एनटीपीसी लिमिटेड
(भारत सरकार का उद्यम)
NTPC Limited
(A Govt. of India Enterprise)
(Formerly National Thermal Power Corporation Ltd.)
केन्द्रीय कार्यालय नोएडा
Corporate Centre NOIDA

Reference: null102:669 Date:21-08-18

From:	SAMIR KUMAR BHOWMICK GM(TF)	To: CC:	BHEL BHEL sirifort New delhi

SUBJECT : PSTPP, EPC - STEAM GENERATOR

Please find enclosed following drawings/documents for necessary action at your end as indicated in purpose code.

VENDOR DRG NO:	null
NTPC DRG NO:	9585-001-104-PVM-H-002
REVISION NO:	02
DRG TITLE:	Painting scheme for boiler auxiliary items like Fans ESP Gates & Dampers APH & Aux. Boiler Chimney
APP CATEGORY:	I
RELEASE DATE:	21-08-18
COMMENTS:	This document is approved subject to incorporation of the comments.

RANIPET	**Bharat Heavy Electricals Limited** **Boiler Auxiliaries Plant** **Ranipet – 632 406**	**BHEL DOC NO.**	**PS:PATR:EPC:R839&R4R2**
		REVISION NO.	**02**
		DATE	**07-08-2018**

PATRATU STPP (3 X 800 MW) - EPC PACKAGE

PAINTING SCHEDULE FOR APH, FAN, GATE&DAMPER, ESP &CHIMNEY(AUX.BLR)

NTPC CONTRACT NO: 01/PVUNL-CS-9585-001-2/N0A-SC

NTPC DRG NO: 9585-001-104-PVM-H-002

BHEL RANIPET Customer No(s).:R839 – R841 & R4R2

Prepared & Reviewed By	Approved By
	Signature Not Verified Digitally signed by R K Niranjan Date: 2018.08.21 16:31:50 IST Reason: CAT I Location: NTPCEOC
(Rajamanickam.M)	(K. C Gandhi Parimalam)

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

RECORD OF REVISION

REV NO	EFFECTIVE DATE	DETAILS OF REVISION MADE
00	05-05-2018	Original issue – first submission
01	18-05-2018	**NTPC comments:** NTPC drg no: 9585-001-102-PVM-H-002 **BHEL reply:** MDL no is allotted by M/s NTPC. Since there is Pressure part schedule allotted under the suggested MDL, M/s NTPC has allotted this MDL. So the MDL no: 9585-001-104-PVM-H-002 is correct.
		NTPC comments: Painting scheme for SCAPH to be included **BHEL reply:** Incorporated in the document
		NTPC comments: Heat resistant Gr. I Aluminium paint shall be provided instead of Gr. II as per Technical specification requirement. (typical) **BHEL reply:** Incorporated in the document in all the areas where this HR aluminium paint was envisaged.
		NTPC comments: Sl no: 04 of APH, Power Tool cleaning to St-3 (SSPC- SP3) **BHEL reply:** Pin rack assembly is machined item; therefore, Power tool cleaning is not envisaged.
		NTPC comments: Sl no: 11 of APH, Temp **BHEL reply:** Temperature is incorporated in the document.
		NTPC comments: Sl no: 13 & 14 of APH, Heat resistant Aluminum Paint Gr. I to IS 13183 (Two coats) **BHEL reply:** Incorporated in the document.
		NTPC comments: What is TC pipe? **BHEL reply:** TC pipe is thermocouple pipe**.**
		NTPC comments: 2. Fans: Stairs and Hand rails- FD/ ID/PA Fan- Stair stringer channels, Platform structural items and toe guard plates **BHEL reply:** We checked with our Engineering and wish to inform that the above referred items will be released by BHEL, Trichy for this project and will be included in their painting scheme. PGMA has not been released by Ranipet for the above referred items.
		NTPC comments: Primer for FD & PA fan rotating part shall be similar to ambient air swept surface (inside) **BHEL reply:** Rotating parts are given paint of Epoxy Zinc phosphate primer as it is capable of withstanding exposure and offers superior protection than compared to Red oxide primer + Synthetic Enamel and is quick drying. This is the painting scheme which we follow for all NTPC projects. Since the rotor will be housed inside the housing the static parts of FD & PA fan are given the paint of Red oxide primer + Synthetic Enamel.
		NTPC comments: Scanner cooling air fan to be included **BHEL reply:** There is no such fan as Scanner cooling air fan in this project. The type of fans is Radial penthouse ventilation fan, ID sealing/ cooling fans, Seal air fans for which the painting is given for all types of above referred fans.
		NTPC comments: Commissioning and mandatory spares, Tools for ID, PA, FD fans, seal air fan, scanner air fans, FD fan for aux. boiler to be included **BHEL reply:** Incorporated in the document
		NTPC comments: Sl no: 03 of Gates and Damper and Sl no: 34 of ESP, Sl no: 05 of Chimney, Furnish surface preparation before galvanizing **BHEL reply:** Incorporated in the document
		NTPC comments: ESP penthouse (columns) to be included **BHEL reply:** ESP penthouse columns are already included under Sl no: 38 of ESP
		NTPC comments: Sl no: 37,38,39 of ESP, Comments on Surface preparation, Primer, Intermediate and Finish paints **BHEL reply:** Incorporated in the document

