COMMENT RESOLUTION SHEET									
DESCRIPTION	GENERAL ARRANGEMENET OF ESPs INCLUDING PLATFORM AND STAIRCASE								
BHEL DOCUMENT/DRAWING No.	UKAI-ME-BAP-001								
GSECL/STEAG DOC NO.									
Revision No.	R0	R1	R1	R2	R2	R3	R3		

Sl. No.	GSECL / STEAG Comments (Rev No. 00) DTN/Email Ref : Approval Category : - 3	BHEL's Clarification (Response / Resolution) on Rev. No. 00 BHEL Reference No. and Date : :	GSECL / STEAG Comments/Approval (Rev No. 01) DTN/Email Ref : Nil/16.09.2025 Approval Category : 3	BHEL's Clarification (Response / Resolution) on Rev. No. 01 BHEL Reference No. and Date :	GSECL / STEAG Comments/Approval (Rev No. 02) Date: 15.10.2025 Approval Category: 2	BHEL's Clarification (Response / Resolution) on Rev. No. 02	GSECL / STEAG Comments/Approval (Rev No. 03) Date: Approval Category: 2	BHEL's Clarification (Response / Resolution) on Rev. No. 03	Status (Open/Close)	Remarks (if Any)
1	Please submit the ESP sizing, efficiency and hopper sizing calculation.	Refer Attached Annexure-1.	Noted. Please refer observation on Annexure-1						Closed.	
2	Please submit Boiler predicted performance document for review of ESP Design Data.	ESP design Data is based on internal Inputs from BHEL Trichy.	Noted.						Closed.	
3	Please submit the datasheet of ESP.	Refer Attached Annexure-1.	Please refer our reply in Point No-13.						Closed.	
4	As per contract-Gas distribution system (GDS) complete with turning vanes/deflector plates, flow splitter, guide vanes, perforated plates and all necessary gas flow control devices in the inlet and outlet cones and duct, warranted by the results of the model tests. BHEL to confirm the same and submitt the test report. BHEL shall show the GDS in GAD as the same is not identifiable from the GAD though GD rapping drive is considered at inlet.	Noted and confirmed. BHEL confirms the Gas distribution system arrangement at ESP inlet .	Noted. However these details will be reviwed in detail drawings of ESP.						Closed.	
5	BHEL to confirm the following- Casing Design Pressure-Compatible with furnace design pressure (With two fans operating, it shall be able to meet 120% BMCR flow, at 50 deg C ambient temperature and 47.5 to 52.5 Hz power supply frequency , guaranteed APH leakage worst coal firing.+ 660mmwc at 67% of yield strength.)	ESP casing shall be designed for ± 660 mm wc at 67% yield strength ,as per pre-bid resolution -mechanical. Refer Sl No .188.	Noted.						Closed.	
6	BHEL to submit the P&ID of ESP system showing all instruments and controls.	No P&ID is applicable for ESP since no piping & instrument are applicable for ESP.	Steag/GSECL consider instrument requirement as mentioned in the document Scheme of air & flue gas path with instrumentation. Please submit ESP P&ID taking the following in to account: 1. Gas passes, gates & dampers, fields 2. Overview of instruments of a Pass (typical) (Levels, Heaters, TR sets and connectivity to operating station at control room. 3. Hopper, support and shaft insulator heater 4. Rapper motors 5. TR sets 6. Hopper level instruments and connectivity. 7. Opacity instruments.	The submitted document is ESP General arrangement drawing intended to cover the ESP basic dimension , broader details of associated ESP accessories, Process data and major specification. However, Requested details can be provided later vide P&ID/other relevant documents by concerned BHEL agency as per the applicability.	BHEL to indicate the document number which covers these information as reference document. Please also see whether the same document is covered in MDL.	ESP mounted instruments are indicated in ESP GAD.Wherease, instrument mounted on Flue gaspath shall be referred from the SCHEME OF AIR & FLUE GAS SYSTEM .	Noted		Closed.	
7	BHEL to indicate Casing design pressure and temperature in the document. In this context, please refer Sl. No. 5 and 6 under ESP Parameters (Casing withstand pressure and short-term excursion temperature) which can be modified as design P and T.	Noted .Refer Attached Annexure-1.	Steag/GSECL understand that ESP is capable to withstand the excursion temperature of 300 Deg. C for 30 min interval. BHEL to indicate casing design temperature in the Table also.	Noted and confirmed . Refer page 11 of Attached Annexure - 1. Same was also already available in ESP GA drawing . Refer Drawing Zone J-12.	Noted. Please indicate casing design temperature in the Table titled "ESP PARAMETERS" (refer location J-11/12).	Incorporated in Revised drawing.	BHEL to explain how the design temperature of ESP casing (200 Deg C) can be less than the short excursion temperature of 300 Deg. C for 30 min interval.	There is a boiler Trip Protection in the event of APH out let temperature exceeding 200 Deg. C for more than 15 minutes. Therefore ESP design considering the short excursion temperature of 300 Deg. C for 30 min is adequate	Open	
8	Hopper liners-3mm (min.) SS, for complete hopper. BHEL to comply.	SS 304 lining of 1.6mm thickness will provided for 1.5m height from the bottom of hoppers,as per pre-bid resolution -mechanical. Refer Sl No .179.	Noted.						Closed.	
9	Please include hopper angle in the GAD (Elevation view and view P).	Refer Attached Annexure-1. Same is updated in ESP GA drawing also under "ESP parameters" .	Hopper angle should not be less than 70 Deg and shall be marked in the drawing.	Hopper valley angle of 60° is provided based on prebid resolution .Refer Part-B Pre-bid resolution sl. No184.	Noted				Closed.	
10	BHEL to confirm the following for the entire coal range: i) Design point: Max. 30 mg/Nm3 @ 6% O2 (dry basis) at BMCR WC condition with one field in all passes out of service. ii) Guarantee point : Max. 25 mg/Nm3 @ 6% O2 (dry basis) at TMCR DC with one field in all passes out of service.	Confirmed.	Noted.						Closed.	
11	BHEL to ensure and provide the platform for the high ash level indicator.	Portable Aluminium ladder light weight & easy to transfer two numbers per unit will be provided to approch for ash level indicator -high as per OEM design.	Noted						Closed.	
12	BHEL to indicate the water washing system with associated specialities in the drawing apart from covering the internal scope in Note No. 25.	This will be the part of detail Engineering.	Kindly provide the Detail Drawing No in refernce and mark the Terminal point.	Water washing system arrangement drawing is provided as later stage of contract as Erection drawing during detail engineering , after approval of ESP GA drawing.	Noted, however Mark the drawing number and include in the MDL, if not done.	Water washing system drawing "0-79-966-01796" is submitted as erection drawing for exection purpose at later stage of contract. Generally such non critical detailed drawings are not included in MDL	Noted. BHEL to include the document as part of the erection drawing for record purpose.		Closed.	
13	BHEL to submit the ESP design basis and data sheet covering following details: a) Number of fields b) Separating surface c) Plate spacing d) Number of lanes e) Active length per field f) Active field height g) Cross section (width x height) h) Number of electrically separated fields i) Separation efficiency j) Effective gas velocity k) Migration velocity l) Residence time m) Auxiliary power of ESP n) Specific separation surface o) Resistivity range p) Aspect ratios q) Gas velocity range r) Corona power s) Specific collection area. GAD cannot be cleared/ approved without approval of ESP Design Basis and Data Sheet.	Refer Attached Annexure-1. Some of the details will be covered in other Documents which will be submitted later.	Noted. Kindly provide the other document number in reference.	Corona power and Auxiliary power of ESP included in total Guaranteed Auxiliary power of BTG, being EPC package for BHEL. Therefore, individual ESP APC breakup cannot be provided.	Clarification is not acceptable. Please comply to comment dated 16.09.2025 and submit balance information/ data which are not covered in Annexure-1.	Calculated Corona power for ESP is 7900KVA (Approx).	BHEL to specify the document title with document number where the total breakup of APC will be recorded.	Breakup of ESP APC is not available in any MDL . However, BHEL confirms that the mentioned corona power for ESP is as per OEM standard design calculation.	Open	
14	BHEL to indicate the plant north in the drawing.	Updated in Rev 01 Drawing.	Noted						Closed.	
15	BHEL to mark ESP Level with respect to plant FFL (±) 0.00 which corresponds to RL +82.2m. Put a Note on FFL of site. Also, include levels in line with the site FFL in Detail B (D-%).	Refer Note no. 03 updated in Rev01 drawing.	Noted						Closed.	
16	Please submit the Functional Writeup of ESP in reference to equipment/item/instrument Nos. as per P&IDs.	No P&ID is applicable for ESP since no piping & instrument are applicable for ESP.	Please refer our reply in Point No-6. Also indicate drawing no. for control/Functional writeup of ESP.	These details shall be covered in ESP O&M manual (MDL no. UKAI - ME– BAP – 009) which will be submitted at later stage of contract.	Noted				Closed.	
17	Refer Key Plan- Please mark two inlet/outlet per pass.	Updated in Rev 01 Drawing.	Noted						Closed.	
18	Please mark co-ordinates (as per Plot Plan) at Pass A gas entry side outer column and Pass F gas exit side outer column.	Refer Plot Plan submitted By BHEL-PEM. Co-ordinated will be updated later .	Please provide co-ordinates as commented.	ESP co-ordinates is decided and arrived by BHEL-PEM based on their final plot plan arrangements. Therefore, we are now, not in position to submit the same. However, you are requested to refer the Plot Plan submitted by BHEL-PEM for ESP co-ordinates.	PI incorprate the same here also. Location of ESP with Centerline is fixed, there is no scope for revision. Also, if it may change then RPT has to revise the drawing accordingly.	Incorporated in Revised drawing.	Noted		Closed.	
19	Refer RHS Top of Drawing - PR:QA:590 is referred for painting. Please submit a separate paint standard for ESP items inclusing structures.	These are internal Reference no. However, Customer/Consultant is requested to refer the Quality MDL .	Please indicate the drawing no. in reference which covers painting of ESP items.	Please refer the MDL no. "RPT-QM-1588-PS-001". Which will be submitted by Qulity department later.	Noted, however Mark the drawing number.	Drawing no. "RPT-QM-1588-PS-001".	Noted		Closed.	
20	Though covered in Note 20, hopper heaters are not marked on the hopper in the drawing. Please do the needful.	Heaters will be shown in detailed drawing of hopper after placement of PO on vendor & vendor design.	Noted.						Closed.	
21	ESP Deasign Data - MW capacity under BMCR WC shall be 840MW instead 800MW . Please also validate gas data, ash load data with respect to coal analyses (WC for BMCR and DC for Guarantee/ TMCR), APH and duct infiltration (15%, 2% etc.) as indicated in the specification.	To avoid the confusion between MW capacity and BMCR , same has been deleted. Noted and confirmed.	Noted.						Closed.	
22	Refer Sl. No. 8 in ESP DESIGN DATA Table- Please delete the word "series" from description i.e. modified description shall be "Number of Electrical Fields out of Operation".	Updated in Rev 01 Drawing.	Noted						Closed.	
23	This is noted that ESP is provided with 10 fields which appears higher. Please check the possibility of 9 fields within the boundary limit of specification (coal analysis, Xs air, APH & Duct infiltration).	10 field is required.	Please check the dust concentration of ash at ESP inlet (91.4 g/Nm3 at BMCR WC, dry basis) which appears high. Also, indicate the wet basis (actual) data and review field requirement, reconfirm.				Reply is pending from BHEL	We have checked and confirmed from Our Boiler process group that values of dust concentration of ash at ESP inlet (91.4 g/Nm3 at BMCR WC, dry basis) are in order . Both Dry and wet values has been already mentioned in the submitted document (annexure-1) and considered for ESP sizing .	Open	
24	PI mark the dimension	Marked in Rev01.	Noted						Closed.	

