

**DAMODER VALLEY CORPORATION(DVC)
2x660 MW - RAGHUNATHPUR TPP PHASE II-STG**


**TECHNICAL SPECIFICATION
FOR CONDENSER ON LOAD TUBE CLEANING
SYSTEMS (COLTCS).**

Specification No. : PE-TS-390-165-N001(REV 0)

VOLUME -III



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
PPEI BLDG., SEC-16A, PLOT NO. 25
NOIDA – 201301 (UP)**

	TITLE : TECHNICAL SPECIFICATION FOR CONDENSER ON LOAD TUBE CLEANING SYSTEMS (COLTCS) PREAMBLE	SPEC. NO. PE-TS-390-165-N001	
		VOLUME : III	
		REV. NO. 0	DATE : 17.07.13
		SHEET 1 OF 2	

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 - I A : This part contains instructions to bidders for making bids to BHEL.

Volume - I B : This part contains general commercial conditions of the tender and include provision that vendor shall be responsible for the quality of item supplied by their sub-vendors.

Volume - I C : This part contains special conditions of contract.

Volume - I D : This part contains commercial conditions for erection and commissioning site work, as applicable.

1.2 **Volume - II TECHNICAL SPECIFICATIONS**

Technical requirements are stipulated in Volume II which comprises of :

Volume - II A : General Technical Conditions

Volume - II B : Technical specification including drawings, if any

1.2.1 **Volume - II B :**


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 standard technical specifications of equipments complete with data sheet A, B & 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).

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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.PES-100-901 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.

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TITLE :
**TECHNICAL SPECIFICATION FOR
COLTCS**

SPEC. NO. PE-TS-390-165-N001

VOLUME III SECTION


REV. NO. 0 DATE 17.07.13

SHEET 1 OF 1

SECTION A

SHALL BE FURNISHED ALONGWITH BID

- **COMPLIANCE CERTIFICATE**
- **PERFORMANCE GUARANTEE SCHEDULE**
- **TECHNICAL DEVIATION SCHEDULE**
- **ELECTRICAL LOAD DATA**
- **GA DRG OF COLTCS**
- **UNIT PRICE SCHEDULE**
- **TOTAL PRICE SCHEDULE.**


	TITLE : COMPLIANCE CERTIFICATE FOR COLTCS	SPEC. NO.	PE-TS-390-165-N001
	PROJECTS: 2x660 MW RAGHUNATHPUR TPP PHASE II-STG	DATE:	17.07.13
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COMPLIANCE CERTIFICATE

The bidder shall confirm compliance with following by signing/ stamping this compliance certificate and furnish same with the offer.

- a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions with regard to same.
- b) There are no other deviations w.r.t. specification other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'
- c) Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL/ Customer/Customer's Consultant approval and customer hold points for inspection/ testing shall be marked in the QP at the contract stage. Inspection/ testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. Charges for 3rd party inspection (TUV/ equivalent) for imported components wherever required shall be included by bidder in the base price itself.
- d) Any drawing/ document/ data-sheet/ calculation/ Quality plan/ Instrumentation etc. submitted along with the offer shall be considered for reference only, same shall be subject to BHEL/ Customer/Customer's Consultant approval in the event of order.
- e) The offered materials shall be either equivalent or superior to those specified in the specification. For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.
- f) The commissioning spares including balls shall be supplied on 'As Required Basis' & prices for same included in the base price itself.
Prices for special tools & tackles, if any, shall also be included in the base price.
Recommended spares for 3 years shall be quoted separately with price indicated separately.
- g) Charges for Installation Checks, Commissioning of equipments, Trial runs and Performance Testing at site shall be included by bidder in the base price itself.
- h) All Instruments shall be located in the Instrument Rack to be supplied by bidder.

The instrument rack shall be installed on ball recirculation pump skid for COLTCS with impulse piping, root valves, fittings, accessories, valve manifolds mounted on gauge racks etc. supplied by bidder accordingly.
- i) The main flanges for Ball separator shall be suitable for the forces and moments as per the specification.
- j) Injection nozzles – 2/4 numbers of stubs of 100 NB or size as informed by bidder shall be provided by BHEL. The injection nozzles, counterflanges for the stubs alongwith nuts, bolts and gaskets shall be supplied by the bidder.
- k) Provision for future installation of Cathodic protection with sacrificial anodes.
- l) Number of balls (Normal as well as abrasive) for COLTCS shall be as specified i.e Number of balls per charge shall be @ 10% of no. of tubes.
- m) The hydrostatic test pressure shall be 1.5 times the design pressure.


	TITLE : COMPLIANCE CERTIFICATE FOR COLTCS		SPEC. NO.	PE-TS-390-165-N001
	PROJECTS: 2x660 MW RAGHUNATHPUR TPP PHASE II-STG		DATE:	17.07.13
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- n) All sub - vendors shall be subject to BHEL/ Customer/Customer's Consultant approval in the event of order.
- o) The Performance guarantees of equipments shall stand valid till the satisfactory completion of performance testing & its acceptance by BHEL/ Customer/Customer's Consultant.
- p) The offered COLTCS have been supplied by bidder in the past meeting the customers qualifying criteria of its operation at two sites for minimum period of two years. Any deviation to this criteria shall be suitably highlighted in the deviation schedule.
- q) The orientation of piping around COLTCS shall be finalised during detailed Engg.
- r) Electrical/ C&I :
- All selected motor ratings have minimum 15 % margin over maximum continuous demand of the driven equipment including voltage and frequency variations, temperature rise and other factors.
 - Supply of electrical viz. LT power cables, instrumentation and control cables, cable glands, lugs, cable trays etc. shall be as per specification. Their erection shall be done by BHEL
 - The junction boxes for termination of DPT/ DPS/ Actuator LS/ solenoid valves/ Ball oversize monitor/ Ball recirculating monitor are included in bidders scope. The instrumentation cable and cabling from instruments/ actuators to junction boxes is also included in bidders scope.
 - Valve actuators and controls shall be provided as specified in Data Sheet-A and Project specific requirements as specified in Section C-2 & Section C-3
 - Alarms/ annunciations/ instruments shall be finalised during detailed engineering in the event of order which shall be subject to BHEL/ Customer/Customer's Consultant approval and shall be without any commercial implications to BHEL.