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

REV NO	EFFECTIVE DATE	DETAILS OF REVISION MADE
01	18-05-2018	**NTPC comments:** Sl no: 06 of chimney, Sl no to be corrected **BHEL reply:** Noted and corrected
		NTPC comments: Sl no: 06, Painting of Damaged areas 2 & 6 of Fans 11& 12 of APH under Sl no: 01 of Table **BHEL reply:** Sl no: 02 is already included but whereas painting as per sub-section- D-01 of Section VI, Civil works is not applicable for the Sl no: 06 of Fans which is coupling/ coupling guard, Sl no: 11& 12 of APH which is Air seal piping and Access door. For these items painting as per Sub-section –A-12 will be applicable which is indicated in Sl no: 02 of the table.
		NTPC comments: Sl no: 06, Painting of Damaged areas, ESP **BHEL reply:** Included in the table
		NTPC comments: Primer –Epoxy zinc rich primer DFT- 100µm **BHEL reply:** As per Note-4 in Sub-Section D-01 of Section –VI, Part-B Page 107 of 340, 70 microns is only indicated for Zinc rich epoxy primer. Therefore we request you to retain the same 70 microns DFT.
		NTPC comments: Note-9 **BHEL reply:** Note -9 is incorporated in the document. Also NTPC specification is well above the requirement of corrosivity category C3 (durability high) as DFT of 160µm is only envisaged as per ISO 12944 standards as against the NTPC requirement of 255µm.
		NTPC comments: On table **BHEL reply:** Incorporated
02	07-08-2018	**NTPC comments:** Incorporate the required painting scheme in this document after getting inputs from from BHEL, Trichy in line with Telangana **BHEL reply:** Details secured from BHEL, Trichy and included in the painting scheme under Sl no: 11&12 in Fans
		NTPC comments: Scanner fan is needed for cooling of the boiler flame scanners. Please check with Trichy and include it **BHEL reply:** Checked with BHEL, Trichy and included the painting details of Scanner fan in the painting scheme under sl no: 10 of Fans.
		NTPC comments: Comments in the table on page 18 **BHEL reply:** Incorporated in the document.

