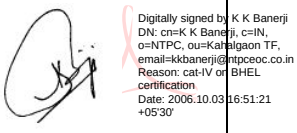
KORBA STPP STAGE-III (1X500 MW)

NTPC Doc. No. 2140-108-110-03HW-PVM-W-026

PAINTING SCHEDULE



FOR

THE EQUIPMENT UNDER BHEL HARDWAR SCOPE OF SUPPLY

Containing:

(i) Appendix-I : Painting Scheme for Steam Turbine Components (4 sheets)

(ii) Appendix-II : Painting Scheme for Condenser & Heat Exchangers (2 sheets)

(iii) Appendix-III : Painting Scheme for Generator, Exciter and Aux. (3 sheets)

This document is identical to approved doc of Kahalgaon stage-II, phase-II, (1x500 MW), except the LP bypass system in Appendix I, which has been put under Imported items category.

Bharat Heavy Electricals Ltd. (BHEL), HARDWAR

Date : 12-09-2006

Appendix-I

PAINTING REQUIREMENTS FOR STEAM TURBINE COMPONENTS

PROJECT : 1X500MW Korba STPP, Stage-III

Painting Scheme

Paint (Coat)	Paint Type	No. of coat	DFT*
Primer Paint	: Epoxy base Zinc rich primer paint	2 Coats	70
Intermediate Paint	: Epoxy TiO_2 Pigmented Polyamide Cured Paint	1 Coat	70
Finish (Final) Paint	: Aliphatic Acrylic 2 Pack Polyurethane Finish paint	2 Coats	60
	Total DFT		180

* DFT – Dry Film Thickness (final) in microns.

Details of Color Scheme :

(**Legend** : **W**-at BHEL works; **V**- at vendor's works; **S**-at site; **NA**-Not applicable)

No	Assembly	Shade	Primer	Int. Paint	Final Paint	Touch -up	Remarks
a	Bearing pedestals with assembled parts (outer unmachined surfaces)	Blue RAL 5012	W	W	W/S	NA	
b	ESV/IV& CV servomotors (outer unmachined)	Canary Yellow	W	W	W/S	NA	
c	Longitudinal girder and front walls of LPT. (Outer unmachined)	Blue RAL 5012	W	W	W/S	NA	
d	LP upper parts (outer unmachined)	Blue RAL 5012	W	W	W/S	NA	
e	Suspension arrangement for ESV & IV (unmachined).	Black RAL 9011	W	W	W/S	NA	
f	Shaft lifting & clearance measuring device. (unmachined)	Blue RAL 5012	W	W	W/S	NA	
g	Assy fixture for HPT (unmachined)	Blue RAL 5012	W	W	W/S	S	
h	Turning over device for HPT (unmachined)	Blue RAL 5012	W	W	S	NA	

PAINTING REQUIREMENTS FOR STEAM TURBINE COMPONENTS

PROJECT : 1X500MW Korba STPP, Stage-III

i	Tools and tackles for Govenning equipments (Unmachined)	Blue RAL 5012	W	W	W/S	NA	
j	Transportation device for HPT (Unmachined	Blue RAL 5012	W	W	W/S	NA	
k	Pressure transducers racks (outer surface)	Blue RAL 5012	W	W	W/S	S	
l	Piping of Governing & LP bypass control rack & supply unit for valves.	As per schematics of governing system	W	W	W	S	
m	Oil pipe line outside the governing equipment (outer)	AS PER RESPECTIVE SYSTEM	W	-	S	NA	
n	Oil tank (MOT), Dirty oil tank , waste oil tank (outer unmachined)	Grey RAL 9002	W	W	W/S	NA	
0	Lifting Beam	Blue RAL 5012	V	V	V	S	
p	Spring Cages	Black RAL 9011	V	-	S	NA	
q	Hangers and supports for turbine integral piping	Black RAL 9011	V	-	S	NA	
r	Oil Vapour Exhauster(including Motor)	Grey RAL 9002	V	V	V	S	
s	3-way Temperature Control Valve Actuator	Grey RAL 900	V	V	V	S	

t	C.F. Temp. Control Valve Actuator	Grey RAL 9002	V	V	V	S	
u	Waste Oil Pump (including motor)	Grey RAL 9002	V	V	V	S	
v	Oil Purifier Control Panel	Grey RAL 9002	V	V	V	S	
w	Oil Purifier	Grey RAL 9002	V	V	V	S	
x	Dampers	Black RAL 9011	V	V	V	S	
y	AOP,EOP, JOP Motors	Blue RAL 5012	-	-	-	S	Red Oxide Primer & Enamel Paint as specified by NTPC
z	Hydraulic Accumulators	Brown	V	V	V	S	

Following Items are imported. Sea worthy packing and painting is done as per standard practice of vender

- CF Pump Motor
- CF Purification Unit
- CF Exhauster
- Vacuum Breaker Valve
- Gear Pump & return Pump
- Duplex Filter (Lub oil)
- Duplex Filter (Jacking Oil)
- LB Bypass System

