 ohms indicates no porosity. Sponge displacement speed on the surface shall not exceed 0.3 meters per second (18 meters per minute). The sponge shall be moved back and forth so that it passes over the same area twice. The measurement is taken on the second pass. A minimum of ten percent of the painted surface shall be examined. If there is any porosity, the area shall be repainted and the inspector or Client /Contractor representative shall have the entire painted surface inspected. For the lining with the thickness above 500 microns, current high voltage holiday detector shall be used. In this case, the voltage between the painted steel surface and the test electrode shall be calculated as maintained 5 volts per one micron of paint coat thickness. The inspector shall mark defective areas for repair. Any porous area shall be repaired when the number of pores is greater than 3 per square meter, the entire area shall be blast cleaned and repainted as per this specification.

7.9. Adherence Check

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 films 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 is made in the film to the substrate, pressure-sensitive tape is applied over the lattice and then removed, and adhesion is evaluated by comparison with descriptions and illustrations.

Spacing between the cut lines shall be 1 mm for film thickness up to 50 microns and 2mm for film thickness from 50 to 125 microns. 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, if the test is unsatisfactory, the entire surface shall be blast cleaned and repainted.

Recoating after this destructive test is at the Applicator's expense.

Coating film should be inspected visually after each layer application and/or before application of the next coat in order to verify that the whole surface is free of defects as:

- Mud-cracking/Alligatoring
- Inclusion and cleanliness
- Pinhole/Holidays
- Bubble
- Mechanical damage
- Runs/sags/tear/curtains
- Over spray
- Orange peeling
- Wrinkling
- Chalking
- Bleeding

 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 12 of 18

7.10. Extent of Inspection

In view of the final acceptance, the extension of the inspection shall be as hereinafter indicated and shall be referred to the following steps of work:

Primed surfaces

Complete painted surfaces.

Paint application shall not be started before previous coat/preparation is inspected and approved.

Inspection shall be carried out in accordance with the relevant ITP/SIP/FIP which specified and confirmed by the Client /Contractor.

All inspection results can be written up into report sheets. All reports shall be submitted to the Client /Contractor during provisional acceptance of the paint.

7.11. Repair of Defects or Damage

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

Failed painted areas due to inadequately prepared surfaces, solvent entrapment or wrinkling, out of range thickness, bleeding, lack of curing after stated time, mud/alligator cracking, chalking, the significant number of spots/rashes rust, incomplete paint systems missed primer/ mid-coat/curing agent lack of required adhesion/ cohesion, delaminated paints, lifted/detached paints, shall be entirely re-blasted and re-painted with the full paint system by contractor to meet the required standard.

Areas which are to be over coated shall be thoroughly cleaned free from grease, oil and other foreign matter and shall be dry. The surfaces shall then be prepared to the standard as originally specified (for large damaged areas), or prepared to the highest possible standard using powered operated tools (ST3)

Subsequently additional compatible coats shall be applies, until they meet the specification.

These additional coats shall blend in with the final coating on adjoining area.

During the agreed maintenance period, any observed defective coatings, rusted areas or failures developing in the paint systems, shall be repaired to the satisfaction of the Client /Contractor inspector.

When factory painted or painted surfaces have been marked in handling, the damaged paint and nonadherent paint shall be removed and the surface thoroughly cleaned.

The edges on the damaged area shall be smoothed. Surface preparation shall extend approximately 5 cm into the sound coat. The primer and finishing coats shall be applied in accordance with Article 6.

Where touch up of a shop applied inorganic zinc silicate primer is involved, the type of paint employed for touch up shall be ethyl silicate based inorganic zinc primer.

Note:





If abrasive blasting is not applicable for any reason to be agreed upon by Client /Contractor or his representative, zinc silicate primer shall not be used for touch up repairs. Zinc rich 2 components epoxy primer or an approved epoxy primer formulated for application on hand or mechanically brushed surfaces should be used instead. The touch up primer shall be compatible with the paint system.

7.12. Manufacturer's shop or field applicator shall submit check certified for the following point:

- Surface profile/degree of cleanliness check
- Verification of paint documentation
- Environmental conditions during application
- Curing check
- Paint faults check
- Adhesiveness cross-out check

Note:

- Acceptable surface profile shall be in accordance to the technical data sheet of the product.

 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 13 of 18

2) Adhesion degree of each product shall be as for ASTM D-3359 and shall be specified by the paint manufacturer and approved by Client /Contractor. After the test, the surface shall be repaired in accordance with the system applied.

7.13. Contractor reserves the right to witness at manufacture's shop in spot for type/lot the following inspections and test.

