

UTTAR PRADESH RAJYA VIDYUT NIGAM LTD
1X660 MW PANKI TPS

**TECHNICAL SPECIFICATION
FOR
ULTRASONIC FLOWMETER**

**VOLUME II-B
(SECTION-A,C &D)**

SPECIFICATION No: PE-TS-426-145-I916



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

	Technical specification for ULTRASONIC FLOWMETER 1 X 660 MW PANKI TPS	SPECIFICATION NO. PE-TS-426-145-I916
		VOLUME IIB

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**TECHNICAL SPECIFICATION
FOR
ULTRASONIC FLOWMETER
1X 660 MW PANKI TPS**

SPEC NO.: PE-TS-426-145-I916

VOLUME II B

SECTION A

**SECTION – A
SCOPE OF ENQUIRY**

	TECHNICAL SPECIFICATION FOR ULTRASONIC FLOWMETER 1X 660 MW PANKI TPS	SPEC NO.: PE-TS-426-145-I916
		VOLUME II B
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SCOPE OF ENQUIRY

1.0 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 Ultrasonic flow meter with accessories as mentioned in different sections of this specification for 1X660 MW PANKI Thermal Power Plant.
- 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 Scope of supply shall be Ultrasonic flow meter along with accessories. as indicated in specification.
- 1.4 Following formats to be signed, stamped with company seal and submitted:
 - a) Complete offer including calculation sheets, catalogues etc.
 - b) Quality Plan
 - c) Datasheets A & B, duly filled
 - d) Unpriced schedule of prices

2.0 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 the proper performance of the equipment shall not relieve the supplier of the responsibility of providing such facilities to complete the supply within the quoted prices.
- 2.3 BHEL's/Customer's representative shall be given access to the shop in which the equipment 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.

**TECHNICAL SPECIFICATION FOR
ULTRASONIC FLOWMETER****1 X 660 MW PANKI TPS****SPEC NO.: PE-TS-426-145-I916****VOLUME II B****SECTION C**

SECTION-C

- 1)SPECIAL TECHNICAL REQUIREMENT**
- 2)CUSTOMER SPECIFICATION**
- 3)DATASHEET A & B**
- 4)QUALITY PLAN**
- 5)BOQ-MAIN SUPPLY**



**TECHNICAL SPECIFICATION FOR
ULTRASONIC FLOW METER**

1 X 660 MW PANKI TPS

SPEC NO.: PE-TS-426-145-1916

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SECTION C

SECTION-C

SPECIAL TECHNICAL REQUIREMENTS

	TECHNICAL SPECIFICATION FOR ULTRASONIC FLOWMETER 1X660 MW PANKI TPS	SPEC NO.: PE-TS-426-145-1916
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SPECIFIC TECHNICAL REQUIREMENTS

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

1.0 Bidder to note that duly filled up Data Sheet-B, Quality Plan and Unpriced format enclosed in Section-C of Volume IIB, to be signed and stamped and submitted with the bid.

2.0 Bidder Presence is required for 4 days for any site support requirement. All the expenses like boarding, lodging and travel, Air fare etc. shall be in bidder's scope.

3.0 DOCUMENTATION:

(A) Along with the bids

- a) Duly filled, signed and stamped datasheet- A & B attached in Section-C of this Specification
- b) Signed and stamped Unpriced format
- c) Signed and stamped QP in BHEL's format attached in Section-C of this Specification
- d) Documents pertaining to PQR

(B) After the award of contract: 10 sets of the following documents to be enclosed along with the contract documents for approval:

- a) Datasheet C completely filled-up.
- b) Quality plan duly signed and stamped.
- c) All Differential pressure vs Flow graphs.
- d) Calculation Sheet.
- e) Assembly dimensional drawings.
- f) GA Drawing.

(C) Final documentation: The documentation as listed below shall be submitted as a part of final documentation.

- | | |
|--|--------------------------|
| 1. Approved final drawings/data sheets, | – 10 sets with 2 CD-ROMS |
| 2. All Test certificates | – 10 sets. |
| 3. Operation & Maintenance Manuals for Ultrasonic flow meter | – 10 sets |
| 4. Assembly drawings and QP for approval | – 10 sets. |
| 5. "As built" drawings | – 10 sets. |

4.0 In case during erection/commissioning of the Ultrasonic flow meter, any spares are required which have not been specified in the Start-up/commissioning spares list, the same will have to be supplied by the vendor free of cost.



