BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPALLI-620014

FUEL SYSTEMS
PRODUCT ENGINEERING (FOSSIL BOILERS)

SPECIFICATION FOR MANUAL VARIABLE ORIFICE OF PULVERIZED COAL PIPING

SPECIFICATION NUMBER: TFS: 1004 REVISION NO: 00

REVISION STATUS

Rev.No.	Date	Description	Altered	Checked & Approved

	NAME	SIGNATURE	DATE
PREPARED	N.SAIRAM	*-sd-*	**08.08.2013**
CHECKED	K.RAJMOHAN	*-sd-*	**08.08.2013**
APPROVED	M. THANDAPANI	*-sd-*	**08.08.2013**

1.0 SCOPE

The scope covers the design, supply, manufacture, testing, certification, marking and identification and packing for shipment of manually operated variable orifice for pulverized coal pipes – for the specified duty conditions in the Annexure.

Vendor should extend commissioning support for the product.

2.0 EXTENT OF SUPPLY

The following extent of supply given is not necessarily exhaustive and shall not relieve the contractor of his responsibility to provide plant, equipment and services necessary to satisfy the performance criteria and guarantees specified.
Provide 6 numbers of Operation and Maintenance (O&M) instructions in hard copy and soft copy each.

3.0 TERMINAL POINTS

The terminal points for the orifices must be suitable to mount the orifices in coal pipes by means of pipe coupling. For the pipe size and collar dimensions refer Mechanical Datasheet (Cl. 10.2) & sketch 1 & 2 given respectively. FACE TO FACE DIMENSION required is 350 mm.

4.0 TECHNICAL REQUIREMENTS – DESIGN AND CONSTRUCTION

4.1 NEED FOR VARIABLE ORIFICE

There are four/ eight coal pipes from each pulverizer. The coal pipes transfer the pulverized coal and primary air mixture from pulverizer to burners. Burners are located at four corners of a tangentially fired boiler.

The variable orifices are to be mounted either vertically or horizontally on the coal pipes. Coal pipe variable orifice shall be designed to be installed in each burner coal line to adjust and balance the coal flow in each pipe for the associated pulverizer.

The coal particles are pulverized to the tune of 75-300 microns in the pulverizer and this coal dust is carried through the coal pipes by the primary air. Flow through the pipes is a dilute two phase (solid-gas) flow. Pulverized coal – air mixture at a temperature of 80°C to 120°C flows through these orifices at a velocity range of 22 to 30 m/sec.

All orifices shall be capable of safe, reliable operation and shall comply with the requirements of NFPA 85 and the strength requirements shall comply in particular with the sub-section 9.4.6.1.