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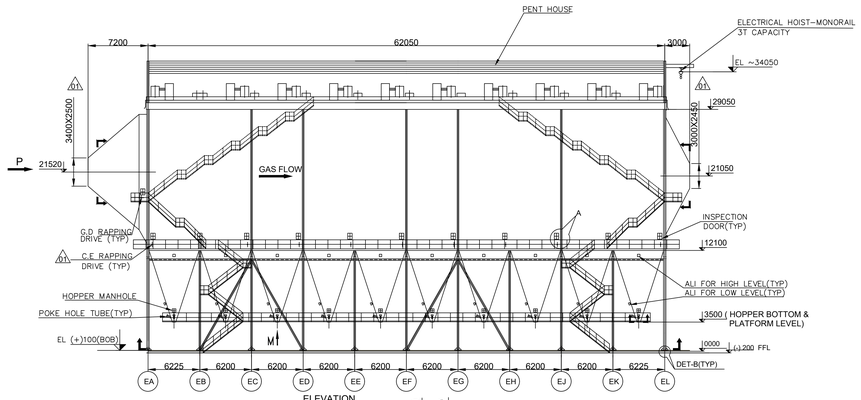
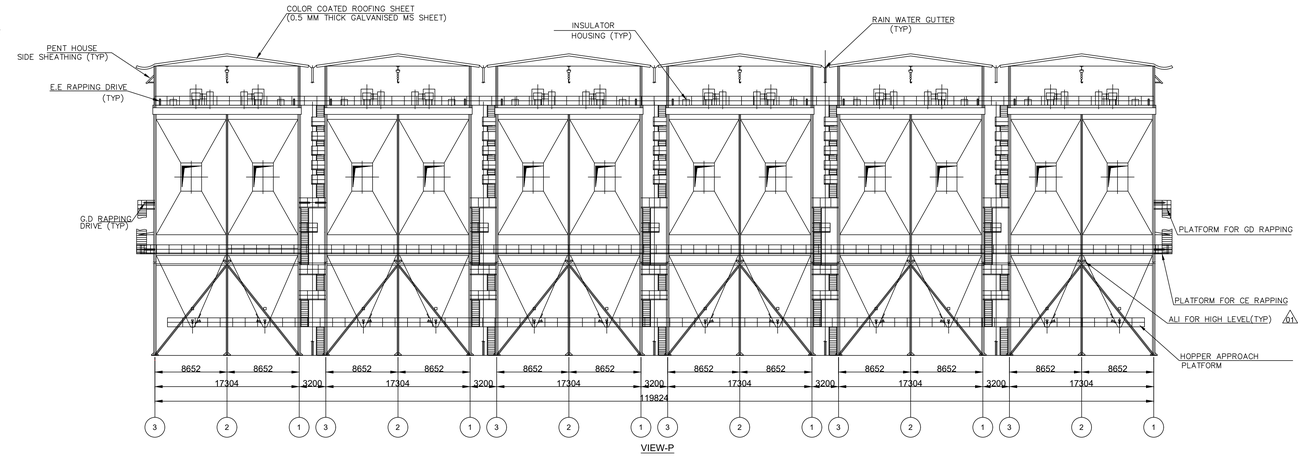
GSECL/STEAG DOC NO.										
Revision No.	R0	R1	R1	R2	R2	R3	R3			
Sl. No.	GSECL / STEAG Comments (Rev No. 00) DTN/Email Ref : Approval Category : - 3	BHEL's Clarification (Response / Resolution) on Rev. No. 00 BHEL Reference No. and Date :	GSECL / STEAG Comments/Approval (Rev No. 01) DTN/Email Ref : Nil/16.09.2025 Approval Category : 3	BHEL's Clarification (Response / Resolution) on Rev. No. 01 BHEL Reference No. and Date :	GSECL / STEAG Comments/Approval (Rev No. 02) Date: 15.10.2025 Approval Category: 2	BHEL's Clarification (Response / Resolution) on Rev. No. 02	GSECL / STEAG Comments/Approval (Rev No. 03) Date: Approval Category: 2	BHEL's Clarification (Response / Resolution) on Rev. No. 03	Status (Open/Close)	Remarks (if Any)
25	Mark Top of pent house	This will be the part of detail Engineering.	Please indicate the detail drawing number in Reference				Noted		Closed.	
26	Where is the equipment?	Updated In Rev01 Drawing.	Noted						Closed.	
27	Pl mark BoB & EoH	Updated In Rev01 Drawing.	Noted						Closed.	
28	Pl mark the dimension	Marked in Rev01.	Noted						Closed.	
29	Color code shall be matched with Boiler roofing sheet.	Noted & confirmed.	Noted, However same shall be put in Note				Noted		Closed.	
30	Indicate the plant NORTH	Updated In Rev01.	Noted						Closed.	
31	Monorail arrangement shall also be possible to lower the TR sets down to the ground level and / or on to a truck. Kindly confirm.	Confirmed.	Noted						Closed.	
32	ALI for High Level (TYP)	Updated In Rev01.	Noted						Closed.	
33	6 mm	5 mm to be considered as per Pre-bid clarification.Refer Sl. No. 189, page Page 23 of 291.	Noted						Closed.	
34	Color shall be matching with boiler sheet	Noted & Confirmed.	Noted, However same shall be put in Note	Noted and Incoporated in revised ESP GA drawing Rev02(Refer Note Sl. No.27).	Noted				Closed.	
35	As per specification minimum width 1200 mm	As per Contract ,width of staircase shall be 1000 mm .	Refer Lead Technical spec Vol-II, Sec-2, Cl 9.02.24 pg no 107: It should be 1200 mm minimum	Noted and Incoporated in revised ESP GA drawing Rev02.	Noted				Closed.	
36	Design Margin ??	Refer Attached Annexure-1 for Hopper size Calculation.	Noted.						Closed.	
37	PL elaborate the Guarantee and design point consideration	This is as per Amendment Sl. No. M-11 , Page 4 of 57.	Noted.						Closed.	
38	with one field out of service in all passes	Updated In Rev01.	Noted						Closed.	
39	Kindly submit the design basis report for the system, before submission of the document.	Refer Attached Annexure-1.	What about electrical TR set sizing calculation?	Pl refer the revised Attached Annexure-1.	Noted. However, TR set kVA calculation to be furnished. 10% margin shall also be considered for sizing TR set secondary current rating.	Based on the ESP TR set calculation, already provided in Annexure-1, 95 KV /1000mA TR set has been provided. Secondary current rating of 1000mA is provided against the requiremnt of 873 mA.For the 95KV/1000mA set the KVA rating of the transformer is approximately 100KVA.	Noted		Closed.	
40	pl mark the Inspection door.	Hopper Manhole is already marked in elevation View , refer Drawing Zone "C-2"	Pl show in section P-P also	Already shown in Q-Q view.	Noted				Closed.	
41	Pl mark fire hydrant point at to extreme end of ESP	This is not in the scope of ESP Drawing .	Kindly furnish the reference drawing in list	Fire Fighting system layout for plant will be finilised by other BHEL agency at later stage of contract .	Noted				Closed.	
42	Pl mark the location of service water terminal valve for ESP water washing.	Terminal point for service water supply is near first row of ESP columns for ESP washing for each boiler.	Pl mark in the drawing with Note	Updated in Revised ESP GA drawing Rev02. Refer Drawing zone D-2.	Noted				Closed.	
43	transformer handling details view "A" for ESP top shall be shown separately for better clarity.	This will be the part of detail Engineering.	Plz indicate the detail drawing number in Reference	This will be prepared at later stage during detail engineering and released as erection drawing.	Noted, however Mark the drawing number.	Drawing no. is"0-79-966-01796".	Noted. BHEL to include the document as part of the erection drawing for record purpose.		Closed.	
44	Pl mention Typ Handrail surrounding all platforms	updated in Rev01. Refer Note no. 25.	Noted						Closed.	
45	Comments for Annexure-1		Refer 1.2 FLUE GAS CRITERIA AT ESP INLET: Please remove the term series from sl. No. 7	Incorpoted in Revised Annexure.	Noted				Closed.	
47	Comments for Annexure-1		Refer IV Hopper Sizing Calculation Sl. No.1 Amount of Dust Collected into the 1st field each hopper of ESPs, kg/Bhr=((91.4*845.6*3600*0.705/1000)/12)*8= 130771 kg/h (against indicated value of 112886 kg/h. Please check and clarify/ validate.	Inlet dust burden considered for calculating the Ash quantity should be on the wet basis.IDB (wet) for the design basis is updated in section 1.2 FLUE GAS CRITERIA AT ESP INLET in revised document.	1. Wet-basis ash concentration at ESP inlet (78.9 g/Nm3) is acceptable. 2. This is noted that BHEL removed the previous dry-basis data (91.4 g/Nm3). On review, 91.4 (dr-basis) is comparatively higher and shall be ~89. BHEL shall check the dry-basis data (91.4 g/Nm3) and may retain in the document. Based on 1 and 2 above, this point is force-closed.			Closed.	

