STANDARD
TECHNICAL SPECIFICATION
FOR
ELECTROMAGNETIC FLOW METER with
ACCESSORIES

VOLUME - IIB

SECTIONS-C & D

SPECIFICATION No: PE-TS-XXX-145-I027

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT DIVISION
NOIDA, INDIA
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CUSTOMER'S SPECIFICATION
## DATA SHEET – A & B

**DATA SHEET A**

- **GENERAL**
  - **PROJECT**
  - **OFFER REFERANCE**
  - **TAG NO.**
  - **SERVICE**
  - **MAKE** : **MODEL**

- **TECHNICAL**
  - **PROCESS END CONNECTION**
  - **FLOW MEASUREMENT**
  - **OUTPUT**
  - **ACCURACY**
  - **FLOW TUBE**
  - **REPEATABILITY**
  - **RANGEABILITY**
  - **HART COMPATIBILITY**
  - **RESPONSE TIME TO STEP CHANGE IN**
  - **INPUT**
  - **LOAD**
  - **CONTACTS(POTENTIAL FREE):**
    - 1) **CONTACT RELAY OUTPUT FOR**
    - 2) **NO. OF CONTACTS & RATING( if applicable)**

- **DISPLAY/INDICATION:**
  - **LOCAL DISPLAY OF FLOW METER**
  - **WITH LCD SCREEN BACKLIGHT AND KEYPAD.**

- **TRANSMITTER:**
  - **OPERATING VOLTAGE**
  - **TOTALIZING FACILITIES**
  - **SOFTWARE FEATURES:**

- **DIAGNOSTICS:**

- **PROTECTION CLASS**

- **POWER SUPPLY**

**DATA SHEET B**

- **TO BE FILLED UP BY BIDDER**

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**Example Data:**

- **PROCESS END CONNECTION:** Full Bore
- **FLOW MEASUREMENT:** Instantaneous flow rate as well as totalized flow
- **OUTPUT:** Isolated 4-20 mA DC with for volumetric flow
- **ACCURACY:** ±1% / OTHERS
- **FLOW TUBE:** SS304
- **REPEATABILITY:** ±0.2% of calibrated span / OTHERS
- **RANGEABILITY:** 10:1 / OTHERS
- **HART COMPATIBILITY:** YES / NO
- **RESPONSE TIME TO STEP CHANGE IN INPUT:** 20 MSEC MAX / OTHERS
- **CONTACTS(POTENTIAL FREE):**
  - 1) CONTACT RELAY OUTPUT FOR ALARM
  - 2) NO. OF CONTACTS & RATING( if applicable)
- **DISPLAY/INDICATION:**
  - LOCAL DISPLAY OF FLOW METER WITH LCD SCREEN BACKLIGHT AND KEYPAD.
- **TRANSMITTER:**
  - OPERATING VOLTAGE
  - TOTALIZING FACILITIES
  - SOFTWARE FEATURES:
- **DIAGNOSTICS:**
  - Compensation for any cross path errors.
  - False signal tolerance, Power supply failure, hardware failure.
- **PROTECTION CLASS**
- **POWER SUPPLY:**

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**NOTES:**

- **Tag No.**
- **DATA SHEET No.** PES-145-27-DS1-0
## DATA SHEET FOR ELECTROMAGNETIC FLOW METER

### ELECTRIC CONNECTION
- [ ] PLUG & SOCKET
- [ ] CABLE GLAND
- Inline Flanged (with matching flange)

### PROCESS END CONNECTION
- [ ] PLUG & SOCKET
- [ ] CABLE GLAND
- Inline Flanged (with matching flange)

### LINEAR
- [ ] Hard Rubber
- [ ] OTHERS

### PROCESS DATA
- **MEDIUM**
- **RATE OF FLOW (T/HR)**
  - [ ] CW
  - [ ] ACW
  - [ ] DMCW
  - [ ] OTHERS

- **OPERATING PRESS (Kg/cm²g)**
- **DESIGN PRESS (Kg/cm²g)**
- **OPERATING TEMP (Deg C)**
- **DESIGN TEMP (Deg C)**
- **PIPE LOCATION**
- **PIPE DIRECTION**
  - [ ] UNDERGROUND
  - [ ] OVERGROUND
  - [ ] HORIZONTAL
  - [ ] VERTICAL

### PIPE LINE DATA
- **PIPE SIZE (OD x THK) mm**
- **PIPE MATERIAL**
- **AVAILABLE PIPE STRAIGHT LENGTH**

### SUPERVISION
- **SUPERVISION OF ERECTION & COMMISSIONING**
  - [ ] YES
  - [ ] NO
**DATA SHEET FOR ELECTROMAGNETIC FLOW METER**

Tag No.  -------  Data Sheet No.  PES-145-27-DS1-0

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**GENERAL**

**TECHNICAL**
<table>
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<tr>
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<tr>
<td>MEDIUM</td>
<td>RATE OF FLOW (T/HR)</td>
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<td>DESIGN PRESS (Kg/cm²g)</td>
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## QUALITY PLAN
**FOR**
**ELECTRO-MAGNETIC FLOWMETER**

**QUALITY PLAN NO.: PE-QP-999-145-1 011**
**VOLUME** IIB
**SECTION** D
**REV. NO.** 00  **DATE:** 31.03.2014
**SHEET** 1  **OF** 2

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<th>Characteristics Checked</th>
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<th>Type/Method of Check</th>
<th>Extent of Check</th>
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<th>Format of Records</th>
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<td>Major</td>
<td>Visual</td>
<td>As applicable</td>
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<td>Technical catalogue/Approved documents</td>
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**Legend:**
- P - Agency Performing the Test.
- W - Agency Witnessing the Test.
- V - Agency Verifying the Test.
BILL OF QUANTITY-SPARES

[A] LIST OF COMMISSIONING SPARES

[B] LIST OF MANDATORY SPARES
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 Electromagnetic 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 Electromagnetic 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.

3.0 TECHNICAL REQUIREMENT

The Electromagnetic 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 5-100%.

All accessories required for mounting/erection of these instruments shall be furnished as necessary for completeness of the system.

Working principle: Magnetic flow meters use a magnetic field applied to the metering tube, which results in a potential difference proportional to the flow velocity perpendicular to the flux lines. The potential difference is sensed by electrodes aligned perpendicular to the flow and the applied magnetic field. The physical principle at work is Faraday's law of electromagnetic induction. The magnetic flow meter requires a conducting fluid and a nonconducting pipe liner. The electrodes must not corrode in contact with the process fluid; some magnetic flowmeters have auxiliary transducers installed to clean the electrodes in place. The applied magnetic field is pulsed, which allows the flowmeter to cancel out the effect of stray voltage in the piping system.

Electromagnetic flow meters are of two types, insertion type and full bore. Full Bore meter is a circular meter where, when the flow passes by filling the entire bore area, the meter can measure the average velocity inside the meter. The Insertion Type measures velocity at only one point.

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. Material of all fittings shall be SS-316.

4.0 GUARANTEE AND PERFORMANCE

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.

i. Technical data sheet for each flow measuring device assembly in the Pro forma enclosed under Data Sheet-B.


iii. Assembly drawing with dimensional details.

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

i. Technical Data Sheet-C.

ii. Sizing Calculations.

iii. Assembly drawing with dimensions.

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.
- 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