


REQUEST FOR QUOTATION

	BHARAT HEAVY ELECTRICALS LIMITED Electronics Division PB No. 2606, Mysore Road Bangalore - 560026 INDIA	RFQ NUMBER: LKKSCP001 RFQ DATE : 24.11.2015	Due Date/Day: 23.12.2015 WED Time : 13:00 HRS Tender Box : Reception Area Opening Venue: NEW ENGG. BLDG
MMI:PU:RF:003	(for all correspondence) Purchase Executive : Lokesh Kumar Khich Phone : 7760053776 Fax : E-mail: lkkhichi@bheledn.co.in		

1. TENDER/OFFER MUST BE SUBMITTED IN TWO PARTS: (1).TECHNO- COMMERCIAL BID (2).PRICE BID.
2. QUOTATIONS MAY BE SUBMITTED BY ORIGINAL EQUIPMENT MANUFACTURER'S (OEM'S) OR THEIR AUTHORIZED DEALERS.
3. EARNEST MONEY DEPOSIT (EMD) OF RS. 2,00,000 (Rs. TWO LAKHS ONLY) IS MANDATORY AND TO BE SUBMITTED ALONGWITH THE TECHNO-COMMERCIAL BID. Please refer clause no. 10 of page no. 03 of CPD 2012.
4. CEBG IS TO BE SUBMITTED FOR THE PERIOD FROM THE DATE OF SUPPLY TO COMMISSIONING. Please refer CEBG clause no. 19 on page no. 7 of CPD 2012.
5. VENDOR HAS TO CONFORM TO THE PRE- QUALIFICATION CRITERIA (Ref: PS-439-331) AS WELL AS TECHNICAL SPECIFICATIONS (Ref: Ref: PS-439-331) POINT-WISE. DEVIATIONS, IF ANY TO BE BROUGHT OUT CLEARLY IN THE TECHNO- COMMERCIAL BID.
6. VENDOR IS ADVISED TO GO THROUGH THE GENERAL TERMS AND CONDITIONS, DOCUMENT CPD-2012 ENCLOSED WITH THIS RFQ.
7. VENDOR HAS TO CONFORM TO ALL THE CLAUSES LISTED IN THE COMMERCIAL TERMS (ANNEXURE- A OR ANNEXURE- B of CPD 2012). DEVIATIONS, IF ANY, TO BE HIGHLIGHTED AND BROUGHT OUT CLEARLY IN THE TECHNICAL BID.
8. DELIVERY REQUIRED: 24 WEEKS FROM THE DATE OF PO.
9. TERMS OF PAYMENT:
 A) For Supply- 80% BASIC OF THE SUPPLY VALUE OF PO + 100 % TAXES WITH 45 DAYS CREDIT AFTER RECEIPT OF MATERIAL AND 10% AFTER COMPLETION OF I & C AND BALANCE 10% AGAINST PERFORMANCE BANK GURANTEE (PBG) OR AFTER WARRANTY PERIOD.
 B) For I & C- 90 % BASIC OF THE I & C VALUE OF PO+ 100% TAXES WITH 45 DAYS CREDIT+ 10% AGAINST PERFORMANCE BANK GURANTEE (PBG) OR AFTER WARRANTY PERIOD.
10. QUOTATION SHOULD BE VALID FOR 90 DAYS FROM DUE DATE.
11. WARRANTY: 24 MONTHS FROM THE DATE OF COMMISSIONING OR 30 MONTHS FROM THE DATE OF RECEIPT OF THE MATERIAL WHICHEVER IS EARLIER.
12. ADVANCE PAYMENT: QUATATION WITH #ADVANCE PAYMENT# SHALL BE LIABLE FOR REJECTION.

SI No.	Description	Qty	Unit	Delivery qty	Delivery Date
1	I&C of Turnkey Multi Solar Cell line	1	AU	1	25.10.2016
2	Turnkey Multicrystalline Solar Cell Line Design, supply, installation, commissioning, technology, line integration, training, process optimization, warranty and Annual Maintenance Contract (AMC) after warranty of Turnkey Multicrystalline solar cell line.	1	ST	1	25.07.2016

Total Number of Items - 2

TWO PART BID - SUBMIT TECHNICAL AND PRICE BID IN SEPARATE SEALED COVERS

NOTES :


- 1.This RFQ is Governed by :
 - a)INSTRUCTIONS TO BIDDERS/SELLERS(Doc No :BHEL:EDN:ITB-SHOP) available at **www.bheledn.com (RFQ-PO Terms & Conditions)**
 - b)GENERAL CONDITIONS OF CONTRACT FOR PURCHASE(Doc no :BHEL:EDN:GCC-SHOP) available at **www.bheledn.com (RFQ-PO Terms & Conditions)**
 - c)Any other specific Terms and Conditions mentioned.
2. Bidders / Representatives who would like to be present during opening of offers are required to furnish authorization letter for the same.

For and On behalf of BHEL.

Lokesh Kumar Khich
Common Purchase


1 OF 2

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<p>1.</p> <p>2.</p>

TWO PART BID - SUBMIT TECHNICAL AND PRICE BID IN SEPARATE SEALED COVERS	
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**TECHNICAL SPECIFICATION
FOR
TURNKEY MULTICRYSTALLINE SILICON SOLAR CELL LINE FOR
3000 CELLS PER HOUR GROSS CAPACITY
AT
ELECTRONICS DIVISION, BHEL, MYSORE ROAD, BANGALORE, INDIA 560026**

REVISION DETAILS: (00)	PREPARED SC		DATE 20.11.2015
	APPROVED SR	ISSUED ENGG	

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Introduction

BHEL is inviting tenders for the supply of total turnkey solution for a multicrystalline silicon solar cell manufacturing line. The proposal includes the entire production line along with the process utilities as per the scope defined to convert raw multicrystalline silicon wafers into solar cells.

Scope

The scope includes design, supply, installation, commissioning, technology, line integration, training, process optimization, warranty and Annual Maintenance Contract (AMC) after warranty. Prospective suppliers are expected to satisfy all the requirements and criteria.

Suppliers are required to quote for and supply all the items mentioned in this specification. A package price for the entire turnkey line as per the scope is to be offered. For evaluation of the offers the package price of the entire turnkey line as per the scope shall be considered. However individual prices of all the equipment & systems along with corresponding catalogues and data Sheets shall also be provided.

The location of the supply and installation is Electronics Division, BHEL located at Mysore Road, Bangalore, INDIA 560026.


Pre-Qualification Criteria (PQC)

The turnkey supplier shall necessarily meet the following pre-qualification criteria.

S.No.	Item	Supplier Confirmation (Yes / No)
1.	Offer shall be for new equipment and not for any refurbished or used equipment.	
2.	Turnkey supplier shall have the experience of turnkey installations of crystalline silicon solar cell line(s). The cumulative installed capacity shall be at least 200 MW and the number of installations shall be at least two (02) during the period from 01.01.2005 to 31.10.2015. Also, at least one of the installations shall be outside the country of origin of the company. Documentary evidence shall be in the form of commissioning certificate or acceptance letter from the customer for successful commissioning of the line.	
3.	Each of the eight major equipment listed below shall have a minimum of 5 installations for crystalline silicon solar cell manufacturing during the period from 01.01.2005 to 31.10.2015. <ol style="list-style-type: none"> 1. Acid texturing bench 2. POCl₃ tube diffusion furnace 3. Wet Junction isolation & PSG removal bench 4. Anti-reflection coating (ARC) deposition system (PECVD tool) – Tube type 5. Printing station 6. Drying and co-firing furnace 7. Solar cell testing and sorting station Documentary evidence shall be in the form of commissioning certificate or acceptance letter from the customer for successful commissioning of the equipment.	

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4.	<p>Turnkey supplier shall be the original equipment manufacturer for at least one of the following process equipment for solar cell manufacturing.</p> <ol style="list-style-type: none"> 1. Acid texturing bench 2. POCl₃ tube diffusion furnace 3. Wet Junction isolation & PSG removal bench 4. Anti-reflection coating (ARC) deposition system (PECVD tool)- Tube type 5. Printing station 6. Drying and co-firing furnace 	
5.	All the major equipment as mentioned in serial number 3 of PQC shall bear the 'Conformité Européenne (CE)' Marking. Documentary evidence in the form of relevant certificates shall be enclosed.	
6.	Foreign turnkey suppliers shall have an authorized office located in India to provide prompt on-site service and spares support for all equipment and utility systems in supplier's scope. The authorization letter for the Indian office shall be provided.	
7.	Turnkey supplier shall agree for comprehensive AMC for all equipment and the utility systems for a period of three (03) years after the expiration of warranty period.	
8.	<p>The turnkey supplier shall obtain undertakings from the original equipment manufacturers (OEMs) of the following major equipment for the supply, commissioning, performance, warranty and AMC for their respective equipment. The undertaking documents shall be submitted along with the techno-commercial offer. The performance guarantee for the complete line shall lie with the turnkey supplier.</p> <ol style="list-style-type: none"> 1. Stack splitter 2. Acid texturing bench 3. POCl₃ tube diffusion furnace 4. Wet Junction isolation & PSG removal bench 5. Anti-reflection coating (ARC) deposition system (PECVD tool) – Tube type 6. Printing station 7. Drying and co-firing furnace 8. Solar cell testing and sorting station 	
9.	The audited financial statement for the last three (03) years or recent Dun & Bradstreet (D&B) report indicating DUNS number shall be submitted with the techno-commercial offer.	

