TECHNICAL SPECIFICATION
FOR
ELECTROMAGNETIC FLOWMETER

TECHNICAL SPECIFICATION

FOR

ELECTROMAGNETIC FLOWMETER

3 x 800 MW PVUNL PATRATU TPP PHASE-I

VOLUME - IIB

SECTIONS-A, C & D

SPECIFICATION No: PE-TS-434-145-I916

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

	TECHNICAL SPECIFICATION FOR ELECTROMAGNETIC FLOWMETER	SPEC NO.: **PE-TS-434-145-I916**
		VOLUME II B
		SECTION A
	3X800MW PVUNL PATRATU TPP PHASE-I	REV. NO. 00 / DATE 27.07.2021
		SHEET 1 OF 2

SECTION – A

SCOPE OF ENQUIRY

	TECHNICAL SPECIFICATION FOR ELECTROMAGNETIC FLOWMETER 3X800MW PVUNL PATRATU TPP PHASE-I	SPEC NO.: **PE-TS-405-145-I916**	
		VOLUME II B	
		SECTION A	
		REV. NO. 00	DATE 27.07.2021
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SCOPE OF ENQUIRY

1.0 SCOPE

1.1 This specification covers the Design, Manufacture, calibration, 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 3X800 MW PVUNL Patratu 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, etc.
b) Quality Plan
c) Datasheets A & B, duly filled

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 is 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.

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SECTION-C

- **SPECIFIC TECHNICAL REQUIREMENT**
- **CUSTOMER'S SPECIFICATION**

	TECHNICAL SPECIFICATION FOR ELECTROMAGNETIC FLOWMETER 3X800MW PVUNL PATRATU TPP PHASE-I	SPEC NO.: **PE-TS-434-145-I916**	
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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 furnish necessary credentials & performance certificate as per PQR (Doc. No. PE-PQ-999-145-I008) for Electromagnetic Flowmeter. Further, Bidder to furnish filled format for Provenness criteria, attached in the specification.

2.0 Flange and counter flange for assembly of instrument on pipe shall be in bidder's scope.

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

4.0 Bidder Presence is required for 2 days each time (2 times) for any site support requirement (for supervision). All the expenses like boarding, lodging and travel, Air fare etc. shall be in bidder's scope.

5.0 DOCUMENTATION:

(A) Along with the bids: No separate documentation required at the time of bids except the Catalogue, PQR document, Proven ness certificate, duly filled Datasheets & Stamped QAP

(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) Calculation Sheet.

d) Assembly dimensional drawings.

e) 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 Electromagnetic flow meter	– 10 sets	
4. Assembly drawings and QP for approval	– 10 sets.	
5. "As built" drawings	– 10 sets.	

6.0 In case during erection/commissioning of the Electromagnetic flowmeter, 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.

7.0 Mandatory spare shall be in bidder scope, same will have to be supplied by vendor as per the attached mandatory spare list.

8.0 Canopy shall be required for all outdoor electromagnetic flowmeter and same shall be in bidder's scope.

9.0 In case of any discrepancy in Specific Technical Requirement and Equipment specification, Specific Technical Requirement shall prevail.

10.0 Electromagnetic flowmeter shall be of Hart compatible.

19.05.00 **Electronic Flow-Meter**

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 electromagnetic principle and shall be electronic type of proven design, make and model acceptable to the owner.

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.

The flow meter shall meet or exceed the following requirement :

(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)	Power Supply	:	240V AC ± 10%, 50 HZ ± 5%/ 24 V DC, to be arranged by the contractor.
(f)	Protection class	:	IP-55
(e)	Flow tube		SS304
(f)	liner		Hard Rubber

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.

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SECTION-D

- **EQUIPMENT SPECIFICATION**
- **DATA SHEETS – A & B**
- **QUALITY PLAN**
- **BOQ-MAIN SUPPLY**
- **SPARES**

	TECHNICAL SPECIFICATION FOR ELECTROMAGNETIC FLOWMETER 3X800MW PVUNL PATRATU TPP PHASE-I	SPEC NO.: **PE-TS-434-145-I916**	
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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 equipment 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 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 equipment's 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.
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.
- 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 3X800MW PVUNL PATRATU TPP PHASE-I	SPEC NO.: **PE-TS-434-145-I916**	
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SECTION-D

DATA SHEETS - A&B

871087/2022/PS-PEM-C_I

FORM NO. PEM-6666-0

BHEL	**DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER**	SPEC NO.: PE-TS-405-145-I916 VOLUME II B SECTION D REV. NO. 00 DATE : 27.07.2021 SHEET 1 OF 28

Tag No. 00GAA10CF011 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	**3 x 800 MW PVUNL PATRATU TPP PHASE-I**	.....
	OFFER REFERENCE	Bidder to indicate	.....
	TAG NO.	00GAA10CF011	.....
	SERVICE:	RAW WTR PT PMPs DISCH HDR FLOW	.....
	MAKE : MODEL	Bidder to indicate	
TECHNICAL	PRINCIPLE	Full Bore Electromagnetic	.....
	FLOW MEASUREMENT	Instantaneous flow rate as well as totalized flow	.....
	OUTPUT	Isolated 4-20 mA DC	.....
	FLOW TUBE	SS304	.....
	ELECTRODE	SS316	.....
	ACCURACY	± 0.5%	.....
	REPEATABILITY	± 0.2% of calibrated span	.....
	RANGEABILITY	10:1	.....
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization).	.....
	OPERATING VOLTAGE	[■] 240V AC [] 24 VDC [] 110 VAC	.....
	TOTALIZING FACILITIES	[■] YES [] NO	.....
	ENCLOSURE	IP-65	.....
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)	.....
	LINER	Hard Rubber	
PROCESS DATA	FLUID	RAW WATER	.....
	RATE OF FLOW (CuBM/HR)	NORMAL : 2920, MAX: 3550	.....
	UPSTREAM WORKING PRESS (Kg/cm2g)	2.5	.....
	DESIGN PRESS (Kg/cm2g)	12	.....
	NORMAL TEMP (Deg C)	36	.....
	MAXIMUM TEMP (Deg C)	60	.....
	PIPE LOCATION	OVERGROUND	.....
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	711 mm x 8.0 mm	.....
	PIPE MATERIAL	CARBON STEEL AS PER IS 2062, ROLLED & WELDED AS IS3589 GR.410	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D DOWNSTREAM: 5D	.....

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
		VOLUME II B	
		SECTION D	
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NOTE: -

1) Accessories like ½" NPT cable gland, Transducer cable (length 20m), gasket, 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.
4) 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.