1) Blasting and primer system:

a) Surface profile/degree of cleanliness/appearance

b) Verification of primer documentation

c) Verification of paints maturity

d) Paint faults check

e) Adhesiveness cross-cut check





2) Painting complete system

a) Verification of paint documentation

b) Verification of paint maturity/thickness

c) Appearance film check

7.14. If during the above mentioned inspection, painting defects (such as dripping, blistering, mud- cracking, over thickness and dry spray) or conditions of preparation, thickness, bond etc, should be found not to be conforming to the requirements, the manufacturer's shop or field applicator at his own expense restore the faulty surfaces to an acceptable degree.

 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 14 of 18





APPENDIXA: PAINT SYSTEM

Item: Header Box for TAG No. AE-1502 & 1503			Maximum Operating Temperature: 121 to 200 ° C	
Minimum surface preparation			SA3	
Paint and DFT (microns)	Primer	Zinc-Silicate Paint (IPS-M-TP-210)	75	
	Intermediate	Silicone Acrylic (IPS-M-TP-168)	25	
	Finishing	Silicone Acrylic (IPS-M-TP-168)	25	
Total DFT (microns)			125	

Item: Header Box for TAG No. E-3201 & 3202			Maximum Operating Temperature: up to 120 ° C	
Minimum surface preparation			SA3	
Paint and DFT (microns)	Primer	Zinc Rich Epoxy (IPS-M-TP-205)	75	
	Intermediate	Epoxy Polyamide (IPS-M-TP-220)	150	
	Finishing	Two-Pack Polyurethane (IPS-M-TP-235)	50	
Total DFT (microns)			275	

Item: Steel structures without fireproof: Ladder, hand rail, side frame, platform, plenum, fan ring for TAG No. AE-1502 & 1503, all steel structures, plenum, fan ring and side frame for E-3201, E-3202			Maximum Operating Temperature: Up to 120°C	
Minimum surface preparation			SA 2 1/2	
Paint and DFT (microns)	Primer	Zinc Rich Epoxy (IPS-M-TP-205)	75	
	Intermediate	Epoxy polyamide (IPS-M-TP-220)	150	
	Finishing	Two-Pack Polyurethane (IPS-M-TP-235)	50	
Total DFT (microns)			275	

Item: all fire proof steel structures: (beam, column, brace, pipe supports) for TAG No. AE-1502 & 1503 & AE-1501			Maximum Operating Temperature: Up to 120°C	
Minimum surface preparation			SA 2 1/2	
Paint and DFT (microns)	Primer	Inorganic zinc silicate	60	
	Intermediate	-	-	
	Finishing	Epoxy polyamide (IPS-M-TP-220)	30	
Total DFT (microns)			90	

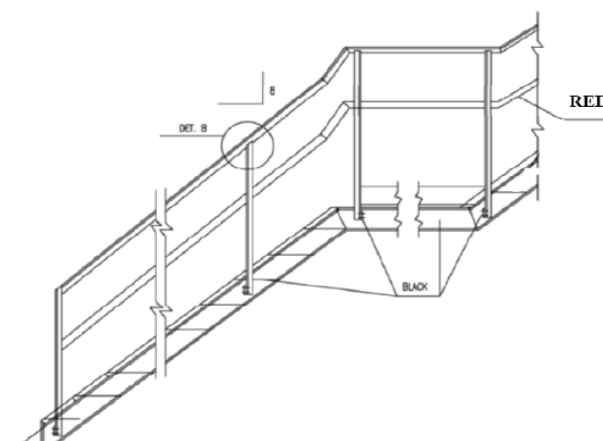
 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 15 of 18




Item: Steel structures without fireproof: Ladder, hand rail, side frame, platform, plenum, fan ring for TAG No. AE-1501			Maximum Operating Temperature: Up to 120°C	
Minimum surface preparation			SA 2 1/2	
Paint and DFT (microns)	Primer	Polyamide cured epoxy primer	75	
	Intermediate	Epoxy polyamide (IPS-M-TP-220)	150	
	Finishing	Two-Pack Polyurethane (IPS-M-TP-235)	50	
Total DFT (microns)			275	

Finishing RAL	Exchangers and air cooler header box (AE-1502, AE-1503)	9006, Aluminum
	Exchangers and air cooler header box (AE-3201, AE-3202)	9010, White
	Main steel structures and side frame	1011, Brown beige
	Handrails (excluding toe plate and mid rail), Stair way (excluding toe plate and mid rail), Upper ladders and round platforms and top rails	9017, Black
	Handrails (toe plate and mid rail), Stair way (toe plate and mid rail), Safety gates, Platforms lower edges and toe plates, mid rails and safety platforms	3020, Red

