

NTPC LIMITED

2 X 800 MW DARLIPALI STPP, SG

VOLUME -III

**TECHNICAL SPECIFICATION
FOR
MISCELLANEOUS PUMPS**

Specification No. : PE-TS-403-100-N001 (REV. 0)



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
PPEI BUILDING, SECTOR 16 A
NOIDA - 201301**



PREAMBLE

SPECN. NO.: PE-TS-403-100-N001

REV. NO. 0 DATE: 18.10.14

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 - 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 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).

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 checklist, sec B7 in vol III

2.0 The requirements mentioned in Section C/Data Sheets-A of Section-D shall prevail and govern in case of conflict between the same and the corresponding requirements mentioned in the descriptive portion in Section -D.



TECHNICAL SPECIFICATIONS

SPECN. NO.:

PE-TS-403-100-N001

MISCELLANEOUS PUMPS

VOLUME:

III

SECTION:

REV. NO.

0

DATE:


18.10.14

INDEX

SECTION TITLE


- A DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER
 - A.1 COMPLIANCE CERTIFICATE
 - A.2 SCHEDULE OF DEVIATIONS
 - A.3 SCHEDULE OF PERFORMANCE GUARANTEE
 - A.4 UNPRICED PRICE SCHEDULE (AS PER NTT FORMAT)
 - A.5 INPUTS FOR HT MOTORS (if applicable)
 - A.6 GENERAL ARRANGEMENT DRAWING

- B DOCUMENTS TO BE SUBMITTED ON PLACEMENT OF LOI
 - B.1 PUMP DATA SHEET -B ALONG WITH PERFORMANCE CURVE
 - B.2 GA & CROSS SECTIONAL DRAWING
 - B.3 PUMP QAP
 - B.4 MOTOR DATASHEET -C ALONG WITH OTHER MOTOR DOCUMENTS
 - B.5 MOTOR QAP
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	TECHNICAL SPECIFICATIONS	SPECN. NO.:		PE-TS-403-100-N001	
	MISCELLANEOUS PUMPS	VOLUME:	III	SECTION:	A
		REV. NO.	0	DATE:	18.10.14

DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER

- A1 COMPLIANCE CERTIFICATE
- A2 SCHEDULE OF DEVIATIONS
- A3 SCHEDULE OF PERFORMANCE GUARANTEES
- A4 INPUTS FOR HT MOTORS (if Applicable)
- A5 GENERAL ARRANGEMENT DRAWING
- A6 UNPRICE PRICE SCHEDULE (AS PER NTIT FORMAT)

	TECHNICAL SPECIFICATIONS	SPECN. NO.:	PE-TS-403-100-N001		
	MISCELLANEOUS PUMPS COMPLIANCE CERTIFICATE	VOLUME:	III	SECTION:	A1
		REV. NO.	0	DATE:	18.10.14

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/ deviations with regard to same.
- b) QP/ test procedures shall be submitted in the event of order based on the guidelines given in the specification & QP enclosed therein.

QP will be subject to BHEL/ CONSULTANT/ CUSTOMER approval in the event of order & 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.
- c) All drawings/data – sheets etc. to be submitted during contract shall be subject to BHEL/ CONSULTANT/ CUSTOMER approval.
- d) There are no other deviation with respect to specification other than those furnished in the 'Schedule of Deviations'.
- e) Mandatory spares as indicated in Datasheet A shall be included in the base price