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	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
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		SECTION D	
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Tag No. 00GAA20CF011 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	**3 x 800 MW PVUNL PATRATU TPP PHASE-I**	.....
	OFFER REFERENCE	Bidder to indicate	.....
	TAG NO.	00GAA20CF011	.....|.....
	SERVICE:	RAW WATER ASH PUMP DISCH HDR FLOW	
	MAKE : MODEL	Bidder to indicate	
TECHNICAL	PRINCIPLE	Full Bore Electromagnetic	.....
	FLOW MEASUREMENT	Instantaneous flow rate as well as totalized flow	.....
	OUTPUT	Isolated 4-20 mA DC	.....
	FLOW TUBE	SS304	.....
	ELECTRODE	SS316	.....
	ACCURACY	± 0.5%	.....
	REPEATABILITY	± 0.2% of calibrated span	.....
	RANGEABILITY	10:1	.....
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization).	.....
	OPERATING VOLTAGE	[■] 240V AC [] 24 VDC [] 110 VAC	.....
	TOTALIZING FACILITIES	[■] YES [] NO	.....
	ENCLOSURE	IP-65	.....
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)	.....
	LINER	Hard Rubber	
PROCESS DATA	FLUID	RAW WATER	.....
	RATE OF FLOW (CuBM/HR)	NORMAL : 140, MAX : 200	.....
	UPSTREAM WORKING PRESS (Kg/cm2g)	3.5	.....
	DESIGN PRESS (Kg/cm2g)	12	.....
	NORMAL TEMP (Deg C)	36	.....
	MAXIMUM TEMP (Deg C)	60	.....
	PIPE LOCATION	OVERGROUND	.....
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	219.1 mm x 6 mm	.....
	PIPE MATERIAL	CARBON STEEL AS PER IS 2062, ROLLED & WELDED AS IS3589 GR.410	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D DOWNSTREAM : 5D	....

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
		VOLUME II B	
		SECTION D	
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NOTE: -

1) Accessories like ½" NPT cable gland, Transducer cable (length 20m), gasket, all process end connection hardware, SS nameplate etc. shall be provided.
2) Double compression type nickel plated brass cable gland.
3) Remote Transmitter:
    ii) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.
4) 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.

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
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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	**3 x 800 MW PVUNL PATRATU TPP PHASE-I**	.....
	OFFER REFERENCE	Bidder to indicate	.....
	TAG NO.	0GHD30CF011	.....|.....
	SERVICE:	APH WASH PUMP DISCH HDR FLOW	
	MAKE : MODEL	Bidder to indicate	
TECHNICAL	PRINCIPLE	Full Bore Electromagnetic	.....
	FLOW MEASUREMENT	Instantaneous flow rate as well as totalized flow	.....
	OUTPUT	Isolated 4-20 mA DC	.....
	FLOW TUBE	SS304	.....
	ELECTRODE	SS316	.....
	ACCURACY	± 0.5%	.....
	REPEATABILITY	± 0.2% of calibrated span	.....
	RANGEABILITY	10:1	.....
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization).	.....
	OPERATING VOLTAGE	[■] 240V AC [] 24 VDC [] 110 VAC	.....
	TOTALIZING FACILITIES	[■] YES [] NO	.....
	ENCLOSURE	IP-65	.....
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)	.....
	LINER	Hard Rubber	
PROCESS DATA	FLUID	CLARIFIED WATER	.....
	RATE OF FLOW (CuBM/HR)	NORMAL : 1050, MAX : 1300	.....
	UPSTREAM WORKING PRESS (Kg/cm2g)	9.3	.....
	DESIGN PRESS (Kg/cm2g)	12	.....
	NORMAL TEMP (Deg C)	36	.....
	MAXIMUM TEMP (Deg C)	60	.....
	PIPE LOCATION	OVERGROUND	.....
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	457 mm x 6 mm	.....
	PIPE MATERIAL	CARBON STEEL AS PER IS 2062, ROLLED & WELDED AS IS3589 GR.410	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D	.....
		DOWNSTREAM : 5D	.....

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
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NOTE: -

1) Accessories like ½" NPT cable gland, Transducer cable (length 20m), gasket, all process end connection hardware, SS nameplate etc. shall be provided.
2) Double compression type nickel plated brass cable gland.
3) Remote Transmitter:
    iii) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.
4) 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.

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DATA SHEET – A & B

DATA SHEET – A (TO BE FILLED BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	**3 x 800 MW PVUNL PATRATU TPP PHASE-I**	.....
	OFFER REFERENCE	Bidder to indicate	.....
	TAG NO.	00GHD40CF011	.....|.....
	SERVICE:	SERVICE WATER PUMP DISCH HDR FLOW	
	MAKE : MODEL	Bidder to indicate	
TECHNICAL	PRINCIPLE	Full Bore Electromagnetic	.....
	FLOW MEASUREMENT	Instantaneous flow rate as well as totalized flow	.....
	OUTPUT	Isolated 4-20 mA DC	.....
	FLOW TUBE	SS304	.....
	ELECTRODE	SS316	.....
	ACCURACY	± 0.5%	.....
	REPEATABILITY	± 0.2% of calibrated span	.....
	RANGEABILITY	10:1	.....
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization).	.....
	OPERATING VOLTAGE	[■] 240V AC [] 24 VDC [] 110 VAC	.....
	TOTALIZING FACILITIES	[■] YES [] NO	.....
	ENCLOSURE	IP-65	.....
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)	.....
	LINER	Hard Rubber	
PROCESS DATA	FLUID	CLARIFIED WATER	.....
	RATE OF FLOW (CuBM/HR)	NORMAL : 1400, MAX : 1700	.....
	UPSTREAM WORKING PRESS (Kg/cm2g)	7.5	.....
	DESIGN PRESS (Kg/cm2g)	12	.....
	NORMAL TEMP (Deg C)	36	.....
	MAXIMUM TEMP (Deg C)	60	.....
	PIPE LOCATION	OVERGROUND	.....
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	610 mm x 7 mm	.....
	PIPE MATERIAL	CARBON STEEL AS PER IS 2062, ROLLED & WELDED AS IS3589 GR.410	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 5D	.....
		DOWNSTREAM: 3D	.....

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NOTE: -

1) Accessories like ½" NPT cable gland, Transducer cable (length 20m), gasket, all process end connection hardware, SS nameplate etc. shall be provided.
2) Double compression type nickel plated brass cable gland.
3) Remote Transmitter:
    iv) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.
4) 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.

