NEYVELI LIGNITE CORPORATION LIMITED (NLC LTD.)

2X500 MW NEYVELI NEW THERMAL POWER PROJECT (NNTPP) - TG PACKAGE

TECHNICAL SPECIFICATION
FOR

FLOW ELEMENT - NOZZLE

VOLUME IIB & III

SPECIFICATION No: **PE-TS-402-145-I 105B**

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT DIVISION
NOIDA, INDIA

1.0 The tender document contains three (3) volumes. The bidder shall meet the requirements of all the three volumes.

1.1 **Volume-I (CONDITIONS OF CONTRACT)**

This consists of four parts as below :-

Volume-IA	:	This part contains instructions to bidders for making bids to BHEL.
Volume-IB	:	This part contains general commercial conditions of the tender & includes provision that vendor is responsible for the quality of item supplied by their sub-vendors.
Volume-IC	:	This part contains special conditions of contract.
Volume-ID	:	This part contains commercial conditions for erection & commissioning site work, as applicable.

1.2 **Volume-II TECHNICAL SPECIFICATIONS**

Technical requirements are stipulated in Volume-II which comprises of :-

Volume-IIA	:	General Technical Conditions
Volume-IIB	:	Technical Specification including Drawings, if any.

1.2.1 **Volume-IIB**

This volume is sub-divided into following sections :-

Section-A	:	This section outlines the scope of enquiry.
Section-B	:	This section provides "Project Information".
Section-C	:	This section indicates technical requirements specific to the contract, not covered in Section-D.
Section-D	:	This section comprises of technical specifications of equipments complete with data sheet A, B and C.

Data Sheet - A specifies data and other requirements pertaining to the Equipment.

Data Sheet - B Specifies data to be filled by the bidder (Data Sheet-B is contained in Volume-III).

Data Sheet - C Indicates data/documents to be furnished after the award of contract as per agreed schedule by the vendor (as applicable).

1.2.2 **Volume-III TECHNICAL SCHEDULES**

This volume contains technical schedules and Data Sheets-B, which are to be duly filled by the bidder and the same shall be furnished with the technical bid as per instructions given in Document No. PE-SS-999-100-Q-002 in Volume-III.

2.0 The requirements mentioned in Section-C / Data Sheets-A of section-D shall prevail and govern in case of conflict between the same and the corresponding requirements mentioned in the descriptive portion in Section-D.

PREPARED BY VM RAO, DGM (Q)	APPROVED BY : RAJIVA K SOOD, AGM & MR SDM_files labelled.doc

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PREPARED BY:	CHECKED BY:	APPROVED BY:
14/8/14	14/8/14	16.08.14
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VOL-II B

BHEL	Technical specification for **FLOW NOZZLE ASSEMBLIES** **2X500 MW NNTPP-TG PACKAGE**	SPECIFICATION NO : PE-TS-402-145-I105B VOLUME **II-B** SECTION **A** REV. NO. 00 DATE: 14.08.2014 SHEET 5 OF 49

SECTION – A

SCOPE OF ENQUIRY

	Technical specification for **FLOW NOZZLE ASSEMBLIES** **2X500 MW NNTPP-TG PACKAGE**	SPECIFICATION NO. PE-TS-402-145-I105B
		VOLUME **II-B**
		SECTION **A**
		REV. NO. 00 DATE: 14.08.2014
		SHEET 6 OF 49

SCOPE OF ENQUIRY

1. SCOPE

1.1 This specification covers the Design, Manufacture, Inspection and Testing at manufacturer's works, proper packing for transportation and delivery to site of the **Flow Nozzle Assemblies** as mentioned in different sections of this specification for **2X500 MW NEYVELI NEW THERMAL POWER PLANT (NNTPP) - TG PACKAGE**

1.2 The quality plan enclosed forms the minimum requirement but not limited to be adhered to by the bidder. Bidder to sign and stamp the same and submit along with the offer as an acceptance.

1.3 Delivery schedule for the flow nozzle assemblies shall be as per Purchase Order.

1.4 Branch pipe for flow nozzles assemblies are free issue from BHEL Piping Centre, Chennai/BHEL Trichy. Bidder's scope includes transportation of the necessary length of branch pipes from BHEL Piping Centre, Chennai/BHEL Trichy to their works.

1.6 Scope of supply shall be flow nozzles , stub nipples, root valves, spares etc. as indicated in specification & calibration to be done(one per type) at IIT/FCRI/GOVT. approved lab.

2. GENERAL TECHNICAL INSTRUCTIONS

2.1 It is not the intent here to specify all the details of design and manufacture. However, the equipment shall conform in all respects to high standard of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to the customer / consultant, who will interpret the meaning of drawing and specification and shall be entitled to reject any component or material which in his judgment is not in full accordance herewith.

2.2 The omission of specific reference to any component / accessory necessary for proper performance of the equipments shall not relieve the supplier of the responsibility of providing such facilities to complete the supply within the quoted prices.

2.3 BHEL's / NLC's representatives shall be given access to the shop in which the equipments are being manufactured or tested and all test records shall be made available to him.

2.4 The Equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and Material Dispatch Clearance Certificate (MDCC) is issued by BHEL / NLC.

SECTION – B

PROJECT INFORMATION

SALIENT FEATURES OF THE SITE & GENERAL PROJECT INFORMATION

1.1 Introduction

The project site at Neyveli has distinct location advantages, being at pit-head distance from the source of lignite supply from Mines, making it convenient for transportation of lignite by belt conveyor. Water source is readily available from the nearby mines lake. Besides, other infrastructure such as access road, railway connection etc, already exist.

1.2 Power Plant Site

The power plant site is located at Neyveli, opposite to the now defunct Fertilizer and Briquetting & Carbonization Plant, near TPS-I Expansion and TPS-II.

1.3 Project & Site Information

(i).	Owner / Purchaser	:	Neyveli Lignite Corporation Limited (NLC Ltd), Neyveli, Cuddalore District, Tamil Nadu State, India
(ii).	Consultant	:	Lahmeyer International (India) Pvt. Ltd (LII), Gurgaon, NCR, India.
(iii).	Project Title	:	2x500 MW Neyveli New Thermal Power Project (NNTPP)
(iv).	Location	:	200 kms south of Chennai and 50 kms south-west of Cuddalore
(v).	Latitude	:	11° 34′ 00″ N to 11° 35′ 00″ N
(vi).	Longitude	:	79° 26′ 00″ E to 79° 27′ 00″ E
(vii).	Elevation above MSL	:	(+) 67 m
(viii).	Nearest Railway Station	:	Neyveli,
(ix).	Nearest Sea Port	:	Chennai, at a distance of 200 km
(x).	Nearest Airport	:	Chennai, at a distance of 200 km
(xi).	Road Access/Approach to Site	:	Connected by Chennai-Thanjavur NH 45C road and state highway connecting Cuddalore – Virudhachalam via Neyveli. Both NH and state high way roads are well connected to NLC township roads. The approach road is approximately 15 kms from Chennai–Thanjavur NH – 45C road
(xii).	**Site Meteorological Data**		
	• Max ambient temperature	:	42.8° C
	• Min Ambient Temperature	:	26.9° C

• Wet bulb temp	:	29° C
• Max. Relative Humidity	:	92 % in the month of September
• Min. Relative Humidity		23 % in the month of May
• Rainfall		About 1265.7 mm annually (average)
• Wind direction		South West to North East direction
• Wind Speed		97.2 km/hr (maximum recorded) 4.3 km/hr (average wind speed)
• Seismicity		As per IS: 1893 (part 4) (Zone-II) Importance factor: 1.75.

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SECTION – C

SPECIFIC TECHNICAL REQUIREMENTS

SPECIFIC TECHNICAL REQUIREMENTS

The technical requirements in this section are specific for this project and shall over-ride the specification under section-D in case of any contradiction.

