ALL DIMENSIONS ARE IN MM

FIRST ANGLE PROJECTION

TELANGANA STATE POWER GENERATION CORPORATION LIMITED

4 X 270 MW MANUGURU TPP

TECHNICAL SPECIFICATION

FOR FLOW ELEMENT ASSEMBLY–NOZZLE

JOB NO. 411	TITLE	TECHNICAL SPECIFICATION FOR NOZZLE ASSEMBLY	DOC. NO. PE–TS–411–145–I816
BHEL	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA		

DEPT CODE		NAME	SIGN	DATE
I	DESN	AKS		05.12.14
	CHD	SS		05.12.14
	APPD	MAM		05.12.14

spectit.dwg

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.

	Technical specification for **FLOW ELEMENT ASSEMBLIES (Nozzle)** **4 X 270 MW MANUGURU THERMAL POWER PROJECT**	SPECIFICATION NO**. PE-TS-411-145-I816**
		VOLUME **II-B**
		SECTION
		REV. NO. / DATE:
		SHEET

CONTENTS

VOL-II B

SECTION – A

SCOPE OF ENQUIRY

SCOPE OF ENQUIRY

1.0 SCOPE

This specification covers the Design, Manufacture, Inspection and Testing at manufacturer's works, proper packing for transportation and delivery to site of the Flow Element Assemblies along with Accessories, Start-up/Commissioning spares as mentioned in different sections of this specification for **4 X 270 MW MANUGURU THERMAL POWER** project**.**

.1 The quality plan enclosed forms the minimum requirement but not limited to be adhered to by the bidder.

.2 The enquiry shall be operated in '"**COMPLIANCE MODE**" means bidder to comply with the requirement of specification, quality plan, delivery schedule, quantities, start-up/commissioning spares, mandatory spares, recommended spares etc, and as a token of acceptance of the same, following formats to be signed, stamped with company seal and submitted separately for each project.

a) Compliance certificate
b) Quality plan
c) Schedule of submission of drawings / documents, equipment manufacture inspection and dispatch
d) Schedule of price, unit prices, inspection schedule

.3 No separate technical offer, data sheets to be submitted with the bid. Any such document shall not be taken cognizance of, and document (Compliance certificate) at 3a above shall be final and binding. Data sheets shall be furnished by the successful bidder (vendor), only after the award of contract.

.4 Bidder to note that CALIBRATION TEST is required to be conducted on one type per size, Bidder to group such assemblies and indicates the same along with the price bid. Unpriced portion to be submitted.

2.0 GENERAL TECHNICAL INSTRUCTIONS

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 The omission of specific reference to any component / accessory necessary for the 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.

3 BHEL's / Customer'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 them.

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/ Customer.

SECTION – B

PROJECT INFORMATION

PROJECT INFORMATION 4X270 MW MANUGURU TPS

INTRODUCTION

4x270 MW Manuguru TPS is being set up by Telangana State Electricity Corporation Limited (TSGENCO) at Manuguru in the district of Khammam, Telangana, India.

The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given here in under is for general guidance and shall not be contractually binding on BHEL/Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.

APPROACH TO SITE

The distance from Manuguru to Major cities in state: Hyderabad-345KM, Warangal-180km, Bhadrachalam-38km, Kothagudem-70km and Khammam-130km, Vijayawada-195km.

District: KHAMMAM

State: TELANGANA

Nearest Airport: The nearest airport is Vijayawada Airport but the most used airport is the Hyderabad International Airport.

Nearest Railway Station: Manuguru railway station is 10KM from nearby town. However Warangal/Vijaywada railway Station is major railway station near to Manuguru.

PROJECT INFORMATION 4X270 MW MANUGURU TPS

1. **Owner** TSGENCO
2. **Owner Consultant** DESEIN PRIVATE LIMITED, NEW DELHI
3. **Project Title** 4X270 MW MANUGURU TPS
4. **Location** 16 Km from Manuguru Railway station
5. **Nearest Railway Stn**. Manuguru
6. **Temperature**
   a. Mean daily minimum ambient temperature during oldest month of the year=11.5 Deg.C
   b. Mean daily minimum ambient temperature during hottest month of the year=45.1 Deg.C
7. **Rainfall**

   Intensity of rainfall @ 80 mm/hr considering heaviest fall in 24 hrs
8. **Wind Data**
   a. Basic wind speed at 10m height

      44 m/sec
   b. Wind pressure As per IS: 875 Part III- 1987
9. **Seismic Zone** Zone III as defined in IS:1893 (part-1)-2002according to Indian Standard Seismic Zoning Map

PROJECT INFORMATION 4X270 MW MANUGURU TPS

10.0	**Power Supply** **The power supplies for distribution and auxiliaries shall be as under:**	
	a) In plant generation	16.5kV ±5% , 3ph, 50Hz ±5%, high resistance earthed.
	b) MV distribution	6.6kV ±10 %, 3ph, 3w , 50 Hz, + 5 % to – 5%, Medium Resistance grounding
	c) LT distribution	415V ±10%, 3ph, 3W, 50Hz + 5% to –5%, High Resistance Grounding for all plant area shall be provided.
	d) Motor rated 160kW and above 160kW	6.6kV ±10 %, 3 ph, 3W,50Hz +5% to -5%.
	e) Motor rated below 160kW and all motorized actuators.	415V ±10%, 3 ph,3w, 50Hz +5% to -5%.
	f) For motors equal and below 30kW winding heating	24V AC ±10, 50 Hz %, [to be generated in 415V switchgear by vendor]
	g) DC Motors	220V DC + 10% to - 15%, 2 wire ungrounded system
	h) Control supply for relay panel/ 6.6kV breakers/415V breakers and DC emergency lighting.	220V DC + 10% to - 15%, 2 wire ungrounded system
	i) UPS for instrumentation & Control system	240V AC ±1 %, 1 ph ,50Hz ±0.5% 2 Wire AC system
	j) Control supply for 415V Motor contactors/AC Control circuits [to be generated in MCC /panel by vendor]	110V AC ±10%, 50Hz + 5% to –5%.
	k) Diesel Generator emergency supply	415V ±10%, 3ph,3W, 50Hz +5%to –5%.
11.0	**Fault levels**	
	a) 400kV	40kA rms for 1 sec
	b) 6.6kV	40 kA rms for 1 sec.
	c) 415V	50 kA rms for 1 sec.

	Technical specification for **ORIFICE** **4 X 270 MW MANUGURU THERMAL POWER PROJECT**	SPECIFICATION NO. PE-TS-411-145-I816	
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CUSTOMER SPECIFICATION

SPECIFIC TECHNICAL REQUIREMENTS for the project.