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BHEL	**DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER**	SPEC NO.: PE-TS-405-145-I916 VOLUME II B SECTION D REV. NO. 00 DATE : 27.07.2021 SHEET 9 OF 28

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	**3 x 800 MW PVUNL PATRATU TPP PHASE-I**	.....
	OFFER REFERENCE	Bidder to indicate	.....
	TAG NO.	00GHD50CF011	.....|.....
	SERVICE:	FGD MAKE-UP WATER PUMP DISCH HDR FLOW	
	MAKE : MODEL	Bidder to indicate	
TECHNICAL	PRINCIPLE	Full Bore Electromagnetic	.....
	FLOW MEASUREMENT	Instantaneous flow rate as well as totalized flow	.....
	OUTPUT	Isolated 4-20 mA DC	.....
	FLOW TUBE	SS304	.....
	ELECTRODE	SS316	.....
	ACCURACY	± 0.5%	.....
	REPEATABILITY	± 0.2% of calibrated span	.....
	RANGEABILITY	10:1	.....
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization).	.....
	OPERATING VOLTAGE	[■] 240V AC [] 24 VDC [] 110 VAC	.....
	TOTALIZING FACILITIES	[■] YES [] NO	.....
	ENCLOSURE	IP-65	.....
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)	
	LINER	Hard Rubber	.....
PROCESS DATA	FLUID	CLARIFIED WATER	.....
	RATE OF FLOW (CuBM/HR)	NORMAL : 700, MAX : 1000	.....
	UPSTREAM WORKING PRESS (Kg/cm2g)	3.5	.....
	DESIGN PRESS (Kg/cm2g)	12	.....
	NORMAL TEMP (Deg C)	36	.....
	MAXIMUM TEMP (Deg C)	60	.....
	PIPE LOCATION	OVERGROUND	.....
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	406.4 mm x 6.0 mm	.....
	PIPE MATERIAL	CARBON STEEL AS PER IS 2062, ROLLED & WELDED AS IS3589 GR.410	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D DOWNSTREAM : 5D	....

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NOTE: -

1) Accessories like ½" NPT cable gland, Transducer cable (length 20m), gasket, all process end connection hardware, SS nameplate etc. shall be provided.
2) Double compression type nickel plated brass cable gland.
3) Remote Transmitter:
    v) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.
4) 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.

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
		VOLUME II B	
		SECTION D	
		REV. NO. 00	DATE : 27.07.2021
		SHEET 11	OF 28

Tag No. 00GHD60CF011 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	**3 x 800 MW PVUNL PATRATU TPP PHASE-I**	.....
	OFFER REFERENCE	Bidder to indicate	.....
	TAG NO.	00GHD60CF011	.....|.....
	SERVICE:	ACW MAKE-UP PUMP DISCH HDR FLOW	
	MAKE : MODEL	Bidder to indicate	
TECHNICAL	PRINCIPLE	Full Bore Electromagnetic	.....
	FLOW MEASUREMENT	Instantaneous flow rate as well as totalized flow	.....
	OUTPUT	Isolated 4-20 mA DC	.....
	FLOW TUBE	SS304	.....
	ELECTRODE	SS316	.....
	ACCURACY	± 0.5%	.....
	REPEATABILITY	± 0.2% of calibrated span	.....
	RANGEABILITY	10:1	.....
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization).	.....
	OPERATING VOLTAGE	[■] 240V AC [] 24 VDC [] 110 VAC	.....
	TOTALIZING FACILITIES	[■] YES [] NO	.....
	ENCLOSURE	IP-65	.....
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)	
	LINER	Hard Rubber	.....
PROCESS DATA	FLUID	CLARIFIED WATER	.....
	RATE OF FLOW (CuBM/HR)	NORMAL : 300, MAX : 450	.....
	UPSTREAM WORKING PRESS (Kg/cm2g)	2.0	.....
	DESIGN PRESS (Kg/cm2g)	12	.....
	NORMAL TEMP (Deg C)	36	.....
	MAXIMUM TEMP (Deg C)	60	.....
	PIPE LOCATION	OVERGROUND	.....
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	273 mm x 6.0 mm	.....
	PIPE MATERIAL	CARBON STEEL AS PER IS 2062, ROLLED & WELDED AS IS3589 GR.410	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D DOWNSTREAM : 5D	.....

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
		VOLUME II B	
		SECTION D	
		REV. NO. 00	DATE : 27.07.2021
		SHEET 12	OF 28

NOTE: -

1) Accessories like ½" NPT cable gland, Transducer cable (length 20m), gasket, all process end connection hardware, SS nameplate etc. shall be provided.
2) Double compression type nickel plated brass cable gland.
3) Remote Transmitter:
    vi) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.
4) 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.

FORM NO. PEM-6666-0

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
		VOLUME II B	
		SECTION D	
		REV. NO. 00	DATE : 27.07.2021
		SHEET 13	OF 28

Tag No. 00GHD09CF011 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	**3 x 800 MW PVUNL PATRATU TPP PHASE-I**	.....
	OFFER REFERENCE	Bidder to indicate	.....
	TAG NO.	00GHD09CF011	.....|.....
	SERVICE:	HVAC MAKE-UP PUMP DISCH HDR FLOW	
	MAKE : MODEL	Bidder to indicate	
TECHNICAL	PRINCIPLE	Full Bore Electromagnetic	.....
	FLOW MEASUREMENT	Instantaneous flow rate as well as totalized flow	.....
	OUTPUT	Isolated 4-20 mA DC	.....
	FLOW TUBE	SS304	.....
	ELECTRODE	SS316	.....
	ACCURACY	± 0.5%	.....
	REPEATABILITY	± 0.2% of calibrated span	.....
	RANGEABILITY	10:1	.....
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization).	.....
	OPERATING VOLTAGE	[■] 240V AC [] 24 VDC [] 110 VAC	.....
	TOTALIZING FACILITIES	[■] YES [] NO	.....
	ENCLOSURE	IP-65	.....
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)	
	LINER	Hard Rubber	.....
PROCESS DATA	FLUID	CLARIFIED WATER	.....
	RATE OF FLOW (CuBM/HR)	NORMAL : 150, MAX : 200	.....
	UPSTREAM WORKING PRESS (Kg/cm2g)	7.0	.....
	DESIGN PRESS (Kg/cm2g)	12	.....
	NORMAL TEMP (Deg C)	36	.....
	MAXIMUM TEMP (Deg C)	60	.....
	PIPE LOCATION	OVERGROUND	.....
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	219.1 mm x 6.0 mm	.....
	PIPE MATERIAL	CARBON STEEL AS PER IS 2062, ROLLED & WELDED AS IS3589 GR.410	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D	.....
		DOWNSTREAM: 5D	

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
		VOLUME II B	
		SECTION D	
		REV. NO. 00	DATE : 27.07.2021
		SHEET 14	OF 28

NOTE: -

1) Accessories like ½" NPT cable gland, Transducer cable (length 20m), gasket, all process end connection hardware, SS nameplate etc. shall be provided.
2) Double compression type nickel plated brass cable gland.
3) Remote Transmitter:
    vii) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.
4) 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.

