

**TSGENCO**  
**4X270 MW Manuguru TPS**

**VOLUME -III**

**TECHNICAL SPECIFICATION  
FOR  
COOLING TOWER**

**Specification No. : PE-TS-411 -165-N001 (REV. 0)**



**BHARAT HEAVY ELECTRICALS LIMITED  
POWER SECTOR  
PROJECT ENGINEERING MANAGEMENT  
NOIDA - 201301**



**TITLE : TECHNICAL SPECIFICATION  
FOR  
COOLING TOWERS  
PREAMBLE**

SPEC. NO. PE-TS- 165-N101

VOLUME : III

SECTION :

REV. NO. 00

DATE : 09.05.11

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 - 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).



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SHEET 2 OF 2

**1.2.2 Volume - III TECHNICAL SCHEDULES**

This volume contains technical schedules and Data Sheets - B (to be submitted at contract stage), which are to be duly filled by the bidder and the same shall be furnished with the technical bid.

**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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**General arrangement drawing for cooling tower, incorporating all relevant dimensions, cold water channels / sludge chamber/ screens/ gates in the cold water channel, staircase etc.**

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**TITLE : TECHNICAL SPECIFICATION  
FOR**

**COOLING TOWERS**

**SPEC. NO. PE-TS-165-N101**

**VOLUME : III**

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**DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER**

- COMPLIANCE CERTIFICATE
- SCHEDULE OF DEVIATIONS
- SCHEDULE OF PERFORMANCE GUARANTEE
- SCHEDULE OF PRICES
- SCHEDULE OF UNIT PRICES
- ELECTRICAL LOAD DATA
- General arrangement drawing for cooling tower, incorporating all relevant dimensions, cold water channels / sludge chamber/ screens/ gates in the cold water channel, staircase etc.
- Pumping head calculations.
- Thermal design calculations.
- Tower performance curves





TITLE:

TECHNICAL SPECIFICATION  
COOLING TOWERS

COMPLIANCE CERTIFICATE

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

VOLUME: III

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SHEET 1 OF 1

**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 approval & 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.
- d) All drawings/ data-sheets/ calculations etc. submitted along with the offer shall be considered for reference only, same shall be subject to BHEL/ CUSTOMER 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 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.
- g) All sub vendors shall be subject to BHEL/ CUSTOMER approval in the event of order.
- h) The Performance guarantees shall stand valid till at least eighteen (18) months after full load commissioning of CT or as per commercial terms and conditions, whichever is later.
- i) Specifically confirm compliance with Cl. Nos. 6.0 and 11.0 and their sub clauses of Sec. C1 of Technical Specification specification.
- j) The hydrostatic testing of piping shall be carried out as specified i.e. at 1.5 times the design pressure.

FORM No. PEM - 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-ES-256-105-N001

VOLUME III PART - A

SHEET OF

Tick the applicable

Some types 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



TITLE:

**TECHNICAL SPECIFICATION  
COOLING TOWERS****GUARANTEE SCHEDULE**

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

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SHEET 1 OF 1

1. Guaranteed Pumping head at design capacity (viz. static lift w.r.t. FGL up to top of topmost pipe without any siphon recovery & frictional losses from bidders terminal point onwards including 10% margin, etc)
2. Guaranteed Cold water temperature at design capacity & parameters with the working cells Deg. C

**PARTICULARS OF BIDDER/ AUTHORISED REPRESENTATIVE**

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL
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TITLE : SCHEDULE OF  
PRICES  
MANUGURU, 4X270 MW

**SPEC NO: PE-TS-411-165-N001**

SL. NO.	** Description of Works Or Equipment/ System	Prices (in Lakhs of Rs.)
1.	<p><b>Prices for Four (4) nos. Natural Draft Cooling Towers to be covered under the following two heads only)</b></p> <p>a). Total Price for Design, Manufacture, Inspection/ Testing, Supplies, Packing for transportation &amp; delivery complete with commissioning spares/ special tools and tackles/ including all accessories &amp; equipments as specified and as necessary including Mandatory Spares for completion for Four (4) numbers Cooling Towers.</p> <p>b). Total price for site civil works including receipt at site, handling, storage, civil &amp; structural work (excluding supply of structural and reinforced steel), erection, testing, Commissioning, trial run, PG test, handing over etc. complete with all accessories as per the specification.</p> <p style="text-align: center;">Total a) + b)</p>	<p>Rs</p> <p>Rs</p> <p>Rs</p>
2.	<p>Reinforcement steel and structural steel is free issue from BHEL. Bidder to indicate Total BOQ for one(1) no. CT as follows for determining the total cost of CT.</p> <p>a) Reinforcement steel (in Metric tonnes)</p> <p>b) Structural steel (in Metric tonnes)</p> <p>c) Cement (in Metric tonnes)</p> <p><u>Notes :</u></p> <p>i) Bidders Total price shall be determined after adding cost of cement, reinforcement steel and structural steel at following rates (as per Terms &amp; conditions), in his total quoted prices at S. No. 1 above.</p> <ul style="list-style-type: none"> <li>• Reinforcement Steel - Rs-----/MT</li> <li>• Structural Steel - Rs-----/MT</li> <li>• Cement - Rs-----/MT</li> </ul> <p>ii) Indicate all duties, taxes, etc. stating whether included/ excluded in above prices.</p>	