Any mandatory spares stated as not applicable, shall have to be supplied without any cost implication to BHEL in the event they are found to be applicable during detail engineering stage.
- f) The offered materials should be either equivalent or superior to those specified. Also for components where material is not specified it shall be suitable for intended duty. All materials shall be subject to approval in the event of order.
- g) Prices for recommended spares (if any) for 3 years operation shall be furnished separately & not included in the base price.
- h) The commissioning spares (if any) are supplied on 'As Required Basis' & prices for same included in the base price (If bidders reply to this is "No commissioning spares are required" and if some spares are actually required during commissioning same shall be supplied by bidder without any cost to BHEL).
- i) All sub vendors shall be as per BHEL/CONSULTANT/CUSTOMER approved list.
- j) Tests for noise, vibration, parallel running etc. for pumps shall be conducted at site by BHEL and if the site performance is found not meeting the requirements in any respect as specified, then the equipment shall be rectified or replaced by the vendor, at his own cost.
- k) Any special tools & tackles, if required, shall be in bidder's scope.
- l) All models offered have been supplied by bidder in the past and are meeting the experience qualifying criteria of BHEL/CONSULTANT/CUSTOMER (viz. offered model is successfully operating in two separate stations for at least two years as on the date of submission of the offer). Any deviation to this criteria shall be suitably highlighted in deviation schedule.
- m) All selected motor ratings have minimum margins as per Datasheet A, Section D1 of Vol IIB

We the undersigned hereby undertake to meet the compliance requirements as listed above on the conditions as elsewhere specified.

PARTICULARS OF BIDDER/ AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL
------	-------------	-----------	------	--------------

FORM No. P.E.M. - 0036-0



TITLE

*** SCHEDULE OF DEVIATIONS**

- () From Conditions of Contract (Volume - I)
- () From General Technical Conditions (Volume - II A)
- () From Technical Specifications (Volume - II B)

SPECIFICATION NUMBER PE-15-150-165-N001

VOLUME III SECTION A-2

SHEET . . . OF

Check the applicable

Some type of deviation shall be noted in a separate sheet

We the undersigned hereby certify that the above mentioned are the only deviations.

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

**SCHEDULE OF PERFORMANCE GUARANTEES****2 X 800 MW DARLIPALI STPP**

SPECN. NO.: PE-TS-403-100-N001

VOLUME: III SECTION: A3 Sheet 1 of 1

REV. NO. 0 DATE: 18.10.14

Following parameters are guaranteed for following pumps

Sl. No.	Pump Description	Guaranteed Capacity	Guaranteed TDH	Guaranteed Pump Eff.	Guaranteed Motor Eff.	Guaranteed Power consumption at inlet to motor terminals	Pump model	Motor Rating	Pump GD ² Value for HT motor driven pump only	Pump RPM	Pump T/S Curve attached for HT motor selection
		(M3/Hr)	(MWC)	%	%	(KW)		(KW)			
Horizontal pumps (Group I)											
1	# DMCW SG AUX PUMPS	500	71								

Note: 1 # Bid evaluation and LD is applicable for these pumps only as per clause 4.00.00 of std technical specn for pumps, section D1, Volume IIB.

We the undersigned hereby undertake to meet the performance guarantees as listed in the table above on the conditions as elsewhere specified. Any variation of the specified conditions during official tests will be taken in account by the customer

PARTICULARS OF BIDDER/ AUTHORISED REPRESENTATIVE

NAME DESIGNATION SIGNATURE DATE COMPANY SEAL



TECHNICAL SPECIFICATIONS

SPECN. NO.:

PE-TS-403-100-N001

MISCELLANEOUS PUMPS

VOLUME:

III

SECTION:

B

REV. NO.

0

DATE:

18.10.14

DOCUMENTS TO BE SUBMITTED ON PLACEMENT OF LOI

- B.1 PUMP DATA SHEET -B ALONG WITH PERFORMANCE CURVE
- B.2 GA & CROSS SECTIONAL DRAWING
- B.3 PUMP QAP (REFER STANDARD PUMP QP ATTACHED AT SECTION D OF VOL II B)
- B.4 MOTOR DATASHEET -C ALONG WITH OTHER MOTOR DOCUMENTS
- B.5 MOTOR QAP (REFER STANDARD MOTOR QP ATTACHED AT SECTION D OF VOL II B)
- B.6 ELECTRICAL LOAD DATA
- B.7 SCHEDULE AS PER LIST



PROJECT:
MISCELLANEOUS PUMPS
DATASHEET - B


VENDOR DOC. NO.

