

**NTPC LTD**  
**3X660 MW NORTH KARANPURA**

**TECHNICAL SPECIFICATION**  
**FOR**  
**ELECTROMAGNETIC FLOWMETER**

**VOLUME II-B & III**

SPECIFICATION No: PE-TS-405-145-I916



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

## PREAMBLE

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  
ELECTROMAGNETIC FLOWMETER

**3X660MW NORTH KARAPURA**

SPEC NO.: **PE-TS-405-145-I916**

VOLUME II B


SECTION A

REV. NO. 00

DATE 17/06/2015

SHEET 1 OF 2

**SECTION – A**  
**SCOPE OF ENQUIRY**

	<b>TECHNICAL SPECIFICATION FOR ELECTROMAGNETIC FLOWMETER</b>	SPEC NO.: <b>PE-TS-405-145-I916</b>	
	<b>3X660MW NORTH KARAPURA</b>	VOLUME II B	
		SECTION A	
		REV. NO. 00	DATE : 17/06/2015
		SHEET 2 OF 2	

## 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 electromagnetic flow meter with accessories as mentioned in different sections of this specification for 3X660 MW North Karanpura 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 electromagnetic 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, Compliance Certificate etc.
  - b) Quality Plan
  - c) Datasheets A & B, duly filled
  - d) Schedule of submission of drawings/documents, equipment manufacture inspection and dispatch.
  - e) Schedule of price, unit prices, inspection schedule.

### 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 equipments shall not relieve the supplier of the responsibility of providing such facilities to complete the supply within the quoted prices.
- 2.3 BHEL's/Customer's representative shall be given access to the shop in which the equipments are being manufactured or tested and all test records shall be made available to him.
- 2.4 The equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and Material Dispatch Clearance Certificate (MDCC) is issued by BHEL.



**TECHNICAL SPECIFICATION  
FOR  
ELECTROMAGNETIC FLOWMETER**

**3X660 MW NORTH KARANPURA**

SPEC NO.: PE-TS-405-145-I916

VOLUME II B

SECTION B


REV. NO. 00


DATE : 17/06/2015


SHEET OF

**SECTION – B**

**PROJECT INFORMATION**

CLAUSE NO.	PROJECT INFORMATION												
<p>1.00.00</p> <p>1.01.00</p> <p>1.02.00</p> <p>1.03.00</p> <p>1.04.00</p> <p>1.04.01</p>	<p><b>BACKGROUND</b></p> <p>North Karanpura Super Thermal Power Project (3x660 MW), a pit head coal based thermal power project, is located in Hazaribagh and Chatra districts of Jharkhand State. Basic inputs i.e. coal, water and land have already been tied up. The project is proposed for the States &amp; Union Territories of Northern, Western and Eastern Regions and the State of Jharkhand.</p> <p>The capacity of the project is 1980 MW comprising of three (3) units of 660 MW each.</p> <p><b>Location and Approach</b></p> <p>The power project is proposed to be located near Tandwa town in Chatra districts in the state of Jharkhand on Hazaribagh-Chatra State highway at a distance of about 50 kms from Hazaribagh city. The nearest commercial airport is Ranchi at a distance of 150 kms from project site. The nearest railhead Khalari Railway Station on Ranchi-Garhwa section of Eastern Railways is about 40 kms from project site.</p> <p>Major rail/road distances from the project site are as under:</p> <table border="1" data-bbox="395 813 1190 958"> <thead> <tr> <th><u>City</u></th> <th></th> <th><u>Distance Approx. (kms)</u></th> </tr> </thead> <tbody> <tr> <td>Ranchi</td> <td>:</td> <td>150</td> </tr> <tr> <td>Khalari</td> <td>:</td> <td>40</td> </tr> </tbody> </table> <p>The site is located near Tandwa town having latitude and longitude of about 23<sup>0</sup> 50' N to 23<sup>0</sup> 52' N and 84<sup>0</sup> 59' E to 85<sup>0</sup> 2' E respectively. The Vicinity Plan of the project is placed at <b>Annexure-I</b>.</p> <p>Further to the information given in this sub-section, Bidders are also advised to visit the project site and collect data on local site conditions.</p> <p><b>Land</b></p> <p>About 2245 acres of land is being acquired for the project. About 1500 acres of land is under possession/legal possession and out of 1500 acres, about 890 acres of land is to be used for plant, ash dyke and initial enabling township. No additional land is envisaged to be acquired in plant area. About 15 acres of land is envisaged to be acquired in Hazaribagh city for Township.</p> <p>Commissioner, Chatra vide dated 25.05.1999 and 14.06.2000 has given in-principle clearance for NKSTPP.</p> <p><b>Water</b></p> <p>Make up water available for this project would be about 22 cusec and will be arranged by constructing a dam/reservoir across river Garhi.</p> <p><b>Fuel (Coal)</b></p> <p><b>Coal Requirement, Availability and Linkage</b></p> <p>Coal requirement for the project is estimated as 10.6 Million Tonne/Annum (MTPA), considering a GCV of 3800 kcal/kg. Ministry of Coal vide letter dated 21.10.99 accorded in-principle coal linkage of 10.00 MTPA subject to ratification by Standing Linkage Committee-Long Term (SLC (LT)), of MOC. SLC (LT) in its meeting held on 15.12.2000 firmed up the coal linkage of 10.24 MTPA for the project. Subsequently, the coal linkage was withdrawn by SLC (LT) in its meeting held on 22/23.10.08.</p>	<u>City</u>		<u>Distance Approx. (kms)</u>	Ranchi	:	150	Khalari	:	40			
<u>City</u>		<u>Distance Approx. (kms)</u>											
Ranchi	:	150											
Khalari	:	40											
<p><b>NORTH KARANPURA STPP</b> (3 X 660 MW) <b>EPC PACKAGE</b></p>	<p><b>TECHNICAL SPECIFICATION</b> <b>SECTION – VI, PART-A</b> <b>BID DOC. NO.:CS-4410-001-2</b></p>	<p><b>SUB-SECTION-IB</b> <b>PROJECT INFORMATION</b></p>	<p><b>PAGE</b> <b>1 OF 10</b></p>										

