01.	**Item**	**Set of Cold end Basketed Heating Elements for 33.5 Size APH - Non-Enamelled.**
02.	**Application :** Heating element Baskets are the heat transfer surfaces in Rotary Regenerative Air Preheater used in coal fired Boiler. Air Preheater is located after DeNox SCR system in the Boiler.	
03.	**Basket Arrangement, Dimensions & Set detail**	Page 05 of 05 shall be referred for basket arrangement and dimensions. Number of baskets per module is indicated in the sketch. 24 Modules are required for one Air Preheater and it is equal to one set.
04.	**Element depth**	950 mm. Tolerance : +0.0, -1.5
05.	**Basket height**	1030 mm. Tolerance: +0.0, -2.0
06.	**Element configuration**	High efficient closed channel cold end profile like DNF/HC or equivalent suitable for APH located after DeNox SCR system. NF and DU profiles are not acceptable.
07.	**Element thickness**	1.2 mm. Tolerance: +0.07, -0.0
08.	**Element material**	Low alloy corrosion resistance steel as per ASTM A606 Type 4 Cold rolled (with Cast analysis Carbon 0.12max, Mn 0.2-0.5,Si 0.25-0.75, P 0.07-0.15,S 0.04max,Cu 0.25-0.55, Cr 0.35-1.25 & Ni 0.65max) or Equivalent Standard.
09.	**Basket material & design**	Low alloy corrosion resistance steel as per ASTM A 588 Gr A or Equivalent. Basket design shall be suitable for side removal by pulling. Baskets with minimum thickness of 5mm, End plates width of 125mm minimum, Minimum1 Holding bar for A2, B & E2 baskets and 2 Holding bars for other baskets.

10. General :

a) The Vendor shall provide data sheet with element profile name, element thickness, material standard with grade, drawing with dimensions including typical basket details, weight of each type of baskets, total weight and other pertinent information along with offer.

b) Baskets are for 33.5 size BHEL APH with inner and outer radius of element space as 1625mm & 7830mm respectively. RPM of rotor is 1.24. Ammonia slip is 2 ppm. SO_3 conversion at SCR may be taken as 1.5%. Vendor to indicate the minimum metal temperature at the top of Cold End layer for all the load conditions given in Page No 2.

c) Vendor to provide the APH performance for all the conditions furnished in Page No 2.

d) Vendor shall submit the quality plan along with offer.

e) Polythene sheet (thickness more than 20 microns) shall be wrapped over the baskets and shipped in wooden crates / steel crates. Baskets name shall be indicated in the baskets and crates by paintings/tags. Suitable corrosion protection coating shall be applied over element surfaces as per vendor's practice before packing.

f) Seaworthy packing shall be considered in case of supply from overseas.

g) Material as per Chinese standard is not acceptable.

11.	**Inspection**	a) By BHEL inspector at vendor's works. b) Necessary test & guarantee certificate shall be submitted.

Rev.No	Date	Prepared	Checked	Approved	Record of Revisions.
00	17.12.19				Fresh issue.

REGENRATIVE AIR PREHEATER PERFORMANCE DATA SHEET

1	Elevation of Plant above MSL m & ft	210				688.8						
2	Number of Air Preheaters Per Boiler	TWO				2						
3	**Air Heater Size & Type**	**33.5**		**VIMT**		**TRI-SECTOR**						
4	Type of APH (Shaft Position)	Vertical										
	For Vertical - Gas Flow Direction	Downward										
	For Horizontal - Duct Arrgt	NA										
5	**Fuel & % Sulphur in Fuel**	COAL				Design Coal 0.7%						
6	**Flow Per APH** kg/hr	**BMCR DC**		**TMCR DC**		**80% TMCR DC**		**BMCR WC**		**60% BMCR DC-1APH**		
	a Gas Entering APH	1361812		1229053		995036		1368263		1735051		
	b Ash Entering APH	61500		55500		45000		91500		78000		
	c Total air to Pulveriser	314554		305193		252270		367216		413714		
	d Primary Air Bypassed	VTS		VTS		VTS		VTS		VTS		
	e Secondary Air Leaving APH	852775		742355		584124		805799		1028965		
	f Total Air to combustion	1167329		1047547		836394		1173014		1442679		
7	**Temperatures** C											
	a Gas Entering at APH Top	342		333		322		344		320		
	b Gas Entering at Cold end Layer	VTS		VTS		VTS		VTS		VTS		
	c Primary Air Entering APH	35		35		35		35		35		
	d Secondary Air Entering APH	30		30		30		30		30		
	e Ambient Air Temperature	27		27		27		27		27		
	f Ambient Air Relative Humidity %	60		60		60		60		60		
	g Primary Air Leaving	VTS		VTS		VTS		VTS		VTS		
	h Secondary Air Leaving	VTS		VTS		VTS		VTS		VTS		
	i Gas Leaving APH (Uncorr/Corr)	VTS	VTS	VTS	≤124	VTS	≤122	VTS	VTS	VTS	VTS	
	j Hot air temp required for Mill	253		242		239		265		248		
8	**Pressures** mmwc											
	a Pressure Drop Air Side Pri/Sec	VTS	VTS	VTS	VTS	VTS	VTS	VTS	VTS	VTS	VTS	
	b Pressure Drop Gas Side	VTS		≤77		≤55		≤94		VTS		
	c Excess Air @ AH Gas Inlet %	20		20		20		20		20		
	d Hot End Press Diff Sec-Gas /Pri-Gas	470	1270	403	1178	311	1089	461	1299	272	1097	
9	Specific Heat Ratio Cpa/Cpg	0.9118		0.9151		0.9151		0.8986		0.9148		
10	Fuel Correction factor(1+%Moisture in Gas)	1.0622		1.0622		1.0622		1.062		1.0622		
11	Min. Metal Temperature at top of CE layer	VTS		VTS		VTS		VTS		VTS		
12	Leakage	VTS		≤8		VTS		VTS		VTS		
13	Cold End Protection Device Envisaged	SCAPH										
14	Primary Sector Opening °	72										
15	Direction of Rotation	REVERSE (GAS-SEC-PRI)										
16	**Element Details**											

	Sl	Description	Height (mm)	(Inch)	Thickness (mm)	Gauge	Type	Material
	a.	Hot End	1050	-	0.8	22	BDNU	Carbon Steel
	b.	Hot Inter	0	-				
	c.	Cold End	950	-	1.2	18	VTS	Corten Steel
	c.	Future	300	12	0.8	22	BDNU	Carbon Steel

17	No. of Soot blowers per AH	TWO	2
18	Other Customer Requirements	ALCS, Double seal, Two Layer	
19	Remarks	VTS = Vendor to Specify	

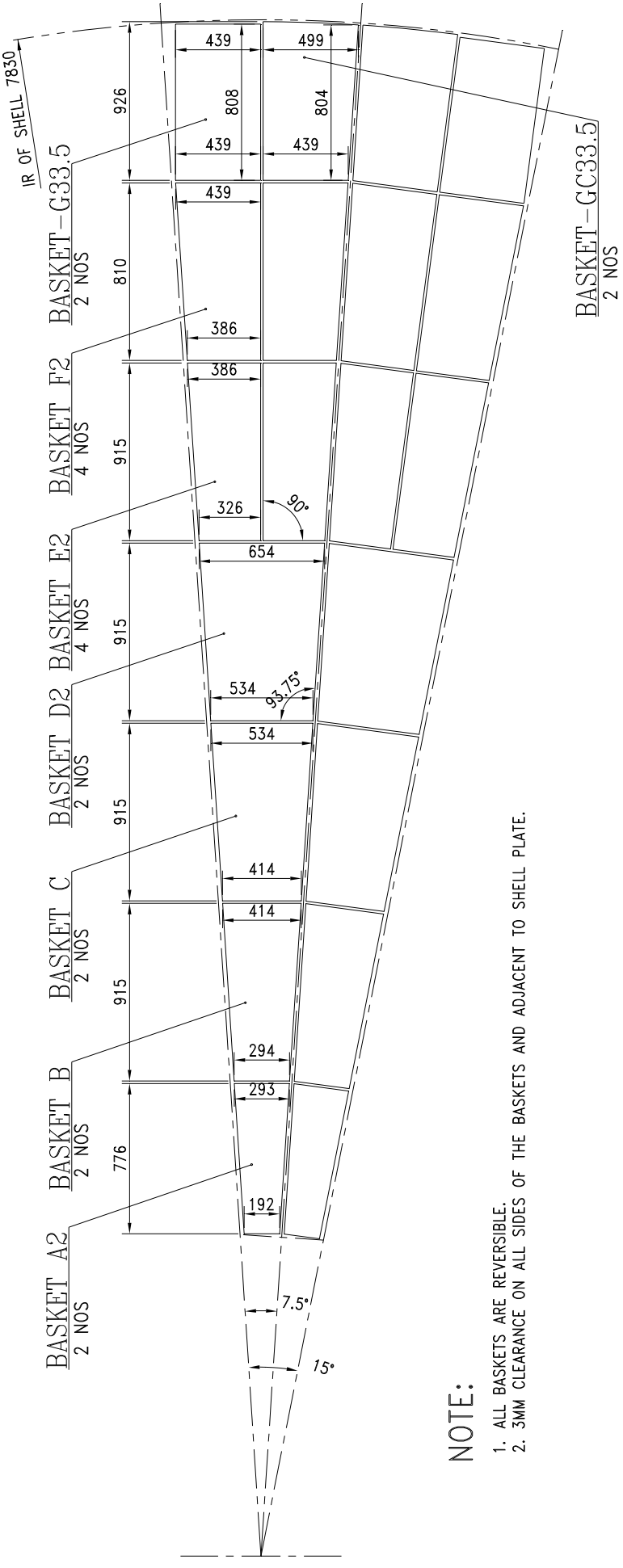
COAL CHARACTERISTICS – INDIGENOUS COAL

DESCRIPTION (Source / Type)	UNIT	Indigenous coal				
		DESIGN COAL (Washed)	WORST COAL (3500kcal/kg HHV)	RANGE	New Worst COAL (3200 kcal/kg HHV) $	
PROXIMATE ANALYSIS						
Fixed carbon	% by wt	28.83	25.50	24-30	25	
Volatile matter	% by wt	26.61	21.30	20-30	20	
Moisture (Total)	% by wt	10.80	12.00	6-15	12	
Ash	% by wt	33.76	41.20	30-43	43	
Total	% by wt	100	100	100	100	
HHV	kcal / kg	3731	3500	3300-4000	3200	
ULTIMATE ANALYSIS						
Carbon	% by wt	40.34	35.87	30-45	35.71	
Hydrogen	% by wt	2.61	2.66	2.5-4.0	2.07	
Sulphur	% by wt	0.70	0.60	0.5-0.7	0.75	
Nitrogen	% by wt	0.97	0.72	0.4-1.5	0.57	
Oxygen (difference)	% by wt	10.82	6.95	Upto 12	5.90	
Moisture	% by wt	10.80	12.00	6-15	12	
Ash	% by wt	33.76	41.20	30-43	43	
HARD GROVE INDEX		55	50	45-60	50	
ASH CHARACTERISTICS						
IT - Initial deformation temp.	°C	1160	1100	1050-1250		
ST - Softening temp. H = W	°C	-	-	-		
HT - Hemispherical temp. = W / 2	°C	1200-1300	1150-1300	1150-1350		
FT - Fusion temp.	°C	1400	1400	1350-1450		
ASH CONSTITUENTS						
A - Si O2	% by wt	61	58	57.2-63.8		
A - Al2 O3	% by wt	29.2	31	26.7-31.8		
B - Fe2 O3	% by wt	5	7	2.0-7.2		
B - CaO	% by wt	1.5	1.5	1.1-1.6		
B - MgO	% by wt	0.4	0.8	0.4-1.0		
B - Na2 O	% by wt	0.12	0.12	0.12		
B - K2 O	% by wt	0.4	0.4	0.4		
A - TiO2	% by wt	1.5	1.0	1.0-1.5		
P2O5	% by wt	0.8	0.2	0.2-0.8		
SO3	% by wt	Trace	Trace	Trace		

COAL CHARACTERISTICS – IMPORTED COAL

DESCRIPTION (Source / Type)	UNIT	Imported coal #				
		For performance demonstration	Range			
PROXIMATE ANALYSIS						
Fixed carbon	% by wt	39.93	30 – 55(ADB)			
Volatile matter	% by wt	30.04	25 - 40 (ADB)			
Moisture (Total)	% by wt	18	25 Max (ARB)			
Ash	% by wt	12.03	8 – 14 (ADB)			
Total	% by wt	100	100			
HHV	kcal / kg	5617	5000 -6000 (ARB)			
ULTIMATE ANALYSIS						
Carbon	% by wt	56.8	57 - 73			
Hydrogen	% by wt	3.88	3.5 - 4.8			
Sulphur	% by wt	0.7	0.8 (Max)			
Nitrogen	% by wt	1.29	1-2			
Oxygen (difference)	% by wt	7.3	Balance			
Moisture	% by wt	18	25 (Max)			
Ash	% by wt	12.03	15 (Max)			
HARD GROVE INDEX		50	45 - 60			
ASH CHARACTERISTICS						
IT - Initial deformation temp.	°C	1150	1050-1300			
ST - Softening temp. II = W	°C	-	-			
HT - Hemispherical temp. = W / 2	°C	1250	1150-1350			
FT - Fusion temp.	°C	1350	1300-1400			
ASH CONSTITUENTS						
A - $S_i O_2$	% by wt	55	40 - 65			
A - $Al_2 O_3$	% by wt	20	11 - 30			
B - $Fe_2 O_3$	% by wt	10	6 - 20			
B - CaO	% by wt	5	1 - 20			
B - MgO	% by wt	2	0.5 - 5			
B - $Na_2 O$	% by wt	1	0.1 - 2.5			
B - $K_2 O$	% by wt	1	0.5 - 2			
A - TiO_2	% by wt	5	0.5 - 10			
P_2O_5	% by wt	1	0.2 - 2.5			
SO_3	% by wt	Trace	Trace			

The boiler and auxiliaries shall also be suitable to operate continuously at Design/ Rated parameters for 100% BMCR condition for fuel of 30:70 ratio by weight of Imported: Indigenous coal as specified.



NOTE:

1. ALL BASKETS ARE REVERSIBLE.
2. 3MM CLEARANCE ON ALL SIDES OF THE BASKETS AND ADJACENT TO SHELL PLATE.