| | | |
|---|---|---|
| | PRE-QUALIFICATION REQUIREMENTS FOR 1X660 MW PANKI TPS | PE-PQ-426-145-1007 |
| | | REVISION NO. 00 DATE 28.10.2021 |
| | | SHEET NO. 1 OF 1 |

| PACKAGE: ULTRASONIC FLOWMETER | |
|---|---|
| 1.0 | |
| a. | Supplier should be Original equipment manufacturer (OEM) for ULTRASONIC FLOW METER. |
| b. | In case supplier is not OEM, evaluation shall be done as following:<br>1. If supplier happens to be Indian subsidiaries of foreign OEM, then the credentials of the foreign OEM can also be considered for meeting PQR.<br>2. If supplier happens to be Authorized channel partner or having a valid collaboration agreement / licensing agreement with some other company or being a Joint Venture Company, then the credentials of collaborator / licensing company / Principal company /JV partner can also be considered for meeting PQR as per scope of the work. The scope matrix shall include their respective roles including design vetting, manufacturing of critical component and warranty/guarantee. If supplier(s) qualifies on the basis of credentials of his principal/JV partner/Collaborator etc., then the principal/JV partner/Collaborator shall be responsible for overall design vetting and warranty/guarantee of the package. |
| 2.0 | The Product being offered by the Supplier should be in use successfully in power plant or any other industrial application for at least 1 (One) year. Supplier to submit either of following supporting documents for the product:<br>a. Copy of minimum 1 (One) Performance Certificate from end user / customer certifying that product has been running satisfactorily for 1 (One) year from date of commissioning. The certificate should clearly indicate date of commissioning, date of issue of certificate and name/designation of the certificate issuer. Copy of purchase order & technical parameter to be attached along with the performance certificate.<br>OR<br>b. Copy of repeat orders from minimum 1 (One) purchaser. Order received by supplier from same purchaser with a gap of minimum 2 (Two) years shall be considered as repeat order. Copy of technical parameters for each order to be attached. |
| 3.0 | Supplier to furnish experience list of last 5 years indicating customer name, purchase order reference, item supplied & year of supply to establish the continuity of business. |
| 4.0 | Supplier to submit all documents in English. If documents submitted by supplier are in language other than English, a self-attested English Translated document should also be submitted. |

| PREPARED BY | CHECKED BY | REVIEWED BY | APPROVED BY |
|---|---|---|---|
| NEHA JAIN<br>DY.MGR-C&I<br>29/10/21 | CHETAN MALIK<br>SR.MGR-C&I<br>29/10/21 | SSB<br>DGM-C&I<br>29.10.2021 | DIPESH PALIT<br>AGM-C&I<br>29/10/21 |

# 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

# CONTENTS

VOL-IIB

# SECTION – A

# SCOPE OF ENQUIRY

| | | |
|---|---|---|
| BHEL | **TECHNICAL SPECIFICATION**<br>**FOR**<br>**ULTRASONIC FLOWMETER**<br>**1X 660 MW PANKI TPS** | SPEC NO.: **PE-TS-426-145-I916**<br>VOLUME II B<br>SECTION A |

# 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.

# SECTION-C

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

# SECTION-C

# SPECIAL TECHNICAL REQUIREMENTS

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

2. 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 without any commercial and delivery implication.

3. Design & Engineering details of all spares (make, model, rating, drawing, data sheet etc.) shall be submitted to the Owner prior to dispatch from manufacturers' works.

# Customer Specification

## 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

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:<br>Analog Current<br>Binary<br><br>Communication ports | <br>Isolated 4-20mA linear outputs for each path<br>Contact relay outputs, 2 NO + 2 NC for alarm<br><br>RS 232 C digital<br>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<br>All weather canopy for protection from direct sunlight and direct rain.<br>Material of all fittings shall be SS 316. |

# SECTION-C

# DATA SHEETS - A&B

FORM NO. PEM-6666-0

| | | |
|---|---|---|
| BHEL | **DATA SHEET FOR UTRASONIC FLOW TRANSMITTER<br>1 x 660 MW PANKI TPS** | SPEC NO.: PE-TS-426-145-I916 |