4.2 ORIFICE OPERATION

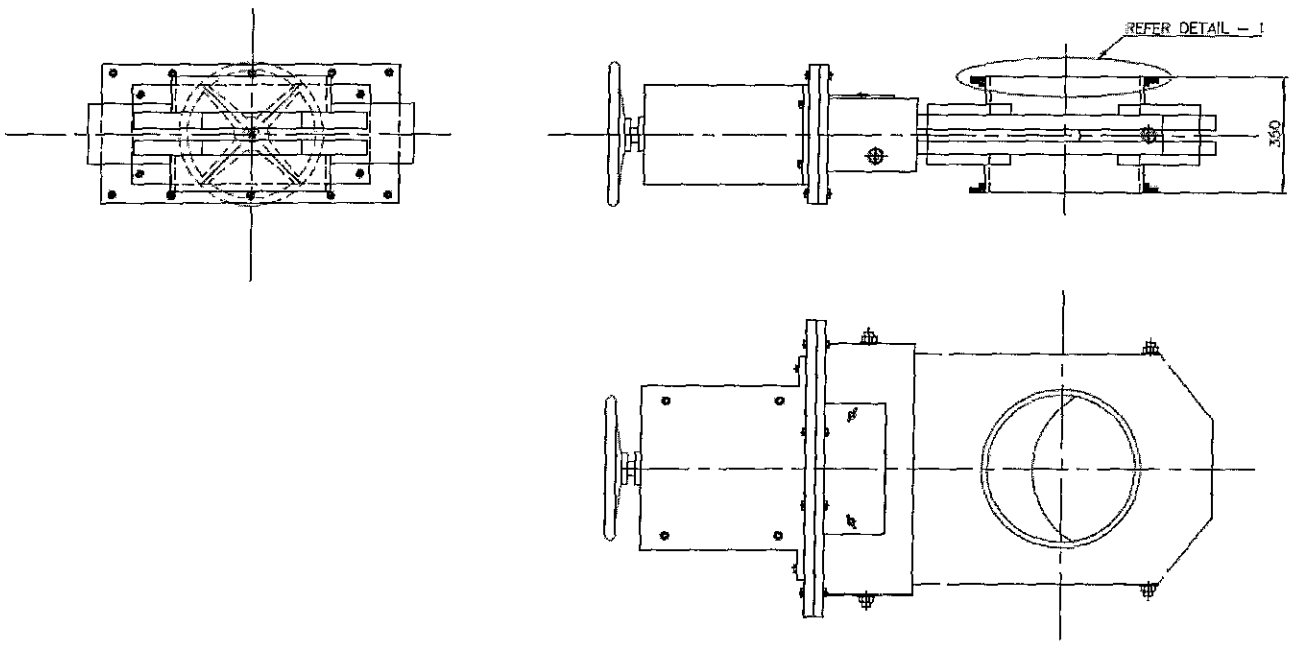
Operation of the variable orifice shall have a suitable mechanism to vary the orifice opening (and hence the flow area). Changing the orifice open area in the Variable coal pipe orifice is performed while the mill is operating, providing an immediate change to the coal flow and burner performance. The orifice shall be smooth to operate and opening or closing of the valve shall be provisioned through suitable hand wheels.

The operating mechanism shall be shielded from the coal stream to provide long-term ease of operation.

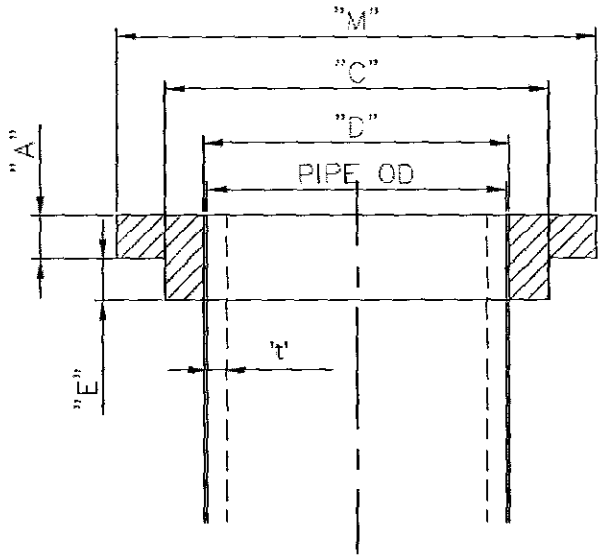
The orifice plate shall be shaped in such a way that full closure of the orifice will not result in complete stoppage of coal so as to ensure minimum coal flow even when the variable orifice is fully closed.

The adjusting mechanism shall be equipped with a gauge to indicate the degree of orificing from 0% (full open with no obstructions) to 60% maximum reduction.

Inspection and maintenance of the orifice can be easily performed without removing the orifice housing from the coal line. A Suggestive arrangement of the variable orifice is shown below. Supplier has to submit arrangement drawings of their design.