CLAUSE NO.	PROJECT INFORMATION			
<p>1.04.02</p> <p>1.05.00</p> <p>1.06.00</p> <p>1.06.01</p> <p>1.06.02</p> <p>1.06.03</p> <p>1.06.04</p>	<p>Cabinet Committee on Investment (GOI) in its meeting on 20.02.13 decided in-principle to restore the original coal linkage granted to NKSTPP (i.e. from Magadh Coal Block) with the stipulation that the coal supply will commence during the 13th Five Year Plan. MOC vide letter dated 09.05.2013 restored the coal linkage with the stipulation that the coal supply will commence during the 13<sup>th</sup> five year plan.</p> <p><b>Coal Transportation</b></p> <p>Coal from Magadh block of North Karanpura Coalfields is proposed to be transported to the project site through conveyor belt system. One external coal handling plant and one internal coal handling plant are envisaged.</p> <p><b>Meteorological Data</b></p> <p>Important meteorological data from nearest observatory at Hazaribag is placed at Annexure-II.</p> <p><b>Plant Water Scheme</b></p> <p>The Plant water scheme is described below.</p> <p><b>Condenser Cooling System</b></p> <p>It is proposed to adopt Air Cooled Condenser for the project.</p> <p><b>Equipment Cooling Water (ECW) System (Unit Auxiliaries)</b></p> <p>All plant auxiliaries shall be cooled by De-mineralized water (DM) in a closed circuit. The primary circuit DM water shall be cooled through heat exchangers by auxiliary cooling water system. The hot secondary circuit cooling water shall be cooled in the cooling towers and shall be returned back to the system.</p> <p><b>Ash Water System</b></p> <p>It is proposed to have HCSD (High concentration Slurry Disposal) system for combined fly ash and bottom ash. No recirculation of ash water from ash disposal area is envisaged.</p> <p><b>Other Miscellaneous Water Systems</b></p> <p>(a) Raw water shall be used for meeting the Fly ash and bottom ash system requirement etc.</p> <p>(b) The service water shall be taken from clarified water tank of Pretreatment plant. Service water (wash water) collected from various areas shall be treated using oil water separators, tube settlers, coal settling pits etc. as per requirement and treated water from liquid effluent treatment plant shall be recycled back to the service water system for re-use.</p> <p>(c) The drinking water requirement of the plant shall be provided from water treatment plant.</p>			
<p><b>NORTH KARANPURA STPP</b> (3 X 660 MW) <b>EPC PACKAGE</b></p>	<p><b>TECHNICAL SPECIFICATION</b> <b>SECTION – VI, PART-A</b> <b>BID DOC. NO.:CS-4410-001-2</b></p>	<p><b>SUB-SECTION-IB</b> <b>PROJECT INFORMATION</b></p>	<p><b>PAGE</b> <b>2 OF 10</b></p>	

CLAUSE NO.	PROJECT INFORMATION			
1.07.00	<p>(d) Steam Cycle make-up water, makeup to the primary circuit of ECW (unit auxiliaries) system, boiler fill water and makeup to the hydrogen generation plant shall be provided from Demineralising plant.</p> <p>(e) The quality of Raw water is enclosed with this sub-section as Annexure-III.</p> <p><b>Criteria for Earthquake Resistant Design of Structures and Equipment</b></p> <p>All power plant structures and equipment, including plant auxiliary structures and equipment shall be designed for seismic forces as given in the Part - B of this section.</p>			
1.08.00	<p><b>Criteria for Wind Resistant Design of Structures and Equipment</b></p> <p>All structures and equipment of the power plant, including plant auxiliary structures and equipment, shall be designed for wind forces as given as given in Part B of this section.</p>			
<p>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.:CS-4410-001-2</p>	<p>SUB-SECTION-IB PROJECT INFORMATION</p>	<p>PAGE 3 OF 10</p>	

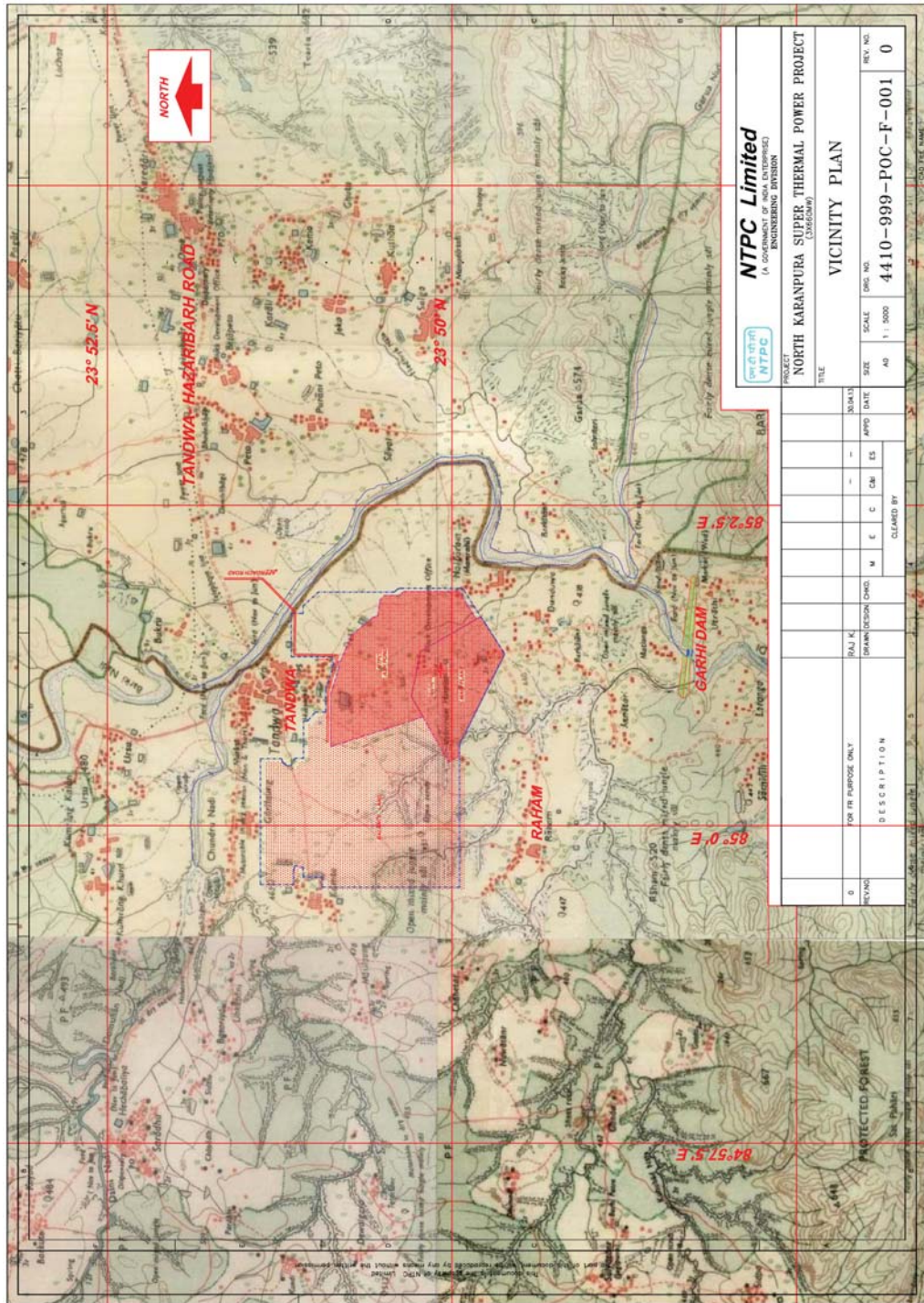
CLAUSE NO.