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
		VOLUME II B	
		SECTION D	
		REV. NO. 00	DATE : 27.07.2021
		SHEET 15	OF 28

Tag No. 00PCB70CF011 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	**3 x 800 MW PVUNL PATRATU TPP PHASE-I**	.....
	OFFER REFERENCE	Bidder to indicate	.....
	TAG NO.	00PCB70CF011	.....
	SERVICE:	ACW BLOWDOWN TO FIRE WATER TANK	.....
	MAKE : MODEL	MAKE-UP FLOW Bidder to indicate	
TECHNICAL	PRINCIPLE	Full Bore Electromagnetic	.....
	FLOW MEASUREMENT	Instantaneous flow rate as well as totalized flow	.....
	OUTPUT	Isolated 4-20 mA DC	.....
	FLOW TUBE	SS304	.....
	ELECTRODE	SS316	.....
	ACCURACY	± 0.5%	.....
	REPEATABILITY	± 0.2% of calibrated span	.....
	RANGEABILITY	10:1	.....
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization).	.....
	OPERATING VOLTAGE	[■] 240V AC [] 24 VDC [] 110 VAC	.....
	TOTALIZING FACILITIES	[■] YES [] NO	.....
	ENCLOSURE	IP-65	.....
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)	.....
	LINER	Hard Rubber	
PROCESS DATA	FLUID	ACW BLOWDOWN WATER	.....
	RATE OF FLOW (CuBM/HR)	NORMAL : 20, MAX: 100	.....
	UPSTREAM WORKING PRESS (Kg/cm2g)	3.0	.....
	DESIGN PRESS (Kg/cm2g)	10	.....
	NORMAL TEMP (Deg C)	36	.....
	MAXIMUM TEMP (Deg C)	60	.....
	PIPE LOCATION	OVERGROUND	.....
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	166.5 mm x 5.4 mm	.....
	PIPE MATERIAL	CARBON STEEL ERW AS PER IS 1239 (HEAVY GRADE)	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 8D DOWNSTREAM: 4D	.....

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
		VOLUME II B	
		SECTION D	
		REV. NO. 00	DATE : 27.07.2021
		SHEET 16	OF 28

NOTE: -

1) Accessories like ½" NPT cable gland, Transducer cable (length 20m), gasket, all process end connection hardware, SS nameplate etc. shall be provided.
2) Double compression type nickel plated brass cable gland.
3) Remote Transmitter:
   viii) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.
4) 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.

FORM NO. PEM-6666-0

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
		VOLUME II B	
		SECTION D	
		REV. NO. 00	DATE : 27.07.2021
		SHEET 17	OF 28

Tag No. 00GAA30CF011 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	**3 x 800 MW PVUNL PATRATU TPP PHASE-I**	.....
	OFFER REFERENCE	Bidder to indicate	.....
	TAG NO.	00GAA30CF011	.....|.....
	SERVICE:	RAW WATER MAKE-UP TO FIRE WATER TANK	
	MAKE : MODEL	Bidder to indicate	
TECHNICAL	PRINCIPLE	Full Bore Electromagnetic	.....
	FLOW MEASUREMENT	Instantaneous flow rate as well as totalized flow	.....
	OUTPUT	Isolated 4-20 mA DC	.....
	FLOW TUBE	SS304	.....
	ELECTRODE	SS316	.....
	ACCURACY	± 0.5%	.....
	REPEATABILITY	± 0.2% of calibrated span	.....
	RANGEABILITY	10:1	.....
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization).	.....
	OPERATING VOLTAGE	[■] 240V AC [] 24 VDC [] 110 VAC	.....
	TOTALIZING FACILITIES	[■] YES [] NO	.....
	ENCLOSURE	IP-65	.....
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)	.....
	LINER	Hard Rubber	
PROCESS DATA	FLUID	RAW WATER	.....
	RATE OF FLOW (CuBM/HR)	NORMAL : 20, MAX : 250	.....
	UPSTREAM WORKING PRESS (Kg/cm2g)	2.5	.....
	DESIGN PRESS (Kg/cm2g)	12	.....
	NORMAL TEMP (Deg C)	36	.....
	MAXIMUM TEMP (Deg C)	60	.....
	PIPE LOCATION	OVERGROUND	.....
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	219.1 mm x 6 mm	.....
	PIPE MATERIAL	CARBON STEEL AS PER IS 2062, ROLLED & WELDED AS IS3589 GR.410	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 10D	.....
		DOWNSTREAM : 5D	.....

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
		VOLUME II B	
		SECTION D	
		REV. NO. 00	DATE : 27.07.2021
		SHEET 18	OF 28

NOTE: -

1) Accessories like ½" NPT cable gland, Transducer cable (length 20m), gasket, all process end connection hardware, SS nameplate etc. shall be provided.
2) Double compression type nickel plated brass cable gland.
3) Remote Transmitter:
    ix) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.
4) 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.

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
		VOLUME II B	
		SECTION D	
		REV. NO. 00	DATE : 27.07.2021
		SHEET 19	OF 28

Tag No. 00PCB80CF011 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	**3 x 800 MW PVUNL PATRATU TPP PHASE-I**	.....
	OFFER REFERENCE	Bidder to indicate	.....
	TAG NO.	00PCB80CF011	.....|.....
	SERVICE:	ACW BLOWDOWN TO CMB HDR FLOW	
	MAKE : MODEL	Bidder to indicate	
TECHNICAL	PRINCIPLE	Full Bore Electromagnetic	.....
	FLOW MEASUREMENT	Instantaneous flow rate as well as totalized flow	.....
	OUTPUT	Isolated 4-20 mA DC	.....
	FLOW TUBE	SS304	.....
	ELECTRODE	SS316	.....
	ACCURACY	± 0.5%	.....
	REPEATABILITY	± 0.2% of calibrated span	.....
	RANGEABILITY	10:1	.....
	DISPLAY/INDICATION	LCD with Internal keypad (Flow rate of totalization).	.....
	OPERATING VOLTAGE	[■] 240V AC [] 24 VDC [] 110 VAC	.....
	TOTALIZING FACILITIES	[■] YES [] NO	.....
	ENCLOSURE	IP-65	.....
	PROCESS END CONNECTION	Inline Flanged (with matching Flange)	.....
	LINER	Hard Rubber	
PROCESS DATA	FLUID	ACW BLOWDOWN	.....
	RATE OF FLOW (CuBM/HR)	NORMAL : 0-78, MAX : 100	.....
	UPSTREAM WORKING PRESS (Kg/cm2g)	3.0	.....
	DESIGN PRESS (Kg/cm2g)	10	.....
	NORMAL TEMP (Deg C)	36	.....
	MAXIMUM TEMP (Deg C)	60	.....
	PIPE LOCATION	OVERGROUND	.....
PIPE LINE DATA	PIPE SIZE (OD x THK) mm	166.5 mm x 5.4mm	.....
	PIPE MATERIAL	CARBON STEEL ERW AS PER IS 1239 (HEAVY GRADE)	.....
	AVAILABLE PIPE STRAIGHT LENGTH	UPSTREAM : 8D	.....
		DOWNSTREAM : 4D	.....

	DATA SHEET FOR ELECTRO-MAGNETIC FLOW METER	SPEC NO.: PE-TS-405-145-I916	
		VOLUME II B	
		SECTION D	
		REV. NO. 00	DATE : 27.07.2021
		SHEET 20	OF 28

NOTE: -

1) Accessories like ½" NPT cable gland, Transducer cable (length 20m), gasket, all process end connection hardware, SS nameplate etc. shall be provided.
2) Double compression type nickel plated brass cable gland.
3) Remote Transmitter:
    x) Enclosure Material – Die Cast Aluminium (incase PP offered, suitable metal enclosure/housing shall be provided. Since it is located in the field.
4) 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.

SECTION-D

QUALITY PLAN

MANUFACTURER / BIDDER / SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-145-I011 Rev No. : 01	DATE: 27.10.2020
	PROJECT:		PO NO.:	DATE:
	ITEM: ELECTRO MAGNETIC FLOW METER	SYSTEM: C&I	SECTION:	SHEET 1 of 3

S No.	Component & Operations	Characteristics	Class	Type of Check	Quantum of check		Reference document	Acceptance norms	Format of record	Agency			`
1	2	3	4	5	6		7	8	9	*	**		10
					M	C/N				D	M	C	N
1.1	**RAW MATERIAL**												
	a) Meter Body b) Tube c) Electrodes d) Earthing Ring e) Electronic Board f) Cable Gland g) Liner	Physical, Chemical properties	MA	Physical, Chemical tests	1/Heat	----	Approved Drg / Data Sheet	Approved Drg / data Sheet	Test Certificate	√	P, V	V	-	
		Dimensions	MA	Measurement	100%	-----	Approved Drg / Data Sheet	Approved Drg / Data Sheet	Inspection Reports	√	P,V	V	-	
1.2	**FLANGES (WITH MATCHING FLANGES)**												
	a) Forgings	Chemical, Mech Properties, & Heat Treatment	MA	Chemical, Mech Properties, & Heat Treatment	100%	----	ANSI B 16.34	ANSI B 16.34	MTC & HT certificate	√	P, V	V	-	
	b) Machining	Dimensions	MA	Measurement	100%	----	Approved Drg / Data Sheet	Approved Drg / Data Sheet	Inspection Reports	√	P, V	V	-	
2.0	**IN-PROCESS**												
	Machining of Components and Assembly	Dimension	MA	Measurement	100%	----	Approved Drg / Data Sheet	Approved Drg / data Sheet	Inspection Reports	√	P, W	V	-	
		Surface finish	MA	Visual	100%	----	---	Mirror Finish	---	√	P, W	V	-	
3.0	**ASSEMBLY (INCLUDING ELECTRONIC COMPONENT) and FINAL INSPECTION**												
	Complete Assembly	Overall dimensions	MA	Measurement	100%	100%	Approved Drg / Data Sheet	Approved Drg / data Sheet	Inspection Reports	√	P, W	W	-	
3.1		a) Marking b) Tag no. c) Direction of flow d) Model no. e) Display f) Process end connection, g) Canopy	MA	Visual	100%	100%	Approved Drg / Data Sheet	Approved Drg / data Sheet	Inspection Reports	√	P, W	W	-	Refer Note 9

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	Prag Jain / M Kesharwani	PRAG JAIN /MAYANK KESHARWANI	Checked by:	KUNDAN PRASAD	KUNDAN PRASAD			Reviewed by:			
Reviewed by:	Suresh Sharma	SURESH SHARMA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL			Approved by:			

MANUFACTURER / BIDDER / SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-145-I011 Rev No. : 01	DATE: 27.10.2020
	PROJECT:		PO NO.:	DATE:
	ITEM: ELECTRO MAGNETIC FLOW METER	SYSTEM: C&I	SECTION:	SHEET 2 of 3

S No.	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
3.2	Electronic Functional Test	a) Power supply b) Output c) Accuracy d) Repeatability e) Range ability f) * HART compatibility	MA	Electrical	100%	100%	Approved Drg / Data Sheet	Approved Drg / Data Sheet	Inspection Reports	√	P, W	W	-	* If Applicable
3.3	Electro Magnetic Flow Meter	Calibration	MA	Performance test	One per type	---	Approved Data Sheet	Approved Data Sheet	Test Certificate	√	P, W	V	-	Refer Note 2
		Painting	MA	Visual	100%	---	Manufacturer standards	Manufacturer standards	Inspection Reports / Manufacturer records	√	P, W	V	-	
4.0	**ACCESSORIES**													
	Mounting Accessories	Quantity Verification	MA	Visual	100%	100%	Approved Drg / Data Sheet	Approved Drg / Data Sheet	Inspection Reports	√	P, W	W	-	Quantity to be checked physically Refer Note 9
	commissioning spares	Quantity Verification	MA	Visual	100%	100%	Approved Drg / Data Sheet	Approved Drg / Data Sheet	Inspection Reports	√	P, W	W	-	If applicable
5.0	**PACKING & DISPATCH**													
	Electro Magnetic Flow Meter	Soundness of Packing against transit damage	MA	Visual	100%	100%	Tech. Spec / Manufacturer standards	Tech. Spec / Manufacturer standards	---	√	P	W	-	Refer Note 10

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	Prag Jain	PRAG JAIN /MAYANK KESHARWANI	Checked by:	KUNDAN PRASAD	KUNDAN PRASAD			Reviewed by:			
Reviewed by:	Suresh Sharma	SURESH SHARMA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL			Approved by:			

	MANUFACTURER / BIDDER / SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-145-I011 Rev No. : 01	DATE: 27.10.2020
		PROJECT:		PO NO.:	DATE:
		ITEM: ELECTRO MAGNETIC FLOW METER	SYSTEM: C&I	SECTION:	SHEET 3 of 3

NOTE:

1. Minimum 2 coats of primer paint to be applied before dispatch (Painting thickness shall be as per Manufacturer's standard)
2. CALIBRATION Test to be carried out at IIT-DELHI / FCRI or NABL approved laboratory.
3. BHEL reserves the right to conduct repeat tests, if required.
4. In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed / verified by supplier's TPI.
5. Project specific Quality Plan to be developed based on customer requirement.
6. Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc.) Indicated in QP shall be referred.
7. Quantum of check by BHEL / BHEL nominated inspection agency shall be indicated during project specific enquiry.
8. Enclosure Degree of Protection certificate/Lab test report shall be checked as per IS/IEC 60529:2001. IP class shall be as per approved data sheet.
9. Material of all the fittings shall be as per approved Data Sheet.
10. Following to be noted for packing:
    a) Material shall be packed suitably in order to avoid damage during transit and also during storage at site.
    b) Photographs of items duly placed inside the box just before the final packing and Photographs of the box just before dispatch to be sent to BHEL purchase group for review before issuing MDCC.
    c) Clearance for dispatch will be given only after receipt of the photos
    d) Sea worthy packing shall be provided, if called for in the Data Sheet. Acceptance norms shall be in line with technical / packing specification.

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 PARTY INSPECTION AGENCY, N: CUSTOMER,
P: PERFORM, W: WITNESS, V: VERIFICATION, AS APPROPRIATE, MA: MAJOR, MI: MINOR, CR: CRITICAL.#

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	Prag Jain M Kesharwani	PRAG JAIN /MAYANK KESHARWANI	Checked by:	KUNDAN PRASAD	KUNDAN PRASAD			Reviewed by:			
Reviewed by:	Suresh Sharma	SURESH SHARMA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL			Approved by:			

BHEL	**TECHNICAL SPECIFICATION FOR** **ELECTROMAGNETIC FLOWMETER** **3X800MW PVUNL PATRATU TPP PHASE-I**	SPEC NO.: **PE-TS-434-145-I916** VOLUME II B SECTION D REV. NO. 00 | DATE : 27.07.2021 SHEET 1 OF 3

SECTION-D

BILL OF QUANTITY

BHEL	Technical specification for **ELECTROMAGNETIC FLOW METER** **3X800MW PVUNL PATRATU TPP PHASE-I**	SPECIFICATION NO. **PE-TS-434-145-I916** VOLUME **II-B** SECTION **D** REV. NO. 00 DATE 27.07.2021 SHEET 2 OF 3

BILL OF QUANTITY

(A) ELECTROMAGNETIC FLOWMETER

S. No.	KKS	SERVICE/ ITEM DESCRIPTION	FLUID	Quantity for 3 Units (in Nos.)
1	00PCB70CF011	MAKE-UP TO FIRE WTR T/K FLOW	ACW	1
2	00PCB80CF011	BLOW DOWN TO CMB FLOW	ACW	1
3	00GAA10CF011	RAW WTR PT PUMP DISCH HDR FLOW	RAW WATER	1
4	00GAA20CF011	RAW WTR ASH PUMP DISCH HDR FLOW	RAW WATER	1
5	00GAA30CF011	RAW WTR PT PUMP DIS HDR TO FIRE WTR T/K FLOW	RAW WATER	1
6	00GHD30CF011	APH WASH PUMP DISCH HDR FLOW	CLFD WATER	1
7	00GHD40CF011	SERVICE WTR PUMP DISCH HDR FLOW	CLFD WATER	1
8	00GHD50CF011	FGD MAKE-UP WTR PUMP DISCH HDR FLOW	CLFD WATER	1
9	00GHD60CF011	ACW MAKE-UP PUMP DISCH HDR FLOW	CLFD WATER	1
10	00GHD09CF011	HVAC MAKE-UP PUMP DISCH HDR FLOW	CLFD WATER	1

(B) SUPERVISION CHARGE

S. No.	SERVICE/ ITEM DESCRIPTION	Quantity for 3 Units (in Man-days)
1	SUPERVISION FOR SITE SUPPORT AT SITE (MAXIMUM MANDAYS) #	4

 # SUPERVISION CHARGES INCLUDES BOARDING, LODGING AND TRAVEL TIME (TO AND FRO) and TRAVEL FARE.

	Technical specification for **ELECTROMAGNETIC FLOW METER** **3X800MW PVUNL PATRATU TPP PHASE-I**	SPECIFICATION NO. **PE-TS-434-145-I916**	
		VOLUME **II-B**	
		SECTION **D**	
		REV. NO. 00	DATE 1 04/06/2019
		SHEET 3 OF 3	

LIST OF MANDATORY SPARES

S. No.	ITEM DESCRIPTION	QUANTITY
1	Transmitters for electromagnetic flow meter.	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 X800MW, 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.

PROVENESS CERTIFICATE

Sl.No.	Item Description	Plant No.1
5.00.00	**INSTRUMENTS (PRIMARY & SECONDARY)**	
	(i) Type of Instrument	
	(ii) Make / Model	
	(iii) Name of Power Station (Location & Address)	
	(iv) Unit Size (MW)	
	(v) Commissioning date	
	Whether above instruments have atleast one (1) year satisfactory operation in one (1) power station having unit rating of 200 MW or above.	Yes/No
	(vi) Client's certificate attached	Yes/No

Signature of authorized signatory.....

871087/2022/PS-PEM-C_I

	PRE-QUALIFICATION REQUIREMENTS	PE-TS-434-145-I916
		REVISION NO. 00 DATE 10.05.2022
	PROJECT: 3X800MW PVUNL PATRATU TPP PHASE-I	SHEET NO. 1 OF 1

PACKAGE: **ELECTROMAGNETIC FLOWMETER**

1.0	
a.	Bidder should be Original equipment manufacturer (OEM) for ELECTROMAGNETIC FLOWMETER.
b.	In case bidder is not OEM, evaluation shall be done as following: 1 If bidder happens to be Indian subsidiaries of foreign OEM, then the credentials of the foreign OEM can also be considered for meeting PQR. 2 If bidder 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 bidder(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 bidder should be in use successfully in power plant or any other industrial application for at least 1 (One) year. Bidder to submit either of following supporting documents for the product: 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 to the date of application. 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. OR b Copy of repeat orders from minimum **1 (One)** purchaser. Order received by bidder 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	Bidder 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	Bidder to submit all documents in English. If documents submitted by bidder are in language other than English, a self-attested English Translated document should also be submitted.