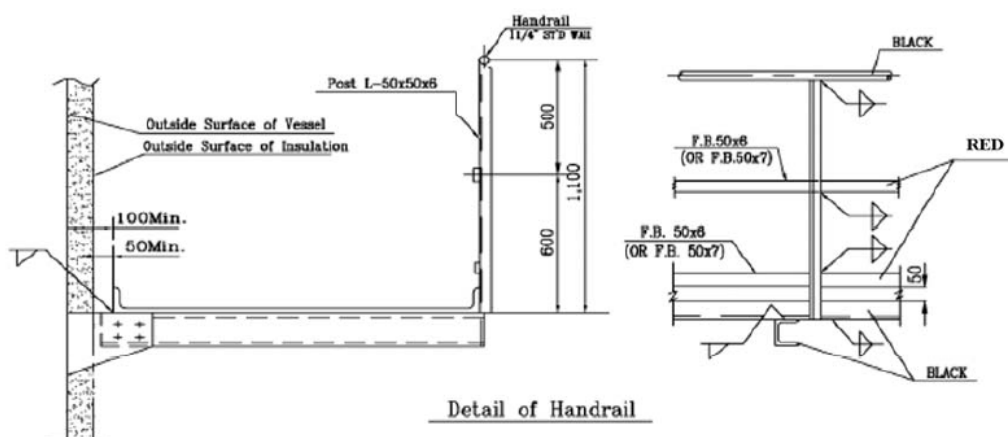
STAIRWAY

- STAIRWAY (EXCLUDING TOE PLATE AND MIDRAIL) - BLACK RAL 9017
- STAIRWAY (TOE PLATE AND MIDRAIL) - RED RAL 3020



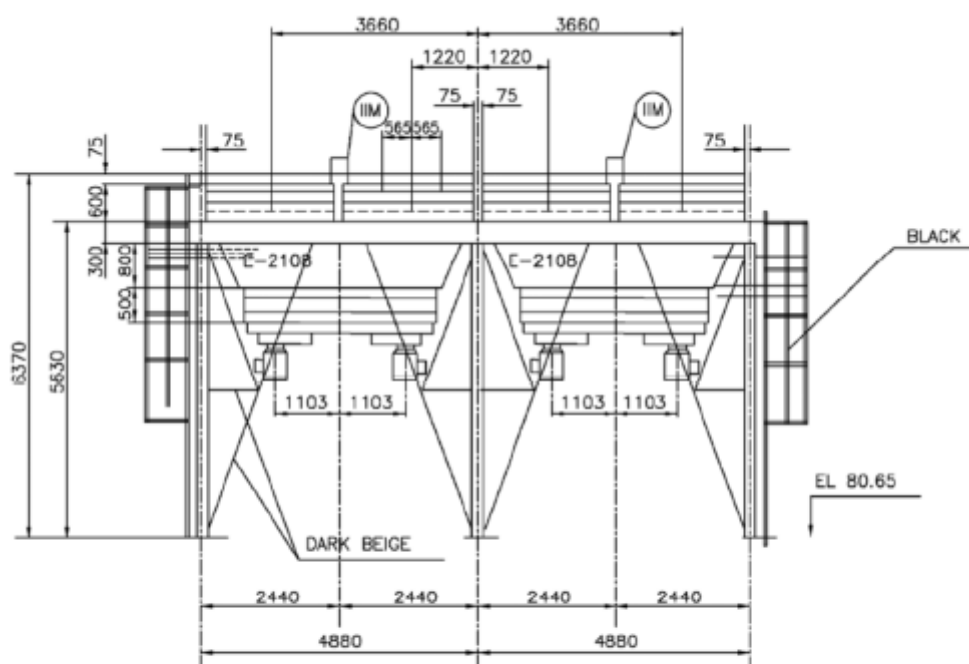
<div></div> <div></div>							<div>DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY</div>		<div></div> <div>شرکت طراحی و ساختمان نفت OIL DESIGN & CONSTRUCTION CO.</div>	
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items		<div>AAC</div>	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.				
SDHT	TG0004	ME	VPRC	0405	010	04			PAGE	16