Sl No	SURFACE LOCATION		PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
					PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

1-AIR PRE HEATER (APH)

01	Steam coil APH Temp > 95°C		50 510	Power Tool cleaning to St3 (SSPC-SP3)	Heat Resistant Aluminum Paint Gr I to IS 13183 (Two Coats)	40	--	--	40
02	Module assembly – Temp > 95°C		52 010	Power Tool cleaning to St3 (SSPC-SP3)	Two Coats Red Oxide Zinc phosphate prime toIS:12744	60	--	--	60
03	Heating Element with Baskets		52 010	Power Tool cleaning to St3 (SSPC-SP3)	Temporary Rust Preventive Oil application (Wet) as per PRQA 522 **Note**: Heating elements are assembled in module assy after dipping in the rust Preventive fluid				
04	Rotor post assembly – Temp > 95°C		52 011	Power Tool cleaning to St3 (SSPC-SP3)	Two Coats Red Oxide Zinc phosphate prime to IS:12744	60	--	--	60
05	Pin rack assembly		52 012	---	Temp rust preventive as per PRQA 523	20	--	--	20
06	Radial Seals –Temp > 95°C	T Bars	52 013	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	--	--	60
		Seals			Temporary rust preventive Oil as per PRQA 523	20	--	--	20
07	Rotor Housing Assembly – Temp > 95°C	Insulated Side	52 030	Power Tool cleaning to St3 (SSPC-SP3)	Heat Resistant Aluminum Paint Gr I to IS 13183 (Two Coats)	40	--	--	40
		Flue gas Swept Surface			Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	--	--	60
08	Hot and Cold End Connecting Plate Assembly – Temp > 95°C	Insulated Side	52 041 52 042	Power Tool cleaning to St3 (SSPC-SP3)	Heat Resistant Aluminum Paint Gr I to IS 13183 (Two Coats)	40	--	--	40
		Flue gas Swept Surface			Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	--	--	60
09	Axial seals		52 054	Power Tool cleaning to St3 (SSPC-SP3)	Team. Rust Preventive Oil as per PRQA 523	20	--	--	20

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	
10	Bypass seals	52 055	Power Tool cleaning to St3 (SSPC-SP3)	Temp. Rust Preventive Oil as per PRQA 523	20	--	--	20
11	Rotor Drive assembly With bracket, Air Motor, Gear Box– Temp <95°C	52 100	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
12	Air seal piping Temp< 95° C	52 211	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
13	Access door – Temp. > 95 ° C	52 220	Power Tool cleaning to St3 (SSPC-SP3)	Heat Resistant Aluminum Paint Gr I to IS 13183 (Two Coats)	40	--	--	40
14	Observation port with light	52 220	No painting , as the same is made of Glass					
	Other than glass part– Temp > 95°C	52 220	Power Tool cleaning to St3 (SSPC-SP3)	Heat Resistant Aluminum Paint Gr I to IS 13183 (Two Coats)	40	--	--	40
15	Rotor Stoppage alarm	52 220	Made of Aluminium (No painting is required)					
	Other than aluminum –– Temp > 95°C		Power Tool cleaning to St3 (SSPC-SP3)	Heat Resistant Aluminum Paint Gr I to IS 13183 (Two Coats	40	--	--	40
16	Air receiver– Temp < 95°C	52 101	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
17	Lifting beams , special Tools & tackles – Temp < 95°C	52 220 52 000	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
18	T C pipe Assy. (Stainless Steel part)	52 220	No Painting					
	T C pipe Assy. (Non Stainless Steel part)– Temp < 95°C	52 220	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	
19	Guide Bearing Assembly– Temp < 95°C	52 261	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
20	Supporting Bearing Assembly– Temp < 95°C	52 262	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
21	Oil piping Hot end– Temp < 95°C	52 271	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
22	Oil piping cold end– Temp < 95°C	52 272	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
23	Oil circulating units – Temp < 95°C	52 274	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
24	Washing manifold & deluge assy items– Temp < 95°C	52 301 52 302	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
25	Cleaning Device assemblies Tube with Nozzle– Temp < 95°C	52 338 52 339	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
26	Cleaning device drive– Temp < 95°C	52 339	Power Tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
27	Commissioning spares	52 988	As per respective items as above					

