

**SPECIFICATIONS FOR DESIGN, DEVELOPMENT
ASSEMBLY & TESTING OF
BASEBOARD PCB CARD FOR POWER SUPPLY OF COMOS**

Specification No. : PS407223
Revision No. : Rev 00
Date : 01.05.2017

The specification is in two parts namely part-A related to **technical requirements** of this tender specification and part- B related to **commercial requirements** of this tender specifications.

Supplier to ensure the following while submitting the bid :

There should be **one** sealed envelope mentioning enquiry number and opening date on top of envelope. This envelop should consist of two sealed individual envelopes –**one** for tehcnical bid and **another** for commercial bid . Enquiry No. , opening date and bid type i.e. Technical / Commercial should also be mentioned on each individual envelope.

On tender opening date only technical bid will be opened while commercial bid will only be opened for those parties who would be found technically suitable acceptable by BHEL in line with technical requirement of the specifications .

PART-A (Technical Requirements)

1. GENERAL

This specification covers the requirements of infrastructure, quality of manpower considered essential for quality and reliability of design ,development , manufacturing testing & supply of various high tech Electronics cards//modules involving multilayer PCBs , ASICs , SMT components and digital electronics components.

The supplier should confirm availability of the required infrastructure and manpower in technical bid as given in this specifications.

a INFRASTRUCTURE FACILITIES

The supplier should have the following manufacturing facilities :

1. Dust Free environment for card assembly.
2. Stencil Printer .
3. Automatic Glue Dispenser
4. High speed component placement machine
Following features would be preferred :
 - Board size capability - 400 mm x 300 mm min.
 - Placement Range - 0603 to SOIC's , 0402 compatible
5. Dual wave Soldering machine
6. 4 zone Reflow oven
7. Digital / Analog Temperature controlled solder stations .
8. Component lead forming machines.
9. Details of Electrostatic discharge protection
& ESD procedure adopted to be submitted with offer .
10. Semi Automatic component insertion machines.

b. TESTING FACILITIES :

The supplier should have the following test facilities :

- (a) Digital oscilloscope Dual channel Min.100 MHZ Band width with following advance features would be preferred. .
 - Advanced signal processing
 - TDR measurement
 - Eye pattern analyzer
 - Cross talk and ringing analysis
- (b) Spectrum analyzer with following features preferably :-
 - Electromagnetic Interference Analysis.
 - High frequency analysis.
 - Harmonic Distortion Measurement.
 - AM / FM Measurement
- (c) Multi channels / 100 MHZ band width logic analyzer
- (d) Multi channels Digital Pattern Generator.
- (e) Computer added Functional Testing facilities for electronic card.

c. Qualified Manpower

Supplier should have at least 1 engineering graduate (electronics) who would be responsible for execution of order . Experience in multilayer PCB manufacturing using latest state of art technology components like SMT , digital electronics components, ASICS & microcontrollers would be preferred. Technical persons responsible for the execution of the contract should be competent enough to substitute / suggest suitable alternatives for the components which are getting obsolete / not available in the market .

Based on technical bid received from supplier , BHEL may depute their team of engineers for on spot inspection at supplier works for confirmation of infrastructure facilities available with the party before considering them for assigning the contract.

d. Experience

Supplier to confirm at least 2 orders have been executed by them involving latest state of art components as mentioned in the specification. Supplier to submit copies of purchase order /contract of such orders executed in past involving SMT components, microcontroller/DSP or ASIC based cards .

e. Willingness for Confidentiality Agreement

Supplier to confirm their willingness for unconditional confidentiality agreement on stamp paper as per **Annexure A** to qualify for their consideration in technical scrutiny of tender.