	TITLE :		SPEC. NO.	PE-TS-390-165-N001
	SCHEDULE OF PERFORMANCE GUARANTEES		VOLUME :	III
	FOR		Sheet	1 of 1
CONDENSER ON LOAD TUBE CLEANING SYSTEM (COLTCS)		Date- 17.07.13		

S.NO.	DESCRIPTION	UNITS	2X660 MW RAGHUNATHPUR TPP PHASE II-STG
1.	Pressure drop across the ball collecting Strainers (i.e. between inlet & outlet nozzle) under clean condition and Normal flow condition	MWC	
2	Percentage of ball recovery	%	
3	Life of sponge rubber balls	Weeks	

PARTICULARS OF BIDDER/ AUTHORISED REPRESENTATIVE			
NAME		DESIGNATION	SIGNATURE
		DATE	COMPANY SEAL

	TITLE * SCHEDULE OF DEVIATIONS () From Conditions of Contract (Volume – I) () From General Technical Conditions (Volume – II A) () From Technical Specifications (Volume –II B)	SPEC. NO. PE-TS-390-165-N001
		VOL III
		SHEET..... OF.....
We the undersigned hereby certify that the above mentioned are the only deviations.		

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL



TITLE :

**PRICE SCHEDULE FOR
COLTCS
2X660 MW RAGHUNATHPUR**

SPEC. NO. PE-TS-390-165-N001

VOLUME III

SECTION

REV. NO. 0

DATE 17.07.13

SHEET 1 OF 1

- 1.0 Total price for design, manufacture, assembly, inspection, testing, packing for transportation and delivery, including final check up of installation, commissioning, trial run and PG testing of Four (4) sets of COLTCS complete in all respect including all accessories & auxiliaries as specified in technical specification and as necessary including mandatory spares (as applicable), commissioning spares of COLTCS including commission balls and special tools & tackles (as required) for erection & maintenance. Rs/USD/Euro (As applicable)
- 2.0 **Recommended spares** : Item-wise break up with item-wise price to be given as per "Schedule of Recommended Spares" enclosed under Vol. III of technical specification. Rs/USD/Euro (As applicable)

Note : Indicate all duties, taxes etc. stating whether included/ excluded in above price.



TITLE :
UNIT PRICE SCHEDULE FOR
COLTCS
2X660 MW RAGHUNATHPUR

SPEC. NO. PE-TS-390-165-N001

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SHEET 1 OF 1

1.0 Unit Prices :

Unit price for design, manufacture, inspection and testing, packing and delivery of COLTCS for one set complete with all accessories except for clause no. 2 & 3 below.

Rs/USD/Euro
(As applicable)

2.0 Lump sum price for 4 sets of COLTCS

Rs/USD/Euro
(As applicable)

- Installation checks, Commissioning
- PG test

3.0 Mandatory Spares

Rs./USD/Euro
(If Applicable)

- Lump sum price

Note :

- Total price based on unit prices as given above shall tally with the total price given in "Schedule of prices" elsewhere. In case of discrepancy the lowest of the two shall be considered for order. Bidder to note that the price mentioned in the "Schedule of prices" and "Schedule of unit prices "shall be binding for evaluation purpose.
- Unit prices quoted by the bidder, as above, shall be binding for any quantity variation which is at discretion of Purchaser.



TITLE :
TECHNICAL SPECIFICATION FOR
COLTCS

SPEC. NO. PE-TS-390-165-N001

VOLUME III

SECTION - B

REV. NO. 0

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SHEET 1 OF 1

SECTION B

SHALL BE FURNISHED ON PLACEMENT OF LOI

- **DATASHEET B**
- **LIST OF SCHEDULES**



TITLE :
TECHNICAL SPECIFICATION FOR
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VOLUME III

SECTION – B

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SHEET 1 OF 1

SECTION B1
DATASHEET B



Title
DATA SHEET - B
CONDENSER ON LOAD TUBE
CLEANING SYSTEM
(SPONGE RUBBER BALL TYPE)

SPECIFICATION NO.
PE-TS-999-165-N001

VOLUME III PART A
SHEET I OF 13

INSTRUCTION TO BIDDER 1. This data sheet shall be read in conjunction with Specification No. PES-179-01
Section - D, Volume - IIB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO. PARTICULARS	ITEM	UNIT
1.0	General :	
1.1	Number of Tube Cleaning System sets being supplied.	Nos.
1.2	Type	
1.3	Liquid handled	
1.4	Manufacturer	
1.5	Country of origin	
2.0	Design :	
2.1	Design Pressure	Bar (g)
	a) Ball Separator	
	b) Ball Recirculating Pump	
	c) Ball Collector	
	d) Piping	
	e) Valves	
	f) Distributors	
	g) Injection Nozzles	
2.2	Design Temperature	°C
2.3	Operating pressure at condenser inlet	Bar (g)
2.4	Design differential pressure	Bar (g)
2.5	Flow rate through ball separator	M ³ /hr
	a) Normal	
	b) Maximum allowable	
2.6	Flow rate through ball collector	M ³ /hr
	a) Normal	
	b) Maximum allowable	