Note:

1. The Pre-qualification criteria are mandatory requirements and the technical bids will be considered only if all the above Pre-Qualification Criteria are met.
2. All supporting documents related to PQC shall be enclosed in techno-commercial offer.

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3. Pre-qualification evaluation will be carried out based on the details furnished by the supplier / feedback from their customers / inspection of the company / product if required by BHEL and at its sole discretion.

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DETAILS OF TECHNICAL SPECIFICATION FOR TURNKEY MULTICRYSTALLINE SILICON SOLAR CELL LINE		
S.N o.	ITEM	Supplier confirmation
1.	<p>Scope of supply</p> <p>The scope shall include design, supply, installation, commissioning, process technology, line integration, training, process optimization and warranty for the entire manufacturing line for multicrystalline silicon solar cell to deliver the line performance as per section 2.1. The chemical dispensing system for all wet benches, gas delivery system for antireflection coating (ARC) deposition system and waste gas abatement for ARC equipment shall be included in the offer. BHEL will provide deionized water, Compressed dry air, process chilled water system, scrubbers and exhaust system and other building utilities. The list of equipment and utilities is enclosed in Annexure 1.</p> <p>The location of the supply is the Electronics Division, BHEL located at Mysore Road, Bangalore, India, 560026.</p>	
2.	<p>Technology</p> <p>The turnkey line shall be based on the conventional aluminum-back surface field (Al-BSF) technology for processing multicrystalline silicon cells with the capability to deliver high emitter sheet resistance of up to 100 ohm/sq. The line shall have the capacity for dual printing using separate printers for front bus bars and front finger pattern. The line shall also have the capability to fabricate PID free cells by depositing the silicon oxynitride antireflection coating on the cells.</p>	
2.1.	<p>Cell line capabilities</p> <p>Wafer: 156 mm x 156 mm, Multicrystalline, p-type Gross line Capacity: 3000 wafers per hour (minimum) Wafer Thickness: 200±20 microns Overall line yield: ≥ 96% Supplier dependent uptime: ≥ 85% with 365 Days x 24 Hours operation Average solar cell efficiency: ≥ 17.5% with 3 busbar pattern.</p>	
2.2.	<p>Process flow</p> <p>The process flow for the fabrication of the solar cells shall be as below:</p>	

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2.3.	<p>Shallow emitter technology</p> <p>The diffusion furnace for the emitter formation shall have the capability to deliver the emitter sheet resistance with uniformity variation of no more than 5% within wafer and 3% within batch at the sheet resistance of 90-100 ohm/sq. with back-to-back loading at the pitch of about 2.38 mm.</p>			
2.4.	<p>Dual printing</p> <p>The metallization line shall have 4 printer stations in BBFF (back-back-front-front) configuration to print the front grid fingers and bus bars separately.</p>			
2.5.	<p>PID free cells</p> <p>The plasma enhanced chemical vapor deposition (PECVD) equipment for the deposition of antireflection coating (ARC) on the solar cell shall have the capability to deposit silicon oxynitride by using N₂O gas to provide potential-induced-degradation (PID) free cells.</p>			
3.	<p>Major equipment summary</p> <p>The following major equipment shall be supplied. The gross throughput of the individual processes may vary from 3000 to 3400 or more wafers per hour. The number of equipment for each processes shall be as below. The detailed equipment specifications are in section 11.</p>			
	S.NO.	Process Equipment	Technology	No. of equipment
	3.1.	Stack splitter	Splitting of wafers from coin stack and transferring to acid texturing bench	01
	3.2.	Wafer texturing bench	Acid based wet chemical process with in-line processing	01
	3.3.	Diffusion furnace	POCl ₃ based diffusion in tube type diffusion furnace with maximum 5 tubes	01
	3.4.	Junction isolation & PSG removal bench	Acid based wet chemical process with in-line processing	01

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3.5.	Anti-reflection coating (ARC) deposition system (PECVD tool)	Silicon nitride deposition by PECVD process in tube furnaces	02	
3.6.	Metallization line (Printing & drying station)	Screen printing with silver and aluminum pastes in BBFF configuration (separate front bus bar and fingers printing)	01	
3.7.	Drying and co-firing line	Belt furnace for final drying and co-firing of contacts	01	
3.8.	Testing and sorting station	A+A+A+ flash solar cell tester with 32 bin sorter integrated into metallization and co-firing line	01	
4.	Process Utilities by Supplier The following process utilities shall be provided with the production line.			
4.1.	Chemical dispensing system (CDS) <ul style="list-style-type: none"> i. The chemical dispensing system required for automatic feeding of chemicals to the texturing, 'emitter etch and PSG removal' bench and graphite boat cleaning bench shall be supplied. ii. The CDS shall include the chemical delivery units for intermediate bulk containers (IBCs) with 100% containment trays and control units. It shall also include piping to the equipment, pumps, chemical leak detectors and safety and chemical management systems for all the chemicals required. iii. The chemical delivery units for all the chemicals shall have one working and one standby IBC so that the IBCs can be replaced when empty without disrupting the process. iv. The system shall have the capability for multi-point distribution of chemicals to centrally cater to all wet benches for each chemical. v. The piping to the equipment shall be of double containment. vi. A central PLC & SCADA/data acquisition system to monitor the CDS Performance and Safety Interlocks shall be provided. vii. The approximate footprint and the factory utility matrix (FUM) for the CDS shall be provided. 			
4.2.	Waste Gas Abatement system for ARC equipment <ul style="list-style-type: none"> i. The complete waste gas abatement system shall be provided for the ARC machines. ii. The scrubbing of process gases for the ARC deposition shall NOT be based on gas based burning (e.g. LPG). iii. The gases treated with the abatement system shall meet the following minimum standards of safety and permitted limits of discharge. <ul style="list-style-type: none"> a. Acid mist concentration: $\leq 50 \text{ mg/Nm}^3$ 			

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		<ul style="list-style-type: none"> b. Alkaline/NaOH mist concentration: $\leq 150 \text{ mg/Nm}^3$ c. Particulate matter concentration: $\leq 150 \text{ mg/Nm}^3$ iv. BHEL will provide the exhaust ducting for the integration of the scrubbers to the exhaust and to the ARC machines. v. The approximate footprint and the factory utility matrix (FUM) for the waste gas abatement system shall be provided. 	
4.3.	Gas delivery system for ARC equipment <ul style="list-style-type: none"> i. The gas delivery system for the ARC equipment including the gas cabinets and the piping from the gas cabinets to the machines for silane, ammonia and nitrous oxide shall be provided as a complete system. ii. No. of gas cabinets: iii. Silane – 2 Nos. iv. Ammonia – 2 Nos. v. N_2O – 1 No. vi. Each gas cabinet shall have two cylinders and provision for auto-change over such that the PECVD process is not interrupted for changing the cylinder. vii. The gas delivery system shall come with all the arrangements deemed necessary for safe handling of toxic and pyrophoric gases. viii. The quality of material and fabrication shall be suitable for handling ultra-high purity gases. ix. Silane gas cabinet shall be equipped with flame sensor integrated to PLC for detecting fires and shut down the system. x. All tubing for carrying the gases shall be electro-polished and coaxial. xi. The system shall be supplied with central PLC and data acquisition system for all the gases being distributed for safety compliance and monitoring. xii. All the gas lines shall be electro-polished 316L stainless steel. All the welding shall be orbital type and there shall be no bending of the pipes. xiii. The mass flow controllers shall be digital. xiv. BHEL will provide the nitrogen gas wherever required for purging and other operations. 		
5.	Process Utilities by BHEL The following utilities with the defined battery limits and specifications will be provided by BHEL.		
5.1.	Electrical power <ul style="list-style-type: none"> i. BHEL will provide 3 phase, $415 \pm 2.5\% V_{AC}$, $50 \pm 2.5\% \text{ Hz}$, 4 wire electrical supply to the nearest wall for each equipment. The Supplier shall take electrical connections from that point onwards. 		