PROJECT INFORMATION



Annexure-I

VICINITY PLAN



NORTH KARANPURA STPP  
(3 X 660 MW)  
EPC PACKAGE

TECHNICAL SPECIFICATION  
SECTION – VI, PART-A  
BID DOC. NO.:CS-4410-001-2

SUB-SECTION-IB  
PROJECT INFORMATION

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CLIMATOLOGICAL TABLE

**CLIMATOLOGICAL TABLE**

STATION : Hazaribagh      देशांतर: 85°22' E      सतही वन मध्य से ऊँचाई: 811 METRES  
 LAT 23°59' N LONG 85°22' E

वायु तापमान

MONTH	STATION PRESSURE			WET BULB			DRY BULB			MEAN			EXTREMES			HUMIDITY			CLOUD AMOUNT			RAINFALL			MEAN WIND SPEED
	mm Hg	mm Hg	mm Hg	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	mm	mm	mm	mm	
JAN	947.8	14.7	10.9	22.6	9.3	26.7	4.6	30.6	18.1	0.9	07	1881	82	10.4	1.4	0.5	23.5	1.7	113.0	0.0	88.1	06	6.2		
FEB	945.7	17.9	12.3	25.7	12.0	30.5	8.9	33.6	19.7	1.7	09	1967	52	10.3	1.3	0.4	16.2	1.4	117.3	0.0	63.5	23	7.3		
MAR	944.0	22.4	15.0	30.8	16.6	35.5	11.4	38.9	18.2	6.7	04	1898	39	10.4	1.4	0.6	18.4	1.7	184.3	0.0	44.2	20	7.9		
APR	941.0	26.6	18.2	35.7	21.3	39.3	16.4	41.7	19.6	10.6	01	1858	36	13.3	1.8	0.3	17.0	1.4	195.2	0.0	60.5	22	8.6		
MAY	937.1	30.7	21.1	37.8	24.0	41.5	19.3	43.9	18.9	15.6	22	1897	43	18.1	2.5	0.3	43.4	2.9	187.2	0.0	84.1	27	9.1		
JUN	933.4	34.3	24.1	34.1	24.1	40.1	21.0	46.6	14	18.3	02	1975	67	25.0	5.3	1.8	177.1	9.2	774.5	0.5	248.2	24	8.7		
JUL	933.1	35.6	26.8	29.5	23.0	35.2	21.4	39.6	08	19.3	18	1975	86	28.2	6.5	3.6	310.0	16.2	693.2	99.8	221.7	08	7.9		
AUG	934.5	25.2	23.7	29.1	22.7	31.5	21.3	34.2	03	20.0	29	1967	88	28.3	6.4	3.8	320.1	16.2	706.1	83.8	180.1	17	7.6		
SEP	935.1	25.1	23.1	29.0	22.2	31.5	20.4	33.3	24	17.8	29	1950	84	28.7	6.4	3.5	280.9	11.6	530.9	40.7	167.4	28	7.3		
OCT	940.8	23.9	20.4	28.5	18.9	31.3	14.3	34.0	04	8.7	12	1966	73	21.4	2.4	1.2	80.8	4.1	378.6	0.0	140.4	24	5.2		
NOV	943.9	20.2	15.5	25.8	13.3	28.3	9.0	31.7	01	4.4	25	1896	68	14.3	1.2	0.4	5.5	0.4	160.0	0.0	95.0	08	4.8		
DEC	948.2	15.7	11.8	23.1	9.3	26.2	5.1	29.4	20	0.5	24	1951	62	11.1	1.1	0.2	5.2	0.4	81.3	0.0	39.4	13	5.3		
ANNUAL TOTAL OR MEAN	941.1	23.3	18.3	29.3	18.1	41.9	3.6	46.6	05	0.5			63	18.2	3.0	1.3	1277.9	67.2	2146.0	739.6	249.2		7.2		
NUMBER OF YEARS	28	27	27	27	28	27	28	83	83	83			55	17.7	3.3	1.5			1893	1966			23		

CLAUSE NO.	PROJECT INFORMATION			
	Annexure-III			
	<b><u>RAW WATER ANALYSIS</u></b>			
	<b>Sl. No.</b>	<b>Constituent</b>	<b>as</b>	<b>mg per litre</b>
	1.	Calcium	CaCO <sub>3</sub>	65
	2.	Magnesium	CaCO <sub>3</sub>	41
	3.	Sodium	CaCO <sub>3</sub>	98
	4.	Potassium	CaCO <sub>3</sub>	5
	5.	Total Cations	CaCO <sub>3</sub>	209
	6.	Total Alkalinity	CaCO <sub>3</sub>	150
	7.	Chloride	CaCO <sub>3</sub>	25
	8.	Sulphate	CaCO <sub>3</sub>	34
	9.	Total Anions	CaCO <sub>3</sub>	209
	9.	Silica (Reactive)	SiO <sub>2</sub>	9
	11.	Iron	Fe	1.2
	12.	pH Value	-	7.6-8.2
	13.	Turbidity	NTU	200
	14.	Organics(As per KMnO <sub>4</sub> method)	Number	2
<b>NORTH KARANPURA STPP (3 X 660 MW) EPC PACKAGE</b>	<b>TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.:CS-4410-001-2</b>	<b>SUB-SECTION-IB PROJECT INFORMATION</b>	<b>PAGE 6 OF 10</b>	

**TABLE-1**  
**LIGHT DIESEL OIL CHARACTERISTICS**  
**(AS PER IS 15770-2008)**

<b>Characteristics</b>	<b>LDO</b>
1. Pour Point (max)	21 °C & 12°C for Summer and Winter respectively
2. Kinematic viscosity in centistokes at 40 deg.C	2.5 to 15.0
3. Sediment percent by mass (max)	0.10
4. Total sulphur percent by mass (max)	1.5
5. Ash percentage by mass (max)	0.02
6. Carbon residue (Rams bottom) percent by pass (max.)	1.50
7. Acidity inorganic	Nil
8. Flash point (Min.) - Pensky Martens	66 deg.C
9. Copper strip corrosion for 3 hours at 100°C	Not worse than No. 2
10. Water content, % by volume (max)	0.25
11. GCV(kcal/kg)	10,000

**TABLE-2**

**ANNEXURE-IV-2**

**HIGH SPEED DIESEL OIL CHARACTERISTICS**

[AS PER IS 1460-2005 (BS-II)]

S. No.	Particulars	Unit	Value
1.	PHYSICAL PROPERTIES		
	a. Distillation volume recovery @ 350 <sup>0</sup> C	% vol. (min)	85
	b. Distillation volume recovery @ 370 <sup>0</sup> C	% vol. (min)	95
	c. Kinematic Viscosity @ 40 Degree C	cSt	2.0 – 5.0
	d. Density @ 15 Degree C	kg/m <sup>3</sup>	820 – 860
	e. Pour Point		
	- Summer	Degree C (max)	15
	- Winter	Degree C (max)	03
	f. Cold Filter Plugging Point		
	- Summer	Degree C (max)	18
	- Winter	Degree C (max)	06
	g. Flash Point (Abal)	Degree C (max)	35
	h. Lubricity WSD 1.4 @ 60 Degree C	Microns (max)	460
2.	HEATING VALUE		
	a. Higher Heating Value (HHV)	Kcal/Kg	11,000
	b. Lower Heating Value (LHV)	Kcal/Kg	10,300
3.	ACIDITY		
	a. Inorganic	mg KOH/g	Nil
	b. Total	mg KOH/g	0.2 (max.)
4.	Copper Strip Corrosion 3 hours @100 <sup>0</sup> C	No.	1 (max)
5.	RCR on 10% residue	% wt.	0.3 (max)
6.	CONTAMINANTS		
	a. Ash	ppm (wt.)	100 (max)
	b. Sediments	% wt	0.05 (max)
	c. Total Sulphur	% wt	0.05 (max)
	d. Water Content	% volume	0.05 (max)
	e. Trace Metals		
	- Na + K	ppm (wt)	0.30 (max)
	- Vanadium	ppm (wt)	0.50 (max)
	- Lead	ppm (wt)	0.50 (max)
	- Calcium	ppm (wt)	2.0
	- Ni + Zn	ppm (wt)	Nil
7.	Nitrogen content (FBN)	% wt.	0.015