PREPARED BY	REVIEWED BY	APPROVED BY
ATUL RANJAN DY. MGR.	MAYANK KESHARWANI SR. MGR.	SURESH CHAND SHARMA DGM

ANNEXURE-I

PROJECT: 3 x 800 MW PVUNL PATRATU TPP PHASE-I
PACKAGE: ELECTROMAGNETIC FLOWMETER

BOQ CUM UNPRICED SCHEDULE FOR MAIN SUPPLY , MANDATORY SPARES AND SUPERVISION OF E&C

Item Number	Item Title	Item Description	FLUID	Item Quantity	Unit of Measure	Delivery Period (In number of days)	Unit Price (Inclusive of all taxes) Only Fil "Quoted/Un Quoted" DO NOT QUOTE/MENTIONED PRICE IN THIS SHEET	FREIGHT PERCENTAGE IN TERMS OF EX-WORKS Bidder to quote freight % of Ex-Works (Inclusive/Nil is not acceptable)	GST % (Included in Unit Price)	HSN Code
1	00PCB70CF011	MAKE-UP TO FIRE WTR T/K FLOW	ACW	1	NOS	999				
2	00PCB80CF011	BLOW DOWN TO CMB FLOW	ACW	1	NOS	999				
3	00GAA10CF011	RAW WTR PT PUMP DISCH HDR FLOW	RAW WATER	1	NOS	999				
4	00GAA20CF011	RAW WTR ASH PUMP DISCH HDR FLOW	RAW WATER	1	NOS	999				
5	00GAA30CF011	RAW WTR PT PUMP DIS HDR TO FIRE WTR T/K FLOW	RAW WATER	1	NOS	999				
6	00GHD30CF011	APH WASH PUMP DISCH HDR FLOW	CLFD WATER	1	NOS	999				
7	00GHD40CF011	SERVICE WTR PUMP DISCH HDR FLOW	CLFD WATER	1	NOS	999				
8	00GHD50CF011	FGD MAKE-UP WTR PUMP DISCH HDR FLOW	CLFD WATER	1	NOS	999				
9	00GHD60CF011	ACW MAKE-UP PUMP DISCH HDR FLOW	CLFD WATER	1	NOS	999				
10	00GHD09CF011	HVAC MAKE-UP PUMP DISCH HDR FLOW	CLFD WATER	1	NOS	999				
11	NA	ELECTROMAGNETIC FLOW METER (TRANSMITTERS)- MANDATORY SPARES	NA	10% OR 1 NO., WHICHEVER IS MORE, OF EACH TYPE AND MODEL $	NOS	999				
12	NA	SUPERVISION FOR SITE SUPPORT AT SITE (MAXIMUM MANDAYS) #	NA	4	MANDAYS	999				

Note:

$ Wherever % is indicated, the quantity shall be calculated for % of supply for total quantity of 3 units of 3 X800MW, 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.

 # SUPERVISION CHARGES INCLUDES BOARDING, LODGING AND TRAVEL TIME (TO AND FRO) AND TRAVEL FARE.

ANNEXURE-A

DELIVERY SCHEDULE -3X800 MW PVUNL PATRATU PROJECT-ELECTROMAGETIC FLOW METER PACKAGE								
Sl. No.	**Package Code**	**Package Name**	**BHEL Drawing No.**	**Drawing Title**	**Primary/Secondary**	**Drg. Sch for Vendor**	**Standard Delivery Terms for Supply Portion**	**Scope of Services and corresponding schedule for rendering the services**
1	**145-47000-A**	**ELECTROMAGNETIC FLOW METERT**	PE-V0-XXX-145-I947	DATA SHEET, CALCULATION, BOQ/BOM & GA DRAWING for Electromagnetic 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.	**Main supply:** Within Four (04) months from date of CAT-1 approval of Primary drawing/documents or BHEL manufacturing clearance whichever is later. subjected to drawing/document submission/re-submission schedule as stipulated, in case of any delay in submission/re-submission of Primary drawing/documents, then same shall be reduced from the given delivery period. Delay in BHEL's comments/approval beyond 18 days shall also be considered for delay analysis. **Mandatory Spares:** Delivery shall be 04 months from the date of manufacturing clearance. Sprate dispatch/manufacturing clearance will be issued for mandatory spares.	**Supvervision of E&C:** Vendor to depute its service engineer for Supervision of E&C within 15 days from BHEL's intimation (for deputing service engineer). For delay in deputing service engineer, LD on Supervision of E&C portion shall be applicable @ ½% of the total Supervision of E&C portion contract value (excluding element of taxes) per week or part thereof, with applicable GST. However, total LD (supply + Supervision of E&C) shall be limited to 10% of cumulative total contract value excluding taxes and freight (supply + Supervision of E&C).
			PE-V0-XXX-145-I948	QAP for Electromagnetic Flow Meter	**Primary**			
			PE-V0-XXX-145-I949	O&M MANUAL for Electromagnetic Flow Meter	**Secondary**	within 30 days of issuance of MDCC		

Bidders to comply the following terms for delivery :

a. The end period specified is for completion of the deliveries. Deliveries to start progressively so as to meet the completion schedule.

b. The delivery conditions specified are for contractual LD purposes, however BHEL may ask for early deliveries without any compensation thereof.

c. Non-applicable drawings shall be decided during bid evaluation.

d. Wherever schedule of drawings/documents submission / re-submission is stipulated in the Technical Specification no.PE–TS–434–145–I916, REV. 00, same shall be superseded by delivery specified in NIT .

RISK & COST

1. In case of delays (beyon d the maximu m late delive ry per iod as per LD cl ause) in supplie s, or if there be defective su pplies or no n-fulfilment o f any other terms and conditions of the Co ntract as en umerated subsequently in this clause, then, without prejudice to its right to recover any expenses, losses or damages to which the B uyer may b e put to in cur or sustain by rea son of th e Seller/ Contractor's d efault or b reach of Order/Contract or to suspend business dealings with the Seller/Contractor in terms of the Buyers' Guidelines for Suspension of Business Dealings as applicable from time to time, the Buyer shall also be entitled to cancel the Order/ Contract either in whol e or portion thereof without compensation to Seller. On t he occurrence of any of the acts/omission s mentioned be low, the Buyer may if it so desi res, procure upon such terms and i n such manner as deemed appropriate, plant/equipment/ stores not so delivered or others of similar description where plant/ equipment/ stores exactly complying with particulars are not, in the opinion of the Buyer (wh ich shall be final), readily procurable, at the risk and cost of the Seller.