Following Items are not painted as these are of Stainless Steel

- Control Fluid Tank
- Compensators

Appendix-I

PAINTING REQUIREMENTS FOR STEAM TURBINE COMPONENTS

PROJECT : 1X500MW Korba STPP, Stage-III

PAINITNG SCHEME NO	TYPE OF PAINT	COMPONENTS
2.	Heat resistant Aluminum paint Two Coats with a total DFT of 35 to 40 microns.	1. Casing and covers of valves (outside) 2. HPT &IPT outer casing (Outer Unmachined) 3. HP exhaust elbow (outer unmachined) 4. Main steam and reheat strainer body (outer unmachined) 5. Shaft seal covers 6. Cross around pipes

Above components are exposed to steam from inside and are covered with insulation

Appendix-II

PAINTING SCHEME FOR
Condenser & Heat Exchangers (BHEL,Hardwar)

PROJECT : 1X500MW Korba STPP, Stage-III

Sl No	Reference : NTPC doc.no. QS-01-DIV-W-04 R-0/Dtd. 20.9.2002
	Following painting scheme is selected based on NTPC specification : **Paint (Coat) Paint Type No. of coat DFT*** Primer Paint : Epoxy base Zinc rich Primer Paint 2 Coats 70 Intermediate Paint : Epoxy TiO_2 Pigmented Polyamide Cured Paint 1 Coat 70 Finish (Final) Paint : Aliphatic Acrylic 2 Pack Polyurethane Finish paint 2 Coats 60 Total DFT 180 microns min. * DFT – Dry Film Thickness (final) in microns.
A.	**Details of Color Scheme (Outside Surfaces):** (**Legend** : **W**-at BHEL works; **V**- at vendor's works; **S**-at site; **NA**-Not applicable)

	Assembly	**Shade**	**Primer**	**Int. Paint**	**Final Paint**	**Touch -up**	**Re-marks**
01	Condenser	Blue RAL 5012	W	W	S	NA	
	L.P.Heater No.1,Gland Steam Condenser, Turbine oil coolers, Seal oil coolers.	-- Do --	W	W	W	S	
	Control fluid coolers & Stator water coolers (water boxes only as shell matl. being SS is not painted).	-- Do --	W	W	W	S	
	Hydrogen Coolers & Exciter Air Coolers.	Grey RAL 9002	W	W	W	S	
	Water Box Handling Arrangement	Golden Yellow RAL 1004	V	V	V	S	
	Air Exhauster for Gland Steam Condenser	Grey RAL 9002	V	V	V	S	
02	For painting work at Site, paint & painting materials are to be arranged at site by BHEL-Site.						
03	The colour bands shall be applied for identification as per Appendix-C of NTPC's Colour Coding Scheme.						

Following Item is imported. Sea worthy packing & painting is done as per standard practice of vendor:
Condenser Air Evacuation Equipment.

PAINTING SCHEME FOR
Condenser & Heat Exchangers (BHEL,Hardwar)

PROJECT : 1X500MW Korba STPP, Stage-III

B.	**Details of Painting (Inside Surfaces):**						
	Assembly	**Shade**	**Primer**	**Int. Paint**	**Final Paint**	**Touch-up**	**Remark**
01	Condenser						
	# Cooling water side surfaces (water boxes inside)	**Black**	**W** (DFT 70 microns	--	**S** (High Build Black Coal Tar Epoxide Paint,Total DFT 0.25mm	**NA**	
	# Tube plate surface towards water box side.	**-do-**	**S@**	--	**-do-**	**-do-**	After tubing.
	# Shell side inside surfaces (steam side)	Shell side inside surfaces are supplied coated with Steam Washable Paint at Works. This paint is to be washed before commissioning.					
02	L.P.Heater No.1 & Gland Steam Condenser	Shell side & Water box inside surfaces are supplied coated with Steam Washable Paint at Works. This paint is to be washed before commissioning.					
03	Turbine Oil Coolers & Seal Oil Coolers.						
	# Shell inside	Supplied sprayed with oil. No painting required at site.					
	# Water Box inside.	**Black**	**W**	---	**W** (High Build Black Coal Tar Epoxide Paint)	**NA**	
04	Control Fluid Coolers & Stator Water Coolers						
	# Shell inside	No painting as material is SS.					
	# Water Box inside.	**Black**	**W**	---	**W** (High Build Black Coal Tar Epoxide Paint)	**NA**	
05	For painting work at Site, paint & painting materials are to be arranged at site by BHEL-Site.						

@ Tube plate surface is supplied painted with steam washable paint which is to be cleared before applying Primer on water box side surface.

PAINTING REQUIREMENTS FOR GENERATOR, EXCITER AND AUXILIARIES

PROJECT : 1X500MW Korba STPP, Stage-III

Sl No

01 Colour & Coding Scheme, Surface Preparation Process and Sequence of Painting of Turbogenerator, Exciter, Mechanical Assemblies and Control Panels shall be as per NTPC's Colour & Coding Scheme Doc. No. QS-01-DIV-W-04, Rev. No. 00, DT. 20.09.2002.

