IRUP

STANDARD CONSTRUCTION SPECIFICATION

FOR

PAINTING WORKS

DOC. NO. : O-301-A

PROJECT NAME : Residue Upgradation and MS / HSD Quality Improvement Project

JOB NO. : 6235

OWNER : INDIAN OIL CORPORATION LIMITED

VADODARA,GUJRAT

0	20.07.2006	FIRST ISSUE FOR ENQUIRY			
REV.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY

TOYO INDIA

TOYO ENGINEERING INDIA LIMITED
MUMBAI

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1.0 GENERAL

1.1 Scope

1.1.1 This Construction specification covers the requirements for painting of all equipments, piping, steel structures etc. for Residue Upgradation and MS / HSD Quality Improvement Project at Indian Oil Corporation Limited, Vadodara, Gujarat, India. M/s. IOCL have appointed Toyo Engineering India Ltd as "Project Management Consultant " (PMC).

It also explains the method of surface preparation, painting systems, procedure for painting and inspection requirements.

1.1.2 This Specification shall be applied to painting work for this Project. The Contractor shall complete the work in all respects with the best quality of materials and workmanship and in accordance with the best engineering practice and instructions from PMC.

1.1.3 This standard specification shall not apply to the following painting work.

(a) Painting to be carried out based on manufacturer's specification.
(b) Repainting.
(c) Painting of temporary installation.
(d) Painting using methods other than general methods such as brushing and spraying.
(e) Coating and Lining.

1.2 Specific Job Requirements

Where specific job requirements are in contradiction to this specification, specific job requirement shall govern.

1.3 Codes and standards

1.3.1 The applicable codes and standards reference in this specification shall be as follows :

(1) (a) ASTM : American Standard Test Methods for Paints and coating.

(b) ASA.A 13.1-1981 : Scheme for identification of piping system.

(2) Steel structure painting council (SSPC-SP) – American Standard.

(3) Swedish standards institution – SIS-05-5900-1967 for surface preparation.

(4) Indian standards.

(a) IS-101 : Methods of test for ready mix paints and enamels.

(b) IS-2379:1990 Pipe line identification colour code.

1.3.2 If there is any conflict between the requirements of the above mentioned codes and standards and this specification, the requirements of this Specification shall prevail. All conflicts shall be referred to PMC for resolution before proceeding with the work.

1.4 Definition

For the purpose of this standard specification, the following definitions shall be applied.

1.4.1 Plant facilities :

Facilities which comprise various types of plants related to energy, chemical industry and protection of environment etc. . These include equipment (e.g. towers, columns, vessels, including combustion equipment), machines, piping, storage tanks, steel frames, stacks, ducts, electrical equipment, instrumentation equipment etc.

1.4.2 Substrata surface :

Surfaces of items to be painted, which, however, have not yet been prepared for painting.

1.4.3 Painting surface :

Substrata surface prepared to receive paint or paint film-surface to receive subsequent or additional coating.

1.4.4 Painting system :

Combination of paint films, including surface preparation, from prime coating to finish coating, in order to satisfy the intended purpose and effectiveness of painting.

1.5 Qualification

Persons who are engaged in painting work shall be fully trained and shall have the qualification of the employer. Certificate, or qualification issued by Authorities are desirable.

2.0 PAINTING SURFACES

2.1 Surfaces to be painted

The exposed surfaces of the following equipments/ items shall be painted.

2.1.1 Exposed surfaces of :

(a) Structural steel for pipe racks, equipment supporting structure etc.

(b) All Piping and Equipments such as columns, vessels, tanks, heat exchangers etc, . (Insulated & uninsulated, and C.S.& S.S).

(c) Steel piping and pipe supports

(d) Ladders, handrails, platforms, stairways etc.

(e) Instrument and electrical panel boards

(f) Valve, relief valves

2.1.2 Surfaces of rotating machinery and the like, except for rotating and sliding contact surfaces.

2.1.3 Part or entire surfaces of items, requiring rust and corrosion protection.

2.1.4 External surfaces of stainless steel equipment, storage tanks, piping etc. to be covered with hot insulation materials, of which operating temperature is upto 500^0C.

2.2 Surface not to be painted

The surfaces of the following shall not be painted.

2.2.1 Internal surfaces of pipes, equipment, etc. and internal surfaces of closed steel structures which do not require chemical, acid and alkali resistance.

2.2.3 Surface of steel structures to be fire-proofed with concrete or mortar covering.

2.2.4 Surfaces of steel structures embedded or in contact with concrete or mortar.

2.2.5 Interior wall surfaces of furnaces, boilers, etc. heating tubes and portions with heat resistant treatment.

2.2.6 Materials with high resistance to corrosion, such as stainless steel and anti weathering steel, except the stainless steel surface of equipment, storage tanks, piping etc. to be covered with hot insulation materials, of which operating temp. is upto 500^0C.

2.2.7 Galvanised steel materials such as gratings, piping, handrails etc.

2.2.8 Friction surfaces to be connected with high tensile strength bolts.

2.2.9 All imported equipments shall be duly final painted before despatch to site, incase of any damage touch up will be carried out at site as per painting procedure. In case of indigenous, equipment shall be applied primer at shop and final paint at site as per painting specification enclosed.

2.2.10 High Pressure Steam Piping not to be painted.

3.0 PAINTING SCHEMES

3.1 Painting system for Equipment, Piping and Steel structures

3.1.1 Painting system for Equipment, Piping and Steel structure are listed in Annexure II.

3.1.2 In case painting system is not applicable due to special environment such as salt water immersion, chemical exposure, chemical immersion etc. Vendors specification or practice may be applicable subject to PMC's prior written approval.

3.1.3 The final colour shall be as per Colour code given in Annexure III. Ground colour shall be applied through out the length of pipes., and on metal cladded insulated lines, minimum 2 M long portion should be painted. Colour bands shall be applied in the following points.

(a) At battery limit points.

(b) At start and terminating points.

(c) At intersection points, change of direction points, junction joints of service, appliances ,Midway of Piping section, near valves,across culverts,etc.

(d) For long stretch piping, at 50 metres interval.

3.1.4 Minimum width of the colour band shall be as follows :

a)	3" NB and below	--	75 mm.
b)	Above 3" NB upto 6" NB	--	NB X 25 mm.
c)	Above 6" NB upto 12" OD	--	NB X 18 mm.
d)	Above 12" OD	--	NB X 15 mm.

The relative width of the first colour band to the subsequent band shall be 4:1.

