

**Bharat Heavy Electricals Ltd**  
Electronics Division  
Mysore Road, Bangalore – 560026

**Tender Document for SUPPLY,  
COMMISSIONING SUPPORT OF POWER  
CONDITIONING UNIT (PCU)  
RFQ REF: HBSBOS003**

Technical Bid Opening Date: 27<sup>th</sup> August, 2014

This Tender Document Contains:

General Terms and Conditions, Technical Specification, Unpriced Bid Formats & Price Bid Formats

Note: Part – I: **To be submitted in a separate sealed cover**

Part – II: **To be submitted in a separate sealed cover.**

And Part-I & Part-II sealed covers should be put in outer envelope and super scribing the Name of work and Name & Address of the tenderer. Tender document should be dropped in Tender drop box super scribed “SC&PV-MM, Wednesday” kept in reception area of BHEL – EDN, Bangalore.

**Contact Person at BHEL:**

- 1. Mr. H.B. Srinivasa : Sr. Manager (SC&PV-MM)**  
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# REQUEST FOR QUOTATION

	<b>BHARAT HEAVY ELECTRICALS LIMITED</b> Electronics Division PB No. 2606, Mysore Road Bangalore - 560026 INDIA	RFQ NUMBER: <b>HBSBOS003</b>  RFQ DATE : 26.JUL.2014	Due Date <b>27.AUG.2014</b> Time: <b>13:00 HRS</b>  VENUE : <b>NEW ENGG. BLDG</b>
MMI:PU:RF:003			

	(for all correspondence) Purchase Executive : SRINIVAS H B Phone : 26998452 Fax : 00918026989217 E-mail: srinivasahb@bheledn.co.in
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Please submit your lowest quotation subject to our terms and conditions attached for the material mentioned below. The quotation must be enclosed in a sealed envelope / Fax superscribed with RFQ no.and due date, should reach us on or before the due date by **13.00** hours IST and will be opened on the same day at **13.30** hours at the venue mentioned above. **PLEASE DROP THE OFFER IN THE BOX PROVIDED AT RECEPTION.**

**RFQ TERMS & CONDITIONS:**

- 1.Offer shall be submitted in two part :  
 Part 1 : Techno-Commercial Bid  
 Part 2 : Price Bid
2. This RFQ document comprises of :
  - (1) Request For Quotation
  - (2) Technical Specifications : PS- 439-884
  - (3) Enclosures B,B1&B2 : Commercial Terms & Conditions, Unpriced Bid Format and Price Bid Format
  - (4) General Terms and Conditions (Doc Ref : SCPV/BOS/01-Rev 01)
3. The delivery date indicated in RFQ is tentative. The actual delivery date shall be as indicated in Annexure B.

SI No.	Description	Qty	Unit	Delivery qty	Delivery Date
1	PS0679039023 Power Conditioning Unit 630KVA Supply As per specs.PS-439-884  Test Certificate	16	NO	16	08.MAR.2015
2	PS0679039295 Commissioning of PCU As PER SPEC PS-439-884	16	AU	16	01.APR.2015
3	PS0679039333 Control cards for 630KW PCU As per specs.PS-439-884 Test Certificate	5	ST	5	08.MAR.2015
4	PS0679039341 Fuses with fuse holders for 630KW PCU As per specs.PS-439-884 Test Certificate	4	ST	4	08.MAR.2015
5	PS0679039350 SPDs for 630KW PCU As per specs.PS-439-884 Test Certificate	4	ST	4	08.MAR.2015


**Total Number of Items - 5**

Please note that the tender will be opened in the presence of the bidders or his authorised representatives (maximum two per organisation) who choose to be present with authorisation letters. Refer annexure for the terms and conditions.  
 Preference will be given to vendors who accepts our standard payment terms i.e.100% payment - 30 days after receipt of material at our works subject to acceptance.  
 Please specify Terms of delivery, Excise duty, sales tax, Ex-BHEL, Ex-works surcharge, Insurance,P&F, Freight and other taxes very clearly .  
 For evaluation,exchange rate(TT selling rate of SBI) as on scheduled date of tender opening (Part-I bid incase of two part bid) shall be considered.  
 The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected.The list of banned firms is available on BHEL web site [www.bhel.com](http://www.bhel.com)


- i). This is only RFQ not an order.
- ii). In all correspondence quote RFQ No. & due date.
- iii). In Quotation BHEL material code / RFQ Sl. No. should be mentioned clearly.

For and On behalf of BHEL.   Page 1 OF 2
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MMI:PU:RF:003			
		(for all correspondence) Purchase Executive : SRINIVAS H B Phone : 26998452 Fax : 00918026989217 E-mail: srinivasahb@bheledn.co.in	
<p>Please submit your lowest quotation subject to our terms and conditions attached for the material mentioned below. The quotation must be enclosed in a sealed envelope / Fax superscribed with RFQ no.and due date, should reach us on or before the due date by <b>13.00</b> hours IST and will be opened on the same day at <b>13.30</b> hours at the venue mentioned above. <b>PLEASE DROP THE OFFER IN THE BOX PROVIDED AT RECEPTION.</b></p>			
<p>iv). Quotation Envelope / Fax not superscribed with RFQ No.and due date is liable for rejection. v). Quotation should remain valid for a minimum peiod of 90 days from due date. vi). In case of non-receipt of Quotation or regret letter for 3 consecutive RFQs you are liable to be removed from our vendors list. vii). All Prices should be written in words and numbers. viii). Excise Chapter Heading should be mentioned for all items where VAT is applicable .</p>			


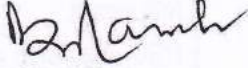
For and On behalf of BHEL.

	<b>PURCHASE SPECIFICATION FOR</b> <b>630KW GRID-CONNECTED POWER CONDITIONING UNITS</b>	PS-439-884
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It must not be used directly or indirectly in anyway detrimental to the interest to the company

**Technical specification**  
**for**  
**Supply, installation and commissioning of**  
**3-phase Grid-connected Power conditioning units**

Revision details :R 00	Prepared	Approved	Date
	 BKC/LNK	 SLR/BNR	02 - 07 - 2014

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	<b>630KW GRID-CONNECTED POWER CONDITIONING UNITS</b>	REV NO: 00
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### 1.0 Pre-qualification criteria:

a) Vendor should have supplied and commissioned power conditioning units for a minimum cumulative of 10MWp SPV power plant projects in India during the last 3 years, with individual power plant projects of 1MW and above .

b) Offered PCU shall be manufactured/assembled in India and shall have capacity to manufacture minimum of 5MW of PCUs per month.

Evidence shall be furnished in the form of completion certificates from end users along with copies of purchase orders. **Vendor acceptance (Yes / No).**

**REFER ANNEXURE-1 ATTACHED WITH THIS SPECIFICATION FOR PROJECT DETAILS AND SCOPE OF SUPPLY.**

### 1.0 Technical specification of Power Conditioning Units:

Offer shall be submitted by vendor with clause-wise acceptance as shown below with signature and seal on every page

In case of conflict between this specification and those (IS: Codes, standards etc) referred to herein, the former shall prevail. If the vendors acceptance is 'NO' against any of the clauses mentioned herein, the offer is liable for rejection on technical grounds.

**Vendor acceptance (Yes / No).**

#### 1.1 Basic requirements

**(PCU type, Standards, Technology, Interconnections, Interfaces etc)**

#	Parameter	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
1.1.1	PCU type	<p>Grid-interactive.</p> <p>PCU shall always remain synchronized with grid, following the grid voltage, frequency and phase. For this purpose, the PCU shall control its output voltage, frequency and phase based on a feedback loop linked to grid.</p> <p>PCU shall automatically control its ON/OFF state, depending on grid availability. It shall, by itself, shutdown in the absence of grid. Similarly, it shall, by itself, resume operations when grid reappears.</p> <p>PCU shall also automatically control its ON/OFF status, based on solar power availability. It shall, by itself, shutdown below a settable value of DC input power. Similarly, it shall, by itself, wake up, above a settable value of DC input power.</p>	



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#	Parameter	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
1.1.2	Compliance with standards	IEEE 929-2000 or equivalent: Recommended practice for utility interface with PV systems. IEC 62093 or equivalent: Balance of system components for photovoltaic systems: design qualification natural environments IEC 61683 or equivalent: Photovoltaic systems – power conditioners – procedure for measuring efficiency IEC 60068-2 : Environmental testing. IEC 62109-1 and 62109-2 or equivalent: Safety of power converters for use in photovoltaic systems: Part-1: General requirements; Part-2: Particular requirements for inverters. IEC 61727 or equivalent for characteristics of utility interface.	
1.1.3	Output transformer	PCU shall be of 'transformer-less' design.	
1.1.4	Maximum Power Point Tracking (MPPT)	MPPT controller, based on intelligent software, as per IEC 62093, for the purpose of maximizing the energy generation from PV array, with constant voltage operation.	
		Microprocessor-based MPPT, to minimize losses.	
1.1.5	AC-DC conversion	IGBT-based 3-phase bridge.	
1.1.6	Built-in support systems	PCU shall be provided with protection circuits, monitoring circuits, data logging & storage system, digital displays, RS485 MODBUS communication outputs for SCADA interface etc as per Cl. 1.7 of this specification.	

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#	Parameter	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
1.1.7	External ducts, louvers & fans	Ducting and ventilation drawings, HVAC design calculations shall be provided by the vendor within seven days of award of Purchase Order.	
1.1.8	DC input and AC output terminations	No of DC Inputs (PV Sub Array) and the maximum size of cable that can be terminated in each terminal shall be indicated in the offer.	
1.1.9	Environment protection	(a) All PCB cards shall be provided with suitable coating (epoxy etc) for protection. (b) All metallic hardware shall be stainless steel such as SS304 etc.	

## 1.2 Technical parameters

1.2.1	Output power rating	Refer cl no 1.1 of ANNEXURE-1. Temperature de-rating curves shall be enclosed with technical bid.	
1.2.2	AC grid connection	3-phase	
1.2.3	Output frequency	50 Hz +/- 5%	
1.2.4	Nominal output voltage	Value to be indicated by vendor.	
1.2.5	Maximum DC input voltage (Max open circuit PV voltage)	1000 V DC	
1.2.6	MPPT Range of control system	Range to be indicated by vendor.	
1.2.7	DC side peak power	Value to be indicated by vendor.	
1.2.8	Max DC operating current	Value to be indicated by vendor.	
1.2.9	Max AC output current	Value to be indicated by vendor.	
1.2.10	Power factor	Designed operation close to unity PF. Adjustable window 0.95 lead to 0.95 lag	



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#	Parameter	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
1.2.1 1	Ambient temperature	0 to 50 deg C.	
1.2.1 2	Relative Humidity	15% to 95% non-condensing	
1.2.1 3	Enclosure	IP 20	
1.2.1 4	Grid Frequency tolerance	+/- 3 Hz	
1.2.1 5	Grid Voltage tolerance	- 20% and + 15%	
1.2.1 6	PCU conversion efficiency	> 97% at 75 % of full load as per IEC 61683. Values at 25%, 50% and 100% load shall be provided by vendor.	
1.2.1 7	AC output current distortion	< 3 % THD at rated power	
1.2.1 8	Optional VAR control	To be provided with set point selection.	
1.2.1 9	Auxiliary power requirement for PCU Controls / Cubicle Fans.	a) 230VAC, 1Ph, UPS supply for PCU control circuit, if required, shall be in vendor's scope. Preferably supply for control circuit shall be generated within the PCU. b) 415VAC, 3-Ph for PCU Cubicle Fans, if required, shall be in vendor's scope and shall be generated within the PCU.	

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### 1.3 Protection systems

#	Parameter	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
1.3.1	Protection systems for current, voltage, temperature, surges, ground faults, etc.	AC & DC over current	
1.3.2		AC & DC short circuit	
1.3.3		DC reverse polarity	
1.3.4		Over temperature protection: Heat sink, Cabinet	
1.3.5		Synchronization loss	
1.3.6		Anti islanding protection	
1.3.7		EMI and RFI	
1.3.8		Grid monitoring Protection against any sustained fault (lightning effect etc) in grid / feeder line.	
1.3.9		Ground fault detection	
1.3.10		AC & DC overvoltage (SPD arrestors shall consist of MOVs and in-built thermal disconnectors). Make of SPD shall be mentioned in the offer.	