**Tag No.: 10**PAB11BP001

**DATA SHEET – A & B**

| DATA SHEET – A | | | DATA SHEET – B (TO BE FILLED BY VENDOR) |
|---|---|---|---|
| GENERAL | PROJECT | **1 X 660 MW PANKI TPS** | |
| | TAG NO. | 10PAB11BP001 | |
| | QUANTITY | ONE (01) | |
| | SERVICE: | CWP DISCH HDR TO CONDENSER | |
| | MAKE : MODEL | Bidder to indicate | |
| TECHNICAL | TYPE | ■ TRANSIT TIME CLAMP-ON<br>■ 2 PAIRS/SETS OF TRANS-RECEIVERS (DUAL PATH WITH 2 SETS OF TRANSDUCER) | |
| | FLOW MEASUREMENT | ■Instantaneous Flow Rate ■ Totalized Flow ■ Velocity | |
| | OUTPUT | Isolated 4-20 mA DC linear output for each path | |
| | ACCURACY | ± 1.0 % | |
| | REPEATABILITY | ±0.2% of calibration span | |
| | RANGEABILITY | 400:1 | |
| | LOAD RESISTANCE | MIN. 500 OHM | |
| | CONTACT RELAY OUTPUT | 2 NO + 2 NC | |
| | DISPLAY/INDICATION | Flow meter with LCD screen backlight based local display & keypad. | |
| | OPERATING VOLTAGE | ■ 230V AC | |
| | PROTECTION CLASS | IP-65 or better for both Transmitter & Sensors | |
| | ENCLOSURE MATERIAL | Die cast Aluminum / SS316, Weather and dust proof | |
| | MOUNTING | SS316 Chain or Strap Including Fittings | |
| | ELECTRICAL CONNECTION | ■ PLUG-IN SOCKET | |
| | COMMUNICATION PORTS | 1)RS 232 C digital.2) Hand held terminal Port | |
| | SOFTWARE | 1)Compensation for any cross path errors. 2)Programming and Configuration from front panel | |
| | DIAGNOSTIC FEATURE | 1) False signal Tolerance 2) Power supply failure | |
| | RECORDING /LOGGING | ■ 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. | |
| | SEA WORTHY PACKING | NOT APPLICABLE | |
| PROCESS DATA | RATE OF FLOW (T/HR) | NORMAL : 83300 TPH MAXIMUM: 100000 TPH | |
| | UPSTREAM WORKING PRESS (Kg/cm2g) | 2.6 Kg/cm2(g) | |
| | DESIGN PRESS (Kg/cm2g) | 6.0 Kg/cm2(g) | |
| | NORMAL TEMP (Deg C) | 33.0 Deg C | |
| | MAXIMUM TEMP (Deg C) | 60.0 Deg C | |
| | PIPE LOCATION | ■ UNDERGROUND ☐ OVERGROUND | |
| PIPE LINE DATA | PIPE SIZE (OD x THK) mm | 3840 x 14 | |
| | PIPE MATERIAL | CARBON STEEL AS PER IS-2062 Gr. B ROLLED AND BUTT WELDED CONFIRIMNG TO IS:3589 Gr. 410 | |
| | AVAILABLE PIPE STRAIGHT LENGTH | UPSTREAM : 10D<br>DOWNSTREAM : 5D | |

FORM NO. PEM-6666-0

| | | |
|---|---|---|
| BHEL | **DATA SHEET FOR UTRASONIC FLOW TRANSMITTER<br>1 x 660 MW PANKI TPS** | SPEC NO.: PE-TS-426-145-I916 |