REV NO.

BHEL DOC. NO.

REV NO.

SL.	DESCRIPTION	UNIT	PUMP DATA	PUMP DATA	PUMP DATA
1.0	GENERAL				
1.1	Designation of the Pump				
1.2	Manufacturer				
1.3	Model No.				
1.4	No. of pumps	Nos.			
2.0	GUARANTEED PERFORMANCE PARAMETERS				
2.1	Performance standard				
2.2	Rated capacity. (No negative tolerance)	M ³ /hr			
2.3	Total dynamic head at rated capacity (No negative tolerance)	MWC			
2.4	Shut off head	MWC			
2.5	Range of Operation of the Pump				
	a) Min.Flow	M ³ /hr			
	b) Max.Flow	M ³ /hr			
2.6	The pumps offered have continuously rising head capacity curves from the duty point towards shut off point.				
2.7	The pumps offered have stable rising H-Q curves within the "Range of Operation"				
2.8	Pump rated speed	RPM			
2.9	Max.value of peak to peak amplitude of vibration on any pump /motor bearing. (Guaranteed at site)	μ			
2.10	Max noise Level (Guaranteed at site)	dB			
2.11	Guaranteed Pump efficiency at rated head & rated capacity without -ve tolerance	%			
2.12	Power consumption				
	a) Guaranteed .pump input power at duty point	KW			
	b) Guaranteed max. Pump input power within range of operation.	KW			
	c) Max. pump input power at shut off	KW			
2.13	NPSH required at rated capacity	MWC			
3.0	DESIGN & CONSTRUCTION FEATURES				
3.1	Type of pump casing				
3.2	Pump duty				
3.3	Type of Impeller				
3.4	Location				
3.5	Pump suitable for parallel operation				
3.6	Torque speed curve of the pump & drive motor furnished for pumps with drive motor rating of 100 KW and above.				
3.7	Pump number of stages				
3.8	Specific speed N = RPM x (Flow in USGPM) ^{1/2} (Head in Ft.) ^{3/4}				

		PROJECT: MISCELLANEOUS PUMPS DATASHEET - B		VENDOR DOC. NO.	REV NO.
				BHEL DOC. NO.	REV NO.
SL.	DESCRIPTION	UNIT	PUMP DATA	PUMP DATA	PUMP DATA
3.9	Minimum suction head required in MLC for pump operation at maximum discharge point within the 'Range of Operation' specified (NPSHR at max. flow).				
3.10	Whether pump is suitable/ designed so that pump internals can be attended without disturbing suction and discharge piping.				
3.11	Type of coupling between pump & motor				
3.12	Bearing (DE & NDE)				
	a) Type and manufacturer				
	b) Bearing no.				
	c) Type of lubrication				
	d) Design life (Hrs.)				
3.13	Shaft Sealing arrangement				
	a) Type and manufacturer				
	b) Sealing liquid				
	c) Requirement of external water if any				
	i) Quality				
	ii) Quantity/ Pump	M ³ /hr			
3.14	In case separate oil/grease/water pump or any such equipment required for bearing lubrication/stuffing box gland sealing, furnish full technical details of these equipment and their drive.				
4.0	MATERIAL OF CONSTRUCTION (Indicate applicable code/ standard)				
4.1	Casing				
4.2	Impeller				
4.3	Shaft				
4.4	Shaft sleeves				
4.5	Wear ring				
4.6	fasteners				
4.7	Gland				
4.8	Lantern ring				
4.9	Mechanical seals (faces)/				
	Gland packing				
4.10	Base plate				
5.0	CONNECTIONS AND OTHER DIMENSIONAL DETAILS				
5.1	Impeller diameter	mm			
6.0	DRIVE DATA				
6.1	Drive unit output at 50°C ambient condition	KW/ P			
7.0	INSPECTION & TESTING				
7.1	Material test				
7.2	Hydrostatic test pressure	Kg/cm ²			
7.3	Hydrostatic test duration	Min.			
7.4	Performance test on pump at shop				
7.5	Dyanamic balance test				



PROJECT:
MISCELLANEOUS PUMPS
DATASHEET - B


VENDOR DOC. NO.