**Bidder shall furnish this price Schedule in his price offer only**

PARTICULARS OF BIDDER/ AUTHORISED REPRESENTATIVE

NAME \_\_\_\_\_

DESIGNATION

SIGNATURE

DATE \_\_\_\_\_

COMPANY SEAL



TITLE : SCHEDULE OF  
UNIT PRICES  
MANUGURU, 4X270 MW

SPEC NO: PE-TS-411-165-N001

SL. NO. \*\* Description of Works Or Equipment/ System Prices (in Lakhs of Rs.)

**1.0 Break up of Cl. 1.0 of "Schedule of Prices" for design, manufacture supplies and site works:**

- a) Design and engineering of one(1) no. CT **Rs.**
- b) Manufacture and supply of following for one(1) no. CT: **Rs.**
- Complete mechanical equipments
  - Complete electrical and C&I equipments
- c) Complete Civil works excluding cement and steel of one no CT. **Rs.**
- d) Erection & Commissioning of following for One (1) no. CT: **Rs.**
- Complete mechanical equipments
  - Complete electrical and C&I equipments
- e) Performance Guarantee testing of One (1) no. CT. **Rs.**

**Note:**

- 1.0 Sum total of Cl. 1.0 should match Cl. 1.0 (Schedule of prices). In the event of discrepancy the least of two figures shall be considered for award of contract.
- 2.0 Prices of commissioning & erection spares shall be included in the price of cooling tower.

**Bidder shall furnish this price Schedule in his price offer only**

PARTICULARS OF BIDDER/ AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL
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**TITLE**  
**DATA SHEET-B**  
**NATURAL DRAFT COOLING TOWER**

**SPECIFICATION NO.:** PE-TS-999-165-N004

**VOLUME :** III

**SECTION :** A

**REV. NO.** 0 **DATE** 22.03.2003

**SHEET** 1 **OF** 9

SL. NO.	DESCRIPTION	UNIT	DATA/PARAMETER
1.0	Type Model No.		
2.0	Quantity	Nos//Unit	
3.0	Rated Capacity	M <sup>3</sup> /Hr	
4.0	Design Wet Bulb Temperature	°C	
5.0	Cold Water Temperature	°C	
6.0	Cooling Tower Approach	°C	
7.0	Cooling Tower Range	°C	
8.0	Cooling Tower Loss		
	a. Evaporation Loss		
	b. Drift Loss		
	c. Blow Down Loss (Concentration Factor to be indicated)		
9.0	Total Differential Pressure Drop (Considering recovery)		
	a. Drop through Louvers	mm of H <sub>2</sub> O	
	b. Drop through Fills	mm of H <sub>2</sub> O	
	c. Drop through Eliminators	mm of H <sub>2</sub> O	
	d. Velocity Pressure	mm of H <sub>2</sub> O	
	e. Drop through plenum	mm of H <sub>2</sub> O	



**TITLE**  
**DATA SHEET-B**  
**NATURAL DRAFT COOLING TOWER**

**SPECIFICATION NO.:** PE-TS-999-165-N004

**VOLUME :** III

**SECTION :** A

**REV. NO.** 0 **DATE** 22.03.2003

**SHEET** 2 **OF** 9

SL. NO.	DESCRIPTION	UNIT	DATA/PARAMETER
10.0	Basin Storage Capacity	M <sup>3</sup>	
11.0	Plan Dimensions (Diameter)	M	
12.0	Overall Size of Cooling Tower (Plan Dimensions X Height)	MXM	
13.0	Required Pumping Head including all losses measured from Terminal Point	M	
14.0	Cooling Tower Levels		
	a. Graded Level	M	
	b. Maximum Water Level	M	
	c. Basin Curb Level	M	
	d. Minimum Water Level	M	
	e. Basin Bottom Level	M	
15.0	Overall Tower Height from Basin Floor	M	
16.0	Basin Dimensions		
	a. Diameter	M	
	b. Depth (from Basin Curb)	M	
17.0	Free Board (Above Max. Water Level)	mm	
18.0	Heat Transfer Data	mm	
	a. Heat Transfer Coefficient (K)		
	b. Tower Coefficient © Ka V/L	M	
	c. Average Fill Height	M	
	d. Total Fill Volume	M <sup>3</sup>	





