

sumanmondal@bhel.in

From: Ashwani Sahu <ashwanisahu@bhel.in>
Sent: 01 September 2025 14:29
To: allsite_finincharge.pser@bhel.in; amarjha@bhel.in; asenapati@bhel.in; deepak.rathore@bhel.in; dsheth@bhel.in; gautam.sutradhar@bhel.in; gopal.bhattacharya@bhel.in; hks@bhel.in; ht@bhel.in; indranil.chakraborty@bhel.in; jaswinder@bhel.in; jg@bhel.in; kalyan.sarkar@bhel.in; kbaishya@bhel.in; kkkachari@bhel.in; mksana@bhel.in; muan@bhel.in; ncd_nath@bhel.in; nilanjan@bhel.in; pdatta@bhel.in; pmandal@bhel.in; rksethy@bhel.in; ry@bhel.in; s_datta@bhel.in; sbsahana@bhel.in; schattopadhyay@bhel.in; shiv_das@bhel.in; sukantaju@bhel.in; tkray@bhel.in; jamindar.doley@bhel.in; nita@bhel.in; nagender@bhel.in; ag@bhel.in; abhakta@bhel.in; a_sarkar@bhel.in
Cc: uds@bhel.in; sng@bhel.in; ramnik@bhel.in; kkkundu@bhel.in; uday@bhel.in; rammay.acharya@bhel.in; nabarun@bhel.in; itbhelpser@bhel.in
Subject: FW: Revised Rates for Hire Charges on Tools & Plants
Attachments: Revised Rates for Hire Charges on Issue of Capital Tools & Plants..pdf; Revised Rates for Inter Regional Hire Charges of Major Tools & Plants.pdf

Dear Sir/ Madam,

Please find trailing mail received from Corp. Finance on Revised rates for hire charges on Tools & Plants.

This is for your kind information and necessary action please.

With kind regards,

Ashwani Sahu
AGM (MSX)

From: kba@bhel.in <kba@bhel.in>
Sent: 29 August 2025 18:08
To: vinodjacob@bhel.in; DIPESHPALIT@BHEL.IN; 'uday shankar' <uds@bhel.in>; vsingh@bhel.in; yatindra@bhel.in; 'Naveen Malhotra' <nmalhotra@bhel.in>; 'Aloke Gautam' <ag@bhel.in>; anoopbhatia@bhel.in; lakshmiranga@bhel.in
Cc: 'Asim Mishra' <asim.mishra@bhel.in>
Subject: Revised Rates for Hire Charges on Tools & Plants

Dear Sir/Madam,

Please find attached herewith the following:

1. Revised Rates for Hire Charges on Issue of Capital Tools & Plants.
2. Revised Rates for Inter Regional Hire Charges of Major Tools & Plants.

सादर धन्यवाद Thanks & Regards

कुल भूषण अग्रवाल
Kul Bhushan Aggarwal

महा प्रबंधक कॉर्पोरेट वित्त
G.M. - Corporate Finance
011-66337729, 9810461774



BHARAT HEAVY ELECTRICALS LTD.
BUSINESS SECTOR (FINANCE)- CORPORATE OFFICE
ASIAD, NEW DELHI

From : Kul Bhushan Aggarwal
GM-Finance

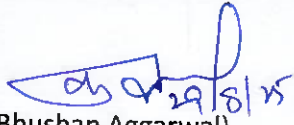
For : As Per Distribution List

No. PW:FM:FAX:T&P Hire :2025-27

Dated: 29th Aug, 2025

Subject : Revision of Hire Charges on Issue of Capital Tools & Plants

1. The rates of hire charges for capital Tools and Plants and Operator's charges circulated vide letter No. PWR:FM: T&P Hire 2023-25 dated 18.09.2023 were valid up to 31.08.2025. The Revised Rates effective from 01.09.2025 are enclosed as detailed below:
 - (i) Annexure C1 & T1: Rates of hire charges applicable to contractors working for BHEL
 - (ii) Annexure C2 & T2: Rates of hire charges applicable to outside agencies other than Contractors working for BHEL.
2. The Crane Operator's charges will be as follows:
 - A. **If BHEL operator is utilised Rs. 9500/- (Rupees Nine thousand five hundred only) per day of 8 hours.** For services less than 4 hours, half of per day rate will be charged. For services for 4 hours or more but up to 8 hours, full day rate will be charged. Overtime Allowance (OTA) will be charged at double the rate on hourly basis.
 - B. **If vendor sourced operator is provided, the rates shall be the actual cost to BHEL with 30% overheads.**
3. The hire charges of Capital Tools & Plants are exclusive of operating expenses e.g. fuel & consumables. **All Operating expenses are chargeable to User's account.**
4. All other terms and conditions / aspects governing the Issue of T&P on Hire "will remain the same as already circulated vide our letter of even number dated 22.1.1992 (copy enclosed).
5. **The revised rates will be effective from 01.09.2025 and shall remain valid up to 31.08.2027.** This will be subject to revision thereafter.
6. For any additional item, the rates of hire charges will be worked out jointly by PS-MSX & Corporate Finance (Business Sector) on specific request. All necessary details will be provided by the concerned Region.


(Kul Bhushan Aggarwal)

GM (Finance)

Encl : As above

BUSINESS SECTOR (CORPORATE FIN.) ASIAD, NEW DELHI

SUB: Rates of hire charges on issue of Capital Tools & Plants

Ref: GM(Fin) Letter No. Ref: PW:FM: FAX: T&P Hire :2025-27 dated 29th Aug, 2025

Distribution:

1. ED / PS SR, Chennai
2. GM & Head / PS-TS, Noida
3. GM & Head / PS ER, Kolkata
4. GM & Head / PS NR, Noida
5. GM & Head / PS WR, Nagpur
6. GM (Fin) / PS WR, Nagpur
7. AGM (Fin) / PS ER, Kolkata
8. AGM (Fin) / PS NR, Noida
9. AGM (Fin) / PS SR, Chennai

CC:

GM & SA to Director Power

Annexure**C1**

Date: 29/08/2025

**REVISED RATES OF T&P HIRE CHARGES FOR CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS**

SL NO.	ITEM DESCRIPTION	USEFUL LIFE (IN YRS)	Revised rates (Rs./Hour) valid from 01/09/2025 to 31/8/2027 (WITHIN USEFUL LIFE)	Revised rates (Rs./Hour) valid from 01/09/2025 to 31/8/2027 (BEYOND USEFUL LIFE)
I.	CRANES :-			
1	Portal Gantry Crane 500T	15	26040.00	26020.00
2	100MT Crawler Crane ZOOMLION CRANE-QUY-100	10	11470.00	11460.00
3	Heavy Lift Crawler Crane 600MT Class DEMAG Model CC2800	15	56920.00	56880.00
4	PORTAL CRANE, 360T	15	14230.00	14220.00
5	600MT Class Crawler Crane- Manitowoc Model 18000-UPGRADED	15	56070.00	56030.00
6	600MT Class Crawler Crane- Liebherr Model LR1600-2 (Upgraded)	15	69370.00	69320.00
7	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH RINGER)	15	33880.00	33850.00
8	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH-OUT RINGER)	15	21170.00	21160.00
9	MANITOWOC M-250T TRUCK CRANE	15	30490.00	30470.00
10	270 MT Class Crawler Crane- Manitowoc Model 2250	15	32010.00	31990.00
11	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1	15	26680.00	26660.00
11.A	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 (UPGRADED)	15	36740.00	36710.00
12	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2	15	15290.00	15280.00
12.A	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 (UPGRADED)	15	19180.00	19170.00
13	LINKBELT LS- 248H CRAWLER CRANE (180T)	15	16940.00	16920.00
14	MANITOWAC MODEL 888 CRAWLER CRANE (200 MT)	15	22020.00	22000.00
15	CRAWLER CRANE SUMITOMO, 150T	15	11010.00	11000.00
16	All Terrain Crane, 150MT- Liebherr Model LTM1150	15	13550.00	13540.00
17	CRAWLER CRANE, 120 T Fushun Model QUY120	10	10920.00	10920.00
18.A	CRAWLER CRANE 135MT Kobelco Model CK1350- 1F	15	10840.00	10830.00
18.B	CRAWLER CRANE 135MT Kobelco Model CK1350	15	8970.00	8970.00
19	CRAWLER CRANE 120MT - Tata-Sumitomo Model SCX1200-2	15	10160.00	10150.00
20	CRAWLER CRANE 100 T (KH 500)	15	10160.00	10150.00
21	Hydraulic Crawler Crane 80MT, Fushun Model QUY 80B	10	5460.00	5460.00
22	ROUGH TERRAIN CRANE 75T (RT880)	12	6200.00	6200.00
23	CRAWLER CRANE, 75T -Tata Model 955ALC/TFC280	12	5430.00	5420.00
24	Mobile Crane, 55MT (TIL)	12	4460.00	4450.00
25	CRAWLER CRANE, 25T -Tata Model TFC75	10	3050.00	3050.00
26	MOBILE CRANE, 20MT (TIL)	10	2290.00	2290.00
27	MOBILE CRANE, 20MT (ESCORTS)	10	2290.00	2290.00
28	MOBILE CRANE ESCORTS- 14MT	10	720.00	720.00
29	HYDAULIC PICK & CARRY CRANE, 8/9/10/11/12 MT	10	390.00	390.00



Annexure

C1

Date: 29/08/2025

**REVISED RATES OF T&P HIRE CHARGES FOR CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS**

SL NO.	ITEM DESCRIPTION	USEFUL LIFE (IN YRS)	Revised rates (Rs./Hour) valid from 01/09/2025 to 31/8/2027 (WITHIN USEFUL LIFE)	Revised rates (Rs./Hour) valid from 01/09/2025 to 31/8/2027 (BEYOND USEFUL LIFE)
30	FORK LIFT 5T	5	650.00	650.00
31	FORK LIFT 3T	5	540.00	540.00

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**REVISED RATES OF T&P HIRE CHARGES FOR CRANES & TRAILERS ETC. FOR
OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	USEFUL LIFE (IN YRS)	Revised rates (Rs./Hour) valid from 01/09/2025 to 31/8/2027 (WITHIN USEFUL LIFE)	Revised rates (Rs./Hour) valid from 01/09/2025 to 31/8/2027 (BEYOND USEFUL LIFE)
I.	CRANES :-			
1	Portal Gantry Crane 500T	15	28930.00	28910.00
2	100MT Crawler Crane ZOOMLION CRANE-QUY-100	10	12740.00	12730.00
3	Heavy Lift Crawler Crane 600MT Class DEMAG Model CC2800	15	63240.00	63200.00
4	PORTAL CRANE, 360T	15	15810.00	15800.00
5	600MT Class Crawler Crane- Manitowoc Model 18000-UPGRADED	15	62300.00	62260.00
6	600MT Class Crawler Crane- Liebherr Model LR1600-2 (Upgraded version)	15	77080.00	77020.00
7	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH RINGER)	15	37640.00	37610.00
8	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH-OUT RINGER)	15	23520.00	23510.00
9	MANITOWOC M-250T TRUCK CRANE	15	33880.00	33850.00
10	270 MT Class Crawler Crane- Manitowoc Model 2250	15	35570.00	35550.00
11	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1	15	29640.00	29620.00
11.A	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 (UPGRADED)	15	40820.00	40790.00
12	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2	15	16990.00	16980.00
12.A	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 (UPGRADED)	15	21310.00	21300.00
13	LINKBELT LS- 248H CRAWLER CRANE (180T)	15	18820.00	18800.00
14	MANITOWAC MODEL 888 CRAWLER CRANE (200 MT)	15	24470.00	24450.00
15	CRAWLER CRANE SUMITOMO, 150T	15	12230.00	12220.00
16	All Terrain Crane, 150MT- Liebherr Model LTM1150	15	15050.00	15040.00
17	CRAWLER CRANE, 120 T Fushun Model QUY120	10	12130.00	12130.00
18.A	CRAWLER CRANE 135MT Kobelco Model CK1350- 1F	15	12040.00	12030.00
18.B	CRAWLER CRANE 135MT Kobelco Model CK1350	15	9970.00	9960.00
19	CRAWLER CRANE 120MT - Tata-Sumitomo Model SCX1200-2	15	11290.00	11280.00
20	CRAWLER CRANE 100 T (KH 500)	15	11290.00	11280.00
21	Hydraulic Crawler Crane 80MT, Fushun Model QUY 80B	10	6060.00	6060.00
22	ROUGH TERRAIN CRANE 75T (RT880)	12	6890.00	6890.00
23	CRAWLER CRANE, 75T -Tata Model 955ALC/TFC280	12	6030.00	6030.00
24	Mobile Crane, 55MT (TIL)	12	4950.00	4950.00
25	CRAWLER CRANE, 25T -Tata Model TFC75	10	3390.00	3390.00
26	MOBILE CRANE, 20MT (TIL)	10	2540.00	2540.00
27	MOBILE CRANE, 20MT (ESCORTS)	10	2540.00	2540.00

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REVISED RATES OF T&P HIRE CHARGES FOR CRANES & TRAILERS ETC. FOR
OUTSIDE AGENCIES

SL NO.	ITEM DESCRIPTION	USEFUL LIFE (IN YRS)	Revised rates (Rs./Hour) valid from 01/09/2025 to 31/8/2027 (WITHIN USEFUL LIFE)	Revised rates (Rs./Hour) valid from 01/09/2025 to 31/8/2027 (BEYOND USEFUL LIFE)
28	MOBILE CRANE ESCORTS- 14MT	10	800.00	800.00
29	HYDAULIC PICK & CARRY CRANE, 8/9/10/11/12 MT	10	430.00	430.00
30	FORK LIFT 5T	5	730.00	730.00
31	FORK LIFT 3T	5	600.00	600.00

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RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/09/2025 to 31/8/2027
I. LIFTING EQUIPMENTS		
1	Strand Jack System for Boiler Drum Lifting	21030
2	MULTI SHEAVE PULLEY BLOCK 40/50T/60T	310
3	MULTI SHEAVE PULLEY BLOCK 100T	630
4	MULTI SHEAVE PULLEY BLOCK 150T	1270
5	ELCTRIC WINCH 5T	1280
6	ELCTRIC WINCH 10T	2370
7	ELECTRIC WINCH 15 T	2170
8	PASSENGER CUM GOODS HOIST 1T	2290
9	FURNACE MAINTENANCE PLATFORM	5060
10	Gang Operated Hydraulic Jack (Set of 4 Jacks - 175 MT each)	2100
II WELDING & HEAT TREATMENT EQUIPMENT		
1	125KW, 3KHZ, AIR-COOLED INDUCTION HEATING EQUIPMENT	16460
2	75KW, 10 KHZ, COMPACT INDUCTION HEATING EQUIPMENT	8230
3	WELDING GENERATOR 320/300 A	300
4	WELDING RECTIFIER 400A/300A	300
5	WELDING RECTIFIER 600A	400
6	DIESEL WELDING GENERATOR 400A/300A	400
7	TRANSFORMER,600A	300
8	TRANSFORMER 300/400A	200
III SERVICE PLANTS & ALLIED EQUIPT.		
1	500KVA DIESEL GENERATOR	3830
2	TRANSFORMER OIL FILTERATION EQUIPMENT 6000LPH CAPACITY WITHOUT STORAGE TANK	6400
3	-DO-, WITH STORAGE TANK	7310
4	OIL FILTERATION M/C, 250/500 LPH (OTHER THAN SILICON OIL)	910
5	OIL FILTERATION M/C, 250GPH/1000LPH (OTHER THAN SILICON OIL)	1370
6	OIL FILTERATION M/C, 500GPH/2500LPH (OTHER THAN SILICON OIL)	1820
7	OIL FILTERATION M/C, 1000GPH/5000LPH (OTHER THAN SILICON OIL)	3650
8	Portable Lube Oil Purification Unit (Centrifuge M/c) Capacity: 750 LPH	1280
9	Low Vacuum de-hydration unit	640
10	DIESEL GENERATING SET,250 KVA	1780
11	DIESEL GENERATING SET,25 KVA	510

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RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/09/2025 to 31/8/2027
12	VACUUM PUMP(ABSOLUTE V.C.)	540
13	ACID CIRCULATING PUMP WITH MOTOR 120M HEAD, 150T/HR	1090
14	ACID TRANSFER PUMP 20/50 T/HR	540
15	DEWATERING PUMP (Kirloskar make,11KW/15HP)	80
16	HP Air compressor (32 Kg/Sq. Cm, 150 CFM)	4260
17	AIR COMPRESSORS 250/300/330/360/350 CFM	2740
18	AIR COMPRESSORS 140/150/190/210 CFM	910
19	ACID CIRCULATING PUMP WITH MOTOR & STARTER, 200T/HR, 150M, 220 HP	1820
20	Industrial Blower 2000CFM	1280
21	Air Leak Test Blower (Flow: 40000 m ³ /Hr)	1160
22	Air Blower (Flow: 20000 m ³ /Hr)	940
IV METAL FORMING /CUTTING EQUIPMENT		
1	TUBE EXPANDING M/C PNEUMATIC 60-100 MM	640
2	ELECTRO HYDRAULIC PIPE BENDING M/C 4"	1640
3	BOLTING MACHINE (ALCOA/AVLOCK/ HUCK)	1810
4	-do- Gun with nose Assembly only	540
V TESTING/INSPECTION EQUIPMENT		
1	DATA LOGGER for PG TESTING	37110
2	MOTORISED HYDRAULIC TEST PUMP 250kg/cmsq	800
3	MOTORISED HYDRAULIC TEST PUMP 400-450kg/cmsq	1090
4	MOTORISED HYDRAULIC TEST PUMP 600 KG/CMSQ	1280
5	HYDRAULIC TEST PUMP 800 KG/CMSQ	1340
6	HYDRAULIC TEST PUMP 1000 KG/CMSQ	2250
7	BOLT STRETCHING DEVICE	910
8	BOROSCOPE/FIBROSCOPE FLEXIBLE TYPE (FLEXUX) IMPORTED	3650
9	ULTRASONIC FLAW DETECTOR	2740
10	MPI TEST KIT	360
11	GAS LEAK DETECTOR	270
12	VIBRATION/SOUND LEVEL METER IRD-306	360
13	VIBRATION/SOUND LEVEL METER IRD-308	360
14	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 350	1460
15	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 360	2560
16	SHOCK PULSE METER	640
17	HV.DC TEST KIT UPTO 50 KV	540
18	HV.DC TEST KIT ABOVE 50 KV	1000
19	HV.AC TEST KIT UPTO 50KV	820
20	HV.AC TEST KIT ABOVE 50KV	2920
21	MOTORISED MEGGER 2.5KV	400
22	MOTORISED MEGGAR 5KV	450
23	OSCILLOSCOPE-DUAL BEAM INDIGENOUS	450
24	OSCILLOSCOPE-DUAL BEAM IMPORTED	1090
25	WAVEFORM ANALYSER	910
26	OSCILLOGRAPH/UV RECORDER 24 CHANNEL	1640
27	OSCILLOGRAPH/UV RECORDER 12 CHANNEL	1090
28	OSCILLOGRAPH/UV RECORDER 6 CHANNEL	910

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RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/09/2025 to 31/8/2027
29	DIGITAL LOW RESISTANCE METER	640
30	DC POTENTIOMETER	180
31	PRECISION DEAD WEIGHT TESTER	1000
32	OPTICAL ALIGNMENT KIT	1370
33	BOROSCOPE/FIBROSCOPE(NON FLEXIBLE)	1200
34	VERNIER THEODOLITE,PRECISION	1200
35	VERNIER THEODOLITE,ORDINARY	200
36	ENGINEERS PRECISION LEVEL/DUMPY LEVEL	120
37	ISKAMATIC 'A'	3210
38	CALIBRATOR '03'	1000
39	48 POLE EXTENDER CARD	200
40	MULTIJET NPM	400
41	OSCILLOMETER	10240
42	VOC EQUIPMENT	1400
43	BINARY SIGNAL GENERATOR	290
44	ELECTRIC COUNTER	690
45	FREQUENCY GENERATOR	1000
46	DBF 3 VIBRATION RECORDER/ANALYSER	3290
47	L&T GOULD OSCILLOGRAPH 2-CHANNEL	490
48	L&T GOULD OSCILLOGRAPH 6-CHANNEL	1180
49	VIBROPORT 41/FFT ANALYSER	5480
50	ELCID kit	10060
51	UNIVERSAL CALIBRATION SYSTEM	2740
52	NATURAL FREQUENCY TESTER	2920
53	DIGITAL HARDNESS TESTER	360
54	ADRE 208 VIBRATION ANALYSER	7310
55	PCB DIAGONISTIC REPAIR KIT	2010
56	SECONDARY INJECTION RELAY TEST KIT	5300
57	MICRO OHM METER	1460
58	DIGITAL MICRO OHM METER MEASURING RANGE: 200 $\mu\Omega$ TO 20K Ω	3250
59	PMI Machine OLYMPUS make	3370
60	Mobile Lighting Mast - 9 metres (4X400 W)	870
61	10KVA RESISTANCE BRAZING MACHINE	140
62	RECURRENT SURGE OSCILLOGRAPH (RSO) TEST KIT WITH PORTABLE HANDHELD OSCILLOSCOPE.	460
63	HYDROGEN GAS LEAK DETECTOR	60
64	STATOR WEDGE ANALYZER KIT WITH COMPLETE ACCESSORIES	5020
65	WEDGE DEFLECTION KIT	80
66	TILE PRESSING MACHINE FOR GAS TURBINE	270
67	INDUCTION BRAZING MACHINE	4910
68	MAGNETIC COHESIVE FORCE (MCF) EQUIPMENT	3650
69	ULTRASONIC FLOW METER	180
70	PORTABLE VIBRATION ANALYSER (MODEL 811T)	40
71	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -14KG/SQ CM. ; FLOW 60 M3/HR	470
72	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -30KG/SQ CM. ; FLOW 15 M3/HR	430

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RATES OF T&P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILERS ETC. FOR
SUB-CONTRACTORS WORKING FOR BHEL FOR DOING BHEL JOBS

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/09/2025 to 31/8/2027
73	HI SPEED MEMORY RECORDER, MAKE -YOKOGAWA, MODEL DL850E-Q-HE/B5/HD1	1820
74	TROLLEY MOUNTED HYDRAULIC JACK (100 MT)	1260
75	5KV Insulation Tester	450
76	4 Channel Digital Oscilloscope /Fast Recorder	1720
77	4 Channel Oscillographic Recorder	590
78	Sound Level Meter	230
79	Thermal Imaging Camera	780
80	Videoscope (Video Boroscope)	1530
81	DO (Dissolve Oxygen) Meter (0 to 1500 ppb)	1320
82	Conductivity Meter	80
83	Core Flux Test Kit	7340
84	Primary Current Injection Kit (2000A)	870
85	3 Phase Secondary Injection Kit (Relay Test)	3790
86	FRF Filtration Kit	1340
87	FFT Analyser	2310
88	Flue Gas Analyser	1030
89	Oil Test Kit (Mineral Oil)-Transformer	1020
90	Winding Resistance kit (R L C Load)	880
91	SFRA test Kit	1200
92	Tan Delta test Kit	4090
93	PF Meter	330
94	Ultrasonic Flow Meter	840
95	Oil Particle Counter	360
96	Plasma Cutting Machine (With complete accessories)	320
97	JCB make DG Set 80 KVA	690
98	Diesel Generating Set 82.5 KVA	640
99	Portable Jacking Oil Pump	1110
100	Alloy Analyser	1820



**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/09/2025 to 31/8/2027
I.	LIFTING EQUIPMENTS	
1	Strand Jack System for Boiler Drum Lifting	23370
2	MULTI SHEAVE PULLEY BLOCK 40/50T/60T	350
3	MULTI SHEAVE PULLEY BLOCK 100T	700
4	MULTI SHEAVE PULLEY BLOCK 150T	1410
5	ELCTRIC WINCH 5T	1420
6	ELCTRIC WINCH 10T	2640
7	ELECTRIC WINCH 15 T	2410
8	PASSENGER CUM GOODS HOIST 1T	2540
9	FURNACE MAINTENANCE PLATFORM	5620
10	Gang Operated Hydraulic Jack (Set of 4 Jacks - 175 MT each)	2340
II	WELDING & HEAT TREATMENT EQUIPMENT	
1	125KW, 3KHZ, AIR-COOLED INDUCTION HEATING EQUIPMENT	18290
2	75KW, 10 KHZ, COMPACT INDUCTION HEATING EQUIPMENT	9140
3	WELDING GENERATOR 320/300 A	330
4	WELDING RECTIFIER 400A/300A	330
5	WELDING RECTIFIER 600A	440
6	DIESEL WELDING GENERATOR 400A/300A	440
7	TRANSFORMER,600A	330
8	TRANSFORMER 300/400A	220
III	SERVICE PLANTS & ALLIED EQUIPT.	
1	500KVA DIESEL GENERATOR	4250
2	TRANSFORMER OIL FILTERATION EQUIPMENT 6000LPH CAPACITY WITHOUT STORAGE TANK	7110
3	-DO-, WITH STORAGE TANK	8130
4	OIL FILTERATION M/C, 250/500 LPH (OTHER THAN SILICON OIL)	1010
5	OIL FILTERATION M/C, 250GPH/1000LPH (OTHER THAN SILICON OIL)	1520
6	OIL FILTERATION M/C, 500GPH/2500LPH (OTHER THAN SILICON OIL)	2030
7	OIL FILTERATION M/C, 1000GPH/5000LPH (OTHER THAN SILICON OIL)	4060
8	Portable Lube Oil Purification Unit (Centrifuge M/c) Capacity: 750 LPH	1420
9	Low Vacuum de-hydration unit	710
10	DIESEL GENERATING SET,250 KVA	1980
11	DIESEL GENERATING SET,25 KVA	560
12	VACUUM PUMP(ABSOLUTE V.C.)	600
13	ACID CIRCULATING PUMP WITH MOTOR 120M HEAD, 150T/HR	1210
14	ACID TRANSFER PUMP 20/50 T/HR	600
15	DEWATERING PUMP (Kirloskar make,11KW/15HP)	90
16	HP Air compressor (32 Kg/Sq. Cm, 150 CFM)	4730
17	AIR COMPRESSORS 250/300/330/360/350 CFM	3040
18	AIR COMPRESSORS 140/150/190/210 CFM	1010