Name of
Bidder/ Vendor

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Signature of Bidder/ Vendor
Authorised Representative

Date



Title
DATA SHEET - B
CONDENSER ON LOAD TUBE
CLEANING SYSTEM
(SPONGE RUBBER BALL TYPE)

SPECIFICATION NO.
PE-TS-999-165-N001

VOLUME	III	PART	A
SHEET	2	OF	13

INSTRUCTION
TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PES-179-01 Section - D, Volume - IIB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	ITEM	UNIT
PARTICULARS		
3.0	Guaranteed Performance	
3.1	Whether condenser back pressure/overall heat transfer coefficient is guaranteed that it will be permanently maintained as long as the tube cleaning system is in operation.	YES/NO
3.2	Pressure drop across the ball separator (i.e., between inlet and outlet connections) : a) Normal flow condition b) Maximum allowable flow condition	
3.3	Power consumption by ball recirculating pump during : a) Normal operation b) Ball collection operation c) Ball sorting operation	KW
3.4	Quantity of cleaning balls required per set for an operating period of one year	Nos.
4.0	Operation : Whether tube cleaning system is designed for the following operation modes :	
4.1	Automatic start-up initiated by push button.	YES/NO
4.2	Automatic shut-down with ball collection effected by : a) Push button b) Adjustable timer Ball monitoring system	YES/NO YES/NO YES/NO

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Title
DATA SHEET - B
CONDENSER ON LOAD TUBE
CLEANING SYSTEM
(SPONGE RUBBER BALL TYPE)

SPECIFICATION NO.
PE-TS-999-165-N001

VOLUME III PART A
SHEET 3 OF 13

INSTRUCTION
TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PES-179-01
Section - D, Volume - IIB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO. PARTICULARS	ITEM	UNIT
4.3	Automatic backwashing of ball separator with ball collection effected by : a) Differential pressure measuring system b) Adjustable timer c) Push button	YES/ NO YES/ NO YES/ NO
4.4	Automatic emergency backwashing of ball separator effected by differential pressure measuring system.	YES/ NO
4.5	Automatic flushing of differential pressure measuring system.	YES/NO
4.6	Automatic ball sorting initiated by push button.	YES/NO
4.7	Whether provision for manual operation of the complete tube cleaning system is made in case of control system failure.	YES/NO
5.0	Ball Separator :	
5.1	Make	
5.2	Nos. provided per set	Nos.
5.3	Code/ Standard	
5.4	Body outer diameter	mm
5.5	Body thickness	mm
5.6	Manhole type & size	mm
5.7	Whether sight glass is provided	
5.8	No. of screens/ strainers provided per each ball separator	Nos.
5.9	Type of arrangement provided to prevent lodging of the debris at the entrance of ball extraction pipes.	

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Bidder/ Vendor

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Authorised Representative

Date



Title

DATA SHEET - B
CONDENSER ON LOAD TUBE
CLEANING SYSTEM
(SPONGE RUBBER BALL TYPE)

SPECIFICATION NO.

PE-TS-999-165-N001

VOLUME

III

PART

A

SHEET

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OF

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INSTRUCTION
TO BIDDER

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This data sheet shall be read in conjunction with Specification No. PES-179-01

Section - D, Volume - IIB.

2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.

ITEM

UNIT

PARTICULARS

5.10 Clearance between screen/ strainer
bars.

mm

5.11 Materials :

- a) Body/ Housing
- b) screen/ Strainer section
- c) Screen/ Strainer shaft
- d) Hardware for fixing the screen/
Strainer
- e) Other internal hardware
- f) External hardware

5.12. Lining material (if applicable)

6.0 **Ball Recirculating Pump :**

6.1 Make

6.2 Nos. provided per set

Nos.

6.2 Design discharge flow

M³/hr

6.4 Design discharge pressure

Bar

6.5 Design pump Speed

RPM

6.6 Design pump efficiency

%

6.7 Seal for the pump

6.8 Materials :

- a) Casing
- b) Impeller
- c) Shaft

7.0 **Ball Collector :**

7.1 Nos. provided per set

Nos.

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Title
DATA SHEET - B
CONDENSER ON LOAD TUBE
CLEANING SYSTEM
(SPONGE RUBBER BALL TYPE)

SPECIFICATION NO.
PE-TS-999-165-N001

VOLUME III PART A
SHEET 5 OF 13

INSTRUCTION
TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PES-179-01
Section - D, Volume - IIB.

2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	PARTICULARS	ITEM	UNIT
7.2	Code/ Standard		
7.3	Whether inspection window/ sight glass is provided.		YES/ NO
7.4	Materials : a) Shell/ Body b) Internals		
7.5	Lining material (if applicable)		
7.6	Whether provision for separating and collecting the undersized balls, is made		YES/ NO.
8.0	Differential Pressure Measuring System:		
8.1	Differential Pressure Switch/ Transmitter a) Type b) Make and Model c) Range d) Accuracy c) Material of sensing element f) No. of contacts g) Contact rating h) Enclosure i) Mounting	Nos.	
8.2	Whether differential Pressure gauge is provided for manual observation.		
8.3	Diffrential Pressure Gauge : a) Type b) Make and Model c) Range		

