Purchase Department
Bharat Heavy Electricals Limited
(A Government of India Undertaking)
Boiler Auxiliaries Plant, Ranipet – 632 406, INDIA

ANNEXURE-A to Enquiry 327XXXXE dated 06.12.2017

Open Tender for Procurement of Basketed Cold End Heating Elements as per our Specification :RAH-534/Rev00

NOTICE INVITING TENDER

Sealed Tenders are invited for the supply of Basketed Cold End Heating Elements as per the Specification, Standards and Quantities as listed below.

SCOPE : SUPPLY OF Complete set of Basketed Cold End Heating Elements as per our Specification :RAH-534/Rev00.

Sl No	Material code	Description	Model No	Material Specification	Unit	Qty	Delivery Schedule
01	R52609210001	Basketed Cold End Heating Elements – 'A2' Baskets as per RAH:534 Rev 00	-	RAH-534/ Rev00	No	192	24.03.18
02	R52609210002	Basketed Cold End Heating Elements – 'B' Baskets as per RAH:534 Rev 00	-	RAH-534/ Rev00	No	192	24.03.18
03	R52609210003	Basketed Cold End Heating Elements – 'C' Baskets as per RAH:534 Rev 00	-	RAH-534/ Rev00	No	192	24.03.18
04	R52609210004	Basketed Cold End Heating Elements – 'D2' Baskets as per RAH:534 Rev 00	-	RAH-534/ Rev00	No	192	24.03.18
05	R52609210005	Basketed Cold End Heating Elements – 'E2' Baskets as per RAH:534 Rev 00	-	RAH-534/ Rev00	No	384	24.03.18
06	R52609210006	Basketed Cold End Heating Elements – 'F2' Baskets as per RAH:534 Rev 00	-	RAH-534/ Rev00	No	384	24.03.18
07	R52609210007	Basketed Cold End Heating Elements – 'G1' Baskets as per RAH:534 Rev 00	-	RAH-534/ Rev00	No	384	24.03.18
08	R52609210008	Basketed Cold End Heating Elements – 'HC34' Baskets as per RAH:534 Rev 00	-	RAH-534/ Rev00	No	192	24.03.18
09	R52609210009	Basketed Cold End Enameled Heating Elements – 'G33' Baskets as per RAH:528 Rev 00	-	RAH-534/ Rev00	No	192	24.03.18
10	R52609320001	Baskets – as per Sl No 01	-	RAH-534/ Rev00	No	48	24.03.18
11	R52609320002	Baskets – as per Sl No 02	-	RAH-534/ Rev00	No	48	24.03.18
12	R52609320003	Baskets – as per Sl No 03	-	RAH-534/ Rev00	No	48	24.03.18
13	R52609320004	Baskets – as per Sl No 04	-	RAH-534/ Rev00	No	48	24.03.18
14	R52609320005	Baskets – as per Sl No 05	-	RAH-534/ Rev00	No	96	24.03.18
15	R52609320006	Baskets - as per Sl No 06	-	RAH-534/ Rev00	No	96	24.03.18

16	R52609320007	Baskets – as per Sl No 07	-	RAH-534/ Rev00	No	96	24.03.18
17	R52609320008	Baskets – as per Sl No 08	-	RAH-534/ Rev00	No	48	24.03.18
18	R52609320009	Baskets – as per Sl No 09	-	RAH-534/ Rev00	No	48	24.03.18

The supplier shall follow our Specn:RAH-534 Rev 00. The Basketed Cold end Heating Elements will be procured as a Set.

Destination : BHEL Stores, Ranipet 632406, Tamil Nadu

BHEL reserves the right that the Price Bid opening will be done through conventional sealed bid opening mode (OR) Reverse Auction method (English method),

New supplier/vendor shall submit SUPPLIER REGISTRTION FORM (SRF) thro' ONLINE PORTAL. You are requested to visit our Web Site : www.bhel.com and click under heading 'Supplier Registration' and fill up the 'Supplier Registration Form' which is available in the Online Supplier Registration Portal. (or Copy the following URL Link and paste in the web link address: http://www.bhel.com/vender_registration/vender.php and proceed with). After successful submission, a hard copy of the same with all the annexures (as called for) may please be sent to

Mr. K.Jothi Arulanandam, Manager-Purchase, Supplier Development Cell,
email: kj@bhelrpt.co.in, phone: 04172 284474 / 4333
Bharat Heavy Electricals Limited, RANIPET, Tamil Nadu, India. PIN:632 406

Qualifying criteria for the new vendors -Pre-qualification creteria

1. The supply shall be as per our Specification RAH-534 Rev 00 only. Deviation if any, the "deviation summary " shall be submitted for our technical evaluation.
2. The Bidder is required to meet the proven-ness criteria for Cold End heating element for Air Preheater with SCR upstream application as per criteria stipulated below.