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#### 1.4 DC, AC side load break disconnecting switch / breaker provisions

#	Parameter	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
1.4.1	DC side	Load break disconnecting mechanism required on DC side. Type (manual / motorized) offered shall be indicated.	
1.4.2	AC side	(a) Air circuit breaker (ACB) shall be provided at the output of the PCU. ACB shall be Motorized, spring charging type with Manual spring charge operating option. 3P, Electrical draw-out type. <ul style="list-style-type: none"> <li>- Breaking capacity: 50kA rms</li> <li>- Rated short-time withstand current: 50kA rms / 1sec</li> <li>- Microprocessor based ET trip system with long time, short time, instantaneous and ground fault protection settings.</li> <li>- Built-in S/T, U/V, closing coil</li> <li>- Manual operating handles and bolt kits to be provided.</li> </ul>	
		(b) Aux contacts from both ACBs (ON/OFF) shall be made available at TB terminals to enable external wiring for SCADA purpose.	
		(c) Surge protection device (3P) with suitable rating shall be provided at the input of the ACB. Make of SPD shall be mentioned in the offer.	
		(d) LED lamp indications shall be provided for R, Y, B indication for grid side supply ON status.	
		(e) ACBs shall be provided either within the PCU cubicle or in a separate LT Panel depending on the design available with vendor. Vendor shall indicate the	

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		methodology followed.	
		(f) Interconnection between the ACB Panel and PCU including cables / busbars as applicable shall be in the scope of the vendor.	

### 1.5 Front panel display and control

#	Parameter	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
1.5.1	Front panel screen (LCD display, etc) with browsing / navigation provisions to 1) select display parameters 2) provide settings for various parameters	DC side voltage, current, power.	
1.5.2		AC side output voltage (all three lines), current (all three lines), frequency, phase, power factor, power, import energy, export energy etc	
1.5.3		Grid side voltage, frequency, phase, etc	
1.5.4		Temperatures (ambient, heat sink, cabinet, fans etc)	
1.5.5		Faults	
1.5.6		Other event logs	
1.5.7		Other features as may be necessary for supervisory control and operation of the PCUs shall be provided.	

### 1.6 Data logging, storage, retrieval, downloading, uploading

1.6.1	Provision of built-in systems for data logging, storage, retrieval, downloading, uploading etc.	Date-cum-time stamped logging of DC and AC side parameters (current, voltage, frequency, phase, power factor, power, import / export energy etc), faults and other events.	
1.6.2		Data storage with retrieval features.	

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#	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
1.6.3	Provision of all necessary built-in systems, ports etc for downloading the data into a PC / Laptop etc that will be required for reporting, data analysis and trouble-shooting purposes.	
1.6.4	Provision of all necessary built-in systems, ports etc for uploading of software etc that will be required for replacing, revising, upgrading the system.	

### 1.7 Provisions for SCADA interface

1.7.1	SCADA interface requirement	Solar PV power plant will have an integrated SCADA, which is within BHEL scope, whereby all the PCUs will be integrated with other data systems such as solar array string monitoring, weather monitoring, HT side transformers / breakers monitoring, etc. Accordingly, PCU shall have necessary communication protocol and output ports to facilitate SCADA interface. SCADA shall be OPC server based.	
1.7.2	Communication protocol	RS485 (MODBUS RTU), Ethernet (MODBUS TCP)	
1.7.3	Daisy-chain looping	PCU shall have provisions for daisy-chain looping of one another for SCADA purposes.	
1.7.4	Parameters for SCADA	All DC and AC parameters (current, voltage, frequency, phase, power factor, power, import/export energy etc), grid data, temperature, faults, other event logs, date/time logs etc from each PCU will be required at SCADA control desk. PCU shall provide for this requirement.	

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### 1.8 Panel related parameters

#	Parameter	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
1.8.1	Structure sheets	CRCA sheet Main frames: 2mm thick min Door: 1.6 mm thick min Gland plate: 3mm thick min	
1.8.2	Bus bars	Tinned copper with appropriate size to match current rating, based on vertical / horizontal layouts and bus bar orientations. Insulation sleeves (PVC etc) shall be used wherever necessary. Bus bars (both AC and DC) shall be colour coded with paint.	
1.8.3	Internal power cables	Insulated (PVC etc) copper cable with appropriate cross section to match current rating.	
1.8.4	Control wiring	Insulated (PVC etc) copper cable with 1.5 sq-mm min. CT wiring 2.5 sq-mm min.	
1.8.5	Base channel	ISMC channel of appropriate size to withstand the weight of the panel; suitable anti-corrosive finish (powder coated finish etc). Single rectangular ISMC base frame shall be provided for the complete panel.	
1.8.6	Provisions for grouting	Base channel shall have suitable provisions (holes, etc) for grouting the panel on floor.	
1.8.7	Earthing terminals as per relevant standards	Earthing terminals shall be provided using tinned copper / aluminium bars of suitable cross section. Terminals shall be brought out to facilitate external connections.	
1.8.8	Insulation clearances	AC side: Phase to Phase / neutral: 25 mm min. DC side: As per relevant standards.	
1.8.9	Painting	Epoxy based powder coating. Paint thickness: 50 microns (minimum). <u>Colour:</u>	

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		<p>Front and Rear Doors (Internal and External): RAL series.</p> <p>End Covers (Internal and External): RAL series.</p> <p>Shade to be mentioned in the offer.</p> <p>Powder coating shall meet the requirement of IS 13871.</p>	
1.8.10	Overall dimensions	Width x Depth x Height in mm shall be indicated in the offer.	
1.8.11	Weight	Panel weight shall be indicated in the offer.	
1.8.12	MQP	Vendor to submit detailed MQP for BHELs approval within one week of placement of Purchase Order.	

## 2.0 Testing and inspection

#	BHEL specification	Vendor compliance (Yes / No)
2.1	<p>Routine tests, as per relevant standards (IEC etc), shall be carried out on the PCUs and shall be witnessed by BHEL. Vendor shall submit Manufacturing Quality Plan and detailed Test Procedure along with drawings for approval by BHEL. Testing shall be carried out by vendor on all the PCUs supplied against Main Order and Initial Spares Order.</p> <p>Following shall be the minimum checks and shall be included by the vendor in the Manufacturing Quality Plan.</p> <ol style="list-style-type: none"> <li>1. Visual inspection check</li> <li>2. Raw material check as per the internal standards of manufacturer</li> <li>3. In-process checks as per the internal standards of manufacturer</li> <li>4. Dimensional check on enclosure</li> <li>5. Degree of Protection Test</li> <li>6. Complete Bill of materials check</li> <li>7. HV / IR insulation tests on main and control circuits</li> <li>8. Burn-in test/Heat run test.</li> <li>9. Factory acceptance tests               <ol style="list-style-type: none"> <li>(a) Load testing of inverter:                   <ul style="list-style-type: none"> <li>- Verification of inverter performance in its stand alone operational mode with a defined power (up to 100% rated full load power) and DC input voltage (up to max value). All parameters: DC voltage, current, power, grid voltage / current of R,Y,B lines, line frequency, ac output power, ac output energy, power factor, line</li> </ul> </li> </ol> </li> </ol>	



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	<p>current, efficiency, THD, etc. to be measured at 25%, 50%, 75% and 100% of the rated nominal power and checked against specified acceptance norms.</p> <ul style="list-style-type: none"><li>- Heat Run Test at rated full load</li><li>- Synchronization to grid</li><li>- Verification of responses of heat sink and cabinet cooling fans to heat sink and cabinet temperature rises.</li><li>- Verification of inverter tripping response to simulated electrical shorts on ac output side.</li></ul> <p>(b) Automatic mode testing (wake up and shut down) with simulated / actual grid and dc input supplies.</p> <ul style="list-style-type: none"><li>- Verification of automatic waking up of inverter as the dc input supply picks up and rises beyond set point levels.</li><li>- Verification of export of power to the grid in relation to functioning of MPPT. This functional test shall include demonstration of change in MPPT output with change in input DC voltage.</li><li>- Verification of automatic shutdown of inverter as dc input supply falls below set point levels</li></ul> <p>(c) Protection tests (by direct method or simulation method)</p> <ul style="list-style-type: none"><li>- Verification of automatic disconnecting and reconnecting of Inverter to the grid, based on rise and fall of heat sink and cabinet temperature with reference to set points.</li><li>- Verification of inverter tripping response to simulated failure of cooling fans.</li><li>- Anti-Islanding Protection test</li><li>- DC Reverse Polarity protection test</li><li>- DC Ground Fault</li><li>- AC and DC Overvoltage</li><li>- Abnormal voltage and frequency</li></ul> <p>(d) Functional tests</p> <ul style="list-style-type: none"><li>- System response to various set points for controls and protections</li><li>- Emergency shutdown cases</li><li>- Disconnecter switch, breaker and contactor operations</li><li>- Meters and displays</li><li>- Data downloading from PCU</li></ul> <p>Test reports shall be submitted prior to dispatch of the system to the site.</p>	
2.2	Type Tests: Valid reports for all types tests as per relevant standards (IEC etc)	

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	conducted within the last 10 years shall be submitted along with offer.	
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### 3.0 Service during warranty period

#	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
3.1	During the warranty period, whenever a technical problem is encountered, BHEL shall report the same to the vendor. Vendor must ensure that the problem is attended to within TWO days from the date of reporting either by replacement or repair of the defective part(s) free of cost to BHEL. Charges incurred by the vendor towards travel, lodging, boarding and any other contingency expenditure shall be deemed included in the cost of equipment	

### 4.0 Instructions to vendors on bid submission:

#### Vendor compliance (Yes / No)

4.1	Offer shall be submitted in two-parts (Two part-bid).  Both parts shall be in separate sealed envelopes as per instructions in tender.  The individual envelopes shall be enclosed in a common bigger envelope with markings (address, etc) on the envelope as per instructions provided in tender.
4.2	First-part shall be techno-commercial bid. Following details shall be furnished: <ul style="list-style-type: none"> <li>1. Technical offer covering letter.</li> <li>2. Filled-up enclosures as per BHEL tender formats (meant for first-part technical bid).</li> <li>3. Clause-wise compliance shall be filled-up in the column provided in this specification, with signature and seal on every page.</li> <li>4. Product brochure of company.</li> <li>5. Product datasheet of the offered PCU model.</li> <li>6. Overall General Arrangement showing relevant views (plan, elevation, side views) with width, height and depth and overall weight. Such details of add-on DC / AC termination</li> </ul>

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	<p>panels, if any, as applicable, shall also be provided along with heat extraction duct drawing.</p> <p>7. Overall electrical schematic diagram of PCU showing details such as DC/AC side isolators/breakers, fuse box, AC/DC side surge protection devices, inverter bridge, filters (EMC etc)</p> <p>8. List of spares offered (with quantity) and without prices.</p> <p>9. List of type test certifications available for the offered rating.</p>
4.3	Second-part shall be price bid with filled up enclosures as per BHEL tender format.
4.4	In addition to the above instructions, tender document provides detailed instructions for bid submission. Vendor shall submit the bid based on such tender instructions.