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Signature of Bidder/ Vendor

Authorised Representative

	Title DATA SHEET - B CONDENSER ON LOAD TUBE CLEANING SYSTEM (SPONGE RUBBER BALL TYPE)		SPECIFICATION NO. PE-TS-999-165-N001	
	VOLUME III PART A		SHEET 6 OF 13	
	INSTRUCTION TO BIDDER			

1. This data sheet shall be read in conjunction with Specification No. PES-179-01
Section - D, Volume - IIB.

2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	PARTICULARS	ITEM	UNIT
1	d) Accuracy e) Material of sensing element f) No. of contacts g) Dial size h) Enclosure i) Mounting	Nos. mm	
8.4	Whether the contacts for differential pressure gauge and switch/ transmitter are independent.		YES/ NO
9.0	Timer for Backwashing		
9.1	Timer make		
9.2	Range of duration setting		
9.3	Range of frequency		
10.0	Ball Monitoring System :		
10.1	Type		
10.2	Make & Model		
10.3	Whether ball monitoring system is designed to perform the following functions :		
	a) Continuously counting the balls in circulation and giving an alarm calling for investigation of ball losses, when the number of circulating balls falls below a set value		YES/ NO
	b) Continuously measuring the size of the balls in circulation and initiating the shut-down of the tube cleaning system with alarm calling for replacement of balls, when the number of oversized balls falls below a set value.		

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Title
DATA SHEET - B
CONDENSER ON LOAD TUBE
CLEANING SYSTEM
(SPONGE RUBBER BALL TYPE)

SPECIFICATION NO.
PE-TS-999-165-N001

VOLUME III PART A
SHEET 7 OF 13

INSTRUCTION TO BIDDER
1. This data sheet shall be read in conjunction with Specification No. PES-179-01
Section - D, Volume - IIB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO. PARTICULARS	ITEM	UNIT
10.4	Whether electronic processor of the ball monitoring system is provided with the following a) Indicators for <ul style="list-style-type: none">Required basic ball chargeRecirculating Ball quantityOversized ball quantity b) Time counters for <ul style="list-style-type: none">Total cleaning system operating hoursCleaning system operating hours with sufficient number of oversized balls c) Recorder for ball consumption	YES/ NO YES/ NO YES/ NO YES/ NO YES/ NO YES/ NO
10.5	Whether provision for Self-testing and Self Calibration are made	YES/ NO
11.0	Cleaning Balls :	
11.1	Type	
11.2	Size	mm
11.3	Specific gravity	
11.4	Material	
11.5	Hardness	
11.6	Total Ball recirculation quantity per set	Nos.
11.7	abrasive coated ball recirculation quantity per set - (if any)	No.s
12.0	Piping :	
12.1	Ball Extraction Piping	

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Signature of Bidder/ Vendor
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Title **DATA SHEET - B**
CONDENSER ON LOAD TUBE
CLEANING SYSTEM
(SPONGE RUBBER BALL TYPE)

SPECIFICATION NO.
PE-TS-993-165-N001

VOLUME III PART A
SHEET 8 OF 13

INSTRUCTION TO BIDDER 1. This data sheet shall be read in conjunction with Specification No. PES-179-01
Section - D, Volume - IIB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	PARTICULARS	ITEM	UNIT
	a) OD x thicknes	mm x mm	
	b) Material		
	c) Length of piping being supplied	M	
12.2	Ball Transport Piping		
	a) OD x thicknes	mm x mm	
	b) Material		
	c) Length of piping being supplied	M	
12.3	Differential pressure measuring system flushing piping.		
	a) OD x thicknes	mm x mm	
	b) Material		
	c) Length of piping being supplied	M	
12.4	Any other		
13.0	Valves (Indicate Type of Valves)		
13.1	Sizes	: mm	
13.2	Nos. provided per set	Nos.	
13.3	Materials		
	a) Body		
	b) Disc/ Trim		
	c) Shaft		
14.0	Distributors		
14.1	Nos. provided per set	Nos.	
14.2	Materials :		
	a) Body		
	b) Sight glass		
	c) Sight glass flanges		
	d) Internal parts		

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Signature of Bidder/ Vendor

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Title
DATA SHEET - B
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CLEANING SYSTEM
(SPONGE RUBBER BALL TYPE)

SPECIFICATION NO.
PE-TS-999-165-N001

VOLUME III PART A
SHEET 9 OF 13

INSTRUCTION
TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PES-179-01
Section - D¹ Volume - IIB.

2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO. PARTICULARS	ITEM	UNIT
14.3	Lining material (if applicable)	
15.0	Injection Nozzles :	
15.1	Nos. provided per each CW inlet pipe	Nos.
15.2	Size of the stubs to be provided in CW inlet pipe for installing the injection nozzles.	mm
15.3	Material	
15.4	Lining material (if applicable)	
16.0	Actuators :	
16.1	Actuators for ball separator :	
	a) Nos. provided per ball separator	No.s
	b) Type & make	
	c) Motor rating	KW
16.2	Actuators for ball collector	
	a) Nos. provided per ball collector.	No.s
	b) Type & make	
	c) Motor rating	KW
16.3	Actuators for Valves:	
	a) Nos. provided per set	No.s
	b) Type & motor	
	c) Motor rating	KW
16.4	Any other	

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CLEANING SYSTEM
(SPONGE RUBBER BALL TYPE)

SPECIFICATION NO.
PE-TS-999-165-N001

VOLUME III PART A
SHEET 10 OF 13

INSTRUCTION TO BIDDER 1. This data sheet shall be read in conjunction with Specification No. PES-179-0:
Section - D, Volume - IIB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	PARTICULARS	ITEM	UNIT
17.0	Electric Drive Motors		
17.1	Drive motor for recirculating pump :		
	a) Type and make		
	b) Rating	KW	
17.2	Drive motor for differential pressure measuring system flushing pump (if applicable)		
	a) Type and make		
	b) Rating	KW	
17.3	Any other.		
18.0	Control Panel		
18.1	Type		
18.2	Model & Manufacturer		
18.3	Operating Voltage/ frequency	V/ Hz	
18.4	Control Voltage/ frequency	V/ Hz	
18.5	Materials of housing and door		
18.6	Protections/ interlocks provided for :		
18.7	Class of Protection		
18.8	Control Hardware		
18.8	Alarms/ Annunciations provided for :		
18.9	Indicators provided for :		
18.10	Whether interconnecting control and power cabling between the control panel and various drive is included in the offer.		
19.0	Pressure gauges :		
19.1	Manufacturer & Type, Model		

Name of Bidder/ Vendor

Revision Number

0

1

2

3

4

Signature of Bidder/ Vendor
Authorised Representative

Date



Title
DATA SHEET - B
CONDENSER ON LOAD TUBE
CLEANING SYSTEM
(SPONGE RUBBER BALL TYPE)

SPECIFICATION NO.
PE-TS-999-165-N001

VOLUME III PART A

SHEET 11 OF 13

INSTRUCTION
TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PES-179-01 Section - D, Volume - IIB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	PARTICULARS	ITEM	UNIT
19.2	Nos. provided per set	Nos.	
19.3	Location		
19.4	Dial size	mm	
19.5	Range & Accuracy		
19.6	Materials of construction :		
	a) Sensing element		
	b) Movement		
	c) Casing		
19.7	Enclosure		
19.8	Mounting		
20.0	Counter Flanges :		
20.1	Whether counter flanges complete with gaskets, bolts and nuts etc. for all terminal points are included in the offer.		YES/ NO
20.2	Type		
20.3	Rating		
20.4	Materials		
	a) Flanges		
	b) Bolts and Nuts		
	c) Gaskets		
20.5	Code/ Standard		
21.0	Whether lifting arrangement is provided for various equipments.		YES/ NO.
22.0	Whether ball recirculating pump, ball collector with interconnecting piping and valves are mounted on a single frame.		YES/ NO
23.0	Whether supports (wherever necessary) complete with foundation plates, bolts, nuts, inserts etc. are included in the offer.		YES/ NO

Name of
Bidder/ Vendor

Revision Number

0

1

2

3

Signature of Bidder/ Vendor
Authorised Representative

Date :



Title
DATA SHEET - B
CONDENSER ON LOAD TUBE
CLEANING SYSTEM
(SPONGE RUBBER BALL TYPE)

SPECIFICATION NO.
PE-TS-999-165-N001

VOLUME III PART A
SHEET 12 OF 13

INSTRUCTION
TO BIDDER

1. This data sheet shall be read in conjunction with Specification No. PES-179-01
Section - D, Volume - IIB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO. PARTICULARS	ITEM	UNIT
24.0	Shop Inspection and Tests	
24.1	Whether all the tests and inspections as detailed in the specification/ quality plan are carried out.	YES/NO
24.2	Hydrostatic Test :	
	a) Test Pressure	Bar (g)
	<ul style="list-style-type: none">• Ball Separator• Recirculating Pump• Ball Collector• Distributors• Injection nozzles• Piping & Valves	
	a) Test duration	Minutes
24.3	Lekage Test :	
	a) Test Pressure	Bar (g)
	b) Test duration	Minutes
25.0	Painting :	
25.1	External Surfaces :	
	a) Surface Preparation	
	b) Primer	
	a) Finish	
25.2	Internal Surfaces :	
	a) Surface Preparation	
	b) Primer	
	a) Finish	
26.0	Weights :	
26.1	Empty Weight	Kg.
	a) Ball Separator	

Name of
Bidder/ Vendor

Revision Number

0

1

2

3

4

Signature of Bidder/ Vendor

Authorised Representative

Date



Title
DATA SHEET - B
CONDENSER ON LOAD TUBE
CLEANING SYSTEM
(SPONGE RUBBER BALL TYPE)

SPECIFICATION NO. .
PE-TS-999-165-N001

VOLUME III PART A
SHEET 13 OF 13

INSTRUCTION TO BIDDER 1. This data sheet shall be read in conjunction with Specification No. PES-179-01
Section - D, Volume - IIB.
2. Items which deviate from Specification shall be marked with an asterisk (*)

SL.NO.	ITEM	UNIT
PARTICULARS		
b) Recirculating pump c) Ball collector d) recirculating unit		
26.2 Operating weight	kg	
a) Ball Separator b) Recirculating pump c) Ball collector d) recirculating unit		
26.3 Weight of the heaviest equipment/ assembly to be handled.	kg.	
27.0 Overall Dimensions		
27.1 Ball Separator		
27.2 Recirculating Unit		
28.0 Other information (if any)		