HAND RAIL






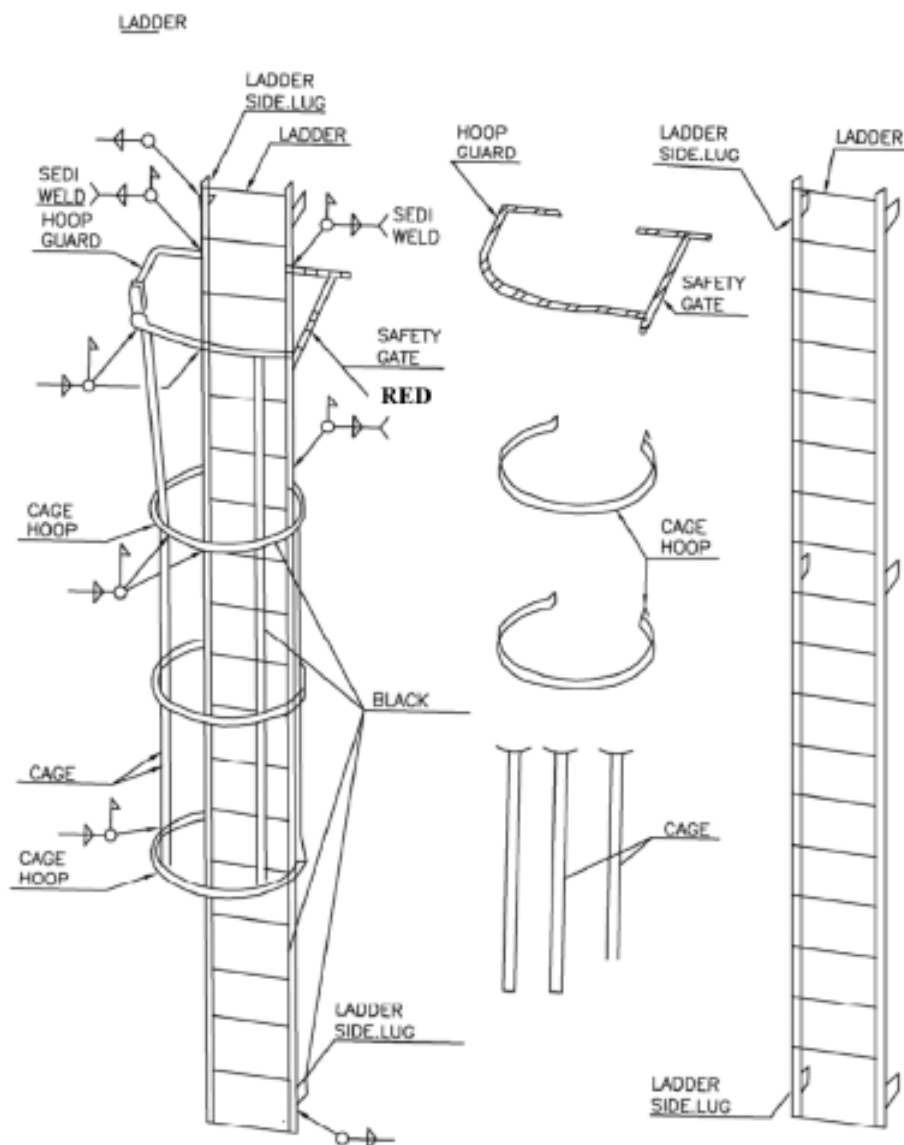
- A) TOE PLATE AND MIDRAIL (RED RAL 3020)
B) ALL THE OTHER PARTS (BLACK RAL 9017)

AIR FIN COOLER







FIRE PROOFED STRUCTURE (NO PAINT)
REMARKED BLACK (RAL 9017)
DARK BEIGE (RAL 1011)





 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	 شرکت طراحی و ساختمان نفت OIL DESIGN & CONSTRUCTION CO.
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	AAC
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 17 of 18



- LADDER (ALL BLACK RAL 9017)
- SAFETY GATE OR SAFETY DEVICE (RED RAL 3020)

 							DISTILLATE HYDROTREATING PROJECT SHIRAZ OIL REFINERY	 شرکت طراحی و ساختمان نفت OIL DESIGN & CONSTRUCTION CO.
DOCUMENT NO.							Surface Preparation, Painting and Coating Procedure for Air Cooler for all items	
Proj.	PO.No.	Disc	Type	Tag No.	Ser. No.	Rev.		
SDHT	TG0004	ME	VPRC	0405	010	04		PAGE 18 of 18

Attachment 1

  						
		Quality Control			Report No.:	
Painting Report		Date Of Exam.:				
PROCEDURE No. : DOCUMENT NO. : SAND BLAST : TOTAL PRIMER : THK : INTERMEDIATE : THK : FINISHING : THK : FINISH COLOR : Temperature : Humidity : Dew point temp :						
ITEM NO:						
S.S. No.	Description	THK(mic)	Result	Date	TIME	Curing & adhesion
1	Sand Blast					
2	Primer					
3	Intermediate					
4	Finish					
Note:						
AAC QC		CONTRACTOR QC		CLIENT/MC		TPI INSPECTOR
NAME & SIGNATURE						
Qualification						
DATE						