**TITLE**  
**DATA SHEET-B**  
**NATURAL DRAFT COOLING TOWER**

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**VOLUME :** III

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SL. NO.	DESCRIPTION	UNIT	DATA/PARAMETER
	e. Total Tower Wetted Surface	M <sup>2</sup>	
<b>19.0</b>	<b>Hot Water Distribution Piping</b>		
	a. Size (OD X Thk)	Mm X mm	
	b. Elevation of Center Line of Hot Water distribution Header	M	
	c. Design pressure for Hot Water Distribution System	Kg/cm <sup>2</sup> (g)	
<b>20.0</b>	<b>Isolation Valves in Hot Water Risers</b>		
	a. Size	mm	
	b. Quantity		
	c. Type/Code & Standard		
	d. Make		
	e. Pressure drop across the valve in fully open position		
	f. Materials of Construction		
	i) Body		
	ii) Disc		
	iii) Drive Shaft/Stub Shaft		
	iv) Bearings		
<b>21.0</b>	<b>Flow Control Valves (If Applicable)</b>		
	a. Size	mm	
	b. Quantity		
	c. Type		
	d. Make		



**TITLE**  
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SL. NO.	DESCRIPTION	UNIT	DATA/PARAMETER
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f. Materials of Construction

- i) Body
- ii) Spindle
- iii) Trim

**22.0 Isolating Valve in Sludge Pit**

a. Size mm

b. Quantity

c. Type

d. Make

e. Conform to which code in respect of design/testing

f. Materials of Construction

- i) Body
- ii) Stem
- iii) Trim

**23.0 Stationary Screen**

a. Quantity

b. Size & Material of Bar

c. Clear Space between the bar

d. Lifting Arrangement

**24.0 Fill & Fill Supports**

a. Type of fill

b. Material

c. Expected Life Years



**TITLE**  
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SL. NO.	DESCRIPTION	UNIT	DATA/PARAMETER
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d. Arrangement of Fill

e. Method to prevent dislocation of Fills      Years

f. Type/Material/Size of fixing arrangement to supporting grid

g. Fill Support Grids

- i) Type
- ii) Material (give full specification)
- iii) Size

h. Grid Supporting Frames

- i) Type
- ii) Material (give full specification)
- iii) Size

i. Fasteners

- i) Type
- ii) Fill/Splash Bars
- iii) Fill Support Grids
- iv) Frames for Supporting the Grids

**25.0 Drift Eliminators**

a. Number of Passes

b. Gross Face Area per pass      M<sup>2</sup>

c. Type

d. Eliminator Blades      mm

- i) Material
- ii) Maximum Length of blade
- iii) Size and shape of blades
- iv) Type and material of drain boards



**TITLE**  
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**SHEET** 6 **OF** 9

SL. NO.	DESCRIPTION	UNIT	DATA/PARAMETER
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e. Blade Support Spacers

i) Type

ii) Material

f. Support for Spacers

i) Type

ii) Material

g. Fasteners

i) Type

ii) Material

**26.0 Gate in Cold Water Outlet Channel**

a. Number per cold water outlet channel

b. Gate Type

c. Name of Manufacturer

d. Gate Size

e. Weight of each gate

f. Are elements of gate dismantling type?

g. Weight of each Element

h. Frame Type

i. Fixing arrangement of frame with RCC channel

j. Lifting Arrangement of Gate





**TITLE**  
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**SECTION :** A

**REV. NO.** 0 **DATE** 22.03.2003

**SHEET** 7 **OF** 9

SL. NO.	DESCRIPTION	UNIT	DATA/PARAMETER
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k.	Expected Life	Years	
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**27.0 Sludge Pump & Motor**

a. Pump Type

b. Make & Model No.

c. Capacity M<sup>3</sup>/Hr

d. TDH MWC

e. Pump Speed RPM

f. Pump Efficiency at Rated Flow

g. Power Consumption at Rated Flow KW

h. Material of Construction

i) Impeller

ii) Casing

iii) Pump & Line Shaft

iv) Bearings

v) Impeller/Casing Wearing Rings

**28.0 Cooling Tower Materials of Construction**

a. Casing

b. Louvers

c. Partition Walls

d. Basin Partition Walls

e. Stack

f. Stair Case

g. Hot Water piping



**TITLE**  
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SL. NO.	DESCRIPTION	UNIT	DATA/PARAMETER
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- h. Hot Water distribution basin
- i. Internal Walkways
- j. Supporting Structure
- k. Hand Rails
- l. Structure Connector
- m Bolts, nuts, washers and other hardware
- n. Nails
- o. Anchor Bolts
- p. Hot Water Distribution Nozzle
- q. Hot Water distribution Plates
- r. Spacers
- s. Mechanical Equipment Support

**29.0 Weight of Equipments**

- a. Weight of Heaviest part to be handled Kgs.
- b. Size of largest part to be handled Kgs

**30.0 Inspection & Testing**

- a. Hydro Test Pressure for Hot water piping
  - i) Test Pressure Kg/cm<sup>2</sup> (g)
  - ii) Duration Minutes



**TITLE**  
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**NATURAL DRAFT COOLING TOWER**

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SL. NO.	DESCRIPTION	UNIT	DATA/PARAMETER
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**31.0 Painting Details**

**a. Externally painted Surfaces**

	External Surface	Surface Preparation	Primer	Final Paint
i.	Piping (Under Ground)			
ii.	Piping (Over Ground)			
iii.	Stationary Screens			
iv.	Hoist Derric			
v.	Other Items			

**a. Internally painted Surfaces**

	Internal Surface	Surface Preparation	Primer	Final Paint
i.	Piping and Valves			
ii.	Other Items			

32.0	Maximum Water Handling capacity	M <sup>3</sup> /Hr		
33.0	Cooling Water Flow Rate (L)	Kg/m <sup>2</sup> /Hr		
34.0	Dry Air Flow Rate (G)	Kg/m <sup>2</sup> /Hr		
35.0	Ratio of Water to Air (L/G)			
36.0	Dry Air Flow	Kg/Hr		
37.0	Temperature of air leaving the Stack	°C		
38.0	Inlet air Enthalpy	KCal/Kg		
39.0	Exit air Enthalpy	KCal/Kg		
40.0	Total Heat Exchange/Kg of Inlet Dry air	KCal/Kg		
41.0	Losses in hot water piping in MWC	MWC		
42.0	Type of air inlet	MWC		

## 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. PEAT - 6024-0



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

NAME	DESIGNATION	SIGNATURE	DATE	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





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 - 6030-0



## 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			COMPANY SEAL
NAME	SIGNATURE	DATE	





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


COMPANY SEAL

[illegible]

(Form No. PEM-6042-0)

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.

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.

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 other wise 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. Wherever 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 at the appropriate stage or at the time of final inspection, as required.
8. This Quality Plan is also applicable to spares, if any, under scope of supply of Vendor.
9. The quality plan shall be submitted in septuplicate (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 : ..... WEEKLY OFF DAY .....  
..... (At least 15 days prior notice shall be given by the Vendor to Inspection Agency)

LIKELY DURATION( No.of working days).....  
WORKING HOURS


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. PEM-6053-0

\* Unpriced schedule shall also be furnished along with Part-A Schedule in Technical Bid.

		TITLE				SPECIFICATION NUMBER			
		* SCHEDULE OF PRICES FOR COMMISSIONING AND MANDATORY SPARES				VOLUME III			
						SHEET ... OF ...			
<p>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.</p>									
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									

		<b>TITLE</b> <b>* SCHEDULE OF PRICES FOR RECOMMENDED SPARES</b>				<b>SPECIFICATION NUMBER</b>  <b>VOLUME III</b>  <b>SHEET</b> _____ <b>OF</b> _____			
The bidder shall give below a list of spares recommended for three years (or as otherwise specified in section - C) for trouble free performance of the equipment / system offered.									
S No	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)
PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE									
NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL					



	TITLE	SPECIFICATION NUMBER
	<b>SCHEDULE OF PRICE FOR ERECTION AND MAINTENANCE TOOLS &amp; TACKLES</b>	VOLUME III
		SHEET ... OF ...

The bidder shall be give 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 vendor's equipment called for in this schedule shall include the cost of consumables, operation services, depreciation, 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

FORM No. PEM - 6056-0



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**

Sl. 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**