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

2. FANS

01	Foundation Matl of FD,ID & PA Fans Bolt & Stud Assy& FD FAN (Aux.Blr)	55 011 55 021 55 031 56 011	Temp. Rust Preventive Fluid as per PRQA 523		20	NIL	NIL	20
02	Foundation Matl of FD, ID & PA Fans – Packer Plates Seal Air Fan Motor Base Frame / Plate& FD Fan Bearing Pedestal Base Frame for Actuators of FD, ID & PA Fans	55 011 55 021 55 031 56 670 56 113 55 516 55 628 55 635	Blast Cleaning to SA 2 ½ (Near white metal) with surface profile 40 – 60 µm	**Primer Coat:** One coat of Inorganic Ethyl Zinc Silicate Primer to IS 14946, (Solid by volume- 60% (min)), (Metallic zinc content 80% (min)) DFT = 75 µm per coat **Intermediate Coat:** One coat of polyamide cured Epoxy based MIO pigmented Intermediate coat (solid by volume- 80% (min) DFT = 100 µm per coat	75 100	Two coats of Two pack Aliphatic Acrylic Polyurethane Paint to IS 13213 (solid by volume- 55% (min) DFT = 40 µm per coat, Shade Grey white RAL9002	80	255
03	**FD FAN <95° C Surface Temperature** **Static Parts** - Insulated Surface (Outside)& Ambient Air swept surface (Inside)	55 516	Power tool cleaning to St3(SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
	Rotating Parts (Inside the Insulated static parts – protection up to erection)	55 216	Power tool cleaning to St3 (SSPC-SP3)	Epoxy based Zinc Phosphate Primer (Two Pack system) as per IS:13238 (Two coats) per coat= 30µm &Total DFT = 60 µm min.	60	NIL	NIL	60
04	**ID FAN >95° C Surface Temperature** **Static Parts** - Insulated Surface (Outside)	55 628	Power tool cleaning to St3(SSPC-SP3)	One coat of HR Aluminium Paint to IS:13183 Gr. I	20	One coat of HR Aluminium Paint to IS:13183 Gr. I	20	40
	Static Parts – Flue gas swept surface (Inside)	55 628	Power tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	NIL	60
	Rotating Parts - (Inside the insulated Static Parts – protection up to erection)	55 328	Power tool cleaning to St3(SSPC-SP3)	Epoxy based Zinc Phosphate Primer (Two Pack system) as per IS:13238 (Two coats) per coat= 30µm & Total DFT = 60 µm min.	60	NIL	NIL	60

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	
05	**PA FAN <95º C surface Temperature** **Static parts –** Insulated Surface (Outside) & Ambient Air swept surface (Inside)	55 635	Power tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
	Rotating Parts (Inside the insulated static parts-protection up to erection)	55 335	Power tool cleaning to St3 (SSPC-SP3)	Epoxy based Zinc Phosphate Primer (Two Pack system) as per IS:13238 (Two coats) per coat= 30µm & Total DFT = 60 µm min.	60	NIL	NIL	60
06	**Coupling and coupling Guard** – for FD, ID& PA FAN , Seal Air FAN & FD Fan (Aux.Blr.) – protection till erection– temp < 95°C	55 810 55 820 55 830 56 870 56 810	Power tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
07	**Lub oil System –** For FD, ID & PA FAN	55 910 55 920 55 930	Power tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
08	**Silencer for FD & PA FAN** **<95º C surface Temperature** Insulated Surface	55 911 55 931	Power tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	
09	**Radial pent house ventilation /ID sealing /cooling fans/ Seal Air Fan & FD FAN (Aux.Blr), Scanner Air fans <95º C surface Temperature -** Insulated Surface	55 024 56 161 56 173 56 373 56 473 56 113 56 313 56 413 43 200	Power tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
10	**Commissioning and mandatory spares Tools for ID, PA,FD fans, Seal air fan, FD fan for aux. blr, Radial penthouse ventilation fan, ID sealing/cooling fans** scanner air fan	55 997 56 997 55 000 56 000	Power tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
11	**Stairs and Hand Rails- FD/ID/PA FAN – Stair stringer channels, hand rails and toe guard plates**	PGMAs as per Trichy Painting scheme	Blast cleaning if required	Hot Dip Galvanizing to 610 gm per Sq. Meter (minimum) and to a coating thickness of 87 µm (minimum)				
12	**Other structural items other than sl no: 11 of above**	PGMAs as per Trichy Painting scheme	Blast Cleaning to SA 2 ½ (Near white metal) with surface profile 40 – 60 µm	**Primer Coat:** One coat of Inorganic Ethyl Zinc Silicate Primer to IS 14946, (Solid by volume- 60% (min)), (Metallic zinc content 80% (min)) DFT = 75 µm per coat **Intermediate Coat:** One coat of polyamide cured Epoxy based MIO pigmented Intermediate coat (solid by volume- 80% (min) DFT = 100 µm per coat	75 100	Two coats of Two pack Aliphatic Acrylic Polyurethane Paint to IS 13213 (solid by volume- 55% (min) DFT = 40 µm per coat, Shade Grey white RAL9002	80	255

To be revised in accordance with Sl.no. 37,38 & 39 of Part-4

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

3. GATES & DAMPERS

01	Gates & Dampers > 95° C Insulated Surfaces	57 203 57 223 57 270 57 273 57 430 57 460 57 470 57 480 57 490, 57 620	Power tool cleaning to St3 (SSPC-SP3)	HR Aluminium Paint to IS: 13183 Gr. I (up to 400 ° C) – Two Coats	40	--	--	40
02	Gates & Dampers < 95 ° C Insulated Surfaces	57 010, 57 013 57 033, 57 063, 57 083, 57 110, 57 113, 57 141, 57 143, 57 160, 57 173	Power tool cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two Coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
03	Ladder, Cage for Ladder, Toe Guard Plate Floor Grill, Hand Rails, Hand Rail Post,	57-466	Gratings- Blast cleaning to Sa 2½ Other Items- Blast cleaning if required	Hot Dip Galvanizing to 610 gm per Sq. Meter (minimum) and to a coating thickness of 87 µm (minimum)				
04	Other Structural Items – other than sl.no. 3 of above.	57-466	Power tool cleaning to St3(SSPC-SP3	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two Coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
05	Ducts Commissioning Spares	57 988	As per respective items mentioned in this Painting Scheme					

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

4. ELECTROSTATIC PRECIPITATOR (ESP OR EP)

1	Insulator Housing Assy– Temp > 95°C	79 806	Power Tool Cleaning to st3 (sspc-sp3)	Heat Resistant Aluminum paint to IS 13183 Gr. I (up to 600^0 C) (Two Coats)	40	NIL	--	40
2	Gas Distribution Assy– Temp > 95°C	79 808	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
3	GD Rapping Mechanism– Temp > 95°C	79 809	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
4	GD Drive Arrangements– Temp< 95°C	79 810	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
5	Gas Screening– Temp > 95°C	79 811	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
6	Emitting System suspension– Temp > 95°C	79 813	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
7	Emitting Electrode –Hook Part	79 815	Rust preventive application on Hook part Oniy (Electrode Wire is Stainless Steel)					
8	Emitting Electrode Rapping Mechanism– Temp > 95°C	79 816	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
9	Drive Arrangement For Emitting System– Temp < 95°C	79 817	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
10	Suspension Arrangement For Collecting Electrode– Temp > 95°C	79 819	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
11	Collecting Electrode	79 820	Rust Preventive Fluid as per TEP AQCS RP					

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	
12	Lifting Beam for Collecting Electrode	79 820	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
13	Frame Of Emitting System-Top– Temp > 95°C	79 821	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
14	Frame Of Emitting System - Bottom– Temp > 95°C	79 822	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
15	Inspection /Access Door	79 823	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
16	Shock Bars - – Temp > 95°C	79 824	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
17	Collecting Electrode (CE) Rapping Mechanism– Temp > 95°C	79 825	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
18	Drive Arrangements for CE Rapping– Temp < 95°C	79 826	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
19	ESP Roof Beams– Temp > 95°C	79 828	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
20	Frame of Emitting System – Middle– Temp > 95°C	79 832	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
21	Outer Roof –EP - – Temp < 95°C	79 842	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
22	Hopper Ridges– Temp > 95°C	79 843	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60