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		<ul style="list-style-type: none"> ii. Supplier shall provide flexible copper cable of adequate length with the equipment for proper routing of cable. iii. All 3 phase machines shall have 415+/-2.5% V_{AC}, 50 Hz, 4 wire arrangement. Single phase machines shall have 230 V_{AC}, 50Hz, 3 wire arrangement. 	
5.2.	Compressed dry air (CDA)	<ul style="list-style-type: none"> i. BHEL will provide the CDA connections up to a common point at the nearest wall to the equipment. ii. Supplier shall make the final connections to the equipment from that point onwards. iii. BHEL will provide CDA meeting the following specifications: <ul style="list-style-type: none"> a. Dew point: ≤ - 40 °C b. Pressure: 7 bar g 	
5.3.	Deionized (DI) water	<ul style="list-style-type: none"> i. BHEL will provide the DI water connections up to a common point at the nearest wall to the equipment. ii. Supplier shall make the final connections to the equipment from that point onwards. iii. BHEL will provide DI water meeting the following specifications: <ul style="list-style-type: none"> a. Resistivity : > 12 and <16 MOhm.cm b. Pressure @POU: 3 – 5 bar g c. System inlet temperature: 20 – 25 °C 	
5.4.	Process cooling water (PCW)	<ul style="list-style-type: none"> i. BHEL will provide the process cooling water connections up to a common point at the nearest wall to the equipment. ii. Supplier shall make the final connections to the equipment from that point onwards. iii. BHEL will provide PCW as per following specification: <ul style="list-style-type: none"> a. Pressure: 5.5 bar b. System Inlet temperature: 18 °C 	
5.5.	Scrubber and Exhaust system	<ul style="list-style-type: none"> i. Supplier shall provide the scrubbers for ARC machines and the printing & firing stations. BHEL will provide the scrubbers for all other equipment. ii. BHEL will install the exhaust ducting from all the equipment and utilities including ARC machines and printing and firing stations. 	

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		iii. Supplier shall provide the equipment details specifying the positions and connection sizes for all exhaust connections.	
	5.6.	Nitrogen and oxygen gas delivery system <ul style="list-style-type: none"> i. The nitrogen and oxygen gases required for the ARC and diffusion station will be provided by BHEL at the point of use by evaporating the liquefied gas. ii. The purity of the liquid nitrogen will be 99.99%. iii. The purity of the liquid oxygen will be 99.5%. iv. Supplier shall make provisions for the gas purifiers as per the process requirement. v. The gases will be carried to the equipment using SS 316L pipes. 	
	5.7.	Chemical effluent treatment <p>BHEL will provide the chemical effluent connections from the machine drains to the effluent treatment plant. The sizes of the drain connections, categories of effluents and chemical composition of each effluent shall be provided in the technical details and FUM.</p>	
	5.8.	Building utilities <p>BHEL will provide air conditioning and all the other building utilities.</p>	
	6.	Line configuration, integration and automation <ul style="list-style-type: none"> i. The manufacturing line should be configured in fully automated clusters for various processes with manual transfer of wafer cassettes from one cluster to another. ii. The stack splitter shall be integrated to the acid texturing station. iii. The metallization and co-firing stations shall be integrated together. iv. The testing and sorting station shall be integrated to the co-firing station. v. Any deviation in the line configuration only on account of space constraints shall be clearly brought out and BHEL shall have the complete discretion over accepting such deviations. vi. All process equipment shall be fully automated with no manual handling of individual wafers by the operator. 	
	7.	Auxiliary equipment <p>The following auxiliary equipment shall necessarily be provided. The auxiliary equipment and other support equipment not explicitly mentioned below but are required for the functioning shall also be provided by the supplier.</p>	

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7.1.	Lab wet bench One (1) table top Lab wet bench with fume hood for carrying out the chemical analysis of sample quantities of the chemicals used in the texturing bench and PSG/emitter etch bench shall be provided. Quantity: 01 No.	
7.2.	Graphite boat cleaning bench The graphite boats used for antireflection coating deposition i.e., PECVD process are to be cleaned chemically outside the deposition chambers. Cleaning for these boats must be provided. Quantity: 01 No.	
7.3.	Graphite boat drying station The graphite boats used for antireflection coating deposition i.e., PECVD process are to be cleaned chemically outside the deposition chambers. Drying station(s) for the chemically cleaned boats must be provided. Quantity: 01 No.	
7.4.	Trolleys Trolleys for wafer cassettes for work in progress for the entire line shall be provided. Quantity: 10 No.	
7.5.	Unpacking table Unpacking table for the incoming raw wafers shall be provided. Quantity: 02 No.	
8.	Consumables The following key consumables required for the operation of the line shall necessarily be provided.	
8.1.	Chemical resistant cassettes for wafers The wafer cassettes capable of holding 100 wafer each shall be provided. The cassettes for carrying the wafers from texture unloading station, diffusion unloading station and PSG/emitter etch unloading station must necessarily be chemical resistant and designed for easy run off of chemicals. Quantity = 140 numbers	
8.2.	Cassettes for wafers (Metal magazines) The wafer cassettes capable of holding 100 wafers each for carrying the wafers from the PECVD machine to the printing line loading station need not be chemical resistant. Quantity = 40 numbers	
9.	Offline Metrology equipment The following offline characterization tools shall be supplied.	

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S.N o.	Tool	Quantity
9.1.	<p>4-point probe for sheet resistivity</p> <p>i. Shall be capable of measuring resistivity of bare wafers & sheet resistance after emitter formation</p> <p>ii. Shall display the type of conductivity (p/n)</p>	01
9.2.	<p>Edge isolation tester</p> <p>i. Shall be capable of measuring the isolation between the front and the back of the wafer after the PSG removal and emitter etch</p>	01
9.3.	<p>Single wavelength ellipsometer</p> <p>i. Shall be capable of determining the thickness and refractive index of the silicon nitride layer.</p> <p>ii. Shall be suitable for textured and AR coated mono- and multicrystalline solar cells.</p> <p>iii. Shall be supplied with the personal computer with necessary software.</p>	01
9.4.	<p>Chemical analysis kit (Minilab)</p> <p>i. Titration apparatus capable of analyzing the concentration of chemicals (HF/ HCl/HNO₃ etc.) in the process baths.</p>	01
9.5.	<p>Corescan equipment</p> <p>i. Shall be capable of providing full surface measurement of</p> <ol style="list-style-type: none"> contact resistance of front side metallization Shunt resistance of solar cells Open circuit voltage (Voc) of solar cell LBIC (Light Beam Induced Current) scan <p>ii. Shall be supplied with the personal computer with necessary software for measurement and the easy data extraction.</p> <p>iii. Shall have the capability to measure up to 5 bus bars solar cells.</p>	01
9.6.	<p>Optical profiler</p> <p>i. Shall have 3D mapping capability for the surfaces.</p> <p>ii. Shall be capable of profiling monocrystalline and multicrystalline textured and non-textured surfaces.</p> <p>iii. Shall be capable of profiling (height and width) the metallization pattern on the solar cell.</p> <p>iv. Shall be supplied with a personal computer with necessary software for measurement and easy data extraction.</p>	01

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	<ul style="list-style-type: none"> v. Vertical scan range: > 100 micrometers; vertical resolution < 0.1 nanometer vi. Lateral resolution < 0.5 micrometers 		
9.7.	Electronic Screen tension measuring device <ul style="list-style-type: none"> i. Shall be capable of measuring the screen tension for stainless steel mesh in both directions together as well as separately and provide absolute measurements. ii. Shall have capability to measure up to 75 N/cm with the accuracy of 0.1 N/cm. 	01	
9.8.	Thermal profiler <ul style="list-style-type: none"> i. Shall have the capacity to profile both drying and firing processes. ii. Shall have thermocouple and data logger encased in a thermal insulation box for obtaining the thermal profile of the drying and fast firing furnaces. iii. Shall be provided with appropriate software to retrieve and analyze the profile data. iv. Shall have the accuracy of ± 0.5 °C and temperature resolution of ± 0.1 °C. v. Shall have the data logging capacity for sampling the entire drying, co-firing and cooling processes and sampling rate to capture the firing peak profile. vi. Shall have the capability to measure the wafer temperature at three different points or more. vii. Shall be provided with a wafer clamp to hold the wafer in place during measurement. 	01	
9.9.	Balances <ul style="list-style-type: none"> i. Precision balance with the accuracy of 0.1 mg shall be provided. ii. General purpose balance for weighing up to 10 kg. shall be provided. 	01 01	
10.	General requirements for the equipment All the equipment quoted shall comply with the following general requirements.		
10.1.	General construction <ul style="list-style-type: none"> i. The equipment shall adhere to appropriate standards for the electrical and mechanical systems to minimize risks to the operators and the equipment. The standards followed for the manufacture of the equipment shall be declared. 		