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

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

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

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

4. Acceptance norm for surface finish after machining for both pipe, nozzle is the requirements as specified in PTC 19.5.

5. Bidder to note that data sheet-B, Format "Schedule of submission of Drawings / Documents, Equipment Manufacture, Inspection and Despatch" enclosed in Section-D, to be signed and stamped and submitted with the bid. Quality Plan enclosed in Volume-IIB should be furnished duly signed and stamped.

6. All the formats in Volume-III should filled-up and furnished with the bid, complete in all respect.In the absence of those, the bid would be considered incomplete and liable for rejection.

7. Wherever IBR certification is required as per data sheet for an element, all accessories pertaining to that element shall require IBR Certification.

8. Material specified as "SS" shall be of "SS 316"

9. **SPARES :** The following spares are required to be offered

(A) Mandatory Spares:

The items listed in list of mandatory spares attached at section-D, of this specification, are the essential spares required to be offered by the bidder, and the price for which (Lump sum as well as individual) for each item to be quoted separately under the separate heading. The format for price schedule to be filled-up by the bidder is enclosed in Volume-III

Each Case / Container containing Mandatory spares shall be clearly marked or labelled on the outside with the description of the spares contained in it. When more than one item of spare parts are packed in a single Case / Carton, a general description of the contents shall be shown outside of such case, and detailed list enclosed. All Cases, Containers and Packages must be suitably marked and numbered for the purpose of identification.

(B) Recommended Spares:

In addition to the Mandatory spares mentioned, the bidder shall also furnish a List of Recommended spares if for 3 years of normal operation of the Flow Element Assemblies. The BHEL reserves the right to buy any or all of the recommended spares.

(C) Start-up & Commissioning Spares:

Start-up and Commissioning spares are those spares, which may be required during the start-up and commissioning of the Flow Element Assemblies. All start-up spares, which are supplied under this contract, shall be strictly interchangeable with the parts for which they are intended for replacements. The format for price schedule to be filled-up by the bidder is enclosed in Volume-III

The Start-up and commissioning spares indicated by the bidder shall be a part of the main Flow Element Assembly supplies. However bidder to indicate prices separately. The list of these spares required is enclosed in the section-D of this specification.

10. Documentation :

(A) Along with the bids: following documents for respective projects separately

a) Signed and stamped compliance certificates in attached format (VOL.-III).
b) Schedule of prices in attached format (VOL.-III).
c) Schedule of submission of Drg. / Doc, Equip. Manufacture, Inspection and Dispatch.
d) Inspection schedule

(B) After the award of contract :

The documentation as listed below to be submitted, separately for respective projects.

6 sets of the following documents + 3 sets of CDs to be submitted for Approval:

a) Assembly drawing of all type of Flow Element assemblies complete with all accessories indicating detailed dimensions, BOM and weights.
b) Flow Element Edge preparation details.
c) Installation drawings for the flow elements.
d) Technical Data sheet-C completely filled-up..
e) Quality Plan duly signed and stamped.
f) Bore size calculations for Flow Nozzles for all the conditions indicated in the data sheets.
g) Differential Pressure Vs Flow, curve for each Nozzle.
h) All relevant catalogues for the models of the Flow Element Assemblies as well as accessories finalized.

(C) Final documentation :

1. Category –I & IV Approved final drawings/data sheets, – 20 sets with 4 CD-ROMS Bore sizing calculations, DP Vs Flow Curve for each Nozzle.

2 Test certificates – 20 sets.

3. Operation & Maintenance Manuals for Flow Element Assemblies and all the Accessories. – 20 sets with 4 CD-ROMS

SECTION – D

- **EQUIPMENT SPECIFICATION**
- **DATA SHEETS – A & B**
- **DATA SHEETS - C**
- **QUALITY PLAN**
- **BILL OF QUANTITY**
- **SCHEDULE OF SUBMISSION OF DRAWINGS /DOCUMENTS, EQUIPMENT MANUFACTURE, INSPECTION AND DISPATCH**

SECTION – D

EQUIPMENT SPECIFICATION

(PES – 145 – 05)

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

	Technical specification for **FLOW ELEMENT ASSEMBLIES (NOZZLE)** **4 X 270 MW MANUGURU THERMAL POWER PROJECT**	SPECIFICATION NO**. PE-TS-411-145-I816**
		VOLUME **II-B**
		SECTION **D**
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SECTION – D

DATA SHEETS – A & B

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP**	SPECIFICATION NO.: .: PE-TS-411-145-I816 VOLUME IIB SECTION REV. NO. - | DATE SHEET

Tag No. : **LAB10BP001** Data 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	**4x 270 MW MANUGURU TPP**	.....
	OFFER REFERENCE	Bidder to specify	.....
	QUANTITY	01 PER UNIT (4 FOR STATION)	.....
	SERVICE	BFP-A SUCTION	.....
	MAKE : MODEL	Bidder to specify	.....
			.....
ELEMENT	TYPE	NOZZLE	.....
	STANDARD	ASME PTC 19.5	.....
	DESIGN	LONG RADIUS, HIGH BETA	.....
	MATERIAL	SS316	.....
	BETA RATIO	AROUND 0.7	.....
	BORE DIAMETER	Bidder to specify	.....
	VENT HOLE	NO	.....
	DRAIN HOLE	NO	.....
END CONNECTION	TYPE	BUTT WELD END	.....
	BRANCH PIPE	YES	.....
	BRANCH PIPE MATERIAL	SAME AS PIPE MATERIAL	.....
	TAPPING LOCATION	D&D/2 , ON PIPE	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] OTHER	.....
	ROOT VALVE NUMBER	[■] 6 [] 12 [] OTHER	.....
	ROOT VALVE SIZE	25 NB	.....
	ROOT VALVE MATERIAL	SS316	.....
	ROOT VALVE RATING : TYPE	ANSI # 800 : GLOBE	.....
	NIPPLE : QTY	6 NOS. ; 250mm LONG	.....
	NIPPLE :RATING	SCH.80	.....
	NIPPLE : MATERIAL	SS316	.....
	NIPPLE : SIZE	25NB	.....
	EXPANDER:QTY	6	.....
	EXPANDER:MATERIAL	SS316	.....
	EXPANDER:SIZE	15 NB X 25 NB	.....
PROCESS DATA	FLUID	[■] CONDENSATE [] FEED WATER [] STEAM [] DMCW [] OTHER	.....
		MAX. NORMAL MINIMUM	.....
	FLOW (T/HR)	450 398 100	.....
	PRESSURE (KG/CM^2 (A))	18 17.5 20	.....
	TEMPERATURE (DEG. C.)	163.1 162.2 138.2	.....
	DESIGN PRESS : TEMP	22 Kg/cm^2(g) : 170 ^oC	.....
	MAX. ALLOWABLE PRESS LOSS	0.25 ATA (at maximum flow)	.....
	DIFF. PRESS AT MAX FLOW	Bidder to specify	.....