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**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/09/2025 to 31/8/2027
19	ACID CIRCULATING PUMP WITH MOTOR & STARTER, 200T/HR, 150M, 220 HP	2030
20	Industrial Blower 2000CFM	1420
21	Air Leak Test Blower (Flow: 40000 m ³ /Hr)	1290
22	Air Blower (Flow: 20000 m ³ /Hr)	1050
IV METAL FORMING /CUTTING EQUIPMENT		
1	TUBE EXPANDING M/C PNEUMATIC 60-100 MM	710
2	ELECTRO HYDRAULIC PIPE BENDING M/C 4"	1820
3	BOLTING MACHINE (ALCOA/AVLOCK/ HUCK)	2010
4	-do- Gun with nose Assembly only	600
V TESTING/INSPECTION EQUIPMENT		
1	DATA LOGGER for PG TESTING	41230
2	MOTORISED HYDRAULIC TEST PUMP 250kg/cmsq	890
3	MOTORISED HYDRAULIC TEST PUMP 400-450kg/cmsq	1210
4	MOTORISED HYDRAULIC TEST PUMP 600 KG/CMSQ	1420
5	HYDRAULIC TEST PUMP 800 KG/CMSQ	1490
6	HYDRAULIC TEST PUMP 1000 KG/CMSQ	2490
7	BOLT STRETCHING DEVICE	1010
8	BOROSCOPE/FIBROSCOPE FLEXIBLE TYPE (FLEXUX) IMPORTED	4060
9	ULTRASONIC FLAW DETECTOR	3040
10	MPI TEST KIT	400
11	GAS LEAK DETECTOR	300
12	VIBRATION/SOUND LEVEL METER IRD-306	400
13	VIBRATION/SOUND LEVEL METER IRD-308	400
14	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 350	1620
15	VIBRATION ANALYSER/DYNAMIC BALANCING M/C IRD 360	2840
16	SHOCK PULSE METER	710
17	HV.DC TEST KIT UPTO 50 KV	600
18	HV.DC TEST KIT ABOVE 50 KV	1110
19	HV.AC TEST KIT UPTO 50KV	910
20	HV.AC TEST KIT ABOVE 50KV	3250
21	MOTORISED MEGGER 2.5KV	440
22	MOTORISED MEGGAR 5KV	500
23	OSCILLOSCOPE-DUAL BEAM INDIGENOUS	500
24	OSCILLOSCOPE-DUAL BEAM IMPORTED	1210
25	WAVEFORM ANALYSER	1010
26	OSCILLOGRAPH/UV RECORDER 24 CHANNEL	1820
27	OSCILLOGRAPH/UV RECORDER 12 CHANNEL	1210
28	OSCILLOGRAPH/UV RECORDER 6 CHANNEL	1010
29	DIGITAL LOW RESISTANCE METER	710
30	DC POTENTIOMETER	200
31	PRECISION DEAD WEIGHT TESTER	1110
32	OPTICAL ALIGNMENT KIT	1520
33	BOROSCOPE/FIBROSCOPE(NON FLEXIBLE)	1340
34	VERNIER THEODOLITE,PRECISION	1340
35	VERNIER THEODOLITE,ORDINARY	220

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**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/09/2025 to 31/8/2027
36	ENGINEERS PRECISION LEVEL/DUMPY LEVEL	130
37	ISKAMATIC 'A'	3570
38	CALIBRATOR '03'	1110
39	48 POLE EXTENDER CARD	220
40	MULTIJET NPM	440
41	OSCILLOMETER	11380
42	VOC EQUIPMENT	1560
43	BINARY SIGNAL GENERATOR	320
44	ELECTRIC COUNTER	770
45	FREQUENCY GENERATOR	1110
46	DBF 3 VIBRATION RECORDER/ANALYSER	3650
47	L&T GOULD OSCILLOGRAPH 2-CHANNEL	540
48	L&T GOULD OSCILLOGRAPH 6-CHANNEL	1320
49	VIBROPORT 41/FFT ANALYSER	6090
50	ELCID kit	11170
51	UNIVERSAL CALIBRATION SYSTEM	3040
52	NATURAL FREQUENCY TESTER	3250
53	DIGITAL HARDNESS TESTER	400
54	ADRE 208 VIBRATION ANALYSER	8130
55	PCB DIAGNOSTIC REPAIR KIT	2230
56	SECONDARY INJECTION RELAY TEST KIT	5890
57	MICRO OHM METER	1620
58	DIGITAL MICRO OHM METER MEASURING RANGE: 200 $\mu\Omega$ TO 20K Ω	3610
59	PMI Machine OLYMPUS make	3740
60	Mobile Lighting Mast - 9 metres (4X400 W)	970
61	10KVA RESISTANCE BRAZING MACHINE	160
62	RECURRENT SURGE OSCILLOGRAPH (RSO) TEST KIT WITH PORTABLE HANDHELD OSCILLOSCOPE.	520
63	HYDROGEN GAS LEAK DETECTOR	60
64	STATOR WEDGE ANALYZER KIT WITH COMPLETE ACCESSORIES	5580
65	WEDGE DEFLECTION KIT	90
66	TILE PRESSING MACHINE FOR GAS TURBINE	300
67	INDUCTION BRAZING MACHINE	5460
68	MAGNETIC COHESIVE FORCE (MCF) EQUIPMENT	4060
69	ULTRASONIC FLOW METER	200
70	PORTABLE VIBRATION ANALYSER (MODEL 811T)	50
71	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -14KG/SQ CM. ; FLOW 60 M3/HR	520
72	CENTRIFUGAL PUMP SET FOR ACID CLEANING (WITH MOTOR AND PANEL) : PRESSURE -30KG/SQ CM. ; FLOW 15 M3/HR	480
73	HI SPEED MEMORY RECORDER, MAKE -YOKOGAWA, MODEL DL850E-Q-HE/B5/HD1	2020
74	TROLLEY MOUNTED HYDRAULIC JACK (100 MT)	1400
75	5KV Insulation Tester	500
76	4 Channel Digital Oscilloscope /Fast Recorder	1910
77	4 Channel Oscillographic Recorder	650

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**RATES OF T & P HIRE CHARGES FOR ITEMS OTHER THAN CRANES & TRAILLERS
ETC. FOR OUTSIDE AGENCIES**

SL NO.	ITEM DESCRIPTION	Revised rates (Rs./Day) valid from 01/09/2025 to 31/8/2027
78	Sound Level Meter	260
79	Thermal Imaging Camera	870
80	Videoscope (Video Boroscope)	1700
81	DO (Dissolve Oxygen) Meter (0 to 1500 ppb)	1470
82	Conductivity Meter	90
83	Core Flux Test Kit	8160
84	Primary Current Injection Kit (2000A)	970
85	3 Phase Secondary Injection Kit (Relay Test)	4210
86	FRF Filtration Kit	1490
87	FFT Analyser	2570
88	Flue Gas Analyser	1150
89	Oil Test Kit (Mineral Oil)-Transformer	1130
90	Winding Resistance kit (R L C Load)	980
91	SFRA test Kit	1330
92	Tan Delta test Kit	4550
93	PF Meter	370
94	Ultrasonic Flow Meter	930
95	Oil Particle Counter	400
96	Plasma Cutting Machine (With complete accessories)	350
97	JCB make DG Set 80 KVA	770
98	Diesel Generating Set 82.5 KVA	710
99	Portable Jacking Oil Pump	1230
100	Alloy Analyser	2030

Anka

आर.एल. साहा
R.L. SAHA
General Manager (Fin)

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
शक्ति सेक्टर/Power Sector



REF: PWR:FAX:HIRE CHARGES
DT : 22.1.92.

SUBJECT : ISSUE OF TOOLS AND PLANTS
TO SUB-CONTRACTORS AND RECOVERY
OF HIRE CHARGES THEREOF

The rates of hire charges for capital tools and plants last circulated vide Sr. Manager/Finance's letter reference PWA:SMQ:FAX:24.02 dated 20.5.88 have been revised. The revised rates have been worked out based upon the recommendations of the study team set up vide office order No. PW:SMQ:FAX:11.36 Dt. 1.10.88. The study team's/committee's recommendations relating to issue of T&P to sub contractors (Appendix I) are enclosed. Accordingly, the revised rates of hire charges have been worked out and are enclosed as follows :-

- i) Annexures 1.1, 1.2, 1.3, & 1.4
Rates for hire charges as applicable to contractors working for BHEL.
- ii) Annexures 2.1 & 2.2
Rates of hire charges as applicable to outside agencies other than contractors working for BHEL.
- iii) Annexure - III
Crane operators charges.

The important conditions/aspects governing the issue of T&P on hire are as follows :-

- i) The tender documents shall specify :-
- a) List of T&P to be provided by BHEL free of hire charges
- b) List of T&P which may be given on hire, if available at site and the rate of hire charges recoverable for the same. For items and rates specified in the N.I.T. these charges shall not change during the currency of that contract. For items/rates not specified in N.I.T. the current rates shall be charged.
- ii) The rates given in Annexure 1.1, 1.2, & 2.1 are on hourly basis. The unit of recovery is an hour and for fraction of an hour, the chargeable unit will be an hour only. The rates given in Annexure 1.3, 1.4 & 2.2 are on day basis (day means a calendar day) and fraction of a day will be charged as full day/purpose of recovery of hire charges.

...2/-



- iii) Operator's charges are on per day basis considering average 8 working hours. For services of less than 4 hours, half the rates will be charged. For services of 4 hours upto 8 hours, full daily rates will be charged. Overtime will be charged at double the rates on hourly basis. ||
- iv) The hire charges are recoverable on the basis of out time and in time i.e. from the time a particular item is issued to the contractor from BHEL's store till the time it is returned. However, the hourly rate is applicable for T&P which cannot be frequently returned due to intermittent use, logging shall be done for actual use and charged accordingly. In case of cranes, matching time for onward and return shall be charged at 50% of the hire charges rates. ||

- v) The rates do not include transportation charges from and to BHEL's store. Safe transportation of T&P from and to BHEL's store shall be the contractors responsibility. ||
- vi) Small T&P items i.e. items costing less than Rs. 10,000/- each shall not be issued to contractors on hire charges. Such items may however be issued to contractors on non-returnable basis at replacement cost plus 30% overheads reduced by depreciation as applicable or a certain reserve price whichever is higher. ||

- vii) If a contractor commits certain T&P at the time of award of contract/L.O.I. and fails to actually deploy the same in time at site, then even for contractors working for BHEL, higher rates of hire charges as given in Annex 2.1 & 2.2 shall be applicable for such items. ||

~~The revised rates of hire charges and operators~~
charges as enclosed, together with terms stated above and other aspects/conditions relating to issue of T&P to sub contractors as given in Appendix I shall be effective from 1.2.1992 till 31.10.93 and will be subject to revision thereafter.



For any additional item not appearing in the enclosed list, rates of hire charges may be calculated by TS HQ in consultation with PS-HQ (Finance) on receipt of necessary details from regions and communicated to the regions.

This issues ^{with} the approval of competent authority.


(R. L. SAHA)
GENERAL MANAGER (F)
PS-HQ


Encl : As above.

DISTRIBUTION :

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Advisor (Finance) Corporate Office, N.Delhi.

S.A. to Director (Power).



**BHARAT HEAVY ELECTRICALS LTD.
BUSINESS SECTOR(FINANCE)- CORPORATE OFFICE
ASIAD, NEW DELHI**

Ref: PWR: FAX: T&P Hire :2025-27

Dated 29th Aug,2025

Sub: Rates for Inter Regional Hire Charges of Major Tools & Plants
(Cranes of capacity 75 T and above)

The rates of Inter Regional Hire charges for cranes of 75 T capacity and above circulated vide our letter No. PWR: FAX: T&P Hire : 2023-25 dated 18.09.2023 are valid up to 31st Aug, 2025. These rates have been reviewed and revised rates are recommended by a duly constituted committee for this purpose and have been duly approved by GM & SA to Director Power.

The Rates (as per Annexure I) will be effective from 01/09/2025 and shall remain valid up to 31/08/2027. This will be subject to revision thereafter.

The terms & conditions/ aspects governing the Inter Regional Hiring of Tools & Plants have been revised. (Annexure II).

For any additional item, the rates of hire charges will be worked out jointly by PS-MSX & Corporate Finance (Business Sector) on specific request. All necessary details will be provided by the concerned Region.

It may be noted that Regions shall not hire any T & P from outside agencies if the same is available in any of the Regions.

(Kul Bhushan Aggarwal)
GM (Finance)

Encl : As above

Distribution

As per list enclosed.

BUSINESS SECTOR (CORPORATE FIN.) ASIAD, NEW DELHI

SUB: Inter Regional Hire Charges of Major Tools & Plants

Ref: GM(Fin) Letter No. Ref: PWR: FAX: T&P Hire :2025-27 dated 29th Aug, 2025

Distribution:

1. ED / PS SR, Chennai
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CC:

GM & SA to Director Power

RATES FOR INTER REGIONAL HIRE CHARGES FOR CRANES OF CAPACITY 75 TON OR MORE FOR PERIOD 01-09-2025 TO 31-08-2027

SL NO.	ITEM DESCRIPTION	Date: 29/08/2025 Rates (Rs./MONTH) valid from 01/09/2025 to 31/8/2027
I.	CRANES : -	
1	Portal Gantry Crane 500T	1215167
2	100MT Crawler Crane ZOOMLION CRANE-QUY-100	621608
3	Heavy Lift Crawler Crane 600MT Class DEMAG Model CC2800	2656108
4	PORTAL CRANE, 360T	664025
5	600MT Class Crawler Crane- Manitowoc Model 18000-UPGRADED	2616583
6	600MT Class Crawler Crane- Liebherr Model LR1600-2 (Upgraded version)	3237133
7	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH RINGER)	1581017
8	CRAWLER CRANE FMC/LINKBELT 718, 250T (WITH-OUT RINGER)	988133
9	MANITOWOC M-250T TRUCK CRANE	1422917
10	270 MT Class Crawler Crane- Manitowoc Model 2250	1494058
11	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1	1245050
11.A	300MT Crane Crawler Crane LIEBHERR Model LR-1350/1 (UPGRADED)	1714608
12	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2	713825
12.A	250MT Class Mid range Crawler Crane- Kobelco Model CKE2500-2 (UPGRADED)	895250
13	LINKBELT LS- 248H CRAWLER CRANE (180T)	790508
14	MANITOWAC MODEL 888 CRAWLER CRANE (200 MT)	1027658
15	CRAWLER CRANE SUMITOMO, 150T	513825
16	All Terrain Crane, 150MT- Liebherr Model LTM1150	632400
17	CRAWLER CRANE, 120 T Fushun Model QUY120	592008
18.A	CRAWLER CRANE 135MT Kobelco Model CK1350- 1F	505925
18.B	CRAWLER CRANE 135MT Kobelco Model CK1350	418967
19	CRAWLER CRANE 120MT - Tata-Sumitomo Model SCX1200-2	474300
20	CRAWLER CRANE 100 T (KH 500)	474300
21	Hydraulic Crawler Crane 80MT, Fushun Model QUY 80B	296000
22	ROUGH TERRAIN CRANE 75T (RT880)	315925
23	CRAWLER CRANE, 75T -Tata Model 955ALC/TFC280	276433

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TERMS & CONDITIONS FOR INTER-REGIONAL HIRING OF T&P

S.No.	Description
1.	The hire charges will be charged on the basis of out-date and in-date, that is from the date a particular equipment is issued by one Region to another Region till the date it is returned.
2.	For the purpose of recovery of hire charges, the minimum unit of recovery will be one month. For any incomplete month, the hire charges will be charged for full one month.
3.	Transportation will be the responsibility of the user Region. Information regarding type of trucks/ trailers required for the safe transportation of the T&P shall be given by the owner Region. To and fro transportation charges will be borne by the user Region and will be in addition to the hire charges to be paid to the owner Region.
4.	De-mobilization, dismantling and loading on trucks/ trailers will be the responsibility of the Region from where the T&P is sent to another Region. Unloading, re-assembly and testing of the T&P will be the responsibility of the Region where the destination project site is located. The cost of such activities at both ends will be borne by the user Region.
5.	The user Region shall also be responsible for payment of road taxes, octroi and other permit expenses etc. and other statutory expenses.
6.	In case the T&P is not physically required to be transported back to the owner Region and is let out on hire by the owner Region to another user Region, the return transportation charges will not be applicable for the first user Region. In such a case, the charges for transportation from the first user Region's project site to the place of another user Region's project site and the cost of de-mobilization, dismantling and loading on trucks/ trailers etc. shall be borne by the later user Region.
7.	The hire charges do not include cost of fuel, lubricants and consumables required for day to day operation of the T&P. The cost of fuel and lubricants will, be borne by the user Region.
8.	The hire charges do not include Operator's charges. Where-ever operator is required, and if the owner Region is in a position to provide, the services of the operator may be availed as per Inter-Unit BHEL rates.
9.	The hire charges include an element of insurance. It will be the responsibility of the owner Region to keep the T&P fully insured against all accidents, transit damages, third party claims etc. However, in case the damages occur while the T&P is in transit to the user Region or at the site of the user Region, then lodging and settlement of all insurance claims will be the responsibility of the user Region. In such cases, the benefit of insurance proceeds will also be passed on to the user Region who in turn shall be responsible to repair/ get repaired and bring back the T&P in satisfactory condition without any debit being passed on to the owner Region.



S.No.	Description
10.	Any intra-regional re-deployment of the T&P will be with prior intimation to the owner Region for the purpose of insurance.
11.	Situations may arise when the user Region desires to return the T&P, but due to specific reasons, the owner Region is not ready for shifting of the T&P to another location. For such periods, no hire charges will be payable. Under such circumstances, the responsibility for proper storage/ maintenance will be of the user region. However, the cost of storage/ maintenance of the T&P shall also be debited to the owner Region at actuals by the Region where the T&P is located. In any case, the owner Region has to take back the T&P or make alternate arrangements within a period of four months.
12.	Hire charges will be payable by the user Region even for the periods under which the T&P is not usable due to normal overhauls/ repairs as this aspect has been taken in to account while working out the hire charges. The rates have been reduced to take care of down-time due to such overhauls/ repairs.
13.	Similarly, for forced outages due to accidents or other reasons the hire charges shall be payable by the user Region as this aspect also has been taken into account while working out the hire charges. The rates have been suitably reduced.
14.	The hire charges and the terms and conditions shall be subject to review after two years based upon the feedback received from the Regions.
15.	<p>Repair and maintenance of Tools & Plants:</p> <p>i. For all new Tools & Plants, and for all existing Tools & Plants after these are put back into good working condition, the responsibility for proper Repair & Maintenance will rest with the Region where the T&P is deployed. Day-to-day and routine maintenance (Replacement of Lubricants, Coolant, Hydraulic Oil, filters, & Battery) will be carried out by the Region where the T&P is located and charges towards such maintenance will not be debited to the Region owning the T&P.</p> <p>ii. REPAIR AND MAINTAINENCE: User region shall be responsible for timely preventive break-down maintenance</p> <p>Further, timely preventive break-down maintenance activities are categorized as follows:</p> <p>Preventive Maintenance charge to be borne by owner region: Repairing/replacement of Crawler system (Crawler Pads, Roller Assembly, Sprocket Wheel, Idler Roller, Gear System), Hoisting & Derricking ropes, Guy Ropes, Pumps & Motors, Display System (Including Camera System), Booms/Jibs, Cable Drum Assembly (Boom & Jib), Nod Assemblies, Anemometer, Pulleys, Slewing system, Limit Switches, Wire Harness, Hydraulic & pneumatic cylinders, Outtrigger Jacks Assembly, Hydraulic & pneumatic valves, , Compressor, Engine Assembly, Pedal Assembly. Other than above-mentioned</p>

S.No.	Description
	<p>Preventive maintenance charges to be borne by user region: Repairing of hoses, Starter Motor, Charging Alternator, Water Pump. Repairing & replacement of Lights, Horn, Cabin Glasses, Switches, Fan Belts, Wiper system, Solenoid, Radiator Assembly, LM/SLI system, Joy Sticks (being an electronics items)</p> <p>User region shall also be responsible for Major breakdown repairs, Minor breakdown repairs and Capital overhauls of crane, for which cost shall be borne by Owner region, subject to the following.</p> <p>(a) timely preventive maintenance being done as per schedule for which necessary records to be provided by User region. b) consent to be taken from Owner region prior to carrying out such repairs. However, Owner region shall provide the Crane in healthy condition.</p> <p>iii. The standard maintenance checklist (daily, weekly, monthly, quarterly, half-yearly and yearly) for maintenance of the Crane to be followed as per schedule by user Region and the same should be shared with owner Region as and when required.</p> <p>iv. The history card of the Crane should be updated by the user Region and the same should be shared with owner Region on monthly basis.</p> <p>v. For Capital Overhauls, the consent of the Owner Region shall be taken regarding technical scope and tendering conditions involved.</p> <p>vi. JOINT INSPECTION: Prior to re-deployment to other Region, fitness of the T&P will be certified jointly by authorized representative(s) of the Region owning the T&P as well as the Region receiving the T&P or jointly with OEM service engineer, in both cases of transfer as well as return of crane. The cost of visit of OEM service engineer, if required, will be borne by the Region where T&P is currently deployed.</p> <p>vii. If the T&P is sent from a user Region i.e. other than the Region owning the T&P, the certificate will be signed by authorized representative(s) of the Region holding the T&P i.e. from where the T&P is to be sent and other user Region or jointly with OEM service engineer, in both cases of transfer as well as return of crane.</p> <p>viii. POST TRANSFER REPAIR EXPENSES The cost of any initial repair & maintenance of Crane i.e. before taking Crane in use by user Region shall be debited to owner Region after taking consent about repair/ replacement of parts from owner Region. Similarly, post return of the crane, any initial repair exp required to be incurred by owner region before redeployment shall be debited to the last user Region</p> <p>ix. Normally, Regions will not hire any T&P from outside agencies if the same is available from any of the Regions. In exceptional cases, this may be permitted with the consent of the Head of the Region.</p>


पावर सेक्टर के लिए हीट ट्रीटमेंट मैनुअल

HEAT TREATMENT MANUAL FOR POWER SECTOR



कार्पोरेट गुणता एवं व्यावसायिक उत्कृष्टता
CORPORATE QUALITY & BUSINESS EXCELLENCE

भारत हेवी इलेक्ट्रिकल्स लिमिटेड, नई दिल्ली
BHARAT HEAVY ELECTRICALS LIMITED, NEW DELHI

 BHEL Maharashtra Company	AA/CQ/GL/011/ Part II-HTM HEAT TREATMENT MANUAL	Rev 01	Date	IMPORTANT NOTE	Page 2 of 22
			10/02/2020		

IMPORTANT NOTE

THIS HEAT TREATMENT MANUAL PROVIDES BROAD BASED GUIDELINES FOR CARRYING OUT HEAT TREATMENT WORKS AT SITES. HOWEVER, SITES SHALL ENSURE ADHERENCE TO THE PRIMARY DOCUMENTS LIKE CONTRACT DRAWINGS, FIELD WELDING SCHEDULES, WELDING PROCEDURE SPECIFICATIONS, PLANT / CORPORATE STANDARDS, STATUTORY DOCUMENTS, CONTRACTUAL OBLIGATIONS, AS APPLICABLE AND SPECIAL INSTRUCTIONS, IF ANY, ISSUED BY RESPECTIVE MANUFACTURING UNITS SPECIFIC TO THE PROJECTS.




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**CHAPTER-1
HEAT TREATMENT PROCEDURE -
BOILER AND AUXILIARIES**

	AA/CQ/GL/011/ Part II-HTM HEAT TREATMENT MANUAL	Rev 01	Date	CHAPTER – 1 HEAT TREATMENT PROCEDURE – BOILER AND AUXILIARIES	Page 5 of 22
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1.0 SCOPE:

1.1 This procedure provides information, method and control for Pre-Heat, Post Heat and Post Weld Heat Treatment (PWHT) of welds of boiler and piping components at sites.

2.0 DOCUMENTS:

2.1 The following documents are referred in preparation of this procedure:

- ASME Sec I & Sec IX
- ASME B31.1
- Indian Boiler Regulations
- AWS D1.1
- BHEL Welding Manual (AA/CQ/GL/011/ Part I-WM – Latest)

2.2 The following are to be referred as Primary Documents:

- Contract drawings
- Field Welding Schedule or equivalent
- Plant / Corporate standards, wherever supplied
- Welding procedure specification
- Contractual obligations, if any

2.2.1 Where parameter for Pre-Heat, Post Heat and PWHT are not available in the primary documents, reference may be made to this procedure.

2.2.2 Where such parameters are not contained either in the primary documents or in this procedure, reference may be made to Manufacturing Units.