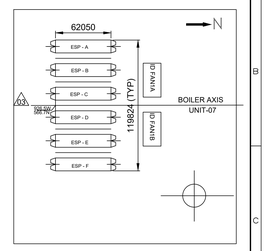
All dimensions are in millimetres



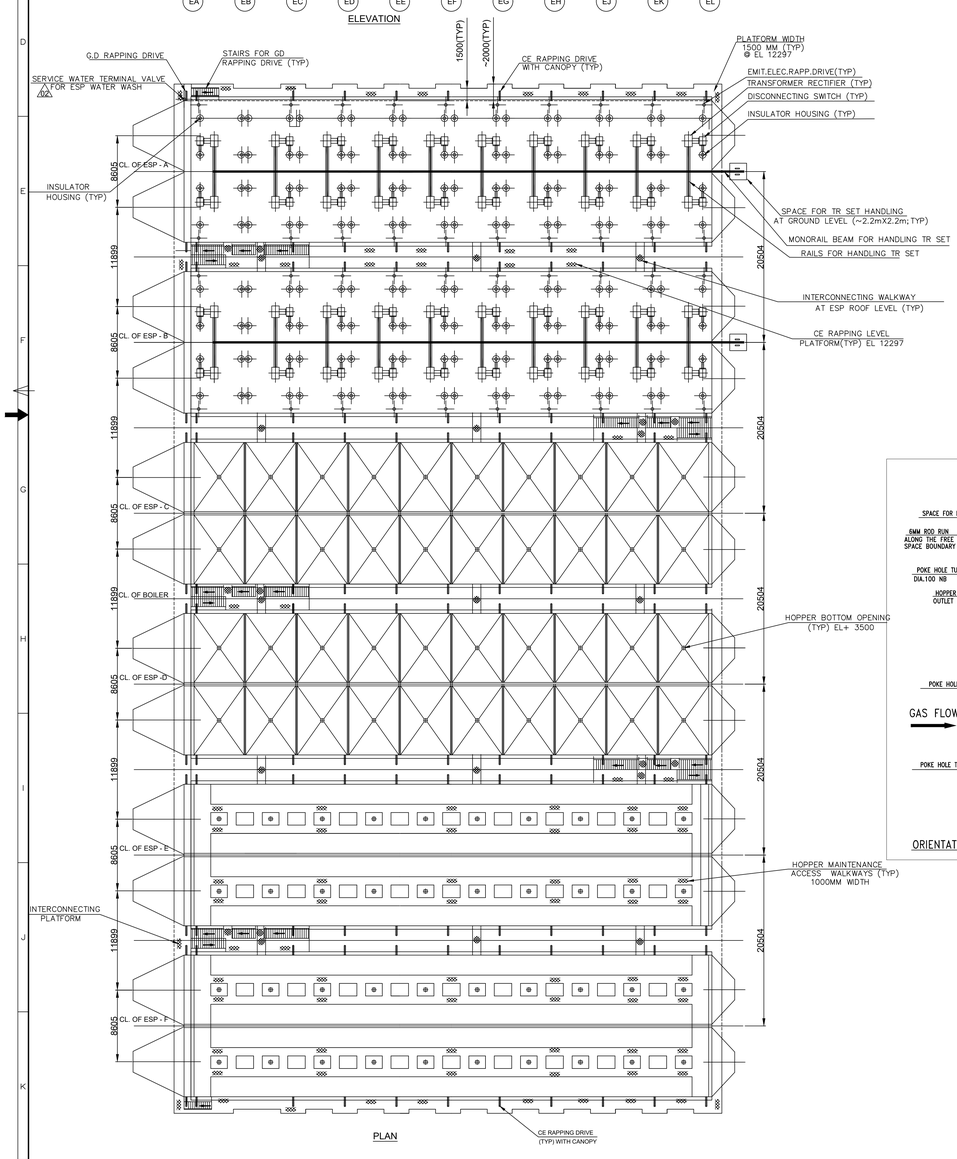
ELEVATION



VIEW-P



KEY PLAN

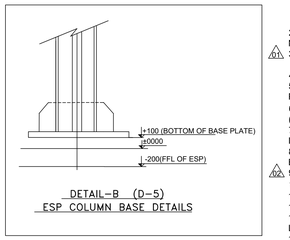


PLAN

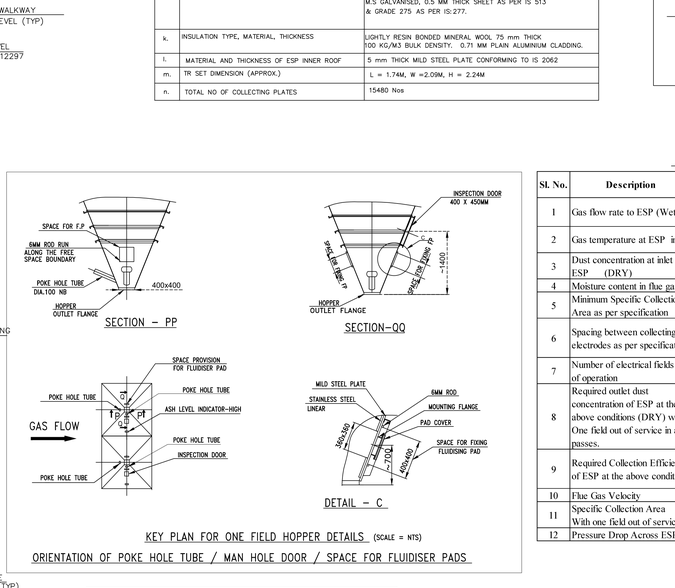
PLAN SHOWN AT ROOF(EL 29050) / HOPPER BREAKLINE(EL 12100) / HOPPER BOTTOM LEVEL(EL 3500)

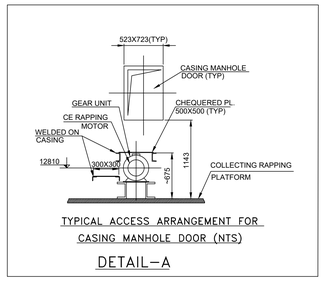
SALIENT DATA:

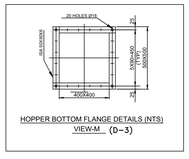
SL No.	DESCRIPTION	
a.	NO.OF TRANSFORMER RECTIFIER (TR) SET PER BOILER	120 , TR set Rating : 95 KV (p) /1000 mA(mean)
b.	WEIGHT OF EACH TR SET	1950 Kg approx.
c.	WEIGHT OF EACH CE RAPPING MOTOR	175 Kg approx.
d.	WEIGHT OF EACH EE RAPPING MOTOR	100 Kg approx.
e.	MATERIAL AND THICKNESS OF COLLECTING ELECTRODE.	1.25 mm THICK MILD STEEL. MATERIAL : IS513 DD
f.	MATERIAL AND THICKNESS OF EMITTING ELECTRODE.	2.7 mm DIA STAINLESS STEEL WIRE CONFORMING TO GARBA 904L (or) 2 RK 66 (or) UNS N 08904 (EQUIVALENT TO UHB 904L).
g.	MATERIAL AND THICKNESS OF ESP CASING, FUNNEL	5 mm THICK MILD STEEL PLATE CONFORMING TO IS 2062 E250 GR A
h.	MATERIAL AND THICKNESS OF ESP HOPPER	5 mm THICK MILD STEEL PLATE CONFORMING TO IS 2062 E250 GR A
i.	MATERIAL AND THICKNESS OF ESP HOPPER LINING	1.6mm CONFORMING TO SS 304 (LINING UPTO 1.5 METER HEIGHT FROM HOPPER BOTTOM)
j.	ESP PENT HOUSE ROOF SHEET & THICKNESS	SINGLE TROUGHED PROFILE, PERMANENTLY COLOR COATED M.S GALVANISED, 0.5 MM THICK SHEET AS PER IS 513 & GRADE 275 AS PER IS:277.
k.	INSULATION TYPE, MATERIAL, THICKNESS	LIGHTLY RESIN BONDED MINERAL WOOL 75 mm THICK 100 KG/M3 BULK DENSITY. 0.71 MM PLAIN ALUMINIUM CLADDING.
l.	MATERIAL AND THICKNESS OF ESP INNER ROOF	5 mm THICK MILD STEEL PLATE CONFORMING TO IS 2062
m.	TR SET DIMENSION (APPROX.)	L = 1.74M, W =2.09M, H = 2.24M
n.	TOTAL NO OF COLLECTING PLATES	15480 Nos



DETAIL-B (D-5)
ESP COLUMN BASE DETAILS





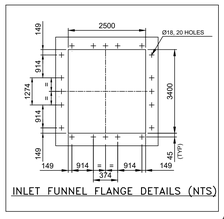


ESP DESIGN DATA

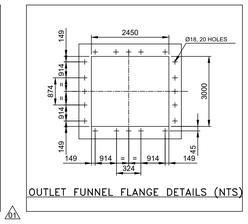
Sl. No.	Description	Unit	Guaarantee point TMCR WC	Design Point BMCR WC
1	Gas flow rate to ESP (Wet)	m^3/s	1150	1327
		Nm^3/sec	756	845.6
2	Gas temperature at ESP inlet	°C	133	140
3	Dust concentration at inlet of ESP (DRY)	gm/Nm^3	76.8	91.4
4	Moisture content in flue gas	% (Wt)	6.306	7.101
5	Minimum Specific Collection Area as per specification	$m^2/m^3/s$	180	-
6	Spacing between collecting electrodes as per specification	mm	400	400
7	Number of electrical fields out of operation	-	One	One
8	Required outlet dust concentration of ESP at the above conditions (DRY) with One field out of service in all passes.	mg/Nm^3	25	30
9	Required Collection Efficiency of ESP at the above conditions	%	99.967	99.967
10	Flue Gas Velocity	m/s	0.69	0.8
11	Specific Collection Area With one field out of service	$m^2/m^3/s$	292.867	253.8
12	Pressure Drop Across ESP	mmWC	25 (max)	