**5.0 Documents to be submitted after receipt of purchase order**  
Vendor compliance (Yes / No)

#	BHEL specification	Vendor compliance (Yes / No)
5.1	<p>Following documents shall be submitted for BHEL approval within seven days from date of purchase order.</p> <ol style="list-style-type: none"> <li>Inverter module and control system specification (GTP/Datasheet)</li> <li>General Arrangement of PCU with LT output Switchgear (either integrated in PCU or in separate panel) (with overall dimensions, plan, elevation, side views, bill of materials of major functional components viz. Inverter stack, IGBTs, heat sinks, cooling fans, air filters, capacitors, inductors, power supplies, sensors, protection cards, fuses, MCBs, ACBs, Surge protection devices, isolator switches, breakers, contactors, displays, push buttons, data loggers, communication devices, ports etc, make / part number / rating / quantity of these components.</li> <li>Panel details of doors, frames, gland plates, bus bars, cables, earth terminals, base channel, paint finish, IP class, applicable standards.</li> <li>General arrangement of front panel with displays, push buttons, lamp indicators, etc.</li> <li>General arrangement showing DC input termination details viz. bus bars with details of holes for cable connections, bus bar supports, fuses, max cable gland size and type of cable (sq mm) etc.</li> <li>General arrangement showing AC output termination details viz. bus bars with details of holes for cable connection, bus bar supports, etc.</li> </ol>	

	<b>PURCHASE SPECIFICATION FOR</b> <b>630KW GRID-CONNECTED POWER CONDITIONING UNITS</b>	PS-439-884
		REV NO: 00
		PAGE : <b>15 OF 15</b>

	<p>shall be furnished.</p> <p>7. All the above documents shall be submitted to BHEL for final approval – GA and Layout Drgs, Foundation Drgs, Datasheet, Detailed BOM, Manufacturing Quality Plan (MQP) including Final Test Procedure. All these documents shall be submitted in soft copy with BHEL drawing nos. which shall be informed during detailed engineering</p>	
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**6.0 Documents to be submitted along with consignment**  
**Vendor compliance (Yes / No)**

6.1	<p>Following documents shall be submitted at the time of dispatch:</p> <p>Test reports on individual PCUs</p> <p>Technical manual with system specifications, installation guidelines, commissioning guidelines, schematic drawings, circuit board overlays, system set points, calibration settings, hardware settings, cable schedule, general arrangement drawings, panel details.</p> <p>Operations and maintenance manual</p> <p>Product catalogues / datasheets of disconnecter switches, breakers, contactors, IGBTs, DC/AC capacitors, power supplies, protection devices, communication devices, sensors, meters etc</p>	
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**ANNEXURE:1**Ref:**BHEL/SCPV/COMMONPURCHASE/PCU630/02**DATE:**09/07/2014****Introduction**

Bharat Heavy Electricals Limited (BHEL), Electronics Division, Bangalore is setting up Grid-connected SPV Power Plants at

A) KPCL, Mandya , KARNATAKA (10 MW).

This technical specification provides BHEL requirements for supply of PCU's for the above Solar PV Plants.

**1.0 Scope of supply**

SL No	Item Description	QUANTITY	Remarks
		KPCL	
1.1	Supply of 630kW (minimum), 3-phase, Grid-connected Power Conditioning Unit (PCU) as per PS-439-884 along with fuse box, DC isolator and AIR CIRCUIT breaker at the AC side either integrated with the PCU unit or as separate units which has to be indicated at the time of submission of bid.	16nos	
1.2	Supply of Spares for 630kW power conditioning units. List of items with quantity is as follows: 1) Microprocessor based Control Cards for PCU. Each set represents the entire control cards required per PCU. 2) Fuses with fuse holders (all types and ratings, AC and DC). Each set represents all fuses-type and quantity required per PCU. 3) Surge Protection Device / MOV (all types and ratings, AC and DC). Each set represents all SPD's-type and quantity required per PCU.	5 sets	.
		4 sets	
		4 sets	
1.3	Commissioning of PCUs along with Training at site.  <b>BHEL scope</b> of activities at site for installation and commissioning: (1) Movement and positioning of PCU panels at the earmarked position in the inverter room. (2) Crimping the incoming (DC side) and outgoing (AC side) cables (BHEL supply). (3) Connecting at the respective termination ends of the panels using the cable glands and fastening hardware (nuts, bolts, washers etc).	16sets	1 Set represents commissioning of 1 PCU

<p><b>Vendor scope</b> of activities at site for commissioning:</p> <ol style="list-style-type: none"> <li>(1) All the electrical checks that are required to confirm that solar DC parameters (current, voltage) are available at the DC input side of PCUs.</li> <li>(2) All the pre-commissioning checks such as mechanical checks (physical firmness of internal components), electrical tests etc up to the level of synchronization of the PCU output with the grid.</li> <li>(3) All the mechanical tools such as spanners, crimping tools etc required for above checks at site shall be in the scope of vendor.</li> <li>(4) All the electrical tools such as measuring instruments, meters etc required for above checks at site shall be in the scope of vendor.</li> <li>(5) Guidance and support to BHEL team in case of technical problems associated with AC grid side (synchronization-related, etc) or DC side (Problems related to DC input parameters, Earth-faults in solar array, etc).</li> <li>(6) Service engineers shall be present at site during commissioning of power plant and at all times as required by BHEL for which 2 days prior intimation will be given by BHEL, providing all necessary guidance and support to achieve successful synchronization of PCU output with grid along with export of power to grid and also to trouble-shoot / resolve the technical problems associated with PCU. Service Engineer shall be from OEM.</li> <li>(7) Guidance and support to BHEL team, at the time of installation and commissioning of SCADA, in respect of connection of communication cables to PCUs and technical problems related to receiving data signals at SCADA station from PCUs.</li> <li>(8) <b>Training:</b> Vendor shall provide training at site to BHEL/BHEL's customer representatives during commissioning. Training shall cover various technical aspects such as functional/ operational features, trouble-shooting procedures, maintenance schedules, requirements, safety, emergency precautions etc. Both the theory and practical (hands on) training shall be covered.</li> </ol> <p><b>Note:</b> Supply and installation of integrated SCADA system for the overall power plant is within BHEL scope.</p> <p>A single lump-sum price on per-PCU basis shall be offered. The lump-sum price shall include all the costs that will be incurred by the vendor towards commissioning including travel, boarding, lodging and any other contingency expenses.</p>		
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## 2.0 Power plant configuration

A brief summary of the power plant as well as type of SPV modules used is provided here below so as to enable the vendors to select and offer appropriate type / model of power conditioning unit (PCU).

### 2.1 Overall summary of plant

#### KPCL-MANDYA:

The 10MWp solar photovoltaic power plant at KPCL-MANDYA has 16 equal segments of solar photovoltaic array that employs BHEL make, mono-crystalline type, SPV modules. Each segment generates DC power of 630kWp, which is then inverted by a 3-phase grid-connected power conditioning unit of 630kWp rating. At the ac output level, every two PCUs are combined to form a 1.26 MWp group using a three-winding transformer. Thus, at each 1.26 MWp level, two PCUs are connected independently to the two LV windings of the transformer to get the combined 1.26 MWp output on the HV side (11kV). Thus, the power plant employs 16 PCUs and 8 transformers, whereby the transformers are combined on the HV side to achieve overall power output of 10 MWp.

### 2.2 Parameters of solar photovoltaic modules

Details of BHEL-make SPV modules with mono-crystalline cells are as follows:

#	Project	Module type	Pmax	Voc	Isc	Vmp	Imp	Remarks
1	KPCL-MANDYA	L24270	280Wp	43V	8.5A	35V	8A	20 numbers of modules of this type will be connected in series per string.

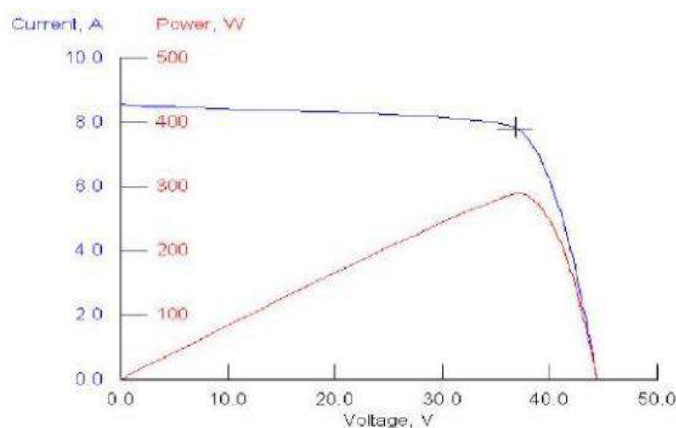
OPEN CIRCUIT VOLTAGE TEMP CO-EFFICIENT [%/ °C]: -0.35

SHORT CIRCUIT CURRENT TEMP CO-EFFICIENT [%/ °C]: 0.04

PEAK POWER TEMP CO-EFFICIENT [%/ °C]: -0.42

### 2.3 I-V Curve for PV modules:

#### A) Model: L24270



## 2.4 Compliance to Standards:

The offered PCU's shall comply with the following standards in addition to the Standards mentioned under clause no 1.1.2 of Purchase Specification PS-439-884:

#	Parameter	Standards	Vendor compliance (Yes / No)
a)	Electromagnetic Compatibility(EMC)	IEC 61000 series-relevant parts	
b)	Protection against Islanding of Grid	IEEE 1547/UL1741/equivalent BIS standard	
c)	Grid connectivity	Relevant CERC Regulations and Grid Code as amended and revised from time to time.	

## 3.0 DC Inputs and termination details

Vendor shall supply the PCU with the termination features on DC side as tabulated below. Detailed drawings of termination arrangements with bus bar particulars such as positions, dimensions, hole sizes, spacing between holes, support to bus bar, etc shall be submitted for BHEL approval within seven days after receipt of purchase order.

#	Parameter	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
3.1	DC input terminals	A minimum of 16 (8 for positive i/p and 8 for negative input) terminals shall be provided.	
3.2	Fuses on DC input side	For every positive and negative DC input, one fuse each shall be provided. Fuse (160 A), 16 no's shall be provided.	
3.3	Max DC input current rating of PCU	Rating shall be selected based on above DC side input current information (8 DC inputs, 136A max per DC input) and PCU-related internal design considerations, if any. Vendor shall indicate the rating. PCU shall work at maximum of 50 °C ambient temperature without any deration in output power. The efficiency	

		of the PCU shall be equal to or more than 97% at 75% load as per IEC 61683.	
3.4	DC cable entry into panel	<p>Bottom entry (rear).</p> <p>Cable entry shall be from bottom rear entry only (to match with cable trench cut-out which will be available only along the rear side of the PCU). PCU panel shall project about 500mm approx. over the cable trench (rear of panel). Cable gland plate for PCU shall be made suitable for the above.</p> <p>Cable is within BHEL scope.</p> <p>Per pair of positive / negative DC input, 185/240 sq-mm Aluminium, multi-strand, armoured, PVC sheath cable will be used. DC termination shall be suitable for the above cable.</p>	
3.5	Gland plates	<p>Gland plates shall be provided with holes to accommodate the cable glands. Spacing between holes shall be chosen to ensure that glands do not touch each other, duly taking into account the clearance required for placing the spanners used to tighten the glands.</p> <p>Preferably, back side portion of the panel shall be used for bottom entry of cable. This is because the front side portion of the panel will be seated on the floor with back portion open to cable trench below. Refer Cl. 3.4 of Annexure-1 for further details regarding DC cable entry.</p>	
3.6	Bus bar design	<p>Width and length of the bus bars shall be so chosen as (1) to provide full electrical contact to the cable lugs, (2) to ensure that lugs and cables do not touch each other and (3) to provide adequate access to the tightening tools (spanners, etc).</p> <p>Bus bars shall be positioned in such a way that the cables enter the panel vertically upwards from the cable trench below, without having to take any bends or turns after entering the panel.</p>	

3.7	In case of separate DC termination panel	<p>(a) In case the DC terminations are not within the main PCU panel with the vendor design featuring a separate panel, the add-on panel shall also be included in the offer.</p> <p>(b) General arrangement showing views and details of termination panel, with cable entry particulars, shall be submitted as part of technical bid.</p> <p>(c) Interconnecting the add-on DC termination panel with the main panel, including supply of cables for this purpose, shall be within the scope of vendor.</p>	
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#### 4.0 AC Output and termination details

Vendor shall supply the PCU with the termination requirements on AC side as tabulated below. General arrangement showing views of termination shall be submitted as part of technical bid. Detailed drawings of termination arrangements with bus bar particulars such as positions, dimensions, hole sizes, spacing between holes, support to bus bar, etc shall be submitted within seven days after receipt of purchase order for BHEL approval.