Name of
Bidder/ Vendor

Revision Number

0

1

2

3

4

Signature of Bidder/ Vendor

Authorised Representative

Clause No.	MOTORS				
	<p style="text-align: right;">..... (Bidder's Name)</p> <p>11. Maximum continuous load demand of driven equipment in KW</p> <p>12. Rated Voltage (volts)</p> <p>13. Permissible variation of :</p> <p style="margin-left: 40px;">a. Voltage (Volts)</p> <p style="margin-left: 40px;">b. Frequency (Hz)</p> <p style="margin-left: 40px;">c. Combined voltage and frequency</p> <p>14. Rated speed at rated voltage and frequency(RPM)</p> <p>15. At rated Voltage and frequency:</p> <p style="margin-left: 40px;">a. Full load current</p> <p style="margin-left: 40px;">b. No load current</p> <p>16. Power Factor at</p> <p style="margin-left: 40px;">a. 100% load</p> <p style="margin-left: 40px;">b. NO load</p> <p style="margin-left: 40px;">c. Starting.</p> <p>17. Efficiency at rated voltage and frequency,</p> <p style="margin-left: 40px;">a. 100% load</p> <p style="margin-left: 40px;">b. 75% load</p> <p style="margin-left: 40px;">c. 50% load</p> <p>18. Starting current (amps) at</p> <p style="margin-left: 40px;">a. 100 % voltage</p> <p style="margin-left: 40px;">b. 85% voltage</p>				
NAME OF THE PROJECT..... STEAMGENERATOR PACKAGE	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;"> TECHNICAL DATA SHEET SECTION-VI BID DOC NO.: CS-9575/ 9571/ 0370/ 0360/ 9586-102-2 </td> <td style="width: 50%; text-align: center;"> PART-F CHAPTER-I SUB-SECTION:DE1 (ELECTRICAL) </td> </tr> <tr> <td colspan="2" style="text-align: right;">PAGE 11 OF 16</td> </tr> </table>	TECHNICAL DATA SHEET SECTION-VI BID DOC NO.: CS-9575/ 9571/ 0370/ 0360/ 9586-102-2	PART-F CHAPTER-I SUB-SECTION:DE1 (ELECTRICAL)	PAGE 11 OF 16	
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PAGE 11 OF 16					

Clause No.	MOTORS				
	<p style="text-align: right;">..... (Bidder's Name)</p> <p>c. 80% voltage</p> <p>19. Minimum permissible starting Voltage (Volts)</p> <p>20. Starting time with minimum permissible voltage</p> <p>a. Without driven equipment coupled</p> <p>b. With driven equipment coupled</p> <p>21. Safe stall time with 100% and 110% of rated voltage</p> <p>a. From hot condition</p> <p>b. From cold condition</p> <p>22. Torques :</p> <p>a. Starting torque at min. permissible voltage(kg-mtr.)</p> <p>b. Pull up torque at rated voltage.</p> <p>c. Pull out torque</p> <p>d. Min accelerating torque (kg.m) available</p> <p>e. Rated torque (kg.m)</p> <p>23. Stator winding resistance per phase (ohms at 20 Deg.C.)</p> <p>24. GD² value of motors</p> <p>25. No of permissible successive starts when motor is in hot condition</p>				
NAME OF THE PROJECT..... STEAM GENERATOR PACKAGE	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;"> TECHNICAL DATA SHEET SECTION-VI BID DOC NO.: CS-9575/ 9571/ 0370/ 0360/ 9586-102-2 </td> <td style="width: 50%; text-align: center;"> PART-F CHAPTER-I SUB-SECTION:DE1 (ELECTRICAL) </td> </tr> <tr> <td colspan="2" style="text-align: right;">PAGE 12 OF 16</td> </tr> </table>	TECHNICAL DATA SHEET SECTION-VI BID DOC NO.: CS-9575/ 9571/ 0370/ 0360/ 9586-102-2	PART-F CHAPTER-I SUB-SECTION:DE1 (ELECTRICAL)	PAGE 12 OF 16	
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PAGE 12 OF 16					

Clause No.	MOTORS
	<p style="text-align: right;">..... (Bidder's Name)</p> <p>26. Locked Rotor KVA Input</p> <p>27. Locked Rotor KVA/KW</p> <p>28. Vibration limit :Velocity (mm/s)</p> <p>29. Noise level limit (dBA)</p> <p>C. CONSTRUCTIONAL FEATURES</p> <p>1. Stator winding insulation</p> <p style="padding-left: 20px;">a. Class & Type</p> <p style="padding-left: 20px;">b. Winding Insulation Process</p> <p style="padding-left: 20px;">c. Tropicalised (Yes/No)</p> <p style="padding-left: 20px;">d. Temperature rise over specified maximum ambient temperature of 50 deg C</p> <p style="padding-left: 20px;">e. Method of temperature measurement</p> <p style="padding-left: 20px;">f. Stator winding connection</p> <p>2. Main Terminal Box</p> <p style="padding-left: 20px;">a. Type</p> <p style="padding-left: 20px;">b. Location (viewed from NDE side)</p> <p style="padding-left: 20px;">c. Entry of cables(bottom/side)</p> <p style="padding-left: 20px;">d. Recommended cable size (To be matched with cable size envisaged by owner)</p> <p style="padding-left: 20px;">e. Fault level (MVA), Fault level duration (sec)</p> <p style="padding-left: 20px;">f. Cable glands & lugs details (shall be suitable for power cable)</p>
NAME OF THE PROJECT..... STEAM GENERATOR PACKAGE	TECHNICAL DATA SHEET SECTION-VI BID DOC NO.: CS-9575/ 9571/ 0370/ 0360/ 9586-102-2
PART-F CHAPTER-I SUB-SECTION:DE1 (ELECTRICAL)	PAGE 13 OF 16