TABLE-3

ANNEXURE-IV-3

**PROPOSED COAL CHARACTERISTICS FOR NORTH KARANPURA  
STPP (3 x 660 MW)**

S.No.	Characteristics (as received basis)	Range of 95 % coal supplies			Range of 5 % coal supplies
		Column - 1	Column - 2	Column - 3	
1.0	<b>PROXIMATE ANALYSIS</b>	Design	Worst	Best	
1.1	Total Moisture (%)	15	18	12	12-18
1.2	Ash (%)	40	46	36	33-46
1.3	Volatile Matter (%)	19	18	22	23-18
1.4	Fixed Carbon (%)	26	18	30	31-18
1.5	Total (%)	100	100	100	
2.0	<b>ULTIMATE ANALYSIS</b>				
2.1	Carbon (%)	29.73	23.08	37.32	40.62-23.08
2.2	Hydrogen (%)	3.7	3.54	3.92	4.02-3.54
2.3	Sulphur (%)	0.5	0.6	0.4	0.4-0.6
2.4	Nitrogen(%)	1.8	1.45	1.6	1.4-1.45
2.5	Oxygen(%) (By difference)	8.66	6.7	8.32	8.12-6.7
2.6	Carbonates (%)	0.58	0.6	0.4	0.4-0.6
2.7	Phosphorous(%)	0.03	0.03	0.04	0.04-0.03
2.8	Total Moisture (%)	15	18	12	12-18
2.9	Ash (%)	40	46	36	33-46
	Total	100	100	100	
2.10	GCV (Kcal/Kg)	3300	2800	4000	4300-2800
2.11	Hard Grove Index	55	50	60	50-65
3.0	<b>ASH ANALYSIS</b>				
3.1	Silica (%)	59.79	61.3	56.7	62-56
3.2	Alumina(%)	25.36	28	23.5	28-23
3.3	Iron Oxide (%)	7.2	6	10	6-10
3.4	Titania	1.2	1	1.5	1-1.7
3.5	Phosphoric Anhydride (%)	2.6	1.5	3	1-3
3.6	Lime (%)	0.88	0.5	1.5	0.5-1.7
3.7	Magnesia (%)	0.55	0.4	1	0.4-1.1
3.8	Sulphuric Anhydride (%)	1.2	0.5	1.4	0.5-1.7
3.9	Alkalies (by difference)	1.22	0.8	1.4	0.6-1.8
	Total	100	100	100	
4.0	<b>ASH FUSION RANGE</b>				
	<b>REDUCING ATMOSPHERE</b>				
4.1	Initial Deformation Temp. (oC)	1100	1100	1100	1100-1150
4.2	Hemispherical Temp. (oC)	1300	1250	1350	1250-1400
4.3	Fusion Temperature (oC)	1400	1400	1400	1400-1450

TABLE – 4

## TYPICAL IMPORTED COAL AND ASH CHARACTERISTICS

Sl.No.	Characteristics (as received basis)	Imported Coal	
		Worst	Best
<b>1.0</b>	<b>Proximate Analysis</b>		
1.1	Total Moisture (%)	20	16
1.2	Ash (%)	10	10
1.3	Volatile Matter (%)	30	45
1.4	Fixed Carbon (%)	40	29
1.5	Total (%)	100	100
<b>2.0</b>	<b>Ultimate Analysis</b>		
2.1	Carbon (%)	56.4	62.4
2.2	Hydrogen (%)	4.5	4.9
2.3	Sulphur (%)	0.9	0.8
2.4	Nitrogen (%)	0.9	0.5
2.5	Oxygen (%) (By difference)	7.3	5.4
2.6	Carbonates (%)	0	0
2.7	Phosphorous (%)	0	0
2.8	Total Moisture (%)	20	16
2.9	Ash (%)	10	10
	Total	100	100
2.10	GCV (Kcal/Kg)	5800	6500
2.11	Hard Grove Index	45	60
2.12	YGP (mg/kg)	100	70
<b>3.0</b>	<b>Ash Analysis</b>		
3.1	Silica (SiO <sub>2</sub> ) (%)	32.74	34.94
3.2	Alumina(Al <sub>2</sub> O <sub>3</sub> ) (%)	30.5	28.43
3.3	Iron Oxides(Fe <sub>2</sub> O <sub>3</sub> ) (%)	18.2	15.2
3.4	Titania (TiO <sub>2</sub> )	1.56	1.76
3.5	Phosphoric Anhydride(P <sub>2</sub> O <sub>5</sub> ) (%)	0.44	0.54
3.6	Lime (CaO) (%)	6.12	7.62
3.7	Magnesia (MgO) (%)	1.83	1.93
3.8	Sulphuric Anhydride (%)	6.95	7.65
3.9	Sodium Oxide (Na <sub>2</sub> O) (%)	0.3	0.4
3.10	Balance alkalies (by difference)	1.36	1.56
	Total	100	100
<b>4.0</b>	<b>Ash Fusion Temperature reducing temperature</b>		
4.1	Initial deformation Temp ( °C)	1100	1250
4.2	Hemispherical Temp. ( °C)	1300	1350
4.3	Flow Temp. ( °C)	1400	1400



TECHNICAL SPECIFICATION FOR  
ELECTROMAGNETIC FLOWMETER

3X 660 MW NORTH KARANPURA

SPEC NO.: PE-TS-405-145-I916

VOLUME II B

SECTION C


REV. NO. 00

DATE 17/06/2015

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**SECTION-C**

**SPECIAL TECHNICAL REQUIREMENT**

	<b>TECHNICAL SPECIFICATION FOR ELECTROMAGNETIC FLOWMETER</b>	SPEC NO.: <b>PE-TS-405-145-I916</b>	
	<b>3X660 MW NORTH KARANPURA</b>	VOLUME II B	
		SECTION A	
		REV. NO. 00	DATE : 17/06/2015
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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, Format “Schedule of submission of Drawings / Documents, Equipment Manufacture, Inspection and Dispatch” enclosed in Section-D of Volume IIB, to be signed and stamped and submitted with the bid.
- 2.0 Bidder Presence is required for 2 days each time (4 times) 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:** No separate documentation required at the time of bids except those specifically listed under Cl. No. 6.0 of Sec-D of Vol-II B.


(B) **After the award of contract:** 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.