#	Parameter	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
4.1	Number of AC outputs	Three phases: R, Y, B terminals	
4.2	AC cable entry into panel	<p>Bottom entry (rear side). Refer Cl. 3.4 for further details regarding cable entry. Cables are in BHEL scope.</p> <p>For each phase, 4 runs of 1Cx300 sq.mm or 3 runs of 1Cx400 sq.mm aluminium, multi-strand, armoured, PVC insulated cable will be used. Final cable selected based on PCU output current shall be informed to vendor during detailed engineering for selecting suitable cable lugs, glands and termination.</p>	
4.3	Gland plates	Gland plates shall be provided with holes to accommodate the cable glands. Spacing between holes shall be chosen to ensure that glands do not	

		<p>touch each other, duly taking to account the clearance required for placing the spanners used to tighten the glands.</p> <p>Preferably, back side portion of the panel shall be used for bottom entry of cable. This is because the front side portion of the panel will be seated on the floor with back portion open to cable trench below.</p>	
4.4	Bus bar design	<p>Width and length of the bus bars shall be so chosen as (1) to provide full electrical contact to the cable lugs, (2) to ensure that lugs and cables do not touch each other and (3) to provide adequate access to the tightening tools (spanners, etc).</p> <p>Bus bars shall be positioned in such a way that cable shall enter the panel vertically upwards from cable trench below, without any bends or turns after entering the panel.</p>	
4.5	In case of separate AC termination panel	<p>In case the AC output terminations are not within the main PCU panel with the vendor design featuring a separate panel, the add-on panel shall also be included in the offer.</p> <p>General arrangement showing views and details of termination panel, with cable entry particulars, shall be submitted as part of technical bid.</p> <p>Interconnecting the add-on AC termination panel with the main panel, including supply of cables for this purpose, shall be within the scope of vendor.</p>	

## **ANNEXURE:1**

**Ref:BHEL/SCPV/COMMONPURCHASE/PCU630/01**

**DATE:09/07/2014**

### **Introduction**

Bharat Heavy Electricals Limited (BHEL), Electronics Division, Bangalore is setting up Grid-connected SPV Power Plants at

A) DIU (3 MW).

B) DADRA AND NAGAR HAVELI (3MW).

C) OPCL (3.42 MW).

This technical specification provides BHEL requirements for supply of PCU's for the above Solar PV Plants.

### **1.0 Scope of supply**

<b>SL No</b>	<b>Item Description</b>	<b>QUANTITY</b>			<b>Remarks</b>
		<b>DIU</b>	<b>OPCL</b>	<b>DNH</b>	
1.1	Supply of 630kW (minimum), 3-phase, Grid-connected Power Conditioning Unit (PCU) as per PS-439-884 along with fuse box, DC isolator and AIR CIRCUIT breaker at the AC side either integrated with the PCU unit or as separate units which has to be indicated at the time of submission of bid.	5nos	5nos	5nos	
1.2	Supply of Spares for 630kW power conditioning units. List of items with quantity is as follows:				
	1) Microprocessor based Control Cards for PCU. Each set represents the entire control cards required per PCU.	2sets	2sets	2sets	
	2) Fuses with fuse holders (all types and ratings, AC and DC). Each set represents all fuses-type and quantity required per PCU.	2sets	2sets	2sets	
	3) Surge Protection Device / MOV (all types and ratings, AC and DC). Each set represents all SPD's-type and quantity required per PCU.	2sets	2sets	2sets	

1.3	<p>Commissioning of PCUs along with Training at site.</p> <p><b>BHEL scope</b> of activities at site for installation and commissioning:</p> <ol style="list-style-type: none"> <li>(1) Movement and positioning of PCU panels at the earmarked position in the inverter room.</li> <li>(2) Crimping the incoming (DC side) and outgoing (AC side) cables (BHEL supply) .</li> <li>(3) Connecting at the respective termination ends of the panels using the cable glands and fastening hardware (nuts, bolts, washers etc) .</li> </ol> <p><b>Vendor scope</b> of activities at site for commissioning:</p> <ol style="list-style-type: none"> <li>(1) All the electrical checks that are required to confirm that solar DC parameters (current, voltage) are available at the DC input side of PCUs.</li> <li>(2) All the pre-commissioning checks such as mechanical checks (physical firmness of internal components), electrical tests etc up to the level of synchronization of the PCU output with the grid.</li> <li>(3) All the mechanical tools such as spanners, crimping tools etc required for above checks at site shall be in the scope of vendor.</li> <li>(4) All the electrical tools such as measuring instruments, meters etc required for above checks at site shall be in the scope of vendor.</li> <li>(5) Guidance and support to BHEL team in case of technical problems associated with AC grid side (synchronization-related, etc) or DC side (Problems related to DC input parameters, Earth-faults in solar array, etc).</li> <li>(6) Service engineers shall be present at site during commissioning of power plant and at all times as required by BHEL for which 2 days prior intimation will be given by BHEL, providing all necessary guidance and support to achieve successful synchronization of PCU output with grid along with export of power to grid</li> </ol>	5sets	5sets	5sets	1 Set represents commissioning of 1 PCU
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	<p>and also to trouble-shoot / resolve the technical problems associated with PCU. Service Engineer shall be from OEM.</p> <p>(7) Guidance and support to BHEL team, at the time of installation and commissioning of SCADA, in respect of connection of communication cables to PCUs and technical problems related to receiving data signals at SCADA station from PCUs.</p> <p>(8) <b>Training:</b> Vendor shall provide training at site to BHEL/BHEL's customer representatives during commissioning. Training shall cover various technical aspects such as functional/ operational features, trouble-shooting procedures, maintenance schedules, requirements, safety, emergency precautions etc. Both the theory and practical (hands on) training shall be covered.</p> <p><b>Note:</b> Supply and installation of integrated SCADA system for the overall power plant is within BHEL scope.</p> <p>A single lump-sum price on per-PCU basis shall be offered. The lump-sum price shall include all the costs that will be incurred by the vendor towards commissioning including travel, boarding, lodging and any other contingency expenses.</p>				
1.4	<p>Post-warranty breakdown maintenance call</p> <p>In case of breakdown of installed PCU(s) after warranty period, vendor shall attend breakdown on call basis. A total of 3 calls per year shall be expected for the year succeeding the warranty period.</p> <p>A single lump-sum price shall be indicated per breakdown maintenance call. In addition to visit charges, this price shall include boarding, lodging and transportation charges.</p>	3 calls.	NIL	3 calls.	Offer shall be indicated per call basis.

## **2.0 Power plant configuration**

A brief summary of the power plant as well as type of SPV modules used is provided here below so as to enable the vendors to select and offer appropriate type / model of power conditioning unit (PCU).

### **2.1 Overall summary of plant**

#### **OPCL:**

The 3MWp solar photovoltaic power plant of OPCL has 5 equal segments of solar photovoltaic array that employs BHEL make, mono-crystalline type, SPV modules. Each segment generates DC power of 630kWp, which is then inverted by a 3-phase grid-connected power conditioning unit of 630kWp rating. At the ac output level, every two PCUs are combined to form a 1.26 MWp group using a three-winding transformer. Thus, at each 1.26 MWp level, two PCUs are connected independently to the two LV windings of the transformer to get the combined 1.26 MWp output on the HV side (33kV). Thus, the power plant employs 5 PCUs and 3 transformers(2 transformers of 1.6MVA and 1 transformer of 800KVA), whereby the transformers are combined on the HV side to achieve overall power output of 3 MWp.

#### **DIU:**

The 3MWp solar photovoltaic power plant at DIU has 5 equal segments of solar photovoltaic array that employs BHEL make, mono-crystalline type, SPV modules. Each segment generates DC power of 630kWp, which is then inverted by a 3-phase grid-connected power conditioning unit of 630kWp rating. At the ac output level, every two PCUs are combined to form a 1.26 MWp group using a three-winding transformer. Thus, at each 1.26 MWp level, two PCUs are connected independently to the two LV windings of the transformer to get the combined 1.26 MWp output on the HV side (11kV). Thus, the power plant employs 5 PCUs and 3 transformers(2 transformers of 1.6MVA and 1 transformer of 800KVA), whereby the transformers are combined on the HV side to achieve overall power output of 3 MWp.

#### **DADRA AND NAGAR HAVELI:**

The 3MWp solar photovoltaic power plant at Dadra and Nagar Haveli has 5 equal segments of solar photovoltaic array that employs BHEL make, mono-crystalline type, SPV modules. Each segment generates DC power of 630kWp, which is then inverted by a 3-phase grid-connected power conditioning unit of 630kWp rating. At the ac output level, every two PCUs are combined to form a 1.26 MWp group using a three-winding transformer. Thus, at each 1.26 MWp level, two PCUs are connected independently to the two LV windings of the transformer to get the combined 1.26 MWp output on the HV side (11kV). Thus, the power plant employs 5 PCUs and 3 transformers(2 transformers of 1.6MVA and 1 transformer of 800KVA), whereby the transformers are combined on the HV side to achieve overall power output of 3 MWp.

### **2.2 Parameters of solar photovoltaic modules**

Details of BHEL-make SPV modules with mono-crystalline cells are as follows:

#	Project	Module type	Pmax	Voc	Isc	Vmp	Imp	Remarks
1	DIU	L20220	250Wp	36	8.5A	30V	8.33A	24 numbers of modules of this type will be connected in series per string.
2	DADRA AND NAGAR HAVELI	L20220	250Wp	36	8.5A	30V	8.33A	24 numbers of modules of this type will be connected in series per string.
3	OPCL	L24270	300Wp	43V	8.5A	35V	8A	20 numbers of modules of this type will be connected in series per string.

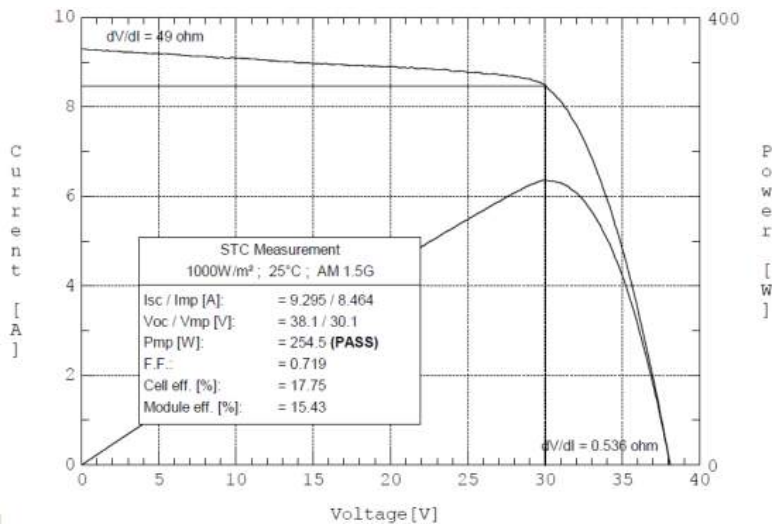
OPEN CIRCUIT VOLTAGE TEMP CO-EFFICIENT [%/ °C]: -0.35

SHORT CIRCUIT CURRENT TEMP CO-EFFICIENT [%/ °C]: 0.04

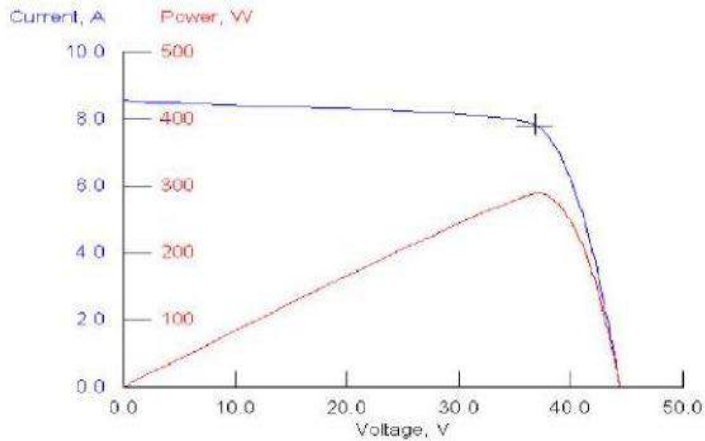
PEAK POWER TEMP CO-EFFICIENT [%/ °C]: -0.42

### 2.3 I-V Curve for PV modules:

#### A) Model: L20220



**B)Model:L24270**



**3.0 DC Inputs and termination details**

Vendor shall supply the PCU with the termination features on DC side as tabulated below. Detailed drawings of termination arrangements with bus bar particulars such as positions, dimensions, hole sizes, spacing between holes, support to bus bar, etc shall be submitted for BHEL approval within seven days after receipt of purchase order.

#	Parameter	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
3.1	DC input terminals	A minimum of 16 (8 for positive i/p and 8 for negative input) terminals shall be provided.	
3.2	Fuses on DC input side	For every positive and negative DC input, one fuse each shall be provided. Fuse (160 A), 16 no's shall be provided.	
3.3	Max DC input current rating of PCU	Rating shall be selected based on above DC side input current information (8 DC inputs, 136A max per DC input) and PCU-related internal design considerations, if any. Vendor shall indicate the rating. PCU shall work at maximum of 50 °C ambient temperature without any	

		deration in output power. The efficiency of the PCU shall be equal to or more than 97% at 75% load as per IEC 61683.	
3.4	DC cable entry into panel	<p>Bottom entry (rear).</p> <p>Cable entry shall be from bottom rear entry only (to match with cable trench cut-out which will be available only along the rear side of the PCU). PCU panel shall project about 500mm approx. over the cable trench (rear of panel). Cable gland plate for PCU shall be made suitable for the above.</p> <p>Cable is within BHEL scope.</p> <p>Per pair of positive / negative DC input, 185/240 sq-mm Aluminium, multi-strand, armoured, PVC sheath cable will be used. DC termination shall be suitable for the above cable.</p>	
3.5	Gland plates	<p>Gland plates shall be provided with holes to accommodate the cable glands. Spacing between holes shall be chosen to ensure that glands do not touch each other, duly taking into account the clearance required for placing the spanners used to tighten the glands.</p> <p>Preferably, back side portion of the panel shall be used for bottom entry of cable. This is because the front side portion of the panel will be seated on the floor with back portion open to cable trench below. Refer Cl. 3.4 of Annexure-1 for further details regarding DC cable entry.</p>	
3.6	Bus bar design	<p>Width and length of the bus bars shall be so chosen as (1) to provide full electrical contact to the cable lugs, (2) to ensure that lugs and cables do not touch each other and (3) to provide adequate access to the tightening tools (spanners, etc).</p> <p>Bus bars shall be positioned in such a way that the cables enter the panel vertically upwards from the cable trench below, without having to take any</p>	

		bends or turns after entering the panel.	
3.7	In case of separate DC termination panel	<p>(a) In case the DC terminations are not within the main PCU panel with the vendor design featuring a separate panel, the add-on panel shall also be included in the offer.</p> <p>(b) General arrangement showing views and details of termination panel, with cable entry particulars, shall be submitted as part of technical bid.</p> <p>(c) Interconnecting the add-on DC termination panel with the main panel, including supply of cables for this purpose, shall be within the scope of vendor.</p>	

#### 4.0 AC Output and termination details

Vendor shall supply the PCU with the termination requirements on AC side as tabulated below. General arrangement showing views of termination shall be submitted as part of technical bid. Detailed drawings of termination arrangements with bus bar particulars such as positions, dimensions, hole sizes, spacing between holes, support to bus bar, etc shall be submitted within seven days after receipt of purchase order for BHEL approval.

#	Parameter	BHEL specification	Vendor compliance (Yes / No) In case of non-compliance or deviation, vendors shall record their comments
4.1	Number of AC outputs	Three phases: R, Y, B terminals	
4.2	AC cable entry into panel	<p>Bottom entry (rear side). Refer Cl. 3.4 for further details regarding cable entry.</p> <p>Cables are in BHEL scope.</p> <p>For each phase, 4 runs of 1Cx300 sq.mm or 3 runs of 1Cx400 sq.mm aluminium, multi-strand, armoured, PVC insulated cable will be used. Final cable selected based on PCU output current shall be informed to vendor during detailed engineering for selecting suitable cable lugs, glands and termination.</p>	

4.3	Gland plates	<p>Gland plates shall be provided with holes to accommodate the cable glands. Spacing between holes shall be chosen to ensure that glands do not touch each other, duly taking to account the clearance required for placing the spanners used to tighten the glands.</p> <p>Preferably, back side portion of the panel shall be used for bottom entry of cable. This is because the front side portion of the panel will be seated on the floor with back portion open to cable trench below.</p>	
4.4	Bus bar design	<p>Width and length of the bus bars shall be so chosen as (1) to provide full electrical contact to the cable lugs, (2) to ensure that lugs and cables do not touch each other and (3) to provide adequate access to the tightening tools (spanners, etc).</p> <p>Bus bars shall be positioned in such a way that cable shall enter the panel vertically upwards from cable trench below, without any bends or turns after entering the panel.</p>	
4.5	In case of separate AC termination panel	<p>In case the AC output terminations are not within the main PCU panel with the vendor design featuring a separate panel, the add-on panel shall also be included in the offer.</p> <p>General arrangement showing views and details of termination panel, with cable entry particulars, shall be submitted as part of technical bid.</p> <p>Interconnecting the add-on AC termination panel with the main panel, including supply of cables for this purpose, shall be within the scope of vendor.</p>	

COMMERCIAL TERMS & CONDITIONS				
RFQ No.HBSBOS003 DATED : 26.07.2014 DUE DATE(TECH BID) : 27.08.2014				
Sl No.	Terms	BHEL Term	Confirmation	Deviation / Remarks
1	Bidding	(a) Bid has to be submitted as Two Part – in two sealed covers-Techno Commercial Bid(Part-1) & Price Bid (Part-II)- clearly written on each cover both put in a single sealed envelope super-scribed with RFQ No. and Due date.	Agree / Not agree	
		(b) Annexures B & B1 to be submitted along with technical bid (Part-1) & Annexure B2 to be submitted along with Price bid (Part-II).	Agree / Not agree	
		(c) Clause-wise compliance to BHEL Purchase specification along with all documents as called in Technical specification to be submitted along with technical bid(Part-1).	Agree / Not agree	
2	Price Basis	Firm i.e., from the date of PO to completion of supply if I&C is not applicable. If I&C is in supplier's scope, then the prices shall remain Firm till commissioning & handing-over of the complete system. (PVC clause not acceptable).	Agree / Not agree	
3	Terms of Delivery	Free On Road Basis to Project site : KPCL Site	Agree / Not agree	
4	Delivery Period	(a) Supply : 9 Weeks from the Drawing Approval; Drawing Submission: 1 Week from PO.	Agree / Not agree	
		(b) I&C : 3 weeks from Supply Date.	Agree / Not agree	
5	Payment Term	(a)Supply : 80% payment of Supply Value + 100% Taxes shall be made with 45 days credit from the date of receipt of material at site. 10% on completion of I&C and certification. Balance 10% on execution of PBG valid for warranty period + 6 months claim period from any of the BHEL Consortium banks.	Agree / Not agree	
		(b)I&C :100% on completion of I&C and certification.	Agree / Not agree	
		( d )For any deviation in payment term, the offer will be liable for loading as per Clause 25A(ii) of Enquiry-General Terms & conditions (Doc Ref : SCPV/BOS/01-Rev 00)	Agree / Not agree	
6	Excise Duty	(a) To confirm whether applicable. If applicable, indicate prevailing rate of Excise duty.	Applicable / Not applicable	Prevailing rate of Excise duty : ..... %
		(b) BHEL is trying to avail Customs Duty & Excise duty exemption.Successful bidder shall support with all relevant documents.	Agree / Not agree	
7	Sales Tax	(a) To confirm whether applicable. If applicable, indicate prevailing rate of Sales Tax against Form C.	Applicable / Not applicable	Prevailing rate of Sales Tax : ..... %
		(b) For issue of form "C", vendor has to furnish "E1/E2" form.Please confirm that "E1/E2 Sale form" will be submitted.	Agree / Not agree	
8	Value Added Tax	Since it is inter-state movement of goods, VAT is not applicable. Only CST against form C is applicable	Applicable / Not applicable	
		OR Both are in the same State, VAT is applicable please indicate VAT applicable.	Applicable / Not applicable	Prevailing rate of VAT : ..... %

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COMMERCIAL TERMS & CONDITIONS				
RFQ No.HBSBOS003 DATED : 26.07.2014 DUE DATE(TECH BID) : 27.08.2014				
Sl No.	Terms	BHEL Term	Confirmation	Deviation / Remarks
9	<b>Octroi</b>	To confirm whether applicable, if applicable indicate current rate of Octroi.	Applicable / Not applicable	Octroi_____%
10	<b>Service Tax</b>	To confirm whether applicable, if applicable indicate current rate of Service Tax.	Applicable / Not applicable	Prevailing rate of Service Tax ..... %
		Furnish following : Service Tax Regn. No. Confirmation that Service Tax register is maintained.	Applicable / Not applicable	Service Tax Regn. No.....
11	<b>Freight</b>	If Freight is quoted extra, original money receipt from Transporter has to be submitted for payment of freight. Please indicate a lumpsum value for Freight charges in Price bid if quoted extra.	Agree / Not agree	
12	<b>Insurance</b>	Transit Insurance will be in vendor's scope.	Agree / Not agree	
13	<b>Evaluation of L1 vendor</b>	Over all L1 of Supply + Commissioning on "FOR" basis to site will only be considered.	Agree / Not agree	
14	<b>Warranty</b>	<b>Warranty for Supply</b> :42 months from date of supply or 36 months from I&C whichever is earlier	Agree / Not agree	
15	<b>Pre Shipment Inspection</b>	Pre Shipment Inspection will be carried out by BHEL/Customer for which test report shall be sent one week in advance.	Agree / Not agree	
16	<b>Penalty</b>	(a) Penalty of 0.5% per week at the basic price of the good for undelivered quantity of supply portion, subject to a maximum of 10%. For Supply, Pre Shipment Inspection Call Letter Date (Receipt of test report) will be treated as delivery for purpose of penalty.	Agree / Not agree	
		( b )For any deviation in penalty term, the offer will be liable for loading as per Clause 25.B of Enquiry-General Terms & conditions (Doc Ref : SCPV/BOS/01-Rev 00)	Agree / Not agree	
17	<b>Road Permit</b>	Road permit if applicable will be given by BHEL before Dispatch of ordered Items	BHEL	
18	<b>Despatch Documents</b>	Complete set of despatch documents in 3 sets shall be forwarded to BHEL directly. Despatch documents include Commercial Invoice, Excise Invoice (if ED is applicable), Lorry receipt (L/R), Packing list, Warranty certificate, Insurance intimation letter, & Original Performance Bank Guarantee (Directly from issuing bank to BHEL). One set of Invoice, Packing list and L/R shall be faxed immediately after despatch to BHEL-EDN, Bangalore.	Agree / Not agree	
19	<b>Other terms &amp; conditions</b>	For any other Terms and Conditions, kindly refer to the enclosed Enquiry-General Terms & Conditions of BHEL (Doc Ref : SCPV/BOS/01-Rev 00)	Agree / Not agree	
20	<b>Reverse Auction</b>	BHEL reserves the right to conduct Reverse Auction. Procedure for the same will be informed by BHEL .	Agree / Not agree	
21	<b>Shipment</b>	Kindly indicate the state/Place from where the shipment will take place.	State/Place	

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TECHNICAL BID ENCLOSURE FOR COMPLIANCE OF QUOTE									
RFQ No.HBSBOS003 DATED : 26.07.2014 DUE DATE(TECH BID) : 27.08.2014									
Sl No.	DESCRIPTION	QTY	UNIT	QUOTED	TAXES				Remarks
					ED %	CST%	VAT %	SERVICE TAX %	
1	PS0679039023: Supply for PCU 630 kVA as per Tech Spec-PS-439-884	16	NO	YES/NO				NA	Taxes Extra
2	PS0679039333: Supply of Control cards as per Tech Spec-PS-439-884	5	ST	YES/NO					Taxes Extra
3	PS0679039341: Supply of Fuse with Fuse Holders as per BHEL Spec PS-439-884	4	ST	YES/NO					Taxes Extra
4	PS0679039350: Supply of SPDs for 630 KW PCU as per BHEL Spec PS-439-884	4	ST	YES/NO					Taxes Extra
5	Commissioning Support of 630 KW PCU as per BHEL Spec PS-439-884	16	AU	YES/NO	NA	NA	NA		Taxes Extra
6	**Freight Charge including Service Tax on Freight(12.36% on 25% of Freight Value)	LUMPSUM		YES/NO	NA	NA	NA	NA	Included/Extra
7	**Insurance	LUMPSUM		YES/NO	NA	NA	NA	NA	Included/Extra

NOTE: 1.YOUR QUOTED PRICES SHALL BE on "FREE ON ROAD" basis to KPCL Site.

2.PL INDICATE TAXES : ED,VAT/CST,SERVICE TAX CLEARLY APPLICABLE AS ON DATE.

3.USE THIS FORMAT FOR COMPLIANCE( REPRODUCING ON YOUR LETTER HEAD IS ACCEPTABLE).

4. FOR SL NOS 1 - 5, TAXES WILL BE CONSIDERED EXTRA.PLEASE QUOTE ONLY THE BASIC RATES.

5.\*\*INDICATE WHETHER FREIGHT CHARGE & INSURANCE CHARGE IS INCLUDED IN QUOTED RATE OR WILL BE CHARGED EXTRA.

IN ABSENCE OF CLARITY, QUOTED RATE WILL BE CONSIDERED AS INCLUSIVE OF FREIGHT & INSURANCE CHARGES.If the offer states Freight at actuals, then Freight will be considered as All Inclusive.

6.BHEL IS TRYING TO GET CONCESSION ON EXCISE DUTY UNDER SUPPLY OF SOLAR POWER PROJECT.AT THE TIME OF CLEARANCE OF GOODS WE MAY ISSUE EXEMPTION CERTIFICATE.IN SUCH CASE, ED WILL BE EXEMPTED BUT NOT REIMBURSED. At present, please quote with applicable rate without concession of ED for comparison.

7. Overall L1 will be Supply+Commissioning+Freight+Insurance will be considered. All PCUs will be procured from Single Vendor only.

AUTHORISED SIGNATORY WITH SEAL

PRICE BID ENCLOSURE									
RFQ No.HBSBOS003 DATED : 26.07.2014 DUE DATE(TECH BID) : 27.08.2014									
Sl No.	DESCRIPTION	QTY	UNIT RATE (Rs.)	TOTAL RATE (UNIT RATE*QTY) (Rs.)	TAXES				Remarks
					ED %	CST%	VAT %	SERVICE TAX %	
1	PS0679039023: Supply for PCU 630 kVA as per Tech Spec-PS-439-884 Unit Rate in Words Rs.	16 Nos.						NA	TAXES EXTRA
2	PS0679039333: Supply of Control cards as per Tech Spec-PS-439-884 Unit Rate in Words Rs.	5 ST						NA	TAXES EXTRA
3	PS0679039341: Supply of Fuse with Fuse Holders as per BHEL Spec PS-439-884 Unit Rate in Words Rs.	4 ST						NA	TAXES EXTRA
4	PS0679039350: Supply of SPDs for 630 KW PCU as per BHEL Spec PS-439-884 Unit Rate in Words Rs.	4 ST						NA	TAXES EXTRA
5	Commissioning Support of 630 KW PCU as per BHEL Spec PS-439-884 Unit Rate in Words Rs.	16 AU			NA	NA	NA		TAXES EXTRA
6	Freight Charge including Service tax on Freight Freight charge in Words Rs.	Lumpsum							**Freight : Included/Extra
7	Insurance Insurance charge in words Rs.	Lumpsum	Rs.						**Insurance : Included/Extra

NOTE: 1.YOUR QUOTED PRICES SHALL BE on "FREE ON ROAD" basis to KPCL Site.

2.PL INDICATE TAXES : ED,VAT/CST,SERVICE TAX CLEARLY APPLICABLE AS ON DATE.

3.USE THIS FORMAT FOR COMPLIANCE( REPRODUCING ON YOUR LETTER HEAD IS ACCEPTABLE).

4. FOR SL NOS 1 - 5, TAXES WILL BE CONSIDERED EXTRA.PLEASE QUOTE ONLY THE BASIC RATES.

5.\*\*INDICATE WHETHER FREIGHT CHARGE & INSURANCE CHARGE IS INCLUDED IN QUOTED RATE OR WILL BE CHARGED EXTRA.

IN ABSENCE OF CLARITY, QUOTED RATE WILL BE CONSIDERED AS INCLUSIVE OF FREIGHT & INSURANCE CHARGES.If the offer states Freight at actuals, then Freight will be considered as All Inclusive.

6.BHEL IS TRYING TO GET CONCESSION ON EXCISE DUTY UNDER SUPPLY OF SOLAR POWER PROJECT.AT THE TIME OF CLEARANCE OF GOODS WE MAY ISSUE EXEMPTION CERTIFICATE.IN SUCH CASE, ED WILL BE EXEMPTED BUT NOT REIMBURSED. At present, please quote with applicable rate without concession of ED for comparison.

7. Overall L1 will be Supply+Commissioning+Freight+Insurance will be considered. All PCUs will be procured from Single Vendor only.

AUTHORISED SIGNATORY WITH SEAL

**Bharat Heavy Electricals Ltd.,**  
(A Government of India undertaking)  
**Electronics Division**  
PB No.2606, Mysore Road, Bangalore-560026, India

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**Enquiry - General Terms & Conditions (Two part bid)**

**I. Enquiry / Request for Quotation (RFQ):**

- (a) Any Purchase Order resulting from this enquiry shall be governed by **these general terms and conditions listed below and special terms and conditions, if any, along with this enquiry** of Bharat Heavy Electricals Limited, Electronics Division, Bangalore-560026 (**hereinafter referred to as BHEL EDN**).
- (b) Any of the terms and conditions not acceptable to vendor, shall be explicitly mentioned in the quotation. Otherwise, it will be treated as that all terms and conditions of this enquiry are acceptable.
- (c) If counter terms and conditions are offered by vendor, BHEL EDN shall not be governed by such terms and conditions, unless it is agreed and incorporated in the Purchase Order of BHEL EDN.
- (d) Any deviation to the terms and conditions not mentioned in the quotation by vendor in response to this enquiry will not be considered, if put forth subsequently or after issue of order, unless clarification is sought for by BHEL EDN and agreed upon in the Purchase Order of BHEL EDN.
- (e) BHEL EDN reserves the right to adopt Reverse Auction for the enquiry sent, at its discretion.
- (f) BHEL EDN shall be at liberty to cancel the tender at any time, before ordering, without assigning any reason.
- (g) Any specific terms and conditions to be complied will be mentioned in RFQ.

**II. General Terms and conditions:**

1. **TWO PART BID:** Quotation shall be submitted in two part bid i.e.

**(a) Techno-commercial i.e., Un-priced Bid (in one sealed envelope):**

Techno-commercial bid shall be submitted with complete description of the equipment, specification compliances to the enquired specification and all the commercial terms & conditions indicated in the **COMMERCIAL TERMS (ANNEXURE-A for Foreign Purchase and ANNEXURE-B for Indigenous Purchase)**. Any other enclosure, which the vendor wishes to submit like product catalogue, technical literature etc., may also be submitted in a sealed envelope super scribed clearly as **"TECHNO-COMMERCIAL BID" with RFQ No. and DUE DATE**. An un-priced copy of price bid (without price) as per **ANNEXURE A-1 for Foreign Purchase and ANNEXURE B-1 for Indigenous Purchase** shall also be enclosed with the techno-commercial bid for evaluation of commercial terms. The vendor shall not give the price in the technical bid.

Confirmation to BHEL specifications shall be indicated by the vendor in the respective columns provided in the purchase specification wherever applicable. Deviations to the specification / item description, if any shall be brought out clearly indicating **"DEVIATION TO BHEL SPECIFICATION"** without fail as a part of technical offer.

Compliance to Pre-qualification criteria (if applicable) shall also be enclosed with the Techno-commercial bid.

Manufacturer's name, their trade mark and brand, part number, alternate material to the one asked in enquiry, if any, should be mentioned in quotation and illustrative leaflets giving technical particulars etc. are to be attached to facilitate consideration and technical evaluation of the quotation. BHEL EDN material code number (as in enquiry) shall be indicated for each item quoted.

**(b) Price Bid (in one sealed envelope):**

Price bid should contain basic unit prices, discount if any, applicable taxes & duties, packing & forwarding charges (if applicable), Freight & insurances (if applicable), FOB charge (if applicable) etc., in a sealed envelope super scribed clearly as **"PRICE BID" with RFQ No. and DUE DATE**.

It is preferred to indicate the rates in both figures and words. In such case, if there is a difference / discrepancy

**Signature of tenderer / with seal**  
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between the rates in figures and words, the **least of the two** rates will be considered. **Price bid shall be quoted as per ANNEXURE A-2 for Foreign Purchase and ANNEXURE B-2 for Indigenous Purchase.**

**(c) Tender Offer (above two envelopes inside another sealed envelope):**

Both these sealed envelopes [(a) Techno-commercial i.e., un-priced Bid and (b) Price Bid] shall be kept in a single sealed envelope and super scribed clearly with **RFQ No. and DUE DATE.**

2. The above sealed envelope (Tender) shall reach our office on or before the due date by 13:00 hrs. Quotations are to be dropped in the tender box marked for the OPENING ON respective days i.e., MONDAY / WEDNESDAY / FRIDAY kept at BHEL-EDN's Reception area of our works with caption "CE, SC & PV, DEFENCE". **Quotations also can be dispatched by Couriers / Registered post / FAX / e-mail to the Purchase Executive indicated in the RFQ at the risk of vendor / bidder.**

Quotation through courier / register post / fax / email when addressed to the specific fax number and email address given in the enquiry, to be sent well in advance to enable BHEL EDN purchase personnel to drop in the tender box before the scheduled opening date and time. Vendor is fully responsible for lack of secrecy on information of such quotations. Vendor shall confirm with the concerned purchase executive after sending the offer regarding such delivery mode to ensure participation. BHEL EDN is not responsible for any delay in receipt of quotation sent by vendor through post/fax/email.

Late Tenders i.e., Tenders received after due date & time will be rejected.

3. The rate quoted shall be in units stated in the enquiry. Where quotation is in terms of unit other than that in enquiry, relationship between the two units must be furnished in the quotation.
4. As far as possible, the quotations shall be free from corrections / overwriting. Corrections / overwriting, if any should be signed by authorized person with the company seal. Any typographical errors, totaling mistakes, currency mistakes, multiplication mistakes, summary mistakes observed in your priced bids, BHEL may consider whichever is beneficial to BHEL for evaluation. Vendor shall doubly ensure that the quote is correct and complete. The corrections / overwriting if any shall be signed with the seal.
5. Quotations are to be duly signed. Unsigned bids/offers are liable for rejection.
6. Tenders will be opened at **13:30 hrs** & the venue is New Engineering Building, 2<sup>nd</sup> floor, MM conference hall, BHEL EDN, Bangalore. All the tenderers or their authorized representatives (with authorization letter from their principals) may witness opening of techno-commercial bid on the due date.
7. After evaluation of techno-commercial bids, price bids of only those which are technically & commercially accepted, will be opened on a subsequent date, which will be intimated to the concerned in advance for witnessing of price bid opening.
8. The quantity in each item to be purchased may vary from quantity enquired according to the actual requirement at the time of placing the purchase order.

**9. DUN & BRADSTREET REPORT (for Foreign purchase):**

In case of foreign vendors, BHEL reserves the right to verify the Dun & Bradstreet report during techno-commercial scrutiny. Please mention DUN Number in **Techno-Commercial bid.**

**10. Payment of Agency Commission to Indian Agent (for Foreign purchase):**

- a. BHEL shall deal directly with foreign vendors, wherever required, for procurement of goods. However, if the foreign principal desires to avail of the services of an Indian agent, then the foreign principal should ensure compliance to regulatory guidelines - which require mandatory submission of an Agency Agreement.
- b. It shall be incumbent on the Indian agent and the foreign principal to adhere to the relevant guidelines of Government of India, issued from time to time.