**TECHNICAL SPECIFICATION FOR
ULTRASONIC FLOW METER**

1 X 660 MW PANKI TPS

SPEC NO.: PE-TS-426-145-1916

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SECTION C

SECTION-C

Customer Specifications

2.12.05 DUAL PATH TRANSIT TIME CLAMP-ON ULTRASONIC FLOW METER

The flow meters shall be of proven reliability, accuracy and repeatability requiring a minimum of maintenance. They shall comply with relevant international standards and shall be subject to owner's approval.

All accessories required for mounting/erection of this instrument shall be furnished, erected and installed as necessary for completeness of the system though not specifically asked for. Also the equipment shall include necessary cables, flexible conduits, junction boxes required for the purpose.

Flow meters shall be provided with suitable environment protection devices/structures such that they shall be suitable for continuous operation in the



1 x 660 MW - Panki Thermal Power Station

Bidding Doc. No. : 14A14-SPC-G-0001



operating environment of a coal fired utility station without any loss of function or departure from the specification requirements.

TECHNICAL REQUIREMENTS

Type	Transit time Clamp On Ultrasonic meter
Mounting Style	Dual path with two sets of transducers on the same pipe
Flow measurement	Instantaneous Flow rate as well as totalized flow
Power supply	230 V AC from UPS.
Outputs: Analog Current Binary	Isolated 4-20mA linear outputs for each path Contact relay outputs, 2 NO + 2 NC for alarm
Communication ports	RS 232 C digital Hand held terminal port
Display/Indication	Flow meter with LCD screen backlight based local display and keypad If required, transmitter shall be suitably located away from the sensor for better access and visibility.
Recording / Totalizing/Logging Facilities	Yes. Should be able to compute cumulative flow over intervals selectable by owner i.e., daily, weekly, monthly etc. The data shall be stored in the memory of flow computer for access in future
Software features	Compensation for any cross path errors. Programming, configuration, shall be possible from front panel.
Diagnostics	False signal tolerance , power supply failure etc
Protection class	IP-65 'or better, Weather protection against direct sunlight, rain etc for Flow .' meter and suitable for Cooling water for Transducer
Accuracy	+/- 1%
Electrical connection	Plug and socket
Pipe location	Underground
Accessories	All mounting hardware required like clamping fixtures, mechanism to remove the transducers online, interconnecting cables etc All weather canopy for protection from direct sunlight and direct rain. Material of all fittings shall be SS 316.



**TECHNICAL SPECIFICATION FOR
ULTRASONIC FLOW METER**

1 X 660 MW PANKI TPS

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SECTION-C

DATA SHEETS - A&B

SPEC NO.: PE-TS-426-145-I916

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DATA SHEET FOR UTRASONIC FLOW TRANSMITTER 1 x 660 MW PANKI TPS

SPEC NO.: PE-TS-426-145-I916

Tag No.: 10PAB11BP001

DATA SHEET – A & B

DATA SHEET – A			DATA SHEET – B (TO BE FILLED BY VENDOR)
GENERAL	PROJECT TAG NO. QUANTITY SERVICE: MAKE : MODEL	1 X 660 MW PANKI TPS 10PAB11BP001 ONE (01) CW HEADER TO CONDENSER Bidder to indicate	
TECHNICAL	TYPE FLOW MEASUREMENT OUTPUT ACCURACY REPEATABILITY RANGEABILITY LOAD RESISTANCE CONTACT RELAY OUTPUT DISPLAY/INDICATION OPERATING VOLTAGE PROTECTION CLASS ENCLOSURE MATERIAL MOUNTING ELECTRICAL CONNECTION COMMUNICATION PORTS SOFTWARE DIAGNOSTIC FEATURE RECORDING /LOGGING SEA WORTHY PACKING	☒ TRANSIT TIME CLAMP-ON ☒ 2 PAIRS/SETS OF TRANS-RECEIVERS (DUAL PATH WITH 2 SETS OF TRANSDUCER) ☒ Instantaneous Flow Rate ☒ Totalized Flow ☒ Velocity Isolated 4-20 mA DC linear output for each path $\pm 1.0 \%$ $\pm 0.2\%$ of calibration span 400:1 MIN. 500 OHM 2 NO + 2 NC Flow meter with LCD screen backlight based local display & keypad. ☒ 230V AC IP-65 or better for both Transmitter & Sensors ☒ COMPATIBLE FOR COASTAL AREA SS316 Chain or Strap Including Fittings ☒ PLUG-IN SOCKET 1)RS 232 C digital.2) Hand held terminal Port 1)Compensation for any cross path errors. 2)Programming and Configuration from front panel 1) False signal Tolerance 2) Power supply failure ☒ YES, should be able to compute cumulative flow over intervals selectable by owner. The data shall be stored in the memory of digital computer for access in future. ☒ YES	
PROCESS DATA	RATE OF FLOW (T/HR) UPSTREAM WORKING PRESS (Kg/cm2g) DESIGN PRESS (Kg/cm2g) NORMAL TEMP (Deg C) MAXIMUM TEMP (Deg C) PIPE LOCATION	NORMAL : 83300 TPH MAXIMUM: 100000 TPH 2.6 Kg/cm2(g) 6.0 Kg/cm2(g) 33.0 Deg C 60.0 Deg C ☒ UNDERGROUND ☐ OVERGROUND	
PIPE LINE DATA	PIPE SIZE (OD x THK) mm PIPE MATERIAL AVAILABLE PIPE STRAIGHT LENGTH	3840 x 14 CARBON STEEL AS PER IS-2062 Gr. B ROLLED AND BUTT WELDED CONFIRMING TO IS:3589 Gr. 410 UPSTREAM : 10D DOWNSTREAM : 5D	