3.1.5 Flow direction shall be indicated by an arrow in the above locations as per para 3.1.3. Colours of arrow shall be black or white in contrast to the colour on which they are superimposed.

3.1.6 Product name shall be marked at pump inlet, outlet and battery limits. Line number shall be stencilled in black or white on all the pipe lines in more than one location. Size of the letter shall be 40 mm to 150 mm as per the size of pipe. Equipment number shall be stencilled in all equipments in black or white letters of 150 mm size.

3.1.7 Wherever deemed required by Process Department or safety, pipes handling hazardous substances will be given hazard marking of 30 mm wide diagonal stripes of Black and Golden Yellow as per IS : 2379.

3.1.8 Identification Markings on Equipment / Piping.

Equipment tag Numbers shall be Stenciled / neatly painted using normal 'Arial' Lettering Style on all equipment and piping (Both insulated & uninsulated) after completion of all paint works. Lettering colour shall be either BLACK or WHITE, depending upon the background, so as to obtain good contrast.

Operations Group shall specify location.

Sizes shall be:

Columns, Vessels, Heaters:	150 mm
Pumps and other M/c	50 mm
Piping	OD / 2 with Maximum 100 MM.
Storage Tanks	(As per Drawings)

4.0 PAINTING PROCEDURE

4.1 Treatment prior to surface preparation

The following work shall be carried out prior to surface preparation.

4.1.1 Remove slag, flux and spatter adhered to weld and steel surfaces.

4.1.2 Where substances such as grease and machine oil are found on the surface, remove them with cleaning solvent or other appropriate methods.

4.1.3 Remove excessive rust and dirt using appropriate methods.

4.2 Surface preparation

4.2.1 Surface preparation shall be carried out by appropriate methods that will ensure the required grade of finish. Procedure and degree of surface preparation are shown in Annexure 1 "Classification of Steel Surface Preparation ".

One or more of the following methods of surface preparation shall be followed, depending on the condition of steel surface, to achieve maximum durability.

a) Shot Blasting as per SA 2 .5
b) Mechanical or power tool cleaning (as specific requirement).
c) High pressure water blast cleaning with or without abrasives.

4.2.2 Restrictions concerning surface preparation and protective measures :

(a) In case of rain or bad weather, surface preparation shall not be carried out outdoors.
(b) When the surface substrata is wet, preparation shall not be carried out.
(c) When the relative humidity is 89 % or higher, surface preparation shall not, in principle, be carried out.
(d) When surface preparation is carried out during the night or in dark locations (inside of tanks, etc.), proper lighting arrangements shall be made to check the extent of rust removal from the surface.

(e) When blast cleaning is to be carried out at the job site, appropriate protective measures shall be taken to ensure prevention of adverse effect of dust on adjacent work or environmental pollution in the surrounding area.

(f) Iron grids used for blasting shall be approved by PMC before commencement of work.

4.2.3 Surface shall be air-blast cleaned by using A1203 particles, chilled cast iron or malleable iron, or by sand blasting where grit blasting is not possible.

4.2.4 Surface preparation is considered very important since the performance of any paint system is directly related to the level of surface preparation adopted prior to painting.

4. 3 Treatment after surface preparation

After the completion of surface preparation, the surfaces are to be checked for the following prior to commencement of painting.

4.3.1 When rusting occurs after completion of surface preparation, surface preparation of the rusted area shall be carried out again, by using appropriate methods, prior to painting.

4.3.2 The painting surface shall be fully cleaned of mill scale, rust, and loose dust accumulated on the surface, due to the surface preparation work.

4.3.3 The painting surfaces (cleaning of which has already been completed) shall be kept clean in such a way as to prevent the adherence of grease, oil, dust and other detrimental materials until the painting work is started.

4.4 Painting

4.4.1 Protection

Contractor shall fully protect all equipments, piping, walls, floors and other surfaces from damage and contamination, and shall provide the necessary protection required to fully protect all surfaces from dust, paint droppings, paint mist, other contaminants during the process of painting work. Care shall be taken to protect all stainless steel surfaces from Zinc Paint.

4.4.2 Mixing of paint

(a) Paint shall be thoroughly stirred before use.

(b) For multi-liquid type paint, the specified mixing ratio and pot life shall be observed.

4.4.3 Application

(a) Painting shall be done either by brushing or by spraying.

(b) Painting tools, suitable for the paint work shall be used according to manufacturers recommendation and as per work location, environment, shape of the items to be painted, and condition of surface to be painted.

(c) Each coat shall be painted in the order specified in the painting system. During painting, the overcoat intervals and films thickness specified, shall be maintained as per manufacturer's recommendations and according to the properties and performance of the paint.

(d) Where each coat is applied successively, such continuous painting work shall be carried out after the lapse of specified drying time and drying of previous film has been confirmed.

4.4.4 Restrictions

Unless special measures are taken, painting shall not be carried out under the following conditions :

(a) When the painting surfaces are moist or likely to become moist due to rain, snow, dew or frost.

(b) When the temperature during painting is 4.4 ^{0} C or lower and is not suitable for drying and hardening of paint.

(c) When the relative humidity is 89 % or more.

(d) When the temperature of painting surfaces is high and defects such as air bubbles may occur in the paint film.

(e) When a strong wind is blowing and foreign materials such as sand may adhere to the paint film.

5.0 FIELD SAFETY AND HYGIENE

5.1 Industrial hygiene and safe working practice in connection with the painting work shall be strictly followed to avoid potential hazards to health and of fire.
Special care shall be taken with regard to the following matters :

5.1.1 When surfaces are to be prepared by blast cleaning or with the use of power tools, protectors such as goggles, mask etc. shall be used.

5.1.2 When painting work is to be carried out using organic solvent in an almost airtight environment, appropriate ventilating and lighting equipments shall be provided. Additionally, appropriate protectors such as gas masks etc. shall be worn.

5.1.3 Monitor for any fire around the work location and extinguish the fire prior to work, if observed.

6.0 FIELD STORAGE AND CONTROL OF PAINT

6.1 Storage

6.1.1 As a rule, paint shall be stored in a well-ventilated room, constructed to the appropriate standard of fire resistance.

6.1.2 All paint and thinner shall be stored in such a way that the manufacturer's labels can be readily identified.

6.1.3 Paint stocks shall be controlled so that they can be used within their effective period of use.

6.1.4 For storage areas, provide prescribed protective measure and signs. Paint exceeding the prescribed quantity shall not be stored.

6.1.5 Care shall be taken while storing and handling to avoid breakage or marked deformation of containers.

6.1.6 When paint is stored outdoors, it shall be protected by using plastic/tin sheets or other appropriate measures, in order to prevent damage to containers or changes in the quality of the paint.

6.1.7 When paint is temporarily stored in the working area, the amount equivalent to one day's use or less shall be stored. Paint shall be protected from rain, snow etc, using plastic/tin sheets.

7.0 INSPECTION

7.1 Inspection of surface Preparation

The prepared surfaces shall be compared with the standard photographs of SIS, IS or SSPC. Where the prepared surfaces are found to be equivalent to those indicated in the above standard photographs, they shall be deemed acceptable.

7.1.1 Appearance of paint film

Paint film shall be visually checked with regard to the following :

- Unfinished surface, drips, wrinkles, blistering, peeling, cracking, crawling, discoloring, stains, pinholes and spraydust.
- Where there are no marked defects in appearance, the paint film shall be deemed acceptable.

7.1.2 Paint film thickness (DFT)

(a) Film thickness shall be measured with appropriate measuring instruments, duly calibrated. Contractor shall provide measuring instruments of appropriate ranges for measuring the dry film thickness.

(b) As a rule, film thickness shall be measured at the shop or field for the total dry film thickness (DFT).

7.1.3 Number of measurements and measured values :

(a) The number and position of measurements shall be determined with due consideration given to the size and shape of items to be painted.

(b) Measurements shall be carried out three times at each measuring point. The average of three measurements shall be taken as the measured value for the item concerned.

7.2 Acceptance (DFT)

When the measured values satisfy the following requirements, they shall be deemed acceptable :

(a) Average of measured film thickness is 90 % or more of prescribed film thickness.

(b) Minimum of measured film thickness is 80% or more of the prescribed film thickness.

8.0 TRANSPORTATION

(a) Painted product shall not be moved or transported until the required curing period has elapsed.

(b) Painted products shall be handled, moved or transported in such a manner as not to damage the paint film. Appropriate protective measures shall be taken, to avoid damage to the paint film during transportation and storing.

9.0 RECORDS

a) Contractor shall submit the batch test certificates of each batch of paints to PMC for review prior to commencement of painting.

b) A report shall be maintained of all the stage wise inspection carried out, showing type of surface preparation, DFT of primer, intermediate and final coats. The report, duly signed by the Contractor's inspector/ PMC shall be submitted to PMC, on completion of final inspection.

ANNEXURE I

ANNEXURE – I

Table 1 Classification of Steel Surface Preparation

Method of Cleaning	Classification	Procedure and Degree of Steel Surface Finish	Reference Standard		
			SSPC	SIS	IS
Blast Cleaning	White Metal blast cleaning	Blast cleaning to pure white metal. Thorough removal of mill scale, rust and foreign matter. Total area to be cleaned and no residues in any form allowable.	SP 5	Sa 3	White metal (silver grey)
- do -	Near White Metal Blast Cleaning	Very thorough blast cleaning. Mill scale, rust and foreign matter shall be removed to the extent that the only traces are remaining as slight stains in the form of spots or strips. Finally, the surface is cleaned with a vacuum cleaner or clean dry compressed air or a clean brush.	SP 10	Sa 2.1/2	Near white metal (light grey)
- do -	Commercial Blast Cleaning	Thorough blast cleaning. Almost all mill scale, rust and foreign matter shall be removed. Finally, the surface is cleaned with a vacuum cleaner, clean dry compressed air or a clean brush. It shall then be greyish in color.	SP 6	Sa 2	Comm-ercial
Power Tool Method	Power Tool Cleaning/ De-rusting	Very thorough scraping and wire-brushing, machine-brushing & grinding etc. Surface preparation shall be done as for St.2, but more effectively. After removal of rust, millscale etc. surface shall have a pronounced metallic sheen.	SP 3	St. 3	
Hand Tool cleaning	Mechanical Hand Tool Cleaning/ De-rusting.	Thorough scraping and wire – brushing, grinding etc. The treatment shall remove loose mill scale, rust and foreign matter. Finally, the surface is cleaned with compressed air or a clean brush . It shall then have a faint metallic sheen.	SP 2	St. 2	

SSPC : Steel Structures Painting Council "Steel Structures Council Manual" Vol. 2. Chapter 2 - 1982

SIS : Swedish Standard Institution "SIS 05 5900 1967".

IS : Indian Standard IS-1477-1971.

ANNEXURE II

ANNEXURE - II

PAINT SYSTEM TABLE - NO. 1

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
EXTERNAL SURFACE OF VESSELS, COLUMNS, PUMPS ETC.	< 60^0	SURFACE PREPARATION	Sa 2 1/2	--	--	--	--	190
		PRIME COAT	ALKYD BASED ZINC PHOSPHATE PRIMER HIGH BUILD	2	35 - 50	12 HRS.	70	
		INTERMEDIATE COAT	ALKYD HIGH BUILD M10 COATING	1	60 - 75	48 HRS.	60	
		FINAL COAT	OLEORESINOUS BASED ALUMINIUM PAINT (IS 2339)	3	20	12 HRS.	60	

PAINT SYSTEM TABLE - NO. 1A

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
TANKS EXTERNAL SURFACE INCLUDING FIXED ROOF DECK	< 60^0	SURFACE PREPARATION	Sa - 2 1/2	--	--	--	--	160
STRUCTURAL STEEL WORKS (PIPE ,RACK & TECHNOLOGICAL STRUCTURE		PRIME COAT	POLYAMIED CURED CATALYSED EPOXY RESIN / ZINC PHOSPHATE PRIMER (LOW BUILD EPOXY)	2	25 - 35	4 HRS.	60	
HAND RAILS,MIDDLE RAIL,LADDER CAGE,MONORAIL BEAM		FINAL COAT CAMOUFLAGE	POLYAMIDE CURED, CATALYSED EPOXY RESIN SUITABLY PIGMENTED (HIGH BUILD EPOXY)	2	50-60	10 HRS.	100	

ANNEXURE - II

PAINT SYSTEM TABLE - NO. 2

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
ROTARY AND OTHER BOUGHTOUT ITEMS	MANUFACTURERS PAINTING SCHEME COMPATIBLE FOR THE TEMPARATURE RANGE OF THE EQUIPMENT SHADE AS PER THIS SPECIFICATION							

PAINT SYSTEM TABLE - NO. 3

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
LADDERS, PLAFORM-STRUCTURALS,CHEQUERED PLATE,HANDRAIL POST TOE GUARD,STAIR CASE STEPTREADS & WALKWAYS	$< 60^{0}$	SURFACE PREPARATION	St-3	--	--	--	--	270
		PRIME COAT	ALKYD BASED ZINC PHOSPHATE PRIMER HIGH BUILD	2	35 - 50	12 HRS.	70	
		INTERMEDIATE COAT	--	--	--	--	--	
		FINAL COAT	HIGH BUILD BITUMINOUS BLACK COMPOSITION - PHENOLIC BITUMIN BASED	2	100-125	24 - 48 HRS.	200	

ANNEXURE - II

PAINT SYSTEM TABLE - NO. 4

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
TANK BOTTOM UNDER SIDE IN CONTACT WITH SOIL	$< 60^0$	SURFACE PREPARATION	St-3	--	--	--	--	420
		FINAL COAT	COAL TAR MASTIC (SHALIMASTIC H.D.)	3	140-150	48 HRS	420	

PAINT SYSTEM TABLE - NO. 5 - DELETED

PAINT SYSTEM TABLE - NO. 6 (IN CONTACT WITH LIQUID & VAPOUR OF HYDROCARBON)

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
TANK (INTERIOR SURFACE OF ROOF, SHELL & BOTTOM	$< 60^0$	SURFACE PREPARATION	Sa - 2 1/2	--	--	--	--	235
		INTERMEDIATE COAT	CATALYZED EPOXY RESIN ZINC PHOSPHATE PRIMER, CURED WITH POLYMIDE	1	25 - 35	12 HRS.	35	
		FINAL COAT	AMMINE ADUCT CURED HB EPOXY, CATELIZED EPOXY RESIN SUITABLE PIGMENTED	2	100-125	8 HRS.	200	

PAINT SYSTEM TABLE - NO. 7 (IN CONTACT WITH ACCUMULATED RAIN WATER & HYDROCARBONS)

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
TOP SURFACE OF FLOATING ROOF IN FR TANKS	$< 60^0$	SURFACE PREPARATION	Sa - 2 1/2	--	--	--	--	160
		PRIME COAT	POLYAMIED CURED CATALYSED EPOXY RESIN , ZINC PHOSPHATE PIGMENT (LOW BUILD EPOXY)	2	25 - 35	4 HRS.	60	
		FINAL COAT CAMOUFLAGE	CATALYSED EPOXY RESIN SUITABLY PIGMENTED (HIGH BUILD EPOXY)	2	50-60	10 HRS.	100	

ANNEXURE - II

PAINT SYSTEM TABLE - NO. 8

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
PIPING AND OTHER EQUIPMENTS NEAR COOLING TOWER (WATER WETTED SURFACE)	AMBIENT	SURFACE PREPARATION	Sa - 2 1/2	--	--	--	--	155
		PRIME COAT	POLYAMIED CURED CATALYSED EPOXY RESIN / ZINC PHOSPHATE PRIMER (LOW BUILD EPOXY)	2	25 - 35	4 HRS.	70	
		INTERMEDIATE COAT	CATALYSED EPOXY RESIN SUITABLY PIGMENTED (HIGH BUILD EPOXY)	1	50-60	10 HRS.	50	
		FINAL COAT	POLYURETHENE COATING 2 PACK,ACRYLIC RESIN WITH POLYURETNE HARDNER,PIGMENTED	1	30-35	6 HRS.	35	

PAINT SYSTEM TABLE - NO. 9

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
EQUIPMENT IN ACID / CHEMICAL HANDLING AREA	$<60^0$	SURFACE PREPARATION	Sa - 2 1/2	--	--	--	--	140
		PRIME COAT	POLYAMIED CURED CATALYSED EPOXY RESIN / ZINC PHOSPHATE PRIMER (LOW BUILD EPOXY)	2	25 - 35	4 HRS.	60	
		INTERMEDIATE COAT	CATALYSED EPOXY RESIN SUITABLY PIGMENTED (HIGH BUILD EPOXY)	1	50-60	10 HRS.	50	
		FINAL COAT	ACRYLIC POLYURETHANE ENAMEL	1	30-35	6 HRS.	30	

ANNEXURE - II

PAINT SYSTEM TABLE - NO. 10

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
VESSELS, COLUMNS, TANKS HEAT EXCHANGERS ETC. (UNINULATED & INSULATED)	60^0 - 160^0	SURFACE PREPARATION	Sa - 2 1/2	--	--	--	--	60
		PRIME / FINAL COAT	HEAT RESISTANCE ALUMINIUM - OLEORESINOUS MEDIUM WITH LEAFING ALUMINIUM PAINT	4	15-20	8 HRS.	60	

PAINT SYSTEM TABLE - NO. 10A

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
PIPING (INSULATED & UNINSULATED)	60^0 - 160^0	SURFACE PREPARATION	St-3	--	--	--	--	60
		PRIME / FINAL COAT	HEAT RESISTANCE ALUMINIUM - OLEORESINOUS MEDIUM WITH LEAFING ALUMINIUM PAINT	4	15-20	8 HRS.	60	

PAINT SYSTEM TABLE - NO. 11

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
VESSELS, COLUMNS, TANKS, HEAT EXCHANGERS (INSULATED & UNINSULATED).	160 - 250^0 C	SURFACE PREPARATION	St - 3	--	--	--	--	60
		PRIME COAT	HEAT RESISTANT ALUMINIUM PAINT UPTO 250^0 C	1	15 - 20	12 HRS.	15	
		INTERMEDIATE COAT	HEAT RESISTANT ALUMINIUM PAINT UPTO 250^0 C	1	15 - 20	12 HRS.	15	
		FINAL COAT	HEAT RESISTANT ALUMINIUM PAINT UPTO 250^0 C	2	15 - 20	12 HRS.	30	

ANNEXURE - II

PAINT SYSTEM TABLE - NO. 11A

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
PIPING (UNINSULATED).	160 - 250^0 C	SURFACE PREPARATION	St - 3	--	--	--	--	60
		PRIME COAT	HEAT RESISTANT ALUMINIUM PAINT UPTO 250 ^{0}C	1	15 - 20	12 HRS.	15	
		INTERMEDIATE COAT	HEAT RESISTANT ALUMINIUM PAINT UPTO 250 ^{0}C	1	15 - 20	12 HRS.	15	
		FINAL COAT	HEAT RESISTANT ALUMINIUM PAINT UPTO 250 ^{0}C	2	15 - 20	12 HRS.	30	

PAINT SYSTEM TABLE - NO. 12

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
VESSELS, COLUMNS, TANKS, HEAT EXCHANGERS (INSULATED & UNINSULATED).	250 - 400^0 C	SURFACE PREPARATION	St - 3	--	--	--	--	60
		PRIME COAT	HEAT RESISTANT ALUMINIUM PAINT (250 - 400^0 C)	1	15 - 20	12 HRS.	15	
		INTERMEDIATE COAT	HEAT RESISTANT ALUMINIUM PAINT (250 - 400^0 C)	1	15 - 20	12 HRS.	15	
		FINAL COAT	HEAT RESISTANT ALUMINIUM PAINT (250 - 400^0 C)	2	15 - 20	12 HRS.	30	

NOTE : APPLICATION SHALL ONLY BE DONE BY AIRLESS /CONVENTIONAL SPRAY GUN

PAINT SYSTEM TABLE - NO. 12 A

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
PIPING (UNINSULATED).	250 - 400^0 C	SURFACE PREPARATION	St - 3	--	--	--	--	60
		PRIME COAT	HEAT RESISTANT ALUMINIUM PAINT (250 - 400^0 C)	1	15 - 20	12 HRS.	15	
		INTERMEDIATE COAT	HEAT RESISTANT ALUMINIUM PAINT (250 - 400^0 C)	1	15 - 20	12 HRS.	15	
		FINAL COAT	HEAT RESISTANT ALUMINIUM PAINT (250 - 400^0 C)	2	15 - 20	12 HRS.	30	

NOTE : APPLICATION SHALL ONLY BE DONE BY AIRLESS /CONVENTIONAL SPRAY GUN

ANNEXURE - II

PAINT SYSTEM TABLE - NO. 13

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
VESSELS, COLUMNS, TANKS, HEAT EXCHANGERS ETC. (BARE & INSULATED).	400 - 650^{0} C	SURFACE PREPARATION	St - 3	--	--	--	--	60
		PRIME COAT	SILICON RESIN HEAT RESISTANT ALUMINIUM PAINT(400 - 650^{0} C)	1	15 - 20	12 HRS	15	
		INTERMEDIATE COAT	SILICON RESIN HEAT RESISTANT ALUMINIUM PAINT(400 - 650^{0} C)	1	15 - 20	12 HRS	15	
		FINAL COAT	SILICON RESIN HEAT RESISTANT ALUMINIUM PAINT(400 - 650^{0} C)	2	15 - 20	12 HRS	30	

PAINT SYSTEM TABLE - NO. 13 A

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
PIPING (UNINSULATED)	400 - 650^{0} C	SURFACE PREPARATION	St - 3	--	--	--	--	60
		PRIME COAT	SILICON RESIN HEAT RESISTANT ALUMINIUM PAINT(400 - 650^{0} C)	1	15 - 20	12 HRS	15	
		INTERMEDIATE COAT	SILICON RESIN HEAT RESISTANT ALUMINIUM PAINT(400 - 650^{0} C)	1	15 - 20	12 HRS	15	
		FINAL COAT	SILICON RESIN HEAT RESISTANT ALUMINIUM PAINT(400 - 650^{0} C)	2	15 - 20	12 HRS	30	

PAINT SYSTEM TABLE - NO. 14

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
FURNACE STACK / FLUE GAS DUCT	UPTO 250^{0} C	SURFACE PREPARATION	St - 3	--	--	--	--	
		PRIME COAT	A) HEAT RESISTANT BITUMINOUS STACK BLACK (OR)	1	30 - 40	24 HRS.	30	30 FOR A & 40 FOR B
			B) H.R. ALUMINIUM PAINT UPTO 250^{0} C	2	15 - 20	12 HRS.	40	
		INTERMEDIATE COAT	--	--	--	--	--	&
		FINAL COAT	A) HEAT RESISTANT BITUMINOUS STACK BLACK (OR)	1	30 - 40	24 HRS.	30	30 FOR A & 40 FOR B
			B) H.R. ALUMINIUM PAINT UPTO 250^{0} C	2	15 - 20	12 HRS.	40	

ANNEXURE - II

PAINT SYSTEM TABLE - NO. 15

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
EXTERNAL SURFACES OF PROCESS PIPING (INSULATED & UNINSULATED)	< 60^0	SURFACE PREPARATION	St-3	--	--	--	--	120
		PRIME COAT	HB ZN CHROMATE PRIMER 1 PACK,SYNTHETIC MEDIUM PIGMENTED WITHZINC CHROMATE	2	25-35	8 HRS.	60	
		FINAL COAT	RESINOUS ALUMINIUM PAINT:SYNTHEICRUBBER BASED AL.PAINT (UPTO 150 C)	2	20	12HRS	40	

PAINT SYSTEM TABLE - NO. 16

DESCRIPTION	TEMP ^{0} C	ACTIVITY	SPECIFICATION OF PAINT MATERIAL	NO. OF COATS	DRY FILM THICKNESS COAT(μ)	DRYING TIME	DFT REQUIRED (μ)	TOTAL DFT MIN.(μ)
EXTERNAL SURFACES OF OTHER THAN PROCESS PIPING (INSULATED & UNINSULATED	< 60^0	SURFACE PREPARATION	St-3	--	--	--	--	150
		PRIME COAT	HB ZINC PHOSPHATE PRIMER MODIFIED ALKYD MEDIUM PIGMENTED WITH ZINC PHOSPHATE	2	35 - 50	8 HRS.	80	
		FINAL COAT	MODIFIED ALKYD MEDIUM SUITABLY PIGMENTED CHEMICAL RESISTANT SYNTHETIC ENAMALE	2	30-35	8 HRS.	70	

ANNEXURE III

ANNEXURE – III

1. Identification markings on Equipment / Piping.

Equipment tag numbers shall be Stenciled / neatly painted using normal 'Arial' Lettering Style on all equipment and piping (Both Insulated & Uninsulated) after completion of all paint works. Lettering colour shall be either BLACK or WHITE, depending upon the background, so as to obtain good contrast.

Size shall be :

Coloums, Vessels, Heaters:	150mm
Pumps and other M/C	50mm
Piping	OD / 2 with Maximum 100MM.
Storage Tanks	(As per Existing Standard)

2. Colour Coding for Control Valve :

a) Carbon Steel Body - Light grey
Alloy Steel body - Canary yellow
Stainless steel body- Natural

b) **The actuator of the Control valve shall be painted as :**

Direct action (open on air failure) Valves - Green

Reverse acting (close on air failure) valves - Red

3. Colour Codes for all Statutory and Rotary Equipments, Auxillary structures etc.

SURFACE	COLOUR
Heater Structure	Black
Heater Roof	H.R. Aluminium Paint.
Vessels, Columns etc.	Aluminium paint (Silver shine)
SO_2 Vessels	Light Yellow
Heat Exchanger	H.R. Aluminium paint.
Fuel Oil tanks	Black
Naphtha tanks	Deep Cream.
Solvent tanks	Deep Cream.
All other tanks	Aluminium paint (Silver shine)
Outer surface of Boiler house	H.R. Aluminium paint.
Pumps	Navy Blue.

Compressors, Blowers, Ventilators etc.	Dark Admirality Grey.
Motor, Switchgear, Machines etc.	Blue Green.
Load lifting equipment, Monorails	Leaf Brown.
Main Steel Structure	Dark / Light Gray
Equipment Platforms	Dark / Light Gray
Gratings – equipment circular platforms	Galvanized
Chequered Plate (Both face)	Black
Hand Rails	Signal Red
Middle Rail	Signal Red
Handrail post	Black
Toe plate	Signal Red
Ladder Vertical Posts	Signal Red
Ladder Rungs & Railing vertical posts	Black
Stair case structure (Side Channels)	Dark / Light Gray
Stair case steptreads	Black
Overhead Monorail	Signal Red
Gantry Girder & Monorail	Dark Green
Monorail Stopper Plates	Signal Red
Coke Cutting System	Signal Red
EOT / HOT Cranes	Canary Yellow
Transformers & Battery room structurals	Dark Admiraltry grey
Electrical Motors	Dark Blue

Special Camouflage Painting for Uninsulated Crude and Product Storage Tanks.

Paint specification shall be as per standards.

Camouflage painting scheme for Defense requirement in irregular patches will be applied with 3 colours

Dark Green	:	Light green	:	Medium Brown
5	:	3	:	2

The patches shall be irregular and asymmetrical and inclined at 30 to 60 Degrees.

Patches should be continuous at surface meeting lines / points.

Slits / holes shall be painted in dark green shade.

Width of patches shall be 1 to 2 meters.

4. Colour Codes for Piping.

	Description	Ground Colour	First Colour Band	Second Colour Band
A	**WATER**			
1.	Drinking water	Sea Green	French Blue	Signal Red
2.	D.M. Water	Sea Green	Orange	---
3.	Boiler feed water	Sea Green	Gulf Red	---
4.	Cooling water	Sea Green	French Blue	---
5.	Quench water	Sea Green	Dark Grey	---
6.	Wash water	Sea Green	Canary Yellow	---
7.	Process water	Sea Green	Oxide Red	---
8.	Condensate water	Sea Green	Light Brown	Signal Red.
9.	Sea-water	Sea Green	White	---
10.	Fire water	Fire Red	---	---
B	**STEAM**			
1.	Very high pressure Steam (VHP)	Aluminium IS-2339	Signal Red	---
2.	High pressure steam (SH)	Aluminium IS-2339	Signal Red	---
3.	Medium pressure steam (SM)	Aluminium IS-2339	French Blue	---
4.	Low pressure steam (SL)	Aluminium IS-2339	Canary Yellow	---
5.	Dilution steam/ Purge steam	Aluminium IS-2339	Grey	Canary Yellow
6.	Steam Condensate	Sea Green	Light Brown	---
C	**GASES**			
1.	Fuel gas and Sweetgas	Canary Yellow	Silver Grey	---
2.	Charge gas	Canary Yellow	Signal Red	French Blue
3.	Residue gas LPG	Canary Yellow	Oxide Red	White
4	Flare Gas	Aluminium IS-2339	Signal Red	---
5.	Acetelene	Canary Yellow	Service Brown	---

	Description	Ground Colour	First Colour Band	Second Colour Band
6.	Sour gas	Canary Yellow	Grey	Violet
7.	Chlorine	Canary Yellow	Dark Violet	---
8.	Nitrogen	Canary Yellow	Black	---
D.	**AIR**			
1.	Compressed air	Sky Blue	Signal Red	---
2.	Plant air	Sky Blue	French Blue	---
3.	Instrument air	Sky Blue	Gulf Red	---
4.	Nitrogen	Canary Yellow	Black	---
5.	Oxygen	Canary Yellow	White	---
6.	CO_2	Canary Yellow	Light Grey	----
7	Hydrogen	Canary Yellow	Signal Red	French Blue
E.	**ACIDS AND CHEMICALS**			
1.	Sulfuric Acid	Dark Violet	Brilliant Green	Light Orange
2.	Nitric Acid	Dark Violet	French Blue	Light Orange
3.	Hydrochloric Acid	Dark Violet	Signal Red	Light Orange
4.	Acetic Acid	Dark Violet	Silver Grey	Light Orange
5.	Caustic	White	Violet	---
6.	Other Chemicals	White	Violet	Signal Red
F.	**HYDROCARBONS**			
1	Naphtha	Aluminium	Dark Brown	---
2	Reformer naptha	Aluminium	Dark Brown	French Blue
3	VGO	Aluminium	Golden Yellow	Signal Red
4.	Propylene	Dark Ad. Grey	Briliant Green	---
5.	Ethylene Glycol	Dark Ad. Grey	Briliant Green	Gulf Red
6.	Ethylene Dichloride	Dark Ad. Grey	Gulf Red	---
7.	Benzene	Dark Ad. Grey	Canary Yellow	---
8.	Butadiene	Dark Ad. Grey	Black	---
9.	Liquid Ethane	Dark Ad. Grey	Light Grey	French Blue
10.	Liquid Propylene	Dark Ad. Grey	Signal Red	Black
11	SKO	Aluminium	Golden Yellow	---

A-

	Description	Ground Colour	First Colour Band	Second Colour Band
12	ATF	Aluminium	Black	---
13	Phosphates	Violet	Orange	White
14	Amine	Admiral Grey	Signal Red	Lt. Brown
15	RCO	Aluminium	Black	Brown
16	Crude Oil	Aluminium	Black	French Blue
17	Liquid Ethylene	Dark Ad. Grey	Light Grey	Black
18	Fuel Oil	Aluminium	Golden Yellow	Black
19	Gas Oil	Aluminium	Green	Canary Yellow
20	Flushing Oil	Aluminium	Green	---
21	Slop	Aluminium	Lt. Brown	Lt. Brown
22	Hazard Marking	Yellow	Black	---
23	Vaccine Residue	Aluminium	Black	Red
24.	Tar	Dark Ad. Grey	Signal Red	Brilliant Green
25.	Aromatic Gasolene	Dark Ad. Grey	Brilliant Green	Canary Yellow
26.	Pyrolysis Gasolene	Dark Ad. Grey	Brilliant Green	Black
27.	Liquid Methanol	Dark Ad. Grey	White	Gulf Red
28.	Vapour LPG	Aluminium	Signal Red	Black
29.	Liquid LPG	Aluminium	Signal Red	Green
30.	Liquid Mixed C4	Dark Ad. Grey	Signal Red	Light Brown
31.	Kerosene	Light Brown	Brilliant Green	---
32.	HSD	Aluminium	French Blue	---

Colour Coding for Control Valve:

a) Carbon steel body - Light grey
Alloy steel body - Canary yellow
Stainless steel body- Natural

b) The actuator of the Control valve shall be painted as :
Direct action (open on air failure) valves - Green
Reverse acting (close on air failure) valves - Red

Notes :- 1) All LPG service PSVs shall be painted blue.
2) All drains & Vents shall be painted in Main line colour.
3) The colour code scheme is for identification of piping service group, It consists of a ground colour and 1 / 2 colour bands.

ANNEXURE IV

ANNEXURE - IV

APPROVED BRAND NAMES

Sr. NO.	PAINT SYSTEM TABLE	GENERIC PAINT NAME	MANUFACTURER'S NAME			
			M/S. SHALIMAR	M/S. BERGER	M/S. ASIAN	M/S.SIGMA COATINGS
1	1,3,15,17	ALKYD ZINC PHOSPHATE PRIMER	TUFFKOTE HB ZINC PHOSPHATE PRIMER (9110-411) 30-50 µm PER COAT	BISON HB ZINC PHOSPHATE PRIMER 35-50 µm PER COAT	APCOMIN HB ZINC PHOSPHATE PRIMER 40µm PER COAT	7131 SIGMAFERRO PRIMER ZP
2	16	HB ZN CHROMATE PRIMER 1 PACK,SYNTHETIC MEDIUM PIGMENTED WITHZINC CHROMATE	EPIGARD 4 ZINC ZINC CHROMATE PRIMER RED (9110-07) 35-50 µm PER COAT	LUXOL ZN CHROMATE PRIMER	APCOMIN HB ZN CHROMATE PRIMER	-
3	1A, 6,7,8,9	POLYAMIED CURED CATALYSED EPOXY RESIN , ZINC PHOSPHATE PIGMENT (LOW BUILD EPOXY)	EPIGARD 4 ZINC PHOSPHATE PRIMER RED (9110-06) 35-50 µm PER COAT	EPILUX 610 PRIMER 25-35 µm PER COAT	APCODUR CP 689 30-35 µm PER COAT	A)7412 SIGMACOVER CM PRIMER b) 6281 SIGMA COVER EP PRIMER/ BUILDCOAT
4	1	ALKYD H.B. MIO PAINT	TUFFKOTE HB M10 COATING (9110-42) 35-50 µm PER COAT	BISON HB M10 COATING 60-75 µm PER COAT	APCOMIN HB M10 PAINT 40-50 µm PER COAT	7244 SIGMAFERRO MIO COAT
5	2,15,17	MODIFIED ALKYD MEDIUM SUITABLY PIGMENTED CHEMICAL RESISTANT SYNTHETIC ENAMALE	SYNTHETIC ENAMEL 25 µm PER COAT	BISON CR ENAMEL	APCOMIN CR SYNTHETIC ENAMEL	7240 SIGMARINE ENAMEL
6	3	BITUMINOUS PAINT	TUFFKOTE HIGH BUILD BITU BLACK 9110-45 75-100 µm PER COAT	BP HIGH BUILD BLACK 90-100 µm PER COAT	ASAIN SUPER SERVICE HIGH BUILD BLACK 100-125 µm PER COAT	7102 SIGMA EMALINE 3000
7	4	COAL TAR MASTIC	ONLY SHALIMASTIC HD OF M/S. STP LIMITED IS AVAILABLE. DFT 140-150 µm PER COAT TO A TOTAL MINM. DFT OF 420 µm			
8	1A,6,7,8,9	CATALYSED EPOXY RESIN SUITABLY PIGMENTED (HIGH BUILD EPOXY)	EPIGARD TL HB (9110-14) 75-100 µm PER COAT	EPILUX 4 HIGH BUILD COATING 100-125 µm PER COAT	APCODUR CP 696 100-125 µm PER COAT	A) 7456 SIGMACOVER CM COATING B) 7433 SIGMAGUARD EHB
9	8,9	POLYURETHENE COATING 2 PACK,ACRYLIC RESIN WITH POLYURETNE HARDNER,PIGMENTED	SHALITHANE FINISH 9110-24	BERGERTHANE ENAMEL	APCOTHANE CF 676	6824 SIGMADUR188
10	1,10,10A,16	ALUMINIUM PAINT IS-2339	ALUMINIUM PAINT 20 µm PER COAT	ALUMINIUM PAINT 20 µm PER COAT	ALUMINIUM PAINT 20 µm PER COAT	7264 SIGMA ALUMINIUM
11	11, 11A,14	HEAT RESISTANT ALUMINIUM UPTO 250^0 C	HEAT RESI. AL. PAINT HR LUSTROL-9110 30-15µm PER COAT	FERROTOL HR ALUMINIUM PAINT 15-20µm PER COAT	HR READY MIXED ALUMINIUM PAINT 25µm PER COAT	7264 SIGMAFERRO ALUMINIUM
12	12,12A	HEAT RESISTANT ALUMINIUM UPTO 250-400^0 C	LU STROTHER HT 400 9110-31 12 µm PER COAT	LUMEROUS HR 47 15-20 µm PER COAT	APCOTHERM HR ALUMINIUM PAINT 15-20 µm PER COAT	7261 SIGMAINE ALUMINIUM HR 500
13	13,13A	HEAT RESISTANT ALUMINIUM UPTO 400-650^0 C	LU STROTHER HT 600 9110-32 15µm PER COAT	LUMEROUS HR 143 15-20 µm PER COAT	HEAT RESISTING SILICONE ALUMINIUM PAINT 25 µm PER COAT	7567 SIGMATHERM SUPERTHERMOVIT 600
14	14	HEAT RESISTANT BITUMINOUS UPTO 250^0 C	HT CHIMNEY BLACK 9110-33 30µm PER COAT	FERROTOL STACK BLOCK 30-40µm PER COAT	--	-

The paints mentioned are for guidelines only, and does not limit the choice of paints in any manner.

ANNEXURE - IV

APPROVED BRAND NAMES

Sr. NO.	PAINT SYSTEM TABLE	GENERIC PAINT NAME	MANUFACTURER'S NAME			
			M/S. SHALIMAR	M/S. BERGER	M/S. ASIAN	M/S.SIGMA COATINGS
1	1,3,15,17	ALKYD ZINC PHOSPHATE PRIMER	TUFFKOTE HB ZINC PHOSPHATE PRIMER (9110-411) 30-50 µm PER COAT	BISON HB ZINC PHOSPHATE PRIMER 35-50 µm PER COAT	APCOMIN HB ZINC PHOSPHATE PRIMER 40µm PER COAT	7131 SIGMAFERRO PRIMER ZP
2	1	ALKYD H.B. MIO PAINT	TUFFKOTE HB M10 COATING (9110-42) 35-50 µm PER COAT	BISON HB M10 COATING 60-75 µm PER COAT	APCOMIN HB M10 PAINT 40-50 µm PER COAT	7244 SIGMAFERRO MIO COAT
4	2	MODIFIED ALKYD MEDIUM SUITABLY PIGMENTED CHEMICAL RESISTANT SYNTHETIC ENAMALE	SYNTHETIC ENAMEL 25 µm PER COAT	BISON CR ENAMEL	APCOMIN CR SYNTHETIC ENAMEL	
5	3	BITUMINOUS PAINT	TUFFKOTE HIGH BUILD BITU BLACK 9110-45 75-100 µm PER COAT	BP HIGH BUILD BLACK 90-100 µm PER COAT	ASAIN SUPER SERVICE HIGH BUILD BLACK 100-125 µm PER COAT	7102 SIGMA EMALINE 3000
6	4	COAL TAR MASTIC	ONLY SHALIMASTIC HD OF M/S. STP LIMITED IS AVAILABLE. DFT 140-150 µm PER COAT TO A TOTAL MINM. DFT OF 420 µm			
7	5, 10	SURFACE TOLERANT SELF PRIMING EPOXY	EPIPLUS 56 100 - 125 µm PER COAT	BERGER PROTECTIOMASTIC 125-175 µm PER COAT	APCODUR CF 640 100-125 µm PER COAT	7428 SIGMACOVER ST
8	6	EPOXY BASED ZINC PHOSPHATE PRIMER	EPIGARD 4 ZINC PHOSPHATE PRIMER RED (9110-06) 35-50 µm PER COAT	EPILUX 610 PRIMER 25-35 µm PER COAT	APCODUR CP 689 30-35 µm PER COAT	A)7412 SIGMACOVER CM PRIMER b) 6281 SIGMA COVER EP PRIMER/ BUILDCOAT
9	6	HIGH BUILD EPOXY ENAMEL	EPIGARD TL HB (9110-14) 75-100 µm PER COAT	EPILUX 4 HIGH BUILD COATING 100-125 µm PER COAT	APCODUR CP 696 100-125 µm PER COAT	A) 7456 SIGMACOVER CM COATING B) 7433 SIGMAGUARD EHB
10	6,8,19	INORGNIC ZINC PRIMER	TUFFKOTE ZILICATE 9110-25 65-75µm PER COAT	ZN ANODE 304 65-75µm PER COAT	APCOSIL 601 65-75µm PER COAT	7558 SIGMA TORNUSIL MC 58
11	7	COAL TAR EPOXY MASTIC	ONLY SHALIMASTIC EHD OF M/S. STP LIMITED IS AVAILABLE. DFT 140-150 mm PER COAT TO A TOTAL MINM. DFT OF 420 mm			
12	8	COAL TAR EPOXY	BIPIGARD "S" (9110-18) 80 125 µm PER COAT	EPILUX 5 100-125 µm PER COAT	APCODUR CP 651 90-100 µm PER COAT	7472 SIGMA TCN 300
13	9	CHLORINATED RUBBER BASED ZINC PHOSPHATE PRIMER	CHLOROKOTE ZP PRIMER (9110-27) 30-50 µm PER COAT	LINOSOL HB ZINC PHOSPHATE PRIMER 30-50 µm PER COAT	ASIOCHLOR HB ZINC PHOSPHATE PRIMER 50 µm PER COAT	7321 SIGMA NUCOL UNICOAT
14	9	CHLORINATED RUBBER PAINT	CHLOROKOTE FINISH (9110-29) 30-40 µm PER COAT	LINOSOL CHLORORUBBER HB COATING 50 µm PER COAT	ASIOCHLOR CF 625 HB CHLORORUBBER PAINT 40-45 µm PER COAT	7308 SIGMA NUCOL FINISH
15	5, 10	EPOXY ALUMINIUM	EPIGARD 4 ALUMINIUM (9110-13) 40 µm PER COAT	EPILUX 4 ALUMINIUM 25-30µm PER COAT	EPIGARD 4 ALUMINIUM (9110-13) 40 µm PER COAT	7428 SIGMACOVER ST ALUMINIUM
2	1	ALUMINIUM PAINT IS-2339	ALUMINIUM PAINT 20 µm PER COAT	ALUMINIUM PAINT 20 µm PER COAT	ALUMINIUM PAINT 20 µm PER COAT	7264 SIGMA ALUMINIUM
16	11, 14	HEAT RESISTANT ALUMINIUM UPTO 250^0 C	HEAT RESI. AL. PAINT HR LUSTROL-9110 30-15µm PER COAT	FERROTOL HR ALUMINIUM PAINT 15-20µm PER COAT	HR READY MIXED ALUMINIUM PAINT 25µm PER COAT	7264 SIGMAFERRO ALUMINIUM
17	12	HEAT RESISTANT ALUMINIUM UPTO 250-400^0 C	LU STROTHER HT 400 9110-31 12 µm PER COAT	LUMEROUS HR 47 15-20 µm PER COAT	APCOTHERM HR ALUMINIUM PAINT 15-20 µm PER COAT	7261 SIGMAINE ALUMINIUM HR 500
18	13	HEAT RESISTANT ALUMINIUM UPTO 400-650^0 C	LU STROTHER HT 600 9110-32 15µm PER COAT	LUMEROUS HR 143 15-20 µm PER COAT	HEAT RESISTING SILICONE ALUMINIUM PAINT 25 µm PER COAT	7567 SIGMATHERM SUPERTHERMOVIT 600
19	14	HEAT RESISTANT BITUMINOUS UPTO 250^0 C	HT CHIMNEY BLACK 9110-33 30µm PER COAT	FERROTOL STACK BLOCK 30-40µm PER COAT	--	-