**Signature of tenderer / with seal**  
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- c. The Agency Agreement should specify the precise relationship between the foreign OEM / foreign principal and their Indian agent and their mutual interest in the business. All services to be rendered by agent/ associate, whether of general nature or in relation to the particular contract, must be clearly stated by the foreign supplier/ Indian agent. Any payment, which the agent or associate receives in India or abroad from the OEM, whether as commission or as a general retainer fee should be brought on record in the Agreement and be made explicit in order to ensure compliance to laws of the country.
  - d. Any agency commission to be paid by BHEL to the Indian agent shall be in Indian currency only.
  - e. Tax deduction at source is applicable to the agency commission paid to the Indian agent as per the prevailing rules.
  - f. In the absence of any agency agreement, BHEL shall not deal with any Indian agent (authorized representatives / associate / consultant, or by whatever name called) and shall deal directly with the foreign principal only for all correspondence and business purposes.
  - g. The "Guidelines for Indian Agents of Foreign Suppliers" shall apply in all such cases.
  - h. The supply and execution of the Purchase Order (including indigenous supplies/ service) shall be in the scope of the OEM/ foreign principal. The OEM/ foreign principal should submit their offer inclusive of all indigenous supplies/ services and evaluation will be based on 'total cost to BHEL'. In case OEM/ foreign principal recommends placement of order(s) towards indigenous portion of supplies/ services on Indian supplier(s)/ agent on their behalf, the credentials/ capacity/ capability of the Indian supplier(s)/ agent to make the supplies/ services shall be checked by BHEL as per the extant guidelines of Supplier Evaluation, Approval & Review Procedure (SEARP), before opening of price bids. It will be the responsibility of the OEM/ foreign principal to get acquainted with the evaluation requirements of Indian supplier/ agent as per SEARP available on [www.bhel.com](http://www.bhel.com).
- The responsibility for successful execution of the contract (including indigenous supplies/ services) lies with the OEM/ foreign principal. All bank guarantees to this effect shall be in the scope of the OEM/ foreign principal.
- i. **Installation & Commissioning:** Scope will be as per RFQ.E&C value should be quoted separately by bidders.
11. **TOTAL COST TO BHEL:** Purchase order will be placed on the lowest quotation (L1) only among the technically & commercially accepted quotations. Lowest quotation (L1) is determined on the basis of the total cost to BHEL.

For Foreign offers, the Exchange rate(TT selling rate of SBI) shall be taken as under.

Single part bids	Date of Tender opening
Two/Three part bid	Date of Part-1 bid opening
Reverse Auction	Date of Part-1 bid opening

If the relevant day happens to be a bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken.

- (1) If Freight is quoted extra, original money receipt from Transporter shall be submitted for payment of Freight charges.
- (2) C-form : For issue of form "C", vendor has to furnish "E1/E2" form.

**12. FIRM PRICE:**

Rates quoted should be firm from the date of offer, till completion of supply. No enhancement in the rates and changes in the techno-commercial terms will be allowed once the quotation is accepted and order is placed.

If Installation & Commissioning is in vendor's scope, then the price shall remain FIRM till commissioning & handing over of the complete system.

**13. TERMS OF PAYMENT:**

**1. SUPPLY**

**A. : FOR FOREIGN PURCHASE**

Payment will be made against “**SIGHT DRAFT**” on presentation of documents to our bankers . Payment through LC is also made subject to loading factors as per Clause 25 (A). For LC payment bank charges within India will be borne by BHEL and outside India will be to vendor’s account.

The payment terms are as follows:

**SIGHT DRAFT PAYMENT (direct payment):**

**SUPPLY :**

(a) **I&C not included in vendor’s scope** : 90% payment of Supply value + 100% Taxes shall be made with 45 days credit from the date of receipt of material at site. Balance 10% on execution of PBG valid for warranty period + 6 months claim period from any of the BHEL Consortium banks.

(b) **Supply & I&C in vendor’s scope** : 80% payment of Supply value + 100% Taxes shall be made with 45 days credit from the date of receipt of material at site. 10% on completion of I&C and certification line item wise on pro-rata basis. Balance 10% on execution of PBG valid for warranty period + 6 months claim period from any of the BHEL Consortium banks..

**(B) FOR INDIGENOUS PURCHASE (DIRECT PAYMENT):**

**SUPPLY :**

(a) **I&C not included in vendor’s scope** : 90% payment of Supply value + 100% Taxes shall be made with 45 days credit from the date of receipt of material at site. Balance 10% on execution of PBG valid for warranty period + 6 months claim period from any of the BHEL Consortium banks.

(b) **Supply & I&C in vendor’s scope** : 80% payment of Supply value + 100% Taxes shall be made with 45 days credit from the date of receipt of material at site. 10% on completion of I&C and certification line item wise on pro-rata basis. Balance 10% on execution of PBG valid for warranty period + 6 months claim period from any of the BHEL Consortium banks.

**2. For I&C:** 100% on completion of I&C and certification line item wise on pro-rata basis.

**3. Civil Works :** 90% on completion of activity milestone and certification line item wise from site-in charge. Balance 10% against PBG for 10% of basic Civil value valid warranty period + 6 months claim period from any of the BHEL Consortium banks.

**4.O&M :** 100% O&M charges are payable as per RFQ terms against report certified by BHEL.

If PBG cannot not be submitted, vendors can also accept for the final 10% payment, payable after the warranty period + 6 months of claim period against supplementary invoice subject to the completion of commissioning (if applicable).

For any deviation in payment term, the offer will be loaded as per Clause 25.00.

**5.ADVANCE PAYMENT: Quotations with “Advance payment” shall be liable for rejection.**

**For Indigenous Vendors, Advance Payment/ Local LC terms will be liable for rejection.**

**14. PENALTY:**

Failure to supply within the delivery time as per purchase order will make the vendor liable to an unconditional penalty of 0.5 % (half percent) per week at the basic price of the goods for the undelivered quantity, subject to a maximum of 10%.

Supply : Date of issue of pre-shipment inspection/ call letter with supporting documents like test reports/conformance to test carried by the vendor will be treated as date of dispatch for the purpose of penalty calculation wherever Pre-Inspection Call is carried out.

**Signature of tenderer / with seal**  
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For all other activities, the actual date of completion of activity as certified by concerned site-incharge will be considered for the purpose of penalty calculation.

**15. PBG:**

Performance Bank Guarantee (PBG) to be submitted on non-judicial stamp paper as per the BHEL prescribed format given in **ANNEXURE-E for Foreign Purchase and Annexure-F for Indigenous Purchase** for 10% of the total supply value obtained from any BHEL member (consortium) banks indicated in **ANNEXURE-G**.

**The Bank Guarantee shall be submitted directly to the concerned Purchase Executive by the issuing Bank with their forwarding letter.** BHEL will verify independently with the bank to establish the authenticity. Alternately, standby LC issued from approved banker can also be considered.

**16. TERMS OF DELIVERY:**

**(a)FOR IMPORTED PURCHASE:**

Price offered shall be for goods packed and delivered **FOB** Seaport,/FCA International Airport including packing, forwarding, Handling, Ancillary charges like processing of Sight Draft, negotiation charges of bank, Export declaration, Certificate of origin etc.

Packing shall be Air/Sea worthy, best suitable for trans-shipment and to take care of transit damages. If containerized, no. of containers & size of container shall be mentioned. Packing weight (gross & net) Packing dimensions shall be given prior to shipment to ascertain whether the consignment can be carried on standard cargo in contract or as ODC.

Wooden packing material for all the foreign consignments should be treated as per ISPM-15 & **Fumigation / Phytosanitary certificate** to be submitted to the freight forwarders/ BHEL along with the invoice, B/L, packing list etc.

Vendors shall indicate the name of International Airport/Seaport. Approved Airports are as per **Annexure-C**. The consignment shall be handed over to BHEL approved freight forwarder as mentioned in PO.

**17. DELIVERY REQUIREMENT:**

Delivery date mentioned in RFQ is tentative. Actual requirement is as per RFQ terms & conditions.

**18. VALIDITY:**

Quotation should remain valid for a period of **90 days** from the date of technical bid opening.

**19. POST-ORDER REQUISITES:**

- a. Vendor shall give an Order Acknowledgement indicating the delivery date within one week of receipt of PO.
- b. Pre-shipment inspection at vendor's works, if required, will be carried out by BHEL. Required assistance will have to be provided by the vendor at the time of pre-shipment inspection.
- c. Test certificates, Calibration certificates and warranty certificates as stipulated at the time of ordering shall be furnished.
- d. Items shall be dispatched by Air worthy /Sea worthy/ Road worthy packing. Any damage and later rejection, due to poor / improper packing shall be to vendor's account.
- e. Any damage/rejection should be made good or replaced immediately without any extra cost to BHEL such as freight, duties, taxes etc. The liability is restricted to the value of the order.
- f. Wherever commissioning is involved, it shall be carried out by the vendor's qualified engineers. Scope of work includes installation, commissioning and start-up trials till satisfactory performance level is reached as certified by BHEL.
- g. BHEL will not be responsible for any loss, damage or injuries to vendor's personnel sustained during

- h. installation / commissioning / start-up trials. Vendor shall ensure compliance with all statutory requisites as laid down by local bodies, state & Central Government. Vendor shall indemnify BHEL for all damages/ losses to various personnel during their presence in BHEL"s premises for whatever purpose.
- i. Suitable markings & damage control indicating devices shall be provided where applicable.
- j. Equipment shall comply with the standard requirements of ISO 14001 & OHSAS 18001.

**20. RISK PURCHASE:**

The purchaser at his discretion may also make purchase of the materials NOT supplied in time at the RISK & COST of the supplier. In this event, it will be obligatory on the part of the supplier who fails to supply the goods in time to make good to BHEL any loss due to such risk purchase.

**21. GENERAL TERMS AND CONDITIONS GOVERNING REVERSE AUCTION (RA):**

- (a) In case of RA, BHEL will communicate business rules governing the RA to the bidders through a service provider.
- (b) BHEL EDN reserves the right to adopt Reverse Auction for the enquiry sent, at its discretion.
- (c) Confirm acceptance for RA in **ANNEXURE A/B**.

**22. REGRET LETTER:** In case any vendor is unable to quote, vendor shall send a regret letter.

**23.** Any dispute arising out of this, shall be referred to the sole arbitration of Head of Dept. Materials Management of group concerned, BHEL EDN or any other officer nominated by him and his award shall be final and binding on the parties. The venue of the arbitration in all cases shall be Bangalore, India.

**24.** Any legal suit in respect of this enquiry lies in the court of Jurisdiction of Bangalore (India) only.

**25. LOADING FACTORS:**

Loading factors as detailed below will be added to the quoted price (basic) to evaluate the lowest quote for non compliance of BHEL standard commercial term.

***A (i). For non compliance of standard Terms of payment (For Foreign Purchase Orders)***

Sl. No.	BHEL standard term	If you quote	Loading factor in % for non-compliance
1	80% against "SIGHT DRAFT" + 20% after commissioning and against PBG(where both commissioning & PBG are applicable)	Payment through Letter of Credit (LC)	10% of quoted value

In general, if the quote is through L/C, it shall be opened 30 days prior to dispatch and valid for 3 months.

***A(ii).For non compliance of standard Terms of payment (For Indigenous Purchase Orders)***

Sl. No.	BHEL standard term	If you quote	Loading factor in % for non-compliance
1	As per RFQ Terms	Any other Payment term	10% of quoted value

***A(ii).For non compliance of standard Terms of Penalty***

Sl. No.	BHEL standard term	If you quote	Loading factor for non-compliance
1	Penalty of 0.5% per week	Other than the above.	Loading Factor 10%-Quoted Max %
	subject to max. of 10% on the		
	basic value of the items not		
	supplied /delayed		

**LIST OF INTERNATIONAL AIRPORTS**

<b>Sl. No</b>	<b>Country</b>	<b>Air Ports</b>
1	Austria	Vienna, Linz, Graz
2	Australia	Sydney, Melbourne, Perth
3	Belgium	Antwerp, Brussels
4	Canada	Toronto, Montreal
5	China	Shanghai
6	Cyprus	Lamaca
7	Czech Republic	Prague (Via Frankfurt)
8	Denmark	Copenhagen
9	Egypt	Cairo
10	Finland	Helsinki
11	France	Paris (Rosy), Lyon
12	Germany	Darmstadt, Mannheim, Nurnberg, Hamburg, Stuttgart, Munich, Koln, Dusseldorf & Hannover, Frankfurt, Berlin
13	Hong Kong	Hong Kong
14	Italy	Rome, Milan, Turin, Bologna, Florence
15	Ireland	Dublin
16	Israel	Telaviv
17	Japan	Tokyo, Osaka
18	Malaysia	Kuala lumpur, Penang
19	Netherlands	Amsterdam, Rotterdam
20	New Zealand	Auckland
21	Norway	Oslo
22	Oman	Muscat
23	Philippines	Manila
24	Romania	Bucharest
25	Russia	Moscow
26	Saudi Arabia	Riyad
27	Singapore	Singapore
28	Slovakia	Bartislowa
29	South Africa	Johannesburg, Durban
30	South Korea	Kimpo
31	Spain	Barcelona
32	Sweden	Stockholm, Gothenburg, Milano
33	Switzerland	Basle, Zurich, Geneva
34	Taiwan	Taipei
35	U.A.E.	Dubai
36	U.K.	Landon (Heathrow), Newcastle, Oxford, Cheltham, Bristol, Welling borough, Birmingham, East Midland, Manchester, Leeds, Glasgow.
37	U.S.A.	New York, Chicago, San Francisco, Los Angeles, Atlanta
38	Ukraine	Kiev

**BHEL EDN APPROVED TRANSPORTERS FOR INLAND ROAD TRANSPORTATION**

1. M/s Awagaman Road Carriers ltd., Bangalore. (AWG)
2. M/s BLR India Pvt. Ltd., Bangalore. (BLR)
3. M/s Delhi Assam Roadways corporation ltd., Bangalore. (DRL)
4. M/s Indo Arya Central transport ltd., Bangalore. (IACT)
5. M/s Prakash parcel Services, Bangalore. (PPS)
6. M/s Road Carrier of India, Bangalore. (RCI)
7. M/s Union Roadways ltd., Bangalore. (URL)

**PERFORMANCE BANK GUARANTEE**  
**(FOR FOREIGN PURCHASE ORDERS)**  
**BANK NAME AND ADDRESS**

Bharat Heavy Electricals Limited (BHEL),  
Electronics Division,  
PB No. 2606,  
Mysore Road,  
BANGALORE- 560 026  
INDIA

Dear Sir,  
Ref: CONTRACT PERFORMANCE GUARANTEE.

WHEREAS you have entered into a contract reference No PO NO. \_\_\_\_\_

wit

h M/s

\_\_\_\_\_ having its registered office \_\_\_\_\_

at \_\_\_\_\_ for the supply of \_\_\_\_\_ as  
detailed in your purchase order No. \_\_\_\_\_ which is hereinafter referred to as "the said contract" and  
whereas M/s \_\_\_\_\_

has undertaken to produce a Bank Guarantee for 10% ( Ten Percent ) of \_\_\_\_\_ the contract price  
amounting to \_\_\_\_\_ ( \_\_\_\_\_

\_\_\_\_\_ ) to secure its obligations to Electronics Division, BHEL having its registered office at New Delhi  
for the performance of the contract including the warranty of the equipment supplied, We \_\_\_\_\_  
Bank, \_\_\_\_\_ hereby expressly, irrevocably and unreservedly undertake and guarantee as  
principal obligors on behalf of M/s \_\_\_\_\_ that in the event Bharat Heavy Electricals Ltd. (B.H.E.L.)  
declares to us in writing that M/s \_\_\_\_\_ has not fulfilled any obligation according to the  
contractual obligation of the said contract, to pay you on demand and without demur to Bharat Heavy Electricals Ltd.,  
Electronics Division, Mysore Road, P.B. No. 2606, Bangalore-560 026, India an amount of \_\_\_\_\_ (in words  
\_\_\_\_\_ ) subject to as may be determined below:

- 1) Notwithstanding any right M/s. \_\_\_\_\_ may have directly against you or any disputes raised  
by M/s \_\_\_\_\_, Your written demand shall be conclusive evidence to us that repayment  
is due under the terms of the said contract and shall be binding on us.
- 2) We shall not be discharged or released from this undertaking and Guarantee by any arrangements, variations  
made between you and M/s. \_\_\_\_\_  
with or without our consent and Knowledge or by any alterations in the obligations of M/s.  
\_\_\_\_\_ by any forbearance whether as to payment, time, performance or otherwise.
- 3) This guarantee shall remain valid until the end of twenty four weeks after the close of the warranty period or until  
the same is reported by BHEL to us whichever is earlier.
- 4) We agree and undertake not to revoke this guarantee during its validity unless discharged in writing by you  
subject to the provision of clause (7) below.
- 5) This guarantee shall be a continuing guarantee subject to the foregoing and shall not be discharged by any change  
in the constitution of the Bank or M/s.  
\_\_\_\_\_.
- 6) This guarantee shall be governed by and constructed in accordance with the Laws of India.
- 7) At any time \_\_\_\_\_ Bank may render this guarantee null and void by paying to Bharat Heavy  
Electricals Ltd. the full amount being  
\_\_\_\_\_ (in words \_\_\_\_\_ )

For and on behalf of Bank  
by its Authorized  
Signatory

**Note:**

**Signature of tenderer / with seal**  
**Page 8 of 12**

- (1) To be executed in Non-Judicial stamp paper by any authorized Indian Bank.
- (2) To be submitted directly by banker to concerned executive in purchase dept., Please give BHEL address to banker.
- (3) Do not enclose with Bank document.
- (4) Any Modification & omissions to this are not permitted

**PERFORMANCE BANK GUARANTEE**  
**(FOR INDIGENOUS PURCHASE ORDERS)**

THIS DEED OF GUARANTEE made and executed on the \_\_\_\_\_ day of \_\_\_\_\_(year), by the \_\_\_\_\_ (Bank), registered under the Companies Act 1956/Nationalized Bank constituted under the Banking Companies (acquisition and transfer of undertakings) Act constituted under the State Bank of India Act / Subsidiary Banks Act, having its registered / head office at \_\_\_\_\_ represented herein by its Branch Manager / authorized representative Sri. \_\_\_\_\_ & Sri. \_\_\_\_\_(Hereinafter called 'guarantor ' which term shall mean and include its successors and assigns)

**IN FAVOUR OF BHARAT HEAVY ELECTRICALS LIMITED**

\_\_\_\_\_ (Buyer's Name), a company registered under the companies Act, 1956 having its registered office at BHEL House at Siri Fort , New Delhi-100 049 and its Electronics Division at Mysore road, Bangalore-26 (hereinafter referred to as the 'Company' Which term shall include its successors and assigns):

Whereas the company has placed an order on \_\_\_\_\_ (State the name of the company / firm and its address) (hereinafter referred to as the 'Supplier' which term shall mean and include its liquidators, successors and assign) for the supply of system under order / Contract No \_\_\_\_\_ Dt \_\_\_\_\_.

AND WHEREAS the supplier has agreed to supply the materials and carryout the works as detailed and in accordance with the terms set out in the said order/contract.

AND WHEREAS the company is not required to pay to the supplier a sum of Rupees \_\_\_\_\_ being the 10% of the value of the goods supplied / Works performed / Services rendered under the said order / contract between the supplier and the company, till the company is satisfied with the mechanical Warranties and the performance standards stipulated in the said order / contract between the company and the supplier has been duly fulfilled, except against a Bank Guarantee for the said sum of Rs \_\_\_\_\_ in favour of the company by reputed Bank, in which case the company has agreed to make payment to the supplier of the said sum of Rupees \_\_\_\_\_ being ( ...% ) of the value of the goods supplied / Works performed / Services rendered under the agreement between the supplier and the company and the Guarantor has at the request of the supplier, agreed to furnish this Guarantee subject to the terms and conditions stated below:

NOW THIS DEED WITNESSES THAT IN pursuance of the above said agreement, the guarantor hereby agrees and covenants With company is as follows :-

- 1) That during the period this contract of Guarantee remains effectual, the guarantor shall be liable in respect of the amount due and owing to the company in respect of the payments to the extent of Rs \_\_\_\_\_ (in words) \_\_\_\_\_ against any loss or damage caused to or suffered by the company by reasons of any breach of the terms of the said order / contract / Agreement by the supplier.
- 2) The Guarantor hereby undertakes to pay the amounts due and payable under this guarantee without any demur, merely on demand from the company intimating that the amount claimed is due by way of loss or damage caused to or suffered or would be caused or suffered by the supplier of any terms contained in the said order / contract. Any such demand made on the guarantor shall be conclusive as regards the amount due and payable by the Guarantor irrespective of the fact whether the Contractor / supplier admits or denies.
- 3) The Guarantor further agrees that the agreement herein contained shall remain in force and effect till all the supplies to be made / Works to be performed / Services to be rendered under the said order / contract / agreement are completed to the entire satisfaction of the company or till company certifies that the terms and conditions of the said order / contract / agreement have been fully and properly carried out by the said supplier and accordingly discharges the Guarantee. Unless a demand or claim under this guarantee is made on the guarantor in writing on or before the expiry of claim period indicated in clause 6 below, the guarantor shall be discharged from all the liability under this guarantee thereafter.
- 4) The guarantor further agrees with the company that the company shall have the fullest liberty without the consent of the guarantor and without effecting in any manner the obligations of the guarantor hereunder to vary any of the terms of the said order / contract / agreement or extend the time of performance by the said supplier from time to time or refrain from exercising the power exercisable by the company against the said supplier or to forebear or omit to enforce any of the terms and conditions relating to the said order / contract / agreement, and the guarantor shall not be relieved of its liability in whole or in part , by reason of any act, commission or forbearance on the part of the company or by reason of any such variation, or extension being granted to the said

**Signature of tenderer / with seal**  
**Page 10 of 12**

supplier or by reason of any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving the guarantor.

- 5) The guarantor undertakes not to revoke this guarantee during its currency except with the previous consent of the company in writing.
- 6) Notwithstanding anything herein above contained, the liability of the guarantor under these presents is restricted to Rs\_\_\_\_\_. The guarantee shall be in force till its expiry on \_\_\_\_\_ unless a demand is made on the guarantor within SIX months from the date of expiry, all the liability of the guarantor under this guarantee shall stand fully discharged. The decision of the claimant in regard to breach of contract is final and binding on the Bank.

IN WITNESS whereof, the guarantor, acting through its authorized representative has executed this deed of Guarantee on the day, month and year first above written.

(Seal of the Bank to be affixed)

WITNESS

- 1.
- 2.

**Note:**

- (1) To be executed in INR 100 Non-Judicial stamp paper by any authorized Indian Bank.
- (2) To be submitted directly by banker to concerned executive in purchase dept., Please give BHEL address to banker.
- (3) Do not enclose with Bank document.
- (4) Any Modification & omissions to this are not permitted.

**BHEL MEMBER BANKS (CONSORTIUM BANKS)**

PBG SHALL BE ISSUED FROM THE FOLLOWING BANKS OR THEIR BRANCH OFFICES ONLY

1	STATE BANK OF INDIA
2	PUNJAB NATIONAL BANK
3	HDFC BANK
4	SYNDICATE BANK
5	CANARA BANK
6	INDIAN BANK
7	ST. BANK OF HYDERABAD
8	ICICI BANK
9	STANDARD CHARTERED BANK
10	UCO BANK
11	KOTAK MAHINDRA
12	ORIENTAL BANK OF COMMERCE
13	STATE BANK OF TRAVANCORE
14	CENTRAL BANK
15	IDBI BANK
16	FEDERAL BANK
17	HSBC LTD
18	DEUTSCHE BANK
19	CORPORATION BANK
20	CITI BANK
21	BANK OF BARODA
22	ABN AMRO BANK
23	UNITED BANK OF INDIA
24	VIJAYA BANK
25	UNION BANK OF INDIA
26	PUNJAB & SIND BANK
27	ANDHRA BANK
28	BANK OF INDIA
29	AXIS BANK