REV NO.

BHEL DOC. NO.

REV NO.

SL.	DESCRIPTION	UNIT	PUMP DATA	PUMP DATA	PUMP DATA
8.0	WEIGHT AND LOADING DATA				
8.1	Weight of the pump & drive assembly	Kg			
8.2	Weight of the heaviest piece to be handled	Kg			
8.3	Size of base plate (length x width)	mm			
9.0	ADDITIONAL INFORMATION FOR VERTICAL PUMPS				
9.1	Type of pump				
9.2	No. of stages for Vertical Turbine Pump	Nos.			
9.3	Bowl Head	MLC			
9.4	Bowl Efficiency	%			
9.5	Setting Length	m			
9.6	Column pipe OD X Thickness	mm X mm			
9.7	No of column pieces	Nos.			
9.8	No of intermediate shafts	Nos.			
9.9	No of bearings	Nos.			
9.10	Type & make of Bearing				
9.11	Sealing/lubrication arrangement of bearings				
9.12	Capacity of overhead forced lubrication tank	m ³			
9.13	Nos of forced lubrication pumps	Nos.			
9.14	Capacity of forced lubrication pumps	m ³ /Hr			
9.15	TDH of forced lubrication pumps	MLC			

		PROJECT:		VENDOR DOC. NO.	REV NO.
		MISCELLANEOUS PUMPS DATASHEET - B		BHEL DOC. NO.	REV NO.
SL.	DESCRIPTION	UOM	PUMP DATA	PUMP DATA	PUMP DATA
1.0	GENERAL				
1.1	Designation of the Pump				
1.2	Manufacturer				
1.3	Model No.				
1.4	No. of pumps	Nos.			
1.5	System Design Pressure	Kg/cm ²			
1.6	Specific Gravity of fluid to be handled	-			
2.0	PERFORMANCE PARAMETERS				
2.1	Performance standard				
2.2	Rated capacity. (No negative tolerance)	M ³ /hr			
2.3	Total Dynamic Head (TDH) at rated capacity (No negative tolerance)	MWC			
2.4	Shut off head	MWC			
2.5	Range of Operation of the Pump				
	a) Min.Flow	M ³ /hr			
	b) Max.Flow	M ³ /hr			
2.6	The pumps offered have continuously rising head capacity curves from the duty point towards shut off point.				
2.7	The pumps offered have stable rising H-Q curves within the "Range of Operation"				
2.8	Pump rated speed	RPM			
2.9	Vibration measurements				
2.9.1	Max.value of vibration on any pump /motor bearing w.r.t. velocity (Vrms) as per ANSI/ HIS 9.6.4 for speed > 600 RPM				
	a) Guaranteed at manufacturer's works	mm/s			
	b) Guaranteed at site	mm/s			
2.9.2	Max.value of vibration on any pump /motor bearing w.r.t. peak to peak amplitude as per ANSI/ HIS 9.6.4 for speed <= 600 RPM				
	a) Guaranteed at manufacturer's works	microns			
	b) Guaranteed at site	microns			
2.10	Max. noise Level (Guaranteed at site)	dB			
2.11	Guaranteed Pump efficiency at rated head & rated capacity without -ve tolerance	%			
2.12	Power consumption				
	a) Guaranteed pump input power at duty point	KW			
	b) Guaranteed max. Pump input power within range of operation.	KW			
	c) Max. pump input power at shut off	KW			
	d) Guranteed power at motor input	KW			
2.13	NPSH required at rated capacity	MWC			
3.0	DESIGN & CONSTRUCTION FEATURES				
3.1	Type of pump casing				
3.2	Pump duty				
3.3	Type of Impeller				
3.4	Location				
3.5	Pump suitable for parallel operation				
3.6	Torque speed curve of the pump & drive motor furnished for pumps with drive motor rating of 100 KW and above.				
3.7	Pump number of stages				

