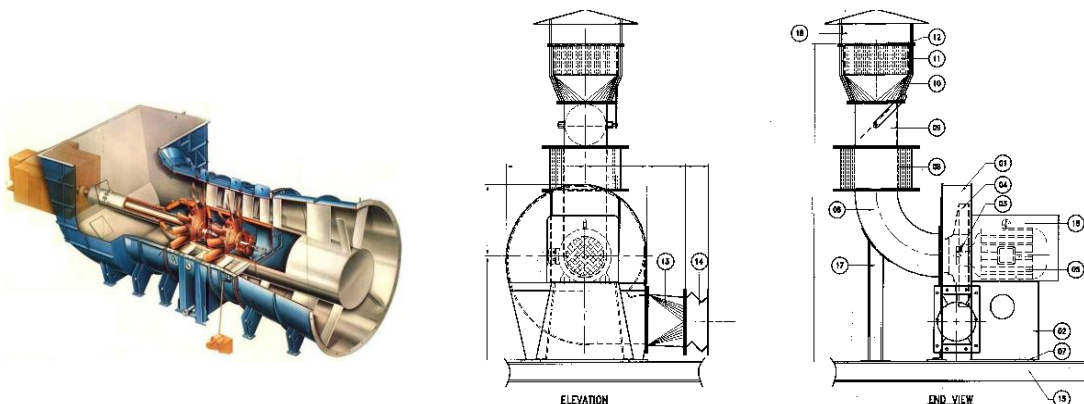


**BHARAT HEAVY ELECTRICALS LIMITED
BOILER AUXILIARIES PLANT
RANIPET-632406**

**FANS ENGINEERING DEPARTMENT
COOLING / SEALING AIR FANS**



03	<i>T. Prasanna Kumar</i> T.Prasanna Kumar	<i>P. Purushothaman</i> P.Purushothaman	<i>Prasanta Saha</i> Prasanta Saha	<i>R.M.Chhipa</i> R.M.Chhipa	REVIEWED&UPDATED ON 19/05/2015
02	S. Stephen	P. Natarajan	Prasanta Saha	R.M.Chhipa	UPDATED ON 04/03/2015
01	A.VAITHI	A.VAITHI	RSGK		UPDATED ON 03/11/2012
00	V .SIVANATHAN	J.CHITTIBABU	RSGK		FRESH ISSUE ON 22/06/2010
REV. NO.	PREPARED	CHECKED	APPROVED	SIGN.OFQA	REMARKS WITH DATE

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DESCRIPTION	SPECIFICATION NUMBER	REV.NO	DATE:11/09/2013
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COOLING / SEALING AIR FANS

SPECN . NO
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Cooling / Sealing air fan is used for cooling the induced draught (axial) fan parts when handling the flue gases.

COOLING / SEALING AIR FAN DETAILS :

SI No.	DESCRIPTION	PARAMETER
1	Application	Cooling / Sealing Air Fan
2	No. off cooling fans per application	1 set , Two x 100% (one working & one Standby , 1 set = 2 no's of cooling Fans)
3	Fan type / Model / Make	Radial, Backward curve
4	Medium to be handled	Atmospheric air
5	Dust in medium	Dusty and corrosive atmosphere as prevailing in industrial area
6	Site elevation	Refer project GA drawing
7	Ambient temperature	Minimum 10 Deg C, Maximum 50 deg C
8	Impeller type and mounting	Centrifugal, Backward curved, Directly on motor shaft
9	Type of control	Inlet Damper and flow control gate at out let
10	Type of drive	Constant speed drive electric motor (to start with a DOL starter)

I) TECHNICAL REQUIREMENT :

FAN :

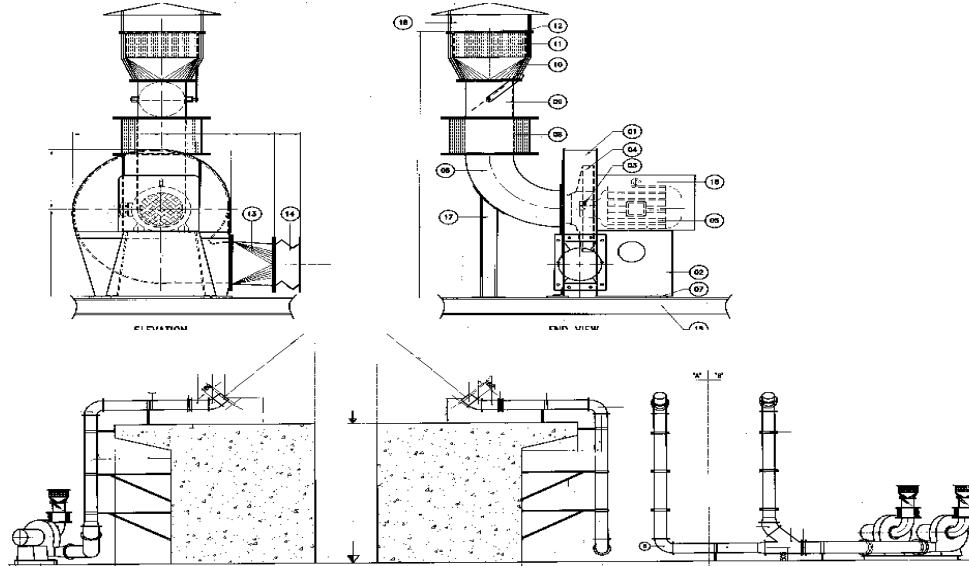
- 1) All fans shall be suited for out-door installation
- 2) Impeller should be mounted on motor shaft with felt ring cooling / sealing for casing to haft. The fan should be low noise design with reinforced housing, with door for inspection / cleaning suction filter and protection cover.
- 3) All fans shall be of single suction only
- 4) Suction filter should be easy to clean and with exchangeable filter pad
- 5) Fan suction shall have suitable arrangement to prevent rainwater directly entering fan
- 6) Silencers, filter assembly are to be vertically mounted as per the attached drawing.
- 7) Maximum Noise pressure level at 1.0m distance from the fans shall be less than or equal to 85 dBA for all fans
- 8) Non Metallic Expansion joints shall be suitable to take care of connecting duct expansions also.
- 9) The selection of fans shall confirm maximum possible efficiency at the required parameters
- 10) Pressure head requirement mentioned in the specification does not include the internal losses of the fans and control dampers / Guide vanes, Diffusers etc.

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COOLING / SEALING AIR FANS

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GENERAL ARRANGEMENT OF COOLING /SEALING FAN(TYPICAL)



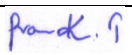
- 11) Recommended minimum thickness (mm) of various fan parts shall be :
Blade & Shroud = 4, Casing, Inlet box = 5 and Suction cone & back plate = 4
- 12) Performance test for all fans shall be conducted at site as per BS 848 / AMCA / VDI code and parameters of the fans, power consumption, Noise level at 1m distance etc. , are to be provided by the vendor at operating conditions specified.

MOTOR :

- 1) The drive motor (LT) shall be as per the specification :TECI:: LT Motor: Rev 01 dt.29/05/14
- 2) The motor shall take care of radial load of impeller as it is mounted on the shaft and the thrust load due to the fan operation.

INTERFACE DETAILS :

- 1) The fans are to be mounted on a common base frame
- 2) All the pipes(Schedule 20), fittings are to be as per the reference drawing provided along with the enquiry.

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SYSTEM :

- 1) Design temperature for mechanical parts shall be 50 Deg C
- 2) The vibration displacement at the Motor bearings at full speed with a clean rotor shall not exceed the limits as per ISO 10816-3 1998 Part 3.
- 3) Fan impellers shall be dynamically balanced at fan manufacturer's works as per ISO 1940 – Gr.2.5

II) COOLING / SEALING AIR FAN PARAMETERS

Sl No	DESCRIPTION	UNIT	PARAMETER
1	Flow	M ³ /Sec	Refer 1 st condition of performance curve, Annex-1
2	Operating Temperature	Deg C	10 to 50
3	Fluid density	Kg/m ³	Atmosphere air density at 10°C at site elevation
4	Total pressure developed by fan	mmwc	Refer 1 st condition of performance curve, Annex-1
5	Speed of the fan	Rpm	2900
*6	Total efficiency of the fan	%	
*7	Shaft power	KW	
*8	Recommended motor rating	KW	

*Unfilled values shall be duly filled by the vendor and shall be submitted

III) PAINTING :

- 1) All surfaces interior an exterior of the equipment parts shall be shot blasted to remove all rust. Scale grease and / or other adhering foreign matter as per Boiler plant Standards. Unless otherwise specified all surfaces of steel work, pipe work etc., shall be applied with two (2) Coats of approved high quality primers and finished with two (2) coats of finish paint in an approved color to give a neat and clean finish.
- 2) All machined surfaces subject to rust are to be coated with a suitable rust preventive compound. Surfaces shall be putty filled and rubbed down to ensure first quality glossy finish.
- 3) Paints shall be carefully selected to withstand not only tropical heat and extremes of weather specified herein but also acid and other chemical fumes. It shall not scale off or crinkle or be removed by abrasion in handling. Red oxide zinc chromate to IS:2074 and synthetic enamel paint to IS2932 shall be provided as per color shades to IS:5 (colors for ready mixed paints and enamels)

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COOLING / SEALING AIR FANS

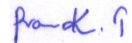
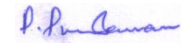
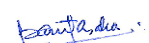
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IV) INSPECTION :

Complete "internal inspection record" done by the vendor shall be sent along with the inspection call for BHEL inspection. The equipment will be inspected by BHEL and / or their authorized representative. Minimum 2 weeks advance notice is to be given for inspection.

V) SCOPE OF SUPPLY

Sl No	Scope of supply	Confirmation by Vendor
1	Motor mounted Centrifugal Cooling / sealing Air Fan (2x100%) one working and one standby	
2	With vertical suction box, Inspection / cleaning door and Drain plugs for each Fan	
3	Silencer, if necessary, at the inlet of suction box	
4	Filter assembly above the suction box / silencer	
5	Base Frame for the two fans and to match the existing foundation , Refer project GA drawing	
6	Foundation fasteners to connect / fix the base Frame with concrete	
7	"Y "Duct to connect delivery of the two fans	
8	Inlet flap type Damper	
9	Check valve/Non return valve at fan discharge	
10	Air flow control gate at common duct before "Y" portion	
11	Air flow control gate at ID Fan Entry & Exit	
12	Non metallic expansion joint	
13	Transition duct, other connecting duct(Schedule 20) & supports	
14	Vibration isolation pads between base frame and concrete	
15	Painting as specified	
15	Any other accessories for the safe and reliable operation of the fans.	
17	One pressure transmitter & accessories at common out let with impulse pipe and connectors.	
18	Isolation valve at outlet	

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TECHNICAL DATA SHEET :

FAN MODEL : -----

Part of the fan	Data	Unit	Data (to be filled in by the vendor)
Inlet box	Inlet box material		
	Inlet box thickness	mm	
Rotor	Impeller blade tip diameter	mm	
	Width of impeller	mm	
	Type of fan blades		
	Blade material		
	Blade thickness	mm	
	Moment of inertia (J) of impeller	Kg-m ²	
	GD ² value of Impeller	Kg-m ²	
	Back plate thickness	Mm	
	Weight of the impeller	Kg	
Casing	Casing material		
	Casing thickness	mm	
	Shroud material		
	Shroud thickness	mm	
	Casing weight	Kg	
Filter	Filter weight	Kg	
Silencer	Silencer weight	Kg	
Torque values	Starting torque at zero load	Kg-m	
	Starting torque at full load	Kg-m	
	No load torque	Kg-m	
	Full load torque	Kg-m	
	Dynamic balancing grade		

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VI) INFORMATION REQUIRED ALONG WITH THE OFFER;

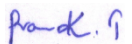
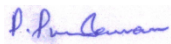
- 1) GA drawing and foundation load details
- 2) Fan performance characteristic curves (flow vs. total pressure rise & Flow vs. Power)
- 3) Speed Vs Torque curves
- 4) Duly filled technical data sheets as per the enclosed format and LT Motor data sheets

VII) INFORMATION TO BE FURNISHED WITHIN 3 WEEKS OF ORDER:

- 1) Final GA drawing
- 2) Load data
- 3) Fan performance characteristic curves
- 4) Speed Vs torque curves
- 5) Duly filled in technical data sheets for fan and motor
- 6) Quality assurance plan
- 7) Performance test procedure
- 8) Operation & Maintenance Manual (3 hard copies and 1 soft copy in Compact Disc)

VIII) PACKING:

The fans are to be assembled stable on wooden pallets and wooden box with suitably covered inside to avoid water entry.

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Annexure-1

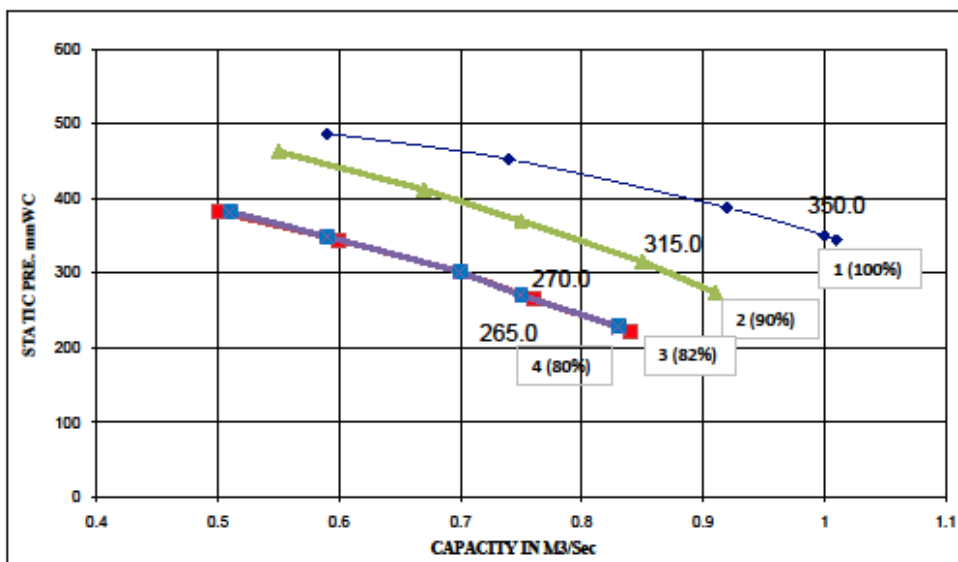
Performance curve

1st conditon		
1m3/s / 350mmwc		
CAPACITY	SP	POWER
M3/S	MMWC	KW
0.59	487.0	4.50
0.74	452.0	5.04
0.92	387.0	5.54
1.00	350.0	5.72
1.01	344.0	5.75

2nd conditon		
0.85m3/s / 315mmwc		
CAPACITY	SP	POWER
M3/S	MMWC	KW
		1.15263158
0.55	462.3	3.93
0.67	411.4	4.35
0.75	369.6	4.58
0.85	315.0	4.82
0.91	273.6	4.97

3rd conditon		
0.75m3/s / 270mmwc		
CAPACITY	SP	POWER
M3/S	MMWC	KW
		1.289286
0.51	381.8	3.35
0.59	348.7	3.60
0.70	301.4	3.91
0.75	270.0	3.97
0.83	228.0	4.20

4th conditon		
0.76m3/s / 265mmwc/		
CAPACITY	SP	POWER
M3/S	MMWC	KW
		1.307143
0.50	381.8	3.35
0.60	344.3	3.67
0.70	301.4	3.94
0.76	265.0	4.03
0.84	222.3	4.26



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