

# 1X800MW WANAKBORI, TPS, UNIT#8


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

Specification No. : PE-TS- 408-165-N002 (REV. 0).

VOLUME -III



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

	<b>TITLE : TECHNICAL SPECIFICATION FOR CONDENSER ON LOAD TUBE CLEANING SYSTEMS (COLTCS) PREAMBLE</b>	<b>SPEC. NO. PE-TS- 408-165-N002</b>	
		<b>VOLUME : III</b>	
		<b>REV. NO. 0</b>	<b>DATE :27.11.2015</b>
		<b>SHEET 1 OF 1</b>	

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).

	<b>TITLE : TECHNICAL SPECIFICATION FOR CONDENSER ON LOAD TUBE CLEANING SYSTEMS (COLTCS) PREAMBLE</b>	<b>SPEC. NO. PE-TS- 408-165-N002</b>	
		<b>VOLUME : III</b>	
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		<b>SHEET 1 OF 1</b>	

**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.

	<b>TITLE : TECHNICAL SPECIFICATION FOR CONDENSER ON LOAD TUBE CLEANING SYSTEMS (COLTCS) PREAMBLE</b>	<b>SPEC. NO. PE-TS- 408-165-N002</b>	
		<b>VOLUME : III</b>	
		<b>REV. NO. 0</b>	<b>DATE :27.11.2015</b>
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TITLE :  
TECHNICAL SPECIFICATION FOR  
COLTCS

SPEC. NO. PE-TS- 408-165-N002

VOLUME III

SECTION

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## SECTION A

**SHALL BE FURNISHED ALONGWITH BID**


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

	<b>TITLE : COMPLIANCE CERTIFICATE FOR COLTCS</b>	<b>SPEC. NO.</b>	<b>PE-TS- 408-165-N002</b>
	<b>PROJECTS:</b> <b>GSECL- 1X800 MW WANAKBORI TPS UNIT-8</b>	<b>DATE:</b>	27.11.2015
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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 3<sup>rd</sup> 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 as per the price format.
- h) All Instruments shall be located in the Instrument Rack (as applicable) 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, counter flanges for the stubs along with 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.

	<b>TITLE : COMPLIANCE CERTIFICATE FOR COLTCS</b>	<b>SPEC. NO.</b>	<b>PE-TS- 408-165-N002</b>
	<b>PROJECTS:</b> <b>GSECL- 1X800 MW WANAKBORI TPS UNIT-8</b>	<b>DATE:</b>	27.11.2015
		<b>SHEET</b>	2 OF 2

- 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 : **SCHEDULE OF PERFORMANCE GUARANTEES  
FOR  
CONDENSER ON LOAD TUBE CLEANING SYSTEM (COLTCS)**

SPEC. NO. PE-TS- 408-165-N002


VOLUME : III

Sheet 1 of 1 Date- 27.11.2015

S.NO.	DESCRIPTION	UNITS	GSECL – 1X800MW WANAKBORI TPS UNIT-8
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
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	<p><b>TITLE</b></p> <p style="text-align: center;"><b>* SCHEDULE OF DEVIATIONS</b></p> <p>( ) From Conditions of Contract (Volume – 1)</p> <p>( ) From General Technical Conditions (Volume – II A )</p> <p>( ) From Technical Specifications (Volume –II B)</p>	<p>SPECIFICATION NO</p> <hr/> <p>VOL III</p> <hr/> <p>SHEET..... OF.....</p>
<p>We the undersigned hereby certify that the above mentioned are the only deviations.</p>		

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





TITLE :  
**UNIT PRICE SCHEDULE FOR  
COLTCS  
1X800MW WANAKBORI TPS UNIT-8**

SPEC. NO. PE-TS- 408-165-N002	
VOLUME III	SECTION
REV. NO. 0	DATE 27.11.2015

1.0 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 2 sets of COLTCS** Rs/USD/Euro (As applicable)