1. **Bidder to note that data sheet-B as enclosed in the section-D to be filled in all respects. Quality Plan enclosed in Vol. IIB should be furnished along with tender duly signed and stamped. NO Deviation is acceptable.**

2. All the formats in Vol. III should be filled up and furnished with the bid complete in all respect. Catalogues, leaflets related with the models of Flow Nozzles and accessories offered must be furnished with the offer. In the absence of those, the bid would be considered incomplete and liable for rejection.

3. Material of body and trim of root valves, nipple and expander/reducer for flow elements shall be SS-316.

4. Acceptance norms for surface finish after machining for both pipe and nozzle should meet the requirement of ASME PTC 19.5

5. Calibration of the Flow nozzles shall be as per ASME PTC 19.5.

6. Hydraulic test pressure for Assemblies shall be 1.5 times of the design pressure at normal temperature.

7. Inspection shall be carried out in line with the approved drawings / data sheets / QP and specific technical requirements.

8. For 25 Nb size root valves, suitable reducer shall be supplied to suit 15 Nb impulse pipe at the other end.

9. SS nameplate for Flow nozzle shall include Tag no./ KKS no./ Sl. No./ Body material/ Beta ratio/ Line size & thickness/ direction of flow.

10. Customer's specification for Flow nozzle is enclosed, sheet no. 13-15 of the Technical specification.

11. One Flow Nozzle of each size and type shall be tested and calibrated by the bidder at IIT/FCRI/GOVT. approved laboratory within his quoted price. However, the calibration test charges shall be furnished by the bidder separately in their offer.

12. Bidder to note that any commercial implication due to change in process parameters for the flow element during contract stage as long as pipe size remain unchanged shall not be acceptable.

13. Documentation:

(A) Along with the bids:

No separate documentation required at the time of bids except those specifically listed under Cl. No. 6.0 of Sec-D of Vol-II B.

(B) After the award of contract:

9 sets of the following documents + 5 sets of CDs to be enclosed for Approval:

a. Assembly drawing of all type of Flow Nozzle assemblies complete with all accessories indicating detailed dimensions, BOM and weights.

b. Flow Nozzle G.A Drawing including Edge preparation details.

c. Technical Data sheet-C completely filled-up.

d. Quality Plan duly signed and stamped.

e. Bore size calculations for Flow Nozzles for all the conditions indicated in the data sheets.

f. Differential Pressure Vs Flow, curve for each Nozzle.

g. All relevant catalogues for the models of the Flow Nozzle Assemblies as well as accessories finalized.

h. Bar chart to indicate the time schedule for procurement, manufacture, testing and dispatch.

(C) Final documentation:

1. Category –I & IV Approved final drawings/data sheets, – 16 sets with 6 CD-ROMS
   Bore sizing calculations, DP Vs Flow Curve for each Nozzle.
2. As-built drawings – 10 sets with 4 CD-ROMS
3. Test certificates – 10 sets with 4 CD-ROMS
4. Operation & Maintenance Manuals – 18 sets with 4 CD-ROMS
   For Flow Element Assemblies and all the Accessories.

2. The take-off nipples shall be screwed / welded according to the design requirement.
3. The hand wheel of the take-off valves shall be so oriented that they can be operated conveniently from approach platform, ladder etc. Otherwise approach platform, ladder shall be provided.
4. For steam services, condensation pots shall be connected to the tapping point before or after first take-off valves. Utmost care shall be taken to ensure that both the condensation pots are at the same level. All necessary bracing, saddle etc. shall be fabricated and used to support the condensation pots with the main pipe.
5. Orifice plates shall be inserted with proper orientation with respect to fluid flow in line.
6. Orifice plate should only be inserted in position for checking the alignment. Thereafter, it will be withdrawn and preserved till pre-commissioning activities are over.
7. Contractor shall supply suitable gaskets while fixing the orifice plates in position.
8. The orifice bar handle, shall be so oriented that the imprints are readable unassisted from the access floor of platform.
9. Contractor shall ensure proper orientation of drain or vent holes

13.6.2 Flow Nozzle

Flow Nozzles shall normally be shop assembled in branch pipe and welded in position with main pipe. The flow nozzles shall generally have D-D/2 tapping and shall be shop assembled with take-off nipples and root valves. Contractor's scope of work shall include connecting the condensation pots (for steam services) before installation of the differential pressure instrument

13.7 Local Panels, Racks, Cubicles, Gauge Board Enclosures & Structures

Local racks, panels, gauge boards, cubicles shall be installed at specified locations. Work shall also include fabrication and installation of gauge boards, stands, mounting brackets and frames, drain headers etc. with associated painting and civil work.

1. Contractor shall erect panels / cubicles / enclosures etc. only after ensuring availability of work front.
2. The panels shall be issued from warehouse or storage yard on the same day when the actual erection is performed.
3. Panel, once uncrated, must be installed on the same day.
4. Panels supplied in packed condition, will be properly slinged for lifting. When lifting unpacked panels eye-bolts shall be used. Unpacking should be done at store or installation site only.
5. During slinging or lifting of the panel, care shall be taken not to damage the structure or any instrument / equipment mounted on the panel.

b) Flow Nozzle

Table 9.18 B

Specification for Flow Nozzle

S.N	Feature	Minimum Requirement
1	Type	Long Radius welded type ASME PTC 19.5 (Part III) or BS – 1042
2	Material	Same as Pipe material
3	Thickness	Suitable for intended application
3	Beta ratio	Around 0.7
4	Tapping's	D and D/2 (3 nos. tappings)
5	Material of Branch Pipe	Same as main pipe
6	Root Valve type	Globe
7	Root Valve material	SS 316
8	Root Valve size	1"
9	Accessories	Root Valves, Vent & Drain Hole

1. Contractor to provide Beta ratio calculation, Assembly drawings & flow vs DP curves.
2. The branch pipes for holding the flow nozzle shall also be furnished along with the flow nozzle. All nipples, welding adaptors and root valves shall also be in the scope of supply.
3. Flow nozzles in high pressure pipes shall be subject to a test according to DIN 50049, 3.1C, considering the technical guideline. The test of flow nozzles shall contain:
   - Check of drawings
   - X-ray testing of the circular bead or colour soaking or ultra-sonic testing
   - Test of sizes.
4. Flow nozzle shall be provided with a permanent mark indicating:
   - Measuring point number
   - Direction of flow
   - Plus and minus tapping
   - Material

   Moreover, the actual inside pipe diameter "D" and the diameter of the flow nozzle shall be stated on the identification plate.
5. The Contractor shall provide the following documents:
   - Design drawings of the flow nozzle
   - Calculation documents

- Fabrication, assembly and installation drawings
- Test reports.