Clause No.	MOTORS										
	<div>(Bidder's Name)</div> <div>3. Type of DE/NDE Bearing</div> <div>4. Motor Paint shade</div> <div>5. Weight of<div>a. Motor stator (KG)</div><div>b. Motor Rotor (KG)</div><div>c. Total weight (KG)</div></div> <div>D. List of accessories.<div>1. Space Heaters (Applicable for 30 KW & above motor) (Nos./Power in watts/supply voltage)</div><div>2. Terminal Box for Space Heater (Yes/No)</div><div>3. Speed switch (Yes/No) No of contacts and contact ratings of speed switch</div><div>4. Insulation of bearing (Yes/No)</div><div>5. Noise reducer (Yes/No)</div><div>6. Grounding pads<div>i) No and size on motor body</div><div>ii) Nos on terminal Box</div></div><div>7. Vibration pads<div>i) Nos and size</div><div>ii) Location</div></div><div>8. Any other fitments</div></div> <tr><td colspan="2">NAME OF THE PROJECT.....</td><td>TECHNICAL DATA SHEET SECTION-VI BID DOC NO.: CS-9575/ 9571/ 0370/ 0360/ 9586-102-2</td><td>PART-F CHAPTER-I SUB-SECTION:DE1 (ELECTRICAL)</td><td>PAGE 14 OF 16</td></tr> <tr><td colspan="2">STEAM GENERATOR PACKAGE</td><td></td><td></td><td></td></tr>	NAME OF THE PROJECT.....		TECHNICAL DATA SHEET SECTION-VI BID DOC NO.: CS-9575/ 9571/ 0370/ 0360/ 9586-102-2	PART-F CHAPTER-I SUB-SECTION:DE1 (ELECTRICAL)	PAGE 14 OF 16	STEAM GENERATOR PACKAGE				
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STEAM GENERATOR PACKAGE											

Clause No.	MOTORS
	<div style="text-align: right; margin-bottom: 20px;"> (Bidder's Name) </div> <p>E. List of curves.</p> <ol style="list-style-type: none"> 1. Torque speed characteristic of the motor 2. Thermal withstand characteristic 3. Starting, current Vs. Time 4. Starting, current Vs speed 5. P.F. and Effi. Vs Load <p>F. Additional Data to be filled for each rating of DC Motor</p> <ol style="list-style-type: none"> 1. Rated armature voltage (Volt) 2. Rated field excitation (Amp) 3. Permissible % variation in voltage 4. Minimum Permissible Starting voltage (volt) 5. At rated voltage <ol style="list-style-type: none"> i) Full load Armature current (Amp) ii) Full load Field current (Amp) iii) No load Armature current (Amp) 6. Full load Field current (Amp) 7. No load Armature current (Amp) 8. Minimum permissible field current (Amp) to avoid overspeeding at <ol style="list-style-type: none"> i) Maximum permissible voltage
NAME OF THE PROJECT..... STEAM GENERATOR PACKAGE	TECHNICAL DATA SHEET SECTION-VI BID DOC NO.: CS-9575/ 9571/ 0370/ 0360/ 9586-102-2
PART-F CHAPTER-I SUB-SECTION:DE1 (ELECTRICAL)	PAGE 15 OF 16

Clause No.	MOTORS
	<p style="text-align: right;">..... (Bidder's Name)</p> <p>ii) Rated voltage</p> <p>iii) Minimum Permissible Voltage</p> <p>9. Resistance (indicative Values) in ohm</p> <p>i) Armature winding (Arm + IP + Series) at 25 deg.C</p> <p>ii) Field Winding at 25 deg. C</p> <p>10. Inductance (indicative values)</p> <p>i) Armature winding</p> <p>ii) Field winding</p> <p>11. Value of trimmer resistance (ohm) to be connected in series with the shunt field to obtain rated speed at</p> <p>i) 220 V DC</p> <p>ii) 250 V DC</p> <p>iii) 187 V DC</p> <p>12. Value of the external resistance (ohm) required to be connected in series with armature during starting only</p> <p>13. Technical data sheet for external resistance box</p> <p>14. GA drawing of motor</p> <p>15. Starting time calculation</p> <p>16. Starter resistance design calculation</p> <p>17. Electrical connection diagram of motor</p>
NAME OF THE PROJECT..... STEAM GENERATOR PACKAGE	TECHNICAL DATA SHEET SECTION-VI BID DOC NO.: CS-9575/ 9571/ 0370/ 0360/ 9586-102-2
PART-F CHAPTER-I SUB-SECTION:DE1 (ELECTRICAL)	PAGE 16 OF 16



TITLE :
TECHNICAL SPECIFICATION FOR
COLTCS

SPEC. NO. PE-TS-390-165-N001

VOLUME III

SECTION — B

REV. NO. 0

DATE 17.07.13

SHEET 1 OF 1


SECTION B2
LIST OF SCHEDULES

CHECKLIST - LIST OF SCHEDULES

Sl. No.	Form No.	Description	Tick Applicable Forms
1.	PEM-6024	Schedule of Drawings/Catalogues submitted with Bid.	✓
2.	PEM-6025@	Schedule of Occurrence of Key Events of Delivery, Erection & Commissioning	
3.	PEM-6026	Schedule of Equipment Manufacture. Despatch and Shipment to Site.	✓
4.	PEM-6027	Schedule of Weights & Dimensions.	
5.	PEM-6028@	Schedule of Performance Guarantee	
6.	PEM-6030	Inspection Schedule	✓
7.	PEM-6031	Schedule of Cement and Steel and Quarterly Cement Requirement.	
8.	PEM-6032	Schedule of Quarterly Requirement of Reinforcing Bars and Structural Steel.	
9.	PEM-6033@	Bill of Quantities (Civil Works)	
10.	PEM-6035	Schedule of Bidder's Proposed Construction/ Site Fabrication Facilities.	
11.	PEM-6036	Schedule of Deviations.	✓
12.	PEM-6040	Schedule of Declaration	✓
13.	PEM-6041	Quality Plan	✓
14.	PEM-6042	Vendor's Drawings/ Documents Schedule	✓
15.	PEM-6043@	Schedule of Occurrence of Key Events for Civil/Structural Works	
16.	PEM-6046	Inspection Request.	✓
17.	PEM-6051@	Schedule of Prices.	✓
18.	PEM-6052@	Schedule of Unit prices	✓
19.	PEM-6053	Schedule of Prices for Commissioning & Mandatory Spares.	✓
20.	PEM-6054	Schedule of Prices for Recommended Spares.	✓
21.	PEM-6055	Schedule Prices for Erection and Maintenance Tools & Tackles.	✓
22.	PEM-6057	Schedule of Daily & Overtime Rates.	
23.	PEM-6058	Schedule of Hire charges for Construction/ Site Fabrication Facilities.	


For Forms marked with @ certain information to be filled by DEs before issuing to bidder.

FORM NO PEM 6024-1

	SCHEDULE OF DRAWINGS/CATALOGUES SUBMITTED WITH BID		SPECIFICATION NO:	
			VOL III	
			SHEET OF.....	
Section C/D enclosed with the specification indicate the drawings / catalogues to be furnished with the bid. The bidder in addition to furnishing the same, can also include any other drawings / catalogues which he may desire to submit with the bid. This schedule duly lists out such drawings as enclosed by the bidder with the bid.				
DRAWING/ CATALOGUE NUMBER	DESCRIPTION			NUMBER OF SHEETS

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

FORM NO PEM 6026-1

	SCHEDULE OF EQUIPMENT, MANUFACTURE, DESPATCH AND SHIPMENT TO SITE			SPECIFICATION NO:	
				VOL III	
				SHEET OF	
Equipment/Major Bought-out items	Time for Manufacture/ Procurement from Date of issues of Letter of intent (Weeks)	Time for Test Dismantling Packing & Ready for Despatch (Weeks)	Time required fro Shipment to Site (Weeks)	Total Time from Date of Issue of Letter of intent to Shipment to Site (Weeks)	
We, the undersigned hereby undertake to meet the schedule in weeks fro manufacture, dispatch and shipment of each equipment and procurement of major boughtout items as listed above.					

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

FORM NO PEM 6027-1



SCHEDULE OF WEIGHTS & DIMENSIONS

SPECIFICATION NO.

VOL III


SHEET OF

The bidder shall state below the weights and dimensions of various packages for shipment covering the complete scope.


Description of Package(S)	Dimension (in meters)	Weight (in tones)

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

FORM NO PEM 6030-1

		INSPECTION SCHEDULE		SPECIFICATION NO	
				VOL III	
				SHEET <small>OF 10</small> OF <small>10</small>	
S No.	ITEM/COMPONENT	PLACE & ADDRESS OF TEST / INSPECTION	SCHEDULE D DATE OF INSPECTION	DURATION OF TEST / INSPECTION (IN DAYS)	
This schedule shall be in the line with specification and quality plan requirements. The information in this form shall be furnished after receipt of LOI/PO.					

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

	TITLE	SPECIFICATION NO
		VOL III
		SHEET OF

* SCHEDULE OF DECLARATIONS

* Bidder shall include this schedule both in technical and Price offers

DECLARATION

Icertify that all the technical data and information pertaining to this specification are correct and are true representation of the equipment/system covered by our format proposal number Dated and there is no deviation to the specification.

I hereby certify that I am duly authorized representative of the Bidder's company whose name appears above my signature.

Bidders Company Name

Authorised representative's
Signature

Name

Bider's Name

The bidder hereby agrees to fully comply with the requirements and intent of this specification for the price indicated

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

	*SCHEDULE OF PRICES FOR COMMISSIONING AND MANDATORY SPARES	SPECIFICATION NO
		VOL III
		SHEET..... OF

***Unpriced schedule shall also be furnished along with Part A- Schedule in technical bid**

The bidder shall indicate here the quantity required for erection / commissioning and mandatory spares for equipment as listed in Section C / Section – D. If the listed spares are not adequate then the bidder shall indicate those and additional spares considered necessary by him.

Type	Manufacturer's Drawing No / Part of spare	Description	Material	Quantity per Unit / Equipment	Quantity Recommended	If Set, Nos. Per Set	Delivery Period (Weeks)	Unit Price (Rs.)	Total Price (Rs.)
Erection & Commissioning									
Mandatory Spares									
Additional Spares Mandatory Erection / Commissioning									

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE					
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL	

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	

FORM NO PEM 6055-1

	TITLE	SPECIFICATION NO
	* SCHEDULE OF PRICE FOR ERECTION AND MAINTENANCE TOOLS & TACKLES	VOL III
		SHEET..... OF.....

*Unpriced schedule shall also be furnished along with Part A- Schedule in technical bid

The bidder shall be given below the list of erection and maintenance tools and tackles as offered by him. This shall also include the customer's list of maintenance tools. If specified in Section - C / Section - D

S. No	DESCRIPTION OF TOOLS & TACKLES	QUANTITY OFFERED	UNIT PRICE (Rs.)	TOTAL PRICE (Rs.)

NOTE : The hire charges for vendors equipment called for in this schedule shall include the cost of consumables, operation services, descriptions, wear and tear as well as vendor's over head and profit (These rates will be payable by customer to the vendor, only if the customer's requires the use of this equipment for carrying out his own work out side the scope of this contract).

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL