PROJECT	BTG PACKAGE FOR 1 x 120 MW GAS BASED CAPTIVE POWER PLANT
CUSTOMER	TATA STEEL LIMITED (TSL), KALINGANAGAR
CONSULTANT FICHTNER	FICHTNER Consulting Engineers (India) Private Limited Chennai, Bengaluru
Maharatna Company	BHARAT HEAVY ELECTRICALS LTD. TRICHY
TITLE	Painting schedule for Boiler components
BHEL DOCUMENT NO:	PL: C3 - PS/ 1430, Rev.01 Dated 12.10.18
TATA DOCUMENT. NO:	QST-23-02-01-20-291-026

APPROVED

	PDS	16.10.18
NAME & SIGNATURE	DEPT.	DATE

TATA STEEL — ENGINEERING & PROJECTS
TATA STEEL LIMITED

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approved
TSL (SURVARAO)

BHARAT HEAVY ELECTRICALS LIMITED
Tiruchirappalli - 620 014

TATA STEEL LIMITED, KALINGANAGAR 2X250TPH CPP, JAJPUR DIST, ORISSA
CUSTOMER NO: I3-1430/1431, UNIT I&II
PAINTING SCHEDULE

TATA Document Number: QST-23-02-01-20-291-026

Prepared by	**K. Srinivasan** **Senior Engineer/ Plant Lab**		**Document No: PL: C3 - PS / 1430**
Reviewed by	**S Thiagarajan** **AGM/ PE/ FB**		**Revision No: 01 Dated: 12-10-2018**
Approved by	**A. Santha Kumari** **AGM/ Plant Lab**		**Sheet No. 02 of 12**

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RECORD OF REVISIONS

Rev. No	Date	Details of revision	Remarks
00	20-09-2018	New	Prepared in line with BHEL standard painting system.
01	12-10-2018	Sheet 4 – Note included for Sl. No. 3 Sheet 7 – Finish paint shade modified for Sl. No. 9.	Modification incorporated as per discussion via MOM dt. 11 & 12.10.2018

TSL (SURYA RAO)

Sl.No.	PGMA / Description	Surface Prepa-ration & 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 1AC	Drum (Except Internals), Drum suspension 04-114, 144;	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744 DFT= 30µm per coat	1	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932 DFT= 20µm per coat	2	International orange Shade No:592 of IS 5	70
2 PS5B	Drum Internals, foundation materials & Dd items 04-114; 21-602,604,700; 24-352,700; 32-700; 35-010,190,700; 39-010,700; 42-700; 48-019,700;	SSPC-SP1/ or SSPC – SP3 Solvent/ Power Tool Cleaning	Rust Preventive Fluid to PR: CHEM: 09 – 04 DFT=25µm per coat	2	--	--	--	--	--	40
3 PS31D	Buck stays 08-101,104,107,400,700,900; Boiler supporting structures, Columns, Girders, Bracings 35-110,120,130,140,150,160,210,220, 35-230,310, 390, 440 to 444, 511,513, 35-521,523, 35-531,533,610; Galleries, Stair-ways & inter connecting walkways (except gratings) # 36-210,220,230,240,250,260,270,280,290 36-300,310,380,390,610,620; 38-210,310,390,610,712; 39-100,140,141,150,300,301,303 Duct supports: 48-015,205,265,385,495,775,785;	Blast cleaning to SA2 ½ (Near white metal) with surface profile 30 µm	Epoxy based Zinc Phosphate Primer to IS13238 DFT 30µm	1	Epoxy based MIO pigmented intermediate coat DFT 75µm	1	Epoxy based Finish paint to IS14209 DFT 30µm Aliphatic acrylic Polyurethane paint to IS 13213 DFT 30µm	1 1	Light Grey Shade No: 631 of IS 5	165

Note: All the floor grills/ gratings shall be hot dip galvanized

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	
4 PS 3	Components Insulated other than components in Sl.No.6 &8 Ring Headers, Down Comers, Hot air Headers outside the gas path etc. Temperature >95°C & <400°C 05-137,147,155,229,231,251; 07-101,201,223,231,232; 10-135,136,176,191,235,236,270; 18-001,010,020; 19-701,702,753,903; 21-600; 24-424,475 48-202,204,207,208,212,214,262,264,267, 48-382,384,492,494,772,774,782,784;	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744 DFT= 30µm per coat	2	--	--	No paint	No paint	Red Oxide	60
5 PS 9	Components >95° C uninsulated other than components coming in gas path. Temp up to 400 deg.C 24-420; 42-300; 48-200, 915;	SSPC-SP3/ Power Tool Cleaning	HR Aluminium Paint to IS 13183 Gr.II	2	--	--	--	--	Aluminium	40
PS 10	Temp > 400 & <600 deg.C 09- 001,002,003; 28-220;	SSPC-SP3/ Power Tool Cleaning	HR Aluminium Paint to IS 13183 Gr.I	2	--	--	--	--	Aluminium	40

TS2/. (SURYA RAO)

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, 11-248,250,251,356,616,691; 12-135,551,803,850,852,900 12-901;19-105;19-802	SSPC – SP2 or SSPC – SP3 Hand tool / Power tool cleaning	Red Oxide Zinc Phosphate Dip coat primer to PR: CHEM: 09 – 03 DFT=35µm per coat	1*	--	--	--	--	Red Oxide	35
7 PS1A	Components < 95° C (insulated/uninsulated) –Other than components in Sl.No.3. Miscellaneous and casing sheets, Fuel firing, Steam blowing piping, Duct plates, expansion joints, Coal Feeding, Handling equipment. 07-601; 21-601,605; 24-350,400,401,403,425,426,427,435,436, 24-437,440,441,442,473; 39-302; 41-350,390,450; 42-002,005,070,146,152,156, 42-157,195,200; 43-004,104,200; 45-220,221; 48-012,014,032,034,042,044,911,912 95-088,089; 96-188,189,193; 97-591; $ Handling Equipments: 99-099,100,400,500	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744 DFT= 30µm per coat	1	--	--	Syn. Enamel paint (Long Oil Alkyd) to IS 2932 DFT= 20µm per coat	2	Smoke Grey Shade No: 692 of IS5	70

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

$ - Final Shade is Golden yellow for Under hung crane, Chain Pulley Block, Ratchet Lever and Trolley with hoist. Black shade for Hook.

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, WW panels, Commissioning Spares & erection Materials etc., 04-988 06-400,500,631,634,637,641,644, 647,651, 06-653,655; 07-993; 12-993; 19-763,850,851,999; 20-988;21-987; 24-955,960,987,988,989,993; 30-103,105,215,219,220,224; 31-010,301; 32-010,210,810; 35-993;36-993;37-010;39-993; 41-988;42-988;48-993;97-590;	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744 DFT= 30µm per coat	2	--	--	No paint	No paint	Red Oxide	60
9 PS1AY	Hand rails and posts, ladders / rungs, stairs 35-850; 36 – 820, 850; 39-820,850;	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744 DFT= 30µm per coat	1	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932 DFT= 20µm per coat	2	Lemon yellow Shade No. 355 of IS 5	70
10 PS6	Floor Grills, guard plate 35-811; 36-811,813,814; 39-810;	SSPC-SP8/ Pickling	Hot dip Galvanizing to a coating weight of 610 g/m^2 (minimum) Refer Notes given below **							

Notes **: Guard plates shall be painted as per painting scheme prescribed in Sl.No: 03.

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PAINTING SCHEME FOR VALVES

Sl.No.	PGMA / Description	Surface Prepa-ration & 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	
11 PS 10	Cast carbon steel valves (Conventional) Cast alloy steel valves (Conventional) All API valves, QCNRV, SV & SRV Silencers 21-800, 850; 24-460,480,485; 80-278,279,280,905;	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr.II/ Gr. I	2	--	--	--	--	Aluminium	40
    PS7	Forged valves	Chemical cleaning	Phosphating To a coating weight of 1500 mg per sq.ft.	--	--	--	--	--	--	--
12 1AS	Soot Blower components 20-301,304, 621, 801,804;	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744 DFT= 30µm per coat	2	--	--	Syn. Enamel paint (Long Oil Alkyd) to IS 2932 DFT= 20µm per coat	2	Verdigris Green Shade No. 280 of IS5	100
	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 Prepa-ration & 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	
13 PS15	For CLH & VLH*** PGs 07,08,12,17,19,21,24,45,47,48 &80 07-401,410,420,431; 19-901 24-351,353, 404; 48-206,395;	Abrasive blast cleaning to Sa 2 ½ 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
14 PS 5B	All Columns below '0' level (embedded in concrete) PGs 34,35,36,38 39	SSPC-SP3/ Power Tool Cleaning	Rust Preventive Fluid to PR: CHEM: 09 – 04 DFT=20µm per coat	2	--	--	--	--	--	40