2. SCOPE OF WORK & Technical requirement

A. SCOPE OF WORK:

1. **Context** This specification applies to requirement of Baseboard PCB card for power supply of BHEL BPL CoMoS project. This card is intended to be used as a baseboard PCB card where the standard DC-DC converters and input filter modules (not in scope of supplier) will be soldered and the complete assembly will function as a switch mode power supply card catering to control voltages of +5,+/-15 & +24 V DC

This card is intended to be used in a rack type enclosure with fixed dimensions. The input to the card shall be 230V AC +25%/-20% and 172V to 268V DC. Same input connector shall be used for AC and DC inputs provided on the front plate of the card. This card shall have multiple outputs which shall be connected to a common backplane through a press-fit type EURO connector at the end of the card.

2. **Block Schematic:** Baseboard PCB card is to be manufactured as per block schematic provided in fig 1.

Following items shown in block schematic are not in scope of supplier

1. INPUT FILTER COSEL PART NO. : NBH-10-432
2. DC/DC CONVERTOR COSEL PART NO. : DBS400B24
3. DC/DC CONVERTER COSEL PART NO: MGS 302415GR
4. DC/DC CONVERTOR COSEL PART NO: MGS302405GR

However, DC/DC 5V converter **Cosel Part no.: TUHS5F05** shall be under supplier's scope of supply.

Successful bidder to develop detail schematic /Gerber files in close collaboration with BHEL and take approval from BHEL before proceeding for manufacturing.

3. **Mechanical Parameters.** The PCB shall be 6U PCB board with Aluminium front plate and card puller arrangement. Front LED's shall be mounted and 2 nos. 25 pin sub D connector for I/O at front plate and 2 nos. Euro connector at the other end of PCB shall be placed.
4. Detailed schematic along with complete BOM shall be generated by the successful bidder in consultation with BHEL Bhopal and final documents to be submitted to BHEL Bhopal for approval before manufacturing.
5. Test schedules for the card will be provided by BHEL to the successful bidder only. Two copies of Test Certificate for each card to be provided by the party along with consignment for each of the card supplied by them after assembly and testing.