- Installation checks, Commissioning
- PG test

3.0 **Mandatory spares(as per Annexure)** Rs/USD/Euro (As applicable)

- Lump sump price

**Notes:-**

- a) Total price of Unit prices given above at sl. No. 1 plus sl. No. 2 plus sl. No. 3 should tally with total price given in Sl. No. (1) of "Schedule of Prices"
- b) Unit price quoted by bidder, as above, shall be binding for any quantity variation, which is at discretion of purchaser.
- c) Price of commissioning & erection spares and other accessories not listed above shall be included in price of equipment & shall be supplied with the equipment.
- d) Indicate all taxes, duties etc. stating whether included/ excluded in above prices.
- e) Recommended spares item wise breakup with item wise price to be given as per "Schedule of Recommended spares" enclosed under vol-III of technical specification.  
Recommended spares are only for reference purpose and not to be considered for evaluation and ordering purpose.



TITLE :  
PRICE SCHEDULE FOR  
COLTCS  
1X800MW WANAKBORI TPS UNIT-8

SPEC. NO. PE-TS- 408-165-N002

VOLUME III

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- 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 TWO (2) sets of COLTCS complete in all respect including all accessories & auxiliaries as specified in technical specification and as necessary including mandatory spares, 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 :  
TECHNICAL SPECIFICATION FOR  
COLTCS

SPEC. NO. PE-TS- 408-165-N002

VOLUME III

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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  
COLTCS

SPEC. NO. PE-TS- 408-165-N002

VOLUME III

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REV. NO. 0

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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.	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 <sup>3</sup> /hr.
	a) Normal	
	b) Maximum allowable	
2.6	Flow rate through ball collector	M <sup>3</sup> /hr
	a) Normal	
	b) Maximum allowable	

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	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
3.0	<b>Guaranteed Performance</b>	
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 :	KW
	a) Normal operation	
	b) Ball collection operation	
	c) Ball sorting operation	
3.4	Quantity of cleaning balls required per set for an operating period of one year	Nos.
4.0	<b>Operation :</b>	
	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	YES/NO
	b) Adjustable timer	YES/NO
	Ball monitoring system	YES/NO

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 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.	ITEM	UNIT
PARTICULARS		
4.3	Automatic backwashing of ball separator with ball collection effected by :	
	a) Differential pressure measuring system	YES/ NO
	b) Adjustable timer	YES/ NO
	c) Push button	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	<b>Ball Separator :</b>	
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.	

Name of Bidder/ Vendor

Revision Number

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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	4	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
5.10	Clearance between screen/ bars.	strainer	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	<b>Ball Recirculating Pump :</b>		
6.1	Make		
6.2	Nos. provided per set		Mos.
6.2	Design discharge flow		M <sup>3</sup> /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	<b>Ball Collector :</b>		
7.1	Nos. provided per set		Nos.

Name of Bidder/ Vendor

Revision Number

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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
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**INSTRUCTION TO BIDDER**

- This data sheet shall be read in conjunction with Specification No. PES-179-01 Section - D, Volume - IIB.
- 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	<b>Differential Pressure Measuring System:</b>		
8.1	Differential Pressure Switch/ Transmitter		
	a) Type		
	b) Make and Model		
	c) Range		
	d) Accuracy		
	e) Material of sensing element		
	f) No. of contacts	Nos.	
	g) Contact rating		
	h) Enclosure		
	i) Mounting		
8.2	Whether differential Pressure gauge is provided for manual observation.		
8.3	Differential Pressure Gauge :		
	a) Type		
	b) Make and Model		
	c) Range		

Name of Bidder/ Vendor					
Revision Number	0	1	2	3	4
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.	ITEM	UNIT
	<b>PARTICULARS</b>	
	d) Accuracy	
	e) Material of sensing element	
	f) No. of contacts	Nos.
	g) Dial size	mm
	h) Enclosure	
	i) Mounting	
8.4	Whether the contacts for differential pressure gauge and switch/ transmitter are independent.	YES/ NO
9.0	<b>Timer for Backwashing</b>	
9.1	Timer make	
9.2	Range of duration setting	
9.3	Range of frequency	
10.0	<b>Ball Monitoring System :</b>	
10.1	Type	
10.2	Maake & 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.	