6. For measurements of steam, balancing vessels shall be provided. Balancing vessels shall be used for flow measurement in steam system based on the differential pressure method to ensure a defined water column. The balance vessels shall be arranged on the same geodetic level. If this is not possible for design reasons, the level difference shall be taken into account during calibration

9.20 Hydrogen Analyzer

Table 9.19

Specification for Hydrogen Analyzer

S.N	Feature	Minimum Requirement
1	Accuracy	+/- 0.2 % of full scale
2	Linearity	+/- 1% of full scale
3	Response time	less than 5 seconds (Up to 90% of full scale)
4	Drift	+/- 0.005% per 2 Deg. Centigrade temp. change
5	Temperature compensation	Automatic
6	Sample filter	Ceramic 3.5 micron
7	Zero & Span Adjustment	Required
8	Ambient Temperature	60*C
9	Indication	Digital
10	Enclosure Type/Material	Weather & Dust proof IP-65 SS
11	Type of Electronics	Microprocessor based with self diagnostic facility
12	Calibration	Auto & manual
13	Output signals	Analog: 4-20 mA DC Binary: 2 NO + 2 NC for Alarms
14	Digital Signal transmission	RS-232 or RS-484 OR as per requirement to suit connection protocol of Plant DCS
15	Other requirement	HART Communication protocol compatibility & suitable for connection to Smart Transmitter Maintenance system. Purging System

9.21 Control Valves

A. Introduction

The control valves and accessories equipment furnished by the Contractor shall be designed, constructed and tested in accordance with the latest applicable requirements of code for pressure piping ANSI B

SECTION – D

- **EQUIPMENT SPECIFICATION**
- **DATA SHEETS – A & B**
- **DATA SHEETS - C**
- **QUALITY PLAN**
- **BILL OF QUANTITY**

	Technical specification for **FLOW NOZZLE ASSEMBLIES** **2X500 MW NNTPP-TG PACKAGE**	SPECIFICATION NO. PE-TS-402-145-I105B
		VOLUME **II-B**
		SECTION **D**
		REV. NO. 00 DATE: 14.08.2014
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SECTION – D

EQUIPMENT SPECIFICATION

(PES – 145 – 05)

To be followed for points pertaining to Flow Nozzle Assembly

	SPECIFICATION FOR FLOW MEASURING DEVICES (NOZZLES)	SPECIFICATION NO.: PES – 145 - 05	
		VOLUME II B	
		SECTION D	
		REV. NO. 04	DATE 30.08.12
		SHEET 1	OF 4

1.0 SCOPE

This specification covers the design, manufacture, calibration ,inspection and testing at the manufacturer's works, proper packing for transportation and delivery to site of flow nozzles along with Branch pipes (Refer Specification No. PES-145-05-A) for use in Utility/Captive Power Station/Combined Cycle Station.

2.0 CODES AND STANDARDS

2.1 All the equipment specified herein shall comply with the requirements of the latest issue of the relevant National and International standards.

2.2 The Design and Materials used for the components shall also comply with the relevant National and International standards.

2.3 As a minimum requirement, ASME PTC 19.5 / ISO 5167 standard shall be complied with for Flow Nozzles & ASME SA106, SA530 with material carbon steel Gr B & C with thickness <= 20 mm shall be used for branch pipes.

3.0 TECHNICAL REQUIREMENTS

The flow nozzles shall be used as the primary flow sensing elements. These sensing elements shall provide a safe and reliable means of creating differential pressures for use in flow measurements.

3.1 Flow Nozzles

The Flow nozzle assemblies shall conform to the following requirements unless specified otherwise in the corresponding data sheets.

3.1.1 Type : The Flow nozzles shall be of long radius, weld in type (suitable for welding with the associated branch pipe). The design and manufacture of the flow nozzles shall be as per ASME PTC 19.5. The data sheet enclosed specifies the requirements of each flow nozzle assembly. The bidder shall calculate the Beta ratio and validate suitability of the selected design for the specified application. Vent holes, if required for the specified duty shall be located at the top and drain holes at the bottom of the nozzle.

3.1.2 Material : The Flow nozzles shall be constructed of stainless steel type SS 316 .

3.1.3 Assembly : The Flow nozzles shall be supplied as complete assemblies, along with duly machined branch pipes, having proper end connection for welding on to the associated pipe at site. Welding shall be done as per the relevant ANSI practice in line with the main piping.

Each flow nozzle assembly shall be provided with minimum three pairs of pressure tapping complete with associated root valves, suitable for the service conditions. D & D/2 pressure tapping shall be provided on the branch pipe. The size of root valve should not be less than 15 NB. Two numbers of root valves to be provided for pressure $\geq$ 40Kg/Cm^2 for each tapping.

Each flow nozzle assembly will also be provided with a suitable nameplate, with tag number and duty.

3.1.4 Branch pipe:

1. For Pipe having thickness > 20 mm (Any Material).

   The branch pipe for mounting the flow Nozzle will be supplied as a free issue item by the purchaser. However the successful bidder shall collect the branch pipe from any of BHEL Units or Site, to be intimated by the purchaser during contract stage. The vendor shall be responsible for proper transportation from the above collection point, machining of the branch pipe and welding the flow nozzle inside the branch pipe. Acquiring of IBR certification if required shall also be the responsibility of the successful bidder. The cost of all such activities shall be included by the bidder in the offer.

2. For Pipe having thickness <= 20 mm (Material Carbon Steel Grade B & C).

   The branch pipe shall be procured by successful bidder as per the specification number PES-145-05-A. Acquiring of IBR certification if required shall also be the responsibility of the successful bidder. The cost of all such activities shall be included by the bidder in the offer.

3.2.5 While machining the ID to maintain uniform internal diameter, care shall be taken to ensure the minimum thickness of the branch pipe as per IBR regulations.

3.3 Guarantee & Performance

The guarantee for the flow nozzle assemblies shall be for 12 months continuous operation from the date of commissioning.

4.0 TESTS & INSPECTION

4.1 The equipment covered under this specification shall be subject to vendor's quality plan to be approved by the purchaser before start of manufacturing. To ensure that quality is in-built in each equipment the quality assurance system manual indicating the system followed by the vendor shall be submitted to purchaser for his review.

4.2 The quality plan forming part of this specification shall be the minimum requirements for the vendor's quality plan to be submitted with the offer. The vendor shall give at least 15 days written notice to purchaser for witnessing the tests/inspection at various stages. The expenses for all such tests/inspection shall be to manufacturer's account except for the expenses of purchaser's representatives witnessing the tests. The purchaser shall attend such tests/inspection within 15 days failing which the manufacturer may proceed with the tests which shall be deemed to have been made in purchaser's presence and shall furnish relevant test certificates to the purchaser.

4.3 One flow nozzle of each type and size shall be tested and calibrated by the bidder at customer's approved laboratory, within his quoted price. Details of the calibration test i.e., type of test, equipments employed etc. shall be submitted in the bid.

4.4 Each branch pipe shall be inspected by the purchaser after the completion of machining and prior to welding of the nozzle. This test will include dimensional checks, surface smoothness checks etc. Each branch pipe of thickness <= 20 mm with pipe material Carbon Steel Gr B & C shall be inspected as per Quality Plan for Branch Pipe.

4.5 IBR certification, if required for the specified service shall be obtained by the successful bidder from the concerned authority for submission to the purchaser.

4.6 The Standard QP is included in this specification to enable bidder to understand the extent of inspection and testing requirements to execute this job. The successful bidder has to follow the agreed QP, taking

care of customer requirements mentioned in Sec-C and submit QP for final approval by BHEL / Customer.

5.0 SPARES

5.1 The offer shall include a list of all the recommended spares offered, for the flow elements and accessories required for 3 years of operation, until & unless specified.

5.2 The offer shall include a list of all the commissioning spares offered, which are required for commissioning of the flow elements & accessories and the cost of which shall be included in the bidder's price.

5.3 The offer shall include a list of mandatory spares (If Specified), which is required for the guarantee period. The cost of these mandatory spares shall also be included in the price of the flow element assemblies and accessories.

5.4 The spares shall also include one set of maintenance kit including special tools, if required.

6.0 DRAWINGS & DOCUMENTS

6.1 To be furnished with the Bid:

The offer shall include the following technical documents in 5 copies each:

1. Technical data sheets for each flow element and accessories, in the proforma enclosed under Data sheet-B.

2. Catalogues/Technical literature for flow element and accessories.

3. List of installations for similar equipment supplied in Thermal Power Station applications.

4. Schedules listed under Vol. III-A duly completed with bidder's signature and seal.

5. Test & Inspection schedules.

6. Details of calibration tests i.e., type of tests, equipments employed for the testing of the flow elements, together with the name of the laboratories where these tests can be conducted.

7 The calculation of proper flow nozzle bore for the process conditions indicated in the data sheet.

8. Assembly drawing of each type of flow elements with detailed dimensions, B.O.M. and weights.

9. Deviations sought by bidder, if any, from the specification.

Note: **In case enquiry is raised in compliance mode, offer submission shall be as per Section A of the technical specification.**

6.2 To be furnished after award of contract

6.2.1 for approval:

1. Technical data sheets for each flow nozzle and accessories, in the proforma enclosed under Data sheet-B.

2. The calculation of proper flow nozzle bore for the process conditions indicated in the data sheet.

3. Assembly drawing of each type of flow nozzle complete with all accessories indicating detailed dimensions, B.O.M. and weights.

4. Detailed dimensional drawings of each flow nozzle, root valves, flow nozzles, branch pipes, pressure connections, nipples etc.

5. Installation drawings for the flow elements.

7. Differential pressure vs flow curve for each Nozzle.

6.2.2 For information:

1. Storage & commissioning instructions.

2. O&M manuals are to be supplied in 10 copies.

7.0 PACKING & MARKING

7.1 **Packing**: Each nozzle assembly and the associated accessories shall be packed properly with adequate protection against friction, stresses, vibrations and shocks during transportation. Each packing shall have markings as per Purchase Order / Special Condition of the Contract (SCC).

7.2 **Marking**: Each flow element assembly shall be identified with the following information:

- Tag Number
- Service
- Element Material
- Beta ratio
- Line size & thickness
- Direction of flow

8.0 APPLICABLE DATA SHEET FORMS

This document shall be read with one or more of the following data sheet forms:

- Data sheet A&B for Flow Measuring Devices (Nozzle) : Data sheet no. PES-145-05-DS3-0
- Data sheet C for Flow Measuring Devices (Nozzle) : Data sheet no. PES-145-05-DS4-0

SECTION – D

DATA SHEETS – A & B

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) 2X500 MW NNTPP-TG PACKAGE**	SPECIFICATION NO.: PE-TS-402-145-I105B	
		VOLUME IIB	
		SECTION D	
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Tag No. : **LCA90 BP 001** Date Sheet No. PES-145-05-DS1-0

DATA SHEET – A & B

	DATA SHEET – A (TO BE FILLED UP BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	**NNTPP–2x500 MW LIGNITE FIRED UNIT AT NEYVELI**	.....
	OFFER REFERENCE	BIDDER TO SPECIFY	.....
	QUANTITY	ONE (1) PER UNIT	.....
	SERVICE	**CONDENSATE FLOW TO DEAERATOR**	.....
ELEMENT	MAKE : MODEL	BIDDER TO SPECIFY	.....
	TYPE	[] ORIFICE [■] NOZZLE	.....
	STANDARD	[■] ASME PTC 19.5 [] BS 1042 [] OTHER	.....
	DESIGN	[] SQ EDGE [] BEVEL EDGE [] CARRIER RING	.....
		[] SHORT RADIUS [■] LONG RADIUS	.....
		[] LOW BETA [■] HIGH BETA	.....
			.....
	MATERIAL	[■] SS316 [] OTHER	.....
	BETA RATIO	~ 0.7	.....
	BORE DIAMETER	BIDDER TO SPECIFY	.....
	VENT HOLE	[] YES [■] NO	.....
	DRAIN HOLE	[] YES [■] NO	.....
END CONNECTION	TYPE	[] FLANGED [■] BUTT WELD END	.....
	FLANGE TYPE	[] WELD NECK [] SLIP ON [] THREADED	.....
	FLANGE RATING : MATERIAL	NOT APPLICABLE	.....
	BRANCH PIPE	[■] YES [] NO	.....
	BRANCH PIPE MATERIAL	SAME AS MAIN PIPE MATERIAL	.....
	TAPPING LOCATION	[■] D&D/2 [] CORNER [] VENTA CONTRACTA	.....
		[] ON FLANGE	.....
		[] ON PIPE [] ON CARRIER RING	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] 2 PAIR [] OTHER	.....
	ROOT VALVE NUMBER : SIZE	[] 12 [] 8 [■] 6 [] 4 : [] 15 NB [■] 25 NB	.....
	ROOT VALVE MATERIAL : RATING	[] CS [] AS [■] SS316 : ANSI # 800(GLOBE)	.....
	NIPPLE : SIZE/MATL/RATING/QTY	25NB/SS316/SCH.80/6 NOS. ; 250mm LONG	.....
	EXPANDER : SIZE/MATL/QTY	15NB x 25NB /SS316/6 NOS. ; 50.8mm LONG	.....
PROCESS DATA	FLUID	[■] CONDENSATE [] FEED WATER	.....
		[] STEAM [] CW [] OTHER	.....
		MAX. (Pump Design) / NORMAL (VWO) / MINIMUM (50 % MCR)	.....
	FLOW (T/HR)	1336 / 1209.6 / 655.4	.....
	PRESSURE (KG/CM2 (A))	9.2 / 7.98 / 4.17	.....
	TEMPERATURE (DEG. C.)	126 / 126 / 109.8	.....
	DESIGN PRESS : TEMP	39 $Kg/cm^2(g)$: 135 ^oC	.....
	MAX. ALLOWABLE PRESS LOSS	0.5 Kg/cm^2 at max. flow	.....
	DIFF. PRESS AT MAX FLOW	BIDDER TO SPECIFY	.....

Tag No. : **LCA90 BP 001**

Date Sheet No. PES-145-05-DS1-0

DATA SHEET – A & B

	DATA SHEET – A (TO BE FILLED UP BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PIPE LINE DATA	PIPE SIZE (OD x THK) mm PIPE MATERIAL BORE DIAMETER mm MIN. AVAILABLE STRAIGHT LENGTH UPSTREAM : DOWNSTREAM FLOW DIRECTION	406.4 x 12.7 SA 106 GR B BIDDER TO SPECIFY 10 D : 5 D [] HORIZONTAL [■] VERTICAL UP [] VERTICAL DOWN	....
OTHER INFORMATION	IBR CERTIFICATION TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	[] REQUIRED [■] NOT REQUIRED BIDDER TO SPECIFY	....

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 650 T/HR AND 1250 T/HR.
2. RECOMMENDED RANGE IS 0 – 1500 T/HR.

	DATA SHEET FOR FLOW ELEMENTS (NOZZLE) 2X500 MW NNTPP-TG PACKAGE	SPECIFICATION NO.: PE-TS-402-145-I105B	
		VOLUME IIB	
		SECTION D	
		REV. NO. 00	DATE 14.08.2014
		SHEET 25 OF 49	

Tag No. : **LAB10 BP 001, LAB20 BP 001, LAB30 BP 001** Date Sheet No. PES-145-05-DS1-0

DATA SHEET – A & B

	DATA SHEET – A (TO BE FILLED UP BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	**NNTPP–2x500 MW LIGNITE FIRED UNIT AT NEYVELI**	.....
	OFFER REFERENCE	BIDDER TO SPECIFY	.....
	QUANTITY	03 PER UNIT (ONE AGAINST EACH TAG NO.)	.....
	SERVICE	**BFP A/B/C SUCTION FLOW**	.....
ELEMENT	MAKE : MODEL	BIDDER TO SPECIFY	.....
	TYPE	[] ORIFICE [■] NOZZLE	.....
	STANDARD	[■] ASME PTC 19.5 [] BS 1042 [] OTHER	.....
	DESIGN	[] SQ EDGE [] BEVEL EDGE [] CARRIER RING	.....
		[] SHORT RADIUS [■] LONG RADIUS	.....
		[] LOW BETA [■] HIGH BETA	.....
			.....
	MATERIAL	[■] SS316 [] OTHER	.....
	BETA RATIO	~ 0.7	.....
	BORE DIAMETER	BIDDER TO SPECIFY	.....
	VENT HOLE	[] YES [■] NO	.....
	DRAIN HOLE	[] YES [■] NO	.....
END CONNECTION	TYPE	[] FLANGED [■] BUTT WELD END	.....
	FLANGE TYPE	[] WELD NECK [] SLIP ON [] THREADED	.....
	FLANGE RATING : MATERIAL	NOT APPLICABLE	.....
	BRANCH PIPE	[■] YES [] NO	.....
	BRANCH PIPE MATERIAL	SAME AS MAIN PIPE MATERIAL	.....
	TAPPING LOCATION	[■] D&D/2 [] CORNER [] VENTA CONTRACTA	.....
		[] ON FLANGE	.....
		[] ON PIPE [] ON CARRIER RING	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] 2 PAIR [] OTHER	.....
	ROOT VALVE NUMBER : SIZE	[] 12 [] 8 [■] 6 [] 4 : [] 15 NB [■] 25 NB	.....
	ROOT VALVE MATERIAL : RATING	[] CS [] AS [■] SS316 : ANSI # 800(GLOBE)	.....
	NIPPLE : SIZE/MATL/RATING/QTY	25NB/SS316/SCH.80/6 NOS. ; 250mm LONG	.....
	EXPANDER : SIZE/MATL/QTY	15NB x 25NB /SS316/6 NOS. ; 50.8mm LONG	.....
PROCESS DATA	FLUID	[] CONDENSATE [■] FEED WATER	.....
		[] STEAM [] CW [] OTHER	.....
		MAX. (Pump Runout) / NORMAL (VWO) / MINIMUM (Min. Recirculation)	.....
	FLOW (T/HR)	985 / 769 / 352	.....
	PRESSURE (KG/CM2 (A))	23.3 / 26.8 / 24.2	.....
	TEMPERATURE (DEG. C.)	145.2 / 160.4 / 110	.....
	DESIGN PRESS : TEMP	35 $Kg/cm^2(g)$: 175 ºC	.....
	MAX. ALLOWABLE PRESS LOSS	0.3 Kg/cm^2 at max. flow	.....
	DIFF. PRESS AT MAX FLOW	BIDDER TO SPECIFY	.....

Tag No. : **LAB10 BP 001, LAB20 BP 001, LAB30 BP 001** Date Sheet No. PES-145-05-DS1-0

DATA SHEET – A & B

	DATA SHEET – A (TO BE FILLED UP BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	406.4 x 9.53	.....
	PIPE MATERIAL	SA 106 GR B	.....
	BORE DIAMETER mm	BIDDER TO SPECIFY	.....
	MIN. AVAILABLE STRAIGHT LENGTH		.....
	UPSTREAM : DOWNSTREAM	10 D : 5 D	.....
	FLOW DIRECTION	[■] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	.....
OTHER INFORMATION	IBR CERTIFICATION	[] REQUIRED [■] NOT REQUIRED	.....
	TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	BIDDER TO SPECIFY	.....

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 350 T/HR AND 800 T/HR.
2. RECOMMENDED RANGE IS 0 – 1100 T/HR.

	DATA SHEET FOR FLOW ELEMENTS (NOZZLE) 2X500 MW NNTPP-TG PACKAGE	SPECIFICATION NO.: PE-TS-402-145-I105B	
		VOLUME IIB	
		SECTION D	
		REV. NO. 00	DATE 14.08.2014
		SHEET 27 OF 49	

Tag No. : **LCH10 BP 001, LCH30 BP 001** Date Sheet No. PES-145-05-DS1-0

DATA SHEET – A & B

DATA SHEET – A (TO BE FILLED UP BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	**NNTPP–2x500 MW LIGNITE FIRED UNIT AT NEYVELI**	.....
	OFFER REFERENCE	BIDDER TO SPECIFY	.....
	QUANTITY	02 PER UNIT (ONE AGAINST EACH TAG NO.)	.....
	SERVICE	**HPH-5A/5B DRAIN FLOW TO DEAERATOR**	.....
ELEMENT	MAKE : MODEL	BIDDER TO SPECIFY	.....
	TYPE	[] ORIFICE [■] NOZZLE	.....
	STANDARD	[■] ASME PTC 19.5 [] BS 1042 [] OTHER	.....
	DESIGN	[] SQ EDGE [] BEVEL EDGE [] CARRIER RING	.....
		[] SHORT RADIUS [■] LONG RADIUS	.....
		[] LOW BETA [■] HIGH BETA	.....
			.....
	MATERIAL	[■] SS316 [] OTHER	.....
	BETA RATIO	~ 0.7	.....
	BORE DIAMETER	BIDDER TO SPECIFY	.....
	VENT HOLE	[] YES [■] NO	.....
	DRAIN HOLE	[] YES [■] NO	.....
END CONNECTION	TYPE	[] FLANGED [■] BUTT WELD END	.....
	FLANGE TYPE	[] WELD NECK [] SLIP ON [] THREADED	.....
	FLANGE RATING : MATERIAL	NOT APPLICABLE	.....
	BRANCH PIPE	[■] YES [] NO	.....
	BRANCH PIPE MATERIAL	SAME AS MAIN PIPE MATERIAL	.....
	TAPPING LOCATION	[■] D&D/2 [] CORNER [] VENTA CONTRACTA	.....
		[] ON FLANGE	.....
		[] ON PIPE [] ON CARRIER RING	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] 2 PAIR [] OTHER	.....
	ROOT VALVE NUMBER : SIZE	[] 12 [] 8 [■] 6 [] 4 : [] 15 NB [■] 25 NB	.....
	ROOT VALVE MATERIAL : RATING	[] CS [] AS [■] SS316 : ANSI # 800(GLOBE)	.....
	NIPPLE : SIZE/MATL/RATING/QTY	25NB/SS316/SCH.80/6 NOS. ; 250mm LONG	.....
	EXPANDER : SIZE/MATL/QTY	15NB x 25NB /SS316/6 NOS. ; 50.8mm LONG	.....
PROCESS DATA	FLUID	[■] CONDENSATE [] FEED WATER	.....
		[] STEAM [] CW [] OTHER	.....
		MAX. (BMCR/VWO) / NORMAL (VWO) / MINIMUM (50% MCR)	.....
	FLOW (T/HR)	135 / 129 / 50.3	.....
	PRESSURE (KG/CM2 (A))	17.4 / 17.85 / 8.98	.....
	TEMPERATURE (DEG. C.)	167.9 / 169 / 144.0	.....
	DESIGN PRESS : TEMP	22 $Kg/cm^2(g)$: 180 ºC	.....
	MAX. ALLOWABLE PRESS LOSS	0.1 Kg/cm^2 at max. flow	.....
	DIFF. PRESS AT MAX FLOW	BIDDER TO SPECIFY	.....

Tag No.: **LCH10 BP 001, LCH30 BP 001** Date Sheet No. PES-145-05-DS1-0

DATA SHEET – A & B

	DATA SHEET – A (TO BE FILLED UP BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	219.1 x 8.18	.....
	PIPE MATERIAL	SA 106 GR C	.....
	BORE DIAMETER mm	BIDDER TO SPECIFY	.....
	MIN. AVAILABLE STRAIGHT LENGTH UPSTREAM : DOWNSTREAM	10 D : 5 D	.....
	FLOW DIRECTION	[■] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	.....
OTHER INFORMATION	IBR CERTIFICATION	[] REQUIRED [■] NOT REQUIRED	.....
	TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	BIDDER TO SPECIFY	.....

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 50 T/HR AND 130 T/HR.
2. RECOMMENDED RANGE IS 0 – 150 T/HR.