DATA SHEET FOR ULTRASONIC FLOW TRANSMITTER 1 x 660 MW PANKI TPS

SPEC NO.: PE-TS-426-145-I916

Tag No.: 10PAB30BP001

DATA SHEET – A & B

DATA SHEET – A			DATA SHEET – B (TO BE FILLED BY VENDOR)
GENERAL	PROJECT TAG NO. QUANTITY SERVICE: MAKE : MODEL	1 X 660 MW PANKI TPS 10PAB30BP001 ONE (01) CW RETURN HEADER TO COOLING TOWER Bidder to indicate	
TECHNICAL	TYPE FLOW MEASUREMENT OUTPUT ACCURACY REPEATABILITY RANGEABILITY LOAD RESISTANCE CONTACT RELAY OUTPUT DISPLAY/INDICATION OPERATING VOLTAGE PROTECTION CLASS ENCLOSURE MATERIAL MOUNTING ELECTRICAL CONNECTION COMMUNICATION PORTS SOFTWARE DIAGNOSTIC FEATURE RECORDING /LOGGING SEA WORTHY PACKING	■ TRANSIT TIME CLAMP-ON ■ 2 PAIRS/SETS OF TRANS-RECEIVERS (DUAL PATH WITH 2 SETS OF TRANSDUCER) ■ Instantaneous Flow Rate ■ Totalized Flow ■ Velocity Isolated 4-20 mA DC linear output for each path $\pm 1.0 \%$ $\pm 0.2\%$ of calibration span 400:1 MIN. 500 OHM 2 NO + 2 NC Flow meter with LCD screen backlight based local display & keypad. ■ 230V AC IP-65 or better for both Transmitter & Sensors ■ COMPATIBLE FOR COASTAL AREA SS316 Chain or Strap Including Fittings ■ PLUG-IN SOCKET 1)RS 232 C digital.2) Hand held terminal Port 1)Compensation for any cross path errors. 2)Programming and Configuration from front panel 1) False signal Tolerance 2) Power supply failure ■ YES , should be able to compute cumulative flow over intervals selectable by owner. The data shall be stored in the memory of digital computer for access in future. ■ YES	
PROCESS DATA	RATE OF FLOW (T/HR) UPSTREAM WORKING PRESS (Kg/cm2g) DESIGN PRESS (Kg/cm2g) NORMAL TEMP (Deg C) MAXIMUM TEMP (Deg C) PIPE LOCATION	NORMAL : 89125 TPH MAXIMUM: 107860 TPH 1.9 Kg/cm2(g) 6.0 Kg/cm2(g) 33.0 Deg C 60.0 Deg C ■ UNDERGROUND ☐ OVERGROUND	
PIPE LINE DATA	PIPE SIZE (OD x THK) mm PIPE MATERIAL AVAILABLE PIPE STRAIGHT LENGTH	3840 x 14 CARBON STEEL AS PER IS-2062 Gr. B ROLLED AND BUTT WELDED CONFIRMING TO IS:3589 Gr. 410 UPSTREAM : 10D DOWNSTREAM : 5D	