ESP PARAMETERS:

Sl. no.	Parameters	Values
1	Hopper valley angle	> 60.0 °
2	Hopper Plate thickness (in mm)	5 mm
3	No. of Hopper Per Boiler	120
4	Casing Thickness (in mm)	5
5	Casing Withstand pressure	660 mmWC at 67% yield strength
6	Short Term Excursion Temperature & Time	300 Deg C for 30 minutes
7	Pressure Drop Across ESP (mmwc)	25 (max)
8	Ash Density for Hopper Volume (kg/m3)	800
9	Ash Density for Hopper Strength (kg/m3)	1600
10	Casing design temp	200 deg C



INLET FUNNEL FLANGE DETAILS (NTS)



OUTLET FUNNEL FLANGE DETAILS (NTS)

NOTES:-

1. [ ] INDICATES BHEL/RANIPET SCOPE OF SUPPLY
   BOB - BOTTOM OF BASE PLATE
   TOF - TOP OF FLOOR GRILL
2. ESP SIZE: 6XFAA-10X45M-2X84165-2 (ALL FIELDS WITH 400MM PITCH).
   NO. OF ESP/BOILER = 1 HAVING 6 PASSES.
3. ELEVATION ±0.000 M CORRESPONDS TO FINISHED FLOOR LEVEL OF TG BUILDING / MILL BUILDING (WHERE APPLICABLE) = RL 82.2 m (w.r.t MSL)
4. (+) 100 mm LEVEL CORRESPONDS TO ESP COLUMN BASE PLATE BOTTOM LEVEL.
5. APPROACH FOR CASING 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.
6. 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.
7. THE PLATFORM WIDTH SHALL BE 1500 MM ALL AROUND ALL ESP PASSES AT COLLECTING ELECTRODE RAPPING PLATFORM AND INTERCONNECTING PLATFORM AT ROOF
8. THE PLATFORM WIDTH SHALL BE 1000 MM AT LEVEL +3500 AROUND ESP HOPPER. MINIMUM 2.0 M WIDE PLATFORMS SHALL BE PROVIDED BETWEEN THE TWO CASINGS OF THE ESPS TO FACILITATE MAINTENANCE AT CE LEVEL.
9. ALL STAIRS ARE OF 1200 mm WIDTH(min).
10. REQUIRED ASH STORAGE CAPACITY FOR 8.0 Hrs IS PROVIDED IN VOLUME OF HOPPERS.
11. ALL GRATINGS, STEP TREADS & HAND RAILS ARE HOT DIP GALVANISED.
12. 3 NOS. OF STAIRCASE AT BOILER SIDE AND 2 NOS. OF STAIRCASE AT CHIMNEY SIDE OF ESP FOR EACH UNIT WILL BE PROVIDED
13. PORTABLE ALUMINUM LADDER LIGHT WEIGHT & EASY TO TRANSFER TWO NUMBERS PER UNIT WILL BE PROVIDED TO APPROACH FOR ASH LEVEL INDICATOR-HIGH.
14. OIL DRAIN PIPES (ERW PIPE) SHALL BE PROVIDED UPTO 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 PGMA 7X-X61 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 BY TRICHY.
17. 06 (SIX) NOs. OF OPACITY MONITORS PER BOILER (SUPPLIED IN ESP SCOPE UNDER PGMA 7X-X74) 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 PANEL TYPE HEATERS.
21. EACH HOPPER IS PROVIDED WITH TWO NUMBERS OF ASH LEVEL INDICATORS (ALI) (ie ONE NO. FOR LOW LEVEL INDICATION AND ONE NO. FOR HIGH LEVEL.
22. INSTALLATION OF FLUIDISER PADS IN THE HOPPERS (AS PER APPLICABILITY OF FLUIDISING SYSTEM):
A) SPACE PROVISION OF 400X400 MM IS MADE IN THE BOTTOM PORTION OF ALL THE HOPPERS FOR INSTALLING FLUIDISER PADS ON 2 OPPOSITE SIDES OF EACH HOPPER. FOR EASY FIXING OF FLUIDISER PADS, THE STAINLESS STEEL LINING INSIDE THE HOPPER TO THE EXTENT OF 360X360MM WILL BE CUT AT BHEL WORKS DURING MANUFACTURING. THE HOPPER WALL TO THE REQUIRED DIMENSION SHALL BE CUT AT SITE BY ASH HANDLING SYSTEM VENDOR /ASH HANDLING SYSTEM EXECUTING AGENCY AT THE TIME OF INSTALLING FLUIDISER PADS.
B) THERMAL INSULATION SHALL BE APPLIED ON FLUIDIZING PADS AREA AFTER THE SAME IS INSTALLED BY THE ASH HANDLING SUPPLIER. THERMAL INSULATION SHALL BE APPLIED IN THE SPACE EARMARKED FOR FLUIDISING PAD AREA ALSO AND SAME SHALL BE IN BHEL SCOPE.
C) SUPPORTS FOR ASH HANDLING COMPONENTS MAY BE TAKEN FROM HOPPER WALL STIFFENERS AND OTHER SUPPORTING STRUCTURES.
D) HOPPER WALLS SHALL NOT BE WELDED WITH STEEL MEMBERS FOR SUPPORTING PIPELINES, TRAYS, ETC., IN CASE, ANY OF THE COMPONENTS OF AHS IS TO BE SUPPORTED BELOW HOPPER, THE SUPPORT SHALL BE TAKEN FROM HOPPER WALL STIFFENER THROUGH HANGER CONNECTION.
E) THE AHS SHALL HAVE AN EXPANSION JOINT BELOW THE HOPPER OUTLET FLANGE TO TAKE CARE OF THERMAL EXPANSION DURING OPERATION.
23. EACH HOPPER HAS BEEN PROVIDED WITH TWO (2) NOS. OF HUNDRED (100) MM DIA POKE HOLE IN MUTUALLY PERPENDICULAR DIRECTIONS, WITH THREADED CAPS.
24. HOPPER APPROACH PLATFORM IS PROVIDED FOR MAINTENANCE /ACCESS TO HOPPER INSPECTION DOOR, LOW LEVEL ALI, POKE HOLES AND CONTROLS OF HIGH LEVEL ALI.
25. SUITABLE WATER WASHING ARRANGEMENT WILL BE PROVIDED. SERVICE WATER LINE FOR BAP PORTION STARTS FROM 1st ROW OF ESP COLUMN AT GROUND LEVEL.
26. TYPICAL HANDRAIL WILL BE SURROUNDING ALL ESP PLATFORMS.
27. COLOR SHALL BE MATCHING WITH BOILER SHEET FOR COLOR COATED ROOFING SHEET.

ZONE	REV	DATE	ALTD:	CHD:	APPD:
	03	29.04.2026	RRK	SKV	VSK
03	DRAWING UPDATED AS MARKED REV03 AS PER CUSTOMER COMMENTS				
ZONE	REV	DATE	ALTD:	CHD:	APPD:
	02	17.09.2025	RRK	SKV	VSK
02	DRAWING UPDATED AS MARKED REV02 AS PER CUSTOMER COMMENTS				
ZONE	REV	DATE	ALTD:	CHD:	APPD:
	01	25.07.2025	RRK	SKV	VSK
01	DRAWING UPDATED AS MARKED REV01 AS PER CUSTOMER COMMENTS				

CUSTOMER NOS: R8/1588

DRAWING NO: UKAI-ME-BAP-001

CUSTOMER:GUJARAT STATE ELECTRICITY CORPORATION LIMITED
PROJECT: 1X800 MW ULTRA SUPER CRITICAL UNIT NO#7 ON ASH DYKE AREA AT UKAI TPS.

BHARAT HEAVY ELECTRICALS LIMITED.
UNIT: BOILER AUXILIARIES PLANT, RANIPET 632 406

DEPT CODE		NAME	SIGN	DATE
M	DRN	RAVI RANJAN KUMAR	-sd-	16.06.25
	CHD	RAVI RANJAN KUMAR	-sd-	16.06.25
	APPD	S K VAISHNAW	-sd-	17.06.25

TITLE: GENERAL ARRANGEMENT OF ESPs INCLUDING PLATFORM AND STAIRCASE

SCALE : N.T.S.

BHEL DRAWING NO: 0-00-111-89424 REV 03

ANNEXURE-1

CUSTOMER: GUJARAT STATE ELECTRICITY CORPORATION LIMITED

ESP sizing calculation & performance data along with hopper sizing calculation

PROJECT: GSECL UKAI TPS 1X800 MW UNIT 7

INTRODUCTION:

When sizing the precipitator for this project, we have relied on our basic sizing technology and our wide experience with collecting high resistive dust. In addition, we have utilized trends in test results available from full scale precipitators.

1.0 DESIGN CRITERIA

The following design criteria form the basis for sizing and performance of precipitators.

1.1 Electrostatic Precipitator:

The required specific collection area (SCA) for the ESP is arrived at based on the expected performance parameter viz. the migration velocity, using modified Deutsche formula. The formula with the design philosophy is outlined under 3.0. Then total collecting area of the ESP is calculated using this SCA and the flue gas flow volume at design condition. The total required collection area is divided into number of electrical sections (bus sections) keeping in mind the number of ESPs, collection area per TR set and the maximum velocity inside the ESP.

The ESP size thus arrived at is checked for the minimum requirement of SCA at guarantee point.