   The Bidder should have previously designed, manufactured and supplied the Cold End heating element of similar profile for Air Preheater with SCR upstream application in a Boiler and shall be in successful operation in at least one (1) plant for a period not less than one (1) year on the date of techno-commercial bid opening.

3. The offered Item shall be free from any Copy right and Patent violations.
4. The following information should be submitted by the vendor where the heating elements have been supplied:
   a. Name of the customer where the Cold End heating elements are supplied.
   b. Rating of Boiler & type of fuel fired.
   c. Complete postal address of the customer.
   d. Name, designation and contact details of the contact person of the customer.
   e. Month & Year of commissioning.
   f. Relevant Purchase Order copies
5. BHEL reserves the right to verify the information (supporting documents for points a to f) and other credentials provided by the Vendor. In case the information provided by vendor is found to be false / incorrect, the offer shall not be considered.

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01.	**Item**	**Set of Cold end Basketed heating elements 34 Size 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**	Please refer page 05 of 05. 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**	To be selected by Vendor as per Selection data and Coal data attached. Not to exceed 914 mm. Tolerance +0.0, -1.5
05.	**Basket height**	Element Depth +80 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**	1.2mm. Tolerance: +0.07, -0.0
08.	**Element material**	Low alloy corrosion resistance steel as per ASTM A242 or Equivalent.
09.	**Basket material & type**	Low alloy corrosion resistance steel as per ASTM A 588 Gr A or Equivalent. Basket design shall be suitable for side removal by pulling.

10. General :

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

b) Vendor to select cold end depth for 34 size BHEL APH with inner and outer radius of baskets as 1625mm & 8185mm respectively. RPM of rotor is 1.2. Ammonia slip is 2 ppm. So_3 conversion at SCR may be taken as 1.5%. Vendor to indicate the minimum metal temperature in intermediate layer for all six load conditions. This value shall not be less than 214 deg C at TMCR-DC (Selection Load).

c) Vendor to provide the APH performance for other 18 load conditions after order.

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 box. Basket names shall be indicated in baskets and boxes by painting/tags.

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

11. Inspection

a) By BHEL inspector at vendor's works.

b) Necessary test & Guarantee certificate shall be submitted.

REGENRATIVE AIR PREHEATER PERFORMANCE DATA SHEET									
1	Elevation of Plant above MSL m & ft	148				485.44			
2	Number of Air Preheaters Per Boiler	TWO				2			
3	**Air Heater Size & Type**	**34**		**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 0.4%			
6	**Flow Per Boiler** kg/hr	**BMCR DC**		**BMCR MM**		**VWO DC**		**TMCR DC**	
	a Gas Entering APH	3278849		3347602		3155076		3003288	
	b Ash Entering APH	61480		80040		59160		56840	
	c Total air to Pulveriser	885388		1002026		784232		681905	
	d Primary Air Bypassed	VTS		VTS		VTS		VTS	
	e Secondary Air Leaving APH	1935129		1852876		1924470		1889735	
	f Total Air to combustion	2820517		2854902		2708702		2571640	
7	**Temperatures** C								
	a Gas Entering at APH Top	351		353		350		346	
	b Gas Entering at Cold end Layer	VTS		VTS		VTS		VTS	
	c Primary Air Entering APH	35		35		35		38	
	d Secondary Air Entering APH	30		30		30		33	
	e Ambient Air Temperature	27		27		27		30	
	f Ambient Air Relative Humidity,%	60		60		60		60	
	g Primary Air Leaving	VTS		VTS		VTS		VTS	
	h Secondary Air Leaving	VTS		VTS		VTS		VTS	
	i Gas Leaving APH (Uncorr / Corr)	VTS	VTS	VTS	VTS	VTS	125	132.2	125
	j Hot air temp required for Mill	286		298		288		292	
8	**Pressures** mmwc								
	a Pressure Drop Air Side Pri/Sec	VTS	VTS	VTS	VTS	VTS	VTS	VTS	VTS
	b Press Drop Gas Side	VTS		VTS		VTS		<97	
	c Excess Air @ AH Gas Inlet,%	20		20		20		20	
	d Hot End Press Diff Sec-Gas /Pri-Gas	485	1250	495	1300	475	1265	440	1240
9	Specific Heat Ratio Cpa/Cpg	0.8921		0.8763		0.8921		0.8889	
10	Fuel Correction factor (1+%Moisture in Gas)	1.0788		1.0818		1.0788		1.0810	
11	Leakage	VTS		VTS		VTS		8.77	
11	Cold End Protection Device Envisaged	SCAPH							
12	Primary Sector Opening °	72 Deg							
13	Direction of Rotation	REVERSE (Gas-Sec-Pri)							
14	**Element Details**								

Sl	Description	Height (mm)	(Inch)	Thickness (mm)	Gauge	Type	Material
a.	Hot End	600	24	0.8	22	DU	Carbon Steel
b.	Hot Inter	850	34	0.8	22	DU	Carbon Steel
c.	Cold End	As reqd	#VALUE!	1.2	18	VTS	Corten Steel
d.	Future	300	12	0.8	22	DU	Carbon Steel

15	No. of Soot blowers per AH	TWO	2
16	Other Customer Requirements	ALCS, Double seal,Three layer	
17	Remarks	VTS = Vendor to Specify	

REGENRATIVE AIR PREHEATER PERFORMANCE DATA SHEET								
1	Elevation of Plant above MSL m & ft	148				485.44		
2	Number of Air Preheaters Per Boiler	TWO				2		
3	**Air Heater Size & Type**	**34**		**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 0.4%		
6	**Flow Per Boiler** kg/hr	**TMCR 40%**		**BMCR60%MM-1 APH**				
	a Gas Entering APH	1459815		2189271				
	b Ash Entering APH	26680		52200				
	c Total air to Pulveriser	332610		666386				
	d Primary Air Bypassed	VTS		VTS				
	e Secondary Air Leaving APH	847558		1149393				
	f Total Air Leaving APH	1180168		1815779				
7	**Temperatures** C							
	a Gas Entering at APH Top	320		320				
	a Gas Entering at Cold end Layer Approx.	VTS		VTS				
	b Primary Air Entering APH	35		35				
	c Secondary Air Entering APH	30		30				
	d Ambient Air Temperature	27		27				
	e Ambient Air Relative Humidity,%	60		60				
	f Primary Air Leaving APH	VTS		VTS				
	g Secondary AirLeaving APH	VTS		VTS				
	h Gas Leaving APH (Uncorr / Corr)	VTS	VTS	VTS	VTS			
	i Hot Air Temp. Required for Mill	272		285				
8	**Pressures** mmwc							
	a Pressure Drop Air Side Pri/Sec	VTS	VTS	VTS	VTS			
	b Allowable Press Drop Gas Side	VTS		VTS				
	c Excess Air @ AH Gas Inlet,%	26.6		20				
	d Hot End Press Diff Sec-Gas /Pri-Gas	230	1015	300	1105			
	e Leakage,%	VTS		VTS				
9	Specific Heat Ratio Cpa/Cpg	0.9051		0.8826				
10	Fuel Correction factor (1+%Moisture in Gas)	1.0757		1.0818				
11	Cold End Protection Device Envisaged	SCAPH						
12	Primary Sector Opening °	72						
13	Direction of Rotation	REVERSE (GAS-SEC-PRI)						
14	**Element Details**							

Sl	Description	Height (mm)	(Inch)	Thickness (mm)	Gauge	Type	Material
a.	Hot End	600	24	0.8	22	DU	Carbon Steel
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d.	Cold End	As reqd	#VALUE!	1.2	18	VTS	Corten Steel
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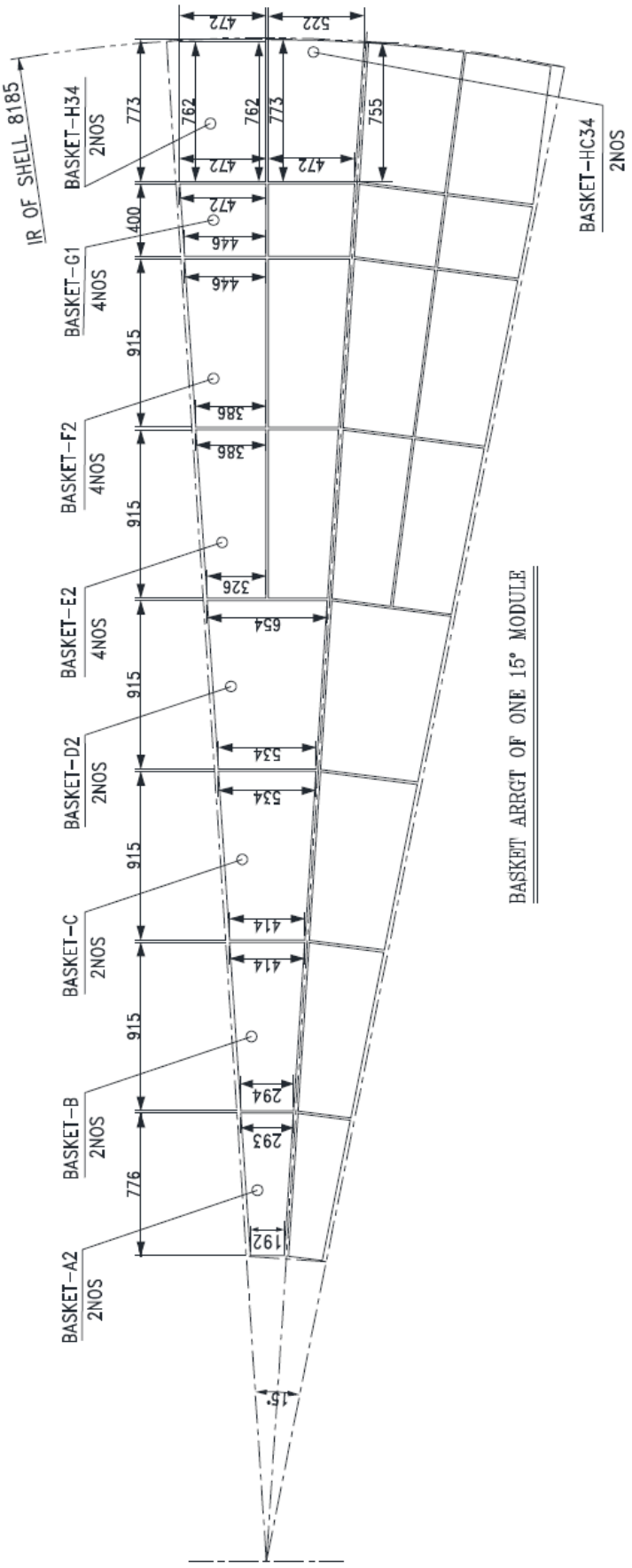
15	No. of Soot blowers per AH	TWO	2
16	Other Customer Requirements	ALCS, Double seal,Three layer	
17	Remarks	VTS = Vendor to Specify	

DOMESTIC COAL CHARACTERISTICS

S No.	Characteristics (As received basis)	Range of 95% coal supplies			Range of 5% coal supplies	
		Column -1	Column-2	Column-3	Range of Adequacy coal	
1.0	**PROXIMATE ANALYSIS**	**Design**	**Worst**	**Best**	**Worst**	**Best**
1.1	Total Moisture (%)	14	17	11.5	17.5	10
1.2	Ash (%)	40	44	34	44.5	32
1.3	Volatile matter (%)	22	19	24	18.75	25
1.4	Fixed carbon (%)	24	20	30.5	19.25	33
2.0	**ULTIMATE ANALYSIS**					
2.1	Carbon (%)	34	30	41.65	28.85	44.41
2.2	Hydrogen (%)	3.1	2.3	3.4	2.3	3.5
2.3	Sulphur (%)	0.4	0.6	0.35	0.6	0.35
2.4	Nitrogen (%)	1.2	0.9	1.23	0.84	0.57
2.5	Oxygen (%) (By difference)	7.3	5.2	7.87	5.41	9.17
2.6	Total Moisture (%)	14	17	11.5	17.5	10
2.7	Ash (%)	40	44	34	44.5	32
2.8	GCV (kcal/kg)	3500	3000	4200	2900	4400
2.9	Hard grove index	50	45	70	45	70
2.10	YGP Index (mg/kg)	75	80	70	85	65
3.0	**ASH ANALYSIS**					
3.1	Silica (%)	58.59	56.81	60.2	56.29	60.42
3.2	Alumina (%)	26.77	27.42	26.1	27.5	25.9
3.3	Iron Oxide (%)	8.8	9.8	7.8	10.1	7.6
3.4	Titania (%)	1.66	1.78	1.56	1.86	1.52
3.5	Phosphoric Anhydride (%)	0.19	0.1	0.24	0.08	0.32
3.6	Lime (%)	1.39	1.48	1.32	1.52	1.28
3.7	Magnesia (%)	1	1.13	0.97	1.17	0.92
3.8	Sulphuric Anhydride (%)	0.05	0.04	0.1	0.04	0.15
3.9	Sodium Oxide (%)	0.2	0.08	0.4	0.08	0.5
3.10	Balance Alkalies (By Difference) (%)	1.35	1.36	1.31	1.36	1.39
4.0	**ASH FUSION RANGE** (Under reducing atmosphere)					
4.1	Initial Deformation Temperature (degree Celsius)	1150	1100	1200	1100	1200
4.2	Hemispherical temperature (degree Celsius)	1300	1250	1350	1250	1350
4.3	Flow temperature (degree Celsius)	1400	1350	1400	1350	1400



3 mm CLEARANCE ON ALL SIDES OF ALL BASKETS.
ALL DIMENSIONS ARE IN mm.