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	<ul style="list-style-type: none"> ii. The equipment must be designed for easy maintenance and accessibility to electrical, electronic and other components. iii. The materials used must be chosen on the basis of the intended working environments, with particular regard to corrosion, abrasion, impacts, extreme temperatures, fatigue, brittleness and ageing. iv. All process equipment shall have the provision for remote troubleshooting and repair using internet if required. v. The computers wherever required shall be provided with latest operating systems. vi. The equipment shall be capable of continuous 24 X 7 operation. vii. The equipment shall be aesthetically fabricated and all exposed parts shall be painted with corrosion-resistant paint. viii. Two hard copies and one soft copy of all the manuals shall be provided for all equipment. ix. All the manuals shall be in English language. All the software and operating systems shall be in English language. 	
10.2.	Electrical & related Safety requirements <ul style="list-style-type: none"> i. All 3 phase machines shall have 415+/-2.5% V_{AC}, 50 Hz, 4 wire arrangement. Single phase machines shall have 230 V_{AC}, 50Hz, 3 wire arrangement. ii. All machines shall be protected against the risk due to electrical shock and failures with respect to earth fault and residual current. iii. Live parts in the equipment shall be protected by insulation that can only be removed by destruction. iv. The insulation shall be capable of withstanding the mechanical, chemical, electrical, and thermal stresses to which it can be subjected under normal operating conditions. v. The emergency stop must supersede all modes of operations and functions. There must be no automatic restart of the machine on reset. 	
10.3.	Uninterrupted Power Supply (UPS) <ul style="list-style-type: none"> i. The control systems/PCs/PLCs/conveyors and systems critical for safety and proper shutdown shall be supported by uninterrupted power supply (UPS) for all the equipment and utilities in supplier's scope. ii. Supplier shall provide the appropriate rating UPS to satisfy the conditions as mentioned in serial number 1 above for all the production equipment, ARC gas delivery and abatement systems, and chemical dispensing system. 	
10.4.	Equipment details The system /machine must be supplied with all appropriate technical documentation including :	

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	<ul style="list-style-type: none"> i. A clear, comprehensive description of the equipment, installation and mounting, and connection to the services instructions. ii. Information on the physical environment (if applicable). iii. Overview (block) diagrams and Circuit wiring diagrams where appropriate. iv. List of recommended spare parts, wear parts and support tools. v. Operating instructions. vi. The preventive maintenance schedule mentioning the daily, weekly, monthly, quarterly and annual activities to reduce unscheduled downtime for each equipment. vii. List of all personal protection equipment required for safe operation of equipment. viii. Dimensions and weight of the equipment. 	
10.5.	Marking and Signage <ul style="list-style-type: none"> i. The system/machine must be marked with all mandatory signage and appropriate warning labels and signs, and identifiers such as marking for electrical shocks, hot surfaces etc. ii. All machinery must be marked visibly, legibly and indelibly with the following minimum particulars: <ul style="list-style-type: none"> a. The business name and full address of the manufacturer b. Marking of the standard or norm followed for manufacturing c. Serial & model number d. The year of construction, that is the year in which the manufacturing process is completed. 	
11.	Major equipment technical features The major process equipment shall conform to the following technical specifications.	
11.1.	Wafer stack splitter <ul style="list-style-type: none"> i. Wafer stack splitter shall take coin stacks of raw wafers, separate them and load them into the acid texturing bench in lanes. ii. Wafer stack splitter shall be integrated to the texturing bench. iii. Wafer stack splitter shall be prepared for up to two (02) inline inspection tools and two (02) bins for out-of-specification wafers. iv. The metrology inspection output shall be available for extraction in ASCII format (text editor/excel etc.). v. Mention the following in regard with the machine make & capabilities. <ul style="list-style-type: none"> a. Make of the machine (OEM and Model) b. Gross throughput capacity (wafer/hr.) 	
11.2.	Wafer acid texturing Equipment	

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	<p>i. Process Technology</p> <ul style="list-style-type: none"> a. The acid-based, isotropic texturing of the multicrystalline silicon wafers shall be carried out in a wet bench. b. The chemical process shall include texturing, porous silicon removal and metal clean steps. c. The process shall be based on chemical reactions with HF, HNO₃, HCl and KOH. <p>ii. Loading and automation</p> <ul style="list-style-type: none"> a. The wet bench shall accept wafers from stack splitter and shall have an unloading station at the end to unload the textured and dried wafers to cassettes suitable for the next operation. <p>iii. Wet tool features</p> <ul style="list-style-type: none"> a. The equipment shall have rinsing after every step to prevent chemical carry off and mixing. b. The process chiller for maintaining the process temperature shall be supplied with the machine. Process cooling water will be available from BHEL at about 18 °C. c. The wet bench shall have separate exhaust segments for NO_x, acidic and general exhausts. d. The machine shall be configured to minimize the water and chemical consumptions. e. The machine shall not leak chemical fumes into the room and shall have provisions for completely containing the chemical leaks and bath dumps in case of faults/failures. <p>iv. Process control</p> <ul style="list-style-type: none"> a. The equipment shall have an HMI/computer to change and monitor the process parameters such as temperature and conveyor speed. b. The equipment shall be capable of driving the texturing process by programmable process recipes and shall have data logging capabilities. <p>v. Safety & troubleshooting</p> <ul style="list-style-type: none"> a. The machine shall not leak chemical fumes into the room and shall have provisions for completely containing the chemical leaks and bath dumps in case of faults/failures. b. Sensors and safety alarm system shall be provided for early warning in case of leakage or exhaust failure. 	
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	vi. Supplier shall provide the complete chemical dispensing system for the bench as described in section 4.1. vii. Mention the following in regard with the process cluster <ul style="list-style-type: none"> a. Make of the process equipment (OEM and Model) b. Make of the wafer handling automation (OEM and model) c. Gross throughput capacity including automation (wafer/hr.) 	
11.3.	Diffusion furnace <ul style="list-style-type: none"> i. Process Technology <ul style="list-style-type: none"> a. The emitter formation shall be carried out in tube furnaces using Phosphorus Oxychloride (POCl₃) as the dopant source and nitrogen as the carrier gas. b. The diffusion process shall be carried out with back-to-back loading of wafers at the pitch of 2.38 mm. ii. Loading and automation <ul style="list-style-type: none"> a. The equipment shall have integrated automation to transfer wafers from the loading cassettes to the quartz boats used for diffusion process and lift systems to transfer the quartz system inside the tube. b. The loading station shall be compatible to the cassettes delivered from the unloading station of the texturing station. Unloading station shall deliver wafers into a cassette suitable for loading station of the emitter etching and PSG removal wet bench. iii. Furnace system <ul style="list-style-type: none"> a. The length of the flat zones shall be 1000 mm minimum. b. The process tubes shall have five (5) heating zones. c. The process temperature capability shall be up to 1000 °C. d. The temperature control system shall have the temperature resolution of ±0.1 °C. e. The temperature control system shall have the accuracy of ±0.5 °C at temperatures greater than 600 °C. f. All the zones shall have spike as well as profiling thermocouples with the capability of automatic profiling. g. The furnace system shall have heat shield and cooling arrangement by water or air circulation. The equipment shall not use the ambient air to provide the cooling. iv. Gas system 	

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	<ul style="list-style-type: none"> a. The bubbler system for delivering POCl₃ for diffusion shall be housed in cabinets with IP65 or better protection and transparent doors and shall make an integral part of the system. b. The bubbler system shall be designed for 1 Litre POCl₃ containers. c. All the gas lines shall be electro-polished 316L stainless steel. All the welding shall be orbital type and there shall be no bending of the pipes. d. All the gas lines shall be fitted with individual pressure gauges, inline filters, manual shut off valves and other accessories. e. The mass flow controllers shall be digital. <p>v. Process control</p> <ul style="list-style-type: none"> a. The process shall be completely recipe driven and the operator shall have a personal computer/HMI to change and monitor the process parameters. The equipment shall have the capability to hold numerous recipes. b. Data logging and extraction capabilities shall also be present with graphic visualization and easy data extraction in ASCII format. <p>vi. Safety & troubleshooting</p> <ul style="list-style-type: none"> a. Safety alarm system for system failures, over-temperature and water leakage etc. should be provided. b. The over-temperature sensors shall monitor each temperature zone of the tubes, the heating element casing and the power electronics. <p>vii. Mention the following in regard with the process cluster</p> <ul style="list-style-type: none"> a. Make of the process equipment (OEM and Model) b. Make of the wafer handling automation (OEM and model) c. Gross throughput capacity including automation (wafer/hr.) d. Number of process tubes e. Process time (minutes) 	
11.4.	<p>Wet Junction Isolation & Phosphorus silicate glass (PSG) removal bench</p> <p>i. Process Technology</p> <ul style="list-style-type: none"> a. The junction isolation process shall be carried out with the complete etching of the back surface of the diffused wafer. b. The PSG removal and emitter etch for edge isolation of the wafers shall be carried out in an integrated wet bench. c. The process shall be based on chemical reactions with HF, HNO₃, H₂SO₄, HCl and KOH. <p>ii. Loading and automation</p> <p>The loading station shall be compatible to the cassettes delivered from the emitter formation equipment and the unloading station shall deliver wafers</p>	