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

TSL (SURYA RAJ)

NOTES:

01. Rust Preventive Coating should be given on HSFG Bolt and nut threads.
02. Machined surfaces and Retainers A & C types are to be applied with a coating of Temporary Rust Preventive oil.
03. 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.
04. 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.
05. PGMAs under Sub-Vendor items are not indicated. For all bought-out and sub-vendors items including PGMAs mentioned above falling under the scope of BHEL the same scheme as for main equipment as covered in this document shall be followed.
06. The Painting Scheme is valid for only Customer No: 1430, 1431 of M/s TATASTEEL KALINGANAGAR CPP -2x250TPH boiler.
07. No painting is required for Stainless Steel, Non-ferrous & galvanized components.
08. 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.
09. 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 Sl. 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 applicable painting scheme.
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. which don't have feasible dimensions for blast cleaning, Sl.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, e.g. PGMA 04-194 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)
17. For internal protection of Pipes, tubes, headers and other pressure parts, Volatile Corrosion Inhibitor (VCI) pellets shall be put (after sponge testing/draining/ or drying) and subsequently end capped. The dosage of VCI pellets shall be approximately 100 g/cu.m. For tubes typically 4 – 5 tablets per end are to be put. For C & I items the dosage of self-indicating Silica Gel (colourless) shall be 250 g/ cu.m. (About 2 to 3 bags weighing approximately 100 grams each). VCI pellets shall not be used for stainless steel components and its composite associates.
18. All threaded components of spring assemblies and turnbuckles shall be galvanized and achromatized to 15 microns minimum thickness.
19. Soot blower components i.e Valve head assembly having high surface temperature (> 200 and <600 deg. C) shall be applied with protective coating as per PS9 (up to 400 deg.C) and PS10 (up to 600 deg.C)
20. Corner plate, sheet channel and fixing pins of PGMA 32-210 shall be painted as per scheme PS3 to total DFT of 60 microns.
21. It is mandatory that for finish coat each layer shall have a permanent DFT and free from any paint defects like sags, wrinkles etc. Total DFT of a component correspond to respective painting scheme has to be ensured and recorded by inspection agency as per QP.
22. Handrails of PGMA under Sl. No. 3 need to be painted in line with scheme for handrails (i.e. Sl .No. 9).

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23. For chequered plates having thickness <=5mm, surface preparation can be power tool cleaning to St3 and painting shall be in line with Sl. No. 7.
24. Painting of bunker structures to be in line with painting scheme of supporting structures (Sl. No. 3).

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	Aliphatic acrylic polyurethane paint to lS 13213 (latest)	10	2	40	30	Phirozi – Blue/ Light grey	176/ 631	Spray	24
2	Heat resistant Aluminium paint to IS 13183 Grade I/II (latest)	10	1	-	20	--	--	Brush / Spray	24
3	Red oxide zinc phosphate primer paint to IS 12744 (latest)	10	1	As per IS 12744	30	Red Oxide	--	Brush / Spray	12
4	Red oxide Zinc Phosphate Dip coat primer paint to PR: CHEM: 09-03	10	1	--	35	Red Oxide	---	Dip	12
5	Long oil alkyd synthetic enamel finish paint to IS2932	10	1	As per IS 2932	15-20	Reqd. shade	Corrpdg. Shade no.	Brush / Spray	12
6	Temporary Rust preventive fluid to PR: CHE: 09 – 04	10	1	--	20	Amber	--	--	12
7	Epoxy Zinc rich primer to IS14589 Gr.II	8	2	40	40	Grey	--	Spray	24
8	De Oxaluminate weldable primer – colour Aluminum	10	1	--	--	Aluminum	--	Brush/ Spray	24
9	Epoxy based polyamide cured MIO pigmented intermediate coat.	8	2	60	75	Brown/ grey	--	Spray	24
10	Epoxy based polyamide cured finish paint to IS14209 (latest).	13	2	60	30	Smoke grey	692	Spray	24
11	Epoxy based zinc phosphate primer to IS13238 (latest)	13	2	40	30	Grey	--	Spray	24

The covering capacity of paints specified is only approximate.
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 Prepa-ration	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: 1, 2,3, 4,5,6,7,8,9,11,12,13,14.	Power tool cleaning to bare metal	As given in scheme							

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