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP**	SPECIFICATION NO.: .: PE-TS-411-145-I816 VOLUME IIB SECTION REV. NO. - | DATE SHEET

Tag No. : **LAB10BP001** Data 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	OD 273X THK 6.35 SA 106 Gr B Bidder to specify 15D 10 D : 5 D [■] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	....
OTHER INFORMATION	IBR CERTIFICATION TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	[■] REQUIRED [] NOT REQUIRED TO BE REFLECTED IN VENDOR DOCUMENT	

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 100 T/HR TO 450 T/HR.
2. RECOMMENDED RANGE IS 0 – 500 T/HR.

	DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP	SPECIFICATION NO.: .: PE-TS-411-145-I816
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		SECTION
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		SHEET

Tag No. : **LAB20BP001** Data 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	**4x 270 MW MANUGURU TPP**	.....
	OFFER REFERENCE	Bidder to specify	.....
	QUANTITY	01 PER UNIT (4 FOR STATION)	.....
	SERVICE	BFP-B SUCTION	.....
	MAKE : MODEL	Bidder to specify	.....
ELEMENT	TYPE	NOZZLE	.....
	STANDARD	ASME PTC 19.5	.....
	DESIGN	LONG RADIUS, HIGH BETA	.....
	MATERIAL	SS316	.....
	BETA RATIO	AROUND 0.7	.....
	BORE DIAMETER	Bidder to specify	.....
	VENT HOLE	NO	.....
	DRAIN HOLE	NO	.....
END CONNECTION	TYPE	BUTT WELD END	.....
	BRANCH PIPE	YES	.....
	BRANCH PIPE MATERIAL	SAME AS PIPE MATERIAL	.....
	TAPPING LOCATION	D&D/2 , ON PIPE	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] OTHER	.....
	ROOT VALVE NUMBER	[■] 6 [] 12 [] OTHER	.....
	ROOT VALVE SIZE	25 NB	.....
	ROOT VALVE MATERIAL	SS316	.....
	ROOT VALVE RATING : TYPE	ANSI # 800 : GLOBE	.....
	NIPPLE : QTY	6 NOS. ; 250mm LONG	.....
	NIPPLE :RATING	SCH.80	.....
	NIPPLE : MATERIAL	SS316	.....
	NIPPLE : SIZE	25NB	.....
	EXPANDER:QTY	6	.....
	EXPANDER:MATERIAL	SS316	.....
	EXPANDER:SIZE	15 NB X 25 NB	.....
PROCESS DATA	FLUID	[■] CONDENSATE [] FEED WATER [] STEAM [] DMCW [] OTHER	.....
		MAX. / NORMAL / MINIMUM	.....
	FLOW (T/HR)	450 / 398 / 100	.....
	PRESSURE (KG/CM^2 (A))	18 / 17.5 / 20	.....
	TEMPERATURE (DEG. C.)	163.1 / 162.2 / 138.2	.....
	DESIGN PRESS : TEMP	22 Kg/cm^2(g) : 170 ^oC	.....
	MAX. ALLOWABLE PRESS LOSS	0.25 ATA (at maximum flow)	.....
	DIFF. PRESS AT MAX FLOW	Bidder to specify	.....

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP**	SPECIFICATION NO.: .: PE-TS-411-145-I816 VOLUME IIB SECTION REV. NO. - | DATE SHEET

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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	OD 273X THK 6.35 SA 106 Gr B Bidder to specify 15D 10 D : 5 D [■] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	....
OTHER INFORMATION	IBR CERTIFICATION TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	[■] REQUIRED [] NOT REQUIRED TO BE REFLECTED IN VENDOR DOCUMENT	

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 100 T/HR TO 450 T/HR.
2. RECOMMENDED RANGE IS 0 – 500 T/HR.

	DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP	SPECIFICATION NO.: .: PE-TS-411-145-I816
		VOLUME IIB
		SECTION
		REV. NO. - / DATE
		SHEET

Tag No. : **LAB30BP001** Data Sheet No. PES-145-05-DS1

DATA SHEET – A & B

	DATA SHEET – A (TO BE FILLED UP BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	**4x 270 MW MANUGURU TPP**	.....
	OFFER REFERENCE	Bidder to specify	.....
	QUANTITY	01 PER UNIT (4 FOR STATION)	.....
	SERVICE	BFP-C SUCTION	.....
	MAKE : MODEL	Bidder to specify	.....
			.....
ELEMENT	TYPE	NOZZLE	.....
	STANDARD	ASME PTC 19.5	.....
	DESIGN	LONG RADIUS, HIGH BETA	.....
	MATERIAL	SS316	.....
	BETA RATIO	AROUND 0.7	.....
	BORE DIAMETER	Bidder to specify	.....
	VENT HOLE	NO	.....
	DRAIN HOLE	NO	.....
END CONNECTION	TYPE	BUTT WELD END	.....
	BRANCH PIPE	YES	.....
	BRANCH PIPE MATERIAL	SAME AS PIPE MATERIAL	.....
	TAPPING LOCATION	D&D/2 , ON PIPE	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] OTHER	.....
	ROOT VALVE NUMBER	[■] 6 [] 12 [] OTHER	.....
	ROOT VALVE SIZE	25 NB	.....
	ROOT VALVE MATERIAL	SS316	.....
	ROOT VALVE RATING : TYPE	ANSI # 800 : GLOBE	.....
	NIPPLE : QTY	6 NOS. ; 250mm LONG	.....
	NIPPLE :RATING	SCH.80	.....
	NIPPLE : MATERIAL	SS316	.....
	NIPPLE : SIZE	25NB	.....
	EXPANDER:QTY	6	.....
	EXPANDER:MATERIAL	SS316	.....
	EXPANDER:SIZE	15 NB X 25 NB	.....
PROCESS DATA	FLUID	[■] CONDENSATE [] FEED WATER [] STEAM [] DMCW [] OTHER	.....
		MAX. / NORMAL / MINIMUM	.....
	FLOW (T/HR)	450 / 398 / 100	.....
	PRESSURE (KG/CM^2 (A))	18 / 17.5 / 20	.....
	TEMPERATURE (DEG. C.)	163.1 / 162.2 / 138.2	.....
	DESIGN PRESS : TEMP	22 Kg/cm^2(g) : 170 ^{o}C	.....
	MAX. ALLOWABLE PRESS LOSS	0.25 ATA (at maximum flow)	.....
	DIFF. PRESS AT MAX FLOW	Bidder to specify	.....