		PROJECT:		VENDOR DOC. NO.	REV NO.
		MISCELLANEOUS PUMPS DATASHEET - B		BHEL DOC. NO.	REV NO.
SL.	DESCRIPTION	UOM	PUMP DATA	PUMP DATA	PUMP DATA
3.8	Specific speed $N = \frac{\text{RPM} \times (\text{Flow in USGPM})^{1/2}}{(\text{Head in Ft.})^{3/4}}$				
3.9	Minimum suction head required in MLC for pump operation at maximum discharge point within the 'Range of Operation' specified (NPSHR at max. flow).				
3.10	Whether pump is suitable/designed so that pump internals can be attended without disturbing suction and discharge piping.				
3.11	Type of coupling between pump & motor				
3.12	Bearing (DE & NDE)				
	a) Type and manufacturer				
	b) Bearing no.				
	c) Type of lubrication				
	d) Design life (Hrs.)				
3.13	Shaft Sealing arrangement				
	a) Type and manufacturer				
	b) Sealing liquid				
	c) Requirement of external water if any				
	i) Quality				
	ii) Quantity/ Pump	M ³ /hr			
3.14	In case separate oil/grease/water pump or any such equipment required for bearing lubrication/stuffing box gland sealing, furnish full technical details of these equipment and their drive.				
4.0	MATERIAL OF CONSTRUCTION (Indicate applicable code/ standard)				
4.1	Casing				
4.2	Impeller				
4.3	Shaft				
4.4	Shaft sleeves				
4.5	Wear ring				
4.6	fasteners				
4.7	Gland				
4.8	Lantern ring				
4.9	Mechanical seals (faces)/				
	Gland packing				
4.10	Base plate				
5.0	CONNECTIONS AND OTHER DIMENSIONAL DETAILS				
5.1	Impeller diameter	mm			
6.0	DRIVE DATA				
6.1	Drive unit output at 50°C ambient condition	KW/ P			
7.0	INSPECTION & TESTING				
7.1	Material test				
7.2	Hydrostatic test pressure	Kg/cm ²			
7.3	Hydrostatic test duration	Min.			
7.4	Performance test on pump at shop				
7.5	Dyanamic balance test				
8.0	WEIGHT AND LOADING DATA				
8.1	Weight of the pump & drive assembly	Kg			
8.2	Weight of the heaviest piece to be handled	Kg			



PROJECT:
MISCELLANEOUS PUMPS
DATASHEET - B


VENDOR DOC. NO.

REV NO.

BHEL DOC. NO.


REV NO.

SL.	DESCRIPTION	UOM	PUMP DATA	PUMP DATA	PUMP DATA
8.3	Size of base plate (length x width)	mm			
9.0	ADDITIONAL INFORMATION FOR VERTICAL PUMPS				
9.1	Type of pump				
9.2	No. of stages for Vertical Turbine Pump	Nos.			
9.3	Bowl Head	MLC			
9.4	Bowl Efficiency	%			
9.5	Setting Length	m			
9.6	Column pipe OD X Thickness	mm X mm			
9.7	No of column pieces	Nos.			
9.8	No of intermediate shafts	Nos.			
9.9	No of bearings	Nos.			
9.10	Type & make of Bearing				
9.11	Sealing/lubrication arrangement of bearings				
9.12	Capacity of overhead forced lubrication tank	m ³			
9.13	Nos of forced lubrication pumps	Nos.			
9.14	Capacity of forced lubrication pumps	m ³ /Hr			
9.15	TDH of forced lubrication pumps	MLC			

	TITLE	SPECIFICATION NO.
	MOTOR DATA SHEET - C	VOLUME II B
		SECTION D
		REV NO. 00 DATE 28.01.10
		SHEET 1 OF 2

S. No.	Description	Data to be filled by successful bidder
A.	General	
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.	Design and Performance Data	
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.
	MOTOR DATA SHEET - C	VOLUME II B
		SECTION D
		REV NO.00 DATE 28.01.10
		SHEET 2 OF 2

S. No.	Description	Data to be filled by successful bidder
	c) At starting	
C.	Constructional Features	
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)	
D.	Characteristic curves/ drawings (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		

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 Occurance 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 Occurance 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-6056	Schedule of Bidder's Man-power for Supervision of E & C and their Charges.	✓
23.	PEM-6057	Schedule of Daily & Overtime Rates	
24.	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 - 0024-0



TITLE
**SCHEDULE OF DRAWINGS /
CATALOGUES SUBMITTED WITH BID**

SPECIFICATION NUMBER _____
VOLUME III PART - A
SHEET _____

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

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NAME	DESIGNATION	SIGNATURE	DATE
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COMPANY SEAL



TITLE :
SCHEDULE OF OCCURRENCE OF KEY EVENTS
OF DELIVERY ERECTION AND
COMMISSIONING

SPECIFICATION NUMBER:

VOLUME III **PART-A**
Sheet of

EQUIPMENT/SYSTEM.	DESCRIPTION OF KEY EVENTS	MONTHS FROM (DATE OF LOI)

We the undersigned hereby undertake to meet the schedule of occurrence of the key event as listed above regarding the delivery, Erection & Commissioning of Equipment/System

PARTICULARS OF BIDDER/ AUTHORISED REPRESENTATIVE

FORM No. PEM - 6026-0



TITLE

**SCHEDULE OF EQUIPMENT,
MANUFACTURE, DESPATCH AND
SHIPMENT TO SITE**

SPECIFICATION NUMBER _____

VOLUME III PART - A

SHEET _____ OF _____

Equipment / Major Bought-out Items	Time for Manufacture/ Procurement from Date of Issue of Letter of Intent (Weeks)	Time for Test, Dismantling Packing & Ready for Despatch (Weeks)	Time required for 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 above time schedule in weeks for manufacture, despatch and shipment of each equipment and procurement of major boughtout items as listed above.

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE

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FORM No. PEN - 6017-0



TITLE

SCHEDULE OF WEIGHTS & DIMENSIONS

SPECIFICATION NUMBER

VOLUME III PART - A

SHEET OF

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

Description of Package(s)	Dimensions (in meters)	Weight (in tonnes)

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

FORM No. PEM - 0030-0



INSPECTION SCHEDULE

SPECIFICATION NUMBER _____
 P.O. NUMBER _____
 VOLUME - III PART - A SHEET _____ OF _____

S. No.	ITEM/COMPONENT	PLACE & ADDRESS OF TEST / INSPECTION	Scheduled Date of Inspection	Duration of Test / Inspection (in days)

This schedule shall be in line with specification and quality plan requirements. The information in this form shall be furnished after receipt of LOI / PO.

PARTICULARS OF VENDOR'S / AUTHORISED REPRESENTATIVE			
NAME	SIGNATURE	DATE	COMPANY SEAL

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FORM No. PEM - 6040-0



TITLE

* SCHEDULE OF DECLARATION

SPECIFICATION NUMBER

VOLUME III PART - A

SHEET OF

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 formal proposal number Dated and there is no deviation to the specification.

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

Bidders Company Name

Authorised representative's Signature

Name

Bidder's Intent
The bidder hereby agrees to fully comply with the requirements and intent of this specifications for the price indicated.

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE

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 11- Remarks - Any special remarks shall be given here.

NOTES :

- 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.
- 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 other wise agreed.
- 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.
- 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.
- 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.
- Wherever inspection by BHEL's Purchaser/Third Party/Statutory authorities are mandatory, this shall be compiled with.
- Inspection reports, log sheets, test reports/certificate, etc. shall be furnished to BHEL at the appropriate stage or at the time of final inspection, as required.
- This Quality Plan is also applicable to spares, if any, under scope of supply of Vendor.
- The quality plan shall be submitted in duplicate (7 Copies).



**VENDOR'S
DRAWINGS/DOCUMENTS SCHEDULE**
(Information in this form is to be furnished
only after receipt of LOI/IPO)

SPECIFICATION NO

VOLUME **III**

SECTION **PART-A**

REV NO. **0**

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

TITLE OF SPECIFICATION

S. NO.	Vendor's Drawing/Document No. (VDN)	PEM's Drawing/Document No. (PDN)	First Submission Date
	TITLE		Final Approval Date
	VDN	PDN	
	TITLE		
	VDN	PDN	
	TITLE		
	VDN	PDN	
	TITLE		
	VDN	PDN	
	TITLE		
	VDN	PDN	
	TITLE		
	VDN	PDN	
	TITLE		
	VDN	PDN	
	TITLE		

PARTICULARS OF VENDOR'S/AUTHORISED REPRESENTATIVE

NAME	SIGNATURE	DATE	COMPANY SEAL



**VENDOR'S
DRAWINGS/DOCUMENTS SCHEDULE**
(Information in this form is to be furnished
only after receipt of LOI/IPO)

SPECIFICATION NO

VOLUME **III**

SECTION **PART-A**

REV NO. **0**

SHEET **1 OF 1**

INSPECTION REQUEST
(From Vendor to BHEL Inspection Agency)

1. PROJECT TITLE
2. NAME OF VENDOR
3. BHEL'S LOI/PO NO DATE
4. SYSTEM/ITEM DESCRIPTION
5. ITEM BEING OFFERED FOR INSPECTION WITH SL. NO. AS PER LOI/PO/BILLING SCHEDULE
6. DESCRIPTION AND SL. NO. OF INSPECTION AS PER QUALITY PLAN
7. QUANTITY OFFERED FOR INSPECTION
8. PLACE OF INSPECTION (FULL ADDRESS AND NAME OF SUB-VENDOR, IF ANY)
PLACE
ADDRESS.....
9. CONTACT PERSON (FOR SL. NO. 8 ABOVE)-
NAME DESIGNATION.....
TELEPHONE..... FAX..... TELEGRAM..... TELEX.....
10. THE FOLLOWING DOCUMENTS ARE APPROVED BY BHEL AND AVAILABLE AT PLACE OF INSPECTION :
(A). QUALITY PLAN (B) DRAWINGS (C) DATA SHEETS, CHARACTERISTIC CURVES ETC.
(D). PLANT STANDARDS
11. REQUIRED DATE OF INSPECTION : LIKELY DURATION(No.of working days).....
WEEKLY OFF DAY WORKING HOURS
(At least 15 days prior notice shall be given by the Vendor to Inspection Agency)

We hereby certify that the above items are complete in all respects and have been fully inspected/tested by us and are found to be as per technical specification/approved drawings/data sheets/characteristic curves and are acceptable to our QC department. The detailed inspection and test reports of our QC department are enclosed.

VENDOR'S PARTICULARS

Name	Designation	Signature	Place	Date	Seal

FORM No. PENT-6053-0



TITLE

*** SCHEDULE OF PRICES FOR COMMISSIONING AND MANDATORY SPARES**

SPECIFICATION NUMBER

VOLUME III

SHEET OF

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 Required	If set, Nos Per set	Delivery period (Weeks)	Unit Price (Rs.)	Total Price (Rs.)
Erection and Commissioning									
Mandatory Spares									
Additional Spares Mandatory Erection / Commissioning									

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE

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CONFIDENTIAL

FORM No. PEM - 6056-B



TITLE

**SCHEDULE OF BIDDER'S MAN POWER
FOR SUPERVISION OF E & C
AND THEIR CHARGES**

SPECIFICATION NUMBER

VOLUME III

SHEET OF

The bidder shall indicate below, designation-wise, the personnel required for supervision of erection and commissioning and their charges.

SUPERVISION OF ERECTION

S. No.	Designation	Normal rate per day of 8 hours	Overtime rate per hour

SUPERVISION OF COMMISSIONING

Sl. No.	Designation	Normal rate per day of 8 hours	Overtime rate per hour

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE

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