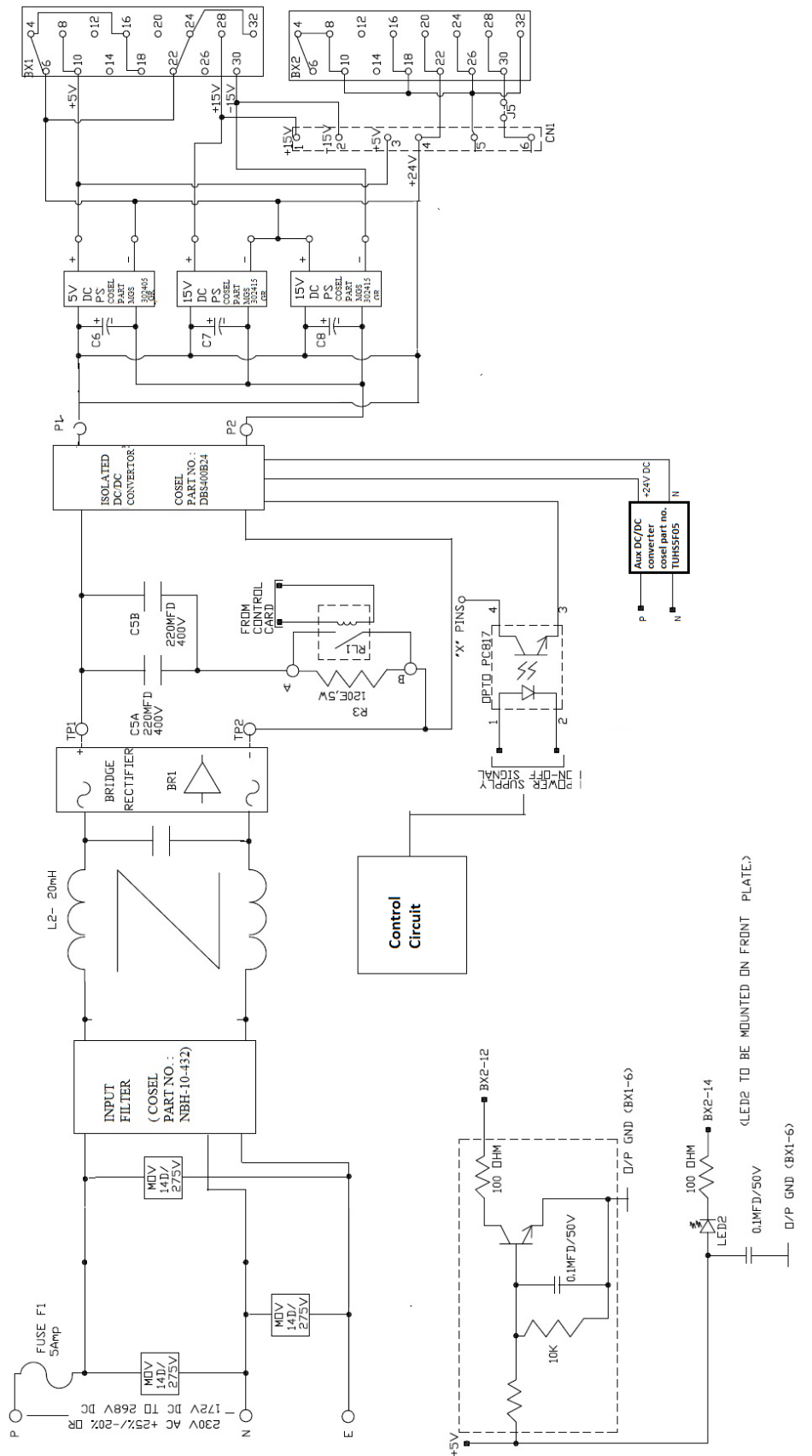


Fig 1: BLOCK SCHEMATIC OF BASEBOARD PCB FOR COMOS POWER SUPPLY

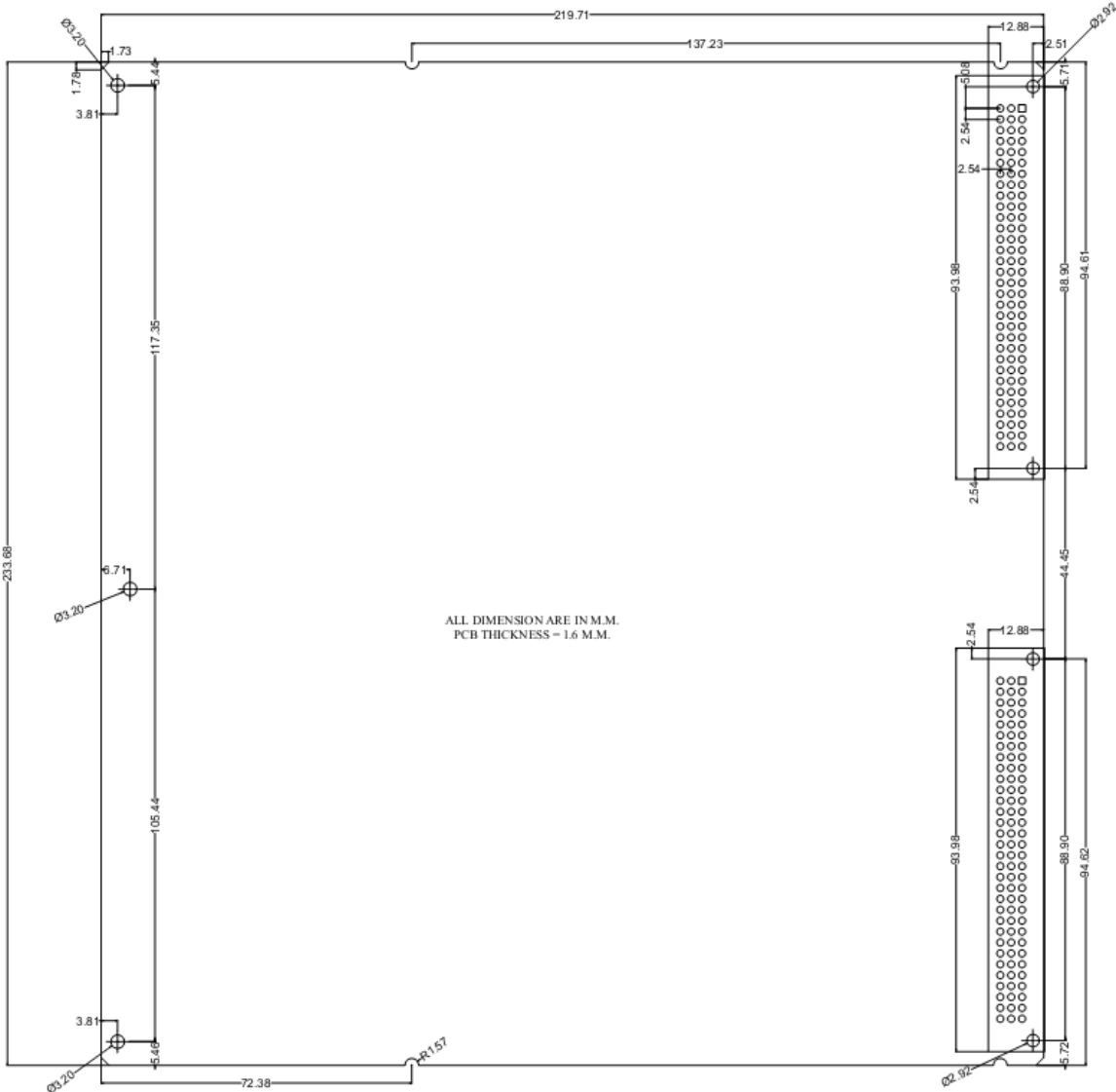