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP**	SPECIFICATION NO.: .: PE-TS-411-145-I816 VOLUME IIB SECTION REV. NO. - | DATE SHEET

Tag No. : **LAB30BP001** Data 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	OD 273X THK 6.35 SA 106 Gr B Bidder to specify 15D 10 D : 5 D [■] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	....
OTHER INFORMATION	IBR CERTIFICATION TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	[■] REQUIRED [] NOT REQUIRED TO BE REFLECTED IN VENDOR DOCUMENT	

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 100 T/HR TO 450 T/HR.
2. RECOMMENDED RANGE IS 0 – 500 T/HR.

	DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP	SPECIFICATION NO.: .: PE-TS-411-145-I816
		VOLUME IIB
		SECTION
		REV. NO. - / DATE
		SHEET

Tag No. : **LAB60BP001** Data 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	**4x 270 MW MANUGURU TPP**	.....
	OFFER REFERENCE	Bidder to specify	.....
	QUANTITY	01 PER UNIT (4 FOR STATION)	.....
	SERVICE	FEED WATER FLOW AT ECO I/L	.....
	MAKE : MODEL	Bidder to specify	.....
			.....
ELEMENT	TYPE	NOZZLE	.....
	STANDARD	ASME PTC 19.5	.....
	DESIGN	LONG RADIUS, HIGH BETA	.....
	MATERIAL	SS316	.....
	BETA RATIO	AROUND 0.7	.....
	BORE DIAMETER	Bidder to specify	.....
	VENT HOLE	NO	.....
	DRAIN HOLE	NO	.....
END CONNECTION	TYPE	BUTT WELD END	.....
	BRANCH PIPE	YES	.....
	BRANCH PIPE MATERIAL	SAME AS PIPE MATERIAL	.....
	TAPPING LOCATION	D&D/2 , ON PIPE	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] OTHER	.....
	ROOT VALVE NUMBER	[] 6 [■] 12 [] OTHER	.....
	ROOT VALVE SIZE	25 NB	.....
	ROOT VALVE MATERIAL	SS316	.....
	ROOT VALVE RATING : TYPE	ANSI # 2500 : GLOBE	.....
	NIPPLE : QTY	12 NOS. ; 250mm LONG	.....
	NIPPLE :RATING	SCH.160	.....
	NIPPLE : MATERIAL	SS316	.....
	NIPPLE : SIZE	25NB	.....
	EXPANDER:QTY	6	.....
	EXPANDER:MATERIAL	SS316	.....
	EXPANDER:SIZE	15 NB X 25 NB	.....
PROCESS DATA	FLUID	[] CONDENSATE [■] FEED WATER [] STEAM [] CW [] OTHER	.....
		MAX. / NORMAL / MINIMUM	.....
	FLOW (T/HR)	865 / 796 / 41.5	.....
	PRESSURE (KG/CM^2 (A))	216 / 192 / 70	.....
	TEMPERATURE (DEG. C.)	248 / 246 / 111	.....
	DESIGN PRESS : TEMP	280 Kg/cm^2(g) : 260 ºC	.....
	MAX. ALLOWABLE PRESS LOSS	0.5 ATA (at maximum flow)	.....
	DIFF. PRESS AT MAX FLOW	Bidder to specify	.....

	DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP	SPECIFICATION NO.: .: PE-TS-411-145-I816
		VOLUME IIB
		SECTION
		REV. NO. - / DATE
		SHEET

Tag No. : **LAB60BP001** Data 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 AVAILABLE STRAIGHT LENGTH UPSTREAM : DOWNSTREAM FLOW DIRECTION	OD 368 X THK 48 SA 106 Gr C Bidder to specify 9 D : 4 D [■] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	....
OTHER INFORMATION	IBR CERTIFICATION TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	[■] REQUIRED [] NOT REQUIRED TO BE REFLECTED IN THE VENDOR DOCUMENT	

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 200 T/HR TO 865 T/HR.
2. RECOMMENDED RANGE IS 0 – 950 T/HR.

	DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP	SPECIFICATION NO.: .: PE-TS-411-145-I816
		VOLUME IIB
		SECTION
		REV. NO. - / DATE
		SHEET

Tag No. : **MAN20BP001** Data 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	**4x 270 MW MANUGURU TPP**	.....
	OFFER REFERENCE	Bidder to specify	.....
	QUANTITY	01 PER UNIT (4 FOR STATION)	.....
	SERVICE	HP BYPASS STEAM FLOW(LEFT)	.....
	MAKE : MODEL	Bidder to specify	.....
			.....
ELEMENT	TYPE	NOZZLE	.....
	STANDARD	ASME PTC 19.5	.....
	DESIGN	LONG RADIUS, HIGH BETA	.....
	MATERIAL	SS316	.....
	BETA RATIO	AROUND 0.7	.....
	BORE DIAMETER	Bidder to specify	.....
	VENT HOLE	NO	.....
	DRAIN HOLE	NO	.....
END CONNECTION	TYPE	BUTT WELD END	.....
	BRANCH PIPE	YES	.....
	BRANCH PIPE MATERIAL	SAME AS PIPE MATERIAL	.....
	TAPPING LOCATION	D&D/2 , ON PIPE	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] OTHER	.....
	ROOT VALVE NUMBER	[] 6 [[■] 12 [] OTHER	.....
	ROOT VALVE SIZE	25 NB	.....
	ROOT VALVE MATERIAL	SS316	.....
	ROOT VALVE RATING : TYPE	ANSI # 3000 SPL : GLOBE	.....
	NIPPLE : QTY	12 NOS. ; 1000mm LONG	.....
	NIPPLE :RATING	SCH.XXS	.....
	NIPPLE : MATERIAL	SS316	.....
	NIPPLE : SIZE	25NB	.....
	EXPANDER:QTY	6	.....
	EXPANDER:MATERIAL	SS316	.....
	EXPANDER:SIZE	15 NB X 25 NB	.....
PROCESS DATA	FLUID	[] CONDENSATE [] FEED WATER [■] STEAM [] CW [] OTHER	.....
		MAX. / NORMAL / MINIMUM	.....
	FLOW (T/HR)	290 / 200 / 50	.....
	PRESSURE (KG/CM^2 (A))	156 / 156 / 156	.....
	TEMPERATURE (DEG. C.)	540 / 540 / 540	.....
	DESIGN PRESS : TEMP	166.6 Kg/cm^2(g) : 540 ^oC	.....
	MAX. ALLOWABLE PRESS LOSS	1.2 ATA (at normal flow)	.....
	DIFF. PRESS AT MAX FLOW	Bidder to specify	.....

	DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP	SPECIFICATION NO.: .: PE-TS-411-145-I816
		VOLUME IIB
		SECTION
		REV. NO. - / DATE
		SHEET

Tag No. : **MAN20BP001** Data 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	OD 219.1 X THK 25 SA 335 P91 Bidder to specify 15D 10 D : 5 D [■] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	....
OTHER INFORMATION	IBR CERTIFICATION TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	[■] REQUIRED [] NOT REQUIRED TO BE REFLECTED IN THE VENDOR DOCUMENT	

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 50 T/HR TO 290 T/HR.
2. RECOMMENDED RANGE IS 0 – 320 T/HR.

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP**	SPECIFICATION NO.: .: PE-TS-411-145-I816 VOLUME IIB SECTION REV. NO. - | DATE SHEET

Tag No. : **MAN30BP001** Data 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	**4x 270 MW MANUGURU TPP**	.....
	OFFER REFERENCE	Bidder to specify	.....
	QUANTITY	01 PER UNIT (4 FOR STATION)	.....
	SERVICE	HP BYPASS STEAM FLOW (RIGHT)	.....
	MAKE : MODEL	Bidder to specify	.....
			.....
ELEMENT	TYPE	NOZZLE	.....
	STANDARD	ASME PTC 19.5	.....
	DESIGN	LONG RADIUS, HIGH BETA	.....
	MATERIAL	SS316	.....
	BETA RATIO	AROUND 0.7	.....
	BORE DIAMETER	Bidder to specify	.....
	VENT HOLE	NO	.....
	DRAIN HOLE	NO	.....
END CONNECTION	TYPE	BUTT WELD END	.....
	BRANCH PIPE	YES	.....
	BRANCH PIPE MATERIAL	SAME AS PIPE MATERIAL	.....
	TAPPING LOCATION	D&D/2 , ON PIPE	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] OTHER	.....
	ROOT VALVE NUMBER	[] 6 [[■] 12 [] OTHER	.....
	ROOT VALVE SIZE	25 NB	.....
	ROOT VALVE MATERIAL	SS316	.....
	ROOT VALVE RATING : TYPE	ANSI # 3000 SPL : GLOBE	.....
	NIPPLE : QTY	12 NOS. ; 1000mm LONG	.....
	NIPPLE :RATING	SCH.XXS	.....
	NIPPLE : MATERIAL	SS316	.....
	NIPPLE : SIZE	25NB	.....
	EXPANDER:QTY	6	.....
	EXPANDER:MATERIAL	SS316	.....
	EXPANDER:SIZE	15 NB X 25 NB	.....
PROCESS DATA	FLUID	[] CONDENSATE [] FEED WATER [■] STEAM [] CW [] OTHER	.....
		MAX. NORMAL MINIMUM	.....
	FLOW (T/HR)	290 200 50	.....
	PRESSURE (KG/CM^2 (A))	156 156 156	.....
	TEMPERATURE (DEG. C.)	540 540 540	.....
	DESIGN PRESS : TEMP	166.6 $Kg/cm^2(g)$: 540 ^oC	.....
	MAX. ALLOWABLE PRESS LOSS	1.2 ATA (at normal flow)	.....
	DIFF. PRESS AT MAX FLOW	Bidder to specify	.....

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP**	SPECIFICATION NO.: .: PE-TS-411-145-I816 VOLUME IIB SECTION REV. NO. - / DATE SHEET

Tag No. : **MAN30BP001** Data 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	OD 219.1 X THK 25 SA 335 P91 Bidder to specify 15D 10 D : 5 D [■] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	....
OTHER INFORMATION	IBR CERTIFICATION TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	[■] REQUIRED [] NOT REQUIRED TO BE REFLECTED IN THE VENDOR DOCUMENT	

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 50 T/HR TO 290 T/HR.
2. RECOMMENDED RANGE IS 0 – 320 T/HR.

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP**	SPECIFICATION NO.: .: PE-TS-411-145-I816 VOLUME IIB SECTION REV. NO. - | DATE SHEET

Tag No. : **LBG10CF001** Data 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	**4x 270 MW MANUGURU TPP**	.....
	OFFER REFERENCE	Bidder to specify	.....
	QUANTITY	01 PER UNIT (4 FOR STATION)	.....
	SERVICE	MS FLOW TO APRDS	.....
	MAKE : MODEL	Bidder to specify	.....
			.....
ELEMENT	TYPE	NOZZLE	.....
	STANDARD	ASME PTC 19.5	.....
	DESIGN	LONG RADIUS, HIGH BETA	.....
	MATERIAL	SS316	.....
	BETA RATIO	AROUND 0.7	.....
	BORE DIAMETER	Bidder to specify	.....
	VENT HOLE	NO	.....
	DRAIN HOLE	NO	.....
END CONNECTION	TYPE	BUTT WELD END	.....
	BRANCH PIPE	YES	.....
	BRANCH PIPE MATERIAL	SAME AS PIPE MATERIAL	.....
	TAPPING LOCATION	D&D/2 , ON PIPE	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] OTHER	.....
	ROOT VALVE NUMBER	[] 6 [[■] 12 [] OTHER	.....
	ROOT VALVE SIZE	25 NB	.....
	ROOT VALVE MATERIAL	SS316	.....
	ROOT VALVE RATING : TYPE	ANSI # 3000 SPL : GLOBE	.....
	NIPPLE : QTY	12 NOS. ; 1000mm LONG	.....
	NIPPLE :RATING	SCH.XXS	.....
	NIPPLE : MATERIAL	SS316	.....
	NIPPLE : SIZE	25NB	.....
	EXPANDER:QTY	6	.....
	EXPANDER:MATERIAL	SS316	.....
	EXPANDER:SIZE	15 NB X 25 NB	.....
PROCESS DATA	FLUID	[] CONDENSATE [] FEED WATER [■] STEAM [] CW [] OTHER	.....
		MAX. NORMAL MINIMUM	.....
	FLOW (T/HR)	45 52 45	.....
	PRESSURE (KG/CM^2 (A))	35 53 150	.....
	TEMPERATURE (DEG. C.)	385 415 540	.....
	DESIGN PRESS : TEMP	166.6 Kg/cm^2(g) : 540 ^oC	.....
	MAX. ALLOWABLE PRESS LOSS	0.3 ATA (at normal flow)	.....
	DIFF. PRESS AT MAX FLOW	Bidder to specify	.....

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP**	SPECIFICATION NO.: .: PE-TS-411-145-I816 VOLUME IIB SECTION REV. NO. - | DATE SHEET

Tag No. : **LBG10CF001** Data 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	219.1X36 SA 335 P22 Bidder to specify 15D 10 D : 5 D [■] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	....
OTHER INFORMATION	IBR CERTIFICATION TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	[■] REQUIRED [] NOT REQUIRED TO BE REFLECTED IN THE VENDOR DOCUMENT	

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 15 T/HR TO 55 T/HR.
2. RECOMMENDED RANGE IS 0 – 60 T/HR.

	DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP	SPECIFICATION NO.: .: PE-TS-411-145-I816
		VOLUME IIB
		SECTION
		REV. NO. - / DATE
		SHEET

Tag No. : **LBG20CF001** Data 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	**4x 270 MW MANUGURU TPP**	.....
	OFFER REFERENCE	Bidder to specify	.....
	QUANTITY	01 PER UNIT (4 FOR STATION)	.....
	SERVICE	CRH FLOW TO AUX. PRDS	.....
	MAKE : MODEL	Bidder to specify	.....
			.....
ELEMENT	TYPE	NOZZLE	.....
	STANDARD	ASME PTC 19.5	.....
	DESIGN	LONG RADIUS, HIGH BETA	.....
	MATERIAL	SS316	.....
	BETA RATIO	AROUND 0.7	.....
	BORE DIAMETER	Bidder to specify	.....
	VENT HOLE	NO	.....
	DRAIN HOLE	NO	.....
END CONNECTION	TYPE	BUTT WELD END	.....
	BRANCH PIPE	YES	.....
	BRANCH PIPE MATERIAL	SAME AS PIPE MATERIAL	.....
	TAPPING LOCATION	D&D/2 , ON PIPE	.....
	NUMBER OF TAPPINGS	[■] 3 PAIR [] OTHER	.....
	ROOT VALVE NUMBER	[] 6 [[■] 12 [] OTHER	.....
	ROOT VALVE SIZE	25 NB	.....
	ROOT VALVE MATERIAL	SS316	.....
	ROOT VALVE RATING : TYPE	ANSI # 800 : GLOBE	.....
	NIPPLE : QTY	12 NOS. ; 1000mm LONG	.....
	NIPPLE :RATING	SCH.XXS	.....
	NIPPLE : MATERIAL	SS316	.....
	NIPPLE : SIZE	25NB	.....
	EXPANDER:QTY	6	.....
	EXPANDER:MATERIAL	SS316	.....
	EXPANDER:SIZE	15 NB X 25 NB	.....
PROCESS DATA	FLUID	[] CONDENSATE [] FEED WATER [■] STEAM [] CW [] OTHER	.....
		MAX. NORMAL MINIMUM	.....
	FLOW (T/HR)	7 2	.....
	PRESSURE (KG/CM^2 (A))	25 39	.....
	TEMPERATURE (DEG. C.)	330 345	.....
	DESIGN PRESS : TEMP	47 Kg/cm^2(g) : 360 ^oC	.....
	MAX. ALLOWABLE PRESS LOSS	0.1 ATA (at normal flow)	.....
	DIFF. PRESS AT MAX FLOW	Bidder to specify	.....

	DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP	SPECIFICATION NO.: .: PE-TS-411-145-I816	
		VOLUME IIB	
		SECTION	
		REV. NO. -	DATE
		SHEET	

Tag No. : **LBG20CF001** Data 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	114.3X6.02 SA 106 Gr B Bidder to specify 15D 10 D : 5 D [■] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	....
OTHER INFORMATION	IBR CERTIFICATION TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	[■] REQUIRED [] NOT REQUIRED TO BE REFLECTED IN THE VENDOR DOCUMENT	

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 2 T/HR TO 8 T/HR.
2. RECOMMENDED RANGE IS 0 – 10 T/HR.

FORM NO. PEM-6666-0

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP**	SPECIFICATION NO.: .: PE-TS-411-145-I816 VOLUME IIB SECTION REV. NO. - DATE SHEET

Tag No. : **LCH23CF101** 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 OFFER REFERENCE QUANTITY SERVICE MAKE : MODEL	**4x 270 MW MANUGURU TPP** Bidder to specify 01 PER UNIT (4 FOR STATION) **HPH-5 DRAIN FLOW TO DEAERATOR** Bidder to specify	....
ELEMENT	TYPE STANDARD DESIGN MATERIAL BETA RATIO BORE DIAMETER VENT HOLE DRAIN HOLE	NOZZLE ASME PTC 19.5 LONG RADIUS, HIGH BETA SS316 AROUND 0.7 Bidder to specify NO NO	....
END CONNECTION	TYPE BRANCH PIPE BRANCH PIPE MATERIAL TAPPING LOCATION NUMBER OF TAPPINGS ROOT VALVE NUMBER ROOT VALVE SIZE ROOT VALVE MATERIAL ROOT VALVE RATING : TYPE NIPPLE : QTY NIPPLE :RATING NIPPLE : MATERIAL NIPPLE : SIZE EXPANDER:QTY EXPANDER:MATERIAL EXPANDER:SIZE	BUTT WELD END YES SAME AS PIPE MATERIAL D&D/2 , ON PIPE [■] 3 PAIR [] OTHER [■] 6 [] 12 [] OTHER 25 NB SS316 ANSI # 800 : GLOBE 6 NOS. ; 250mm LONG SCH.80 SS316 25NB 6 SS316 15 NB X 25 NB	....
PROCESS DATA	FLUID FLOW (T/HR) PRESSURE (KG/CM2 (A)) TEMPERATURE (DEG. C.) DESIGN PRESS : TEMP MAX. ALLOWABLE PRESS LOSS DIFF. PRESS AT MAX FLOW	[■] CONDENSATE [] FEED WATER [] STEAM [] CW [] OTHER MAX. (LPH-2&3 Out) / NORMAL (VWO) / MINIMUM (50% MCR) 125.6 / 123.0 / 48.2 12.5 / 14.8 / 6.6 155.6 / 168.1 / 143.9 19 $Kg/cm^2(g)$: 175 °C 0.5 Kg/cm^2 at max. flow	....

FORM NO. PEM-6666-0

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP**	SPECIFICATION NO.: .: PE-TS-411-145-I816 VOLUME IIB SECTION REV. NO. - | DATE SHEET

Tag No. : **LCH23CF101** 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	219.1 x 6.35 SA 106 GR B Bidder to specify 10D:5D [] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	....
OTHER INFORMATION	IBR CERTIFICATION TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	[] REQUIRED [■] NOT REQUIRED	

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

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 40 T/HR AND 125 T/HR.
2. RECOMMENDED RANGE IS 0 – 130 T/HR.

FORM NO. PEM-6666-0

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP**	SPECIFICATION NO.: .: PE-TS-411-145-I816 VOLUME IIB SECTION REV. NO. - | DATE SHEET

Tag No. : **LBS41CF100** 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 OFFER REFERENCE QUANTITY SERVICE MAKE : MODEL	**4x 270 MW MANUGURU TPP** Bidder to specify 01 PER UNIT (4 FOR STATION) **EXTRACTION STEAM FLOW TO DEAERATOR** Bidder to specify	....
ELEMENT	TYPE STANDARD DESIGN MATERIAL BETA RATIO BORE DIAMETER VENT HOLE DRAIN HOLE	NOZZLE ASME PTC 19.5 LONG RADIUS, HIGH BETA SS316 AROUND 0.7 Bidder to specify NO NO	....
END CONNECTION	TYPE BRANCH PIPE BRANCH PIPE MATERIAL TAPPING LOCATION NUMBER OF TAPPINGS ROOT VALVE NUMBER ROOT VALVE SIZE ROOT VALVE MATERIAL ROOT VALVE RATING : TYPE NIPPLE : QTY NIPPLE :RATING NIPPLE : MATERIAL NIPPLE : SIZE EXPANDER:QTY EXPANDER:MATERIAL EXPANDER:SIZE	BUTT WELD END YES SAME AS PIPE MATERIAL D&D/2 , ON PIPE [■] 3 PAIR [] OTHER [■] 6 [] 12 [] OTHER 25 NB SS316 ANSI # 800 : GLOBE 6 NOS. ; 250mm LONG SCH.80 SS316 25NB 6 SS316 15 NB X 25 NB	....
PROCESS DATA	FLUID FLOW (T/HR) PRESSURE (KG/CM2 (A)) TEMPERATURE (DEG. C.) DESIGN PRESS : TEMP MAX. ALLOWABLE PRESS LOSS DIFF. PRESS AT MAX FLOW	[] CONDENSATE [] FEED WATER [■] STEAM [] CW [] OTHER MAX. (Both HPH Out) / NORMAL (VWO) / MINIMUM (60% MCR) 47.7 / 42.2 / 21.6 6.77 / 6.36 / 3.98 305.6 / 299.3 / 303.0 8.5 $Kg/cm^2(g)$: 310 ^oC 0.1 Kg/cm^2 at max. flow	....

BHEL	**DATA SHEET FOR FLOW ELEMENTS (NOZZLE) FOR 4 X 270 MW MANUGURU TPP**	SPECIFICATION NO.: .: PE-TS-411-145-I816 VOLUME IIB SECTION REV. NO. - | DATE SHEET

Tag No. : **LBS41CF100** 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 10D:5D [] HORIZONTAL [] VERTICAL UP [] VERTICAL DOWN	....
OTHER INFORMATION	IBR CERTIFICATION TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES	[■] REQUIRED [] NOT REQUIRED	

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

NOTES:

1. FLOW ELEMENT ACCURACY IS REQUIRED BETWEEN 20 T/HR AND 45 T/HR.
2. RECOMMENDED RANGE IS 0 – 100 T/HR.

SECTION – D

DATA SHEETS - C

BHEL	**DATA SHEET FOR FLOW MEASURING DEVICES (NOZZLE)** **4 X 270 MW MANUGURU THERMAL POWER PROJECT**	SPECIFICATION NO.: **PE-TS-411-145-I816** VOLUME III SECTION REV. NO. / DATE: SHEET

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

Data Sheet C

DATA SHEET-C FOR FLOW MEASURING DEVICES (ORIFICE & 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			
	NO. OF TAPPINGS			
	ROOT VALVE			
	NUMBER	SIZE		
	ROOT VALVE MATERIAL			
	RATING			
PROCESS DATA	FLUID			
	FLOW T/HR			
	PRESS ATA			
	TEMP (DEG. C)			
	DESIGN PRESS	TEMP		
	PRESS LOSS at MAX/ NORMAL FLOW			
	DIFF PRESS AT MAX/NORMAL FLOW			
PIPE LINE DATA	PIPE SIZE (OD X THK) mm			
	PIPE MATERIAL			

FORM NO. PEM-6666-0

	DATA SHEET FOR FLOW MEASURING DEVICES (NOZZLE) **4 X 270 MW MANUGURU THERMAL POWER PROJECT**	SPECIFICATION NO.: **PE-TS-411-145-I816** VOLUME III SECTION REV. NO. / DATE: SHEET

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

Data Sheet C

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

	BORE DIAMETER mm				
	AVAILABLE STRAIGHT LENGTH				
	UPSTREAM	DOWNSTREAM			
	FLOW DIRECTION				
OTHER INFORMATION	IBR CERTIFICATION				
	TOTAL WEIGHT OF FLOW ELEMENT AND ACCESSORIES				
NAME					NAME
SIGNATURE					SIGNATURE
DATE					DATE

SECTION – D

QUALITY PLAN

PEM :: C&I

STANDARD QUALITY PLAN FOR FLOW NOZZLE ASSEMBLY

QUALITY PLAN NO.:	**PE-QP-999-145-I005**
VOLUME	IIB
SECTION	D
REV. NO.	05 DATE: 30.05.13
SHEET	1 OF 3

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

Sl. No.	Component / operation	Characteristics Checked	* Category	Type/Method of Check	Extent of Check	Reference documents	Acceptance Norms	Format of Records	Agency $ P	Agency $ W	Agency $ V	Remarks
		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

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	----	Tech Spec.	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	
		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	
		3. Overall Dimensions and end connection	MA	Measurement	100%	AP / DS	AP / DS	IR	3/2	2/1	---	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 BHEL 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

SECTION – D

BILL OF QUANTITY

INCLUDING

SPARES

BILL OF QUANTITY

	[A] FLOW ELEMENT ASSEMBLIES COMPLETE WITH Three (3) pairs of tappings, AND ACCESSORIES, like Pressure take-off points, Root valves, Nipples etc.				
S. No.	**TAG NO.**	**SERVICE**	**TYPE OF ASSY**	**QTY PER UNIT**	**QTY For 4 units**
i)	LAB10BP001	BFP-A SUCTION	NOZZLE	01	04
ii)	LAB20BP001	BFP-B SUCTION	NOZZLE	01	04
iii)	LAB30BP001	BFP-C SUCTION	NOZZLE	01	04
iv)	LAB60BP001	FEED WATER FLOW AT ECO I/L	NOZZLE	01	04
v)	MAN20BP001	HP BYPASS STEAM FLOW (L)	NOZZLE	01	04
vi)	MAN30BP001	HP BYPASS STEAM FLOW (R)	NOZZLE	01	04
vii)	LBG10CF001	MS FLOW TO APRDS	NOZZLE	01	04
viii)	LBG20CF001	CRH FLOW TO AUX. PRDS	NOZZLE	01	04
ix)	LCH23CF101	HPH-5 DRAIN FLOW TO DEAERATOR	NOZZLE	01	04
x)	LBS41CF100	EXTRACTION STEAM FLOW TO DEAERATOR	NOZZLE	01	04

[B] MANDATORY SPARES FOR FLOW ELEMENT ASSEMBLIES

S. No.	DESCRIPTION	TOTAL QUANTITY
i)	ROOT VALVES	ONE (1) PAIR FOR EACH TAG FOR EACH UNIT

	Technical specification for **FLOW ELEMENT ASSEMBLIES** **4 X 270 MW MANUGURU THERMAL POWER PROJECT**	SPECIFICATION NO.**PE-TS-411-145-I816**
		VOLUME **III**
		SECTION
		REV. NO. / DATE:
		SHEET

SCHEDULE OF SUBMISSION OF DRAWINGS / DOCUMENTS, EQUIPMENT MANUFACTURE INSPECTION AND DESPATCH

1.	**ZERO DATE**	**DATE of LOI / FOI / TOI**
2.	Submission of Data Sheets / documents / catalogues / Valve sizing calculations / Noise calculations for approval.	2 Weeks from the Zero date.
3.	Technical finalisation, freezing of inputs of manufacture by way of vetting of documents and technical discussions and resubmissions of documents (if required)	6 Weeks from the Zero date.
4.	Inspection of Equipment as per Approved (Category-I) drawings / documents.	14 Weeks from the Zero date.
5.	Release of MDCC by BHEL	15 Weeks from the Zero date.
6.	Dispatch (Packaging & Dispatch)	16 Weeks from the Zero date.
7.	Final documents submission as per Contract	16 Weeks from the Zero date.

NOTE: Delays due to non-fulfillment of the requirements of approved Quality Plan and approved Data sheets, Drawings, Catalogues and Sizing Calculations observed during inspection shall be to the Vendor's account.

Delays due to INCOMPLETE (Partly) submission of Data sheets, Drawings, Catalogues and Sizing Calculations also be considered as **"DOCUMENTS NOT SUBMITTED"**

(Signature and Stamp of the Bidder)

4 X 270 MW MANUGURU THERMAL POWER PROJECT

TECHNICAL SPECIFICATION
FOR

FLOW ELEMENT ASSEMBLIES
(NOZZLE)

VOLUME III

SPECIFICATION Nos
PE-TS-411-145-I816

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

CONTENTS

VOL-III

COMPLIANCE CERTIFICATE
For
Flow Elements assemblies
(To be Signed & Stamped by the Bidder)

PROJECT: 4 X 270 MW MANUGURU THERMAL POWER PROJECT

Specification no. : PE-TS-411-145-I 816

We shall comply with the following:-

1. All the requirements as stated in Technical Specification / Specific Technical requirement / Data sheets / BHEL quality plan etc as enclosed in the tender, shall be fully complied **without any deviation**.

2. BHEL Quality Plan (enclosed with the specification) duly signed and stamped is submitted herewith **without any deviation.**

3. Sizing Calculations, Data sheet-C in line with Data sheet-A of specification, dimensional drawings / edge preparation details, etc shall be submitted for BHEL/Customer review and approval, to reach BHEL within 15 days after receipt of LOI.

4. Any change in Sizing calculations, QP etc., if desired by BHEL / Customer during approval of the documents after award of contract, without major changes in process parameters as per tender Specification, shall be carried out without any commercial implication and time delay.

5. The offered Flanges, Root valves, Nipples, Reducers are suitable for the applicable process parameters.

Signature with date	
Name	
Company seal	

CALIBRATION CHARGES FOR FLOW ELEMENTS

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

S. No.	TAG NO.	SERVICE	TYPE OF ASSY	CALIBRATION CHARGES PER ASSY(EX WORKS)	REMARKS
i)	LAB10BP001	BFP-A SUCTION	NOZZLE		
ii)	LAB20BP001	BFP-B SUCTION	NOZZLE		
iii)	LAB30BP001	BFP-C SUCTION	NOZZLE		
iv)	LAB60BP001	FEED WATER FLOW AT ECO I/L	NOZZLE		
v)	MAN20BP001	HP BYPASS STEAM FLOW (L)	NOZZLE		
vi)	MAN30BP001	HP BYPASS STEAM FLOW (R)	NOZZLE		
vii)	LBG10CF001	MS FLOW TO APRDS	NOZZLE		
viii)	LBG20CF001	CRH FLOW TO AUX. PRDS	NOZZLE		
ix)	LCH23CF101	HPH-5 DRAIN FLOW TO DEAERATOR	NOZZLE		
x)	LBS41CF100	EXTRACTION STEAM FLOW TO DEAERATOR	NOZZLE		

NOTE: 1. Bidder to note that CALIBRATION TEST is required to be conducted on one type per size, Bidder to group such assemblies and indicate the same along with the price bid.

INSPECTION SCHEDULE

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

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

SCHEDULE OF PRICES FOR FLOW ELEMENT (NOZZLE)

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

S. No.	TAG NO.	SERVICE	TYPE	QTY FOR 4 UNITS	Unit Price for each ASSY. (Rs) (Ex-works)	Total price of flow assemblies(Rs.) FOR STATION (Ex-works)
i)	LAB10BP001	BFP-A SUCTION	NOZZLE	4		
ii)	LAB20BP001	BFP-B SUCTION	NOZZLE	4		
iii)	LAB30BP001	BFP-C SUCTION	NOZZLE	4		
iv)	LAB60BP001	FEED WATER FLOW AT ECO I/L	NOZZLE	4		
v)	MAN20BP001	HP BYPASS STEAM FLOW (L)	NOZZLE	4		
vi)	MAN30BP001	HP BYPASS STEAM FLOW (R)	NOZZLE	4		
vii)	LBG10CF001	MS FLOW TO APRDS	NOZZLE	4		
viii)	LBG20CF001	CRH FLOW TO AUX. PRDS	NOZZLE	4		
ix)	LCH23CF101	HPH-5 DRAIN FLOW TO DEAERATOR	NOZZLE	4		
x)	LBS41CF100	EXTRACTION STEAM FLOW TO DEAERATOR	NOZZLE	4		

[B] MANDATORY SPARES FOR FLOW ELEMENT ASSEMBLIES

S. No.	DESCRIPTION	TOTAL QUANTITY
i)	ROOT VALVES	ONE (1) PAIR FOR EACH TAG FOR EACH UNIT

[C] CALIBRATION CHARGES (SEPARATE LIST TO BE ATTACHED)

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

SCHEDULE OF UNIT PRICES

[A] UNIT PRICES FOR ROOT VALVES AND NIPPLES

S.No	DESCRIPTION	Tag Nos	Unit Rate (Rs) (ExWorks)
1	ROOT VALVES	SS 316, 15 NB, SW, # 800	
2	NIPPLE	15 NB/SS 316/SCH 80/12 Nos. 250 mm long	

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