3.0 PROCEDURE:

3.1 Preheating & Post heating:

3.1.1 Prior to start of preheating, ensure that surfaces are clean and free from grease, oil and dirt. Preheating temperature shall be maintained as per applicable WPS. Preheating shall be checked and recorded, using thermal chalks/ crayons or pyrometers in case of tubes other than T91/T92/T23. For all other components including T91/T92/T23 tube joints, the preheat temperature shall be ensured by using a calibrated chart recorder and two calibrated thermocouples fixed at 0° and 180° positions on both sides of the joint. Preheating shall be checked at a distance of 1.5 times the part thickness or 75mm (whichever is greater) from weld end. The thermocouple shall be fixed using the capacitor discharge welding machine. The preheating arrangements shall be inspected and approved by site engineer.


3.1.1.1 Bunching of tubes for Preheating:

Where a bunch of closely placed tube welds (e.g. Super Heater / Reheater Coils) requires to be preheated, the same may be grouped together as if they form a single component. The maximum number of tubes bunched together in such cases shall be limited to 12. Each joint

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within the bunch shall have at least one thermocouple fixed near the joint for preheat monitoring.

- 3.1.2 When parts of two different thicknesses are welded together, the preheating requirements of the thicker part shall govern.
- 3.1.3 When parts of two different P numbers are joined together, the material requiring higher preheat shall govern (please refer Tables A2.1 to A2.7 of Welding Manual, AA/CQ/GL/011/ PART I-WM – Latest, for P numbers).
- 3.1.4 In case of any power interruption during welding, the joint shall be wrapped with dry thermal insulating blankets to ensure slow and uniform cooling. **Requirement of uninterrupted power supply shall be ensured for materials like Gr.91, 92 & 23 and BS EN 10025**
- 3.1.5 Preheating & Post Heating Methods:
- 3.1.5.1 Preheating & Post heating shall be applied by any of the methods given below:
- Electrical resistance heating
 - Induction heating
 - LPG burners
- 3.1.5.2 Preheating/post heating using cutting/ heating torches with oxy-acetylene flame is not permitted.
- 3.1.6 In addition, the following requirements shall also be followed:
- 3.1.6.1 Alternate burner arrangements shall be made for preheating/post heating during power failure to maintain the required temperature.
- 3.1.6.2 Two additional spare thermocouples shall be fixed for emergency use.
- 3.1.6.3 Preheating/Post heating shall be done locally BY heating a circumferential band covering the parent material away from the weld groove by induction or electrical resistance heating. The heating element (Coil/Finger/Ceramic Pad) placed on the heating band shall be closely packed without any gaps between the element. The area shall be free of grease, oil etc. prior to preheating/post heating.
- 3.2 **Post Weld Heat Treatment (PWHT):**
- 3.2.1 PWHT shall be done by locally heating a circumferential band covering the entire weld and adjacent area of base metal, by induction or electrical resistance heating. The heating element (coil/ finger element/ pad) placed on the heating band shall be closely packed without any gaps between the elements. The area shall be free of grease, oil etc. prior to PWHT.
- 3.2.1.1 Unless otherwise specified in the FWS/WPS, the PWHT parameters shall be as per the Tables 1.1, 1.2, 1.3, 1.4.
- 3.2.2 **Heating and Insulation band for PWHT:**

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3.2.2.1 When heat treating butt joints, width of the circumferential heating band on either side of the weld must be at least 3 times the width of the widest part of the weld groove; but not less than twice the thickness of the thicker part being welded. When heat treating nozzles and attachment welds, the width of the heating band beyond the welding to be heat treated on either side of weld shall be at least 3 times the base material thickness. The heating band shall extend axially around the entire vessel. Width of the insulation band on either side shall be at least twice the width of the heating band.

3.2.2.2 In case of fin welded panels where circumferential winding of the coil is not possible heating elements shall be placed on both sides of the panels

3.2.3 Post weld heat treatment temperature cycle shall be measured and monitored by use of thermocouples with calibrated recorders.

3.2.4 Where the soaking temperature is found to be lesser than specified, the PWHT cycle shall be repeated.

3.2.5 In case of interruption during PWHT, the following actions shall be taken depending on the stage during which interruption has occurred.

1) During heating cycle

Repeat the whole operation from beginning.

2) During soaking

Heat treat subsequently for balance soaking. If the balance soaking time required is less than 15 minutes, soaking time shall be maintained for 15 minutes minimum.

3) During cooling (above 300 °C).


If the Rate of Cooling (ROC) during interruption meets the specified rate, cool subsequently at the required rate. Otherwise, reheat to the soaking temperature, hold for 15 minutes and then cool at the specified rate.

3.2.6 Fixing of thermocouple (TC) during preheating, post heating and PWHT:

3.2.6.1 Thermocouples shall be fixed on the job using capacitor discharge welding method. Thermocouple leads shall be attached within 6 mm of each other. A Welding Procedure Specification shall be prepared, describing the low-energy capacitor discharge equipment, the combination of materials to be joined, and the technique of application. No preheating is required. Also Qualification of the welding procedure is not required. The energy output of the welding process shall be limited to 125 W-sec. After temporary attachments are removed, the areas shall be examined by LPI.

Following are the equipment / facilities for heating cycles.

- (1) Thermo couples: Ni-Cr / Ni-Al of 0.5 mm gauge size (K-Type).
- (2) Temperature Recorders: 6 Points / 12 Points/ 24 Points.

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3.2.6.2 Following are guidelines regarding number and placement of thermocouples:

- Minimum of two thermocouples shall be placed for each joint, 180° apart.
- Thermocouples shall be located at a distance of approximately 1.5 times the parent metal thickness from the weld centre.
- Additionally, one point of the temperature recorder shall be used for recording ambient temperature.
- For placement of thermocouples on P91/P92/F91/F92/C12A Figure 1.1 shall be referred for preheating and Figure 1.2 shall be referred for PWHT.

3.2.6.3 Thermocouple leads shall be suitably insulated to protect the ends from direct radiation from heating elements.

3.2.6.4 The temperature variation between any two thermocouples shall be within 50°C for temperature above 300°C during heating and cooling.

3.2.7 **Bunching of tubes for PWHT:**

3.2.7.1 Where a bunch of closely placed tube welds (e.g. Super Heater / Reheater Coils) require to be Post weld heat treated, the same may be grouped together as if they form a single component. The maximum number of tubes bunched together in such cases shall be limited to 12. Each joint within the bunch shall have at least one thermocouple fixed near the joint for PWHT temperature monitoring.

3.2.8 **Soaking Time:**

3.2.8.1 Unless otherwise specified in the FWS/WPS, the soaking time shall be calculated as 2.5 minutes per mm of thickness with 30 minutes minimum for tube welds and 60 minutes minimum for other welds. For P1 material, the soaking time shall be calculated as 2.5 minutes per mm of thickness upto 50mm with an additional 15 minutes for every 25mm thickness above 50mm.

3.2.8.2 The following guidelines shall be used to determine the thickness and subsequent selection of the soaking time of PWHT:

- (a) For full penetration butt welds, the nominal thickness is the thinner of the parts being joined.
- (b) For full penetration corner welds, the nominal thickness is the depth of the weld.
- (c) For partial penetration groove and material repair welds, the nominal thickness is the depth of the weld. The total depth of partial or full penetration groove welds made from both sides shall be taken as the sum of the depth of both sides at a given location.
- (d) For fillet welds, the nominal thickness is the weld throat. When a fillet weld is used in conjunction with a groove weld, the nominal thickness is the total of groove depth and fillet throat thickness.

3.2.8.3 Soaking time is to be reckoned from the time temperature of the joint crosses the recommended lower temperature of the cycle, to the time it comes down below the same recommended lower temperature of the cycle.

3.2.9 **Heating and Cooling Rates:**

3.2.9.1 Wherever not specified, the heating rate above 300°C and cooling rate after soaking upto 300°C shall be as follows: This is applicable for all materials except Gr.91/Gr.92 materials for which Cl. 3.2.11.3 shall be referred.

Thickness of Material	Maximum Heating Rate Above 300°C	Maximum Cooling Rate Upto 300°C
≤ 25 mm	220°C/hour	220°C/hour
> 25 ≤ 50 mm	110°C/hour	110°C/hour
> 50 ≤ 75 mm	75°C/hour	75°C/hour
> 75mm	55°C/hour	55°C/hour

3.2.10 **PWHT Job Card:**

3.2.10.1 Prior to start of PWHT operations, a job card shall be prepared including details of weld reference, soaking time, soaking temperature, maximum rates of heating and cooling, temperature recorder details and date of PWHT as per Annexure I of this manual except Gr.91/Gr.92/Gr.23 materials. For P91/P92/F91/F92/C12A/T91/T92/T23 materials Annexures II, III, IV in Chapter A1 of Welding Manual - AA/CQ/GL/011/ PART I-WM – Latest, as applicable, shall be referred.

3.2.10.2 Obtain the clearance for post weld heat treatment cycle from the site engineer.

3.2.10.3 On completion of PWHT, the actual parameters shall be recorded on the job card.

3.2.10.4 A chart number shall be given to each chart and attached to the job card.

3.2.11 **Heat Treatment of P91/P92/F91/F92/C12A welds:**

3.2.11.1 A minimum of four thermocouples shall be placed such that at least two are on the weld and the other two on the base material on either side of the weld within the heating band, 180° apart, at a distance of 50mm (approximately) from the center of the weld joint as per Figure 1.2. Two standby thermocouples shall also be provided on the weld (to be used in case of any failure of the thermocouple).

3.2.11.2 The PWHT temperature shall be 740-770°C and the soaking time shall be 2.5 minutes per mm of weld thickness, subject to a minimum of one hour. All records shall be reviewed by site Engineer prior to PWHT clearance. Heating shall be done by Induction heating only. However, for thickness upto 32 mm, Resistance heating may also be used.

When OD ≤ 170 mm, PWHT by resistance heating may also be used for thickness

beyond 32 mm and up to 40 mm, provided the heat treatment is performed in two stages as follows:

- i. In the first stage, half of the total weld thickness shall be deposited and PWHT shall be carried out for the deposited weld thickness (soaking time not less than 60 minutes).**
- ii. In the second stage, the balance thickness shall be deposited and PWHT shall be carried out for the total weld thickness.**

3.2.11.3 The rate of heating / cooling (above 300 °C): -

- Thickness up to 50 mm - 110°C / hour (max)
- Thickness 50 to 75mm - 75°C / hour (max)
- Thickness above 75mm - 55°C / hour (max)

3.2.11.4 Welding and PWHT shall be monitored every one hour by site engineer. Job card for PWHT shall be maintained as per Annexure II, Chapter A1 of Welding Manual - AA/CQ/GL/011/ PART I-WM – Latest.

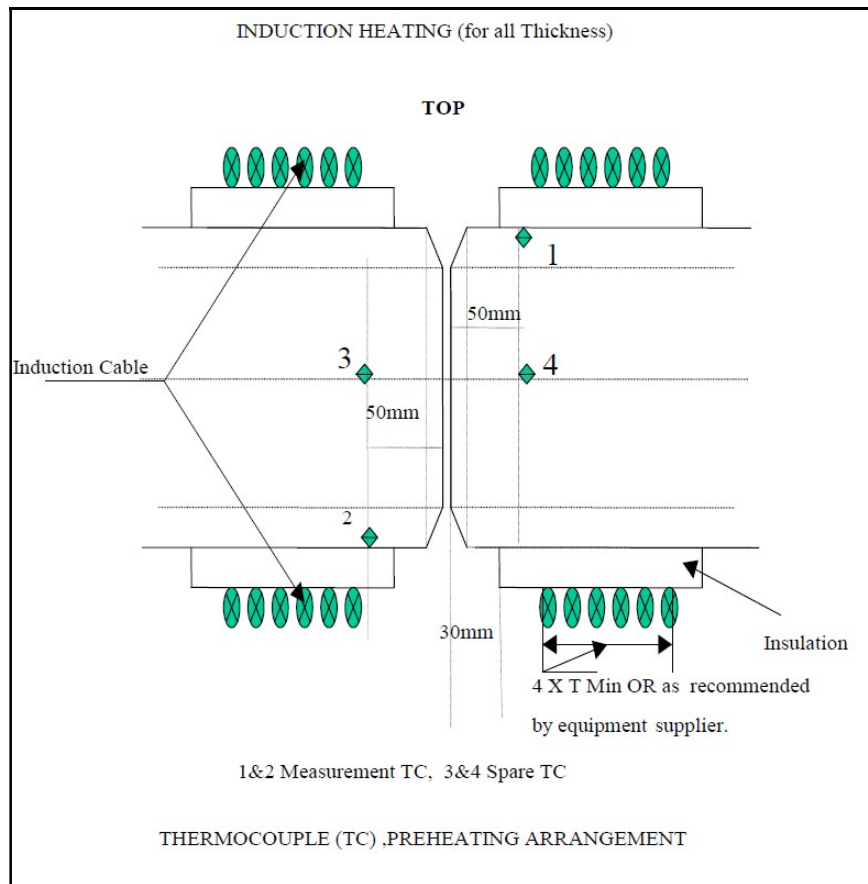


Figure 1.1: Placement of Thermocouples on P91/P92/F91/F92/C12A materials for Preheating

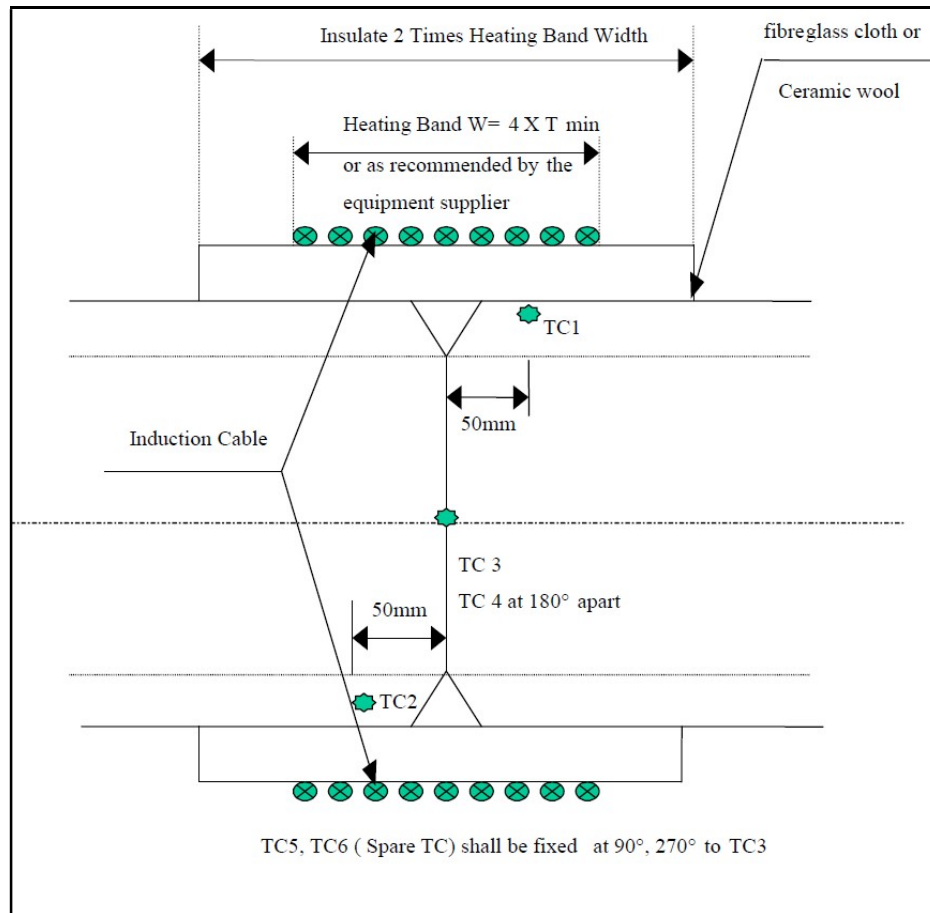


Figure 1.2: Placement of Thermocouples on P91/P92/F91/F92/C12A materials for PWHT

3.2.12 Heat Treatment of T91/T92/T23 welds:

3.2.12.1 Heat treatment controls of T91/T92 welds shall be as detailed in Cl. 3.2.1 to Cl.3.2.10 of this Manual.

3.2.12.2 Figure 1.2 & 1.3 of this manual shall be referred for Resistance heating coil arrangement for Preheating and PWHT of T91/T92 tube assembly. **Flexible ceramic pads may also be used for carrying out PWHT of T91/T92 welds.**

3.2.12.3 The PWHT temperature shall be 730-760°C and the soaking time shall be 2.5 minutes per mm of weld thickness, subject to a minimum of 30minutes. All records shall be reviewed by site Engineer prior to PWHT clearance.

3.2.12.4 The rate of heating / cooling (above 300 ° C) for T91/T92 welds shall not exceed 140°C/hour.

3.2.12.5 Heat treatment controls of T23 welds shall be as detailed in Chapter B4 of Welding Manual - AA/CQ/GL/011/ PART I-WM – Latest.

3.3 Heat Treatment of Components /Systems other than Boiler and Piping:

3.3.1 Preheating, post heating and PWHT methodologies and parameters shall be as recommended by the concerned equipment suppliers.

3.4 **Heat Treatment Operator Requirements:**

The operator for the Heat Treatment shall be a qualified technician and shall be conversant in the operation & maintenance of heat treatment machines & process. He shall be trained by the concerned Site Engineer in order to operate and maintain the equipment and carry out the process properly.

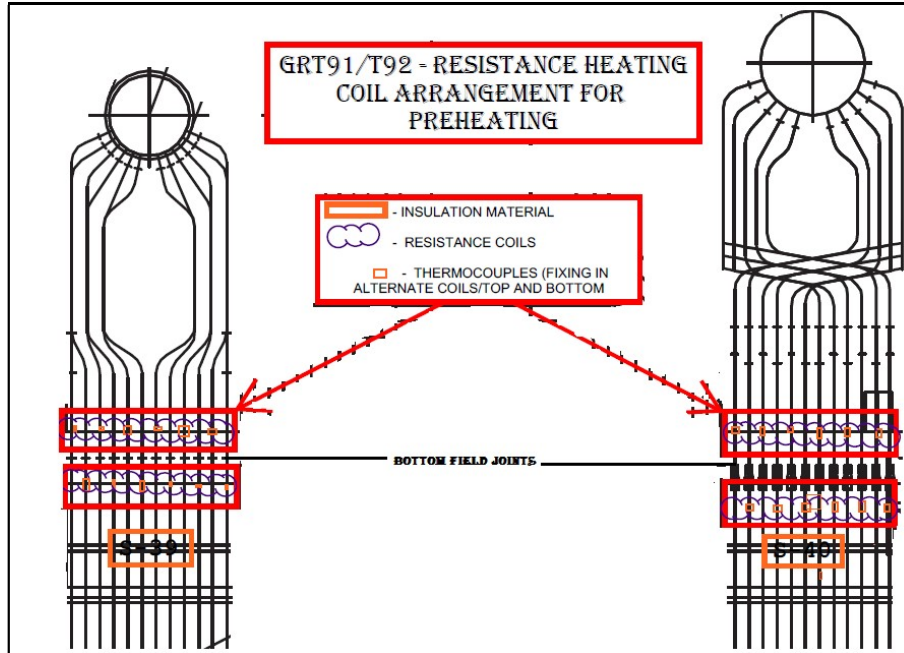


Figure 1.3: Resistance heating Coil arrangement for Preheating of T91/T92 tube assembly

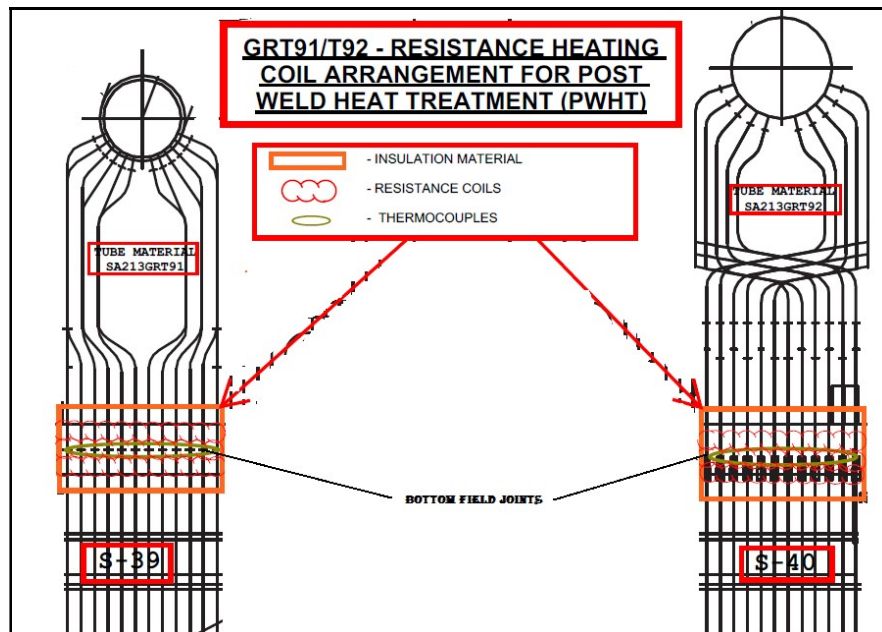



Figure 1.4: Resistance heating Coil arrangement for PWHT of T91/T92 tube assembly

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3.5 List of Tables:

- Table-1.1: Weld preheat and PWHT for tubes and pipes outside diameter \leq 102 mm.
- Table-1.2: Weld preheat and PWHT for Boiler Header welds.
- Table-1.3: Weld preheat and PWHT for pipes outside diameter $>$ 102 mm.
- Table-1.4: Pre-heat and PWHT for Non-Pressure Parts including Structural.

4.0 RECORDS:

Relevant records like Job card and HT Charts shall be maintained by the Site Engineer till the closure of the project. The records may be handed over to the customer at the time of project closure if required by the contract



ANNEXURE I: PWHT JOB CARD

POST WELD HEAT TREATMENT (PWHT) JOB CARD

Project: _____

Card No. : _____ Date :

Unit No. : _____ Package :

Description: Temp. Recorder Details :

Weld Reference : _____ 1. Make : _____

Material Spec. : _____ 2. Type : _____

Size: Dia. mm _____ 3. Sl. No. _____

Thick (t) mm _____ 4. Chart speed: _____ mm / hour

NDE Cleared on : _____ 5. Calibration Due on : _____

Report No. : _____

Thermocouple Locations :

Minimum 2

Distance of TC from the weld centre =

Heating Band =

Insulation Band =

Date of PWHT Chart No. : _____

Start Time : _____ End Time :

	Required	Actual	
Rate of Heating (Max) °C/h			
Soaking Temperature °C			
Soaking Time (Minutes)			
Rate of cooling (Max)° C			

Ambient temperature recorded on the PWHT Chart: _____

TABLE – 1.1
WELD PRE HEAT AND PWHT FOR TUBES & PIPES
OUTSIDE DIAMETER \leq 102 mm
(Applicable for Butt Welds and Socket Welds)

P. No. of Material	Thickness (mm)	Preheat (°C)	PWHT (°C)
P1 Gr 1	\leq 19	Nil	Nil
P1 Gr 2 (C \leq 0.25%)	\leq 19	Nil	Nil
P1 Gr 2 (C > 0.25%)	\leq 9	Nil	Nil
	> 9	Nil	595-625
P3 Gr 1 P3 Gr 2	\leq 13	Nil	Nil
	> 13	100 (Note 1)	620 - 650
P4 Gr 1	\leq 13	150	Nil
	> 13	150	650 - 670
P5 A Gr 1	\leq 8	150	Nil
	> 8	150	680 -710
P15 E Gr 1 (Gr. 91 & Gr.92)	All	220	730 - 760
SA 213 T23	All	220	730 - 760
P8	All	Nil	Nil

Note 1: Pre-heating is necessary for $t > 16$ mm.

TABLE – 1.2
WELD PREHEAT AND PWHT FOR BOILER HEADER WELDS
(Applicable For Welding of Header to Header Joints)

P. No. of Header Material	Thickness (mm)	Preheat °C	Post Heating °C	PWHT °C
P1Gr 1	$t \leq 19$	Nil	Nil	Nil
	$19 < t \leq 25$	Nil	Nil	595 - 625
	$25 < t \leq 75$	100	Nil	595 - 625
	$t > 75$	150	Nil	595 - 625
P1Gr 2	$t \leq 19$	Nil	Nil	620 – 635
	$t > 19$	150	150 for 2 hours	620 – 635
P4 Gr 1	All	150	Nil	650 - 670
P5 A	All	150	250 for 2 hours	680 - 710
P15E Gr1 (Gr 91 & Gr 92)	All	220	Nil	740 - 770
P15 E Gr1 + P5 A	All	220	Nil	730-760
T23	All	220	250 for 1 hour	730 - 760

**TABLE – 1.3
 WELD PREHEAT AND PWHT FOR PIPES
 OUTSIDE DIAMETER >102 MM**

P No. of Material	Thickness (mm)	Butt Welds		Stub and Attachment welds				Post heat °C
		Preheat °C	PWHT °C	Throat ≤ 19 mm		Throat > 19 mm		
				Preheat °C	PWHT °C	Preheat °C	PWHT °C	
P1 Gr 1	≤ 19	Nil	Nil	Nil	Nil	Nil	595 - 625	Nil
	>19≤25	Nil	595 - 625	Nil	595 - 625	Nil	595 - 625	Nil
	>25≤75	150	595 - 625	150	595 - 625	150	595 - 625	Nil
	>75	150	595 - 625	150	595 - 625	150	595 - 625	Nil
P1 Gr 2	≤9	Nil	Nil	Nil	Nil	Nil	595 - 625	Nil
	>9≤19	Nil	595 - 625	Nil	595 - 625	Nil	595 - 625	Nil
	>19	150	595 - 625	150	595 - 625	150	595 - 625	150 for 2 hrs
P4 Gr 1	All	150	640-670*	150	640-670*	150	640-670*	Nil
P5 A	All	150	680 - 710	150	680-710	150	680-710	250 for 2 hrs
P15 E Gr1	All	220	740-770	220	740-770	220	740-770	NA
P15 E Gr1 + P5 A	All	220	730-760	220	730-760	220	730-760	NA

** Minimum 650°C for ASME jobs*

For butt welds of different P group combinations, PWHT temperature may be as follows:

P1 + P3 - 620 to 650°C

P1 + P4 - 640 to 670°C *Minimum 650°C for ASME jobs*

P4 + P5A- 680 to 710°C


(For other P Group combinations, refer to Manufacturing unit)

**TABLE – 1.4
 PREHEAT AND PWHT FOR NON PRESSURE PARTS INCLUDING STRUCTURALS**

P. No. of Material / Material Specification	Gas Cutting		Welding		
	Thickness (mm)	Preheat °C	Thickness (mm)	Preheat (°C)	PWHT (°C)
P1 / IS 2062 E250 BR, E350 BR,E350C	≤ 50 > 50	Nil 100	≤ 38 > 38 ≤ 63 > 63	Nil 100 150	595-625 1.0 All butt welds > 50 mm thick 2.0 For Ceiling girders if thickness > 50 mm 3.0 No HT required for web to flange fillet welds.
BS EN 10025 Gr 420 N (Ceiling Girder)	All	220	All	220	620 – 650
P3 Gr 1 and Gr 2	T>25	150	All	150	620-650 a) All butt welds in tension member b) All butt welds of fabricated components > 16mm thick and fillet welds with throat thickness > 13 mm
P4 Gr 1	All	150	All	150	650-680 a) All butt welds in tension member b) All butt welds of fabricated components > 16mm thick and fillet welds with throat thickness > 13 mm
P5A Gr 1	All	150	All	150	680-710 All welds (Note 2)
P15E Gr.1	Not permitted	Not permitted	All	220	740-770

NOTE:

1. All gas cut edges shall be ground for a width of 3mm to remove the HAZ.
2. All welds of P5A material shall be post heated at 250°C for 2 hours immediately after welding.

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**CHAPTER -2
HEAT TREATMENT PROCEDURE -
STEAM TURBINE, TURBO-GENERATOR
AND AUXILIARIES**



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Table 2.1
Pre heat & PWHT of Critical Piping with Turbine & Auxiliaries

Sl. No	Material Spec 1	Material Spec 2	OD	Thickness	Type of Weld	Pre heat Deg. C	PWHT Temp. Deg. C	Holding time minimum (minutes)
1	GS 17 CrMoV 511	SA335 P91	≥110	>30	G	200 to 300	690±10 (Notes)	240
2	G17 CrMo 9 10	SA335 P22	≥110	>30	G	200 to 300	690±10 (Notes)	240
3	21 Cr Mo Ni V47	SA335 P22	≥110	>30	G	200 to 300	690±10 (Notes)	240

Notes: Maximum rate of heating: 50 °C per hour above 300 °C
Maximum rate of cooling: 30°C per hour up to 3

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RECORD OF REVISIONS

Rev:00 Date: 24.10.2016 Completely revised the previous manual of 2010 version with new document number to include new materials and updated in-line with the current practices.

Rev:01 Date: 31.01.2020 Reviewed and revised for updation as per the below table.
All changes made in Rev 1 marked in red.

Chapter	Clause no.	Changes	Remarks
1	3.2.11.2	Revised to include PWHT by resistance method for Gr 91 materials up to 40 mm thickness.	Revised
	3.2.12.2	Revised to include usage of Flexible ceramic pads for PWHT of T91/T92 welds.	Revised
	Table 1.3	Updated minimum PWHT temperature of P4 material in-line with ASME	Revised
	Record of Revisions	Record of Revisions updated	Updated



A Maharatna Company

एन टी पी सी लिमिटेड

(भारत सरकार का उद्यम)

NTPC Limited

(A Govt. of India Enterprise)


(Formerly National Thermal Power Corporation Ltd.)

(केंद्रीय कार्यालय नोएडा)

Corporate Center NOIDA

Reference : CC-ENGG-9662-001-102-PVM-H-001

Date : 18/08/2025

From : MANPAL SHARMA DY. GENERAL MANAGER	To : BHEL DELHI SIRIFORT, BHEL HOUSE,P.S.PROJECT MANAGEMENT GRP BHEL NEW DELHI 110049
Cc : NKALITA@BHEL.IN	
Subject : EPC PKG Please find enclosed following drawings/ documents for necessary action at your end.	
Vendor Drg. No. : 8003-001-102-PVM-H-001 Orgn. Drg. No. : 9662-001-102-PVM-H-001 Revision No. : 00 Drg. Title : PAINTING SCHEDULE OF SG App. Category : CATREL Release Date : 18/08/2025	 Scan to verify
Comments : Drawings/Documents are being submitted to NTPC for information. The contractor/Vendor hereby confirms full compliance with all the specified requirements of the contract specification, without any deviation, whatsoever. In case during the tenure of the contract, it is observed/found that the data/information in the released Drawing/documents does not meet the contract specification, the Contractor/Vendor will modify/rectify/replace the equipment/ systems/ utilities to meet the specifications without any commercial implication or any time extension to NTPC in this regard	



Engineering Division
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टेलिफोन नं.- 0120-2410333, 2410116 फेक्स-0120-2410136, 2410137

पंजीकृत कार्यालय: एनटीपीसी भवन, स्कोप कॉम्प्लेक्स, 7 इंस्टीट्यूशनल एरिया, लोधी रोड, नई दिल्ली-110 003

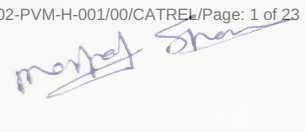
टेलिफोन नं.- 011-24361018 फेक्स-011-24361018, वेबसाइट: www.ntpc.co.in

ENGINEERING OFFICE COMPLEX, Plot No: A-SA, Sector-24, Post Box No: 13, Noida (UP), Pin-201 307

Telephone No: 0120-2410333, 2410116 Fax-0120-2410136, 2410137

Registered Office: NTPC Bhawan, Scope Complex, 7 Institutional Area, Lodhi Road, New Delhi-110 003

Telephone No: 011 24361000 Fax: 011 24361018, Website: www.ntpc.co.in

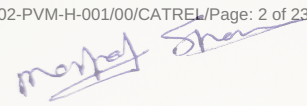


Name of the Project/ Package : Singareni STPP-II 1X800 MW, EPC PKG

Drawing / Document Number : 9662-001-102-PVM-H-001

Drawing / Document Title : PAINTING SCHEDULE OF SG

“We confirm that this document meets all the contract requirements including safety and statutory requirements and facilitate ease of operation and maintenance. In case any deviation is found, the Contractor shall carry out all required changes/ modifications without any cost implications to NTPC. In addition, Penalty on account of non-compliance of contract specification as deemed fit by the Employer shall be recovered”



Endorsement Sheet For Painting schedule

TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION		BHEL Doc. No: PL:C3-PS/1861
Project Name	SINGARENI(1X800MW) TPP Stage 2	
Contract No	CW-CM-11579-C-O-M-001(R) –FC-NOA-962 Dt 28.02.2025 (BHEL Work order no 1861)	
Package Name	EPC PACKAGE -SG	
Main Supplier	BHEL	
Manufacturer Name	M/S BHEL-TIRUCHIRAPPALLI / NTPC APPROVED SUBCONTRACTORS	
Project/package Specific Document No.	9662-001-102-PVM-H-001	
Drawing Title	PAINTING SCHEDULE FOR SG	
Reference Project Name	NTPC SIPAT STPP STAGE III (1X800 MW)	
Reference Contract No	8003	
Reference Package Name	EPC PACKAGE	
Reference Main Supplier	BHEL	
Reference Manufacturer Name	-	
Reference Project/package Specific document No.	8003-001-102-PVM-H-001	
Reference Drawing Title	PAINTING SCHEDULE FOR SG	
<input checked="" type="checkbox"/> Certified that the item/component is identical to that considered for reference document approval.		
<input type="checkbox"/> That there are minor changes in the item/ component with respect to that considered for reference <i>PAINTING SCHEDULE</i> document approval and the same affect the reference document slightly as indicated below		



K. SRINIVASAN
MANAGER / PLANT LAB
BHEL-HPBP TRICHY

Date: 12.08.2025

NTPC (Approved by/Date/Seal)

PROJECT ENGG MANAGER

CTF

BHEL

CUSTODIAN NAME



A Maharatna Company

एन टी पी सी लिमिटेड

(भारत सरकार का उद्यम)

NTPC Limited

(A Govt. of India Enterprise)

(Formerly National Thermal Power Corporation Ltd.)

(केंद्रीय कार्यालय नोएडा)

Corporate Center NOIDA

Reference : CC-ENGG-8003-001-102-PVM-H-001

Date : 17/01/2025

From : Vikas Khare
ADDL. GENERAL MANAGER

To : BHARAT HEAVY ELECTRICALS LTD
NEW DELHI
110049
IN

Cc : pmgvijay@bhel.in
ksbura@bhel.in

Subject : EPC Package, Sipat-Stage-III

Please find enclosed following drawings/ documents for necessary action at your end.

Vendor Drg. No. : 8003-001-102-PVM-H-001
Orgn. Drg. No. : 8003-001-102-PVM-H-001
Revision No. : 00
Drg. Title : PAINTING SCHEDULE OF SG
App. Category : CATREL
Release Date : 17/01/2025



Scan to verify

Comments : This is an Auto Archive document designed and developed by BHEL. Hence, BHEL has the entire responsibility to ensure fulfillment for technical specification and contractual requirement. Review and approval of the same from NTPC Engineering is not envisaged.



Engineering Division
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अभियंत्रिकी कार्यालय परिसर, प्लॉट नं.- ए 8ए, सेक्टर-24, पोस्ट बॉक्स नं.- 13, नोएडा (उ.प्र.) पिन-201 307

टेलिफोन नं.- 0120-2410333, 2410116 फैक्स-0120-2410136, 2410137

पंजीकृत कार्यालय: एनटीपीसी भवन, स्कोप कॉम्प्लेक्स, 7 इन्स्टीट्यूशनल एरिया, लोडू रोड, नई दिल्ली-110 003

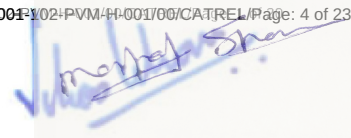
टेलिफोन नं.- 011-24361018 फैक्स-011-24361018, वेबसाइट: www.ntpc.co.in

ENGINEERING OFFICE COMPLEX, Plot No: A-8A, Sector-24, Post Box No: 13, Noida (UP), Pin-201 307

Telephone No: 0120-2410333, 2410116 Fax-0120-2410136, 2410137

Registered Office: NTPC Bhawan, Scope Complex, 7 Institutional Area, Lodhu Road, New Delhi-110 003

Telephone No: 011 24360100 Fax: 011 24361018, Website: www.ntpc.co.in

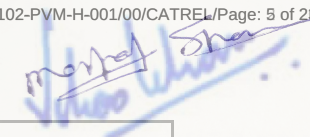


Name of the Project/ Package : Sipat Super Thermal Power Project -III 1x800MW, EPC Package, Sipat-Stage-III

Drawing / Document Number : 8003-001-102-PVM-H-001

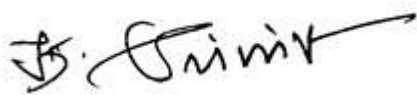
Drawing / Document Title : PAINTING SCHEDULE OF SG

“We confirm that this document meets all the contract requirements including safety and statutory requirements and facilitate ease of operation and maintenance. In case any deviation is found, the Contractor shall carry out all required changes/ modifications without any cost implications to NTPC. In addition, Penalty on account of non-compliance of contract specification as deemed fit by the Employer shall be recovered”



Endorsement Sheet For Painting schedule

TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION		BHEL Doc. No: PL:C3-PS/1856
Project Name	NTPC SIPAT STPP STAGE III (1X800 MW)	
Contract No	8003	
Package Name	EPC PACKAGE	
Main Supplier	BHEL	
Manufacturer Name	-	
Project/package Specific Document No.	8003-001-102-PVM-H-001	
Drawing Title	PAINTING SCHEDULE OF SG	
Reference Project Name	NTPC SINGRAULI STPP STAGE III (2X800 MW)	
Reference Contract No	1150	
Reference Package Name	EPC PACKAGE	
Reference Main Supplier	BHEL	
Reference Manufacturer Name	-	
Reference Project/package Specific document No.	1150-001-102-PVM-H-006A	
Reference Drawing Title	PAINTING SCHEDULE FOR SG & AUXILIARIES	
<input checked="" type="checkbox"/> Certified that the item/component is identical to that considered for reference document approval.		
<input type="checkbox"/> That there are minor changes in the item/ component with respect to that considered for reference <i>PAINTING SCHEDULE</i> document approval and the same affect the reference document slightly as indicated below		



K. SRINIVASAN
MANAGER / PLANT LAB
BHEL-HPBP TRICHY

Date: 07.01.2025

NTPC (Approved by/Date/Seal)
CTF

PROJECT ENGG MANAGER

BHEL

CUSTODIAN NAME



A Maharatna Company

एन टी पी सी लिमिटेड
(भारत सरकार का उद्यम)

NTPC Limited
(A Govt. of India Enterprise)
(Formerly National Thermal Power Corporation Ltd.)
(केंद्रीय कार्यालय नोएडा)
Corporate Center NOIDA

Reference : CC-ENGG-1150-001-102-PVM-H-006A

Date : 17/09/2024

From : Anirudh Sood
SENIOR MANAGER

To : BHEL PEM,NOIDA

Cc :

Subject : EPC package of Singrauli Stage-III

Please find enclosed following drawings/ documents for necessary action at your end.

Vendor Drg. No. : 1150-001-102-PVM-H-006A
Orgn. Drg. No. : 1150-001-102-PVM-H-006A
Revision No. : 01
Drg. Title : PAINTING SCHEME FOR SG & AUXILLIARIES
App. Category : CAT-I
Release Date : 17/09/2024



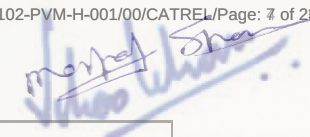
Scan to verify

Comments : Based on the document submitted through endorsement, the document is approved.



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टेलिफोन नं.- 0120-2410333, 2410116 फैक्स-0120-2410136, 2410137
पंजीकृत कार्यालय: एनटीपीसी भवन, स्कोप कॉम्प्लेक्स, 7 इंस्टीट्यूशनल एरिया, लोडू रोड, नई दिल्ली-110 003
टेलिफोन नं.- 011-24361018 फैक्स-011-24361018, वेबसाइट: www.ntpc.co.in
ENGINEERING OFFICE COMPLEX, Plot No: A-8A, Sector-24, Post Box No: 13, Noida (UP), Pin-201 307
Telephone No: 0120-2410333, 2410116 Fax-0120-2410136, 2410137
Registered Office: NTPC Bhawan, Scope Complex, 7 Institutional Area, Lodhu Road, New Delhi-110 003
Telephone No: 011 24360100 Fax: 011 24361018, Website: www.ntpc.co.in



Endorsement Sheet For Painting schedule

TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION		BHEL Doc. No: PL:C3-PS/1840
Project Name	NTPC SINGRAULI STPP STAGE III (2X800 MW)	
Contract No	1150	
Package Name	EPC PACKAGE	
Main Supplier	BHEL	
Manufacturer Name	-	
Project/package Specific Document No.	1150-001-102-PVM-H-006A	
Drawing Title	PAINTING SCHEDULE FOR SG & AUXILIARIES	
Reference Project Name	LARA SUPER THERMAL POWER PROJECT STAGE-II 2x800 MW	
Reference Contract No	9587	
Reference Package Name	EPC PACKAGE	
Reference Main Supplier	BHEL	
Reference Manufacturer Name	-	
Reference Project/package Specific document No.	9587-001-102-PVM-H-006A	
Reference Drawing Title	PAINTING SCHEDULE FOR SG & AUXILIARIES	
<input type="checkbox"/> Certified that the item/component is identical to that considered for reference document approval.		
<input checked="" type="checkbox"/> That there are minor changes in the item/ component with respect to that considered for reference <i>PAINTING SCHEDULE</i> document approval and the same affect the reference document slightly as indicated below		
<p><u>PL:C3-PS/1834, rev. 01, Sheet 6 of 13.</u></p> <p>- colour shade black for hook is changed to Signal red in the painting schedule document.</p>		



K. SRINIVASAN
MANAGER / PLANT LAB
BHEL-HPBP TRICHY

Date: 09.09.2024

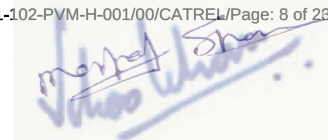
NTPC (Approved by/Date/Seal)

PROJECT ENGG MANAGER

CTF

BHEL

CUSTODIAN NAME



BHARAT HEAVY ELECTRICALS LIMITED
Tiruchirapalli - 620 014

NTPC – SINGRAULI STPP, STAGE-III (2X800MW) - UNIT-I & II

Ref: PL: C3-PS/1834-Rev.00 & Transmittal ref: CC- ENGG-1150-001-102-PVM-H-006A Dt. 06.09.2024.

BHEL Reply against NTPC comments/ observations on the referred painting schedule as follows

1. **NTPC comment:** Sheet 6 of 13, Sl. No. 8, colour shade shall be signal red for hook.

BHEL reply: Noted & retained.

2. **NTPC comment:** Sheet 8 of 13, Sl. No. 11 – painting schedule depends on temperature as per specs 1.06.11, S. No.5, A-12, Part B.

BHEL Reply: Painting scheme followed as per NTPC spec 1.06.11, S. No.5, A-12, Part B only. Phosphating of forged valves has been proposed as per 1.06.11, Point No.2-Page 6 of 8, A-12, Part B "For valves below 65NB and temperature upto and including 540 DegC, Parkerizing/zinc phosphate corrosion resistant coating is also acceptable in lieu of Aluminum paint".

3. **NTPC comment:** Sheet 8 of 13, Sl. No. 11 (1AS2) – Temperature more than 95⁰C for soot blower component, design for temperature >95⁰C to be used.

BHEL Reply: DA head valve assembly having design temperature >95⁰C is given with heat resistant aluminum paint in note 19, sheet 11 of 13. Other soot blower components having temperature <95⁰C only.

4. **NTPC comment:** Sheet 11 of 13, Sl. No. 19 – PS10 not mentioned in spec. Painting schedule as per specs for temperature >95⁰C.

BHEL Reply: PS10 refers to heat resistant aluminum IS13183 Gr.I based painting scheme for temperature >400⁰C & up to 600⁰C. Painting scheme for temperature >95⁰C i.e. heat resistant aluminium IS13183 Gr.I (PS10) & Gr.II (PS9) is followed as per NTPC spec.

5. **NTPC comment:** Sheet 11 of 13, Sl. No. 25 – Painting as per applied in steel structure.

BHEL Reply: Noted. As informed in the video conference held on subject, these components are not under the supply scope of BHEL, trichy.

Document is submitted for approval.

-*****-



A Maharatna Company

एन टी पी सी लिमिटेड

(भारत सरकार का उद्यम)

NTPC Limited

(A Govt. of India Enterprise)


(Formerly National Thermal Power Corporation Ltd.)

(केंद्रीय कार्यालय नोएडा)

Corporate Center NOIDA

Reference : CC-ENGG-9587-001-102-PVM-H-006A

Date : 25/06/2024

From : RAMESH CHANDRA SHIAL ENGINEER	To : BHARAT HEAVY ELECTRICALS LTD NEW DELHI 110049 IN
Cc : sudipt@bhel.in dipakbag@bhel.in	
Subject : EPC Package Please find enclosed following drawings/ documents for necessary action at your end.	
Vendor Drg. No. : HPBP-00-9587-328 Orgn. Drg. No. : 9587-001-102-PVM-H-006A Revision No. : 01 Drg. Title : Painting scheme for SG & Auxilliaries App. Category : CAT-I Release Date : 25/06/2024	 Scan to verify
Comments : No Comment	



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अभियंत्रण की कार्यालय परिसर, प्लॉट नं.- ए 8ए, सेक्टर-24, पोस्ट बॉक्स नं.- 13, नोएडा (उ.प्र.) पिन-201 307

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पंजीकृत कार्यालय: एनटीपीसी भवन, स्कोप कॉम्प्लेक्स, 7 इंस्टीट्यूशनल एरिया, लोडू रोड, नई दिल्ली-110 003

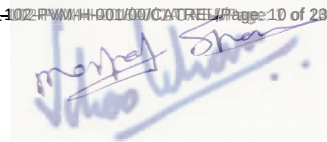
टेलिफोन नं.- 011-24361018 फैक्स-011-24361018, वेबसाइट: www.ntpc.co.in

ENGINEERING OFFICE COMPLEX, Plot No: A-8A, Sector-24, Post Box No: 13, Noida (UP), Pin-201 307

Telephone No: 0120-2410333, 2410116 Fax-0120-2410136, 2410137

Registered Office: NTPC Bhawan, Scope Complex, 7 Institutional Area, Lodhu Road, New Delhi-110 003

Telephone No: 011 24360100 Fax: 011 24361018, Website: www.ntpc.co.in



BHARAT HEAVY ELECTRICALS LIMITED
Tiruchirapalli - 620 014

NTPC – LARA STPP, STAGE-II (2X800MW) - UNIT ~~I & II~~

III & IV

Ref: PL: C3-PS/1834-Rev.00 & Transmittal ref: CC- ENGG-9587-001-102-PVM-H-006A Dt. 18.03.2024.

BHEL Reply against NTPC comments/ observations on the referred painting schedule as follows

1. **NTPC comment:** Sheet 3, Sl. No. 3, colour shade shall be RAL 5012 for boiler columns/ Girder/ Bracings.

BHEL reply: Colour shade modified for boiler columns, Girder, Bracings in the revised document.

2. **NTPC comment:** Sheet 10, Sl. No. 8 – This includes duct inside surfaces, truss, beams, gusset plate, guide vanes, divider plates, rectifier, divider vanes etc. coming in the gas path.

BHEL Reply: comment included.

3. **NTPC comment:** Sheet 13 of 13 – Finish coat shall be 3 as per talcher approved document.

BHEL Reply: It is typographical error. Finish coat shall be 1 as per contract.


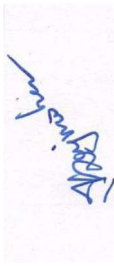

Revised document is submitted for approval.



BHARAT HEAVY ELECTRICALS LIMITED
 Tiruchirappalli - 620 014

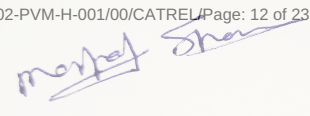
**NTPC- LARA STPP, STAGE-II (2X800MW)
 RAIGARH DIST, CHHATTISGARH
 CUSTOMER NO: U8-1834/1835 UNIT – I&II
 PAINTING SCHEDULE**

NTPC Drawing No: 9585-001-102-PVM-H-006A

Prepared by	K. Srinivasan Manager/ Plant Lab		Document No: PL: C3 - PS / 1834
Reviewed by	K. Rajmohan AGM/ PE/ FB		Revision No: 01 Dated: 14-06-2024
Approved by	A. Santhakumari AGM / Plant Lab		Sheet No. 01 of 13.

m:\chem. \ contracts 18\NTPC 2X800 MW LARA\psword_00.doc

Manoj Shan

RECORD OF REVISIONS

Rev. No	Date	Details of revision	Remarks
00	04-03-2024	New	Prepared in line with NTPC Bidding Doc. No. CS-9587-001R-2 & related amendments and clarifications to Bidding Documents issued by NTPC.
01	14-06-2024	Sheet 3, Sl. No. 3(i); Sheet 12, Sl. No.2 - RAL 5012 included for primary structures. Sheet 10, Sl. No. 8 – comment included.	Modified as per comments for CAT.II approval by NTPC ‘Transmittal for comments on painting scheme for SG & Auxiliaries’ Ref: CC:ENGG-9587-001-102-PVM-H-006A Dt.18.03.2024.

Mohd Sharif

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 PS10	<u>Collector & Separator Vessels (Except Internals), Supports</u> 04 -321,323;	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminum Paint to IS 13183 Gr. I DFT 20 μm per coat	1	--	--	Heat Resistant Aluminum Paint to IS 13183 Gr. I DFT 20 μm per coat	1	Aluminum	40
2 PS5	<u>Collector & Separator Vessels internals and Dd items (threaded and machined surfaces only)</u> 04-347;07-331, 360, 361, 362, 393; 08-911,912,913;09-304;12-306, 314, 317, 12-324, 327, 328, 344, 348, 354, 393; 17-304,306,319;19-306,307;21-602, 605, 21-700; 24-352,700,803,813,814,818, 827, 24-842;28-700; 32-700; 35-190, 701,721,722,723,724, 725, 726,727, 35-728, 730;36-700, 701, 721, 722, 723; 39- 700; 41-710;42-700,710;43-710; 45-710;47-710; 48-019,700;65-710;67-710; Foundation materials: 35-010, 39-012;	SSPC – SP3 Power Tool Cleaning	Rust Preventive Fluid to PR: CHEM: 09 – 04 DFT=25 μm per coat	1	--	--	--	--	25	
3 (i) PS19C8	<u>Boiler supporting structures, Columns, Girders, Bracings</u> 35-131 to 138,141 to 148,151 to 158; 35-181 to 188,211,212; 35-311,312,321,322,331,332,341,342; 35-351,352,361,362,371,372,374,375; 35-511 to 518,521 to 528,531 to 538,	Blast cleaning to SA2 1/2 (Near white metal) conforming to ISO 8501-1 with surface profile 40-60 μm	Inorganic Ethyl Zinc Silicate Primer DFT=70 μm per coat (refer sheet 12 Sl.no.11 for details)	1	Polyamide cured epoxy with MIO content. Minimum DFT 100 μm per coat (refer sheet 12 Sl.no.10 for details)	1	Aliphatic isocyanate cured acrylic finish paint DFT 70 μm (refer sheet 12 Sl.no.2 for details)	1	Light Blue Shade To RAL 5012	240

For structural steel, all coats shall be applied at shop.

Mohd Sharif

S. 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	
3 (ii) PS19C4	Galleries, Stair-ways & inter connecting Walkways 36-111 to 113,151 to 153,311 to 316,321 to 326,331 to 338,341 to 346,351 to 356,361 to 366,371 to 377,381 to 383,391 to 395,610,613,620,621,630,631,740; 38-210,299,310,410,510,610,710; ID system structures. 39-101,102,141,142,150,299,300; 39-304,305,306,993; Duct supports 48-015,115,145,205,225,265,385,435,465; 49-485,495,665; Buck stays 08-001,003,006,007,111,380,501; 08-503,901,910; Platforms & Beams: 35-213,214,221,222,231,232; 35-381 to 388,390,441 to 448,451 to 458,995;	Blast cleaning to SA2 1/2 (Near white metal) conforming to ISO 8501-1 with surface profile 40-60 μm	Inorganic Ethyl Zinc Silicate Primer DFT=70 μm per coat (refer sheet 12 Sl.no.11 for details)	1	Polyamide cured epoxy with MIO content. Minimum DFT 100 μm per coat (refer sheet 12 Sl.no.10 for details)	1	Aliphatic isocyanate cured acrylic finish paint DFT 70 μm (refer sheet 12 Sl.no.2 for details)	1	Grey White Shade To RAL 9002	240
4 PS9	Components >95° C Insulated other than components in SLNo.7 & 9 Max temperature 400 deg.C Ring Headers, Down Corners, Hot air Headers outside the gas path etc. 05-137,147,155,227,231,251,327,330,350; 07-102,110,125,217,223,231,232; 12-178, 850,852, 900; 17-407,476,807; 18-001,002,010,701; 19-701,702,903;21-600;24-811, 824,828; 24-836,837;	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr. II DFT 20 μm per coat	1	--	--	Heat Resistant Aluminium Paint to IS 13183 Gr. II DFT 20 μm per coat	1	Aluminium	40

For structural steel, all coats shall be applied at shop.

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 PS9 (Contd.)	Hot Air: 48-018,022,116,200,202,204,207,208,212; 48-214,222,224,262,264,267,662,664,667; Flue Gas: 48-372,382, 384,386, 48-432,434,462,464,482,484,492,494,496,498;	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr. II DFT 20 μm per coat	1	--	--	Heat Resistant Aluminium Paint to IS 13183 Gr. II DFT 20 μm per coat	1	Aluminium	40
5 PS 9	<u>Components >95°C uninsulated other than components coming in gas path.</u> Temp: >95°C & <400°C 24-807,820,860,865,867;42-200,300; Instrument tappings, doors: 48-200,915;	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr. II DFT 20 μm per coat	1	--	--	Heat Resistant Aluminium Paint to IS 13183 Gr. II DFT 20 μm per coat	1	Aluminium	40
6 PS 10	Components uninsulated other than components coming in gas path. (Temp: >400°C & <600°C) 09-003,004,005; 28-220; Components insulated (Temp: >400°C & <600°C) RH & SH headers 10-135,174,176,178,191,235,274,276,278,283, 10-284,285,291; 15-136, 178,236,278;	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr. I DFT 20 μm per coat	1	--	--	Heat Resistant Aluminium Paint to IS 13183 Gr. I DFT 20 μm per coat	1	Aluminium	40
7 PS2	<u>Loose tubes, SH, RH & Eco. coils</u> 11-074,078,374,378,406,467,469, 11-487,491,494,606,608,684,694,716,717,718, 11-767,768,769,787,791,916,917,918,967,968, 11-969,987,991;12-179,181,184,187,368, 12-405,514,524,544,554; 12-800,803,805,862,903,914,917,924,927,928,944,948; 12-954,968; 16-201,202,203,270,278,379; 19-092,402,804,814,824,853,884,914,924,984;	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*	--	--	No paint	No paint	Red Oxide	35

*-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.9.

John Doe

Maya Khan

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	
8 PSIA1	Miscellaneous and casing sheets 04-147,547; 07-409,431,460,461,462,502,503,509,531,560; 12-506,600,906,907;17-919;21-601,604,606; 24-350,351,354, 801,804,805,806,808, 809, 24-810,815,817,825,826,835,840,841,855, 24-950,955,960,966 to 969;30-233,234; 36-396,398,611; 38-611; Fuel firing: 41-350,390,500,997; Steam blowing piping 42-001,002,005,010,046,065,070,120,152,154, 42-157,997; 43-004,005,104,105,200,997; 45-200,801,802, 804,805,858,997; 47-281,283, 858,997; Duct plates, expansion joints 48-911,912; Coal Feeding 65-736,997; 67-204,272,276, 283,801,802,803,997; 95-088,091,485;96-186;97-585, 592; \$Handling equipment:99-099,100,300,400; Impulse lines: 24-800 Seal air ducting: Cold Air duct:48-012,014, 112,114, 141; Tempering Air: 48-142,144;	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744 DFT= 30µm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932 DFT= 20µm per coat	2	2	Smoke Grey Shade No: 692 of IS5	100

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

Sl. No.	PG/MA / 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	
9 PS3	Components $>95^\circ\text{C}$ coming in the gas path, Headers, Commissioning Spares & erection Materials etc., 06-400,401,431,434,437,441,444, 06-447,451,453,455,500,501,515,731,732, 06-734,735,737,741,744,745,747,751,752,753, 06-755,759; 07-309,315,316,318,423,993; 10-182,183,184,185; 11-474; 12-993;17-174,504,506,900,903; 19-704,753,763,783,793,802,850,851,852; 21-987,988; 24-822,823,987,988,989,993; 30-103,105,212,215,219,223,224,235; 31-010,104; 32-010,210,810; 35-993; 36-993;37-010;38-993; 41-988; 42-858,988; 48-993; 65-200; 67-200; 95-988;96-193; 97-282,287,297,298,407,577,590,591; 97-593,596,599;99-501,514;	SSPC-SP3/Power Tool Cleaning	Red Oxide Zinc Phosphate Primer (Alkyd Base) to IS 12744 DFT= 30 μm per coat	2	--	--	No paint	No paint	Red oxide	60
10 PS6	<u>Hand rails and posts, ladders / rungs</u> 35-821,822,823,851; 36-820,821,822,823,851,852,853; <u>Floor Grills, Step treads</u> 35 - 811,812; 36-811,812,813,814; 38-810,820,850; 39-810,820,850;	SSPC - SP8/ Acid pickling	Hot dip Galvanizing to a coating weight of 610 g/m ² (minimum) and to a coating thickness of 87 μm . Refer Notes given below **							

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

Mohd Shariq

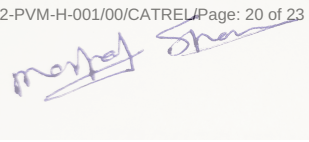
PAINTING SCHEME FOR VALVES

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	
11	<u>Cast carbon steel valves (Conventional)</u> <u>Cast alloy steel valves (Conventional)</u> <u>All API valves, OCNRV, SV & SRV Silencers,</u> <u>21-800,825; 24-885;</u> <u>Safety valves & ERV</u> <u>21-850; 24-880,881,883;</u> <u>Forged valves</u>	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr.II/I DFT= 20 μm per coat	1	--	--	Heat Resistant Aluminium Paint to IS 13183 Gr.II/I DFT= 20 μm per coat	1	Aluminium	40
1AS2	<u>Soot Blower components</u> 20-051,054,201,204,511,794,962	Chemical cleaning	Phosphating to a coating weight of 1500 mg per Sq.ft.	--	--	--	--	--	--	--
		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	100
	<u>HP / LP system</u>	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr.I DFT= 20 μm per coat	1	--	--	Heat Resistant Aluminium Paint to IS 13183 Gr.I DFT= 20 μm per coat	1	Aluminium	40

@ Heat resistant silicone based aluminum paint to IS 13183 Gr.II shall be applied for temperature up to 400 deg.C, Gr. I shall be applied for temperature >400 deg.C and up to 600 deg.C


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	
12 PS15	For CLH & VLH* PGs 07,08,12,17,19,21,24,47,48 & 80 07-402,403,405;12-517,528; 17-904,906; 19-506,507,904,905, 906,907; 24-353; 48-206,395;	Blast cleaning to SA2 $\frac{1}{2}$ (Near white metal) with surface profile 35-50 μm	Epoxy zinc rich primer To IS 14589 Gr. II (latest) %VS=35, (min) DFT=40 microns per coat	1	--	--	Aliphatic acrylic Poly-urethane paint to IS13213 (latest) %VS=40.0 (min) DFT= 30.0 microns per coat	1	Phirozi Blue Shade No. 176 of IS5	70
13 PS8B	Components > 95°C, un-insulated Fuel pipes 47-200, 289;	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr. I DFT 20 μm per coat	1	--	--	Heat Resistant Aluminium Paint to IS 13183 Gr. I DFT 20 μm per coat	1	Aluminium	40
14 PS 1BE	All Columns below '0' level (embedded in concrete) PGs 34,35,36,38, 39	SSPC-SP3/ Power Tool Cleaning	HB Chlorinated Rubber Based Zinc Phosphate primer %VS=40, (min) DFT=50 microns per coat	1	--	--	No paint	No paint	Grey	50

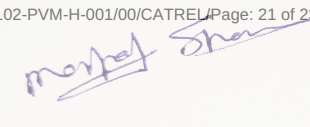
*- For components other than CLH & VLH, painting scheme shall be as given in Sl. No. 8.



NOTES:

1. Rust Preventive Coating should be given on HSFG Bolt and nut threads.
2. Machined surfaces and all retainers 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 NTPC doc. ref no: QS-01-DIV-W-4, Rev.00.
5. 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.
6. This painting Schemes is valid for only Customer No: U8/1834 & 1835, NTPC LARA - 2X800 MW.
7. No painting is required for Stainless Steel, non-ferrous & galvanized components.
8. Wherever inside surfaces of components under PGMA 48 – XXX & others, 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. **This includes duct inside surfaces, truss, beams, gusset plate, guide vanes, divider plates, rectifier, divider vanes etc. coming in the gas path.**
9. The Temporary Rust Preventive coating that already been applied on any components, tubes, pipes etc., shall be visually inspected for good adherence. If the coating is intact, direct coating of alkyd based red oxide paints over the coating is permitted. In case, the coating has peeled off over a large area, then the coating is to 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 ≤ 25 mm/tubes/drain pipes & bent rods are used, power tool / hand tool cleaning to SSPC – SP3 / SP2 shall be followed and the painting shall be done as described in SI.No.8.
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 paintings, making good any damaged shop painting and completing any unfinished portion of the shop coat 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, bent rods, small plates etc. which are not having feasible dimensions for blast cleaning, painting scheme of SI.No.8 shall be followed.

- 
15. For very small components with weldable primer at edges, the entire component shall be applied with weldable primer. Structural members having welded connections at site, relevant area can be painted with primer paint instead of Weldable primer.
 16. Painting scheme for all temporary structures like 04-196 shall be PS 1AE i.e. 1 coat of Red oxide Zinc Phosphate primer (Alkyd Base) to IS 12744-DFT-30 μ and 2 coats of Synthetic Enamel paint (Long Oil Alkyd) to IS 2932-DFT-2X20 μ Shade Yellow –Shade Yellow –Total DFT 70 μ . 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. Where measured total dry film thickness falls below the specified minimum, an additional coat of finish paint shall be applied.
 22. For chequered plates, surface preparation can be power tool cleaning to S3 and painting shall be in line with Sl. No. 8.
 23. Handrails, step treads of PGMA under Sl. No. 3 need to be galvanized in line with scheme for handrails (i.e. Sl.No. 10).
 24. Inside surfaces of fabricated structure (e.g. Box type column) shall be painted with two coats of red oxide primer paint during fit up stage.
 25. Painting of bunker structures to be in line with painting scheme of supporting structures (Sl. No. 3).
 26. 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.
 27. For items meant for Spares and subcontracting where no further processing is involved, the painting scheme selected shall be the same as that of similar product configuration/ description.



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 per coat (approx.)	Shade	Shade No. to IS5	Mode of appln.	Over coating interval, Hrs.
1	Epoxy Zinc rich primer to IS14589 Gr.II (latest)	8	2	35	50	Grey	--	Spray	24
2	Two-pack aliphatic Isocyanate cured acrylic finish paint (solid by volume minimum 55% (min) with Gloss retention (SSPC Paint Spec No 36, ASTM D 4587, D 2244, D 523) of Level 2 (after minimum 1000 hours exposure, Gloss loss less than 30 and colour change less than 2.0 Delta – E).	13	2	55	70	Grey white/ Light blue	RAL 9002/ RAL 5012	Airless Spray	24
3	Heat resistant Aluminium paint to IS 13183 Grade I/II (latest)	10	1	-	20	--	--	Brush / Spray	24
4	Red oxide zinc phosphate primer paint to IS 12744 (latest)	10	1	--	30	-	--	Brush / Spray	12
5	Red oxide Zinc Phosphate Dip coat primer paint to PR: CHEM: 09-03	10	1	--	35	--	---	Dip	12
6	Long oil alkyd synthetic enamel finish paint to IS2932 (latest)	17	1	--	20	Reqd. shade	Compdg. Shade no.	Brush / Spray	12
7	Temporary Rust preventive fluid to PR: CHE: 09 – 04	10	1	--	25	--	--	--	12
8	General purpose Aluminium paint to IS 2339 (latest)	10	2	--	20	Aluminium	--	Brush	12
9	HB Chlorinated Rubber Based Zinc Phosphate Primer-Colour Grey	8	1	40	50	Grey	--	Brush / Spray	12
10	Two component polyamide cured epoxy based polyamide cured MIO pigmented intermediate coat. (containing lamellar MIO minimum 30% on pigment)	8	2	80	100 (min)	Brown/grey	--	Airless Spray	24
11	Two component moisture curing zinc (ethyl) silicate primer, metallic Zinc content 80% (min), Zinc dust quality shall be as per ASTM D 520 Type 2.	8	2	60	70 (min)	Grey	--	Airless Spray	24

The covering capacity of paints specified is only approximate.

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

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
			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 of minimum 6" of surrounding areas to bare metal	Epoxy zinc rich primer to IS 14589 Grade II	2 T.DFT 70 μ (min)	As given in scheme	1	As given in scheme	1	As given in scheme	As given in scheme

Mohd. Shariq



A Maharatna Company

एन टी पी सी लिमिटेड

(भारत सरकार का उद्यम)

NTPC Limited

(A Govt. of India Enterprise)

(Formerly National Thermal Power Corporation Ltd.)

(केंद्रीय कार्यालय नोएडा)

Corporate Center NOIDA

Reference : CC-ENGG-9662-001-104-PVM-H-002

Date : 13/11/2025

From : MANPAL SHARMA
DY. GENERAL MANAGER

To : BHEL DELHI
SIRIFORT, BHEL HOUSE,P.S.PROJECT
MANAGEMENT GRP BHEL
NEW DELHI
110049

Cc : NKALITA@BHEL.IN

Subject : EPC PKG

Please find enclosed following drawings/ documents for necessary action at your end.

Vendor Drg. No. : NA

Orgn. Drg. No. : 9662-001-104-PVM-H-002

Revision No. : 00

Drg. Title : PAINTING SCHEME FOR SG AREA FANS, ESP, GATES & DAMPERS
AND APH

App. Category : CATREL

Release Date : 13/11/2025



Scan to verify

Comments : Drawings/Documents are being submitted to NTPC for information. The contractor/Vendor hereby confirms full compliance with all the specified requirements of the contract specification, without any deviation, whatsoever. In case during the tenure of the contract, it is observed/found that the data/information in the released Drawing/documents does not meet the contract specification, the Contractor/Vendor will modify/rectify/replace the equipment/ systems/ utilities to meet the specifications without any commercial implication or any time extension to NTPC in this regard.



Engineering Division
ISO 9001:2008 Certified



अभियंत्रिकी कार्यालय परिसर, प्लॉट नं.- ए 8ए, सेक्टर-24, पोस्ट बॉक्स नं.- 13, नोएडा (उ प) पिन-201 307
टेलिफोन नं.- 0120-2410333, 2410116 फेक्स-0120-2410136, 2410137

पंजीकृत कार्यालय: एनटीपीसी भवन, स्कोप कॉम्प्लेक्स, 7 इंस्टीट्यूशनल एरिया, लोधी रोड, नई दिल्ली-110 003

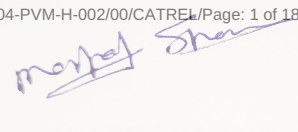
टेलिफोन नं.- 011-24361018 फेक्स-011-24361018, वेबसाइट: www.ntpc.co.in

ENGINEERING OFFICE COMPLEX, Plot No: A-SA, Sector-24, Post Box No: 13, Noida (UP), Pin-201 307

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Telephone No: 011 24360100 Fax: 011 24361018, Website: www.ntpc.co.in



Name of the Project/ Package : Singareni STPP-II 1X800 MW, EPC PKG

Drawing / Document Number : 9662-001-104-PVM-H-002

Drawing / Document Title : PAINTING SCHEME FOR SG AREA FANS, ESP, GATES & DAMPERS AND APH

“We confirm that this document meets all the contract requirements including safety and statutory requirements and facilitate ease of operation and maintenance. In case any deviation is found, the Contractor shall carry out all required changes/ modifications without any cost implications to NTPC. In addition, Penalty on account of non-compliance of contract specification as deemed fit by the Employer shall be recovered”



RANIPET

Bharat Heavy Electricals Limited
Boiler Auxiliaries Plant
Ranipet – 632 406

BHEL DOC NO.	PS: SING: EPC: R8/1587
REVISION NO.	00
DATE	11-11-2025

Moyel
Shan



SCCL SINGARENI TPP - STAGE II (1X800 MW) - EPC PACKAGE

PAINTING SCHEME FOR SG AREA FANS, ESP, G&D AND APH

CONTRACT NO: CW-CM-11159-C-O-M-001(R)-FC-NOA-962, DATED 18-06-2025

DRAWING NO: 9662-001-104-PVM-H-002; REV:00

BHEL RANIPET Customer No(s): R8/1587

Prepared & Reviewed by	Approved by
	
Renjith K / Sr. Manager (QA)	T. Venugopal / AGM (Quality)

T.VENUGOPAL
AGM / QUALITY
BHEL/BAP/RANIPET - 632 406.

SI 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	11-11-2025	Original issue – first submission

SI 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	50510	Power Tool cleaning to St3 (SSPC-SP3)	Heat Resistant Aluminum Paint Gr II to IS 13183 (Two Coats)	40	--	--	40
02	Module assembly – Temp > 95°C	52010	Power Tool cleaning to St3 (SSPC-SP3)	Two Coats Red Oxide Zinc phosphate prime to IS:12744	60	--	--	60
03	Heating Element with Baskets	52010	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	52011	Power Tool cleaning to St3 (SSPC-SP3)	Two Coats Red Oxide Zinc phosphate prime to IS:12744	60	--	--	60
05	Pin rack assembly	52012	---	Temp rust preventive as per PRQA 523	20	--	--	20
06	Radial Seals –Temp > 95°C	T Bars	52013	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	52030	Power Tool cleaning to St3 (SSPC-SP3)	Heat Resistant Aluminum Paint Gr II 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	52041 52042	Power Tool cleaning to St3 (SSPC-SP3)	Heat Resistant Aluminum Paint Gr II 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	52054	Power Tool cleaning to St3 (SSPC-SP3)	Temp. Rust Preventive Oil as per PRQA 523	20	--	--	20

SI No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	
10	Bypass seals	52055	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	52100	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	52211	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	52220	Power Tool cleaning to St3 (SSPC-SP3)	Heat Resistant Aluminum Paint Gr II to IS 13183 (Two Coats)	40	--	--	40
14	Observation port with light	52220	No painting, as the same is made of Glass					
	Other than glass part– Temp > 95°C	52220	Power Tool cleaning to St3 (SSPC-SP3)	Heat Resistant Aluminum Paint Gr II to IS 13183 (Two Coats)	40	--	--	40
15	Rotor Stoppage alarm	52220	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 II to IS 13183 (Two Coats)	40	--	--	40
16	Air receiver– Temp < 95°C	52101	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	52220 52000	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)	52220	No Painting					
	T C pipe Assy. (Non Stainless Steel part)– Temp < 95°C	52220	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

SI 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	52261	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	52262	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	52271	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	52272	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	52274	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	52301 52302	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	52339 52340	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	52339	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 and Mandatory spares	52988	As per respective items as above					

SI 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 Material of FD, ID & PA Fans	55011 55021 55031	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 Base Frame for Actuators of FD, ID & PA Fans	55011 55021 55031 56473 55516 55628 55635	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 = 70 µm per coat Intermediate Coat: One coat of polyamide cured Epoxy based MIO pigmented Intermediate coat (Lamellar MIO 30% (min)), (solid by volume- 80% (min)) DFT = 100 µm per coat	70 100	Two coats of two pack Aliphatic Isocyanate cured Acrylic Finish Paint to IS 13213 (solid by volume- 55% (min)) DFT = 35 µm per coat, Shade: Light blue RAL 5012	70	240
03	FD FAN <95° C Surface Temperature Static Parts - Insulated Surface (Outside) & Ambient Air swept surface (Inside) setting & indication shaft assy, expansion joint parts	55516 55716 55816 55410 55510	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)	55216	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), expansion joint parts	55628 55728 55828 55420 55520	Power tool cleaning to St3(SSPC-SP3)	One coat of HR Aluminium Paint to IS:13183 Gr. II	20	One coat of HR Aluminium Paint to IS:13183 Gr. II	20	40
	Static Parts – Flue gas swept surface (Inside), setting & indication shaft assy	55520	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)	55328	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

SI No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)	
05	PA FAN <95° C surface Temperature Static parts – Insulated Surface (Outside) & Ambient Air swept surface (Inside) setting & indication shaft assembly, expansion joint parts	55635 55735 55835 55430 55530	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)	55335	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, SA Fan motor canopy, FD, ID, PA Fan motor canopy, FD, ID, PA Fan LOS canopy, Fan Tools and fixture – temp < 95°C	55000 55015 55025 55035 56075 56079 55810 55820 55830 56870 55019 55029 55039 55210 55220 55230	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	55910 55920 55930	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 <95° C Surface Temperature Insulated Surface	55911 55931	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

SI 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 fan /ID sealing /cooling fans/ Radial Seal Air Fan, Radial seal air fan stator, Radial seal air fan bearing housing <95° C Surface Temperature	55024 56161 56173 56473 56370	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	FD, ID, PA & SA Fan Stair & Handrail - Galvanizing items (as per BHEL Engineering document)	55012 55022 55032 56072	Gratings- Blast cleaning to Sa 2½ Other Items- Power tool cleaning to St3 (SSPC-SP3) and acid cleaning	Hot Dip Galvanizing to 610 gm sq. Meter (minimum) and to a coating thickness of 85 µm (minimum)				
	FD, ID, PA & SA Fan Stair & Handrail – Other than galvanized structural items		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 = 70 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	70 100	Two coats of two pack Aliphatic Isocyanate cured Acrylic finish Paint to IS 13213 (solid by volume- 55% (min)) DFT = 35 µm per coat, Shade: Light blue RAL 5012	70	240

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

3. GATES & DAMPER

01	Gates & Dampers (200 ° C to 400 ° C) Insulated Surfaces	57203, 57223, 57270, 57273, 57620	Power tool cleaning to St3 (SSPC-SP3)	HR Aluminium Paint to IS: 13183 Gr. II (200 °C to 400 °C) – Two Coats	40	--	--	40
02	Gates & Dampers > 95°C up to 200 °C Insulated Surfaces	57430, 57460, 57470, 57480, 57490	Power tool cleaning to St3 (SSPC-SP3)	HR Aluminium Paint to IS: 13183 Gr. III (up to 200 °C) – Two Coats	40	--	--	40
03	Gates & Dampers, Seal Air piping < 95 ° C	57010, 57033, 57063, 57083, 57110, 57113, 57141, 57S41, 57143, 57160, 57173	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
04	Ladder, Cage for Ladder, Toe Guard Plate Floor Grill, Hand Rails, Hand Rail Post,	57466 57666	Gratings- Blast cleaning to Sa 2½ Other Items- Power tool cleaning to St3 (SSPC-SP3) & Acid cleaning	Hot Dip Galvanizing to 610 gm per Sq. Meter (minimum) and to a coating thickness of 85 µm (minimum)				
05	Other Structural Items – other than sl.no. 4 of above. Blower with motor, valves, Mounting bracket	57466, 57666, 57209, 57491, 57S91, 57497, 57S97	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
06	Ducts Commissioning Spares	57988	As per respective items mentioned in this Painting Scheme					

SI 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 Assembly– Temp > 95°C	79906	Power Tool Cleaning to st3 (sspc-sp3)	Heat Resistant Aluminum paint to IS 13183 Gr. II (200 °C to 400 °C) (Two Coats)	40	NIL	--	40
2	Gas Distribution Assembly– Temp > 95°C	79908	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	79909	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	79910	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	79911	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	79913	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	79915	Rust preventive application on Hook part only (Electrode Wire is Stainless Steel)					
8	Emitting Electrode Rapping Mechanism– Temp > 95°C	79916	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	79917	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	79919	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
11	Collecting Electrode	79920	Rust Preventive Fluid as per TEP AQCS RP					

SI 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	79920	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	79921	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	79922	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
15	Inspection /Access Door	79923	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	79924	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	79925	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	79926	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	79928	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	79932	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	79942	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	79943	Power Tool Cleaning to St3 (SSPC-SP3)	Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60

SI 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	79944	Power Tool Cleaning to st3 (SSPC-SP3)	Heat Resistant Aluminum paint to IS 13183 Gr. II (200 °C to 400 °C) (Two Coats)	40	NIL	--	40
				Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
24	Hopper Middle & Lower part – Temp > 95°C	79945	Power Tool Cleaning to st3 (SSPC-SP3)	Heat Resistant Aluminum paint to IS 13183 Gr. II (200 °C to 400 °C) (Two Coats)	40	NIL	--	40
				Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
25	Insulator Support Panel – Temp > 95°C	79946	Power Tool Cleaning to st3 (SSPC-SP3)	Heat Resistant Aluminum paint to IS 13183 Gr. II (200 °C to 400 °C) (Two Coats)	40	NIL	--	40
				Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
26	Roof Panel Assy – Temp > 95°C	79947	Power Tool Cleaning to st3 (SSPC-SP3)	Heat Resistant Aluminum paint to IS 13183 Gr. II (200 °C to 400 °C) (Two coats)	40	NIL	--	40
				Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60
27	Casing Structure – Temp > 95°C	79948	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	79949	Power Tool Cleaning to st3 (SSPC-SP3)	Heat Resistant Aluminum paint to IS 13183 Gr. II (200 °C to 400 °C) (Two coats)	40	NIL	--	40
				Red Oxide Zinc Phosphate Primer to IS: 12744 (Two coats)	60	NIL	--	60

SI No	SURFACE LOCATION	PGMA	SURFACE PREPARATION	PRIMER		FINISH		TOTAL DFT IN (µm min.)	
				PAINT	DFT (µm min.)	PAINT	DFT (µm min.)		
29	ESP Funnel Assembly – Temp > 95°C	Insulated Side	79950	Power Tool Cleaning to St3 (SSPC-SP3)	Heat Resistant Aluminum paint to IS 13183 Gr. II (200 °C to 400 °C) (Two coats)	40	NIL	--	40
					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 SI no: 38		79955	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, Fixing component for ESP insulation – Temp > 95°C		79957 79968 79989	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		79961	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		79966	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		79965 89610 89611 89612 89613	Gratings- Blast cleaning to Sa 2½ Other Items - Power tool cleaning to St3(SSPC-SP3) and acid cleaning	Hot Dip Galvanizing to 610 gm sq. Meter (minimum) and to a coating thickness of 85 µm (minimum)				
35	Commissioning Spares		79988	As per respective item, as listed in the painting schedule					
36	Tools & Tackles – Temp < 95°C		79996	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

SI 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	79965						
38	Supporting Structure for ESP, Penthouse columns (Refer note 5 for surface embedded in concrete)	79955 79981	Blast Cleaning to Sa 2.5 Near White metal finish of ISO 8501-1 with surface roughness profile to 40-60 µm					
39	Other than galvanized items vide sl. No. 34, like Stair stringer Channels, Bracket, Support Bracket, Frames Loose Channels, Toe Plates, Stiffener Plates and Angles for EP Galleries, Stair and Walk Way	79965 89610 89611						

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 = 70µm 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 = 35 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- 70 µm (min) Shade Light Blue RAL5012

Note:

- The total paint thickness (Primer (70 µm) + Intermediate (100 µm) + Finish coat (70 µm) shall be minimum **240 µm**.
- DFT of individual paint coat shall be ensured separately and the same shall meet the specified minimum DFT of each coat as given above.
- 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.

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

5. 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, 10 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	<ol style="list-style-type: none"> 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 and ESP		Primer and Finish : As given in respective scheme

6. 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. PGMA's 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. For all site erection shop materials Red Oxide Zinc Phosphate Primer shall be applied to meet the temporary protection.
4. In sub-assembly, wherever plates / sheets of thickness less than or equal to 5mm and rods are used, very minor items like clamps, small items etc. tiny items of weight less than 25 Kg - Power Tool or Hand Tool Cleaning to SSPC - SP 3 / SP 2 and painting as per FAN, sl. No. 6 shall be followed.
5. Ground shade / colour of finish paints and identification tag/band for equipment's, fans, piping, pipe services, supporting structures and other components followed as per NTPC doc ref no: QS-01-DIV-W-4, Rev.00.
6. DFT shall meet the specified value. In case of non-meeting of DFT in number of coats specified, subsequent coats shall be applied to meet specified DFT.
7. 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.
8. 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.
9. Weld edges made for site welding shall be manual cleaned by wire brush and shall be applied with weldable primer.
10. 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.
11. Heat resistant aluminum paint – the usage of Gr – I or Gr – II in place of Gr – III or Gr – I in place of Gr-II is technically acceptable.
12. The primer coat shall be applied in shop immediately after blast cleaning by airless spray technique. Intermediate coat shall be applied in shop after an interval of minimum 24 hours (from the application of primer coat) by airless spray technique.

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

7. 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 (IN HOURS)	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	Light blue RAL 5012
05	Heat resistant aluminum paint	IS 13183	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

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

8. 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 4 of 8 to 8 of 8
02	Structures of ESP, Packer plates, Base frames of motor and actuators	Technical specification Section- VI, Part-B, Sub section D-1-6, Civil works Design Criteria page 23 of 25 clause 6.04.03 and Section- VI, Part-A, Sub section IID, Civil works Page 8 of 10, clause 1.00.02
03	Touch up painting on damaged areas	Technical specification Section- VI, Part-B, Sub section D-1-6, Civil works - Page 25 of 25, clause 6.04.03, Note 4.
04	Galvanizing of gratings, hand railings and ladders	Technical specification Section- VI, Part-B, Sub section D-1-6, Civil works - Page 25 of 25, page 25 of 25, clause 6.04.05 & 6.04.06




A Maharatna Company

एन टी पी सी लिमिटेड
(भारत सरकार का उद्यम)
NTPC Limited
(A Govt. of India Enterprise)
(Formerly National Thermal Power Corporation Ltd.)
(केंद्रीय कार्यालय नोएडा)
Corporate Center NOIDA

Reference : CC-ENGG-9662-001-104-PVM-B-001

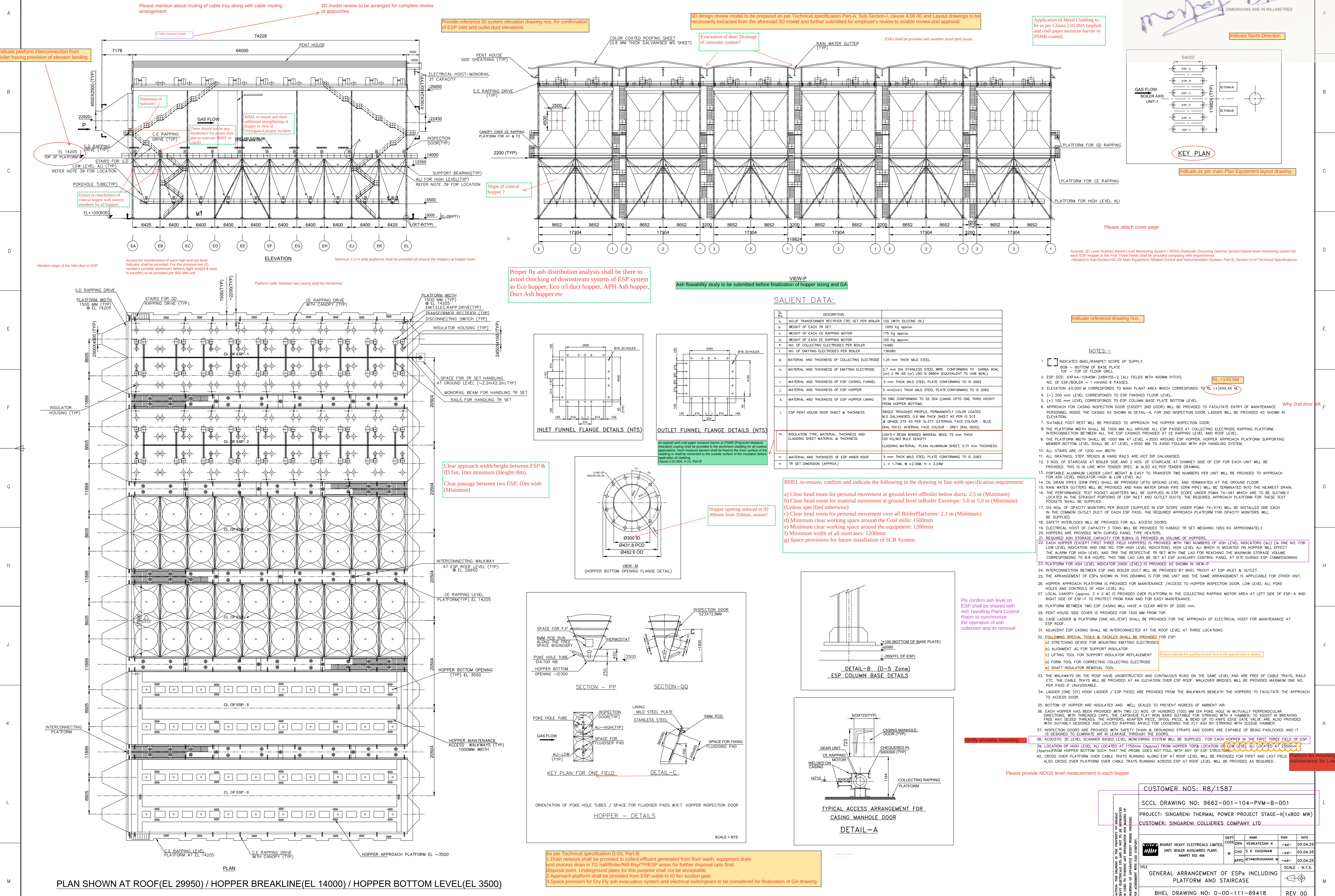
Date : 17/09/2025

From : MANPAL SHARMA DY. GENERAL MANAGER	To : BHEL DELHI SIRIFORT, BHEL HOUSE,P.S.PROJECT MANAGEMENT GRP BHEL NEW DELHI 110049
Cc : NKALITA@BHEL.IN	
Subject : EPC PKG Please find enclosed following drawings/ documents for necessary action at your end.	
Vendor Drg. No. : 9662-001-104-PVM-B-001 Orgn. Drg. No. : 9662-001-104-PVM-B-001 Revision No. : 00 Drg. Title : GA OF ESP INCLUDING PLATFORMS AND STAIRCASES, ROOF, CANOPY, FUNNEL AND HOPPER FLANGE DETAILS ETC. App. Category : CAT-II Release Date : 17/09/2025	 Scan to verify
Comments : Comments noted	



Engineering Division
ISO 9001:2008 Certified

अभियंत्रिकी कार्यालय परिसर, प्लॉट नं.- ए 8ए, सेक्टर-24, पोस्ट बॉक्स नं.- 13, नोएडा (उ.प्र.) पिन-201 307
टेलिफोन नं.- 0120-2410333, 2410116 फैक्स-0120-2410136, 2410137
पंजीकृत कार्यालय: एनटीपीसी भवन, स्कोप कॉम्प्लेक्स, 7 इंस्टीट्यूशनल एरिया, लोधी रोड, नई दिल्ली-110 003
टेलिफोन नं.- 011-24361018 फैक्स-011-24361018, वेबसाइट: www.ntpc.co.in
ENGINEERING OFFICE COMPLEX, Plot No: A-SA, Sector-24, Post Box No: 13, Noida (UP), Pin-201 307
Telephone No: 0120-2410333, 2410116 Fax-0120-2410136, 2410137
Registered Office: NTPC Bhawan, Scope Complex, 7 Institutional Area, Lodhi Road, New Delhi-110 003
Telephone No: 011 24361000 Fax: 011 24361018, Website: www.ntpc.co.in



Grid lines A through M and 1 through 12.

Annotations: Please mention about routing of cable tray along with cable routing arrangement, 3D model review to be arranged for complete review of approaches, Provide reference ID system elevation drawing nos. for confirmation of ESP inlet and outlet duct elevations, 3D design review model to be prepared as per Technical specification Part-A, Sub Section-1, clause 4.08.00 and Layout drawings to be necessarily extracted from the aforesaid 3D model and further submitted for employer's review to enable review and approval, Application of Metal Cladding to be as per Clause 2.02.00A (asphalt and craft paper moisture barrier or PSMR coated), Indicate North Direction, Indicate as per main Plan Equipment layout drawing, Please attach cover page, Acoustic 3D Level Scanner Based Level Monitoring System / NOCS (Naturally Occurring Gamma Sensor) based level monitoring system for each ESP Hopper in the First Three Fields shall be provided complying with requirements indicated in Sub-Section-III-C3 Main Equipment Related Control and Instrumentation System, Part-B, Section-VI of Technical Specifications.

Annotations: Dimension of staircase, BHEL to ensure and show additional strengthening of hopper in view of Trislangana 1 project incident due to staircase BHEL to provide, Ensure no interference of conical hopper with nearest members for all hoppers, EL+100(BOB), Minimum 1.0 m wide platforms shall be provided all around the hoppers at hopper level, Access for maintenance of each high and low level indicator shall be provided. For this purpose two (2) numbers portable aluminum ladders (light weight & easy to transfer) to be provided per 800 MM unit, Platform width between two casing shall be mentioned, Platform width 1500 MM (TYP) @ EL 14205, CE RAPPING DRIVE WITH CANOPY (TYP), TRANSFORMER RECTIFIER (TYP), DISCONNECTING SWITCH (TYP), INSULATOR HOUSING (TYP), SPACE FOR TR SET HANDLING AT GROUND LEVEL (~2.2mX2.2m; TYP), MONORAIL BEAM FOR HANDLING TR SET RAILS FOR HANDLING TR SET, INTERCONNECTING WALKWAY AT ESP ROOF LEVEL (TYP) @ EL 29950, CE RAPPING LEVEL PLATFORM (TYP) EL 14205, HOPPER BOTTOM OPENING (TYP) EL 3500, HOPPER MAINTENANCE ACCESS WALKWAYS (TYP) 1000MM WIDTH, CE RAPPING LEVEL PLATFORM AT EL 14205, CE RAPPING DRIVE WITH CANOPY (TYP), HOPPER APPROACH PLATFORM EL ~3500, PLAN SHOWN AT ROOF(EL 29950) / HOPPER BREAKLINE(EL 14000) / HOPPER BOTTOM LEVEL(EL 3500)

Annotations: COLOR COATED ROOFING SHEET (0.8 MM THICK GALVANIZED MS SHEET), Evacuation of dust/ Drainage of rainwater system?, RAIN WATER GUTTER, ESPs shall be provided with weather proof pent house, ELEVATION, VIEW-P, SALIENT DATA: Table with columns SL, NO., DESCRIPTION, and values for various components like transformer rectifier, rapping motor, electrodes, etc.

Annotations: Proper fly ash distribution analysis shall be there to avoid choking of downstream system of ESP system as Eco hopper, Eco of duct hopper, APH Ash hopper, Duct Ash hopper etc, Ash flowability study to be submitted before finalization of hopper sizing and GA, INLET FUNNEL FLANGE DETAILS (NTS), OUTLET FUNNEL FLANGE DETAILS (NTS), Hopper opening reduced to ID 300mm from 350mm, reason?, Clear approach width/height between ESP & ID fan, 10m minimum (Height=8m), Clear passage between two ESP, 10m wide (Minimum), Hopper bottom opening flange detail, SECTION-PP, SECTION-QQ, KEY PLAN FOR ONE FIELD, DETAIL-C, TYPICAL ACCESS ARRANGEMENT FOR CASING MANHOLE DOOR, DETAIL-A, As per Technical specification G-03, Part-B: 1. Drain network shall be provided to collect effluent generated from floor wash, equipment drain and process drain in TG Hall/Boiler Mill Bay/TP/ESP areas for further disposal upto final disposal point. Underground pipes for this purpose shall not be acceptable. 2. Approach platform shall be provided from ESP outlet to ID fan suction gate. 3. Space provision for Dry Fly ash evacuation system and electrical switchgears to be considered for finalization of GA drawing.

Annotations: BHEL to ensure, confirm and indicate the following in the drawing in line with specification requirement: a) Clear head room for personal movement at ground level of Boiler below ducts: 2.5 m (Minimum) b) Clear head room for material movement at ground level in Boiler Envelope: 5.0 m 5.0 m (Minimum) (Unless specified otherwise) c) Clear head room for personal movement over all Boiler Platforms: 2.1 m (Minimum) d) Minimum clear working space around the Coal mills: 1500mm e) Minimum clear working space around the equipment: 1200mm f) Minimum width of all staircases: 1200mm g) Space provisions for future installation of SCR System, Ps confirm ash level on ESP shall be shared with Ash Handling Plant Control Room to synchronize the operation of ash collection and its removal, Ps confirm the mounting, Please provide NOCS level measurement in each hopper, PHISHM for mounting and maintenance for Low ALI?

Annotations: NOTES: 1. INDICATES BHEL/RAMPSET SCOPE OF SUPPLY. 2. ESP SIZE: 6XFAA-10X45M-2X8155-2 (ALL FIELDS WITH 400MM PITCH). 3. ELEVATION 40.000 M CORRESPONDS TO MAIN PLANT AREA WHICH CORRESPONDS TO RL +144.5M. 4. (-) 200 mm LEVEL CORRESPONDS TO ESP FINISHED FLOOR LEVEL. 5. (+) 100 mm LEVEL CORRESPONDS TO ESP COLUMN BASE PLATE BOTTOM LEVEL. 6. APPROACH FOR INSIDE INSPECTION DOOR (EXCEPT 2ND DOOR) WILL BE PROVIDED TO FACILITATE ENTRY OF MAINTENANCE PERSONNEL INSIDE THE CASING AS SHOWN IN DETAIL-A. FOR 2ND INSPECTION DOOR, LADDER WILL BE PROVIDED AS SHOWN IN ELEVATION. 7. SUITABLE FOOT REST WILL BE PROVIDED TO APPROACH THE HOPPER INSPECTION DOOR. 8. THE PLATFORM WIDTH SHALL BE 1500 MM ALL AROUND ALL ESP PASSES AT COLLECTING ELECTRODE RAPPING PLATFORM. INTERCONNECTION BETWEEN ALL THE ESP CASINGS PROVIDED AT CE RAPPING LEVEL AND ROOF LEVEL. 9. THE PLATFORM WIDTH SHALL BE 1000 MM AT LEVEL +3550 AROUND ESP HOPPER. HOPPER APPROACH PLATFORM SUPPORTING MEMBER BOTTOM LEVEL SHALL BE AT LEVEL +3550 MM TO AVOID FOULING WITH ASH HANDLING SYSTEM. 10. ALL STAIRS ARE OF 1200 mm WIDTH. 11. ALL GRATING, STEP TREADS & HAND RAILS ARE HOT DIP GALVANIZED. 12. 3 NOS. OF STAIRCASE AT BOILER SIDE AND 2 NOS. OF STAIRCASE AT CHIMNEY SIDE OF ESP FOR EACH UNIT WILL BE PROVIDED. THIS IS IN LINE WITH TENDER SPEC. & ALSO AS PER TENDER DRAWING. 13. PORTABLE ALUMINUM LADDER LIGHT WEIGHT & EASY TO TRANSFER TWO NUMBERS PER UNIT WILL BE PROVIDED TO APPROACH FOR ASH LEVEL INDICATOR-HIGH & LOW LEVEL ALL. 14. OIL DRAIN PIPES (ERW PIPE) SHALL BE PROVIDED UP TO GROUND LEVEL AND TERMINATED AT THE GROUND FLOOR. 15. RAIN WATER GUTTERS WILL BE PROVIDED AND RAIN WATER DRAIN PIPE (ERW PIPE) WILL BE TERMINATED INTO THE NEAREST DRAIN. 16. THE PERFORMANCE TEST POCKET ADAPTERS WILL BE SUPPLIED IN ESP SCOPE UNDER POMA 7X-XM WHICH ARE TO BE SUITABLY LOCATED IN THE STRAIGHT PORTIONS OF ESP INLET AND OUTLET DUCTS. THE REQUIRED APPROACH PLATFORM FOR THESE TEST POCKETS SHALL BE SUPPLIED. 17. SIX NOS. OF OPACITY MONITORS PER BOILER (SUPPLIED IN ESP SCOPE UNDER POMA 7X-XM) WILL BE INSTALLED ONE EACH IN THE COMMON OUTLET DUCT OF EACH ESP PASS. THE REQUIRED APPROACH PLATFORM FOR OPACITY MONITORS WILL BE SUPPLIED. 18. SAFETY INTERLOCKS WILL BE PROVIDED FOR ALL ACCESS DOORS. 19. ELECTRICAL HOIST OF CAPACITY 3 TONS WILL BE PROVIDED TO HANDLE TR SET WEIGHING 1950 KG APPROXIMATELY. 20. HOPPERS ARE PROVIDED WITH CURVED PANEL TYPE HEATERS. 21. REQUIRED ASH STORAGE CAPACITY FOR 8 hrs IS PROVIDED IN VOLUME OF HOPPERS. 22. EACH HOPPER (EXCEPT FIRST THREE FIELD HOPPERS) IS PROVIDED WITH TWO NUMBERS OF ASH LEVEL INDICATORS (ALI) (i.e. ONE NO. FOR LOW LEVEL INDICATION AND ONE NO. FOR HIGH LEVEL INDICATION). HIGH LEVEL ALI WHICH IS MOUNTED ON HOPPER WILL EFFECT THE ALARM FOR HIGH LEVEL AND TRIP THE RESPECTIVE TR SET WITH TIME LAG FOR REACHING THE MAXIMUM STORAGE VOLUME CORRESPONDING TO 8.0 HOURS. THIS TIME LAG CAN BE SET AT ESP AUXILIARY CONTROL PANEL AT SITE DURING ESP COMMISSIONING. 23. PLATFORM FOR ASH LEVEL INDICATOR (HIGH LEVEL) IS PROVIDED AS SHOWN IN VIEW-P. 24. INTERCONNECTION BETWEEN ESP AND BOILER DUCT WILL BE PROVIDED BY BHEL TRICHY AT ESP INLET & OUTLET. 25. THE ARRANGEMENT OF ESPs SHOWN IN THIS DRAWING IS FOR ONE UNIT AND THE SAME ARRANGEMENT IS APPLICABLE FOR OTHER UNIT. 26. HOPPER APPROACH PLATFORM IS PROVIDED FOR MAINTENANCE / ACCESS TO HOPPER INSPECTION DOOR, LOW LEVEL ALI, POKE HOLES AND CONTROLS OF HIGH LEVEL ALI. 27. LOCAL CANOPY (Approx. 2 X 2 M) IS PROVIDED OVER PLATFORM IN THE COLLECTING RAPPING MOTOR AREA AT LEFT SIDE OF ESP-A AND RIGHT SIDE OF ESP-F TO PROTECT FROM RAIN AND FOR EASY MAINTENANCE. 28. PLATFORM BETWEEN TWO ESP CASING WILL HAVE A CLEAR WIDTH OF 2000 mm. 29. PENT HOUSE SIDE COVER IS PROVIDED FOR 1500 MM FROM TOP. 30. CAGE LADDER & PLATFORM (ONE NO./ESP) SHALL BE PROVIDED FOR THE APPROACH OF ELECTRICAL HOIST FOR MAINTENANCE AT ESP ROOF. 31. ADJACENT ESP CASING SHALL BE INTERCONNECTED AT THE ROOF LEVEL AT THREE LOCATIONS. 32. FOLLOWING SPECIAL TOOLS & TACKLES SHALL BE PROVIDED FOR ESP: a) STRETCHING DEVICE FOR MOUNTING EMITTING ELECTRODES b) ALIGNMENT JIG FOR SUPPORT INSULATOR c) LIFTING TOOL FOR SUPPORT INSULATOR REPLACEMENT d) FORM TOOL FOR CORRECTING COLLECTING ELECTRODE e) SHAFT INSULATOR REMOVAL TOOL. 33. THE WALKWAYS ON THE ROOF HAVE UNOBSTRUCTED AND CONTINUOUS RUNS ON THE SAME LEVEL AND ARE FREE OF CABLE TRAYS, RAILS ETC. THE CABLE TRAYS WILL BE PROVIDED AT AN ELEVATION OVER ESP ROOF. WALKOVER BRIDGES WILL BE PROVIDED MAXIMUM ONE NO. PER PASS IF UNAVOIDABLE. 34. LADDER (ONE 01) HOOK LADDER / ESP PASS) ARE PROVIDED FROM THE WALKWAYS BENEATH THE HOPPERS TO FACILITATE THE APPROACH TO ACCESS DOOR. 35. BOTTOM OF HOPPER ARE INSULATED & WELL SEALED TO PREVENT INGRESS OF AMBIENT AIR. 36. EACH HOPPER HAS BEEN PROVIDED WITH TWO (2) NOS. OF HUNDREDS (100) MM DIA POKE HOLES IN MUTUALLY PERPENDICULAR DIRECTIONS, WITH THREADED CAPS. THE CAP HAVE FLAT IRON BARS SUITABLE FOR STRIKING WITH A HAMMER, TO ASSIST IN BREAKING FREE ANY SEIZED THREADED CAPS. THE HOPPERS ADAPTER PIECE, SPOOL PIECE, & BEND UP TO INFLATE GATE VALVE ARE ALSO PROVIDED WITH SUITABLY DESIGNED AND LOCATED RAPPING ANKLS FOR LOOSENING THE FLY ASH BY STRIKING WITH SLUDGE HAMMER. 37. INSPECTION DOORS ARE PROVIDED WITH SAFETY CHAIN & GROUNDING STRAPS AND DOORS ARE CAPABLE OF BEING PADLOCKED AND IT IS DESIGNED TO ELIMINATE AIR IN LEAKAGE THROUGH THE DOORS. 38. ACOUSTIC 3D LEVEL SCANNER BASED LEVEL MONITORING SYSTEM WILL BE SUPPLIED FOR EACH HOPPER IN THE FIRST THREE FIELD OF ESP. 39. LOCATION OF HIGH LEVEL ALI LOCATED AT 1750mm (Approx) FROM HOPPER TOP & LOCATION OF LOW LEVEL ALI LOCATED AT 2500mm (Approx) FROM HOPPER BOTTOM SUCH THAT THE PROBE DOES NOT FOUL WITH ANY OF ESP STRUCTURE. 40. CROSS OVER PLATFORM OVER CABLE TRAYS RUNNING ALONG ESP AT ROOF LEVEL WILL BE PROVIDED FOR FIRST AND LAST FIELD. ALSO CROSS OVER PLATFORM OVER CABLE TRAYS RUNNING ACROSS ESP AT ROOF LEVEL WILL BE PROVIDED AS REQUIRED.

Annotations: Key Plan, Why 2nd door left, Ps confirm the mounting, Please provide NOCS level measurement in each hopper, PHISHM for mounting and maintenance for Low ALI?, CUSTOMER NOS: RB/1587, SCCL DRAWING NO: 9662-001-104-PVM-B-001, PROJECT: SINGARENI THERMAL POWER PROJECT STAGE-II(1x800 MW), CUSTOMER: SINGARENI COLLIERIES COMPANY LTD, BHARAT HEAVY ELECTRICALS LIMITED, UNIT: BOILER AUXILIARIES PLANT, SHEET: 62/488, DEPT: COORD, NAME: VENKATESAN K, SIGN: --sd--, DATE: 03.04.25, M: CHD, S: K VAISHANAW, --sd--, 03.04.25, APPD: PETAJANURIGANAND M, --sd--, 03.04.25, TITLE: GENERAL ARRANGEMENT OF ESPs INCLUDING PLATFORM AND STAIRCASE, SCALE: N.T.S., BHEL DRAWING NO: 0-00-111-89418, REV 00, SH AD



A Maharatna Company

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(भारत सरकार का उद्यम)

NTPC Limited

(A Govt. of India Enterprise)


(Formerly National Thermal Power Corporation Ltd.)

(केंद्रीय कार्यालय नोएडा)

Corporate Center NOIDA

Reference : CC-ENGG-9662-001-102-PVM-B-013

Date : 12/11/2025

From : MANPAL SHARMA DY. GENERAL MANAGER	To : BHEL DELHI SIRIFORT, BHEL HOUSE,P.S.PROJECT MANAGEMENT GRP BHEL NEW DELHI 110049
Cc : NKALITA@BHEL.IN	
Subject : EPC PKG Please find enclosed following drawings/ documents for necessary action at your end.	
Vendor Drg. No. : 9662-001-102-PVM-B-013 Orgn. Drg. No. : 9662-001-102-PVM-B-013 Revision No. : 00 Drg. Title : GEN. ARRGT ID SYSTEM -ELEVATION App. Category : CAT-II Release Date : 12/11/2025	 Scan to verify
Comments : Comply CRS with comments marked. 3D Model & CFD analysis report essential	



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अभियंत्रिकी कार्यालय परिसर, प्लॉट नं.- ए 8ए, सेक्टर-24, पोस्ट बॉक्स नं.- 13, नोएडा (उ प) पिन-201 307
टेलिफोन नं.- 0120-2410333, 2410116 फेक्स-0120-2410136, 2410137

पंजीकृत कार्यालय: एनटीपीसी भवन, स्कोप कॉम्प्लेक्स, 7 इन्स्टीट्यूशनल एरिया, लोधी रोड, नई दिल्ली-110 003

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ENGINEERING OFFICE COMPLEX, Plot No: A-SA, Sector-24, Post Box No: 13, Noida (UP), Pin-201 307

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mayal shan

**ENDORSEMENT SHEET FOR DATASHEET/ GA/ SCHEME/ TYPE TEST APPROVAL
REFERENCE DATASHEET/ GA/ SCHEME/ TYPE TEST REPORT (DS/ GA/ SC/ TTR)**

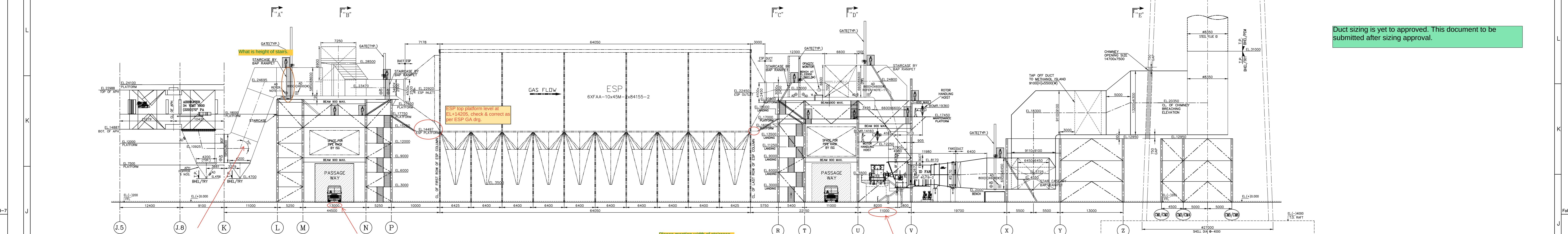
<i>TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION</i>		To be filled in by NTPC	
PROJECT NAME	SINGARENI THERMAL POWER PROJECT STAGE-II-1x800 MW, SCCL SINGARENI	REVIEW & ENDORSEMENT BY NTPC PROJECT SPECIFIC DOCUMENT NUMBER ALLOTTED	
CONTRACT NO	-	DOC NO.:	DATE:
CONTRACT NAME	EPC PACKAGE	REV. NO.:	
MAIN SUPPLIER	HIGH PRESSURE BOILER PLANT, BHEL, TRICHY		
MANUFACTURER WORKS & ADDRESS	HIGH PRESSURE BOILER PLANT, BHEL, TRICHY		
ITEM/EQUIPMENT / SYSTEM/ SUB-SYSTEM DETAILS: MODEL NO/ TYPE SIZE /RATING etc. ANY OTHER IMP PARAMETER	DRG TITLE: LAYOUT OF ID SYSTEM-ELEVATION/Rev-00 Dt.27/10/2025 CUSTOMER DRG NO: 9662-001-102-PVM-B-013 BHEL DRG NO: 0-00-020-78518	ESP inlet/outlet elevation and Chimney location is not as per mentioned reference drawing of Sipat-III	
REFERENCE APPROVED DOC NO.:	8003-001-102-PVM-B-013 Dt. 26/06/2025		
Confirmation by Main Supplier (TICK WHICHEVER APPLICABLE)			
I. That the item/ component is identical to that considered for DS/ GA/ SC/ TTR approval.		OR	Tick as Applicable <input type="checkbox"/> Comply the requirement <input type="checkbox"/>
II. That there are minor changes in the item/ component with respect to that considered for DS/ GA/ SC/ TTR approval, however the same change do not affect the contents of DS/ GA/ SC/ TTR. <input checked="" type="checkbox"/> OR			The DATASHEET/ GA/ SCHEME/ TYPE TEST is endorsed for this project without any change
III. That there are minor changes in the item/ component with respect to that considered for DS/ GA/ SC/ TTR approval, however the same affect the DS/ GA/ SC/ TTR slightly, as indicated below / in attached sheet.			The DATASHEET/ GA/ SCHEME/ TYPE TEST is endorsed for this project with changes as indicated
CHANGES: 1. Reference drawing numbers are project specific. 2. Note no.I is project specific. 3. ESP and its connecting duct are project specific. 4. Chimney and its location are project specific. Hence, duct arrangement from ID fan to chimney is project specific. Endorsed drawing of Sipat-III is not yet approved. So, the evaluation shall be considered in non-endorsement route, please comply and attach CRS against the		DISTRIBUTION OF ENDORSEMENT OF A) DATASHEET/ GA/ SCHEME/ TYPE TEST: 1. MAIN SUPPLIER 2. MANUFACTURER 3. RIO/ CQA	
<i>H. Prakash</i> 27/10/25 M. PRAKASH Manager Layouts / PE (FB) BHEL, TRICHY - 620 014.	<i>M. Haridasan</i> 27-10-25 M. HARIDASAN Dy. General Manager Product Engineering (FB) BHEL, TRICHY - 620 014		NTPC (Reviewed /Approved by/ Date & Seal)
SIGN with Seal.: (Prepared)	DATE:	SIGN with Seal.: (Approved)	DATE:

Duct sizing document is not yet approved. This document cannot be reviewed in totality till approval of the same.

CFD, PMT for ducts and ESP to be submitted to finalize the optimum duct layout & substantiate the velocities criteria compliance as per spec requirement at Clause 1.05.14.01, Sub-section A-01, Part-B

Duct sizing is yet to be approved. This document to be submitted after sizing approval.

All the equipments and instruments access to be shown/confirmed



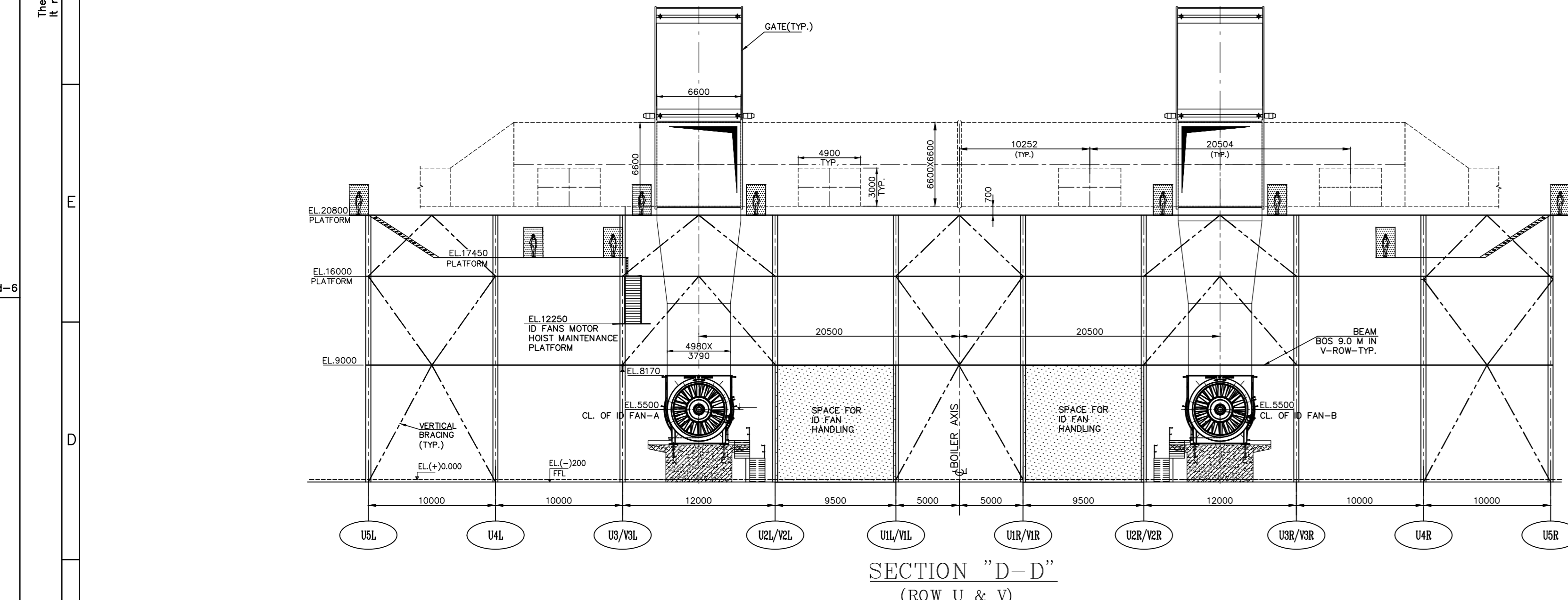
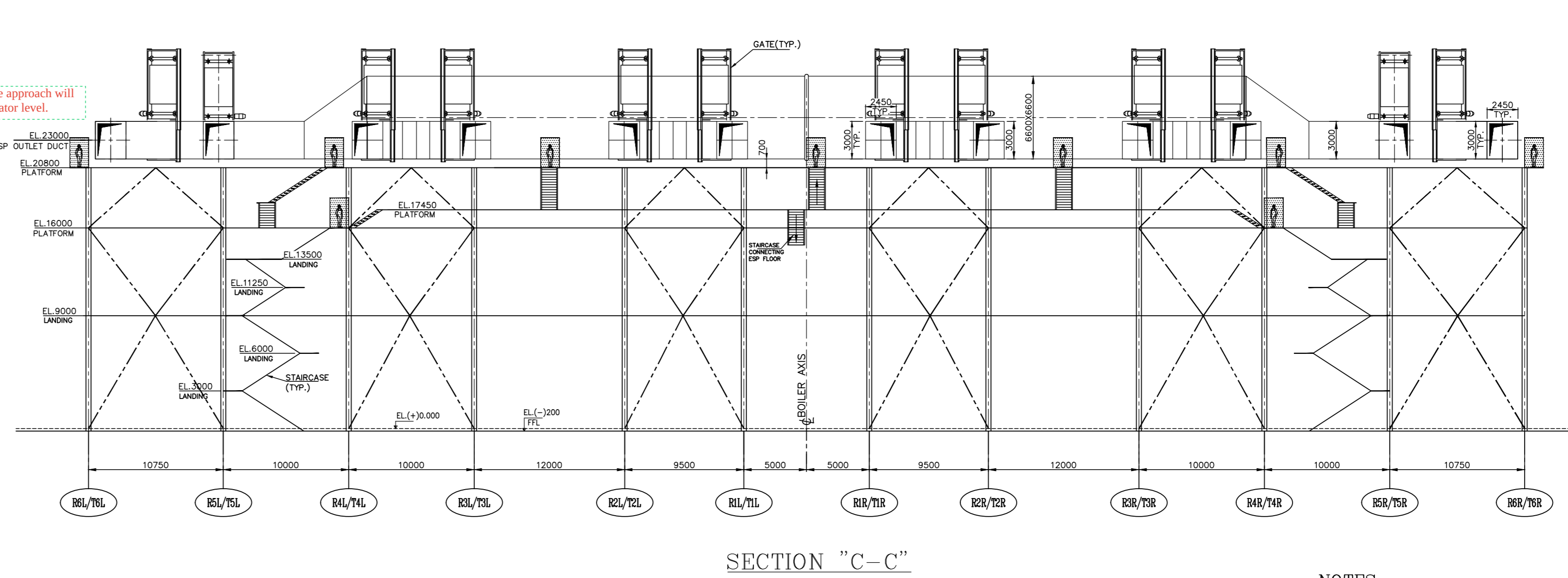
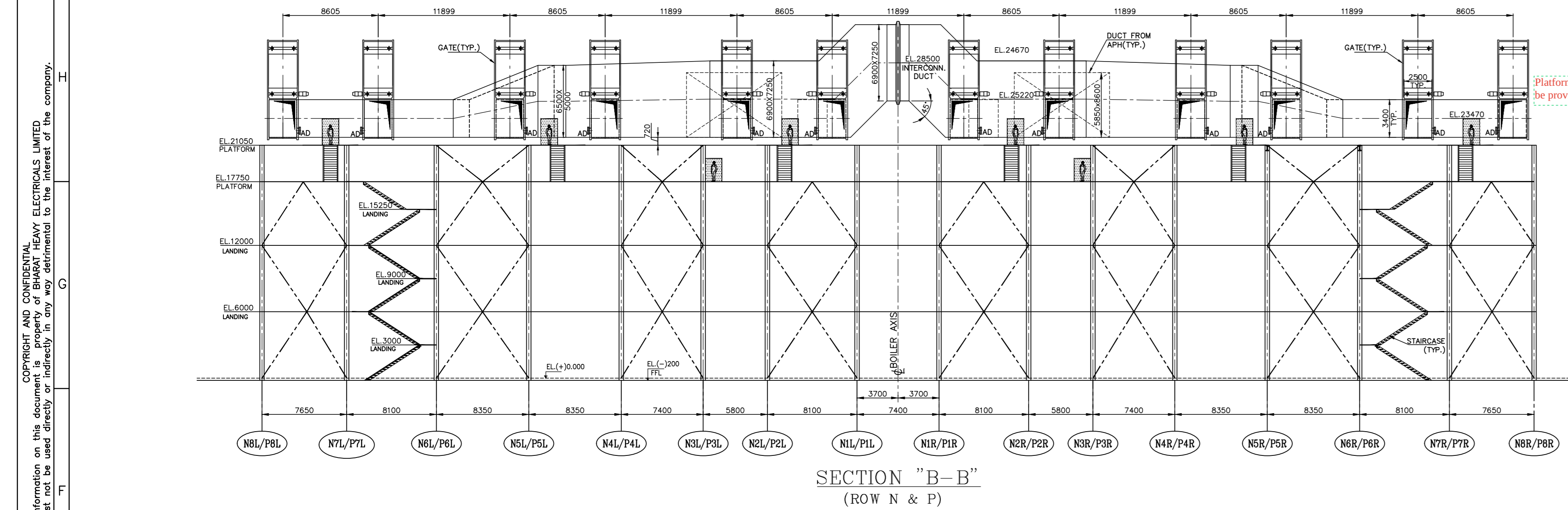
In view of this steep upward duct angle the following compliances are essential.
1. BHEL to submit CFD analysis report, show actual ash accumulation rate at varying load in all hoppers.
2. BHEL to submit 3D model for review of layout.
Approval of this document is subjected to review and approval of above compliances.

Clear approach width/height between Boiler & ESP is to be maintained as 12m minimum (Height=8m)

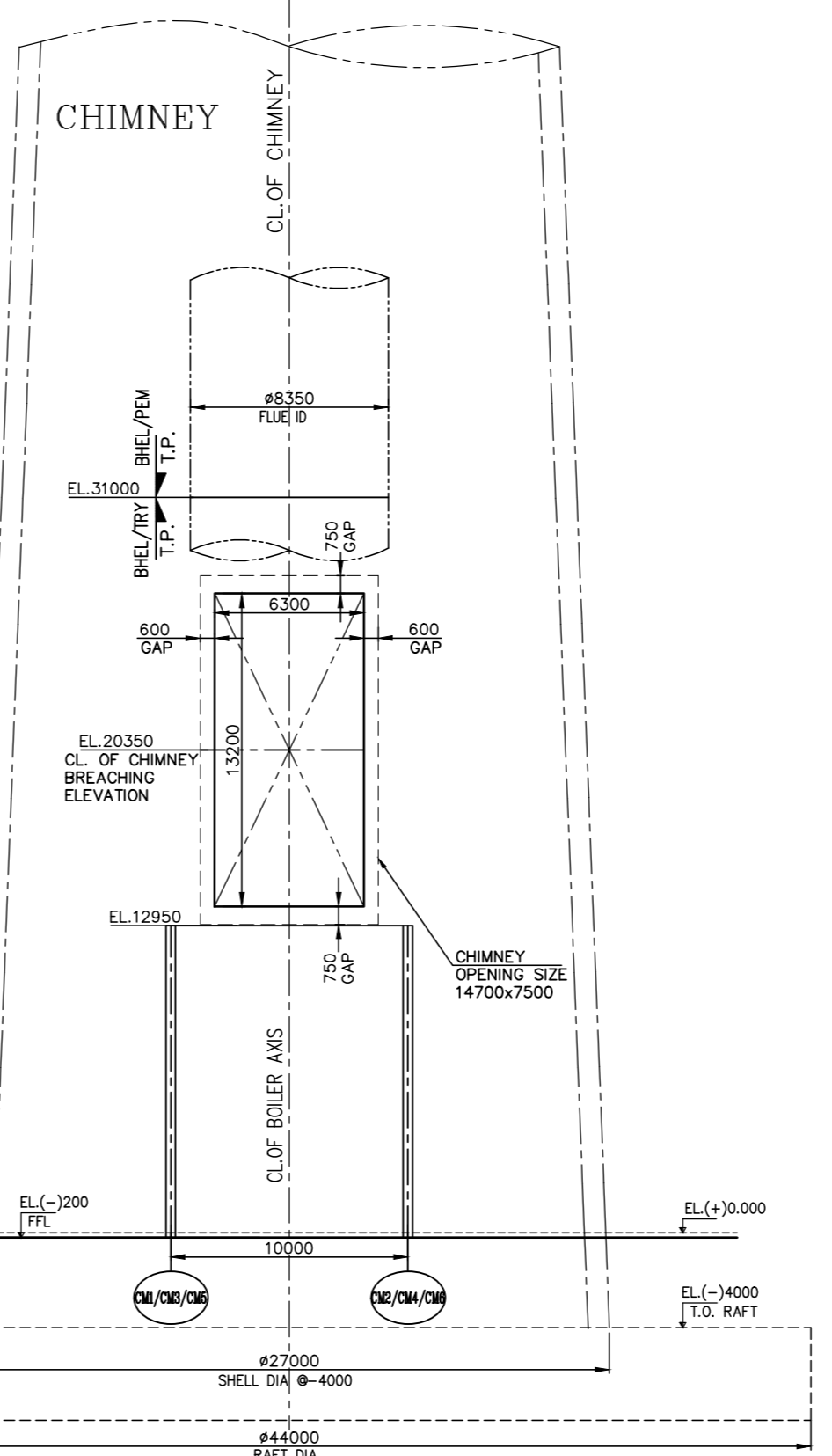
Please mention width of staircase

Clear approach width/height between ESP & ID fan to be maintained at 10m minimum (Height=8m)

The information on this document is property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.



BHEL to ensure compliance to following technical specification requirements:
1) ID system ducts must be modelled in 3D modelling software as per clause 4.08.00, Sub-Section-1, Part-A, Section-VI and clause 8.03.04, Part-C, Section-VI of contract documents
2. As per Clause 1.03.00, SUB SECTION- C-03 (Equipment layout):
a) Sub Clause 11. Clear approach width/height between Boiler & ESP:12m minimum (Height=8m)
b) Sub Clause 11. Clear approach width/height between ESP & ID Fan:10m minimum (Height=8m)
c) Sub Clause 8. Minimum clear working space around the equipment: 1200mm
d) Sub Clause 10. Minimum width of all staircase: 1200mm
e) Sub Clause 15. Clear head room for personal movement at ground level of Boiler below ducts: 2.5m(Minimum)
f) Sub Clause 16. Clear head room for personal movement over all Boiler Platforms: 2.1m (Minimum)
g) Sub Clause 21. Minimum straight length in flue Gas duct at ESP outlet for Opacity meters. As required for accurate dust measurement within the battery limits.
h) Sub Clause 56. De-NOx System shall be located in boiler area.
Refer G-03-Part-B of Tech Spec, consider the following accordingly:
(1) As per clause 1.08.00, Bottom flange level of Air-Preheaters (Both Primary and Secondary) hoppers and additional hoppers (if any) shall be fixed based on each evacuation system as offered by the bidder taking care of clear height requirement between Boiler & ESP and considering unobstructed route for Fly Ash conveying pipes avoiding vertical bends.
(2) As per clause 1.05.00, Drain network shall be provided to collect effluent generated from floor wash, equipment drain and process drain in Boiler/Mill Bay/TP/ESP areas for further disposal upto final disposal point. Underground pipes for this purpose shall not be acceptable.



NOTES:

- 1. ALL ELEVATIONS ARE WITH RESPECT TO EL (+)10.00m, FINISHED GROUND FLOOR LEVEL OF BUILDING AND MILL BAY, WHICH CORRESPONDS TO RL(+144.50M) FINISHED GROUND FLOOR LEVEL (PAVING LEVEL) OF MILL BAY AND ESP AREAS ARE AT (-)0.200m, WHICH CORRESPONDS TO RL(+144.30M, FINISHED GROUND FLOOR LEVEL (PAVING LEVEL) OF MILL BAY AND CHIMNEY AREA(INSIDE) ARE AT (+)0.000m, WHICH CORRESPONDS TO RL(+144.50M.
2. AD - ACCESS DOOR SIZE = 450x450 mm, UNLESS SPECIFIED.
3. ALL THE DUCT SIZES ARE TO INSIDE ONLY UNLESS SPECIFIED.
4. ALL INNER CORNERS OF DUCT TURNINGS ARE 600 MM RADIUS UNLESS NOTED.
5. THE ACCESS DOORS ARE LOCATED 600 MM FROM EDGE OF DAMPER, DUCT & EXP. JOINT AS SHOWN, SUITABLY ERECTED ACCORDING TO FLOOR PLAN
6. ALL PLATFORM ELEVATIONS ARE TO TOP OF GRATING, UNLESS NOTED.
7. CENTERLINE OF ALL DUCT ACCESS DOORS TO BE LOCATED 600MM ABOVE BOTTOM INSIDE OF DUCT PLATES UNLESS NOTED.
8. ALL GATES ARE PROVIDED WITH FLOOR AT BOTTOM OF DUCT. THE APPROACH FOR ACTUATORS & ALLIED ITEMS WILL BE PROVIDED BY INTEGRAL PLATFORM & STAIRCASE AS PART OF GATES.
9. ALL SIZES AND DIMENSIONS SHOWN ARE IN MILLIMETERS.
10. FOR ALL OTHER INFORMATION & DIMENSIONS, SEE REFERENCE DRAWINGS.
11. DOOR ONLY FOR VISUAL INSPECTION PURPOSE. INSTALL SAFETY BAR TO PREVENT PERSONNEL ENTRY.

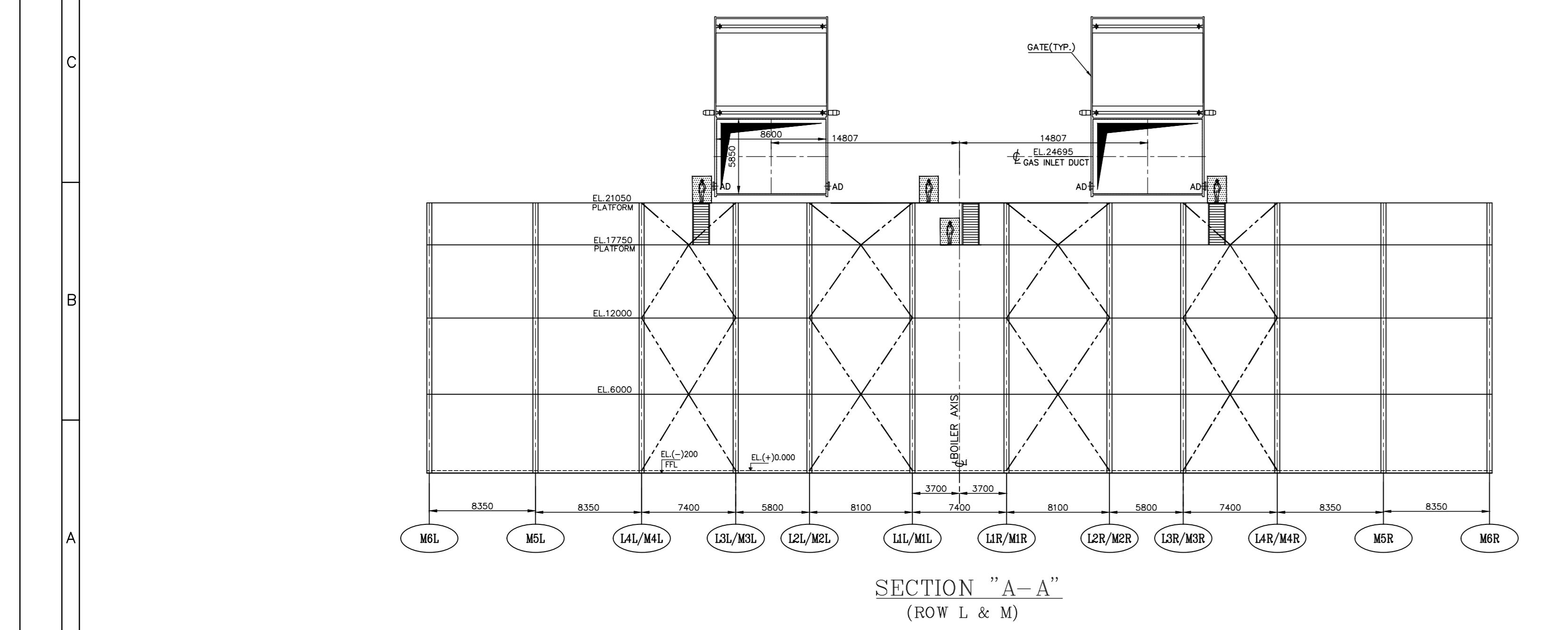
LEGEND:

- LOS - LUBE OIL SYSTEM
VA - VERTICAL LAZARER
TYP - TYPICAL
ESP - ELECTROSTATIC PRECIPITATOR
T.P. - TERMINAL POINT
AD - ACCESS DOOR

REFERENCE DRGS:

- 1. THIS DRAWING IS TO BE READ ALONG WITH 'LAYOUT OF ID SYSTEM-PLAN'- BHEL DRG. NO. 0-00-020-78519/ CUSTOMER DRG. NO. 9662-001-102-PVM-B-444.
2. REFER GA DRG. NO. 0-00-022-7851/ NTPC DRG. NO. 9662-001-102-PVM-B-012 FOR BOILER PARAMETERS, LEGEND, NOTES, REFERENCE DRGS. & UNIT DESCRIPTION.

DESCRIPTION	BHEL DRAWING NO.	CUSTOMER DRAWING NO.
GA OF BOILER SECTIONAL SIDE ELEVATION - SECTION 'E-E'	0-00-022-78511	9662-001-102-PVM-B-012
GENERAL ARRGT. OF BOILER SECTIONAL PLAN-SECTION 'A-A'	0-00-022-78512	9662-001-102-PVM-B-007
GENERAL ARRGT. OF BOILER SECTIONAL PLAN-SECTION 'B-B'	0-00-022-78513	9662-001-102-PVM-B-008A
LAYOUT OF FLUE GAS DUCTING - GAS DUCT FROM AIRHEATER	0-00-020-78530	9662-001-102-PVM-F-028
GA OF ESP INCLUDING PLATFORM & STAIRCASE	0-00-111-89418	9662-001-104-PVM-B-001
GA DRAWING FOR ID FAN WITH FOUNDATION PLAN AND LOADING DETAILS	1-00-099-29584	9662-001-102-PVM-B-018
GA OF CHIMNEY	PE-06-526-620-C001	9662-001-317-PVC-B-009
PLOT PLAN	PE-06-526-100-M001	9662-001-301-POC-F-001
LAYOUT OF ID SYSTEM-PLAN	0-00-020-78519	9662-001-102-PVM-B-444
GA OF GATES AND DAMPERS	---	9662-001-102-PVM-B-014



CUSTOMER No.:1861

CUSTOMER DRAWING NO. 9662-001-102-PVM-B-013

OWNER THE SINGARENI COLLIERIES COMPANY LTD. (A Government Company) POWER PROJECT DIVISION

CONSULTANT N T P C LIMITED (A Government of India Enterprise) CONSULTANCY WING

JOB NO. 526 PROJECT SINGARENI THERMAL POWER PROJECT STAGE-II (1X800 MW)

STATUS CONTRACT DISTRIBUTION

CONTRACTOR BHARAT HEAVY ELECTRICALS LTD DEPT. CODE NAME SIGN DATE

TRUOHIRAPALLI-INDIA-620014 BOILER PLANT UNIT; TRUOHIRAPALLI-INDIA-620014 EQUIPMENT - STEAM GENERATOR

TITLE LAYOUT OF ID SYSTEM-ELEVATION

DEPT. SCALE: 1:275 BHEL DRAWING NO. 0-00-020-78518

SIGN SHEET 1 OF 1 REV. 00

FORMAT SIZE A0

CORPORATE DRG ID:TP-DG-0-00-020-78519/00



A Maharatna Company

एन टी पी सी लिमिटेड

(भारत सरकार का उद्यम)

NTPC Limited

(A Govt. of India Enterprise)


(Formerly National Thermal Power Corporation Ltd.)

(केंद्रीय कार्यालय नोएडा)

Corporate Center NOIDA

Reference : CC-ENGG-9662-001-102-PVM-B-444

Date : 12/11/2025

From : MANPAL SHARMA DY. GENERAL MANAGER	To : BHEL DELHI SIRIFORT, BHEL HOUSE,P.S.PROJECT MANAGEMENT GRP BHEL NEW DELHI 110049
Cc : NKALITA@BHEL.IN	
Subject : EPC PKG Please find enclosed following drawings/ documents for necessary action at your end.	
Vendor Drg. No. : BCR_0768 Orgn. Drg. No. : 9662-001-102-PVM-B-444 Revision No. : 00 Drg. Title : GEN. ARRGT ID SYSTEM-PLAN App. Category : CAT-II Release Date : 12/11/2025	 Scan to verify
Comments : Comply CRS with Comments Marked. 3D modeling and CFD analysis report are essential	



Engineering Division
ISO 9001:2008 Certified



अभियंत्रिकी कार्यालय परिसर, प्लॉट नं.- ए 8ए, सेक्टर-24, पोस्ट बॉक्स नं.- 13, नोएडा (उ प्र) पिन-201 307
टेलिफोन नं.- 0120-2410333, 2410116 फेक्स-0120-2410136, 2410137

पंजीकृत कार्यालय: एनटीपीसी भवन, स्कोप कॉम्प्लेक्स, 7 इंस्टीट्यूशनल एरिया, लोधी रोड, नई दिल्ली-110 003

टेलिफोन नं.- 011-24361018 फेक्स-011-24361018, वेबसाइट: www.ntpc.co.in

ENGINEERING OFFICE COMPLEX, Plot No: A-SA, Sector-24, Post Box No: 13, Noida (UP), Pin-201 307


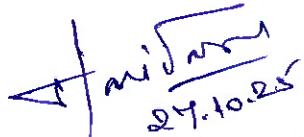
Telephone No: 0120-2410333, 2410116 Fax-0120-2410136, 2410137

Registered Office: NTPC Bhawan, Scope Complex, 7 Institutional Area, Lodhi Road, New Delhi-110 003

Telephone No: 011 24360100 Fax: 011 24361018, Website: www.ntpc.co.in

Moyel Shan

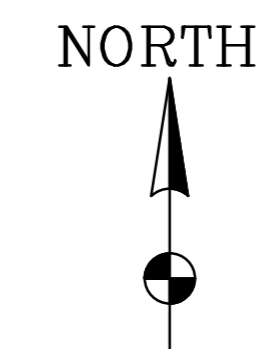
**ENDORSEMENT SHEET FOR DATASHEET/ GA/ SCHEME/ TYPE TEST APPROVAL
REFERENCE DATASHEET/ GA/ SCHEME/ TYPE TEST REPORT (DS/ GA/ SC/ TTR)**

TO BE FILLED IN BY SUPPLIER AT TIME OF SUBMISSION		To be filled in by NTPC	
PROJECT NAME	SINGARENI THERMAL POWER PROJECT STAGE-II-1x800 MW, SCCL SINGARENI	REVIEW & ENDORSEMENT BY NTPC PROJECT SPECIFIC DOCUMENT NUMBER ALLOTTED	DOC NO.:
CONTRACT NO	-	REV. NO.:	DATE:
CONTRACT NAME	EPC PACKAGE	<div style="border: 1px solid orange; padding: 5px;">There is variation in Chimney location wrt mentioned reference drawing.</div>	
MAIN SUPPLIER	HIGH PRESSURE BOILER PLANT, BHEL, TRICHY		
MANUFACTURER WORKS & ADDRESS	HIGH PRESSURE BOILER PLANT, BHEL, TRICHY		
ITEM /EQUIPMENT / SYSTEM/ SUB-SYSTEM DETAILS: MODEL NO/ TYPE SIZE /RATING etc. ANY OTHER IMP PARAMETER	DRG TITLE: LAYOUT OF ID SYSTEM-PLAN/Rev-00 Dt.27/10/2025 CUSTOMER DRG NO: 9662-001-102-PVM-B-444 BHEL DRG NO: 0 00-020-78519	<div style="border: 1px solid green; padding: 5px;">Comply endorsement sheet requirement</div>	
REFERENCE APPROVED DOC NO.:	8003-001-102-PVM-B-444 Dt. 26/06/2025		
Confirmation by Main Supplier (TICK WHICHEVER APPLICABLE)			
I. That the item/ component is identical to that considered for DS/ GA/ SC/ TTR approval. OR		Tick as Applicable	
II. That there are minor changes in the item/ component with respect to that considered for DS/ GA/ SC/ TTR approval, however the same change do not affect the contents of DS/ GA/ SC/ TTR. <input checked="" type="checkbox"/> OR		The DATASHEET/ GA/ SCHEME/ TYPE TEST is endorsed for this project without any change	
III. That there are minor changes in the item/ component with respect to that considered for DS/ GA/ SC/ TTR approval, however the same affect the DS/ GA/ SC/ TTR slightly, as indicated below / in attached sheet.		The DATASHEET/ GA/ SCHEME/ TYPE TEST is endorsed for this project with changes as indicated	
CHANGES: <ol style="list-style-type: none"> Reference drawing numbers are project specific. Note no.1 is project specific. ESP and its connecting duct are project specific. Chimney and its location are project specific. Hence, duct arrangement from ID fan to chimney is project specific. 		DISTRIBUTION OF ENDORSEMENT OF A) DATASHEET/ GA/ SCHEME/ TYPE TEST: 1. MAIN SUPPLIER 2. MANUFACTURER 3. RIO/ CQA	
<div style="border: 1px dashed green; padding: 5px;">Endorsed drawing of Sipat-III is not yet approved. So, the review shall be done in non-endorsement route, please comply and attach CRS against the comments.</div>			
 M. PRAKASH Manager Layouts / PE (FB) BHEL, TRICHY - 620 014. SIGN with Seal.: (Prepared) DATE:	 M. HARIDASAN Dy. General Manager Product Engineering (FB) BHEL, TRICHY - 620 014 SIGN with Seal.: (Approved) DATE:	NTPC (Reviewed /Approved by/ Date & Seal)	

Duct sizing document is not yet approved. This drawing cannot be reviewed in totality till approval of the same.

In view of this steep upward duct angle the following compliances are essential. 1. BHEL to submit CFD analysis report, show actual ash accumulation rate at varying load in all hoppers. 2. BHEL to submit 3D model for review of layout. Approval of this document is subjected to review and approval of above compliances.

Marked Sheet



Please mention platform width wherever provided

What is basis of duct hopper nos

Provide continuous platform upto top of ESP gate level and for gate actuator/gearbox level with common staircase approach OR provide individual staircase approach till top of all ESP I/L & O/L gates.

Platform & Staircase approach will be provided till actuator level.

CFD, PMT for ducts and ESP to be submitted to finalize the optimum duct layout & substantiate the velocities criteria compliance as per spec requirement at Clause 1.05.14.01, Sub-section A-01, Part-B

Vertical text on the left margin: CUSTOMER HAS CHOSEN... THE INFORMATION ON THIS DOCUMENT IS PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED...

Fold-7

Fold-4

Fold-1

Fold-5

Fold-6

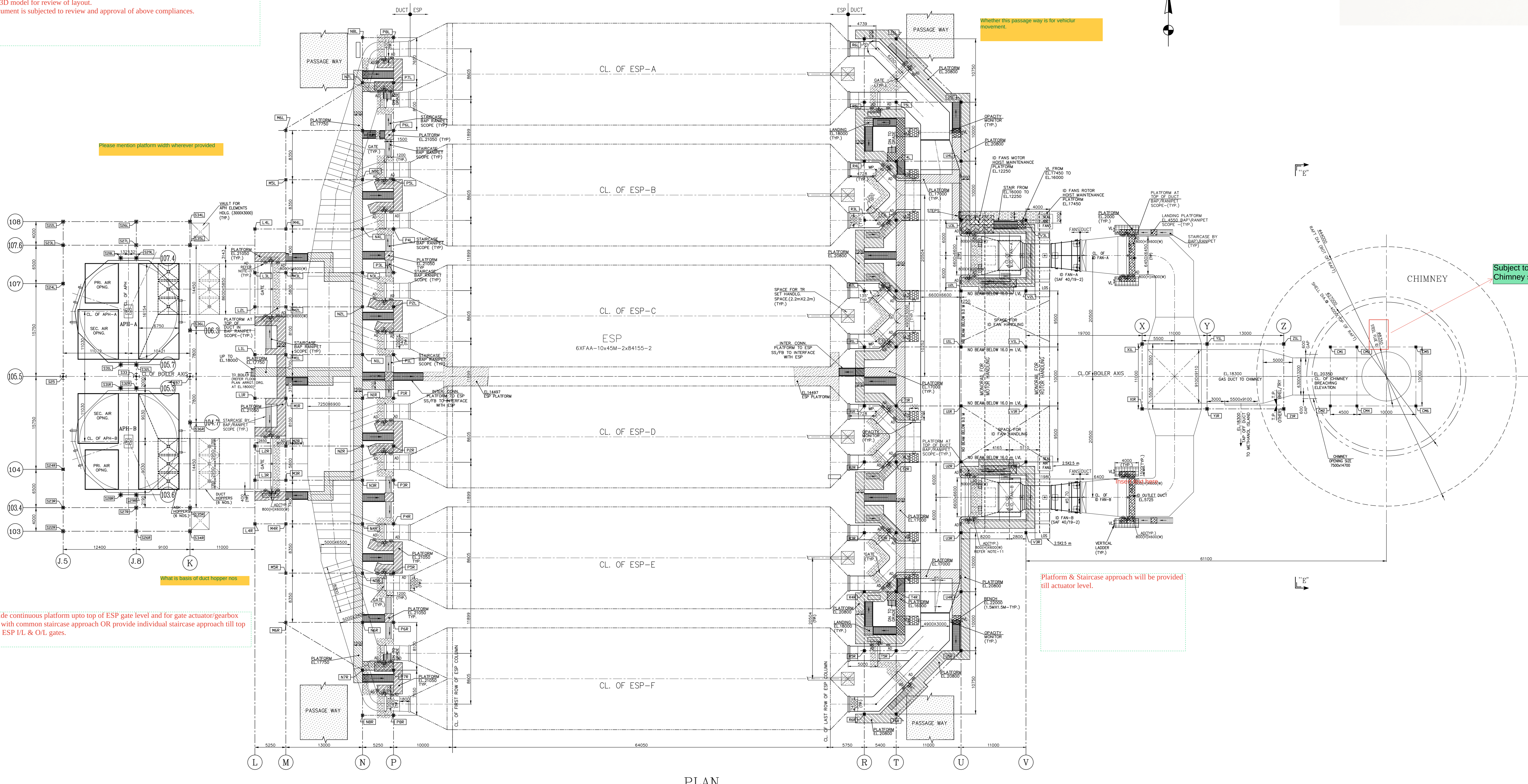
Fold-7

Fold-4

Fold-1

Fold-5

Fold-6



PLAN

NOTES:

- 1. ALL ELEVATIONS ARE WITH RESPECT TO EL. (+)0.00m, FINISHED GROUND FLOOR LEVEL OF TG BUILDING AND MILL BAY, WHICH CORRESPONDS TO RL(+144.50M) FINISHED GROUND FLOOR LEVEL (PAVING LEVEL) OF BOILER AND ESP AREAS ARE AT (-)0.200m, WHICH CORRESPONDS TO RL(+144.30M) FINISHED GROUND FLOOR LEVEL (PAVING LEVEL) OF MILL BAY AND CHIMNEY AREA(INSIDE) ARE AT (+)0.00m, WHICH CORRESPONDS TO RL(+144.50M).
2. AD = ACCESS DOOR SIZE= 450x450 mm, UNLESS SPECIFIED.
3. ALL THE DUCT SIZES ARE TO INSIDE ONLY UNLESS SPECIFIED.
4. ALL INNER CORNERS OF DUCT TURNING ARE 600 MM RADIUS UNLESS NOTED.
5. THE ACCESS DOORS ARE LOCATED 600 MM FROM EDGE OF DAMPER, DUCT & EXP. JOINT AS SHOWN. SUITABLY ERRECTED ACCORDING TO FLOOR PLAN
6. ALL PLATFORM ELEVATIONS ARE TO TOP OF GRATING, UNLESS NOTED.
7. CENTERING OF ALL DUCT ACCESS DOORS TO BE LOCATED 600mm ABOVE BOTTOM INSIDE OF DUCT PLATES UNLESS NOTED.
8. ALL GATES ARE PROVIDED WITH FLOOR AT BOTTOM OF DUCT. THE APPROACH FOR ACTUATORS & ALLIED ITEMS WILL BE PROVIDED BY INTEGRAL PLATFORM & STAIRCASE AS PART OF GATES.
9. ALL SIZES AND DIMENSIONS SHOWN ARE IN MILLIMETERS.
10. FOR ALL OTHER INFORMATION & DIMENSIONS, SEE REFERENCE DRAWINGS.
11. DOOR ONLY FOR VISUAL INSPECTION PURPOSE. INSTALL SAFETY BAR TO PREVENT PERSONNEL ENTRY.

LEGEND:

- LOS - LUBE OIL SYSTEM
VA - VERTICAL LADDER
TYP. - TYPICAL
ESP - ELECTROSTATIC PRECIPITATOR
T.P. - TERMINAL POINT
AD - ACCESS DOOR

REFERENCE DRGS:

- 1. THIS DRAWING IS TO BE READ ALONG WITH 'LAYOUT OF ID SYSTEM-ELEVATION'- BHEL DRG. NO. 0-00-020-78518/ CUSTOMER DRG. NO. 9662-001-102-PVM-B-013.
2. REFER GA DRG. NO. 0-00-022-78517/ NTPC DRG. NO. 9662-001-102-PVM-B-012 FOR BOILER PARAMETERS, LEGEND, NOTES, REFERENCE DRGS. & UNIT DESCRIPTION.
DESCRIPTION BHEL DRAWING NO. CUSTOMER DRAWING NO.
GA OF BOILER SECTIONAL SIDE ELEVATION - SECTION 'E-E' 0-00-022-78511 9662-001-102-PVM-B-012
GENERAL ARRGT. OF BOILER SECTIONAL PLAN-SECTION 'A-A' 0-00-022-78512 9662-001-102-PVM-B-007
GENERAL ARRGT. OF BOILER SECTIONAL PLAN-SECTION 'B-B' 0-00-022-78513 9662-001-102-PVM-B-008A
LAYOUT OF FLUE GAS DUCTING - GAS DUCT FROM AIRHEATER 0-00-020-78530 9662-001-102-PVM-F-012B
GA OF ESP INCLUDING PLATFORM & STAIRCASE 0-00-111-89418 9662-001-104-PVM-B-001
GA DRAWING FOR ID FAN WITH FOUNDATION PLAN AND LOADING DETAILS 1-00-099-29584 9662-001-102-PVM-B-018
GA OF CHIMNEY PE-06-526-620-0201 9662-001-317-PVC-B-029
PLOT PLAN PE-06-526-100-40001 9662-001-301-PCC-F-001
LAYOUT OF ID SYSTEM-ELEVATION 0-00-020-78518 9662-001-102-PVM-B-013
GA OF GATES AND DAMPERS - 9662-001-102-PVM-U-104

Duct sizing is yet to be approved. This document to be submitted after sizing approval.

BHEL to ensure compliance to following technical specification requirements: 1) ID system ducts must be modelled in 3D modelling software as per clause 4.08.00, Sub-Section-1, Part-A, Section-VI and clause 8.03.04, Part-C, Section-VI of contract documents.
2. As per Clause 1.03.00, SUB SECTION- G-03 (Equipment layout):
a) Sub Clause 11. Clear approach width/height between Boiler & ESP-12m minimum (Height=8m)
b) Sub Clause 11. Clear approach width/height between ESP & ID Fan:10m minimum (Height=8m)
c) Sub Clause 8. Minimum clear working space around the equipment: 1200mm
d) Sub Clause 10. Minimum width of all staircase: 1200mm
e) Sub Clause 15. Clear head room for personal movement at ground level of Boiler below ducts: 2.5m (Minimum)
f) Sub Clause 16. Clear head room for personal movement over all Boiler Platforms: 2.1m (Minimum)
g) Sub Clause 21. Minimum straight length in flue gas duct at ESP outlet for Opacity meters :As required for accurate dust measurement within the battery limits.
h) Sub Clause 56. De-NOx System shall be located in boiler area.

Refer G-03 Part-B of Tech Spec. consider the following accordingly: (3)As per clause 1.03.00. Bottom flange level of Air-Preheaters (Both Primary and Secondary) hoppers and additional hoppers (if any) shall be fixed based on ash evacuation system as offered by the bidder taking care of clear height requirement between Boiler & ESP and considering unobstructed route for Fly Ash conveying pipes avoiding vertical bends. (2)As per clause 1.05.00. Drain network shall be provided to collect effluent generated from floor wash, equipment drain and process drain in Boiler/Mill Bay/TP/ESP areas for further disposal upto final disposal point. Underground pipes for this purpose shall not be acceptable.

Customer Drawing No. 9662-001-102-PVM-B-444
Owner: THE SINGARENI COLLIERIES COMPANY LTD. (A Government Company) POWER PROJECT DIVISION
Consultant: N T P C LIMITED (A Government of India Enterprise) CONSULTANCY WING
Job No. 526
Status: CONTRACT
Project: SINGARENI THERMAL POWER PROJECT STAGE-II (1X800 MW)
Contractor: BHARAT HEAVY ELECTRICALS LTD DEPT. CODE: 001 NAME: BHARAT HEAVY ELECTRICALS LTD SIGN: MPRASHASH DATE: 20.10.25
Title: LAYOUT OF ID SYSTEM-PLAN
Scale: 1:275
Drawing No: 0-00-020-78519
Sheet: 1 OF 1
Rev: 00