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		<p>into a cassette suitable for loading station of the antireflection coating (ARC) equipment.</p> <p>iii. Wet tool features</p> <ol style="list-style-type: none"> a. The equipment shall have rinsing after every step to prevent chemical carry off and mixing. b. The process chiller for maintaining the process temperature shall be supplied with the machine. Process cooling water will be available from BHEL at about 18 °C. c. The wet bench shall have separate exhaust segments for NOx, acidic and general exhausts. d. The machine shall be configured to minimize the water and chemical consumptions. e. The machine shall not leak chemical fumes into the room and shall have provisions for completely containing the chemical leaks and bath dumps in case of faults/failures. <p>iv. Process control</p> <ol style="list-style-type: none"> a. The equipment shall have an HMI/computer to change and monitor the process parameters such as temperature and conveyor speed. b. The equipment shall be capable of driving process by pre-decided and programmable process recipes and shall have data logging capabilities. <p>v. Safety & troubleshooting</p> <ol style="list-style-type: none"> a. The machine shall not leak chemical fumes into the room and shall have provisions for completely containing the chemical leaks and bath dumps in case of faults/failures. b. Sensors and safety alarm system shall be provided for early warning in case of leakage or exhaust failure. <p>vi. Supplier shall provide the complete chemical dispensing system for the bench as described in section 4.1.</p> <p>vii. Mention the following in regard with the process cluster</p> <ol style="list-style-type: none"> a. Make of the process equipment (OEM and Model) b. Make of the wafer handling automation (OEM and model) c. Gross throughput capacity including automation (wafer/hr.) 	
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11.5.	<p>Anti-reflection coating deposition</p> <p>i. Process Technology</p> <ol style="list-style-type: none"> a. The ARC deposition shall be carried out in tube furnaces with silane, ammonia and N₂O (for PID-free cells) process gases using plasma-enhanced-chemical-vapor-deposition (PECVD) batch process technique. b. The multi-layer ARC deposition capability without using N₂O gas shall also be provided. c. The cleaning of the graphite boats shall NOT be done in the furnace tubes using gases, but outside the tubes by chemical processes. <p>ii. Loading and automation</p> <ol style="list-style-type: none"> a. Supplier shall supply the automation to transfer wafers from the loading cassettes to the graphite boats used for PECVD process and lift systems to transfer the boats inside the tube. b. The loading station shall be compatible to the cassettes delivered from the unloading station of the 'emitter etch and PSG removal' wet bench. Unloading station shall deliver wafers into a cassette suitable for loading station of the printing line. <p>iii. Furnace system</p> <ol style="list-style-type: none"> a. The process temperature capability shall be no less than 450 ° C. b. The temperature controller shall have the temperature resolution of ±0.1 C with the temperature accuracy of no less than ±0.5 ° C. c. The furnace system shall have heat shield and cooling arrangement by water or air circulation. d. All the zones shall have spike as well as profiling thermocouples with the capability of automatic profiling. <p>iv. Plasma enhanced deposition system</p> <ol style="list-style-type: none"> a. The thin film deposition shall be carried out with direct plasma. b. The process pressure set point and venting shall have soft-approach by varying the pumping speed or any other mean to avoid particle generation. <p>v. Process control</p> <ol style="list-style-type: none"> a. The process shall be completely recipe driven and the operator shall have a computer/HMI to change and monitor the process parameters. The equipment shall have the capability to hold numerous recipes. b. Data logging and extraction capabilities shall also be present with graphic visualization and easy data extraction in ASCII format. 	
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		<p>vi. Gas delivery system</p> <ul style="list-style-type: none"> a. Gas delivery system for delivering all process gases shall be provided as per section 4.3. b. BHEL will provide the nitrogen gas wherever required for purging and other operations. <p>vii. Safety & troubleshooting</p> <ul style="list-style-type: none"> a. Safety alarm system for system failures, over-temperature and water leakage etc. should be provided. b. The over-temperature sensors shall monitor each temperature zone of the tubes, the heating element casing and the power electronics. <p>viii. Exhaust & abatement</p> <ul style="list-style-type: none"> a. Supplier shall provide the abatement system per the factory utility matrix (FUM) details. b. The scrubbing of process gases shall NOT use a gas (e.g., LPG) based burner. c. BHEL will provide the exhaust connections to the equipment, cabinets, and the abatement system and for the treated gases. The connection sizes and other details for making the connections to the equipment and to the scrubber system(s) shall be provided. <p>ix. Mention the following in regard with the process cluster</p> <ul style="list-style-type: none"> a. Make of the process equipment (OEM and Model) b. Make of the wafer handling automation (OEM and model) c. Gross throughput capacity including automation (wafer/hr.) d. Number of process tubes per equipment e. Process time (minutes) 	
11.6.	Metallization – printing & drying	<p>i. Process Technology</p> <ul style="list-style-type: none"> a. The printing (metallization) of the solar cells shall be carried out by using silver paste for complete front grid (bus bars and fingers) and back bus bars. b. The remaining portion of the back side shall be printed with aluminum paste for back surface field. c. The printing shall be carried out with four (4) printers in back-back-front-front configuration with separate printing for front fingers and front bus bars. <p>ii. Loading and automation</p> <ul style="list-style-type: none"> a. The metallization station shall have loading station compatible for the cassettes unloaded from the ARC machine. 	

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- b. The belt/conveyor arrangement in the drying furnaces for carrying the wafers shall be of SS material with pins or other arrangement to reduce contact area between the belt and the wafer.
- c. The line shall have the buffers in between to reduce the effect of maintenance/screen changing on the machine throughput.
- d. The printing stations for aluminum pastes shall have automatic paste dispensers with programmable dispensing intervals.
- e. Printing line shall be integrated with the drying and co-firing line so that wafers directly move to the next machine after the printing process is complete.

iii. Printing stations

- a. The alignment of wafers with the printing screen(s) shall be done optically.
- b. Printers shall have the motorized screen alignment with X, Y (lateral) and theta (angle) coordinates.
 - a. Adjustment range for X, Y : 25 mm
 - b. Adjustment range for theta(angle) : 10°
- c. The squeeze motion, snap off and pressure mechanism shall be software controlled.
 - a. Typical squeeze stroke length : 180 mm
- d. The alignment method for printing shall be based on camera vision system with centering tolerance of ± 0.025 mm.
- e. The prints modes available: Print/Print, Print/Flood, Flood/Print.

iv. Drying stations

- a. The temperature capability for the drying stations shall be no less than 300 °C.
- b. The temperature tolerance for the side-center-side and along the length : ± 7 °C
- c. The drying stations process shall be recipe driven and operator shall have the HMI for controlling & monitoring processes.
- d. Volatile organic compounds filters and electrostatic filters shall be provided for the drying station for aluminum paste.

v. Process control

- a. The printing process shall be recipe driven and operator shall have the HMI for controlling & monitoring processes.
- b. The printing and drying processes shall be recipe driven and operator shall have the HMI for controlling & monitoring processes.

vi. Mention the following in regard with the process cluster

- a. Make of the process equipment (OEM and Model)
- b. Make of the wafer handling automation (OEM and model)
- c. Gross throughput capacity including automation (wafer/hr.)