CLAUSE NO.	TECHNICAL REQUIREMENTS																											
	<p><b>Electronic Flow-Meter</b></p> <p>The electronic flow meter shall include flow sensor and flow indicator cum integrator / totaliser and shall include all required accessories for satisfactory operation. The flow meter shall be based on full bore ultrasonic / electromagnetic principle and shall be electronic type of proven design, make and model acceptable to the owner.</p> <p>The Bidder shall submit all necessary technical literature and details of selection criteria of the instrument offered to substantiate the model selected. The Bidder shall also furnish list of similar installation along with feed back on satisfactory performance of the instruments.</p> <p>The flow meter shall meet or exceed the following requirement :</p> <table border="0"> <tr> <td>(a) Output</td> <td>:</td> <td>4-20 mA DC Isolated output</td> </tr> <tr> <td>(b) Accuracy</td> <td>:</td> <td>± 0.5% of calibrated span or better *</td> </tr> <tr> <td>(c) Repeatability</td> <td>:</td> <td>± 0.2% of calibrated span or better</td> </tr> <tr> <td>(d) Ambient Temp. &amp; Humidity</td> <td>:</td> <td>4 deg.C to 55 deg.C. 5% to 100% RH</td> </tr> <tr> <td>(e) Power Supply</td> <td>:</td> <td>240V AC ± 10%, 50 HZ ± 5%/ 24 V DC, to be arranged by the contractor.</td> </tr> <tr> <td>(f) Protection class</td> <td>:</td> <td>IP-55</td> </tr> <tr> <td>(g) Flow tube</td> <td>:</td> <td>SS304</td> </tr> <tr> <td>(h) liner</td> <td>:</td> <td>Hard Rubber</td> </tr> </table> <p>The flow meter shall provide local indication for instantaneous flow. It should also be possible to get local display for daily and monthly discharge. The flow meter shall indicate totaliser / integrator to get the daily and monthly discharge as stated above.</p>			(a) Output	:	4-20 mA DC Isolated output	(b) Accuracy	:	± 0.5% of calibrated span or better *	(c) Repeatability	:	± 0.2% of calibrated span or better	(d) Ambient Temp. & Humidity	:	4 deg.C to 55 deg.C. 5% to 100% RH	(e) Power Supply	:	240V AC ± 10%, 50 HZ ± 5%/ 24 V DC, to be arranged by the contractor.	(f) Protection class	:	IP-55	(g) Flow tube	:	SS304	(h) liner	:	Hard Rubber	
(a) Output	:	4-20 mA DC Isolated output																										
(b) Accuracy	:	± 0.5% of calibrated span or better *																										
(c) Repeatability	:	± 0.2% of calibrated span or better																										
(d) Ambient Temp. & Humidity	:	4 deg.C to 55 deg.C. 5% to 100% RH																										
(e) Power Supply	:	240V AC ± 10%, 50 HZ ± 5%/ 24 V DC, to be arranged by the contractor.																										
(f) Protection class	:	IP-55																										
(g) Flow tube	:	SS304																										
(h) liner	:	Hard Rubber																										
<p>NORTH KARANPURA STPP (3X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-B BID DOC. NO.:CS-4410-001-2</p>	<p>SUB-SECTION-IIIC-04 MEASURING INSTRUMENTS (PRIMARY &amp; SECONDARY)</p>	<p>PAGE 35 OF 36</p>																									



**TECHNICAL SPECIFICATION  
FOR  
ELECTROMAGNETIC FLOWMETER**

**3X660 MW NORTH KARANPURA**

SPEC NO.: PE-TS-405-145-I916		
VOLUME	II B	
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## **SECTION – D**

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

**TECHNICAL SPECIFICATION FOR  
ELECTROMAGNETIC FLOWMETER****3X660 MW NORTH KARANPURA**SPEC NO.: **PE-TS-405-145-I916**

VOLUME II B

SECTION D

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**SECTION-D****EQUIPMENT SPECIFICATION**



**TECHNICAL SPECIFICATION  
ELECTROMAGNETIC FLOW METER**

SPEC NO.: PE-SS-999-145-I027

VOLUME II B

SECTION D

REV. NO. 01

DATE : 30.08.2012

SHEET

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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 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% 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.

**3.1 A 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**

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 a agreed Quality Plan shall be furnished. In the



**TECHNICAL SPECIFICATION  
ELECTROMAGNETIC FLOW METER**

SPEC NO.: PE-SS-999-145-I027

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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 Proforma enclosed under Data Sheet-B.
- ii. Catalogue/Technical Literature.
- iii. 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.

- 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.



**TECHNICAL SPECIFICATION  
ELECTROMAGNETIC FLOW METER**

SPEC NO.: PE-SS-999-145-I027

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- 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

**TECHNICAL SPECIFICATION FOR  
ELECTROMAGNETIC FLOW METER****3X660 MW NORTH KARANPURA**SPEC NO.: **PE-TS-405-145-I916**

VOLUME II B

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**SECTION-D****DATA SHEETS - A&B**



**DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER**

SPEC NO.: PE-TS-405-145-I916	
VOLUME	II B
SECTION	D
REV. NO.	00
DATE	:17.06.15
SHEET	8 OF 21

Tag No. 00GHD50CF011

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

**DATA SHEET – A & B**

DATA SHEET – A (TO BE FILLED BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	<b>3X660 MW NORTH KARANPURA</b>
	OFFER REFERENCE	Bidder to indicate
TECHNICAL	TAG NO.	00GHD50CF011
	SERVICE :	ACW Make-Up Pump Discharge
	MAKE : MODEL	Bidder to indicate
	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	± 0.5%
	FLOW TUBE	SS304
	REPEATABILITY	±0.2% of calibrated span
	RANGEABILITY	10:1
PROCESS DATA	RESPONSE TIME	USER PROGRAMMABLE
	LOAD	500 ohms
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization). 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. Daily & Monthly Display can also be obtained by using a Data Logger mounted locally.
	OPERATING VOLTAGE	<input checked="" type="checkbox"/> 240V AC <input type="checkbox"/> 24 VDC <input type="checkbox"/> 110 VAC
	TOTALIZING FACILITIES	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	ENCLOSURE	IP-65
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)
	LINER	Hard Rubber
	FLUID	WATER
	RATE OF FLOW (CuBM/HR)	NORMAL : 240
UPSTREAM WORKING PRESS (Kg/cm2g)	3.5	
DESIGN PRESS (Kg/cm2g)	12	
NORMAL TEMP (Deg C)	35	
MAXIMUM TEMP (Deg C)	60	
PIPE LOCATION	OVERGROUND	



## DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER

SPEC NO.: PE-TS-405-145-I916

VOLUME II B

SECTION D

REV. NO. 00

DATE :17.06.15

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PIPE LINE DATA	PIPE SIZE (OD x THK) mm	200 Nb	.....
	PIPE MATERIAL	CARBON STEEL AS PER IS 2062 GR.B	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D DOWNSTREAM : 5D	.....
			.....

- NOTE:- 1) Accessories like ½" NPT cable gland, Transducer cable (length 20m), All PROCESS END CONNECTION hardware, SS nameplate etc. shall be provided.
- 2) Double compression type nickel plated brass cable gland.
- 3) Remote Transmitter:
- i) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.



**DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER**

SPEC NO.: PE-TS-405-145-1916	
VOLUME	II B
SECTION	D
REV. NO.	00
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Tag No. 00GHD10CF011

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

**DATA SHEET – A & B**

DATA SHEET – A (TO BE FILLED BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	<b>3X660 MW NORTH KARANPURA</b>
	OFFER REFERENCE	Bidder to indicate
TECHNICAL	TAG NO.	00GHD10CF011
	SERVICE :	HVAC M/UP Pump Discharge
	MAKE : MODEL	Bidder to indicate
	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	± 0.5%
	FLOW TUBE	SS304
	REPEATABILITY	±0.2% of calibrated span
	RANGEABILITY	10:1
PROCESS DATA	RESPONSE TIME	USER PROGRAMMABLE
	LOAD	500 ohms
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization). 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. Daily & Monthly Display can also be obtained by using a Data Logger mounted locally.
	OPERATING VOLTAGE	<input checked="" type="checkbox"/> 240V AC <input type="checkbox"/> 24 VDC <input type="checkbox"/> 110 VAC
	TOTALIZING FACILITIES	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	ENCLOSURE	IP-65
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)
	LINER	Hard Rubber
	FLUID	WATER
	RATE OF FLOW (CuBM/HR)	NORMAL : 127
UPSTREAM WORKING PRESS (Kg/cm2g)	5.2	
DESIGN PRESS (Kg/cm2g)	12	
NORMAL TEMP (Deg C)	35	
MAXIMUM TEMP (Deg C)	60	
PIPE LOCATION	OVERGROUND	



## DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER

SPEC NO.: PE-TS-405-145-I916

VOLUME II B

SECTION D

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PIPE LINE DATA	PIPE SIZE (OD x THK) mm PIPE MATERIAL  AVAILABLE PIPE STRAIGHT LENGTH	200 Nb  <b>CARBON STEEL AS PER IS 2062 GR.B</b>  UPSTREAM : 10D DOWNSTREAM : 5D	..... ..... ..... .....

- NOTE:-
- 1) Accessories like ½" NPT cable gland, 20 m Transducer cable, All PROCESS END CONNECTION hardware , SS nameplate etc. shall be provided.
  - 2) Double compression type nickel plated brass cable gland.
  - 3) Transducer cable min length shall be mentioned as per GA of Pit and location of transmitter.
  - 4) Remote Transmitter:
    - i) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.



**DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER**

SPEC NO.: PE-TS-405-145-1916	
VOLUME	II B
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Tag No. 00GHD31CF011

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

**DATA SHEET – A & B**

DATA SHEET – A (TO BE FILLED BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	<b>3X660 MW NORTH KARANPURA</b>
	OFFER REFERENCE	Bidder to indicate
TECHNICAL	TAG NO.	00GHD31CF011
	SERVICE :	Service water Pump Discharge
	MAKE : MODEL	Bidder to indicate
	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	± 0.5%
	FLOW TUBE	SS304
	REPEATABILITY	±0.2% of calibrated span
	RANGEABILITY	10:1
PROCESS DATA	RESPONSE TIME	USER PROGRAMMABLE
	LOAD	500 ohms
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization). 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. Daily & Monthly Display can also be obtained by using a Data Logger mounted locally.
	OPERATING VOLTAGE	<input checked="" type="checkbox"/> 240V AC <input type="checkbox"/> 24 VDC <input type="checkbox"/> 110 VAC
	TOTALIZING FACILITIES	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	ENCLOSURE	IP-65
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)
	LINER	Hard Rubber
	FLUID	WATER
	RATE OF FLOW (CuBM/HR)	NORMAL : 545
UPSTREAM WORKING PRESS (Kg/cm2g)	7.8	
DESIGN PRESS (Kg/cm2g)	12	
NORMAL TEMP (Deg C)	35	
MAXIMUM TEMP (Deg C)	60	
PIPE LOCATION	OVERGROUND	



## DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER

SPEC NO.: PE-TS-405-145-I916

VOLUME II B

SECTION D

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PIPE LINE DATA	PIPE SIZE (OD x THK) mm	300 Nb	.....
	PIPE MATERIAL	<b>CARBON STEEL AS PER IS 2062 GR.B</b>	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D DOWNSTREAM : 5D	.....
			.....

NOTE:- 1) Accessories like ½" NPT cable gland, 20 m Transducer cable, All PROCESS END CONNECTION hardware , SS nameplate etc. shall be provided.

2) Double compression type nickel plated brass cable gland.

3) Transducer cable min length shall be mentioned as per GA of Pit and location of transmitter.

4) Remote Transmitter:

i) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.



**DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER**

SPEC NO.: PE-TS-405-145-I916	
VOLUME	II B
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Tag No. 00GHD30CF011

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

**DATA SHEET – A & B**

DATA SHEET – A (TO BE FILLED BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	<b>3X660 MW NORTH KARANPURA</b>
	OFFER REFERENCE	Bidder to indicate
TECHNICAL	TAG NO.	00GHD30CF011
	SERVICE :	APH/ESP Pump Discharge
	MAKE : MODEL	Bidder to indicate
	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	± 0.5%
	FLOW TUBE	SS304
	REPEATABILITY	±0.2% of calibrated span
	RANGEABILITY	10:1
PROCESS DATA	RESPONSE TIME	USER PROGRAMMABLE
	LOAD	500 ohms
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization). 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. Daily & Monthly Display can also be obtained by using a Data Logger mounted locally.
	OPERATING VOLTAGE	<input checked="" type="checkbox"/> 240V AC <input type="checkbox"/> 24 VDC <input type="checkbox"/> 110 VAC
	TOTALIZING FACILITIES	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	ENCLOSURE	IP-65
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)
	LINER	Hard Rubber
	FLUID	WATER
	RATE OF FLOW (CuBM/HR)	NORMAL : 840
UPSTREAM WORKING PRESS (Kg/cm2g)	8	
DESIGN PRESS (Kg/cm2g)	12	
NORMAL TEMP (Deg C)	35	
MAXIMUM TEMP (Deg C)	60	
PIPE LOCATION	OVERGROUND	



## DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER

SPEC NO.: PE-TS-405-145-I916

VOLUME II B

SECTION D

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PIPE LINE DATA	PIPE SIZE (OD x THK) mm	400 Nb	.....
	PIPE MATERIAL	<b>CARBON STEEL AS PER IS 2062 GR.B</b>	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D DOWNSTREAM : 5D	.....
			.....

NOTE:- 1) Accessories like ½" NPT cable gland, 20 m Transducer cable, All PROCESS END CONNECTION hardware, SS nameplate etc. shall be provided.

2) Double compression type nickel plated brass cable gland.

3) Transducer cable min length shall be mentioned as per GA of Pit and location of transmitter.

4) Remote Transmitter:

i) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.



**DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER**

SPEC NO.: PE-TS-405-145-1916	
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Tag No. 00GHD70CF011

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

**DATA SHEET – A & B**

DATA SHEET – A (TO BE FILLED BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	<b>3X660 MW NORTH KARANPURA</b>
	OFFER REFERENCE	Bidder to indicate
TECHNICAL	TAG NO.	00GHD70CF011
	SERVICE :	Potable water Pump Discharge
	MAKE : MODEL	Bidder to indicate
	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	± 0.5%
	FLOW TUBE	SS304
	REPEATABILITY	±0.2% of calibrated span
	RANGEABILITY	10:1
PROCESS DATA	RESPONSE TIME	USER PROGRAMMABLE
	LOAD	500 ohms
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization). 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. Daily & Monthly Display can also be obtained by using a Data Logger mounted locally.
	OPERATING VOLTAGE	<input checked="" type="checkbox"/> 240V AC <input type="checkbox"/> 24 VDC <input type="checkbox"/> 110 VAC
	TOTALIZING FACILITIES	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	ENCLOSURE	IP-65
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)
	LINER	Hard Rubber
	FLUID	WATER
	RATE OF FLOW (CuBM/HR)	NORMAL : 20
UPSTREAM WORKING PRESS (Kg/cm2g)	6.5	
DESIGN PRESS (Kg/cm2g)	12	
NORMAL TEMP (Deg C)	35	
MAXIMUM TEMP (Deg C)	60	
PIPE LOCATION	OVERGROUND	



## DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER

SPEC NO.: PE-TS-405-145-I916

VOLUME II B

SECTION D

REV. NO. 00

DATE :17.06.15

SHEET 8

OF 21

PIPE LINE DATA	PIPE SIZE (OD x THK) mm	80 Nb	.....
	PIPE MATERIAL	<b>CARBON STEEL AS PER IS 2062 GR.B</b>	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D DOWNSTREAM : 5D	..... .....

NOTE:- 1) Accessories like ½" NPT cable gland, 20 m Transducer cable, All PROCESS END CONNECTION hardware, SS nameplate etc. shall be provided.

2) Double compression type nickel plated brass cable gland.

3) Transducer cable min length shall be mentioned as per GA of Pit and location of transmitter.

4) Remote Transmitter:

i) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.



**DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER**

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Tag No. 00GHD80CF011

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

**DATA SHEET – A & B**

DATA SHEET – A (TO BE FILLED BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	<b>3X660 MW NORTH KARANPURA</b>
	OFFER REFERENCE	Bidder to indicate
GENERAL	TAG NO.	00GHD80CF011
	SERVICE :	Colony Potable water Pump Discharge
GENERAL	MAKE : MODEL	Bidder to indicate
	PROCESS END CONNECTION	Full Bore
TECHNICAL	FLOW MEASUREMENT	Instantaneous flow rate as well as totalized flow
	OUTPUT	Isolated 4-20 mA DC with for volumetric flow
TECHNICAL	ACCURACY	± 0.5%
	FLOW TUBE	SS304
TECHNICAL	REPEATABILITY	±0.2% of calibrated span
	RANGEABILITY	10:1
TECHNICAL	RESPONSE TIME	USER PROGRAMMABLE
	LOAD	500 ohms
TECHNICAL	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization). 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. Daily & Monthly Display can also be obtained by using a Data Logger mounted locally.
	OPERATING VOLTAGE	<input checked="" type="checkbox"/> 240V AC <input type="checkbox"/> 24 VDC <input type="checkbox"/> 110 VAC
TECHNICAL	TOTALIZING FACILITIES	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	ENCLOSURE	IP-65
TECHNICAL	PROCESS END CONNECTION	Inline Flanged (with matching Flange)
	LINER	Hard Rubber
PROCESS DATA	FLUID	WATER
	RATE OF FLOW (CuBM/HR)	NORMAL : 130
PROCESS DATA	UPSTREAM WORKING PRESS (Kg/cm2g)	4.7
	DESIGN PRESS (Kg/cm2g)	12
PROCESS DATA	NORMAL TEMP (Deg C)	35
	MAXIMUM TEMP (Deg C)	60
PROCESS DATA	PIPE LOCATION	OVERGROUND



## DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER

SPEC NO.: PE-TS-405-145-I916

VOLUME II B

SECTION D

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OF 21

PIPE LINE DATA	PIPE SIZE (OD x THK) mm	200 Nb	.....
	PIPE MATERIAL	<b>CARBON STEEL AS PER IS 2062 GR.B</b>	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D DOWNSTREAM : 5D	.....
			.....

NOTE:- 1) Accessories like ½" NPT cable gland, 20 m Transducer cable, All PROCESS END CONNECTION hardware , SS nameplate etc. shall be provided.

2) Double compression type nickel plated brass cable gland.

3) Transducer cable min length shall be mentioned as per GA of Pit and location of transmitter.

4) Remote Transmitter:

i) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.



**DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER**

SPEC NO.: PE-TS-405-145-1916	
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Tag No. 00GN10CF011

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

**DATA SHEET – A & B**

DATA SHEET – A (TO BE FILLED BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	<b>3X660 MW NORTH KARANPURA</b>
	OFFER REFERENCE	Bidder to indicate
TECHNICAL	TAG NO.	00GN10CF011
	SERVICE :	Final Effluent Disposal Pumps Discharge
	MAKE : MODEL	Bidder to indicate
	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	± 0.5%
	FLOW TUBE	SS304
	REPEATABILITY	±0.2% of calibrated span
	RANGEABILITY	10:1
PROCESS DATA	RESPONSE TIME	USER PROGRAMMABLE
	LOAD	500 ohms
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization). 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. Daily & Monthly Display can also be obtained by using a Data Logger mounted locally.
	OPERATING VOLTAGE	<input checked="" type="checkbox"/> 240V AC <input type="checkbox"/> 24 VDC <input type="checkbox"/> 110 VAC
	TOTALIZING FACILITIES	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	ENCLOSURE	IP-65
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)
	LINER	Hard Rubber
	FLUID	Effluent
	RATE OF FLOW (CuBM/HR)	NORMAL : 100
UPSTREAM WORKING PRESS (Kg/cm2g)	8	
DESIGN PRESS (Kg/cm2g)	15	
NORMAL TEMP (Deg C)	40	
MAXIMUM TEMP (Deg C)	60	
PIPE LOCATION	OVERGROUND	



## DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER

SPEC NO.: PE-TS-405-145-I916

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PIPE LINE DATA	PIPE SIZE (OD x THK) mm	200 Nb	.....
	PIPE MATERIAL	<b>CARBON STEEL AS PER IS 2062 GR.B</b>	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D DOWNSTREAM : 5D	.....
			.....

NOTE:- 1) Accessories like ½" NPT cable gland, 20 m Transducer cable, All PROCESS END CONNECTION hardware, SS nameplate etc. shall be provided.

2) Double compression type nickel plated brass cable gland.

3) Transducer cable min length shall be mentioned as per GA of Pit and location of transmitter.

4) Remote Transmitter:

i) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.