DATA SHEET FOR UTRASONIC FLOW TRANSMITTER 1 x 660 MW PANKI TPS

SPEC NO.: PE-TS-426-145-I916

Tag No.: 10PAB50BP001

DATA SHEET – A & B

DATA SHEET – A			DATA SHEET – B (TO BE FILLED BY VENDOR)
GENERAL	PROJECT TAG NO. QUANTITY SERVICE: MAKE : MODEL	1 X 660 MW PANKI TPS 10PAB50BP001 ONE (01) ACW SUPPLY HEADER Bidder to indicate	
TECHNICAL	TYPE FLOW MEASUREMENT OUTPUT ACCURACY REPEATABILITY RANGEABILITY LOAD RESISTANCE CONTACT RELAY OUTPUT DISPLAY/INDICATION OPERATING VOLTAGE PROTECTION CLASS ENCLOSURE MATERIAL MOUNTING ELECTRICAL CONNECTION COMMUNICATION PORTS SOFTWARE DIAGNOSTIC FEATURE RECORDING /LOGGING SEA WORTHY PACKING	■ TRANSIT TIME CLAMP-ON ■ 2 PAIRS/SETS OF TRANS-RECEIVERS (DUAL PATH WITH 2 SETS OF TRANSDUCER) ■ Instantaneous Flow Rate ■ Totalized Flow ■ Velocity Isolated 4-20 mA DC linear output for each path ± 1.0 % ± 0.2% of calibration span 400:1 MIN. 500 OHM 2 NO + 2 NC Flow meter with LCD screen backlight based local display & keypad. ■ 230V AC IP-65 or better for both Transmitter & Sensors ■ COMPATIBLE FOR COASTAL AREA SS316 Chain or Strap Including Fittings ■ PLUG-IN SOCKET 1)RS 232 C digital.2) Hand held terminal Port 1)Compensation for any cross path errors. 2)Programming and Configuration from front panel 1) False signal Tolerance 2) Power supply failure ■ YES, should be able to compute cumulative flow over intervals selectable by owner. The data shall be stored in the memory of digital computer for access in future. ■ YES	
PROCESS DATA	RATE OF FLOW (T/HR) UPSTREAM WORKING PRESS (Kg/cm2g) DESIGN PRESS (Kg/cm2g) NORMAL TEMP (Deg C) MAXIMUM TEMP (Deg C) PIPE LOCATION	NORMAL : 6075 TPH MAXIMUM: 7900 TPH 3.7 Kg/cm2(g) 7.5 Kg/cm2(g) 33.0 Deg C 60.0 Deg C ☐ UNDERGROUND ☒ OVERGROUND	
PIPE LINE DATA	PIPE SIZE (OD x THK) mm PIPE MATERIAL AVAILABLE PIPE STRAIGHT LENGTH	1118 x 14 CARBON STEEL AS PER IS-2062 Gr. B ROLLED AND BUTT WELDED CONFIRMING TO IS:3589 Gr. 410 UPSTREAM : 10D DOWNSTREAM : 5D	



DATA SHEET FOR ULTRASONIC FLOW TRANSMITTER 1 x 660 MW PANKI TPS

SPEC NO.: PE-TS-426-145-I916

Tag No.: 10GAD10CF011

DATA SHEET – A & B

DATA SHEET – A			DATA SHEET – B (TO BE FILLED BY VENDOR)
GENERAL	PROJECT TAG NO. QUANTITY SERVICE: MAKE : MODEL	1 X 660 MW PANKI TPS 10GAD10CF011 ONE (01) RAW WATER INTAKE PUMP DISCHARGE HEADER Bidder to indicate	
TECHNICAL	TYPE FLOW MEASUREMENT OUTPUT ACCURACY REPEATABILITY RANGEABILITY LOAD RESISTANCE CONTACT RELAY OUTPUT DISPLAY/INDICATION OPERATING VOLTAGE PROTECTION CLASS ENCLOSURE MATERIAL MOUNTING ELECTRICAL CONNECTION COMMUNICATION PORTS SOFTWARE DIAGNOSTIC FEATURE RECORDING /LOGGING SEA WORTHY PACKING	☒ TRANSIT TIME CLAMP-ON ☒ 2 PAIRS/SETS OF TRANS-RECEIVERS (DUAL PATH WITH 2 SETS OF TRANSDUCER) ☒ Instantaneous Flow Rate ☒ Totalized Flow ☒ Velocity Isolated 4-20 mA DC linear output for each path ± 1.0 % ± 0.2% of calibration span 400:1 MIN. 500 OHM 2 NO + 2 NC Flow meter with LCD screen backlight based local display & keypad. ☒ 230V AC IP-65 or better for both Transmitter & Sensors ☒ COMPATIBLE FOR COASTAL AREA SS316 Chain or Strap Including Fittings ☒ PLUG-IN SOCKET 1)RS 232 C digital.2) Hand held terminal Port 1)Compensation for any cross path errors. 2)Programming and Configuration from front panel 1) False signal Tolerance 2) Power supply failure ☒ YES, should be able to compute cumulative flow over intervals selectable by owner. The data shall be stored in the memory of digital computer for access in future. ☒ YES	
PROCESS DATA	RATE OF FLOW (T/HR) UPSTREAM WORKING PRESS (Kg/cm2g) DESIGN PRESS (Kg/cm2g) NORMAL TEMP (Deg C) MAXIMUM TEMP (Deg C) PIPE LOCATION	NORMAL : 2850 TPH MAXIMUM: 3705 TPH 1.6 Kg/cm2(g) 10.0 Kg/cm2(g) 33.0 Deg C 60.0 Deg C ☐ UNDERGROUND ☒ OVERGROUND	
PIPE LINE DATA	PIPE SIZE (OD x THK) mm PIPE MATERIAL AVAILABLE PIPE STRAIGHT LENGTH	711 x 8 CARBON STEEL AS PER IS-2062 Gr. B ROLLED AND BUTT WELDED CONFIRMING TO IS:3589 Gr. 410 UPSTREAM : 10D DOWNSTREAM : 5D	