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11.7.	<p>Co-firing – Drying & firing furnace</p> <p>i. Process Technology</p> <p>a. The final drying of the printing paste and the co-firing shall be carried out on a belt furnace with different temperature zones.</p> <p>b. The simultaneous processes of final drying and contact formation by the silver pastes, alloying of aluminum paste and the hydrogen passivation of antireflection coating shall complete the fabrication of the solar cell.</p> <p>ii. Loading and automation</p> <p>a. The co-firing furnace shall be integrated with the printing line so that the wafers travel on its conveyor directly from the printing line.</p> <p>b. The co-firing station shall be integrated to the testing sorting station so that the solar cells can be tested in inline manner.</p> <p>c. Suitable buffer at the unloading side shall be provided so that the cells may be tested near the STC conditions by the integrated cell tester.</p> <p>iii. Furnace capabilities</p> <p>a. Temperature capability shall not less than 1000 °C for firing and 350 °C for drying furnaces.</p> <p>b. The belt speed capability shall be up to 280 inches/min.</p> <p>c. The belt material for firing zone shall be Nichrome V.</p> <p>d. The equipment shall have a cooling zone so that cells may be tested near STC conditions.</p> <p>iv. Process control</p> <p>The drying and firing stations process shall be recipe driven and operator shall have the HMI for controlling & monitoring processes.</p> <p>v. Safety & troubleshooting</p> <p>Safety alarm system for system failures, over-temperature and water leakage etc. should be provided.</p> <p>vi. Mention the following in regard with the machine capabilities</p> <p>a. Make of the machine (OEM and Model)</p> <p>b. Gross throughput capacity (wafer/hr.)</p>	
11.8.	<p>Testing and sorting</p> <p>i. The testing and sorting equipment shall be integrated to the fast firing line.</p> <p>ii. The flash sun simulator shall be rated A+A+A+ for spectral, spatial and temporal stability.</p>	

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		<ul style="list-style-type: none"> iii. The tester shall test the solar cells by simulating AM 1.5G spectrum and irradiance (1000 W/m²) as per the STC conditions. `. iv. The tester shall be capable of handling solar cells with 3, 4 and 5 bus bars. v. The binning of the cells using the current voltage measurement parameters shall be available in 32 bins and the bin definition shall be programmable with one or more parameters. vi. The following current voltage (IV) measurement data of the cells shall be stored and made available for extraction from the computer. <ul style="list-style-type: none"> a. Short Circuit current b. Open circuit voltage c. Fill factor d. Cell power output e. Series resistance f. Shunt resistance g. Sorted bin of the cell h. Batch number of the cell (manual/pre-defined identification) vii. Appropriate software shall be installed at the testing/sorting station to continuously monitor the cell performance and analyze the historical and statistical trends. viii. Three (03) Reference cells (156 mm size, multicrystalline) tested by reputed institutes shall be provided with the equipment. ix. Mention the following in regard with the machine capabilities <ul style="list-style-type: none"> a. Make of the machine (OEM and Model) b. Gross throughput capacity (cells/hr.) 	
12.	<p>Technical documentation</p> <p>The following documents have to be submitted with the offer.</p> <ul style="list-style-type: none"> i. The datasheets and catalogues for the equipment shall be provided. ii. A list of all equipment and utility systems containing item description, quantities, make (OEM), model etc. shall be provided along with the offer. iii. The production area layout in designated area in AutoCAD format (BHEL will provide the floor layout) shall be provided. iv. The factory utility matrix for the production line as well as the utilities in supplier's scope shall be provided. v. The price list of all the spare parts for corrective maintenance i.e., parts that are needed to be replaced only in case of malfunction or breakdown shall be provided. vi. The price list and quantities of wear parts for one (01) year of preventive maintenance shall be provided. vii. The price list of the consumables such as quartz tubes and boats, graphite boats and wafer cassettes shall be provided. 		

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13.	Pre-dispatch inspection	<p>The pre-dispatch inspection of the machine will be carried out at the OEM site with the following conditions.</p> <ul style="list-style-type: none"> i. The supplier shall inform BHEL two months in advance for carrying out the inspection. ii. The equipment shall be shown for the completeness in accordance with the specification. iii. The design, sizing and utility connections with respect to the drawing shall be shown. iv. The safety circuits, alarms and safety labels shall be shown. 	
14.	Packing	<p>The items shall be packed for sea-freight worthiness. Packing slips / labels/ BHEL PO Reference shall be fixed indicating the items packed inside. Fragile items shall be packed separately with adequate packing indicating “Fragile” slip outside.</p>	
15.	Layout, Moving in and positioning	<p>BHEL has provided the production area layout drawings indicating pillar and beam positions, entry door and other features to aid the layout design.</p> <ul style="list-style-type: none"> i. The available height of the production area is 4.1 metre and that below the beams is about 3.45 metres. ii. The equipment shall be designed and positioned in the building layout as per the process areas designated in the BHEL drawings. iii. Supplier shall lay the equipment in the building layout in AutoCAD format and submit that with the offer. iv. Supplier shall also furnish the weight and detailed drawing for each equipment for maintenance and servicing. v. It is recommended that the supplier may visit BHEL facility prior to submission of offers. vi. Supplier shall move in and position the equipment as per the layout. 	
16.	Installation and commissioning (I&C)	<p>Supplier shall complete the following activities and demonstrations for the completion of Installation and commissioning:</p> <ul style="list-style-type: none"> i. The demonstration of properly routed and working utility connections. ii. The demonstration of the safety circuits and other safety provisions. iii. The demonstration of successful integration of utilities and process equipment in terms of loading/unloading of wafers and running the process with pre-defined process recipes. 	

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- iv. The demonstration of the working conditions of the offline metrology equipment supplied with the line.
- v. The fabrication of solar cells from the input wafer.

The demonstration of successful fabrication of the solar cells from the wafers will complete the installation and commissioning process.

17. **Site Acceptance Test (SAT)**

SAT will be carried out after the completion of installation and commissioning. Supplier shall complete the following activities and demonstrations for SAT:


- i. **Training:** Training of BHEL personnel on the operations, maintenance and troubleshooting of the process equipment, utility systems and metrology tools.
- ii. **Supplier dependent uptime:** The demonstration of Supplier-dependent uptime as per section 2.1 for the entire line.
- iii. **Quality parameters:** The values and uniformity of the emitter sheet resistance, thickness and refractive index of antireflection coating shall be demonstrated as mentioned in the table below. The values of other parameters such as the aspect ratio of the front metallization fingers targeted to meet cell efficiency that will be demonstrated at the time of SAT shall be indicated by the Supplier in the table below.

Parameter	Range of Values
a. Emitter sheet resistance value	90 – 100 Ohm.cm
b. Emitter sheet resistance uniformity	
A. Within wafer	≤ 5%
B. Within batch	≤ 3%
C. Batch to batch	≤ 2%
c. Quality of edge isolation (Ohms)	Specify
d. Thickness of Silicon nitride	70 – 90 nm
e. Silicon nitride thickness uniformity	
A. Within wafer	≤ 5%
B. Within batch	≤ 4.5%
C. Batch to batch	≤ 2%
f. Refractive index of Silicon nitride	Specify
g. Aspect ratio of metallization finger	Specify
h. Width of metallization finger	Specify
i. Other	Specify

- iv. **Efficiency:** The average efficiency of the cells from the production line shall be demonstrated as mentioned in section 2.1.

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	<p>v. Yield of the process: The overall yield of the process shall be demonstrated as mentioned in section 2.1. The yield and efficiency shall be demonstrated simultaneously.</p>	
18.	<p>Conditions for Site acceptance test</p> <p>i. Observation period: The supplier dependent uptime, efficiency and yield of the line shall be demonstrated simultaneously over the observation period of 7 days with three shift operation.</p> <p>ii. Supplier shall intimate BHEL prior to the beginning of the observation period.</p> <p>iii. The quality parameters (section 17.iii) may be demonstrated within or prior to the observation period.</p> <p>iv. The downtimes due to the utilities in the Supplier’s scope will be counted towards supplier dependent downtime. The definitions of supplier dependent uptime, scheduled and non-scheduled downtimes are as per SEMI guidelines. The SEMI guidelines shall be adopted during the acceptance tests for the turnkey supply.</p>	
19.	<p>Materials specifications for achieving the performance in SAT</p> <p>The site acceptance test shall be performed with predefined wafer and materials specifications.</p> <p>i. The turnkey supplier shall provide the specifications and suppliers reference for the wafers, gases, and chemical and metallization pastes immediately on receipt of Purchase Order from BHEL for the turnkey Line.</p> <p>ii. The materials shall be commercially available and commonly used for the solar cell fabrication.</p> <p>iii. The suppliers recommended for materials shall be regular suppliers to the crystalline silicon solar cell industry for their respective materials.</p>	
20.	<p>Time schedule</p> <p>The bar chart for the execution of the installation and commissioning is to be provided.</p>	
21.	<p>Warranty</p> <p>i. Supplier shall provide the warranty for a period of 24 Months from the date of successful commissioning of the turnkey line or 30 Months from the date of receipt of turnkey line, whichever is earlier.</p> <p>ii. First six months after SAT, one service engineer shall be deputed to BHEL on daily (24 x 7) basis for ensuring un-interrupted operation of the line.</p> <p>iii. A service engineer as and when required by BHEL within 24 hours of notification during the remaining warranty period shall be deputed.</p>	