**TECHNICAL SPECIFICATION FOR  
ELECTROMAGNETIC FLOWMETER  
3X 660 MW NORTH KARANPURA**

SPEC NO.: **PE-TS-405-145-I916**

VOLUME II B

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## **SECTION-D**

# **BILL OF QUANTITY**



Technical specification for  
**ELECTROMAGNETIC FLOW METER**  
**3X660 MW NORTH KARANPURA**

SPECIFICATION NO. **PE-TS-405-145-I916**

VOLUME **II-B**

SECTION **D**

REV. NO. 00


DATE 17/06/2015

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## BILL OF QUANTITY

### [A] ELECTROMAGNETIC FLOWMETER WITH ALL ACCESSORIES

S. No.	KKS	SERVICE/ ITEM DESCRIPTION	QTY/UNIT	TOTAL QTY FOR STN
1	00GHD50CF011	ACW Make Up pump Discharge	1	1
2	00GHD10CF011	HVAC M/UP Pump Discharg	1	1
3	00GHD31CF011	Service water Pump Discharge	1	1
4	00GHD30CF011	APH Pump Discharge	1	1
5	00GHD70CF011	Potable water Pump Discharge	1	1
6	00GHD80CF011	Colony Potable water Pump Discharge	1	1
7	00GN10CF011	Flow Transmitter At The Common Discharge Header Of Final <b>Effluent</b> <b>Disposal</b> Pumps	1	1

	<b>3 X 660MW NORTH KARANPURA</b>  <b>TECHNICAL SPECIFICATION FOR ELECTROMAGNETIC FLOW METERS</b>	SPECIFICATION NO. <b>PE-TS-405-145-I 916</b>	
		VOLUME <b>II-B</b>	
		SECTION <b>D</b>	
		REV. NO. 00	DATE: 04.09.2015
		SHEET	

**[A] LIST OF MANDATORY SPARES**

<b>S.No.</b>	<b>ITEM DESCRIPTION</b>	<b>QUANTITY</b>
<b>1</b>	Electronic Transmitters (Complete Assembly)	10% or 1 No., whichever is more, of each type and model.

**NOTES :**

Wherever % is indicated, the quantity shall be calculated for % of supply for total quantity of 3 units of 3 x660MW, unless otherwise specified. The quantity to be reckoned for % indicated shall be rounded off to the next higher whole number. For example if the % of total quantity arrived is 0.2, the quantity to be supplied shall be 1 and if the % of total quantity is 5.1, the quantity to be supplied shall be 6.



*TECHNICAL SPECIFICATION FOR*  
**ELECTROMAGNETIC FLOW METER**  
**3X660MW NORTH KARANPURA**

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## SECTION-D

## QUALITY PLAN



**QUALITY PLAN  
FOR  
ELECTRO-MAGNETIC FLOWMETER**

QUALITY PLAN NO.: **PE-QP-999-145-I011**

VOLUME **IIB**

SECTION **D**

REV. NO. **00** DATE: **31.03.2014**

SHEET **1** OF **2**

PEM :: C&I

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



*TECHNICAL SPECIFICATION FOR*  
**ELECTROMAGNETIC FLOW METER**

**3X660 MW NORTH KARANPURA**

**SPEC NO.: PE-TS-405-145-I916**

VOLUME II B


SECTION D

REV. NO. 00

DATE : 17/06/2015

SHEET

**SCHEDULE OF SUBMISSION OF DRAWINGS/ DOCUMENTS, EQPT.  
MANUFACTURE, INSPECTION AND DISPATCH**

	<b>Technical specification for ELECTROMAGNETIC FLOW METER</b>  <b>3X660MW NORTH KARANPURA</b>	SPECIFICATION NO. <b>PE-TS-405-145-1916</b>	
		VOLUME <b>II-B</b>	
		SECTION <b>D</b>	
		REV. NO. 00	DATE: 17/06/2015
		SHEET	

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

1.	<b><u>ZERO DATE</u></b>	<b><u>DATE of LOI / FOI / TOI</u></b>
2.	Submission of Data Sheets / documents / catalogues 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.	18 Weeks from the Zero date.
5.	Release of MDCC by BHEL	19 Weeks from the Zero date.
6.	Dispatch (Packaging & Dispatch)	20 Weeks from the Zero date.
7.	Final documents submission as per Contract	24 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)**

**NTPC LTD**  
**3X660MW NORTH KARANPURA**

**TECHNICAL SPECIFICATION  
FOR  
ELECTROMAGNETIC FLOW METER**

**VOLUME III**

**SPECIFICATION No: PE-TS-405-145-I916**



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



Technical specification for  
**ELECTROMAGNETIC FLOWMETER**  
**3X660MW NORTH KARANPURA**

SPECIFICATION NO. **PE-TS-405-145-I916**

VOLUME **III**

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REV. NO. 00

DATE: 17.06.2015

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**VOLUME-III**



Technical specification for  
**ELECTROMAGNETIC FLOWMETER**  
**3X660MW NORTH KARANPURA**

SPECIFICATION NO. **PE-TS-405-145-I916**

VOLUME **III**

SECTION

REV. NO. 00

DATE: 17.06.2015

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S. No.	DESCRIPTION
1	COMPLIANCE CERTIFICATES
2	SCHEDULE OF PRICES
3	SCHEDULE OF UNIT PRICES
4	INSPECTION SCHEDULE

**COMPLIANCE CERTIFICATE**  
**For**

**ELECTROMAGNETIC FLOWMETER**

**(To be Signed & Stamped by the Bidder)**

**Project: 3X660MW NORTH KARANPURA TPP**

**Specification no.: PE-TS-405-145-1916**

**We shall comply with the following:-**

1. All the requirements as stated in Technical Specification / Specific Technical requirement / Data sheets / Drawings, 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.**

Signature with date	
Name	
Company seal	



Technical specification for  
**ELECTROMAGNETIC FLOWMETER**  
**3X660MW NORTH KARANPURA**

SPECIFICATION NO. **PE-TS-405-145-I916**

VOLUME **III**

SECTION

REV. NO. 00

DATE: 17.06.2015

SHEET

### SCHEDULE OF PRICES

S.NO.	ITEM DESCRIPTION		QTY FOR ONE UNIT	PRICE FOR ONE UNIT
<b>[A] ELECTROMAGNETIC FLOW METER</b>				
S. No.	KKS NO.	SERVICE/ ITEM DESCRIPTION		
1	00GHD50CF011	ACW Make Up pump Discharge	1	
2	00GHD10CF011	HVAC M/UP Pump Discharg	1	
3	00GHD31CF011	Service water Pump Discharge	1	
4	00GHD30CF011	APH Pump Discharge	1	
5	00GHD70CF011	Potable water Pump Discharge	1	
6	00GHD80CF011	Colony Potable water Pump Discharge	1	
7	00GN10CF011	FLOW TRANSMITTER AT THE COMMON DISCAHRGE HEADER OF FINAL <b>EFFLUENT DISPOSAL</b> PUMPS	1	

#### PARTICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL



Technical specification for  
**ELECTROMAGNETIC FLOWMETER**  
**3X660MW NORTH KARANPURA**

SPECIFICATION NO. **PE-TS-405-145-I916**

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## SCHEDULE OF UNIT PRICES

### ULTRASONIC FLOW METER

S. No.	ITEMS	UNIT PRICE
1.	SENSOR	
2.	TRANSMITTER	
3.	CABLE BETWEEN SENSOR TO TRANSMITTER (PER METER)	

### PETICULARS OF THE BIDDER / AUTHORISED REPRESENTATIVE

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



Technical specification for  
**ELECTROMAGNETIC FLOWMETER**  
**3X660MW NORTH KARANPURA**

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## 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