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) 2X500 MW NNTPP-TG PACKAGE**	SPECIFICATION NO.: PE-TS-402-145-I105B	
		VOLUME IIB	
		SECTION D	
		REV. NO. 00	DATE 14.08.2014
		SHEET 29 OF 49	

Tag No.: **LBS41 BP 001** Date Sheet No. PES-145-05-DS1-0

DATA SHEET – A & B

	DATA SHEET – A (TO BE FILLED UP BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	**NNTPP–2x500 MW LIGNITE FIRED UNIT AT NEYVELI**	.....
	OFFER REFERENCE	BIDDER TO SPECIFY	.....
	QUANTITY	ONE (1) PER UNIT	.....
	SERVICE	**EXTRACTION STEAM FLOW TO DEAERATOR**	.....
ELEMENT	MAKE : MODEL	BIDDER TO SPECIFY	.....
	TYPE	[] ORIFICE [■] NOZZLE	.....
	STANDARD	[■] ASME PTC 19.5 [] BS 1042 [] OTHER	.....
	DESIGN	[] SQ EDGE [] BEVEL EDGE [] CARRIER RING	.....
		[] SHORT RADIUS [■] LONG RADIUS	.....
		[] LOW BETA [■] HIGH BETA	.....
			.....
	MATERIAL	[■] SS316 [] OTHER	.....
	BETA RATIO	~ 0.7	.....
	BORE DIAMETER	BIDDER TO SPECIFY	.....
	VENT HOLE	[] YES [■] NO	.....
	DRAIN HOLE	[] YES [■] NO	.....
END CONNECTION	TYPE	[] FLANGED [■] BUTT WELD END	.....
	FLANGE TYPE	[] WELD NECK [] SLIP ON [] THREADED	.....
	FLANGE RATING : MATERIAL	NOT APPLICABLE	.....
	BRANCH PIPE	[■] YES [] NO	.....
	BRANCH PIPE MATERIAL	SAME AS MAIN PIPE MATERIAL	.....
	TAPPING LOCATION	[■] D&D/2 [] CORNER [] VENTA CONTRACTA	.....
		[] ON FLANGE	.....
		[] ON PIPE [] ON CARRIER RING	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] 2 PAIR [] OTHER	.....
	ROOT VALVE NUMBER : SIZE	[] 12 [] 8 [■] 6 [] 4 : [] 15 NB [■] 25 NB	.....
	ROOT VALVE MATERIAL : RATING	[] CS [] AS [■] SS316 : ANSI # 800(GLOBE)	.....
	NIPPLE : SIZE/MATL/RATING/QTY	25NB/SS316/SCH.80/6 NOS. ; 250mm LONG	.....
	EXPANDER : SIZE/MATL/QTY	15NB x 25NB /SS316/6 NOS. ; 50.8mm LONG	.....
PROCESS DATA	FLUID	[] CONDENSATE [] FEED WATER	.....
		[■] STEAM [] CW [] OTHER	.....
		MAX. (Max Output, Both Strings HPH Out) / NORMAL (VWO) / MINIMUM (50% MCR)	.....
	FLOW (T/HR)	79 / 70.4 / 31.3	.....
	PRESSURE (KG/CM2 (A))	7.69 / 7.15 / 3.95	.....
	TEMPERATURE (DEG. C.)	316.5 / 307.7 / 326.1	.....
	DESIGN PRESS : TEMP	9 $Kg/cm^2(g)$: 325 ºC	.....
	MAX. ALLOWABLE PRESS LOSS	0.1 Kg/cm^2 at max. flow	.....
	DIFF. PRESS AT MAX FLOW	BIDDER TO SPECIFY	.....

Tag No. : **LBS41 BP 001** Date Sheet No. PES-145-05-DS1-0

DATA SHEET – A & B

	DATA SHEET – A (TO BE FILLED UP BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PIPE LINE DATA	PIPE SIZE (OD x THK) mm PIPE MATERIAL BORE DIAMETER mm MIN. AVAILABLE STRAIGHT LENGTH UPSTREAM : DOWNSTREAM FLOW DIRECTION	508 x 12.7 SA 106 GR B BIDDER TO SPECIFY 10 D : 5 D [■] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	....
OTHER INFORMATION	IBR CERTIFICATION TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	[■] REQUIRED [] NOT REQUIRED BIDDER TO SPECIFY	....

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 25 T/HR AND 75 T/HR.
2. RECOMMENDED RANGE IS 0 – 100 T/HR.

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) 2X500 MW NNTPP-TG PACKAGE**	SPECIFICATION NO.: PE-TS-402-145-I105B	
		VOLUME IIB	
		SECTION D	
		REV. NO. 00	DATE 14.08.2014
		SHEET 31 OF 49	

Tag No.: **LBS43 BP 001, LBS44 BP 001** Date Sheet No. PES-145-05-DS1-0

DATA SHEET – A & B

	DATA SHEET – A (TO BE FILLED UP BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	**NNTPP–2x500 MW LIGNITE FIRED UNIT AT NEYVELI**	.....
	OFFER REFERENCE	BIDDER TO SPECIFY	.....
	QUANTITY	02 PER UNIT (ONE AGAINST EACH TAG NO.)	.....
	SERVICE	**EXTRACTION STEAM FLOW TO BFPT-A/B**	.....
ELEMENT	MAKE : MODEL	BIDDER TO SPECIFY	.....
	TYPE	[] ORIFICE [■] NOZZLE	.....
	STANDARD	[■] ASME PTC 19.5 [] BS 1042 [] OTHER	.....
	DESIGN	[] SQ EDGE [] BEVEL EDGE [] CARRIER RING	.....
		[] SHORT RADIUS [■] LONG RADIUS	.....
		[] LOW BETA [■] HIGH BETA	.....
			.....
	MATERIAL	[■] SS316 [] OTHER	.....
	BETA RATIO	~ 0.7	.....
	BORE DIAMETER	BIDDER TO SPECIFY	.....
	VENT HOLE	[] YES [■] NO	.....
	DRAIN HOLE	[] YES [■] NO	.....
END CONNECTION	TYPE	[] FLANGED [■] BUTT WELD END	.....
	FLANGE TYPE	[] WELD NECK [] SLIP ON [] THREADED	.....
	FLANGE RATING : MATERIAL	NOT APPLICABLE	.....
	BRANCH PIPE	[■] YES [] NO	.....
	BRANCH PIPE MATERIAL	SAME AS MAIN PIPE MATERIAL	.....
	TAPPING LOCATION	[■] D&D/2 [] CORNER [] VENTA CONTRACTA	.....
		[] ON FLANGE	.....
		[] ON PIPE [] ON CARRIER RING	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] 2 PAIR [] OTHER	.....
	ROOT VALVE NUMBER : SIZE	[] 12 [] 8 [■] 6 [] 4 : [] 15 NB [■] 25 NB	.....
	ROOT VALVE MATERIAL : RATING	[] CS [] AS [■] SS316 : ANSI # 800(GLOBE)	.....
	NIPPLE : SIZE/MATL/RATING/QTY	25NB/SS316/SCH.80/6 NOS. ; 250mm LONG	.....
	EXPANDER : SIZE/MATL/QTY	15NB x 25NB /SS316/6 NOS. ; 50.8mm LONG	.....
PROCESS DATA	FLUID	[] CONDENSATE [] FEED WATER	.....
		[■] STEAM [] CW [] OTHER	.....
		MAX. (60% MCR, One BFP in Opern.) / NORMAL (VWO) / MINIMUM (60% MCR)	.....
	FLOW (T/HR)	44.63 / 33.7 / 22.32	.....
	PRESSURE (KG/CM2 (A))	3.71 / 6.20 / 3.71	.....
	TEMPERATURE (DEG. C.)	309.7 / 306.6 / 309.7	.....
	DESIGN PRESS : TEMP	15 $Kg/cm^2(g)$: 325 ºC	.....
	MAX. ALLOWABLE PRESS LOSS	0.1 Kg/cm^2 at max. flow	.....
	DIFF. PRESS AT MAX FLOW	BIDDER TO SPECIFY	.....

Tag No. : **LBS43 BP 001, LBS44 BP 001** Date Sheet No. PES-145-05-DS1-0

DATA SHEET – A & B

	DATA SHEET – A (TO BE FILLED UP BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	406.4 x 9.53	.....
	PIPE MATERIAL	SA 106 GR B	.....
	BORE DIAMETER mm	BIDDER TO SPECIFY	.....
	MIN. AVAILABLE STRAIGHT LENGTH		.....
	UPSTREAM : DOWNSTREAM	10 D : 5 D	.....
	FLOW DIRECTION	[■] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	.....
OTHER INFORMATION	IBR CERTIFICATION	[■] REQUIRED [] NOT REQUIRED	.....
	TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	BIDDER TO SPECIFY	.....

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 20 T/HR AND 35 T/HR.
2. RECOMMENDED RANGE IS 0 – 55 T/HR.

SECTION – D

DATA SHEETS – C

FORM NO. PEM-6666-0

	Technical specification for **FLOW NOZZLE ASSEMBLIES** **2X500 MW NNTPP-TG PACKAGE**	SPECIFICATION NO. PE-TS-402-145-I105B VOLUME II B SECTION D REV. NO. 00 DATE: 14.08.2014 SHEET 34 OF 49

TAG No. ……. Qty..... Data Sheet No.: **PES-145-05-DS2-0**

Data Sheet C

DATA SHEET-C FOR FLOW MEASURING DEVICES (NOZZLES)
(TO BE FILLED BY CONTRACTOR AFTER AWARD OF CONTRACT)

GENERAL*	PROJECT					
	OFFER REFERENCE					
	TAG NO.	QUANTITY				
	SERVICE					
	MAKE	MODEL				
ELEMENT	TYPE					
	STANDARD					
	DESIGN					
	MATERIAL					
	BETA RATIO					
	BORE DIAMETER					
	VENT HOLE					
	DRAIN HOLE					
END CONNECTION	TYPE					
	FLANGE TYPE					
	FLANGE RATING	MATERIAL				
	BRANCH PIPE					
	BRANCH PIPE MATERIAL					
	TAPPING LOCATION					
	NUMBER OF TAPPINGS					
	ROOT VALVE NO.	SIZE				
	ROOT VALVE MATERIAL	RATING				
PROCESS DATA	FLUID					
	FLOW T/HR					
	PRESSURE ATA					
	TEMP DEG C					
	DESIGN PRESS	DESIGN TEMP				
	MAX ALLOWABLE PRESSURE LOSS					
	DIFF PRESS AT MAX FLOW					

	Technical specification for **FLOW NOZZLE ASSEMBLIES** **2X500 MW NNTPP-TG PACKAGE**	SPECIFICATION NO. PE-TS-402-145-I105B VOLUME II B SECTION D REV. NO. 00 DATE: 14.08.2014 SHEET 35 OF 49

TAG No. ……. Qty..... Data Sheet No.: **PES-145-05-DS2-0**

Data Sheet C

DATA SHEET-C FOR FLOW MEASURING DEVICES (NOZZLES)
(TO BE FILLED BY CONTRACTOR AFTER AWARD OF CONTRACT)

PIPE LINE DATA	PIPE SIZE (OD x THK) mm			
	PIPE MATERIAL			
	BORE DIAMETER mm			
	AVAILABLE STRAIGHT LENGTH			
	UPSTREAM	DOWNSTREAM		
	RESTRICTION			
	UPSTREAM	DOWNSTREAM		
	FLOW DIRECTION			
OTHER INFORMATION	IBR CERTIFICATION			
	TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES			

	PREPARED BY	**CHECKED BY**	**APPROVED BY**	**COMPANY SEAL**
NAME				
SIGNATURE				
DATE				

SECTION – D

QUALITY PLAN

PEM :: C&I

QUALITY PLAN
FOR
FLOW NOZZLE ASSEMBLY

QUALITY PLAN NO.:	**PE-QP-402-145-I105B**
VOLUME	IIB
SECTION	D
REV. NO.	00 DATE: 14.08.14
SHEET	37 OF 49

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
1.0	**RAW MATERIAL**											
	Flow Nozzle, pipe, adapter	Physical, Chemical properties	MA	Physical, Chemical tests	One / Heat	AP / DP /SP	AP / DP /SP	TC	3/2	---	2,1	Refer Note-1
		Ultrasonic testing (nozzle only)	MA	Ultrasonic test	100%	ASTMA388 & ANSI B 16.34	ASTMA388 & ANSI B 16.34	TC	3	2	1	
2.0	**IN PROCESS**											
2.1	Welding procedure specification (WPS)	Correctness	MA	Scrutiny	100%	IS:7307 / ASME IX	IS:7307 / ASME IX	Format of IS / ASME	3/2	---	2,1	IBR certification to be verified by BHEL,if applicable
2.2	Procedure Qualification Record(PQR) & Welders qualification	Weld soundness	MA	Physical test / Radiographic Test	IS:7307/ IS:7310/ ASME IX	IS:7307/ IS:7310/ ASME IX	IS:7307/ IS:7310/ ASME IX	Format of IS / ASME	3/2	2	1	Welding to be done by qualified welders. Refer Note-3
2.3	Weld FIT-UPS	Dimension, Alignment, Orientation.	MA	Measurement & Visual	100%	WPS/Approved drg.	WPS/Approved drg.	IR / Log Book	3/2	---	2	
2.4	Weldments final run	1. Surface defects	MA	Penetrant Test	100%	IS:3658 / ASTM 165/ ASME VIII Div. I	ASTM. / 165ASME VIII Div I	IR / Log Book	3/2	2	1	100% by Vendor,10 % by BHEL
		2. Sub Surface defects(After PWHT)	MA	Radiographic Test	100%	ASME SEC. V	ASME SEC. VIII	IR	3/2	2	1	Films to be reviewed by BHEL.

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics
IR - Inspection Reports; TC - Test Certificates; AP – Approved Drawings/doc
DS – Data Sheet; SP – Tech. Spec.
MR- Manufacturer records; MS- Manufacturer standards
$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.
1 - BHEL; 2 - Vendor; 3 - Sub-vendor; 4 – NLC/LII

PEM :: C&I

QUALITY PLAN FOR FLOW NOZZLE ASSEMBLY

QUALITY PLAN NO.:	**PE-QP-402-145-I105B**
VOLUME	IIB
SECTION	D
REV. NO.	00 DATE: 14.08.14
SHEET	38 OF 49

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
		3 Heat Treatment	MA	Review of HT Chart	100%	ASME SEC. VIII	ASME SEC. VIII	HT Chart	3/2	2	1	100% by Vendor,10% by BHEL
2.5	Machining											
	1. Flow Nozzle (machined)	1. Dimensions	MA	Measurement	100%	AP / DS	AP / DS	IR	3/2	2	1	
		2. Profile	MA	Measurement	100%	AP / DS	AP / DS	IR	3/2	2	1	
		3. Surface finish	MA	Visual	100%	----------	Mirror finish.	IR / Mfd Records	3/2	2	1	
	2. Pipe, Adapter	1. Machining of pipe ID	MA	Measurement	100%	AP / DS	AP / DS	IR	3/2	2	1	
		2. Dimensions	MA	Measurement	100%	AP / DS	AP / DS	IR	3/2	2	1	
		3. Surface flaw on weld edge preparation (for shop welding)	MA	Penetrant Test	100%	ASTM 165/ IS-3658	ASTM 165/ IS-3658	IR /TC	3/2	2	1	
		4. IBR Clearance	MA	Review	100%	IBR Compliance	IBR Compliance	Form III C	3/2		1	
3.0	**ROUTINE TEST**	1. Leak tightness	CR	Hydraulic test(1.5 times Design pressure)	100%	AP / DS	No Leakage	Test Certificate	3/2	2,1	---	Minimum time duration of test shall be ½ hours.

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics; IR - Inspection Reports; TC - Test Certificates; AP – Approved Drawings/doc; DS – Data Sheet; SP – Tech. Spec.; MR- Manufacturer records; MS- Manufacturer standards; $ P - Agency Performing the Test.; W - Agency Witnessing the Test.; V - Agency Verifying the Test.; 1 - BHEL; 2 - Vendor; 3 - Sub-vendor; 4 – NLC/LII

PEM :: C&I

QUALITY PLAN
FOR
FLOW NOZZLE ASSEMBLY

QUALITY PLAN NO.:	**PE-QP-402-145-I105B**
VOLUME	IIB
SECTION	D
REV. NO.	00 DATE: 14.08.14
SHEET	39 OF 49

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $			Remarks
									P	W	V	
		2. Calibration	CR	Measurement	1 per type per size	----	ASME PTC19.5	TC	2	---	1	Refer note-4
4.0	**FINAL ASSEMBLY**	1. Marking – Tag No., direction of flow	MI	Visual	100%	AP / DS	AP / DS	IR	2	---	1,4	
		2. Workmanship, surface flaw on weld edge preparation on end of pipe (for site welding)	MA	Visual, Penetrant test	100%	ASTM165 / IS: 3658	No Surface Flaw	TC /IR	3/2	2	1,4	
		3. Overall Dimensions and end connection	MA	Measurement	100%	AP / DS	AP / DS	IR	3/2	2/1, 4	---	Refer Note-2 before dispatch
5.0	**PACKING & DISPATCH**	Soundness of Packing against transit damage	MA	Visual	100%	SP / MS	SP /MS		2	---	---	Refer Note-5

NOTE:

1. Test Certificates to be verified by BHEL at final inspection stage.
2. Minimum 2 coats of primer paint to be applied before dispatch.
3. In case of NTPC / LLOYDS / BHEL qualified welders available, then prequalification and WPS, PQR not required, only TC to be verified.
4. CALIBRATION Test to be carried out at IIT-DELHI / FCRI or GOVT. approved laboratory.
5. Sea Worthy packing, if applicable.
6. Qualification records of the Vendors can be verified.
7. For P91 & P22 material welding should be continuously done. No interruptions shall be allowed.

LEGEND: * CR - Critical characteristics; MA - Major characteristics; MI - Minor characteristics
IR - Inspection Reports; TC - Test Certificates; AP – Approved Drawings/doc; DS – Data Sheet; SP – Tech. Spec.; MR- Manufacturer records; MS- Manufacturer standards
$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.
1 - BHEL; 2 - Vendor; 3 - Sub-vendor; 4 – NLC/LII

SECTION – D

BILL OF QUANTITY

BILL OF QUANTITY FOR FLOW NOZZLES

[A]FLOW NOZZLE ASSEMBLIES COMPLETE WITH Three(3) pairs of tappings & ACCESSORIES, like Pressure tap-off points, Root valves, Nipples etc.

S. No.	TAG NO.	SERVICE	QTY/UNIT	TOTAL QTY
1	LCA90BP001	CONDENSATE FLOW TO DEAERATOR	01	02
2	LAB10/20/30BP001	BFP A/B/C SUCTION FLOW	03	06
3	LCH10/30BP001	HPH-5A/5B DRAIN FLOW TO DEAERATOR	02	04
4	LBS41BP001	EXTRACTION STEAM FLOW TO DEAERATOR	01	02
5	LBS43BP001/44BP001	EXTRACTION STEAM FLOW TO BFPT-A & BFPT-B	02	04

NEYVELI LIGNITE CORPORATION LIMITED (NLC LTD.)

2X500 MW NEYVELI NEW THERMAL POWER PROJECT (NNTPP) - TG PACKAGE

TECHNICAL SPECIFICATION
FOR

FLOW ELEMENT - NOZZLE

VOLUME III

SPECIFICATION No: **PE-TS-402-145-I 105B**

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT DIVISION
NOIDA, INDIA

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NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

INSPECTION SCHEDULE

(PLACE & ADDRESS OF TESTING/INSPECTION AND ITS SCHEDULE DATE & DURATION IN NUMBER OF DAYS ITEM/COMPONENT WISE TO BE LISTED)

PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

DEVIATION SCHEDULE

PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

SCHEDULE OF UNIT PRICES

[A] FLOW ORIFICE ASSEMBLIES COMPLETE WITH Three (3) pairs of tappings, and ACCESSORIES, like Pressure tap-off points, Root valves, Nipples etc.

S. No.	TAG NO.	SERVICE	TYPE OF ASSY	Unit Price (of one complete Assy excluding calibration charges Ex-Works(in Rs.)
1	LCA90BP001	CONDENSATE FLOW TO DEAERATOR	NOZZLE	
2	LAB10BP001	BFP A SUCTION FLOW	NOZZLE	
3	LAB20BP001	BFP B SUCTION FLOW	NOZZLE	
4	LAB30BP001	BFP C SUCTION FLOW	NOZZLE	
5	LCH10BP001	HPH-5A DRAIN FLOW TO DEAERATOR	NOZZLE	
6	LCH30BP001	HPH-5B DRAIN FLOW TO DEAERATOR	NOZZLE	
7	LBS41BP001	EXTRACTION STEAM FLOW TO DEAERATOR	NOZZLE	
8	LBS43BP001	EXTRACTION STEAM FLOW TO BFPT-A	NOZZLE	
9	LBS44BP001	EXTRACTION STEAM FLOW TO BFPT-B	NOZZLE	

PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

[B] Unit prices for Root Valves and Nipples

S. No.	DESCRIPTION	For ORIFICE Tag Nos.	Unit Rate(Rs.)
1	ROOT VALVES	SS 316, 25 NB, ANSI#800	
2	NIPPLE	SS 316, 25 NB, SCH 80, 250 mm LONG	
3	EXPANDER	SS 316, 15 X 25 NB, SCH 3000, 50.8 mm LONG	

PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

SCHEDULE OF PRICES

[A] FLOW NOZZLE ASSEMBLIES COMPLETE WITH THREE (3) PAIRS OF TAPPINGS, AND ACCESSORIES, LIKE PRESSURE TAP-OFF POINTS, ROOT VALVES, NIPPLES etc.

S. NO. (A)	TAG NO. (B)	SERVICE (C)	TYPE (D)	UNIT PRICE FOR EACH ASSY EXCLUDING CALBRATION CHARGES (Rs.) (E)	CALIBRATION CHARGES(Rs.) (F)	TOTAL PRICE OF FLOW ASSY (INCLUDING COMMISSIONING SPARES for two units)(Rs.) (G)=2 X (E) + (F)
1	LCA90BP001	CONDENSATE FLOW TO DEAERATOR	NOZZLE			
2	LAB10BP001	BFP A SUCTION FLOW	NOZZLE			
3	LAB20BP001	BFP B SUCTION FLOW	NOZZLE		NA	
4	LAB30BP001	BFP C SUCTION FLOW	NOZZLE		NA	
5	LCH10BP001	HPH-5A DRAIN FLOW TO DEAERATOR	NOZZLE			
6	LCH30BP001	HPH-5B DRAIN FLOW TO DEAERATOR	NOZZLE		NA	
7	LBS41BP001	EXTRACTION STEAM FLOW TO DEAERATOR	NOZZLE			
8	LBS43BP001	EXTRACTION STEAM FLOW TO BFPT-A	NOZZLE			
9	LBS44BP001	EXTRACTION STEAM FLOW TO BFPT-B	NOZZLE		NA	

PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE

NAME	**DESIGNATION**	**SIGNATURE**	**COMPANY SEAL**