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	iv. The warranty shall cover all the spare and wear parts for the entire warranty period. v. The spare and wear parts needed for the smooth operation shall be stocked locally/at BHEL. There shall not be any interruption of production due to spare and wear parts. vi. All the preventive maintenance tasks defined in the AMC shall be performed during the complete warranty period as well without any extra payment.	
22.	Comprehensive Annual Maintenance Contract (AMC) i. Comprehensive AMC for three (03) year after the expiration of the warranty period shall be provided. ii. AMC shall cover all the spare and wear parts for the entire period of AMC. iii. The price for comprehensive AMCs for three (03) consecutive years after the warranty period shall be quoted. The AMC value(s) will be considered for arriving at the lowest bidder. iv. All the maintenance checks and activities to be performed at quarterly and annual basis as per the 'Maintenance Schedule' provided for each equipment shall be completed by the service engineer during the visit to BHEL in assistance with BHEL personnel. v. The service engineer(s) shall be deputed as and when required by BHEL within 24 hours of notification during the remaining AMC period.	
23.	General Conditions i. The commercial terms of this tender shall be applicable for the future purchases of the spares/consumables/sub-systems and consumables for the equipment to be procured from the supplier. ii. Supplier shall confirm adequacy of the equipment and accessories quoted for the intended use of turnkey line. Any other requirement shall not be entertained later. iii. Any deviation from the BHEL specification shall be clearly brought out. Otherwise, it is understood that BHEL specification is accepted in total and there is NIL deviation. iv. Supplier shall keep BHEL indemnified against any damage during installation, commissioning, repairs and maintenance of the equipment. Personnel deputed at BHEL shall be covered by relevant statutory provisions of the ESI/Workmen compensation Act or other acts as applicable.	

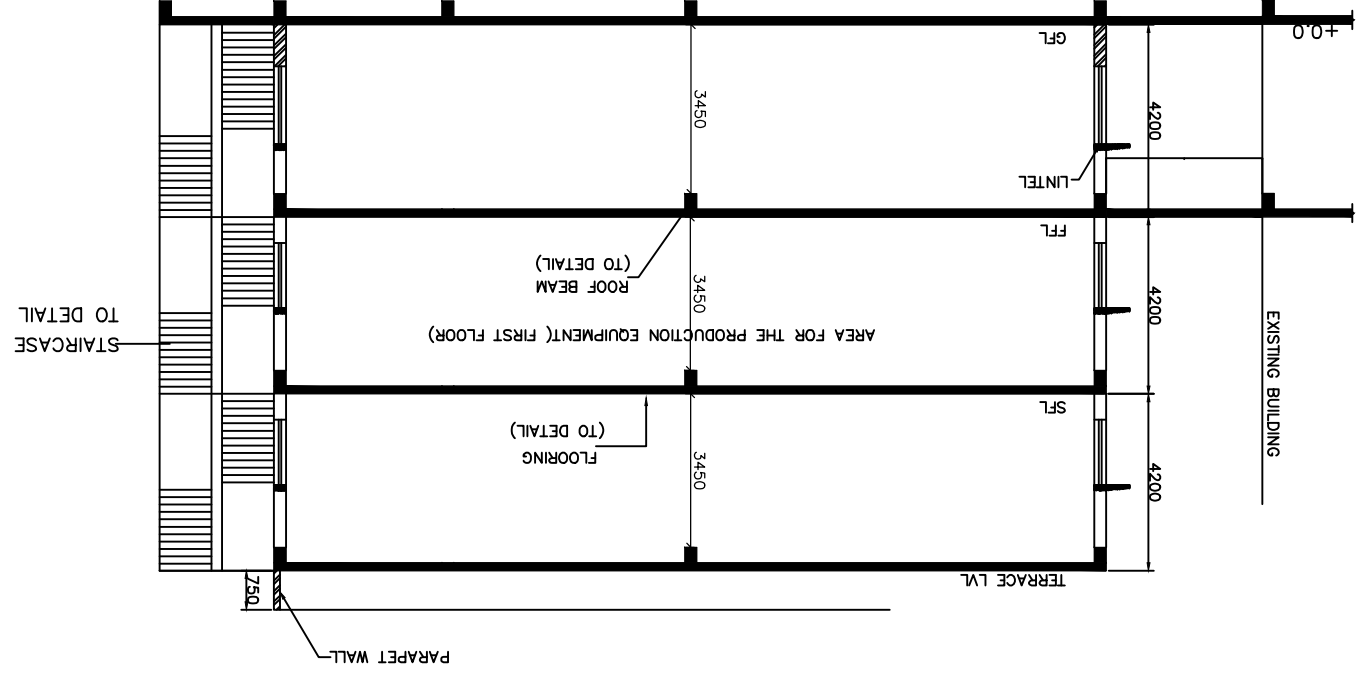
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**LIST OF ITEMS FOR TURNKEY MULTICRYSTALLINE SILICON SOLAR CELL LINE FOR
3000 CELLS PER HOUR GROSS CAPACITY**

S. No.	Item	Quantity (SET)
	Process Equipment	
1.	Stack splitter	01
2.	Wafer texturing bench	01
3.	Diffusion furnace	01
4.	Junction isolation & PSG removal bench	01
5.	Anti-reflection coating (ARC) deposition system (PECVD tool)	02
6.	Metallization line (Printing & drying station)	01
7.	Drying and co-firing line	01
8.	Testing and sorting station	01
	Process Utilities	
9.	Chemical dispensing system (CDS)	01
10.	Waste Gas Abatement system for ARC equipment	01
11.	Gas delivery system for ARC equipment	01
	Auxiliary Equipment	
12.	Lab wet bench	01
13.	Graphite boat cleaning bench	01
14.	Graphite boat drying station	01
15.	Trolleys	10
16.	Unpacking table	02
	Consumables	
17.	Chemical resistant cassettes for wafers	140
18.	Cassettes for wafers (Metal magazines)	40
	Offline Metrology equipment	
19.	4-point probe for sheet resistivity	01
20.	Edge isolation tester	01
21.	Single wavelength ellipsometer	01
22.	Chemical analysis kit (Minilab)	01
23.	Corescan equipment	01
24.	Optical profiler	01
25.	Electronic Screen tension measuring device	01
26.	Thermal profiler	01
27.	Precision balance	01
28.	General purpose balance	01

LEVELS



PRICE BID FORMAT
LIST OF ITEMS FOR TURNKEY MULTICRYSTALLINE SILICON SOLAR CELL LINE FOR
3000 CELLS PER HOUR GROSS CAPACITY

S. No.	Item	Quantity (SET)	Currency	Unit Price
	Process Equipment			
1.	Stack splitter	01		
2.	Wafer texturing bench	01		
3.	Diffusion furnace	01		
4.	Junction isolation & PSG removal bench	01		
5.	Anti-reflection coating (ARC) deposition system (PECVD tool)	02		
6.	Metallization line (Printing & drying station)	01		
7.	Drying and co-firing line	01		
8.	Testing and sorting station	01		
	Process Utilities			
9.	Chemical dispensing system (CDS)	01		
10.	Waste Gas Abatement system for ARC equipment	01		
11.	Gas delivery system for ARC equipment	01		
	Auxiliary Equipment			
12.	Lab wet bench	01		
13.	Graphite boat cleaning bench	01		
14.	Graphite boat drying station	01		
15.	Trolleys	10		
16.	Unpacking table	02		
	Consumables			
17.	Chemical resistant cassettes for wafers	140		
18.	Cassettes for wafers (Metal magazines)	40		
	Offline Metrology equipment			
19.	4-point probe for sheet resistivity	01		
20.	Edge isolation tester	01		
21.	Single wavelength ellipsometer	01		
22.	Chemical analysis kit (Minilab)	01		
23.	Corescan equipment	01		
24.	Optical profiler	01		
25.	Electronic Screen tension measuring device	01		
26.	Thermal profiler	01		
27.	Precision balance	01		
28.	General purpose balance	01		

PS: This filled Price Bid format has to be submitted only in the Part-II Price bid only



Bharat Heavy Electricals Ltd.,

(A Government of India undertaking)

Electronics Division

PB No.2606, Mysore Road, Bangalore-560026,India

CPD-2012
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General Terms & Conditions for Supply of CAPITAL ITEMS
(Imported & Indigenous)
Doc Ref: CPD-2012

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 PARTS BID:** Quotation shall be submitted in two parts 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 / ANNEXURE-B)**. 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) 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. EMD Payment if applicable as mentioned in RFQ shall be enclosed along with the Techno-commercial 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**. Installation, commissioning, start-up and training charges (if any) shall also be indicated in the price bid.

It is preferred to indicate the rates in both figures and words. In such case, if there is difference / discrepancy between the rates in figures and words, the **least of the two** rates will be considered.

(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 Bids] 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 (BOX NO.4)/ WEDNESDAY (BOX NO.6)/ FRIDAY (BOX NO.8)** 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 will be rejected.