DATA SHEET FOR ULTRASONIC FLOW TRANSMITTER 1 x 660 MW PANKI TPS

SPEC NO.: PE-TS-426-145-I916

Tag No.: 10GAD24CF011

DATA SHEET – A & B

DATA SHEET – A			DATA SHEET – B (TO BE FILLED BY VENDOR)
GENERAL	PROJECT TAG NO. QUANTITY SERVICE: MAKE : MODEL	1 X 660 MW PANKI TPS 10GAD24CF011 ONE (01) AHP MAKE-UP PUMP DISCHARGE HEADER Bidder to indicate	
TECHNICAL	TYPE FLOW MEASUREMENT OUTPUT ACCURACY REPEATABILITY RANGEABILITY LOAD RESISTANCE CONTACT RELAY OUTPUT DISPLAY/INDICATION OPERATING VOLTAGE PROTECTION CLASS ENCLOSURE MATERIAL MOUNTING ELECTRICAL CONNECTION COMMUNICATION PORTS SOFTWARE DIAGNOSTIC FEATURE RECORDING /LOGGING SEA WORTHY PACKING	☒ TRANSIT TIME CLAMP-ON ☒ 2 PAIRS/SETS OF TRANS-RECEIVERS (DUAL PATH WITH 2 SETS OF TRANSDUCER) ☒ Instantaneous Flow Rate ☒ Totalized Flow ☒ Velocity Isolated 4-20 mA DC linear output for each path ± 1.0 % ± 0.2% of calibration span 400:1 MIN. 500 OHM 2 NO + 2 NC Flow meter with LCD screen backlight based local display & keypad. ☒ 230V AC IP-65 or better for both Transmitter & Sensors ☒ COMPATIBLE FOR COASTAL AREA SS316 Chain or Strap Including Fittings ☒ PLUG-IN SOCKET 1)RS 232 C digital.2) Hand held terminal Port 1)Compensation for any cross path errors. 2)Programming and Configuration from front panel 1) False signal Tolerance 2) Power supply failure ☒ YES, should be able to compute cumulative flow over intervals selectable by owner. The data shall be stored in the memory of digital computer for access in future. ☒ YES	
PROCESS DATA	RATE OF FLOW (T/HR) UPSTREAM WORKING PRESS (Kg/cm2g) DESIGN PRESS (Kg/cm2g) NORMAL TEMP (Deg C) MAXIMUM TEMP (Deg C) PIPE LOCATION	NORMAL : 1750 TPH MAXIMUM: 2275 TPH 3.0 Kg/cm2(g) 10.0 Kg/cm2(g) 33.0 Deg C 60.0 Deg C ☐ UNDERGROUND ☒ OVERGROUND	
PIPE LINE DATA	PIPE SIZE (OD x THK) mm PIPE MATERIAL AVAILABLE PIPE STRAIGHT LENGTH	610 x 8 CARBON STEEL AS PER IS-2062 Gr. B ROLLED AND BUTT WELDED CONFIRMING TO IS:3589 Gr. 410 UPSTREAM : 10D DOWNSTREAM : 5D	