**Name of Bidder/ Vendor**

Revision Number

0

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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 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.	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"> <li>◆ Required basic ball charge</li> <li>◆ Recirculating Ball quantity</li> <li>◆ Oversized ball quantity</li> </ul> b) Time counters for <ul style="list-style-type: none"> <li>◆ Total cleaning system operating hours</li> <li>◆ Cleaning system operating hours with sufficient number of oversized balls</li> </ul> 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	

Name of Bidder/ Vendor

Revision Number

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1

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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-990-165-N001**

<b>VOLUME</b>	<b>III</b>	<b>PART</b>	<b>A</b>
<b>SHEET</b>	<b>8</b>	<b>OF</b>	<b>13</b>

**INSTRUCTION TO BIDDER**

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

SL.NO.	ITEM	UNIT
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
2.4	Any other	
3.0	<b>Valves (Indicate Type of Valves)</b>	
3.1	Sizes	: mm
3.2	Nos. provided per set	Nos.
3.3	<b>Materials</b>	
	a) Body	
	b) Disc/ Trim	
	c) Shaft	
3.0	<b>Distributors</b>	
3.1	Nos. provided per set	Nos.
3.2	<b>Materials :</b>	
	a) Body	
	b) Sight glass	
	c) Sight glass flanges	
	d) Internal parts	

Name of Bidder/ Vendor					
Division 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** 9 **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
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	

Name of Bidder/ Vendor

Revision Number

0	1	2	3	4
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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 10 OF 13**

**INSTRUCTION TO BIDDER**

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

SL.NO.	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	

<b>Name of Bidder/ Vendor</b>					
<b>Revision Number</b>	0	1	2	3	4
<b>Signature of Bidder/ Vendor Authorised Representative</b>					
<b>Date</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 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.	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**

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

SL.NO.	PARTICULARS	ITEM	UNIT
24.0	<b>Shop Inspection and Tests</b>		
24.1	Whether all the tests and inspections as detailed in the specification/ quality plan are carried out.		YES/NO
24.2	<b>Hydrostatic Test :</b>		
	a) Test Pressure	Bar (g)	
	<ul style="list-style-type: none"> <li>◆ Ball Separator</li> <li>◆ Recirculating Pump</li> <li>◆ Ball Collector</li> <li>◆ Distributors</li> <li>◆ Injection nozzles</li> <li>◆ Piping &amp; Valves</li> </ul>		
	a) Test duration	Minutes	
24.3	<b>Lekage Test :</b>		
	a) Test Pressure	Bar (g)	
	b) Test duration	Minutes	
25.0	<b>Painting :</b>		
25.1	<b>External Surfaces :</b>		
	a) Surface Preparation		
	b) Primer		
	a) Finish		
25.2	<b>Internal Surfaces :</b>		
	a) Surface Preparation		
	b) Primer		
	a) Finish		
26.0	<b>Weights :</b>		
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
	<b>PARTICULARS</b>	
	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	<b>Overall Dimensions</b>	
27.1	Ball Separator	
27.2	Recirculating Unit	
28.0	Other information (if any )	
G:\MSEVASH\DS-COTCS.RTF		

Name of Bidder/ Vendor				
Revision Number	0	1	2	3
Signature of Bidder/ Vendor				
Authorised Representative				

	TITLE	SPECIFICATION NO.
	<b>MOTOR</b>  <b>DATA SHEET - C</b>	VOLUME II B
		SECTION D
		REV NO. 00 DATE 29/08/2005
		SHEET 1 OF 2

S. No.	Description	Data to be filled by successful bidder
<b>A.</b>	<b>General</b>	
1	Manufacturer & country of origin	
2	Motor type	
3	Type of starting	
4	Name of the equipment driven by motor & Quantity	
5	Maximum Power requirement of driven equipment	
6	Rated speed of Driven Equipment	
7	Design ambient temperature	
<b>B.</b>	<b>Design and Performance Data</b>	
1	Frame size & type designation	
2	Type of duty	
3	Rated Voltage	
4	Permissible variation for	
5	a) Voltage	
6	b) Frequency	
7	c) Combined voltage & frequency	
8	Rated output at design ambient temp (by resistance method)	
9	Synchronous speed & Rated slip	
10	Minimum permissible starting voltage	
11	Starting time in sec with mechanism coupled	
12	a) At rated voltage	
13	b) At min starting voltage	
14	Locked rotor current as percentage of FLC (including IS tolerance)	
15	Torque	
	a) Starting	
	b) Maximum	
16	Permissible temp rise at rated output over ambient temp & method	
17	Noise level at 1.0 m (dB)	
18	Amplitude of vibration	
19	Efficiency & P.F. at rated voltage & frequency	
	a) At 100% load	
	c) At 75% load	

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE	SPECIFICATION NO.
	<b>MOTOR</b>  <b>DATA SHEET - C</b>	VOLUME II B
		SECTION D
		REV NO. 00 DATE 29/08/2005
		SHEET 2 OF 2

S. No.	Description	Data to be filled by successful bidder
	c) At starting	
<b>C.</b>	<b>Constructional Features</b>	
1	Method of connection of motor driven equipment	
2	Applicable Standard	
3	DOP of Enclosure	
4	Method of cooling	
5	Class of insulation	
6	Main terminal box	
	a) Type	
	b) Power Cable details (Conductor, size, armour/unarmour)	
	c) Cable Gland & lugs details (Size, type & material)	
	d) Permissible Fault level ( kArms & duration in sec)	
7	Space heater details (Voltage & watts)	
8	Flame proof motor details (if applicable)	
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	
10	Winding connection	
11	Kind of rotor winding	
12	Kind of bearings	
13	Direction of rotation when viewed from NDE	
14	Paint Shade & type	
15	Net weight of motor	
16	Outline mounting drawing No (To be enclosed as annexure)	
<b>D.</b>	<b>Characteristic curves/ drawings</b> (To be enclosed for motors of rating $\geq 55KW$ )	
	a) Torque speed characteristic	
	b) Thermal withstand characteristic	
	c) Current vs time	
	d) Speed vs time	

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			



TITLE :  
TECHNICAL SPECIFICATION FOR  
COLTCS

SPEC. NO. PE-TS- 408-165-N002

VOLUME III

SECTION

REV. NO. 0

DATE 27.11.2015

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.**

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**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



**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



**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

**INSTRUCTIONS FOR FILLING QUALITY PLAN**  
(Form No. PEM-6042-0)

The Quality Plan shall include all the Quality Control Measures and Checks adopted by the Vendor to ensure that the material component assembly services supplied by him meet will meet the requirements as per specifications and good practices. They shall include all stages of operation such as materials, processes, manufacture, assembly, packing and despatch. The following guide lines may be noted.

- Column 1- Serial Number—
- Column 2- Component/Operation- The component and/or operation being checked shall be given here.
- Column 3- Characteristics check- The characteristics being checked shall be given here, e.g., chemical composition, mechanical properties, leak tightness, surface defects etc..
- Column 4- Category - 'CR' stands for critical characteristic - affecting safety of equipment and personnel  
'MA' stands for major characteristic - affecting safety of equipment and personnel  
'MI' stands for minor characteristic - affecting appearance etc
- Column 5- Type/Method of check e.g. chemical analysis tensile testing, hydraulic test, visual examination radiography etc
- Column 6- Extent of check, such as, 100, 10, 1 per heat etc.
- Column 7- Reference Documents - Documents, such as technical specification, drawings, standard specifications (IS, BS ETC.) procedure, etc. according to which check is done.
- Column 8- Acceptance Norms - Standards etc. according to which acceptability or otherwise of the characteristics being checked is decided.
- Column 9- Format of Record - Formats, log sheets, reports, etc. in which the observations are recorded. Standard log sheets, reports, formats etc. of the Vendors shall be numbered and such reference numbers shall be included here.
- Column 10- Agency - The agency which performs the test/instruction shall be written in sub-column 'W'  
The agency which verifies test certificates/inspection records and carries out audit check of the components/operation shall be written in sub-column 'V'  
The agencies are codified '1' stands for (BHEL)  
as 1,2 & 3 '1' \* means the operation shall be cleared by BHEL before the start of the next operation.  
'2' Stands for Vendor  
'3' stands for sub-Vendor of the Vendor and so on.
- Example :
- Entry '3' in column 'P' means test/inspection to be performed by sub-Vendor's QC.
- Entry '2' in column 'W' means test/inspection to be witnessed by Vendor's QC
- Entry '1' in column 'V' means verification shall be done by BHEL and next stage to be started only after the hold point is cleared by BHEL
- Column II- Remarks - Any special remarks shall be given here

**NOTES**

- 1 In absence of correlation with the test certificate(s) (e.g. material identification) samples shall be drawn by BHEL and all tests as per relevant specifications shall be carried out in their presence or in recognized Government Laboratory.
- 2 When materials and components are initially identified and stamped by BHEL QS engineer, the identification marks shall be preserved till despatch. Wherever this is not possible, the identification mark shall be transferred to the components in the presence of BHEL QS Engineer unless otherwise agreed.
- 3 For castings and forgings integral test specimens shall be provided. When this is not possible for casting, they shall be poured in the presence of BHEL QS Engineer unless otherwise, if witnessing of test by BHEL, is called for.
- 4 When welders qualified by reputed inspection agencies or statutory bodies are not available, qualification tests shall be conducted in the presence of BHEL QS Engineer.
- 5 This Quality Plan is liable to be modified as per the requirements of approved drawings and changes in technical specifications drawings. If there are contradictions in respect of column 7 & 8 between this Quality Plan and the approved drawings specifications, the latter shall prevail.
- 6 Whenever inspection by BHEL's Purchaser Third Party Statutory authorities are mandatory, this shall be complied with.
- 7 Inspection reports log sheets test reports certificate etc shall be furnished to BHEL of the appropriate status or at the time of final inspection as required.
- 8 This Quality Plan is also applicable to states of the order scope of supply of Vendor.



**INSPECTION SCHEDULE**

SPECIFICATION NO

VOL III

SHEET..... OF.....

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



<b>QUALITY PLAN</b>		SHEET OF		CUSTOMER		PROJECT TITLE		SPECIFICATION NUMBER											
										BIDDER/VENDOR		QUALITY PLAN NUMBER		SPECIFICATION TITLE					
COMPONENT / OPERATION		CHARACTERISTIC CHECK		CAT		TYPE/METHOD OF CHECK		EXTENT OF CHECK		REFERENCE DOCUMENT		ACCEPTANCE NORM		FORMAT OF RECORD		AGENCY		REMARKS	
S. No.	2	3	4	5	6	7	8	9	10	11	P	W	V						
BHEL										BIDDER / VENDOR									
NAME										SIGNATURE									
DATE										BIDDER/VENDOR COMPANY SEAL									



**INSPECTION SCHEDULE**

SPECIFICATION NO

VOL III

SHEET..... OF.....

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

	<b>TITLE</b> * <b>SCHEDULE OF DECLARATIONS</b>	SPECIFICATION NO
		VOL III
		SHEET..... OF.....

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

**DECLARATION**

I .....certify 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.

Biders 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



	<b>TITLE</b> <b>* SCHEDULE OF PRICE FOR ERECTION AND MAINTENANCE TOOLS &amp; TACKLES</b>	SPECIFICATION NO
		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





**\*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