Sketch – 1 Suggestive GA Variable orifice



DETAIL - 1
REFER TABLE - I FOR DIMENSIONS

TABLE - I

711.2	742	728	30.0	25	714
660.4	689	675	30.0	25	662.9
PIPE OD	M	C	A	E	D

Sketch – 2 Pipe Collar Dimensions

4.3 OPERATING ENVIRONMENT

The equipment will be required to operate in dust laden pulverized coal-air mixture, which can be expected to settle on the orifice components during normal operation.

The leading edge of the Orifice element blade shall have methods to eject out the accumulated dust and clean the blade guides during closing or opening. Vendor shall include necessary provision in the orifice to prevent ingress of dust and ensure friction free movement. The supplier has to ensure that the orifices are suitable for operation in the specified conditions. The vendor shall submit the arrangement details for the same.

As the coal particles are highly erosive in nature, the supplier shall provide suitable measures to combat erosion in orifice internals. Vendor shall indicate the details in the offer.

5.0 INSPECTION AND TESTING

Supplier shall submit QP for Purchaser's review and approval. It is expected that Quality plan shall encompass the Supplier's standard inspection to satisfy all applicable design code and its testing requirements and will involve, as a minimum, the examination of material certificates, dimensional checks on parts and sub-assemblies, examination by visual or other methods for welds and material surfaces. The Purchaser's inspecting authority is to be allowed reasonable access to the Supplier's works during manufacture/ testing before delivery, in accordance with the approved Quality plan.

6.0 CODES AND STANDARDS

The Supplier is required to list all the standards applicable to the equipment covered in this specification. The same is to be provided and agreed to before manufacturing proceeds. Where the Supplier considers that the standards used in the design, manufacture or operation of the equipment may vary with the contents of this specification, then the matter shall be immediately brought to the written attention of Purchaser.

7.0 DOCUMENTATION

7.1 Technical offer shall contain complete details as called for specification confirming the requirements point by point.
7.2 Completely filled in data sheet CLAUSE 10.0.
7.3 Supplier shall submit the dimensional drawing giving details of MOC, accessories, dimensions
7.4 Supplier may separately quote for the list of spares for two years of trouble free operation.
7.5 Supplier to quote for commissioning spares along with the main offer.
7.6 Reference list for 2 installations of the product with minimum 2 years of working.

8.0 GUARANTEE

The performance guarantee shall be given for minimum a period of 12 months from the date of commissioning or 18 months from the date of shipment whichever is earlier.

9.0 PACKING AND DESPATCH

After inspection, the assembly shall be cleaned, prepared and suitably protected for despatch in such a way as to minimize the possibility of damage and deterioration during transit and storage.

10.0 DATA SHEET

BHEL MATERIAL CODE:

10.1 ORIFICE DATA SHEET

	BHEL SPEIFICATION	VENDOR CONFIRMATION
DESIGN PRESSURE	To comply with NFPA 85, Valve body shall be designed for class 150.	
NORMAL WORKING PRESSURE	300-400 mm WC	
Design temperature	120°C	
Normal working temperature	90°C	
Indoor or outdoor installation	Outdoor	
Design pressure drop	Vendor to furnish	
Velocity of coal/air	25 m/s	
Operation/frequency of use	Normally open. Adjusted frequently (Whenever operation parameters change)	
Flow medium	Hot air and coal particles	
Coal particle size	300 µm (99% through 50 mesh to 75 µm 70% through 200 Mesh)	
Erosion	The coal particles are highly erosive and the supplier shall provide measures to combat erosion of orifice internals	
Estimated life of Orifice	Vendor to confirm	

10.2 MECHANICAL DATA SHEET FOR VARIABLE ORIFICE OF PULVERIZED COAL PIPES

Model No.	Supplier to furnish	
Service	Regulating coal pipe flow	
Orifice design code	Supplier to Furnish	
Pipe Size	OD 660mm , ID 632 mm	
End Connection - Coupled	Coupling collar details as per the figure and the dimension table (TABLE – I) shown in page 5.	
Body Tapping (Yes/No)	Vendor to furnish details if applicable	
Quality Plan	Supplier to furnish	
Painting Details	As per approved QP	
Installation orientation	Horizontal/Vertical	

	BHEL SPECIFICATION	VENDOR CONFIRMATION
MATERIAL SELECTION		
Body	Carbon steel (Specify grade)	
Body liner	Supplier to furnish	
Slide	Supplier to furnish	
Guide rails	Supplier to furnish	
Package material gland	Supplier to furnish	

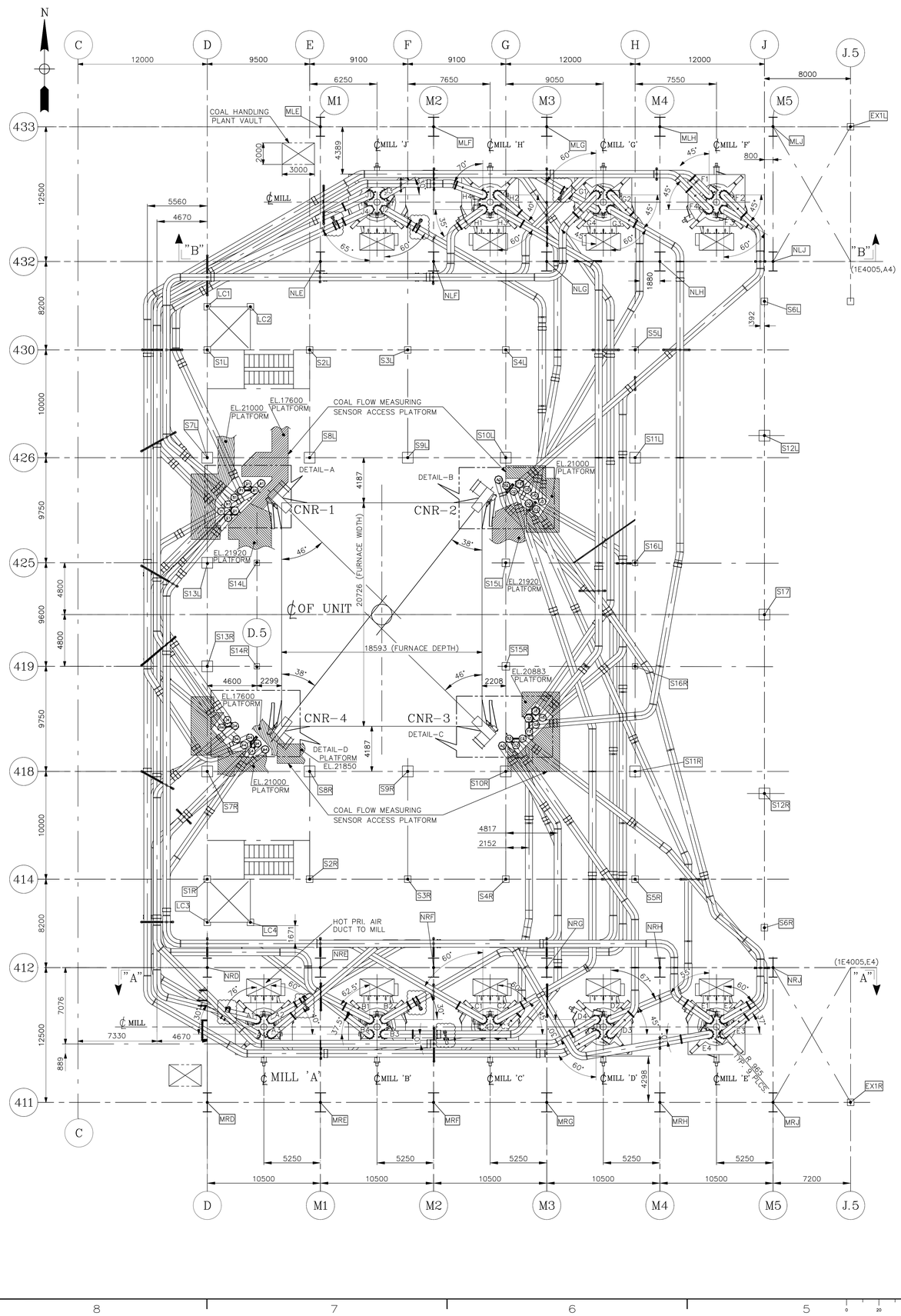
10.3 OTHERS

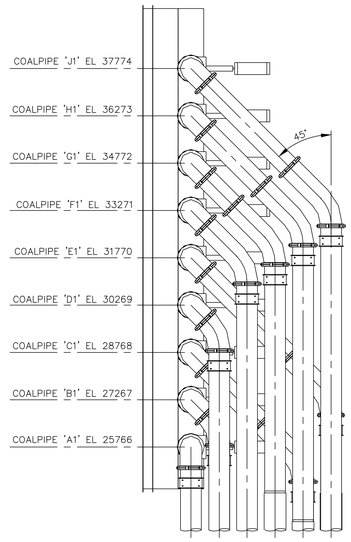
BHEL SPECIFICATION	VENDOR CONFIRMATION
10.3.1 COMMISSIONING SPARES QUOTED WITH MAIN OFFER	YES / NO
10.3.2 2/3 YEARS OPERATIONAL SPARES QUOTED SEPARATELY	YES / NO
10.3.3 GENERAL ARRANGEMENT DRAWING NO.	

NOTE:

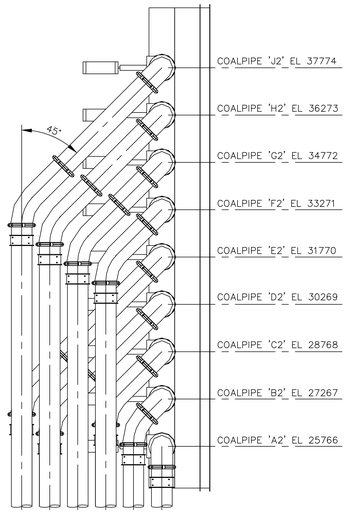
Vendor shall fill-up the orifice data sheet (Cl. 10.1), Mechanical data sheet (Cl.10.2), Data sheets for others (Cl. 10.3), submit along with the offer duly signing the same.

00212-1E4000	REVISION	00	D R V W 08AUG12	C H BS K 21AUG12	A P PB P 22AUG12	C0 – INITIAL ISSUE FOR INFORMATION	01	D R KK W 01MAR13	C H BS K 11MAR13	A P PB P 15MAR13	C4 – FINAL ISSUE FOR INFORMATION

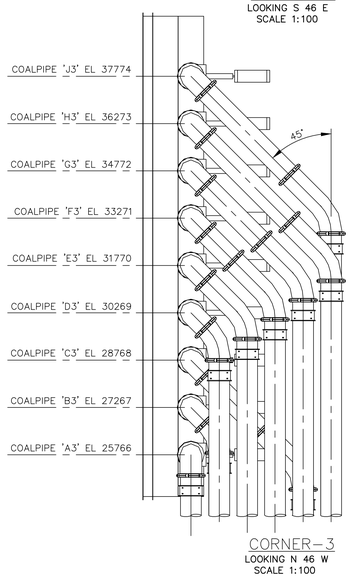




CORNER–1
LOOKING S 46 E
SCALE 1:100



CORNER–2
LOOKING S 38 W
SCALE 1:100



CORNER–3
LOOKING N 46 W
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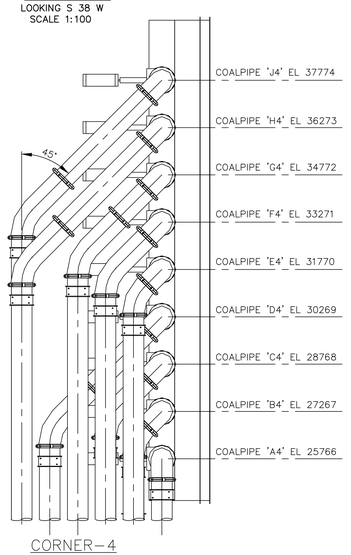
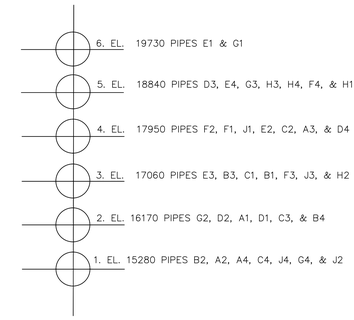


CORNER–4
LOOKING N 38 E
SCALE 1:100

COAL PIPE ELEVATIONS



GENERAL NOTES

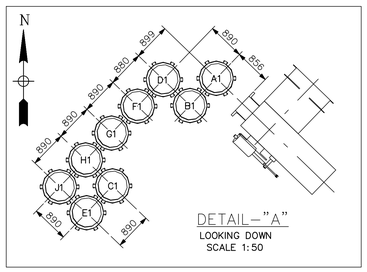
1. ALL DIMENSIONS ARE IN mm.
2. COAL PIPE SIZE WILL BE CARBON STEEL 660mm. OD X 14.2mm. THICK
3. COAL PIPE BENDS SIZE WILL BE 708mm. OD, 2D BEND RAD EXCEPT FOR THE FUEL INLET ELBOW THAT WILL BE 1D BEND RAD. ALL BENDS WILL HAVE 20mm THICK CERAMIC LINING WITH 8mm THICK STEEL SHELL AND 10mm MORTAR.
4. ALL CERAMIC BENDS 11° TO 29° SHALL UTILIZE AN INLET EXTENSION OF 100 mm AND AN OUTLET EXTENSION OF 660 mm.
5. ALL CERAMIC BENDS 30° TO 90° SHALL UTILIZE AN INLET EXTENSION OF 100 mm AND AN OUTLET EXTENSION OF 1320 mm.
6. OUTLET EXTENSION CRITERIA SHALL NOT APPLY TO FULLY CERAMIC LINED BEND TO BEND CONNECTIONS AND THE FUEL INLET ELBOWS THAT WILL BE LINED UP TO THE BURNER SHUT–OFF GATES.
7. ALL BENDS WITH ANGLE 10° OR LESS SHALL BE STEEL BENDS WITH INLET/OUTLET EXTENSIONS OF 800 mm.
8. FOR VIEWS TAKEN ON MILL BAY COLUMN AXIS SEE REF DWG NO 5
9. STRAIGHT PIPE ABOVE MILL UPTO MILL OUTLET ELBOW AND ORIFICES ARE CERAMIC LINED.

REF. DWGS.

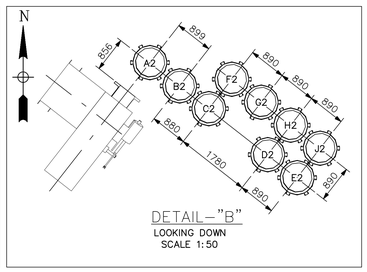
1. 660 OD COAL PIPING–KEY PLAN & WND BOX CONN DETAIL	----- 00212–1E4001
2. 660 OD COAL PIPING–FRONT & SOUTH SIDE ELEV.	----- 00212–1E4002
3. 660 OD COAL PIPING–REAR & NORTH SIDE ELEV.	----- 00212–1E4003
4. 660 OD COAL PIPING–CHUNK LOADS (FOR FOUNDATION)	----- 00212–1E4004
5. 660 OD COAL PIPING–CROSSING MILL BAY VIEWS	----- 00212–1E4005
6. 660 OD COAL PIPING–LOADS & SUPPT LOCATIONS	----- 00212–1E4007
7. 660 OD COAL PIPING–ISOMETRICS (SHTS. 1 THRU 37)	----- 00212–1E4020
8. HP 1103 BOWL MILL ARRANGEMENT	----- E–PLVE–1505

SPECIAL NOTES:

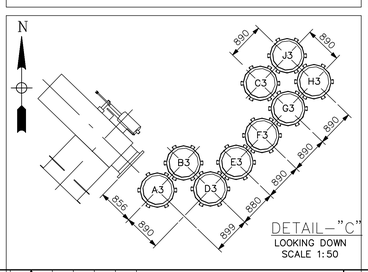
1. "*" ADJUSTABLE COAL FLOW ORIFICE.
2. ADJUSTABLE COAL FLOW ORIFICES AND ITS SENSOR PROPOSED LOCATIONS ARE SHOWN IN THE DRAWING. HOWEVER GET THE CONFIRM FROM VENDOR FOR ORIFICE AND ITS SENSOR LOCATION BEFORE ERECTION.
3. THE FOLLOWING "ADJUSTABLE COAL FLOW ORIFICES" ARE LOCATED IN VERTICAL PIPE A1, B1, C1, D1, E1, F1, G1, H1, J1, A3, B3, C3, D3, E3, F3, G3, H3, J3, C2, D2, E2, F2, G2, H2, B4, D4, E4, F4 & H4.
4. THE FOLLOWING "ADJUSTABLE COAL FLOW ORIFICES"ARE LOCATED IN HORIZONTAL PIPE A2, A4, B2, C4, G4, J2 & J4.
5. ORIFICE VENDOR IS TO CONFIRM THE PROPOSED LOCATION OF ADJUSTABLE COAL FLOW ORIFICE IN VERTICAL AND HORIZONTAL RUNS OF COAL PIPES.



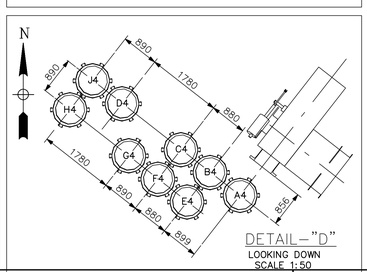
DETAIL–"A"
LOOKING DOWN
SCALE 1:50



DETAIL–"B"
LOOKING DOWN
SCALE 1:50



DETAIL–"C"
LOOKING DOWN
SCALE 1:50



DETAIL–"D"
LOOKING DOWN
SCALE 1:50

REV.	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
01	FINAL ISSUE FOR INFORMATION	15MAR13	KK	BS	PB
00	INITIAL ISSUE FOR INFORMATION	22AUG12	VV	BS	PB

BHEL CUSTOMER No.: 1711 & 1712

NTPC DRG NO 9575–102–01–TR–PVM–F–0781

CUSTOMER: NTPC LIMITED (A Government of India Enterprise)

PROJECT: MOUDA SUPER THERMAL POWER PROJECT
STAGE–II (2 X 660MW)
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

ALL DIMENSIONS ARE IN MILLIMETERS | BHEL DRAWING NO. 0–47–260–02391 | REV. 01

PROJECTION | SCALE

CONTRACT NO. 00212 | UNIT NO'S. 3 & 4

660 OD COAL PIPING ARRANGEMENT
FOR STEAM GENERATOR
MOUDA SUPER THERMAL POWER PROJECT
STAGE II – 2 X 660 MW

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SCALE : AS NOTED
DRAWN BY : VV DATE : 08AUG2012
CHECKED BY : B.S DATE : 21AUG2012
APPROVED BY : P.B DATE : 22AUG2012

WBS CODE : 44888120

QSGM ALSTOM

DRAWING NO. 00212–1E4000 | REV. 01

C FILE NAME: 00212–1E4000
D DIRECTORY: v:\00212