DATA SHEET FOR UTRASONIC FLOW TRANSMITTER 1 x 660 MW PANKI TPS

SPEC NO.: PE-TS-426-145-I916

Tag No.: 10GAD28CF011

DATA SHEET – A & B

DATA SHEET – A			DATA SHEET – B (TO BE FILLED BY VENDOR)
GENERAL	PROJECT TAG NO. QUANTITY SERVICE: MAKE : MODEL	1 X 660 MW PANKI TPS 10GAD28CF011 ONE (01) RAW WATER PUMP DISCHARGE HEADER Bidder to indicate	
TECHNICAL	TYPE FLOW MEASUREMENT OUTPUT ACCURACY REPEATABILITY RANGEABILITY LOAD RESISTANCE CONTACT RELAY OUTPUT DISPLAY/INDICATION OPERATING VOLTAGE PROTECTION CLASS ENCLOSURE MATERIAL MOUNTING ELECTRICAL CONNECTION COMMUNICATION PORTS SOFTWARE DIAGNOSTIC FEATURE RECORDING /LOGGING SEA WORTHY PACKING	☒ TRANSIT TIME CLAMP-ON ☒ 2 PAIRS/SETS OF TRANS-RECEIVERS (DUAL PATH WITH 2 SETS OF TRANSDUCER) ☒ Instantaneous Flow Rate ☒ Totalized Flow ☒ Velocity Isolated 4-20 mA DC linear output for each path ± 1.0 % ± 0.2% of calibration span 400:1 MIN. 500 OHM 2 NO + 2 NC Flow meter with LCD screen backlight based local display & keypad. ☒ 230V AC IP-65 or better for both Transmitter & Sensors ☒ COMPATIBLE FOR COASTAL AREA SS316 Chain or Strap Including Fittings ☒ PLUG-IN SOCKET 1)RS 232 C digital.2) Hand held terminal Port 1)Compensation for any cross path errors. 2)Programming and Configuration from front panel 1) False signal Tolerance 2) Power supply failure ☒ YES, should be able to compute cumulative flow over intervals selectable by owner. The data shall be stored in the memory of digital computer for access in future. ☒ YES	
PROCESS DATA	RATE OF FLOW (T/HR) UPSTREAM WORKING PRESS (Kg/cm2g) DESIGN PRESS (Kg/cm2g) NORMAL TEMP (Deg C) MAXIMUM TEMP (Deg C) PIPE LOCATION	NORMAL : 1975 TPH MAXIMUM: 2570 TPH 3.0 Kg/cm2(g) 10.0 Kg/cm2(g) 33.0 Deg C 60.0 Deg C ☐ UNDERGROUND ☒ OVERGROUND	
PIPE LINE DATA	PIPE SIZE (OD x THK) mm PIPE MATERIAL AVAILABLE PIPE STRAIGHT LENGTH	610 x 8 CARBON STEEL AS PER IS-2062 Gr. B ROLLED AND BUTT WELDED CONFIRMING TO IS:3589 Gr. 410 UPSTREAM : 10D DOWNSTREAM : 5D	



**TECHNICAL SPECIFICATION FOR
ULTRASONIC FLOW METER**

1 X 660 MW PANKI TPS

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SECTION C

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QUALITY PLAN

 PEM :: C&I QUALITY PLAN FOR ULTRASONIC FLOWMETER QUALITY PLAN NO.: PE-QP-999-145-I 011									
VOLUME					IIB				
SECTION					D				
REV. NO.					00				
SHEET					1 OF 2				
DATE: 31.03.2014									

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	Standard Certificates	Certificate of Compliance, Warranty Certificate,	Major	Visual	As applicable	Technical documents/Approved documents	Technical catalogue/Approved documents	Technical catalogue/Approved documents	2/3	---	2, 1	
2	Visual Check	Mechanical	Major	Visual	100%	Technical catalogue/Approved documents	Technical catalogue/Approved documents	Technical catalogue/Approved documents	2/3	1	1	
3	Functional test & power ON	Electrical	Major	Visual	100%	Functional test report for meter & transducer	Approved documents	Technical catalogue/Approved documents	2/3	-	1	
4	HART Communication	Electrical	Major	---	100%	Technical catalogue/Approved documents	Technical catalogue/Approved documents	Technical catalogue/Approved documents	-	-	1	

LEGEND:	\$ P - Agency Performing the Test. W - Agency Witnessing the Test. V - Agency Verifying the Test.	1 - Customer 2 - Vendor 3 - Sub-vendor
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**TECHNICAL SPECIFICATION FOR
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SECTION-C

BILL OF QUANTITY



Technical specification for
ULTRASONIC FLOW METER

1 X 660 MW PANKI TPS

SPECIFICATION NO. **PE-TS-426-145-I916**

VOLUME **II-B**

SECTION **C**

BILL OF QUANTITY-ULTRASONIC FLOWMETERS

S. No.	KKS	SERVICE/ ITEM DESCRIPTION	QTY	UNIT
1	10PAB11BP001	CW HEADER TO CONDENSER	1	NOS
2	10PAB30BP001	CW RETURN HEADER TO COOLING TOWER	1	NOS
3	10PAB50BP001	ACW SUPPLY HEADER LINE	1	NOS
4	10GAD10CF011	RAW WATER INTAKE PUMP DISCHARGE HEADER LINE	1	NOS
5	10GAD24CF011	AHP MAKE-UP PUMP DISCHARGE HEADER LINE	1	NOS
6	10GAD28CF011	RAW WATER PUMP DISCHARGE HEADER LINE	1	NOS
7	-----	SUPERVISION OF ERECTION & COMMISSIONING	4	MANDAYS



TECHNICAL SPECIFICATION FOR
ULTRASONIC FLOWMETER

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SECTION D

SECTION-D

EQUIPMENT SPECIFICATION

	TECHNICAL SPECIFICATION FOR ULTRASONIC FLOW METER	SPEC NO.: PE-SS-999-145-I027
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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 Ultrasonic Flow Meter for use in Utility/Captive Power Station/Combined Cycle Station.

2.0 CODES AND STANDARDS

- 2.1 All the equipments specified herein shall comply with the requirements of the latest issue of the relevant National and International standards.
- 2.2 The Ultrasonic Flow Meters shall be of proven reliability, accuracy and repeatability requiring a minimum of maintenance. The Design and Materials used for the components shall also comply with the relevant National and International standards and shall be subject to owner's approval.

3.0 TECHNICAL REQUIREMENT

The Ultrasonic Flow Meters and the accessories shall be suitable for continuous operation under an ambient temperature of 0-55°C for Transmitter and (-) 20 to 100°C for Transducer and Relative Humidity of 0-95% unless specified otherwise in volume IIB Section-B or Section-C.

All accessories required for mounting/erection of these instruments shall be furnished as necessary for completeness of the system though not specifically asked for. Also the equipment shall include necessary cables, flexible conduits, junction boxes required for the purpose.

Flow meters shall be provided with suitable environment protection devices/structures such that they shall be suitable for continuous operation in the operating environment of a coal fired utility station without any loss of function or departure from the specifications requirements.

3.1 Flow measurement

The Ultrasonic Flow Transmitter shall be based on transit-time flow measurement technique uses a pair of transducers with each transducer sending and receiving coded ultrasonic signals through the fluid. When the fluid is flowing, signal transit-time in the downstream direction is shorter than in the upstream direction; the difference between these transit times is proportional to the flow velocity. The Ultrasonic Flow Transmitter measures this time difference and uses programmed pipe parameters to determine flow rate and direction. Ultrasonic Flow Transmitters are classified as either wetted or non-wetted (clamp-on). Clamp-on transducers are clamped onto the outside of the pipe and never come into contact with the process fluid. Wetted transducers are mounted into the pipe or flow cell in direct contact with the process fluid. Hart Compatibility for the transmitter shall be provided. In case of Intrusion type meter shall be provided with spool piece along with end Flange & counter Flanges (as applicable).

3.2 Accessories:

All mounting hardware like clamping fixtures, mechanism to remove the sensors on line, interconnecting screened cables between Transducer & Transmitter, Cable Glands etc. is required to be supplied. Weather canopy for protection from direct sunlight and direct rain shall also be offered as an option. Material of all fittings shall be SS-316.

4.0 GUARANTEE AND PERFORMANCE

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The guarantee of flow measuring assembly shall be 18 months from the date of dispatch or 12 months from commissioning whichever is earlier.

5.0 TEST & INSPECTION

- 5.1 The bidder shall adopt suitable quality assurance plan to ensure that the equipments offered will meet the specification requirements in full.
- 5.2 The Quality Plan shall be discussed and finalized with the technically accepted bidders before opening the price bid. The stages where the purchaser would like to be associated for witnessing or verification would be indicated by the purchaser in the Quality Plan before approval.
- 5.3 Inspection will be conducted by BHEL and/or their authorized representatives as per the agreed inspection schedule. The inspection schedule will be submitted by the bidder for BHEL's approval at contract stage. The cost of all tests and inspections will be deemed to have been included in the bid. For all the type tests "Type Test Certificates" as per agreed Quality Plan shall be furnished. In the absence of the same, such Type Tests shall be arranged at the Vendor's works in the presence of BHEL and/or their authorized representatives or in independent Test House/Laboratory approved by BHEL.

6.0 SPARES AND CONSUMABLES

6.1 Commissioning Spares and consumables

As part of the main equipment supply, the bidder shall supply all commissioning spares and consumables required during Start-up,

6.2 Recommended Spares

The bidder shall furnish a list of Recommended Spares along with the normal service expectancy period and frequency of replacement; quantities recommended for 3 years operation along with unit rate against each item to enable BHEL/BHEL's Customer to place a separate order later, if required.

6.3 Special Tools & Tackles

The bidder shall furnish a list of Special Tools & Tackles included in the bid.

7.0 DRAWINGS & DOCUMENTS

7.1 The offer shall include the following in 4 copies each.

- Technical data sheet for each flow measuring device assembly in the Pro forma enclosed under Data Sheet-B.
- Catalogue/Technical Literature.
- Assembly drawing with dimensional details.

7.2 4 copy each of the following along with 2 CDs to be furnished after award of contract for owner approval.

- Technical Data Sheet-C.
- Sizing Calculations.
- Assembly drawing with dimensions.

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iv. Installation drawing.

8.0 FOR INFORMATION

- 8.1 Storage and Commissioning Instruction
8.2 O&M are to be supplied as specified.

9.0 PACKING & MARKING

- 9.1 Each item shall be properly packed with adequate protection against friction, stresses, vibration & shock during transportation. Each packing box shall have marking as per Purchase Order.
- 9.2 Each assembly shall be identified with the following information.
- Tag No.
 - Service.
 - Line size & thickness.
 - Direction of flow.

10.0 APPLICABLE DATA SHEETS

This document shall be read in conjunction with following data sheets.

1. Data Sheet - A & B : Data sheet no. PES-145-27-DS1-0



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PRINCIPLE OF MEASUREMENT

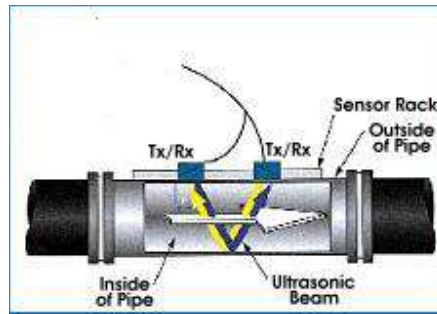


FIG.1

Transit-time flow meters measure the difference in travel time between pulses transmitted in a single path along and against the flow. Two transducers are used, one upstream of the other. Each acts as both a transmitter and receiver for the ultrasonic beam.

TYPICAL INSTALLATION (ASSEMBLY)

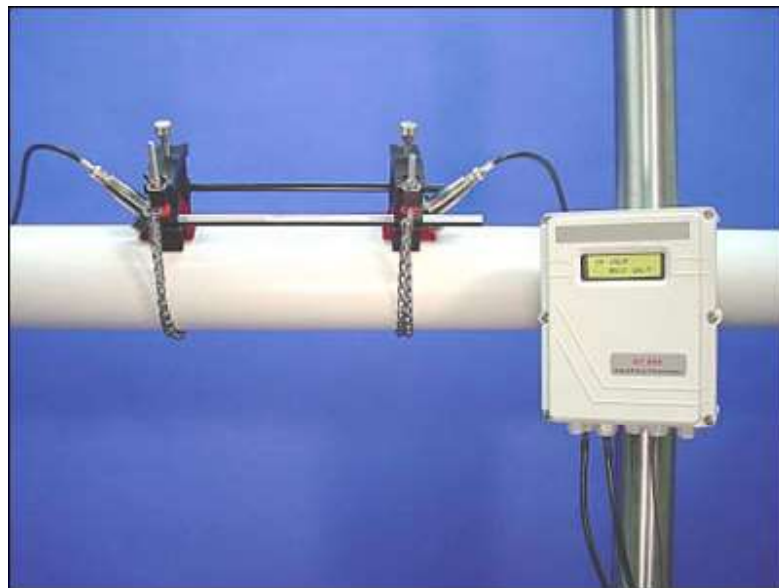


FIG.2

Ultrasonic flow meter suitable for clamp on flow measurement without modifications to pipe work.