FIG 2: PCB dimension.

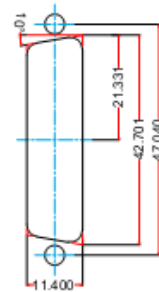
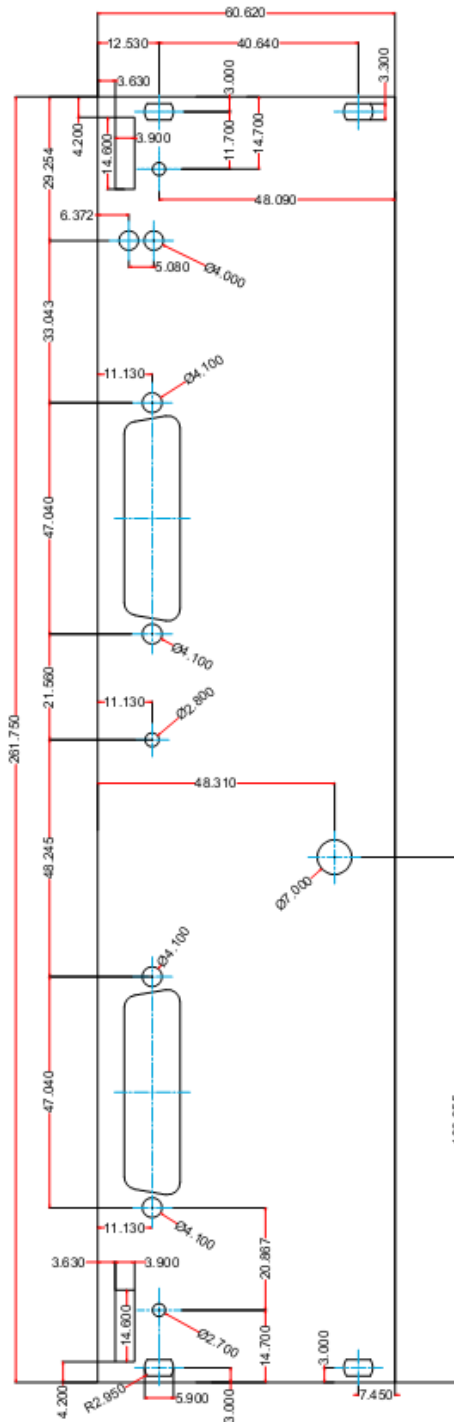
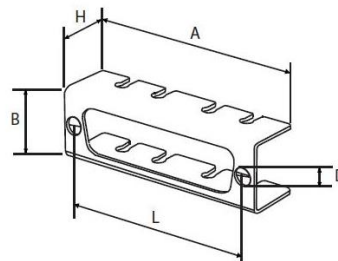


PLATE THICKNESS = 2.0 M.M.
 ALL DIMENSIONS ARE IN M.M.
 FRONT PLATE DESIGN

Coding plates



Material: Stainless steel

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Components of Front Plate:

sr. no.	Item Description	Part no.	
1	LED (Dual Green)	Manufacturer Part No.	553-0122-200F
		Element14 Part No.	1306045
2	D-Sub Connector	Harting	9651626811
		Digikey Part No.	1195-2478-ND
3	Card Puller (Top)	Manufacturer (Schroff)	20817-327
		Element14 Part No.	2126777
4	Card Puller (Bottom)	Manufacturer (Schroff)	20817-328
		Digikey Part No.	1439-1047-ND
5	Switch	Manufacturer (TE or similar)	MTA106D
		Element14 Part No.	1653438
6	Coding Plate	Gimota Part no.	SUCB1

B. QUALITY OF ELECTRONIC CARD ASSEMBLY:

The module shall be used in power plants near HV area, the quality of the assembly , soldering, handling of the components & assembled cards(EMI/EMC), sourcing of semiconductor components are of vital importance. Therefore, each of the above should be carefully monitored and sources of the components must be from OEM/reputed international farms who adhere to strict quality norm.

To improve, maintain Quality, and highest level of reliability, it is essential to generate statistical data of any failure during testing and also after burn in, rework done. So that improvement in the assembly and process can analyzed. Supplier should provide the statistical report to BHEL.

C. FITTINGS OF CARDS & MECHANICAL ASSEMBLY:

As quality of soldering is predominant in performance of the individual electronics card, final assembly like fixing heat sinks with MOSFETS, fixing of vertically mounted cards, electrolytic capacitors, fiber optic connectors are crucial for reliable functioning of the modules in traction application. Supplier must ensure use of proper size of hardware and insulating fixing material. All hardware are of stainless steel. Each fixing screw must contain proper plain washer & spring washer.

D. CONFORMAL COATING OF THE PCB'S:

Conformal coating is very essential for long life and trouble free operation in dusty and hazardous environment. The conformal coating should be in line with prevailing practice of relevant industry, It is recommended multiple layers of coating is applied on each PCB's and proper time delay between two layers of coating is followed.

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CAUTION:

1. Before applying coating, the PCB's should be tested in all respect.
2. All contacts for connectors and test points & fiber optic ports must be protected thoroughly by providing suitable cover on it. This cover only be opened after the coating is dried up.
3. Standard EMI/EMC protective norms must be followed during the entire process.

E. All the PCBs should have BHEL monogram (copper) and should be UL certified and marked.

F. TESTING & TEST REPORTS:

The test schedule calls for testing of individual cards. Each module should comply 100% with the test parameters as per the test schedule. Each module has to be burn-in at 60 Degree C for minimum 24 Hour. Test result shall be generated and compiled for every module with each cards.

3. DOCUMENTS TO BE SUBMITTED TO BHEL FOR APPROVAL .

While executing the PO, supplier shall submit to BHEL and take approval for the following documents for each of the modules mentioned in the enquiry.

1. Schematic drawing .
2. Bill of material
3. SIZE ,Component location / Legend & Mounting details .
4. PCB Layout .
5. Gerber file & print out for every layer.