   The Seller shall be liable to the Buyer for any excess co sts incurred thereof and the Seller shall continue the performance of the Order/Contract to the extent not cancelled under the provisions of this clause. The Seller shall on no account be entitled to any gain on such repurchases. If the Bidder doe s not agree to thi s Risk Purchase cl ause, BHEL reserves th e right to reje ct the bid/offer of the Bidder. The ord er/contract may be cancelled in whole or p art thereof an d Risk & Co st Clause in li ne with term s and conditions of PO/Cont ract may be invoked by the Buyer in any of the following cases:

   i. If the Seller/Contra ctor fails to deliver the good s or materials or any instal ment thereof within the perio d(s) fixed for such delivery or the Seller's poor progress of the supply/services vis-à-vis delivery/execution timeline as stipulated in the contract, backlog attributable to the Seller including unexecuted portion of supply does not appear to be executable within balance period available;

   ii. delivers g oods or mat erials not of the cont racted quality and failing to adhe re to the contra ct specifications/execution methodology;

   iii. withdrawal from or repudiation/abandonment of the supply/services by the Seller before completion as per contract or if the Seller refuses or is unable to supply goods or materials covered by the order/Contract either in whole or in part or otherwise fails to perform the Order/Contract.

   iv. Non supply by the Seller within scheduled completion/delivery period as per contract or as extended from time to time for reasons attributable to the Seller;

   v. Termination of Contract on account of any other reason(s) attributable to the Seller.

   vi. Assignment, transfer, sub-letting of Contract with out BHEL's written permission resulting in termination of Contract or part thereof by BHEL.

   vii. If the Seller be an individual or a Sole Proprietorship, in the event of death or insanity of the Seller.

   viii. If the Seller/Contractor being an individual or if a partnership firm thereof, shall at any time be a djudged insolvent or shall have a receivin g order for administration of his estate made against him or shall take a ny proceeding for composition under any Insolvency Act for the time being in force or make any assignment of the order/Contract or enter into any arrangement or composition with his creditors or suspend payment or if the firm dissolved under the Partnership Act;

   ix. If the Seller/Co ntractor being a Company is wound up voluntarily or by order of a Cou rt or a Receiver, Liquidator or Manager on behalf of the debenture holders and creditors is appointed or circumstances have arisen which entitles the Court of debenture holder and creditors to appoint a receiver, liquidator or manager

   x. Non- Compliance to any contractual condition or any other default attributable to the Seller.

   Such defaulting vendor/Seller shall not be eligible to participate in re-tendering conducted on account of risk purchase made due to fault of such vendor/Seller.

2. BHEL's right to go for Risk and Cost, Calcul ation of Risk and Cost amount & L D, recovery options to BHEL are given as under: -

2.1 BHEL reserves the right to terminate the contra ct or withdraw portion of work and get it do ne through other agency, at the risk and cost of the contractor *after due notice of a period of 14 days' by BHEL* in any of the following cases:

i) If the Sell er/Contractor fails to deliver the go ods or materi als or any in stalment there of within th e period(s) fixe d for such d elivery or th e Seller' s poor p rogress of the su pply/ services v is-a-vis delivery/execution timelin e as stipulated in the Contract, backlog attributa ble to sell er i ncluding unexecuted portion of supply does not appear to be executable within balance available period;

ii) Delivers g oods o r mat erials not of the contra cted qu ality and failing to adhe re to t he contract specifications;

iii) Withdrawal from or repudiation/ abandonment of the supply/ services by Seller before completion as per contract or if the Seller refu ses or is unabl e t o supply go ods o r materials cove red by the Order/Contract either in whole or in part or otherwise fails to perform the Order/Contract;

iv) Non-supply by the Seller within scheduled completion/delivery period as per Contract or as extended from time to time, for the reasons attributable to the Seller;

v) Termination of Contract on account of any other reason (s) attributable to Seller.

vi) Assignment, transfer, subletting of Contract without BHEL's written permission resulting in termination of Contract or part thereof by BHEL.

vii) If the Seller be an individual or a sole proprietorship Firm, in the event of the death or insanity of the Seller;

viii) If the Seller/Contractor being an individual or if a firm on a partnership thereof, shall at any time, be adjudged insolvent or shall have a receiving order for administration of his estate made against him or shall take any proceeding for composition under any Insolvency Act for the time being in force or make any assignment of the Order/Contract or enter into any arrangement or composition with his creditors or suspend payment or if the firm dissolved under the Partnership Act;

ix) If the Seller/Contractor being a company is wound up voluntarily or by order of a Court or a Receiver, Liquidator or Manager on behalf of the debenture holders and creditors is appointed or circumstances shall have ari sen which entitles the Court of debenture holder and creditors to appoint a receiver, liquidator or manager;

x) Non-compliance to any contractual condition or any other default attributable to Seller.

2.1.1 Risk & Cost Amount against Balance Work:

Risk & Cost amount against balance work shall be calculated as follows:

Risk & Cost Amount= [(A-B) + (A x H/100)]

Where,
A= Value of Balance scope of Work (*) as per rates of new contract
B= Value of Balance scope of Work (*) as per rates of old contract being paid to the contractor at the time of termination of contract i.e. inclusive of PVC & ORC, if any.
H = Overhead Factor to be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

2.1.2 Balance scope of work (in case of termination of contract):

Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of Contract', shall be taken as balance scope of Work for calculating risk & cost amount.

Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.

Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities.

Substitute/ extra items whose rates have already been approved would form part of contract quantities for this purpose.

Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.

However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

NOTE: In case portion of work is being withdrawn at risk & cost of contractor instead of termination of contract, contract quantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work' for calculating Risk & Cost amount.

2.1.3 LD against delay in executed work in case of Termination of Contract:

LD against delay in executed work shall be calculated in line NIT terms & conditions, for the delay attributable to contractor. For limiting the maximum value of LD, contract value shall be taken as Executed Value of work till termination of contract.

Method for calculation of LD against delay in executed work in case of termination of contract" is given below:

i. Let the time period from scheduled date of start of work till termination of contract excluding the period of Hold (if any) not attributable to contractor = T1
ii. Let the value of executed work till the time of termination of contract = X
iii. Let the Total Executable Value of work for which inputs/fronts were made available to contractor and were planned for execution till termination of contract = Y
iv. Delay in executed work attributable to contractor i.e. T2 = [1-(X/Y)] x T1
v. LD shall be calculated in line with LD clause (clause 16) of the Contract for the delayattributable to contractor taking "X" as Contract Value and "T2" as period of delay attributable to contractor.

2.2 Recoveries arising out of Risk & Cost and LD or any other recoveries due from Contractor:

Without prejudice to the other means of recovery of such dues from the Seller recoveries from the Seller on whom risk
& cost has been invoked shall be made from the following:

a) Dues available in the form of Bills payable to seller, SD, BGs against the same contract.
b) Dues payable to seller against other contracts in the same Region/Unit/ Division of BHEL.
c) Dues payable to seller against other contracts in the different Region/Unit/ division of BHEL.

In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor.