



BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPALLI-620014

PROJECT: NTPC MOUDA SATGE II 2X660 MW

DATE: 26-07-2012

DRAWING TITLE: **Painting scheme**

DRAWING NO.: 9575-102-01-TR-PVM-W-0824

REF. TRANSMITTAL: CC:9575102:268

NTPC Comment: BHEL is requested to furnish the paint schedule & shade of electrical items viz., motor, actuators, MCC and other electrical control panels.

BHEL Reply: We have submitted the document in line with Barh stage II. Please refer note 5. The painting details for above items will be indicated in the vendor data sheet.

NTPC Comment: BHEL may please confirm inclusion of C&I equipment in a separate document and furnish the same for NTPC review and approval.

BHEL Reply: We have submitted the document in line with Barh stage II. No separate document for C&I equipment. It will be indicated in vendor data sheets.

NTPC Comment: Foot note meant for Sl.No. 6 in page 5 of 10 struck off.

BHEL Reply: The foot note has been modified in line with Sl.no. 8 painting scheme, as both are coming in the gas path. Since some of the components in Sl.No. 6 may be subcontracted & dip painting facility is available in BHEL, Trichy only, brush painting is to be retained.

NTPC Comment: The coating thickness in Sl.No. 9 is changed from 85 μ to 87 μ for galvanization of 610 gm/sq.m.

BHEL Reply: Coating thickness is revised to 87 μ .

NTPC Comment: Note no.4 & 5 has been commented in page 9 of 10.

BHEL Reply: The comments have been incorporated.

NTPC Comment: Comment written against note no.16 in page 9 of 10.

BHEL Reply: BHEL confirms the same, as the transport structures are meant for safe transporting of main components from manufacturing centre to site and they will be cut and thrown away at site before erection.

NTPC Comment: Comment on paint details given in page 10 of 10 (Sl.No.6, 7 & 8).

BHEL Reply: Paint details are incorporated as given in sl.no. 6 & 7. But, in Sl.No. 8. NTPC has wrongly mentioned the specification number for synthetic enamel paint as 12744 instead of 2932. The correct specn.no. has been incorporated.

NTPC Comment: NTPC has given total DFT 100 μ in intermediate coat inadvertently.




BHEL Reply: Total DFT for the primer as 100 μ is given separately.

BHARAT HEAVY ELECTRICALS LIMITED
Tiruchirappalli - 620 014



**NTPC LTD– MAUDA SUPER THERMAL POWER PROJECT
STEAM GENERATOR PACKAGE
2X660MW –SUPERCRITICAL BOILERS
CUSTOMER NO: U6/1711 & U6/1712- UNIT 3 & 4
PAINTING SCHEDULE**

NTPC Drawing No: 9575-102-01-TR-PVM-W-0824

Prepared by	L.Gragori Manager/Plant Lab		Document No: PL: C3 - PS / 1711
Reviewed by	S.Dhanabal SDGM / PE / FB		Revision No: 01 Dated: 17.07.2012
Approved by	Dr.K.P.Dhandapani AGM / Plant Lab		Sheet No. : 1 of 10

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RECORD OF REVISIONS

Rev. No	Date	Details of revision	Remarks
00	02.07.2012	New	Prepared in line with Tender Technical Specification Bid Doc No. CS-9575/9571/0370/0360/9586-102 (R) -2
01	17.07.2012	a) Foot note for Sl.No. 6 modified. b) Coating thickness for galvanizing component changed from 85μ to 87μ. c) Note No. 4, 5 & 16 modified. d) Painting details given for Red oxide & Syn.Enamel paint in Paint details. e) Total DFT given for the primer in Sl.No.1 of Painting of Damaged areas	Changes incorporated as per CAT.II approval by NTPC 'Transmittal for Documents/Drawings' Ref.No.CC: 9575102:268 Dt. 12-07-12 & NTPC Drg. No.9575-102-01-TR-PVM-W-0824- Rev.00

Sl.No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate coat		Finish coat			Total DFT μm (min)
			Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
1 PS 1AC2	Collector & Separator Vessels (Except Internals), Supports 04 – 146,321,323	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744 DFT= 30 μm per coat	2	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932 DFT= 20 μm per coat	2	International-Orange Shade No: 592 of IS 5	80
2 PS5	Collector & Separator Vessels internals 04- 321,323; 35-010,190; 39-700	SSPC-SP1/ or SSPC – SP3 Solvent / Power Tool Cleaning	Rust Preventive Fluid to PR: CHEM: 09 – 04 DFT=25 μm per coat	1	--	--	--	--	--	25
3 PS19C	Buck stays 08 – 001, 003,006,007,111,380,382 08 – 501,503,901,907,910 Boiler supporting structures, Columns,Girders,Bracings 35 – 111,112,121,122,130,140,150, 35 – 211,212,213,214,221,222,231,232 35 – 311,312,321,322,331,332,341,342 35 – 351, 352,361,362,381,382,383, 385 35 - 386,387,390 35 – 441,442,443,444,445,446,447,451, 35 - 452,453,454,455,456,457,511, 512, 35 - 513,514,515,516,517,521,522,523, 35- 524,525,526,527,531,532,533,534,535 35- 536,537.Galleries, Stair-ways & inter connecting walkways 36– 110,130,150, 311,312,313,314 36– 315,316,321to 326, 331 to 335,336337,338,356,364,365,366	Blast cleaning to SA2 ½ (Near white metal) with surface profile 35-50 μm	Inorganic Ethyl Zinc Silicate Primer DFT=75 μm per coat	1	Epoxy Based MIO /TiO2 Pigmented Intermediate Coat DFT=75 μm per coat	1	#Epoxy Finish Coat, DFT=35 μm per coat + #Ali.Acrylic PU Paint DFT=30 μm per coat	2 1	Grey White Shade To RAL 9002	250

Out of 2 coats of Epoxy based finish paint, one coat of Epoxy finish paint shall be given at shop / subcontracting works and second coat of Epoxy finish and one coat of aliphatic Polyurethane paint shall be applied at site.

Sl.No.	PGMA / Description	Surface Prepn & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT μm (min)
			Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
6 PS2	Loose tubes, SH, RH & Eco.coils, 11- 074,078,374,378,606,608,684,694, 11-716,718,767,769,787,791 11-918,967,969,987,991 12-184,187,515,619,803,805,903,914,917, 12-924,927,928,944,948,954,968 16-079,235,236,238,379 19- 814,824,884,914,924,984	SSPC – SP2 or SSPC – SP3 Hand tool / Power tool cleaning	Red Oxide Zinc Phosphate Dip coat primer to PR: CHEM: 09 – 03 DFT=35 μm per coat	1*	--	--	--	--	Red Oxide	35
7 PS1A1	Components < 95° C –Other than components in Sl.No.3. 07-402,403,405,409 410,411,412, 431, 12-906, 17-904,906,919 19-905, 906,907; 21-601 24-350,351,800,801,802,805, 806,808,809 24-810, 815,821,825,835,840; 35-995; 36-611,613,740;39- 302 ; 41-350,390,500 42-002,005,010,065, 070,120,128,152 42-154,157; 43-004,005,104,105,200; 45-801,802,804,805;47-261,263 48-012,014, 112,114, 48-141,142,144, 145,204,205,225, 48- 235,385,435 ; 65-736 67-204,272,276, 283,801,802,803 95-091,485,495;96-186;97-585;97-592	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744 DFT= 30 μm per coat	2	--	--	Syn. Enamel paint (Long Oil Alkyd) to IS 2932 DFT= 20 μm per coat	2	Smoke Grey Shade No: 692 of IS5	80

*-In lieu of dip painting, 2 coats of brush painting of Red oxide Zinc Phosphate primer to a coating thickness of 60 μ is also permitted in line with Sr.No.8.

Sl.No.	PGMA / Description	Surface Prepn & Surface Profile	Primer coat		Intermediate coat		Finish coat			Total DFT μm (min)
			Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
8 PS3	Components >95° C coming in the gas path ,Headers, Commissioning Spares & erection Materials etc., 05-155,327,331,351; 06-400,500,731 06-734,737,741,744,747,751,753,755, 07-102,215,216,218,223,231,232 07-993; 10- 182,183,184,185,283, 285 12-993; 15-136;17-174,903;18-002 18-010;19- 701,702,850 19-851,852; 20-988,998; 21-987,988; 24-700,880;24-987,988,989,993; 30-103,105,211,215,219,223,235 ; 31-010,104,993; 32-010,110,120,310 32-410,510,710;35-993;36-993; 37-010, 810; 38-993; 39-993;41-988; 42-988; 48-,214,224, 234, 384, 434,464 48-484, 48-494,664,993; 97-590 99-099	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744 DFT= 30 μm per coat	2	--	--	--	--	Red Oxide	60
9 PS6	Hand rails and posts, ladders / rungs 35 – @ 821,822, @823,851 36 – @820,851,852,853 38 – @820,850 39 – @820, 850 Floor Grills, Step treads 35 – 811; 36-811,812,813,814 38 – 810; 39 – 810	a) Hot dip Galvanizing to a coating weight of 610 gm per sq.m and to a coating thickness of 87 microns . Refer Notes given below **								

Notes **: The Guard plates, Hood Ladders and Stringer channels shall be painted as per painting scheme prescribed in Sl.No: 03.

PAINTING SCHEME FOR VALVES

Sl.No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate coat		Finish coat			Total DFT μm (min)
			Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
10	Cast carbon steel valves (Conventional) Cast alloy steel valves (Conventional) All API valves, QCNRV, SV & SRV Silencers	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr.I	2	--	--	--	--	Aluminium	40
	Forged valves	Phosphating	To a coating weight of 1500 mg per sq.ft.	--	--	--	--	--	--	--
1AS2	Soot Blower components 20-051,054,201,204,794.	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744 DFT= 30 μm per coat	2	--	--	Syn. Enamel paint (Long Oil Alkyd) to IS 2932 DFT= 20 μm per coat	2	Verdigris Green Shade No. 280 of IS5	80
	HP / LP system	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr.I	2	--	--	--	--	Aluminium	40

Sl.No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate coat		Finish coat			Total DFT μ m (min)
			Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
11 PS15	For CLH & VLH*** PGs 07,08,12,17,19,21,24,47,48 &80	Abrasive blast cleaning to Sa 2 1/2 35- 50 microns	Epoxy zinc rich primer To IS 14589 Gr.II %VS=35, (min) DFT=40 microns per coat	1	--	--	Aliphatic acrylic Poly-urethane paint %VS=40.0 (min) DFT=30.0 microns per coat	1	Phirozi Blue Shade No. 176 of IS5	70
12 PS8A	Components < 95 C, un-insulated Fuel pipes 47-266,267,268,269	SSPC-SP3/ Power Tool Cleaning	General purpose Aluminium paint to IS 2339	2	--	--	--	--	Aluminium	40
13 PS 1BE	All Columns below '0' level (embedded in concrete) PGs 35,36,38 39	SSPC-SP3/ Power Tool Cleani	HB Chlorinated Rubber Based Zinc Phosphate primer %VS=40, (min) DFT=50 microns per coat	1	--	--	--	--	Grey	50

***For components other than CLH & VLH, Painting Scheme given in Sl. No. 7 shall be followed.

NOTES:

1. Rust Preventive Coating should be given on HSEFG Bolt and nut threads.
2. Machined surfaces and Retainers A& C types are to be applied with a coating of Temporary Rust Preventive oil.
3. All threaded and other surfaces of foundation bolts and its materials, insulation pins, Anchor channels, Sleeves shall be coated with Temporary Rust Preventive Fluid and during execution of civil works; the dried film of coating shall be removed using organic solvents.
4. Ground shade/colour of Finish paints & identification tag/Band for equipments, pipings pipe service, boiler supporting structures and other boiler components shall be followed as per tender **QS-1-DIV-W-4 (Rev.01)**.
5. PGMA's under Sub-Vendor items are not indicated. **For all bought-out and sub-vendors items including PGMA's mentioned above falling under the scope of BHEL the same scheme as for main equipment as covered in this document shall be followed.**
6. The Painting Scheme is valid for only Customer No: 1711 &1712 of NTPC MAUDA.
7. No painting is required for Stainless Steel, Non-ferrous & galvanized components.
8. Wherever inside surfaces of components under PGMA 48 – XXX & other PGs, need protection till erection, two coats of Red-oxide zinc phosphate primer paint to IS12744 to a DFT of 60 microns shall be applied, after power tool cleaning.
9. The Temporary Rust Preventive coating that already been applied on any components, tubes, pipes etc., shall be removed by suitable solvents / heating to 350 –400 °C for an hour before primer paint application –but, in this case, it should be ensured that the minimum surface cleanliness required for primer paint application shall be SSPC – SP2 (equivalent – Hand Tool cleaning).
10. In components, wherever plates / sheets of thickness less than or equal to 5 mm and rods of <25mm/tubes/drain pipes are used, power tool / hand tool cleaning to SSPC- SP3 / SP2 shall be followed and the painting shall be done as described in Scheme No: 07.
11. For all commissioning components-erection materials (xx-993) two coats of Red oxide Zinc Phosphate Primer shall be applied to meet the temporary protection till erection, after power tool cleaning.
12. Touch-up painting of damaged areas shall be carried out as per clause 5.01.04, Part B.Sub section V, Section VI of the NTPC Technical Specification.
13. All components covered under different PGMA's are to be painted In case any component is left out, the same shall be deemed to be included under the relevant section based on paint logic approved.
14. For very small components like clamps etc. scheme no.7 shall be followed.
15. For very small components with weldable primer at edges, the entire component shall be applied with weldable primer.
16. All temporary/ transport structures, are to be painted with one coat of Red-oxide zinc phosphate primer paint to IS12744 to a DFT of 30 µ/coat and 2 coats of Synthetic Enamel finish paint to IS 2932 –**Shade Yellow**-to a DFT of 20 µ/coat. The total DFT shall be 70 µ and these are to be cut & removed at site after erection. **(It excludes components covered under Sr.No. 3 & 9 of description table)**

Painting Scheme – Details for procurement & application purposes

Sl.No.	Generic nature of paint	Theoretical Covering Capacity Sq.m per Litre.	No. of pack	Volume solids, % (min)**	DFT in microns (min) per coat	Shade	Shade No. to IS5	Mode of appln.	Over coating interval, Hrs.
1	Inorganic ethyl zinc silicate to IS 14946 –Main Coat	8	2	60	75	Grey	--	Spray only	16
2	Poly amide cured Epoxy based Tio2/MIO pigmented intermediate coat	6	2	60	100	GREY	--	## Spray	24
3	Epoxy based polyamide cured finish paint to IS 14209	10	2	40	40	Smoke Grey	692	Spray	24
4	Aliphatic acrylic polyurethane paint to IS 13213	10	2	40	30	Grey White Phirozi – Blue.	RAL 9002 176	Spray Spray	24 24
5	Heat resistant Aluminium paint to IS 13183 Grade I/II	10	1	-	-	--	--	Brush / Spray	24
6	Red oxide zinc phosphate primer paint to IS 12744	10	1	As per IS 12744	30	Red Oxide	--	Brush / Spray	12
7	Red oxide Zinc Phosphate Dip coat primer paint to PR: CHEM: 09-03	10	1	--	--	Red Oxide	---	Dip	12
8	Long oil alkyd synthetic enamel finish paint to IS2932	10	1	As per IS 2932	20	Reqd. shade	Corrpdg. Shade no.	Brush / Spray	12
9	Temporary Rust preventive fluid to PR: CHE: 09 – 04	10	1	--	--	--	--	--	12
10	Epoxy Zinc rich primer to IS14589 Gr.II	8	2	35	40	Grey	--	Spray	24
11	General purpose Aluminium paint to IS 2339	10	2	--	20	Aluminum	--	Brush	12
12	HB Chlorinated Rubber Based Zinc Phosphate Primer-Colour Grey	8	1	40	50	Grey	--	Brush / Spray	12

Brush painting is accepted, if recommended by the Paint suppliers. The covering capacity of paints specified is only approximate.

The paints and Rust Preventive fluid shall be procured from BHEL's approved suppliers. ** Values are indicative.

Painting of Damaged Areas

(Areas where the paint has deteriorated badly by erosion and areas where the paint film has lost its adhesion and where the steel has rusted appreciably, should be repainted as follows)

Sl.No.	Components	Surface Preparation	Primer coat		Intermediate coat		Finish coat			Total DFT μm (min)
			Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
1	Paint damaged components fall under Sl.no: 3	Power tool cleaning to bare metal	Epoxy zinc rich primer to IS 14589 Grade II to a DFT of 50 mic/coat	2 T.DFT 100μ (min)	As given in scheme	1	As given in scheme	3	As given in scheme	275
2	Paint damaged components fall under Sl.no: 11	Power tool cleaning to bare metal	One coat of Epoxy zinc rich primer to IS 14589 Grade II to a DFT of 40 microns	1	--	--	As given in scheme	1	As given in scheme	70
3	Paint damaged components fall under Sl.no: 1, 2,4,5,6,7,8,10,12.	Power tool cleaning to bare metal	As given in scheme	As given in scheme	--	--	As given in scheme	As given in scheme	As given in scheme	As given in scheme