4. IEC Compliance

Type Testing / Environment Testing For Power supply			
Sr.No	Test	Standard	Specification
EMI / EMC Test			
1	Conducted Emission	CISPR 11 Class A	Quasi peak: 150kHz-500kHz, 79 dBµV,500kHz-30 MHz, 73 dBµV Average: 150kHz-500kHz, 66 dBµV500kHz-30 MHz, 60 dBµV
2	Radiated Emission	CISPR 11 Class A	Quasi peak: 30-230MHz, 40dBµV at 10m measurement distance230-1000 MHz, 47 dBµV at 10m measurement distance
3	Radiated susceptibility	IEC 61000-4-3	80 MHz-1000MHz, 30V/m

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4	Conducted Immunity	RF	IEC 61000-4-6	Power port: 0.15-80MHz :10Vrms 1kHz, 80% AM Signal port: 0.15-80MHz :10Vrms 1kHz, 80% AM
5	Power Frequency Magnetic field		IEC 61000-4-8	100 A/m for continuous 1min 1000 A/m for 3 sec
6	Ring Wave immunity		IEC 61000-4-12	Power Port: non-repetitive damped oscillatory transients (ring waves) with 2 kV line to ground as voltage of the first peak (maximum or minimum) in the test waveform & 1kV line to line as voltage of the first peak (maximum or minimum) in the test waveform Signal port: non-repetitive damped oscillatory transients (ring waves) with 1 kV line to ground as voltage of the first peak (maximum or minimum) in the test waveform & 0.5kV line to line as voltage of the first peak (maximum or minimum) in the test waveform
Environment Test				
7	Damp Heat Test – Steady State		IEC 60068-2-78	+40°C / 4 days / 93% RH
8	Cold Test - Operating		IEC 60068-2-1	- 40°C / 16 H
9	Dry Heat Test – Operating		IEC 60068-2-2	+70°C / 16 H
10	Damp Heat Test Cyclic		IEC 60068-2-30	+55°C,95% RH / 6 Days
Mechanical Stress Test				
11	Vibration (during operation and Transportation)		IEC 60255-21-1 Vibration Response –Powered ON, Class 1	Acceleration: 1g from 10 to 150Hz, 1 sweep in each axis total 3 axes
			IEC 60068-2-6	Acceleration: 1g from 10 to 150 Hz 20 sweep
Dielectric Test				
12	Dielectric Test		IEC60255-27 Cl no. 10.6.4.3; cl no. 10.6.4.3.3 table no. 14	For Power Supply, Ct & PT – AC test voltage 2 kV For digital I/O, analog I/O & 4 to 20 mA I/O – AC test voltage 0.5 kV

5. WARRANTY.

PCB/ modules along with all the components mounted thereon shall be guaranteed for 30 months from the date of supply or 24 months from date of commissioning whichever is earlier.

6. Document to be submitted with technical Bid

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Following document duly filled must be submitted by the bidder party as annexure to their **technical bid** (to be kept in separate sealed envelope) . Otherwise bid will be technically rejected.

A. Infrastructure details

SNo.	Description/Equipment	Make / details #
1	Dust Free environment for card assembly	Area to be specified with temperature& humidity information.
2	Automatic Glue Dispenser	
3	High speed component placement machine	
4	Dual wave Soldering machine	
5	4 zone Reflow oven	
6	Digital / Analog Temperature controlled solder stations	
7	Component lead forming machine	
8	Details of Electrostatic discharge protection & ESD procedure adopted .	
9	Semi Automatic component insertion machines	
10	Digital sampling oscilloscope Dual channel Min.100 MHZ Band width .	
11	Digitizing oscilloscope with Min.100MHZ band width	
12	Multi channel Spectrum analyzer	-
13	Multi channels , 100 MHZ band width logic analyzer	
14	Multi channels Digital Pattern Generator.	
15	Multi channel temperature scanner.	
16	Computer aided Functional Testing facilities for electronic card.	

Machine details like model / Type No. make ,features ,capacity etc to be given.

- B. Qualified manpower details
- C. Confirmation for Confidentiality agreement
- D. Details of the order executed (see Para 1-d)

PART-B (COMMERCIAL REQUIREMENTS)

Bidder to submit commercial bid including details of scope of work , basis for scope of work and necessary price breakup for scope defined in 2 A/I & 2A/II of this

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specification and as BHEL enquiry calls for. Bid should also contain delivery time and payment terms ,warranty offered for bidder's scope of work etc.

The commercial bid to be kept in separate sealed envelope.