**Tag No.: 10**PAB30BP001

**DATA SHEET – A & B**

| DATA SHEET – A | | | DATA SHEET – B (TO BE FILLED BY VENDOR) |
|---|---|---|---|
| GENERAL | PROJECT | **1 X 660 MW PANKI TPS** | |
| | TAG NO. | 10PAB30BP001 | |
| | QUANTITY | ONE (01) | |
| | SERVICE: | CW RETURN HEADER TO COOLING TOWER | |
| | MAKE : MODEL | Bidder to indicate | |
| TECHNICAL | TYPE | ■ TRANSIT TIME CLAMP-ON<br>■ 2 PAIRS/SETS OF TRANS-RECEIVERS (DUAL PATH WITH 2 SETS OF TRANSDUCER) | |
| | FLOW MEASUREMENT | ■Instantaneous Flow Rate ■ Totalized Flow ■ Velocity | |
| | OUTPUT | Isolated 4-20 mA DC linear output for each path | |
| | ACCURACY | ± 1.0 % | |
| | REPEATABILITY | ±0.2% of calibration span | |
| | RANGEABILITY | 400:1 | |
| | LOAD RESISTANCE | MIN. 500 OHM | |
| | CONTACT RELAY OUTPUT | 2 NO + 2 NC | |
| | DISPLAY/INDICATION | Flow meter with LCD screen backlight based local display & keypad. | |
| | OPERATING VOLTAGE | ■ 230V AC | |
| | PROTECTION CLASS | IP-65 or better for both Transmitter & Sensors | |
| | ENCLOSURE MATERIAL | Die cast Aluminum / SS316, Weather and dust proof | |
| | MOUNTING | SS316 Chain or Strap Including Fittings | |
| | ELECTRICAL CONNECTION | ■ PLUG-IN SOCKET | |
| | COMMUNICATION PORTS | 1)RS 232 C digital.2) Hand held terminal Port | |
| | SOFTWARE | 1)Compensation for any cross path errors. 2)Programming and Configuration from front panel | |
| | DIAGNOSTIC FEATURE | 1) False signal Tolerance 2) Power supply failure | |
| | RECORDING /LOGGING | ■ 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. | |
| | SEA WORTHY PACKING | NOT APPLICABLE | |
| PROCESS DATA | RATE OF FLOW (T/HR) | NORMAL : 89125 TPH MAXIMUM: 107860 TPH | |
| | UPSTREAM WORKING PRESS (Kg/cm2g) | 1.9 Kg/cm2(g) | |
| | DESIGN PRESS (Kg/cm2g) | 6.0 Kg/cm2(g) | |
| | NORMAL TEMP (Deg C) | 40.5 Deg C | |
| | MAXIMUM TEMP (Deg C) | 60.0 Deg C | |
| | PIPE LOCATION | ■ UNDERGROUND ☐ OVERGROUND | |
| PIPE LINE DATA | PIPE SIZE (OD x THK) mm | 3840 x 14 | |
| | PIPE MATERIAL | CARBON STEEL AS PER IS-2062 Gr. B ROLLED AND BUTT WELDED CONFIRIMNG TO IS:3589 Gr. 410 | |
| | AVAILABLE PIPE STRAIGHT LENGTH | UPSTREAM : 10D<br>DOWNSTREAM : 5D | |

FORM NO. PEM-6666-0

| | | |
|---|---|---|
| BHEL | **DATA SHEET FOR UTRASONIC FLOW TRANSMITTER<br>1 x 660 MW PANKI TPS** | SPEC NO.: PE-TS-426-145-I916 |