1.2 FLUE GAS CRITERIA AT ESP INLET:

Sl. No.	Description	Unit	Guarantee point TMCR WC	Design Point BMCR WC
1.	Gas flow rate to ESP (Wet)	m³/s	1150	1327
		Nm^3/sec	756	845.6
2.	Gas temperature at ESP inlet	°C	133	140
3.	Dust concentration at inlet of ESP (Dry)	gm/Nm³	76.8	91.4
4.	Dust concentration at inlet of ESP (Wet)	gm/Nm³	67.3	78.9
5.	Moisture content in flue gas	% (Wt)	6.306	7.101
6.	Minimum Specific Collection Area as per specification	$m^2/m^3/s$	180	-
7.	Spacing between collecting electrodes as per specification	mm	400	400
8.	Number of electrical fields out of operation	-	One	One
9.	Required outlet dust concentration of ESP at the above conditions (Dry) with one field out in all passes.	mg/Nm³	25	30
9.	Required Collection Efficiency of ESP at the above conditions	%	99.967	99.967

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2.0 COAL & FLY ASH DATA

2.1 COAL ANALYSIS

Characteristics		Design Coal	Worst Coal
Proximate Analysis (As Received Basis)			
Total Moisture	%	12.00	15.00
Ash	%	42.86	43.53
Volatile Matter	%	21.14	20.47
Fixed Carbon	%	24.00	21.00
Ultimate Analysis (As Received Basis)			
Carbon	%	34.8	31.39
Hydrogen	%	2.43	2.30
Nitrogen	%	0.84	0.80
Oxygen(By Difference)	%	6.39	6.15
Sulphur	%	0.50	0.60
Total Moisture	%	12.00	15.00
Ash	%	42.86	43.53
Carbonates	%	0.15	0.20
Phosphorus	%	0.03	0.03
HHV	Kcal/ Kg	3300	3000
Hard Grove Index		50	45

YGP (mg/kg)		80	80

2.2 ASH ANALYSIS

Silica (SiO2)	%	61.85	62.40
Alumina(Al2O3)	%	27.36	27.31
Iron Oxide(Fe2O3)	%	5.18	4.96
Titania (TiO2)	%	1.84	1.88
Phosphoric Anhydride	%	0.54	0.55
Lime (CaO)	%	1.47	1.42
Magnesia (MgO)	%	1.00	1.03
Sulphuric Anhydride (SO3)	%	0.05	0.05

3.0 THE SIZING PHILOSOPHY

A variant of the Deutsche Formula is used as the basis for precipitator sizing. We follow the modified Deutsche formula

Efficiency $= 1 - e^{-(w_k \times A/Q)^{0.5}}$

Where

A = collection Area in m^2

Q = Gas flow rate in m^3/s

w_k = Sizing constant, m/s

The equation would be the same as Deutsche formula if the exponent 0.5 is changed to 1 and the sizing constant 'w_k' is equal to the Deutsche migration velocity 'w'. The reason for introducing the modification was that 'W' in the Deutsche equation is compiled only for a homogeneous dust with a fixed particle size. For a heterogeneous dust such as fly ash, 'w' decreases as particle size becomes smaller, which means that the average 'w' for a given grain size distribution decreases as finer particles have to be collected and hence the collection efficiency raises. Thus, a rigorous approach to precipitator with the Deutsche formula would require separate calculation of precipitator characteristics for each dust fraction.

The exponent in the 'w_k' modification serves to alter the slope of the relationship between efficiency and the dimensioning constant. Data from a large number of fly ash installations indicate that an exponent of 0.5 serves to produce a nearly constant 'w_k' for a given set of operating conditions and virtually eliminates the functional dependence of 'w_k' on efficiency. Through this modification 'w_k' looses physical meaning and should be considered as a "Dust constant" which takes into consideration the heterogeneous character of the dust.

The 'w_k' theory is theoretical basis for our sizing procedures. This theory is complemented with an empirical data base which is used to provide specific application parameters for various process conditions. The application parameters consists of characteristics 'w_k' values and correction factor for process variable

such as temperature, inlet dust loading, moisture content as well as precipitator configuration such as number of fields, field area, aspect ratio, etc.

The data base for fly ash application has been compiled from tests conducted at a large number of fly ash installations and pilot plants. At each test, raw data is collected from measurement of various process variables, precipitator performance and ash characteristics. The raw test data is carefully evaluated and prepared for computer analysis. Test data from tests are analyzed by performing different linear transformations on the data and determining useful relationship with the aid of multivariable correlation analysis. The formula for this careful mathematical analysis of test data provides a sound empirical foundation for precipitator sizing.

For this project, from the size selected, 'w_k' works out to be 25.32 cm/s and SCA of 253.8 m2/m3/sec corresponding to design point condition (with worst coal firing) with one field in each pass out of service. Further, 'w_k' and SCA for Guarantee point condition (with coal firing) works out to be 21.94 cm/s and 292.87 $m^2/m^3/s$ respectively.
Thus, the selected precipitator of size 6 X FAA - 10 X 45M - 2 X 84165-2 meets the tender specified minimum SCA value of 200 $m^2/m^3/sec$ under the Guarantee point condition. Accordingly the selected precipitator of size 6 X FAA - 10 X 45M - 2 X84165 – 2 will achieve the guaranteed performance.

3.1 CALCULATION OF W_k

At design point (BMCR WC):

Specific collection area with one field out of service, SCA = 253.8 $m^2/m^3/s$ (ref cl. 4.0)

Collection efficiency = 99.967%

Using the formula

$$\text{Efficiency} = 1 - e^{-(w_k \times SCA)\ \hat{}\ 0.5}$$

(Note: SCA = A/Q)

Substituting the values we get

$$99.967\ \% = 1 - e^{-(w_k \times 253.8)\ \hat{}\ 0.5}$$

Therefore w_k = 0.2532 m/s

At guarantee point (TMCR WC):

Specific collection area, SCA = 292.87 $m^2/m^3/s$ (ref cl. 4.0)

Collection efficiency = 99.967%

Using the formula

$$\text{Efficiency} = 1 - e^{-(w_k \times SCA)^{0.5}}$$

(Note: SCA = A/Q)

Substituting the values we get

$$99.967\ \% = 1 - e^{-(w_k \times 292.87)^{0.5}}$$

Therefore $w_k = 0.2194$ m/s

3.2 ESP SIZE CALCULATION

The ESP Collection area provided with one field in each stream out of service at guarantee point condition.	= SCA X Flow	= 292.8678 X 1150= 336798m^2
The corresponding Collection area with one field in each stream out of service at design point condition	= SCA X Flow	= 253.8040 X 1327= 336798 m2
No. of ESPs per boiler as per tender	= 6	
Min. Aspect ratio	= 1.5	
Max. flue gas velocity	= 1	m/s
Max. collection area per TR set	= 4000	m^2
Min. Treatment time	= 20	Seconds

Based on the above we arrive at size of 6 X FAA - 10 X 45M - 2 X 84165-2

Calculation of collection area for the selected ESP size:

1	ESP size	6 X FAA - 10 X 45M - 2 X 84165– 2
2	No. of ESPs	6
3	No. of fields along the flow	10
4	No. of bus sections	2
5	Length of one each field, Ln	4.5 m
6	Height of field, Hn	16.5 m
7	Width of one bus section, Bn	8.4 m
8	Pitch of collecting electrode, p	400 mm
9	Resistivity range	10^{11} to 10^{13} ohm-cm
10	Collection area per field, F	= Ln X Hn X 2 X Bn/p = 4.5X16.5 X 2 X 8.4 / 0.4 = 3118.5 m^2
11	Total collection area per boiler with all fields in service	= F X total no. of fields = 3118.5 X 6 X 2 X 10 = 374220 m^2
12	Total collection area per boiler with one field in each stream out of service	= F X No. of fields in service = 3118.5 X 6 X 2 X (10-1) = 336798 m^2

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4.0 ESP DATA

DESCRIPTION	**UNIT**	**VALUES**	
ESP size		6X FAA - 10 X 45M - 2 X 84165 - 2	
No. of ESPs per boiler		One with six passes	
No. of fields in the direction of flow with one field in each stream out of service		9	
Aspect ratio		2.45	
Collection area at Guarantee point with one field in each stream out of service	m^2	336798	
Collection area at Design point with one field in each stream out of service	m^2	336798	
		Guarantee Point	**Design Point**
Gas velocity, (Gas flow/no of ESP/ (field width x no of bus sections x field height)	m/s	=1150/6/(8.4x2x16.5) = 0.69	=1327/6/(8.4x2x16.5) =0.79
Treatment time, (Field length x no of fields in series/gas velocity)	s	(9x4.5) /0.69 = 58.69	(9x4.5) /0.79= 51.26
Specific collection area (SCA) as per tender	$m^2/m^3/s$	200	
Specific collection area (SCA) provided with one field out of service	$m^2/m^3/s$	292.87	253.8
Migration velocity	m/s	0.2194	0.2532

5.0 ESP HOPPER SIZING CALCULATION

1.	Hopper capacity shall be calculated based on design point firing conditions while firing worst coal .		
2.	Storage capacity of each hopper	:	8 hours
3.	Hopper Valley Angle	:	Not less than 60 Degree
4.	Bulk Density of Ash	:	800 kg/m3
II	**ESP Selection Parameters (Design Point Conditions)**		
1.	Flue gas flow entering the ESP, m^3/s	:	1327
	Flue gas flow entering the ESP, Nm^3/s	:	845.6
2.	Flue gas temperature, Deg C	:	140
3	Dust Concentration at inlet of ESP (Wet), g/Nm^3		78.9
III	**ESP Size**	:	6 X FAA - 10X 45M - 2 X 84 165 - 2
1.	No. of hoppers per boiler	:	120
2.	Hopper size (ref enclosed sketch), mm	:	Hopper Top: 8300 x 6000 Hopper Bottom: 400 x 400 Hopper Height: 8600
IV	**Hopper Sizing Calculation**		
1.	Amount of Dust Collected into the ESPs, kg/hr	:	240184 kg/hr
2.	Stage Efficiency of first field, %	:	70.5
3.	Amount of ash collected in each first field hopper of one ESP for 8.0 hours with this stage efficiency, kg	:	112886 kg
4.	The volume required for ash storage per hopper considering 800 kg/m^3 as bulk density, m^3	:	141.1 m^3
5.	Total volume available for ash collection in each hopper, m^3	:	151.4 (Ref. Calculation in next section)

The total volume provided as above meets the tender specification requirement.

Note: Hopper sketch indicating dimensions available in Page - 10

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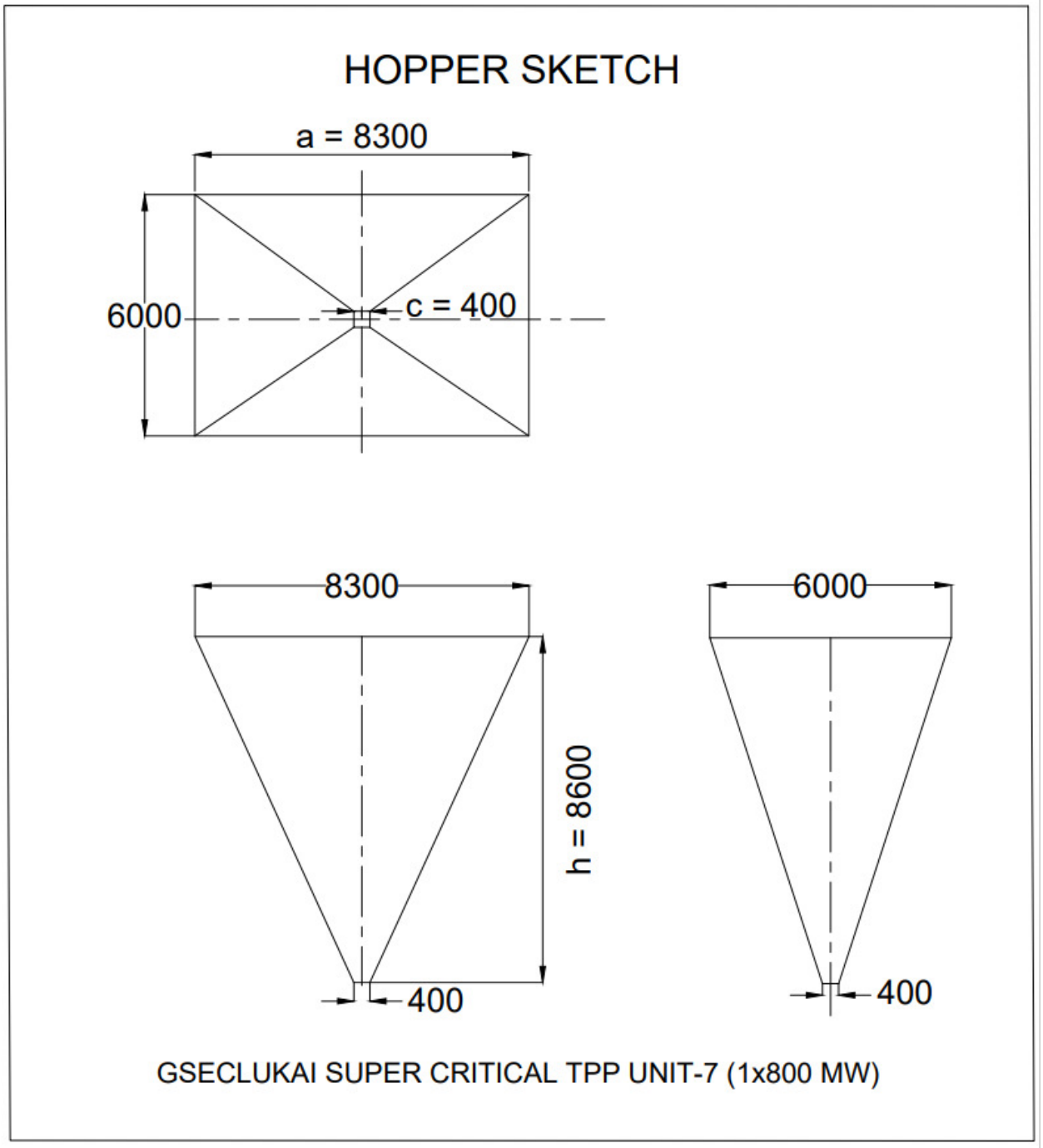
5.1 CALCULATION OF HOPPER CAPACITY / VOLUME

1.	Hopper size, mm	8300 (a) x 6000 (b) x 8600 (h) : 400 (c) x 400 (c)
2.	Hopper volume, m^3	$= h \times [a \times b + c^2 + (a + c)x(b + c)] / 6 = 151.4$ where h = 8600 mm a = 8300 mm b = 6000 mm c = 400 mm
3.	Hopper valley angle	$= \tan^{-1} [8600 / \sqrt{[\{ (8300-400)^2 + (6000-400)^2\}/4]}]$ $= 60.6^{\circ}$

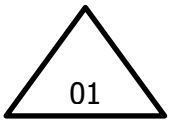
HOPPER SKETCH



6.0 DESIGN PHILOSOPHY OF ESP CASING

ESP casing is designed for the pressure load of + or - 660 mmWC at 67% yield strength and temperature of 200 deg C. ESP casing is divided into number of panels based on transportation requirements. Each panel is supported by primary horizontal stiffeners at top and bottom and by the columns at the sides. For the given plate thickness i.e. 5 mm for ESP, spacing of vertical stiffeners are arrived for the loads considering different temperature conditions including the requirement of withstanding excursion temperature of about 300 Deg C for 30 minutes. Vertical stiffeners are designed for the reaction from the area of plate it supports. In turn the primary horizontal stiffeners are designed for the reaction loads from vertical stiffeners. These main stiffeners transfers load to the column stays / bracings provided in between the columns.

7.0 ESP TRANSFORMER RECTIFIER SET SIZING CALCULATION



1.0 CALCULATION OF TOTAL COLLECTION AREA OF SELECTED ESP SIZE

1	ESP size	6 X FAA - 10 X 45M - 2 X 84165– 2
2	No. of ESPs	6
3	No. of fields along the flow	10
4	No. of bus sections	2
5	Length of one each field, Ln	4.5 m
6	Height of field, Hn	16.5 m
7	Width of one bus section, Bn	8.4 m
8	Pitch of collecting electrode, p	400 mm
9	Collection area per field, F	= Ln X Hn X 2 X Bn/p = 4.5 X 16.5 X 2 X 8.4 / 0.4 = 3118.5 m^2
10	Total collection area per boiler with all fields in service	= F X total no. of fields = 3118.5 X 6 X 2 X 10 = 374220 m^2

2.0 TR SET CALCULATION

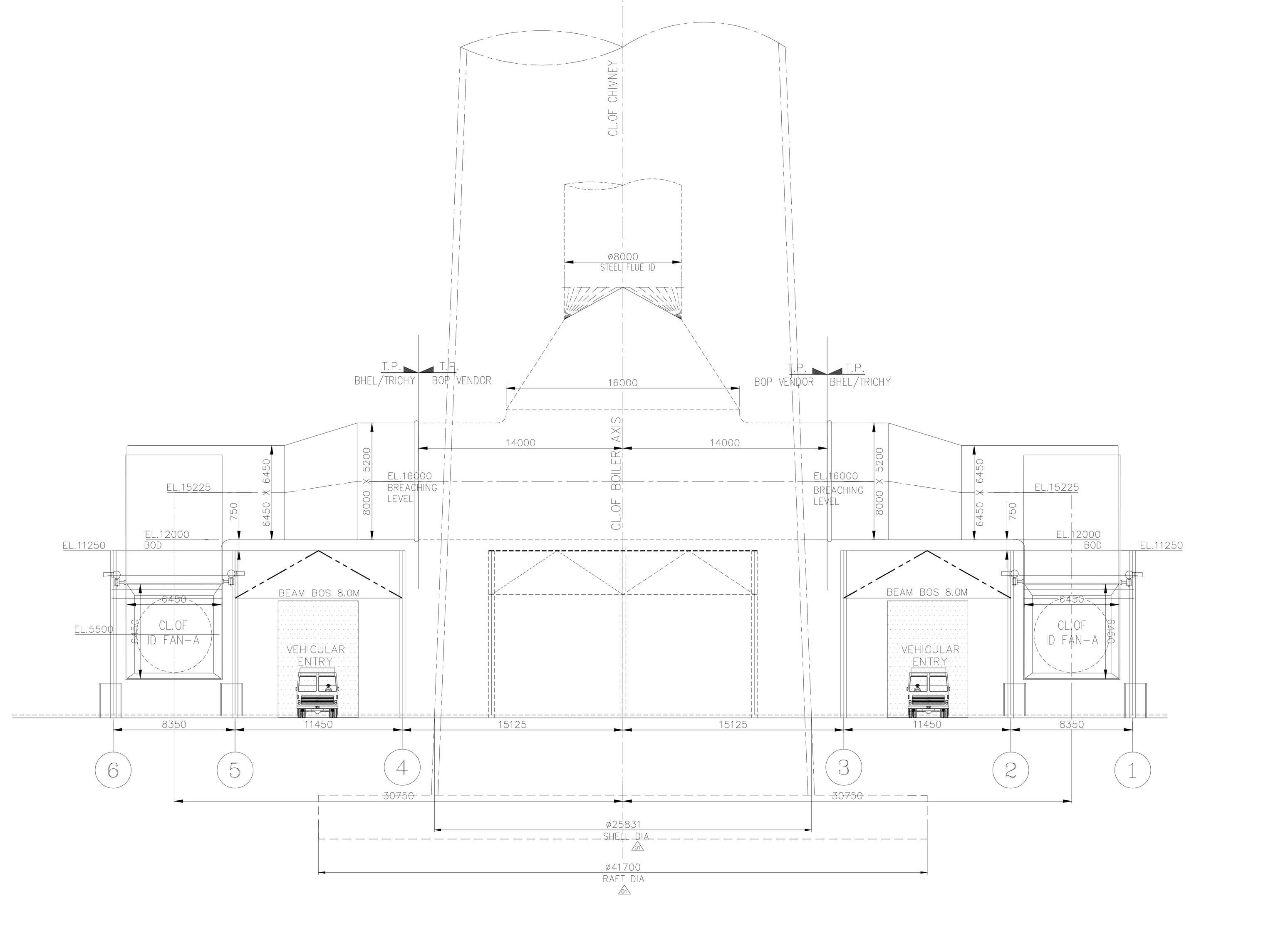
kV rating corresponding to 400 mm Collecting Electrode spacing	95 kV (peak)
Collection Area catered by 1 TR set (1 electrical field)	3118.5 m^2
Predicted current density	0.28 mA/m^2
mA rating based on current density	3118.5 x 0.28 = 873.18 mA ~ 1000 mA (selected)

SIDE ELEVATION

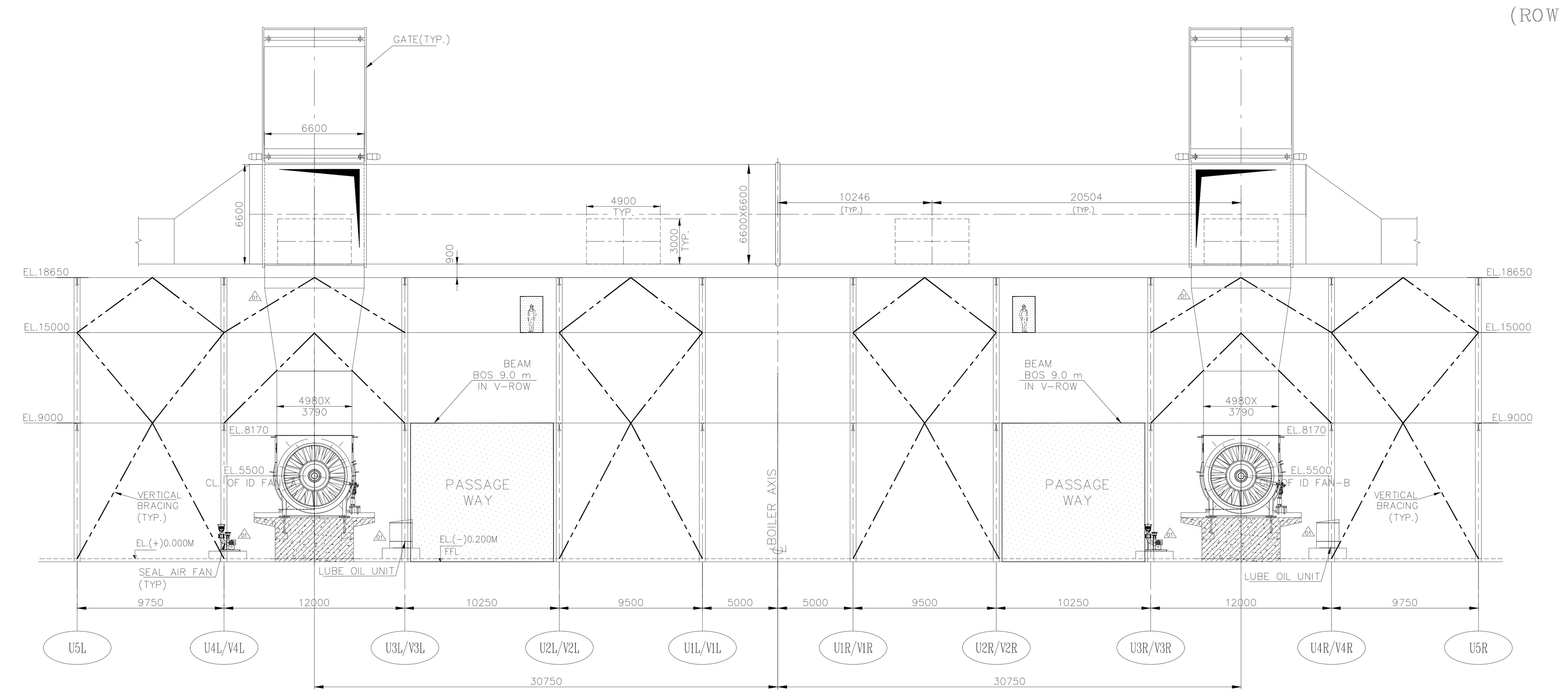
SECTION "A-A" (ROW L & M)

SECTION "B-B" (ROW N & P)

SECTION "C-C" (ROW R & T)



SECTION -"E-E"



SECTION "D-D" (ROW U & V)

LEGEND:

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

REFERENCE DRGS:

1. REFER GA DRG. NO. 0-00-022-78646 FOR BOILER PARAMETERS, LEGEND, NOTES, REFERENCE DRGS. & UNIT DESCRIPTION.

DESCRIPTION	BHEL DRAWING NO.
GA OF BOILER SECTIONAL SIDE ELEVATION – SECTION "E-E"	0-00-022-78646
GENERAL ARRGT. OF BOILER SECTIONAL PLAN-SECTION "B-B"	0-00-022-78648
LAYOUT OF ID SYSTEM – PLAN	0-00-020-78607
LAYOUT OF FLUE GAS DUCTING – GAS DUCT FROM AIRHEATER	0-00-020-78618
MAIN PLANT EQUIPMENT LAYOUT AT EL(+/-) 0.0M	PE-DG-529-100-M002
GA OF ESP INCLUDING PLATFORM & STAIRCASE	0-00-111-89424
GA DRAWING FOR ID FAN WITH FOUNDATION PLAN AND LOADING DETAILS	1-00-099-29598
GA OF CHIMNEY	424/E/DD-01
GA OF CHIMNEY	424/E/DD-03 (01)

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(+)82.2M.FINISHED GROUND FLOOR LEVEL (PAVING LEVEL) OF BOILER AND ESP AREAS ARE AT (–)0.200m, WHICH CORRESPONDS TO RL(+)82.0M. FINISHED GROUND FLOOR LEVEL (PAVING LEVEL) OF MILL BAY AND CHIMNEY AREA(INSIDE) ARE AT (+)0.00m, WHICH CORRESPONDS TO RL(+)82.2M.
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 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 SHOWN ARE PROVIDED WITH FLOOR AT BOTTOM OF DUCT. THE APPROACH FOR ACTUATORS & ALLIED ITEMS WILL BE PROVIDED BY INTEGRAL LADDERS & GRILL AS PART OF GATES.
9. ALL SIZES AND DIMENSIONS SHOWN ARE IN MILLIMETERS.
10. FOR ALL INFORMATION & DIMENSIONS, SEE REFERENCE DRAWINGS.

ग्राहक/CUSTOMER: GUJARAT STATE ELECTRICITY CORPORATION LIMITED

परियोजना PROJECT: 1X800MW SUPER CRITICAL THERMAL POWER PLANT UNIT NO.7 ON ASH DYKE AREA AT UKAI

OWNER'S CONSULTANT: STEAG ENERGY (SERVICES) INDIA PVT. LTD.

कार्य संख्या- JOB NO. 529

स्थिति STATUS CONTRACT

मुद्रण स्केल मीटर में PRINT SCALE IN METRE

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
BHARAT HEAVY ELECTRICALS LTD
BOILER PLANT UNIT;
TIRUCHIRAPALLI – INDIA–620014

DEPT CODE -

	नाम NAME	हस्ताक्षर SIGNATURE	दिनांक DATE
तैयारकर्ता/DRN	LOGANATHAN		10.05.2026
डिजाइनकर्ता/DESN	LOGANATHAN		10.05.2025
जांचकर्ता/CHD	S KAILASH		15.05.2026
अनुमोदनकर्ता/APPD	HARIDASAN		15.05.2026

पुनरीक्षण REV.	दिनांक DATE	परिवर्तितकर्ता ALTD	जांचकर्ता CHD	अनुमोदनकर्ता APPD
01	07.07.2026	LOGANATHAN	KAILASH	HARIDASAN

CUSTOMER COMMENTS UPDATED
CHIMNEY SHELL AND RAFT DIAMETER REVISED
TERMINAL POINT REVISED NEAR CHIMENY

शीर्षक/TITLE

LAYOUT OF ID SYSTEM – ELEVATION

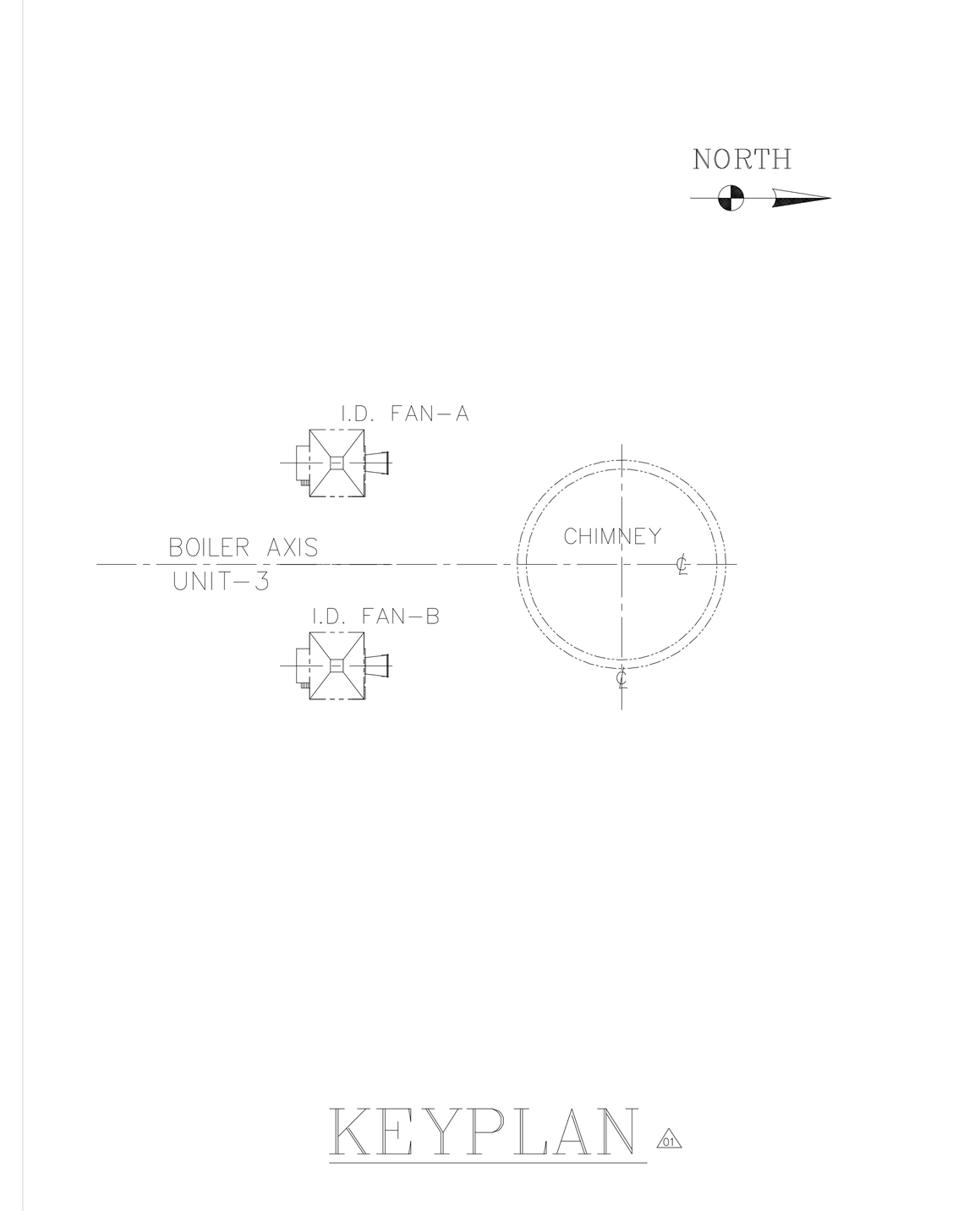
एमपीएल MPL	सिविल CIVIL	इलेक्ट्रिकल ELEC	एसएण्डसीई S&CE	डब्ल्यूएसई WSE	मैक्स MAX	विभाग DEPT.	स्केल – SCALE– 1:250

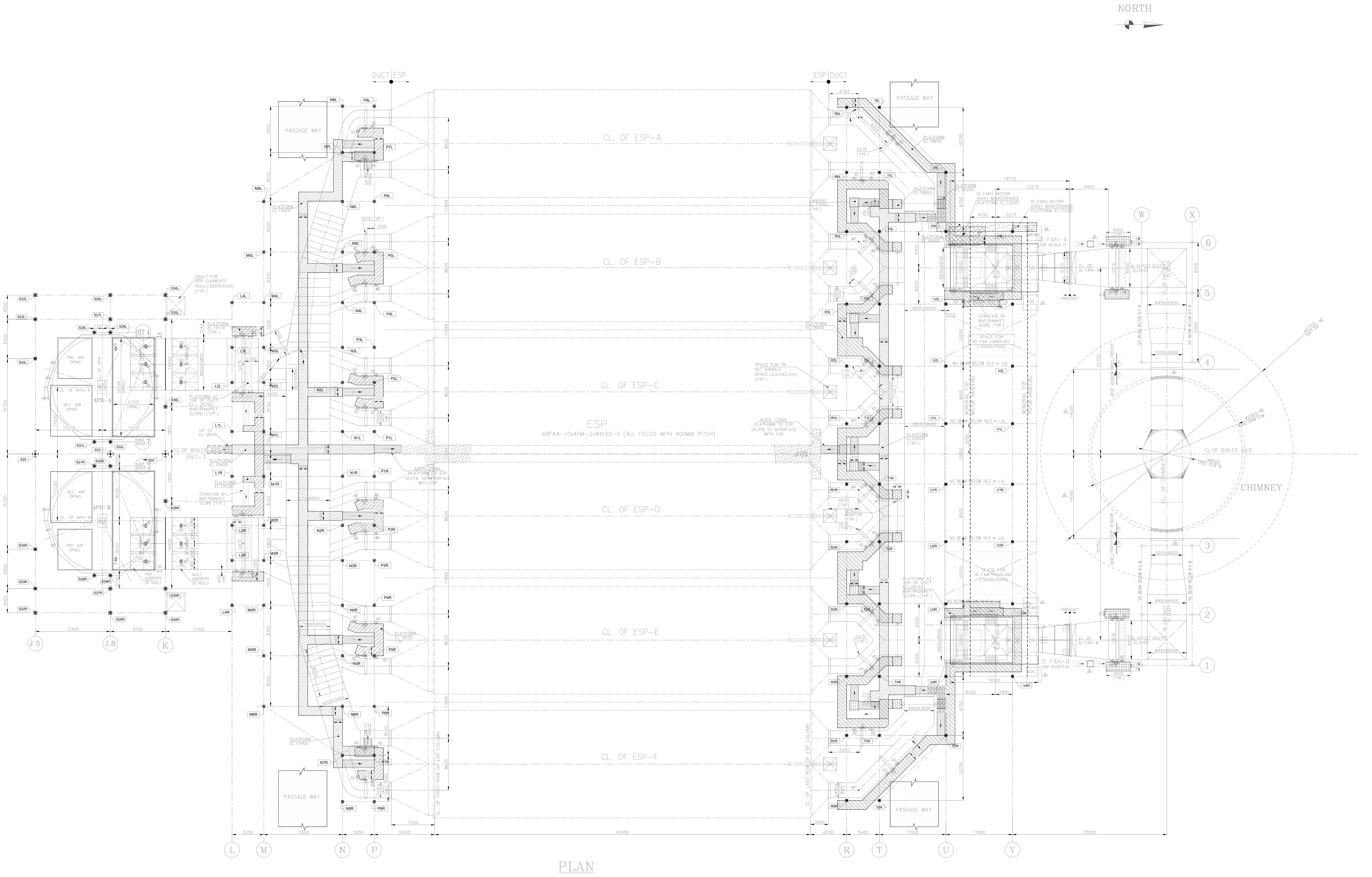
ड्राइंग संख्या / DRAWING NO. 0-00-020-78606

शीट SHEET 1 OF 1 — पुनरीक्षण REV. R 01

फॉर्मेट साइज A0 FORMAT SIZE A0

CORPORATE DRG ID:TP-DG-0-00-020-78606/01





PLAN

REFERENCE DRGS:

1. REFER GA DRG. NO. 0-00-022-78646 FOR BOILER PARAMETERS, LEGEND, NOTES, REFERENCE DRGS. & UNIT DESCRIPTION.

DESCRIPTION	BHEL DRAWING NO.
GA OF BOILER SECTIONAL SIDE ELEVATION – SECTION "E-E"	0-00-022-78646
GENERAL ARRGT. OF BOILER SECTIONAL PLAN-SECTION "B-B"	0-00-022-78648
LAYOUT OF ID SYSTEM – ELEVATION	0-00-020-78606
LAYOUT OF FLUE GAS DUCTING – GAS DUCT FROM AIRHEATER	0-00-020-78618
MAIN PLANT EQUIPMENT LAYOUT AT EL(+/-) 0.0M	PE-DG-529-100-M002
GA OF ESP INCLUDING PLATFORM & STAIRCASE	0-00-111-89424
GA DRAWING FOR ID FAN WITH FOUNDATION PLAN AND LOADING DETAILS	1-00-099-29598
GA OF CHIMNEY	424/E/DD-01
GA OF CHIMNEY	424/E/DD-03 △01

LEGEND:

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

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(+)82.2M.FINISHED GROUND FLOOR LEVEL (PAVING LEVEL) OF BOILER AND ESP AREAS ARE AT (–)0.200m, WHICH CORRESPONDS TO RL(+)82.0M. FINISHED GROUND FLOOR LEVEL (PAVING LEVEL) OF MILL BAY AND CHIMNEY AREA(INSIDE) ARE AT (+)0.00m, WHICH CORRESPONDS TO RL(+)82.2M.
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 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 SHOWN ARE PROVIDED WITH FLOOR AT BOTTOM OF DUCT. THE APPROACH FOR ACTUATORS & ALLIED ITEMS WILL BE PROVIDED BY INTEGRAL LADDERS & GRILL AS PART OF GATES.
9. ALL SIZES AND DIMENSIONS SHOWN ARE IN MILLIMETERS.
10. FOR ALL INFORMATION & DIMENSIONS, SEE REFERENCE DRAWINGS.

ग्राहक /CUSTOMER	GSECL — GUJARAT STATE ELECTRICITY CORPORATION LIMITED
परियोजना PROJECT	1X800MW SUPER CRITICAL THERMAL POWER PLANT UNIT NO.7 ON ASH DYKE AREA AT UKAI
OWNER'S CONSULTANT	steag energy services — STEAG ENERGY (SERVICES) INDIA PVT. LTD.
कार्य संख्या- JOB NO.	529
स्थिति STATUS	CONTRACT
मुद्रण स्केल मीटर में PRINT SCALE IN METRE	0 2 4 6 8 10 20 30 40 50
BHEL	भारत हेवी इलेक्ट्रिकल्स लिमिटेड BHARAT HEAVY ELECTRICALS LTD BOILER PLANT UNIT; TIRUCHIRAPALLI – INDIA-620014
DEPT CODE	-

	नाम NAME	हस्ताक्षर SIGNATURE	दिनांक DATE
तैयारकर्ता/DRN	LOGANATHAN		10.05.2026
डिजाइनकर्ता/DESN	LOGANATHAN		10.05.2025
जांचकर्ता/CHD	S KAILASH		15.05.2026
अनुमोदनकर्ता/APPD	HARIDASAN		15.05.2026

पुनरीक्षण REV.	दिनांक DATE	परिवर्तितकर्ता ALTD	जांचकर्ता CHD	अनुमोदनकर्ता APPD
01	07.07.2026	LOGANATHAN	KAILASH	HARIDASAN

CUSTOMER COMMENTS UPDATED
CHIMNEY SHELL AND RAFT DIAMETER REVISED
TERMINAL POINT REVISED NEAR CHIMENY

शीर्षक/TITLE
LAYOUT OF ID SYSTEM – PLAN

एमपीएल MPL	सिविल CIVIL	इलेक्ट्रिकल ELEC	एसएण्डसीई S&CE	डब्ल्यूएसई WSE	मैक्स MAX	विभाग DEPT.	स्केल – SCALE– 1:250

हस्ताक्षर SIGN
दिनांक DATE

ड्राइंग संख्या / DRAWING NO. 0-00-020-78607
शीट SHEET 1 OF 1
पुनरीक्षण REV. R 01

फॉर्मेट साइज A0
FORMAT SIZE A0