Sl No	SURFACE LOCATION		PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
					PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	
23	Hopper Upper part – Temp> 95°C	Insulated side	79 844	Power Tool Cleaning to st3 (SSPC-SP3)	Heat Resistant Aluminum paint to IS 13183 Gr. I (up to 600^0 C) (Two Coats)	40	NIL	--	40
		Flue Gas Swept Surface			Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
24	Hopper Middle & Lower part– Temp > 95°C	Insulated side	79 845	Power Tool Cleaning to st3 (SSPC-SP3)	Heat Resistant Aluminum paint to IS 13183 Gr. I (up to 600^0 C) (Two Coats)	40	NIL	--	40
		Flue Gas Swept Surface			Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
25	Insulator Support Panel– Temp > 95°C	Insulated Side	79 846	Power Tool Cleaning to st3 (SSPC-SP3)	Heat Resistant Aluminum paint to IS 13183 Gr. I (up to 600^0 C) (Two Coats)	40	NIL	--	40
		Flue Gas Swept Surface			Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
26	Roof Panel Assy– Temp > 95°C	Insulated Side	79 847	Power Tool Cleaning to st3 (SSPC-SP3)	Heat Resistant Aluminum paint to IS 13183 Gr I (up to 600^0 C) (Two coats)	40	NIL	--	40
		Flue Gas Swept Surface			Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
27	Casing Structure– Temp > 95°C		79 848	Power Tool Cleaning to st3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
28	Casing (Shell, Side Panels, Gables & GD Housing)– Temp > 95°C	Insulated Side	79 849	Power Tool Cleaning to st3 (SSPC-SP3	Heat Resistant Aluminum paint to IS 13183 Gr I (up to 600^0 C) (Two coats)	40	NIL	--	40
		Flue Gas Swept Surface			Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60

Sl No	SURFACE LOCATION		PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
					PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	
29	ESP Funnel Assy– Temp > 95°C	Insulated Side	79 850	Power Tool Cleaning to st3 (SSPC-SP3	Heat Resistant Aluminum paint to IS 13183 Gr I (up to 600^0 C) (Two coats)	40	NIL	--	40
		Flue Gas Swept Surface			Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
30	ESP Pent House– Temp <95°C (Other than columns) Columns- Refer to Sl no:38		79 855	Power tool cleaning to St3(SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
31	Splitters & Guide Vanes– Temp > 95°C		79 857 79 889	Power tool cleaning to St3(SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
32	ESP Performance Test Equipment– Temp < 95°C		79 861	Power tool cleaning to St3(SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
33	Water Washing System– Temp < 95°C		79 866	Power tool cleaning to St3(SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
34	Hand Rail Post, Bend ,ERW Tubes ,Floor Grill and Step Tread		79 865 89 610 89 611 89 612 89 613	Gratings- Blast cleaning to Sa 2½ Other Items- Blast cleaning if required	Hot Dip Galvanizing to 610 gm sq. Meter (minimum) and to a coating thickness of 87 µm (minimum)				
35	Commissioning Spares		79 988	As per respective item , as listed in the painting schedule					
36	Tools & Tackles– Temp < 95°C		79 996	Power tool cleaning to St3(SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	
37	Approach Platform For Hopper	79 865	Blast Cleaning to Sa 2.5 Near White metal finish of ISO 8501-1 with surface roughness profile to 40-60 µm	**Primer Coat:** One coat of two component moisture curing Inorganic Ethyl Zinc Silicate Primer to IS 14946, (Solid by volume- 60% (min)) Metallic Zinc content- 80% (min) in dry film, **DFT = 75µm per coat (min)** Zinc dust composition quality shall be Type-II as per ASTM D520-00 **Intermediate Coat:** One coat of two component Polyamide cured Epoxy based MIO pigmented (containing lamellar MIO min 30% on pigment) Intermediate coat (solid by volume- 80% (min) **DFT = 100µm per coat (min)** **Finish Coat:** Two coats of Two Pack Aliphatic isocyanate cured Acrylic finish Paint to IS 13213 (solid by volume- 55% (min) **DFT = 40 µm per coat (min)**, with gloss retention (SSPC paint spec no.36, ASTM D4587, d2244, d523 of level 2 after min. 1000 hours exposure, gloss loss less than 30 and colour change less than 2.0ΔE **Total- 80 µm (min)** Shade **Grey white RAL9002** **Note:** **1.** The total paint thickness (Primer (75 µm) + Intermediate (100 µm) +Finish coat (80 µm) shall be minimum **255µm**. **2.** DFT of individual paint coat shall be ensured separately and the same shall meet the specified minimum DFT of each coat as given above. **3.** Bottom of base plate including below zero level portion marked in EP Supporting Columns which will be embedded in concrete, those surfaces shall be prepared by manual cleaning to ST3 and provided with primer coat of chlorinated rubber based zinc phosphate primer of min. 50 µm DFT.
38	Supporting Structure for ESP, Penthouse columns (Refer note 5 for surface embedded in concrete)	79 855 79 881						
39	Stair stringer Channels, Bracket, Supp Bracket, Frames Loose Channels , Toe Plates, Stiffener Plates and Angles for EP Galleries ,Stair and Walk Way	79 865 89 610						

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

5. CHIMNEY FOR AUX. BOILER

01	Chimney Foundation Materials		87 010	Power tool cleaning to St3(SSPC-SP3)	Temp. Rust Preventive Fluid as per PRQA 523	20	--	--	20
02	Chimney shell– temp > 95°C	Insulated Side	87 100	Power tool cleaning to St3(SSPC-SP3)	Heat Resistant Aluminum paint Gr I of IS: 13183 (Two coats)	40	--	--	40
		Flue Gas Swept Surface			Red Oxide Zinc Phosphate Primer to IS: 12744 (Two Coats)	60	--	--	60
03	Chimney Ducts– temp > 95°C	Insulated Side	87 150	Power tool cleaning to St3(SSPC-SP3)	Heat Resistant Aluminum paint Gr I of IS: 13183 (Two coats)	40	--	--	40
		Flue Gas Swept Surface			Red Oxide Zinc Phosphate Primer to IS: 12744 (Two Coats)	60	--	--	60
04	Chimney Base, Painters Trolley (other than SS) and Strakes– temp < 95°C		87 100 87 200 87 150	Power tool cleaning to St3(SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two Coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100
05	Platform Ladder and hand rails post, hand rails and floor grills & step treads		87 200 87 300	Gratings- Blast cleaning to Sa 2½ Other Items- Blast cleaning if required	Hot Dip Galvanizing to 610 gm/Sq. m (min) and to a coating thickness of 87 µm (minimum)				
06	Other than sl.no.05 of platform structural items– temp < 95°C		87 200 87 300	Power tool cleaning to St3(SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two Coats)	60	Synthetic Enamel to IS2932 Shade: Grey White RAL 9002 (Two coats)	40	100

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

4. PAINTING OF DAMAGED AREAS

Areas where paint has deteriorated badly by erosion and areas where the paint film has lost its adhesion property and where the steel has got rusted appreciably - these areas are to be repainted as per the following procedure:

SL NO	SURFACE LOCATION	SURFACE PREPARATION	PRIMER, INTERMEDIATE & FINISH
1	Paint damaged Components falling under sl.no. 02 of FAN and sl.no. 37,38,39 of ESP	Surface preparation by manual cleaning. Minimum 6" of surrounding areas with existing coat to be roughened by wire brush & emery paper for best adhesion by patch primer	1. Primer: One coat of Self priming Epoxy Zinc rich primer to IS:14589 Gr.II to DFT of 70 µm (min.) 2. Intermediate and Finish: As given in respective scheme as above 3. If primer is intact, intermediate and finish to be done as per the respective scheme.
2	Paint damaged components falling under other sl. Nos. of APH, FAN, GATE & DAMPER, CHIMNEY & ESP		Primer and Finish : As given in respective scheme

GENERAL NOTES

1. No painting is required for Galvanized, non-ferrous & stainless steel items, except as indicated above.
2. Machined items are to be applied with coat of temporary rust preventive oil
3. PGMAs covered in sub-supplier (ie., Purchased) items viz., support bearing / slide bearing and other sub-delivery components of ESP etc., are not indicated in the above list. However, the Painting Schedule for all items supplied by all sub-suppliers and BOI under the scope of BHEL shall be same as for main equipment covered in this document.
4. In sub-assy, wherever plates / sheets of thickness less than or equal to 5mm and rods are used - Power Tool or Hand Tool Cleaning to SSPC - SP 3 / SP 2 shall be followed.
5. Ground shade/colour of finish paints and identification tag/band for equipments, fans, piping, pipe services, supporting structures and other components followed as per NTPC doc ref no: QS-01-DIV-W-4, Rev.00.
6. All components covered under different PGMAs are to painted. In case any component is left out, the same shall deemed to be included under the relevant section.
7. All threaded and other surfaces of foundation bolts and its materials, insulation pins, Anchor channels, Sleeves, HSFG bolts 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.
8. Weld edges made for site welding shall be manual cleaned by wire brush and shall be applied with weldable primer.
9. All steel structures shall be provided with painting as given in the specification. Further, painting system shall also meet the requirements of corrosivity category C3 (durability high) as per ISO 12944.

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

Painting scheme- Details of procurement & application processes

SL NO	TYPE OF PAINT	SPECIFICATION OF PAINT	NO OF PACK	VOLUME OF SOLIDS (% Min)	MODE OF APPLICATION	OVER COATING INTERVAL	SHADE
01	Epoxy Zinc phosphate primer	IS 13238	2	40	Spray	24	Grey
02	Zinc Ethyl silicate primer (% Zn on dry film= 80 (min))	IS 14946	2	60	Airless Spray only	24	Grey
03	Epoxy High solid-Polyamide cured Epoxy based MIO pigmented **intermediate coat**	--	2	80	Airless Spray	16	Brown
04	Aliphatic acrylic polyurethane paint	IS 13213	2	55	Airless Spray	16	Grey white RAL 9002
05	Heat resistant aluminium paint	IS 13183 Grade I	1	--	Brush/ Spray	24	--
06	Chlorinated rubber based zinc phosphate primer	--	1	40	Brush/ Spray	12	Grey
07	Long oil alkyd Synthetic enamel finish paint	IS 2932	1	35	Brush/ Spray	12	Corresponding shade no
08	Red oxide Zinc phosphate primer	IS 12744	1	--	Brush/ spray	12	--

Note: Application of paint as per paint/ primer manufacturer's instruction

Sl No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	

PAINTING REQUIREMENTS AS STIPULATED IN TENDER DOCUMENT

SL NO	AREAS	TENDER DOCUMENT REFERENCE
01	ESP and Auxiliaries like ESP, APH, Fans, GAD	Technical specification Section- VI, Part-B, Sub section A-12 Page 6 of 9 and 8 of 9
02	Structures of ESP, Packer plates, Base frames of motor and actuators	Technical specification Section- VI, Part-B, Sub section D-01, Civil works Page 106 & 107 of 340, clause 6.04.01 to 6.04.03
03	Touch up painting on damaged areas	Technical specification Section- VI, Part-B, Sub section D-01, Civil works Page 107 of 340, clause 6.04.04
04	Galvanizing of gratings, hand railings and ladders	Technical specification Section- VI, Part-B, Sub section D-01, Civil works Page 108 of 340, clause 6.04.08 & 6.04.09