**Tag No.: 10**PAB50BP001

**DATA SHEET – A & B**

| DATA SHEET – A | | | DATA SHEET – B (TO BE FILLED BY VENDOR) |
|---|---|---|---|
| GENERAL | PROJECT | **1 X 660 MW PANKI TPS** | |
| | TAG NO. | 10PAB50BP001 | |
| | QUANTITY | ONE (01) | |
| | SERVICE: | ACWP DISCHARGE HEADER | |
| | MAKE : MODEL | Bidder to indicate | |
| TECHNICAL | TYPE | ■ TRANSIT TIME CLAMP-ON<br>■ 2 PAIRS/SETS OF TRANS-RECEIVERS (DUAL PATH WITH 2 SETS OF TRANSDUCER) | |
| | FLOW MEASUREMENT | ■Instantaneous Flow Rate ■ Totalized Flow ■ Velocity | |
| | OUTPUT | Isolated 4-20 mA DC linear output for each path | |
| | ACCURACY | ± 1.0 % | |
| | REPEATABILITY | ±0.2% of calibration span | |
| | RANGEABILITY | 400:1 | |
| | LOAD RESISTANCE | MIN. 500 OHM | |
| | CONTACT RELAY OUTPUT | 2 NO + 2 NC | |
| | DISPLAY/INDICATION | Flow meter with LCD screen backlight based local display & keypad. | |
| | OPERATING VOLTAGE | ■ 230V AC | |
| | PROTECTION CLASS | IP-65 or better for both Transmitter & Sensors | |
| | ENCLOSURE MATERIAL | Die cast Aluminum / SS316, Weather and dust proof | |
| | MOUNTING | SS316 Chain or Strap Including Fittings | |
| | ELECTRICAL CONNECTION | ■ PLUG-IN SOCKET | |
| | COMMUNICATION PORTS | 1)RS 232 C digital.2) Hand held terminal Port | |
| | SOFTWARE | 1)Compensation for any cross path errors. 2)Programming and Configuration from front panel | |
| | DIAGNOSTIC FEATURE | 1) False signal Tolerance 2) Power supply failure | |
| | RECORDING /LOGGING | ■ 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. | |
| | SEA WORTHY PACKING | NOT APPLICABLE | |
| PROCESS DATA | RATE OF FLOW (T/HR) | NORMAL : 6075 TPH MAXIMUM: 7900 TPH | |
| | UPSTREAM WORKING PRESS (Kg/cm2g) | 3.7 Kg/cm2(g) | |
| | DESIGN PRESS (Kg/cm2g) | 7.5 Kg/cm2(g) | |
| | NORMAL TEMP (Deg C) | 36.0 Deg C | |
| | MAXIMUM TEMP (Deg C) | 60.0 Deg C | |
| | PIPE LOCATION | ■UNDERGROUND ☐OVERGROUND | |
| PIPE LINE DATA | PIPE SIZE (OD x THK) mm | 1118 x 10 | |
| | PIPE MATERIAL | CARBON STEEL AS PER IS-2062 Gr. B ROLLED AND BUTT WELDED CONFIRIMNG TO IS:3589 Gr. 410 | |
| | AVAILABLE PIPE STRAIGHT LENGTH | UPSTREAM : 10D<br>DOWNSTREAM : 5D | |

FORM NO. PEM-6666-0

| | | |
|---|---|---|
| BHEL | **DATA SHEET FOR UTRASONIC FLOW TRANSMITTER<br>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 | **1 X 660 MW PANKI TPS** | |
| | TAG NO. | 10GAD10CF011 | |
| | QUANTITY | ONE (01) | |
| | SERVICE: | RAW WATER INTAKE PUMP DISCHARGE HEADER | |
| | MAKE : MODEL | Bidder to indicate | |
| TECHNICAL | TYPE | ■ TRANSIT TIME CLAMP-ON<br>■ 2 PAIRS/SETS OF TRANS-RECEIVERS (DUAL PATH WITH 2 SETS OF TRANSDUCER) | |
| | FLOW MEASUREMENT | ■Instantaneous Flow Rate ■ Totalized Flow ■ Velocity | |
| | OUTPUT | Isolated 4-20 mA DC linear output for each path | |
| | ACCURACY | ± 1.0 % | |
| | REPEATABILITY | ±0.2% of calibration span | |
| | RANGEABILITY | 400:1 | |
| | LOAD RESISTANCE | MIN. 500 OHM | |
| | CONTACT RELAY OUTPUT | 2 NO + 2 NC | |
| | DISPLAY/INDICATION | Flow meter with LCD screen backlight based local display & keypad. | |
| | OPERATING VOLTAGE | ■ 230V AC | |
| | PROTECTION CLASS | IP-65 or better for both Transmitter & Sensors | |
| | ENCLOSURE MATERIAL | Die cast Aluminum / SS316, Weather and dust proof | |
| | MOUNTING | SS316 Chain or Strap Including Fittings | |
| | ELECTRICAL CONNECTION | ■ PLUG-IN SOCKET | |
| | COMMUNICATION PORTS | 1)RS 232 C digital.2) Hand held terminal Port | |
| | SOFTWARE | 1)Compensation for any cross path errors. 2)Programming and Configuration from front panel | |
| | DIAGNOSTIC FEATURE | 1) False signal Tolerance 2) Power supply failure | |
| | RECORDING /LOGGING | ■ 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. | |
| | SEA WORTHY PACKING | NOT APPLICABLE | |
| PROCESS DATA | RATE OF FLOW (T/HR) | NORMAL : 2850 TPH MAXIMUM: 3705 TPH | |
| | UPSTREAM WORKING PRESS (Kg/cm2g) | 1.8 Kg/cm2(g) | |
| | DESIGN PRESS (Kg/cm2g) | 10.0 Kg/cm2(g) | |
| | NORMAL TEMP (Deg C) | 33.0 Deg C | |
| | MAXIMUM TEMP (Deg C) | 60.0 Deg C | |
| | PIPE LOCATION | ■ UNDERGROUND ☐OVERGROUND | |
| PIPE LINE DATA | PIPE SIZE (OD x THK) mm | 711 x 8 | |
| | PIPE MATERIAL | CARBON STEEL AS PER IS-2062 Gr. B ROLLED AND BUTT WELDED CONFIRIMNG TO IS:3589 Gr. 410 | |
| | AVAILABLE PIPE STRAIGHT LENGTH | UPSTREAM : 10D<br>DOWNSTREAM : 5D | |

FORM NO. PEM-6666-0

| | | |
|---|---|---|
| BHEL | **DATA SHEET FOR UTRASONIC FLOW TRANSMITTER<br>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 | **1 X 660 MW PANKI TPS** | |
| | TAG NO. | 10GAD24CF011 | |
| | QUANTITY | ONE (01) | |
| | SERVICE: | AHP MAKE-UP PUMP DISCHARGE HEADER | |
| | MAKE : MODEL | Bidder to indicate | |
| TECHNICAL | TYPE | ■ TRANSIT TIME CLAMP-ON<br>■ 2 PAIRS/SETS OF TRANS-RECEIVERS (DUAL PATH WITH 2 SETS OF TRANSDUCER) | |
| | FLOW MEASUREMENT | ■Instantaneous Flow Rate ■ Totalized Flow ■ Velocity | |
| | OUTPUT | Isolated 4-20 mA DC linear output for each path | |
| | ACCURACY | ± 1.0 % | |
| | REPEATABILITY | ±0.2% of calibration span | |
| | RANGEABILITY | 400:1 | |
| | LOAD RESISTANCE | MIN. 500 OHM | |
| | CONTACT RELAY OUTPUT | 2 NO + 2 NC | |
| | DISPLAY/INDICATION | Flow meter with LCD screen backlight based local display & keypad. | |
| | OPERATING VOLTAGE | ■ 230V AC | |
| | PROTECTION CLASS | IP-65 or better for both Transmitter & Sensors | |
| | ENCLOSURE MATERIAL | Die cast Aluminum / SS316, Weather and dust proof | |
| | MOUNTING | SS316 Chain or Strap Including Fittings | |
| | ELECTRICAL CONNECTION | ■ PLUG-IN SOCKET | |
| | COMMUNICATION PORTS | 1)RS 232 C digital.2) Hand held terminal Port | |
| | SOFTWARE | 1)Compensation for any cross path errors. 2)Programming and Configuration from front panel | |
| | DIAGNOSTIC FEATURE | 1) False signal Tolerance 2) Power supply failure | |
| | RECORDING /LOGGING | ■ 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. | |
| | SEA WORTHY PACKING | NOT APPLICABLE | |
| PROCESS DATA | RATE OF FLOW (T/HR) | NORMAL : 1750 TPH MAXIMUM: 2275 TPH | |
| | UPSTREAM WORKING PRESS (Kg/cm2g) | 3.3 Kg/cm2(g) | |
| | DESIGN PRESS (Kg/cm2g) | 10.0 Kg/cm2(g) | |
| | NORMAL TEMP (Deg C) | 33.0 Deg C | |
| | MAXIMUM TEMP (Deg C) | 60.0 Deg C | |
| | PIPE LOCATION | ■ UNDERGROUND ☐ OVERGROUND | |
| PIPE LINE DATA | PIPE SIZE (OD x THK) mm | 610 x 8 | |
| | PIPE MATERIAL | CARBON STEEL AS PER IS-2062 Gr. B ROLLED AND BUTT WELDED CONFIRIMNG TO IS:3589 Gr. 410 | |
| | AVAILABLE PIPE STRAIGHT LENGTH | UPSTREAM : 10D<br>DOWNSTREAM : 5D | |

FORM NO. PEM-6666-0

| | | |
|---|---|---|
| BHEL | **DATA SHEET FOR UTRASONIC FLOW TRANSMITTER<br>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 | **1 X 660 MW PANKI TPS** | |
| | TAG NO. | 10GAD28CF011 | |
| | QUANTITY | ONE (01) | |
| | SERVICE: | RAW WATER PUMP DISCHARGE HEADER | |
| | MAKE : MODEL | Bidder to indicate | |
| TECHNICAL | TYPE | ■ TRANSIT TIME CLAMP-ON<br>■ 2 PAIRS/SETS OF TRANS-RECEIVERS (DUAL PATH WITH 2 SETS OF TRANSDUCER) | |
| | FLOW MEASUREMENT | ■Instantaneous Flow Rate ■ Totalized Flow ■ Velocity | |
| | OUTPUT | Isolated 4-20 mA DC linear output for each path | |
| | ACCURACY | ± 1.0 % | |
| | REPEATABILITY | ±0.2% of calibration span | |
| | RANGEABILITY | 400:1 | |
| | LOAD RESISTANCE | MIN. 500 OHM | |
| | CONTACT RELAY OUTPUT | 2 NO + 2 NC | |
| | DISPLAY/INDICATION | Flow meter with LCD screen backlight based local display & keypad. | |
| | OPERATING VOLTAGE | ■ 230V AC | |
| | PROTECTION CLASS | IP-65 or better for both Transmitter & Sensors | |
| | ENCLOSURE MATERIAL | Die cast Aluminum / SS316, Weather and dust proof | |
| | MOUNTING | SS316 Chain or Strap Including Fittings | |
| | ELECTRICAL CONNECTION | ■ PLUG-IN SOCKET | |
| | COMMUNICATION PORTS | 1)RS 232 C digital.2) Hand held terminal Port | |
| | SOFTWARE | 1)Compensation for any cross path errors. 2)Programming and Configuration from front panel | |
| | DIAGNOSTIC FEATURE | 1) False signal Tolerance 2) Power supply failure | |
| | RECORDING /LOGGING | ■ 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. | |
| | SEA WORTHY PACKING | NOT APPLICABLE | |
| PROCESS DATA | RATE OF FLOW (T/HR) | NORMAL : 1975 TPH MAXIMUM: 2570 TPH | |
| | UPSTREAM WORKING PRESS (Kg/cm2g) | 3.3 Kg/cm2(g) | |
| | DESIGN PRESS (Kg/cm2g) | 10.0 Kg/cm2(g) | |
| | NORMAL TEMP (Deg C) | 33.0 Deg C | |
| | MAXIMUM TEMP (Deg C) | 60.0 Deg C | |
| | PIPE LOCATION | ■ UNDERGROUND ☐ OVERGROUND | |
| PIPE LINE DATA | PIPE SIZE (OD x THK) mm | 610 x 8 | |
| | PIPE MATERIAL | CARBON STEEL AS PER IS-2062 Gr. B ROLLED AND BUTT WELDED CONFIRIMNG TO IS:3589 Gr. 410 | |
| | AVAILABLE PIPE STRAIGHT LENGTH | UPSTREAM : 10D<br>DOWNSTREAM : 5D | |

# SECTION-C

# QUALITY PLAN

| | MANUFACTURER / BIDDER / SUPPLIER NAME & ADDRESS | QUALITY PLAN : STANDARD QUALITY PLAN | | SPEC. NO : | DATE: |
|---|---|---|---|---|---|
| | | CUSTOMER : | | QP NO.: PE-QP-426-145-I011, REV 00 | DATE: 01.11.2021 |
| | | PROJECT: | | PO NO.: | DATE: |
| | | ITEM: ULTRASONIC FLOW METER | SYSTEM: C&I | SECTION: | SHEET 1 OF 2 |

| SNo. | Component & Operations | Characteristics | Class | Type of Check | Quantum of check | | Reference document | Acceptance norms | Format of record | Agency | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 | * | ** | | | 10 |
| | | | | | M | C/N | | | | D | M | C | N | |
| **1.00** | **RAW MATERIAL** | | | | | | | | | | | | | |
| 1.1 | Electronic Housing | Chemical Property | MAJOR | Visual | 100% | - | Approved Drg / data Sheet | Technical catalogue/ Approved documents | Technical catalogue/ Approved documents | √ | P | V | -- | |
| 1.2 | Cable gland | Chemical Property | MAJOR | Visual | 100% | - | Approved Drg / data Sheet | Technical catalogue/ Approved documents | Technical catalogue/ Approved documents | √ | P | V | -- | |
| 1.3 | Mounting Material | | | | | - | Mfr. Standard | Technical catalogue/ Mfr. Standard | | √ | P | V | -- | |
| **2.00** | **IN PROCESS INSPECTION** | | | | | | | | | | | | | |
| 2.1 | Standard Certificates | Certificate of Compliance, Warranty Certificate, | MAJOR | Visual | 100% | As applicable | Technical documents/ Approved documents | Technical catalogue/ Approved documents | Technical catalogue/ Approved documents | √ | P,V | V | - | |
| 2.2 | Visual Check | Mechanical | MAJOR | Visual | 100% | - | Technical catalogue/ Approved documents | Technical catalogue/ Approved documents | Technical catalogue/ Approved documents | - | P | V | - | |
| 2.3 | Calibration | Electrical | CRITICAL | Measurement | 1 / type per size | 1 / type per size | Tech Spec. | Tech Spec. | Test Certificate / Inspection Report | √ | P | V | | Refer Note-3 |
| **3.00** | **FINAL INSPECTION** | | | | | | | | | | | | | |
| 3.1 | **Complete Assembly** | Overall dimension and end connection | MAJOR | Measurement | 100% | - | Approved Drg / data Sheet | Technical catalogue/ Approved documents | Inspection Report | √ | P,W | V | | |
| | | Marking–Tag No., direction of flow | MINOR | Visual | 100% | - | Approved Drg / data Sheet | Technical catalogue/ Approved documents | Inspection Report | √ | P,W | V | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.2 | **Functional Test** | | | | | | | | | | | | | |
| 3.21 | Functional test & power ON | Electrical | MAJOR | Visual | 100% | - | Functional test report for meter & transducer | Approved documents | Technical catalogue/Approved documents | - | P | V | - | |
| 3.22 | HART Communication | Electrical | MAJOR | --- | 100% | - | Technical catalogue/ Approved documents | Technical catalogue/ Approved documents | Technical catalogue/ Approved documents | - | - | V | - | |
| **4.00** | **PACKING & DISPATCH** | Soundness of Packing against transit damage | MAJOR | Visual | 100% | - | Mfr. Standard | Technical catalogue/ Mfr. Standard | | -- | P | W | --- | Refer Note-4 |

**NOTES:**

1. BHEL reserves the right to conduct repeat tests, if required.
2. Protection Class shall be IP-65 or better or as per approved datasheet.
3. CALIBRATION Test to be carried out at NABL approved laboratory.
4. Following to be noted for packing:
   (a) Shall be packed suitably in order to avoid damage during transit and also during storage at site.
   (b) Photographs of Ultrasonic Flow Meter duly placed inside the wooden box just before final packing.
   (c) Photographs of the packing (with LR No.) as per approved packing procedure (if applicable) just before dispatch.
   (d) Clearance for dispatch will be given only after receipt of the photos
   (e) Sea worthy packing shall be provided, if called for in the Data sheets. Acceptance Norms shall be in line with the Technical Specification.
5. Project specific QP will be prepared based on customer requirement.
6. In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed/verified by supplier TPIA.
7. The latest revisions/year of issue of all the standard indicated in the QP shall be referred.
8. Quantum of check by BHEL/BHEL nominated inspection agency shall be indicated during project specific enquiry.

**LEGEND:**

* RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION, **D:** DOCUMENTATION.

** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **C**: MAIN SUPPLIER/ BHEL/ THIRD INSPECTION AGENCY, **N**: CUSTOMER, **P**: PERFORM, **W**: WITNESS, **V:** VERIFICATION, AS APPROPRIATE.

# SECTION-C

# BILL OF QUANTITY

# BOQ FOR UFM FOR 1 X 660 MW PANKI TPS

| A | Ultrasonic flow meter Assemblies complete with cable gland, transducer cable, all mounting hardware, SS name plate, SS chain etc. | | | |
|---|---|---|---|---|
| **Sl no.** | **Service Description** | **KKS number** | **UNIT OF MEASUREMENT** | **Total Quantity** |
| **1** | CWPs DISCH HEADER FLOW TO CONDENSER | 10PAB11BP001 | NOS. | 1 |
| **2** | CW RETURN HEADER FLOW TO FOREBAY | 10PAB30BP001 | NOS. | 1 |
| **3** | ACWPs DISCH HEADER FLOW | 10PAB50BP001 | NOS. | 1 |
| **4** | RAW WATER INTAKE PUMPs DISCHARGE HEADER FLOW | 10GAD10CF011 | NOS. | 1 |
| **5** | AHP MAKE-UP PUMPs DISCHARGE HEADER FLOW | 10GAD24CF01 | NOS. | 1 |
| **6** | RAW WATER PUMPs DISCHARGE HEADER FLOW | 10GAD28CF011 | NOS. | 1 |
| | | | | |
| **B** | **SUPERVISON OF E & C** | | | |
| B.1 | Charges of Supervision of Erection & Commissioning at site (Including lodging & boarding, Local Conveyence at site) per Manday (Excluding Travel Time) | | MANDAYS | 4 |
| B.2 | Lump sum price for travel (Per Visit) including ticket ,Visa/ Insurance (as applicable), intermediary stay Including travel time | | NUMBER OF TRIPS | 2 |
| | | | | |
| **C** | **MANDATORY SPARES** (20% or 2 nos. of each make and type, whichever is more) | | | 2 |

# SECTION-D

# EQUIPMENT SPECIFICATION

**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.

**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 -** Refer GCC

**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 Along with the bids:**

The offer shall include the following documents:

a) Data Sheet A & B duly signed and stamped.

b) Quality Plan duly signed and stamped.

c) Unpriced Schedule of Prices.

d) Documents pertaining to PQR

**7.2** The offer shall include the following after award of contract for owner's approval. *

* (List of drawing/document with Schedule attached at last page of this file)

**7.3** Final documentation for a project specific contract:
Final documentation shall contain **8 sets with 3 CDROMS** of each of the following:

a) Approved final drawings/data sheets
b) All Test certificates
c) Operation & Maintenance Manuals
d) Assembly drawings and QP for approval
e) Calibrations Reports
f) Quality Inspection Report

**8.0 PACKING & MARKING**

8.1 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.

8.2 Each assembly shall be identified with the following information.
- Tag No.
- Service.
- Line size & thickness.
- Direction of flow.

**9.0 APPLICABLE DATA SHEETS**

This document shall be read in conjunction with Data Sheet - A & B, included in Section-C, Vol. II-B

| Sl. No. | Package Code | Package name | Deptt. | BHEL Drawing No | Drawing Title | Primary/Secondary | BHEL Inputs | Drg Sch for Vendors |
|---|---|---|---|---|---|---|---|---|
| 6 | 145-42000-A | ULTRASONIC FLOW METERS | C&I | PE-V0-XXX-145-I902 | DATA SHEET,CALCULATION, BOQ/BOM & GA DRAWING for Ultrasonic Flow Meter | Primary | | R-0 within 14 days from PO & subsequent revisions incorporating all the BHEL comments within 10 days of comments received from BHEL. BHEL shall furnish comments / approval on each submission within 18 days from receipt. |
| | | | | PE-V0-XXX-145-I903 | QAP for Flow Ultrasonic Meter | Primary | | |
| | | | | PE-V0-XXX-145-I906 | O&M MANUAL for Ultrasonic Flow Meter | Secondary | | within 30 days of issuance of MDCC |