02 Following painting scheme is selected based on NTPC specification :

Paint (Coat)	Paint Type	No. of coat	DFT*
Primer Paint	: Epoxy based Zinc rich primer paint	2 Coats	70
Intermediate Paint	: Epoxy TiO_2 Pigmented Polyamide Cured Paint	1 Coat	70
Finish (Final) Paint	: Aliphatic Acrylic 2 Pack Polyurethane Finish paint	2 Coats	60
		Total DFT	200

* DFT – Dry Film Thickness (final) in microns.

03 **Details of Color Scheme :**
(**Legend** : **W**-at BHEL works; **V**- at vendor's works; **S**-at site; **NA-**Not applicable)

No	Assembly	Ground Colour	Primer	Int. Paint	Final Paint	Touch-up	Identification Band Colour (For Piping)	NTPC Doc. Sl.No. / Page No.	Remarks
A	**Turbogenerator (Stator, end-shield, Terminal box etc.)**	Blue RAL 5012	W	S	S	NA		2/5	
B	**Exciter & exciter cover**	Blue RAL 5012	W	S	S	NA		2/5	
C	**Generator Gas System consisting of :**								
	Gas Unit	Grey RAL 9002	W	W	W	S		5C/23	
	Duplex Gas Dryer	Grey RAL 9002	W	W	W	S		5C/23	
	H2 Distributor	Grey RAL 9002	W	W	W	S		5C/23	
	CO2 Distributor	Grey RAL 9002	W	W	W	S		5C/23	
	N2 Distributor	Grey RAL 9002	W	W	W	S		5C/23	
	CO2 Vapouriser	Grey RAL 9002	W	W	W	S		5C/23	
	Piping and impulse piping in H2 line	Grey RAL 9002	V/ W	S	S	NA	Canary yellow ISC 309	5C/23	Legend-H
	Piping and impulse piping in CO2 line	Grey RAL 9002	V/ W	S	S	NA	Canary yellow ISC 309	5C/24	Legend-CO2

		Piping and impulse piping in N2 line	Grey RAL 9002	V/ W	S	S	NA	Canary yellow ISC 309	5C/24	Legend-N
		Pipe supports	Black RAL 9011	V/ W	S	S	NA		15/7	
		Valves	Grey RAL 9002	V	V	V	S		8/6	
		Bearing Vapor exhauster	Grey RAL 9002	V	V	V	S		5C/23	
	d	**Generator Seal Oil System consisting of :**								
		S.O. Motors	Blue RAL 5012	V	N A	V	S		71/16	Enamel paint to be used with matching primer and intermediate paint (alkyd based)
		S.O. Pump Unit	Grey RAL 9002	W	W	W	S		60/13	
		S.O. Unit	Grey RAL 9002	W	W	W	S		60/13	
		S.O. Valve Rack	Grey RAL 9002	W	W	W	S		60/13	
		S.O. Instrument Rack	Grey RAL 9002	W	W	W	S		60/13	
		S.O. Storage Tank	Grey RAL 9002	W	W	W	S		60/13	
		S.O. Piping & impulse piping	Grey RAL 9002	V/ W	S	S	NA	Light Brown ISC 410	6C/24	Legend-SO
		Valves	Grey RAL 9002	V	V	V	S		8/6	
		Pipe Supports	Black RAL 9011	V/ W	S	S	NA		15/7	
	e	**PW System consisting of :**								
		PW Motors	Blue RAL 5012	V	N A	V	S		71/16	Enamel paint to be used with matching primer and intermediate paint (alkyd based)
		PW pump & filter unit	Grey RAL 9002	W	W	W	S		60/13	
		PW coolers	Grey RAL 9002	W	W	W	S		60/13	Inform HXE
		Alkaliser Unit	Grey RAL 9002	W	W	W	S		60/13	
		PW Piping & impulse piping	Grey RAL 9002	V/ W	S	S	NA	Sea Green ISC 217	1b/21	Legend - DMW
		Valves	Grey RAL 9002	V	V	V	S		8/6	

		Pipe Supports	Black RAL 9011	V/ W	S	S	NA		15/7	
		PW tank	Grey RAL 9002	W	W	W	S		60/13	
	f	**Generator System consisting of :**								
		ACW piping for H2 coolers and impulse piping	Grey RAL 9002	V/ W	S	S	NA	Sea Green ISC 217	1b/21	Legend ACW
		Valves	Grey RAL 9002	V	V	V	S	White RAL 9010	8/6	
		Pipe Supports	Black RAL-9011	V/ W	S	S	NA		15/7	
		Drain / Vent Pipes	Grey RAL 9002	V/ W	S	S	NA		1b/21	
	g	**Control Cabinets – Interior**	White Glossy Enamel	W /V	W /V	W /V	NA			
	h	**Control Cabinets – Exterior**	Blue Ral 5012 Grey RAL 9002	W /V	W /V	W /V	S		77/17	Front & Rear panels in Grey. End panel sides in Blue
04	Identification plates for Mechanical Equipment and Piping (by the respective equipment supplier) -Background White RAL9010 -Border Black RAL9011 -Lettering Black RAL9011									
05	For painting work at Site, paint & painting materials are to be arranged by BHEL-Site at their end.									

T.R.

1. The Colour Bands shall be applied for identification as Per Appendix C of NTPC's Colour and Coding Scheme.