3. The rate quoted against each item 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.** and the venue is NEB, 2nd floor, MM conference hall. 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. Quantity discount, if any, should be mentioned in the quotation.
9. BIDDERS (for indigenous purchase) shall indicate clearly Excise duty, Education Cess, Sales Tax/VAT, Octroi, Exit/Entry tax, Service Tax as applicable for the quoted items. In the absence of clarity of these, any claim at a later date will not be entertained. Any changes in Taxes and duties after award of the contract will not be considered except such are those, which are imposed by Govt., notification within the contractual delivery after placement of PO. Seeking price amendments for change in Excise duty due to crossing of turnover limits will not be considered under any circumstances.

10. EARNEST MONEY DEPOSIT (EMD):

EMD if applicable is mandatory and will be indicated in the RFQ. EMD shall be sent either by Pay Order or Demand Draft in favour of M/s Bharat Heavy Electricals Ltd, Electronics Division, Bangalore only. In case of foreign bidders, e-payment may also be made as EMD, details shall be obtained from purchase executive

EMD by the Tenderer will be forfeited as per Tender Documents if, the successful bidder/vendor refuses to honour the Order after award of the same on him and/or withdraws his bid and /or unilaterally changes the offer and/or any of its terms & conditions within the validity period. EMD of unsuccessful Tenderers shall be returned on acceptance of award /LOI/PO on successful Tenderer. The EMD of successful bidder shall be returned only after submission of Contract Execution Bank Guarantee (CEBG).

EMD will not carry any interest.

EMD will be waived in the following cases on submission of required documents by:

- a) Central / State - PSUs / Government departments
- b) Valid Micro and Small Enterprises under MSME. If claiming exemption under Micro or Small enterprise, submit the notarized/attested copy of your certificate along-with the original auditor's certificate stating the investment in your plant and machinery as on 31.03.2013 as per the format in Annexure-I

11. 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 your DUNS Number in the techno-commercial bid.

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

i. 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.

ii. 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.

iii. 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.

iv. Any agency commission to be paid by BHEL to the Indian agent shall be in Indian currency only.

v. Tax deduction at source is applicable to the agency commission paid to the Indian agent as per the prevailing rules.

vi. 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.

vii. The "Guidelines for Indian Agents of Foreign Suppliers" enclosed at annexure –'A' shall apply in all such cases.

viii. 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. In this regard, details may be checked as per Annexure-H. 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.

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.

13. VALUE FOR ERECTION & COMMISSIONING AT BHEL:

Erection & Commissioning (E&C) value will include services to be rendered at BHEL like erection, commissioning, job proving, performance tests, and training to operators etc.

The estimated percentage of E&C value shall be 10% or as specified in the RFQ.

E&C value should be quoted separately by bidders. Only in case where quoted value is less than the value (in %) specified in the NIT or separate E&C values are not mentioned in the offer, value for E&C portion shall be deemed to be considered as the value indicated in NIT & accordingly supply value will be adjusted from that quoted value and balance will be released as E&C payment as per clause 16.

14. TOTAL COST TO BHEL:

The bidders shall quote charges for 'Supply' and 'Erection & Commissioning' separately.

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.

The evaluation of tender shall be on the basis of total cost to BHEL including supply and Erection and Commissioning. For evaluation Exchange rate (TT selling rate of SBI) ruling on the date of Tender opening (Techno-commercial / un-priced Bid) will be considered for converting foreign currency to Indian currency. Loading factors for deviations to BHEL commercial terms & conditions will be considered.

15. FIRM PRICE: Rates quoted should be firm from the date of P.O., to the completion of supply and 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 Erection & Commissioning is in vendor's scope, then the price shall remain FIRM till commissioning & handing over of the complete system.

16. TERMS OF PAYMENT:**(a) FOR FOREIGN PURCHASE:**

Payment will be made against "**SIGHT DRAFT**" on presentation of documents to our bankers. Subject to loading factors as per **Clause 32 (Ai)**, BHEL may agree for the payment through LC at its discretion. 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:

~~(i) 90% against complete dispatch documents i.e. AWB / BOL, Invoice, Packing list, Warranty certificate, Nil shortage certificate, Certificate of country of origin etc., & balance 10 % after completion of commissioning or on submission of Performance Bank Guarantee (PBG).~~

(ii) 80% against complete dispatch documents i.e. AWB / BOL, Invoice, Packing list, Warranty certificate, Nil shortage certificate, Certificate of country of origin etc., 10% after completion of commissioning & balance 10 % on submission of Performance Bank Guarantee (PBG) (where both commissioning & PBG are applicable).

Note: If PBG could 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). In such cases loading for PBG is not applicable.

If payment terms as mentioned by BHEL are not agreed by bidder, such bidder have to submit Bank Guarantee at the time of payment / opening of LC in the prescribed Format of the amount, exceeding 80% of the PO value, valid till issue of E&C Certificate for the equipment.

Payment through L/C:

Where the payments are through L/C (L/C opening charges are to be loaded), payment of Supply value shall be 80% on dispatch and 20% on issue of E&C Certificate. Payment of E&C value shall be made against E&C certificate issued by BHEL. E&C certificate shall be issued on satisfactory completion of erection, commissioning, job proving, performance tests, and training to operators etc. as envisaged in PO. The L/C shall be opened by BHEL as per following:

- (i) Within 30 Days of receipt of acceptable CEBG, an irrevocable unconfirmed L/C will be opened for 30% of the payment towards supply, due on shipment i.e. 24% of the Supply value of PO (30% of 80%).

Not earlier than 60 days before the shipment date, the value of this irrevocable unconfirmed L/C would be enhanced from 24 % to 80% of the Supply value of PO.

The above L/C can be negotiated after the Shipment against submission of B/L or AWB and such other documents as mentioned in the PO. The above L/C will be valid for a period extending 21 days beyond the shipment date for negotiation of documents.

- (ii) 15 days prior to the scheduled & confirmed arrival of the technicians of supplier with their names, an irrevocable unconfirmed L/C will be opened for a value equal to 20% of the Supply value of PO plus 100% of the E&C value of PO. The validity of L/C would be sufficient to cover the period required for the completion of E&C plus 21 days as negotiation period.

This L/C can be negotiated after: (a) Completion of E&C of the equipment in BHEL and against E&C certificate issued by BHEL and (b) Submission of Performance Bank Guarantee (PBG) by Supplier in the prescribed Format valid for 30 days beyond the warranty period, from one of the Consortium Banks of BHEL or from a reputed Bank and confirmed by Consortium Bank of BHEL for 10% of total PO Value. The PBG confirmation charges shall be borne by vendor.

Under all circumstances, CEBG will be kept valid till the PBG becomes operational.

(b) FOR INDIGENOUS PURCHASE:

- ~~(i) 90% basic payment + 100% taxes & duties shall be within 45 days & balance 10 % after completion of commissioning or on submission of Performance Bank Guarantee (PBG).~~

- (ii) 80% payment of Supply value shall be made within 45 days from the date of receipt of material at BHEL. Balance 20% of Supply value plus 100% of the E&C portion of PO value will be paid against E&C certificate issued by BHEL and submission of Performance Bank Guarantee (PBG) valid for 30 days beyond the warranty period by Supplier from any of the

Consortium Banks of BHEL for 10% of total PO Value in the prescribed Format. The PBG confirmation charges shall be borne by vendor.

Note: If PBG could 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). In such cases loading for PBG is not applicable.

If payment terms as mentioned by BHEL are not agreed by bidder, such bidder have to submit Bank Guarantee at the time of payment in the prescribed Format of the amount, exceeding 80% of the PO value, valid till issue of E&C Certificate for the equipment.

17. ADVANCE PAYMENT: Quotations with “Advance payment” without fully securing with equal value of BG shall be liable for rejection.

18. PENALTY: Failure to supply/completion of E&C 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/E&C for the undelivered quantity, subject to a maximum of 10%.**

If pre-shipment inspection is involved, date of issue of pre-shipment call by the vendor along with test certificates / test reports / certificate of conformance / calibration reports as proof of completion will be treated as date of dispatch for the purpose of penalty calculation. In the absence of reports stated above, actual date of inspection will be considered as date of dispatch for penalty calculation.

Date of receipt / Date of dispatch / Date of LR / Date of Airway bill / Date of pre-shipment inspection call with relevant documents as stated above, whichever is applicable as mentioned in PO shall be considered for determination of actual delivery date for the purpose of penalty calculation. BHEL is not liable for delayed OA for opening LC or corrections/amendment to LC asked after opening of LC.

19. Contract Execution Bank Guarantee (CEBG):

CEBG shall be required for all POs where value (Supply + E&C) of each P.O. is more than Rs. 20 lakhs. CEBG should be submitted as per the format in Annexure-D.

The successful vendor shall have to furnish a Contract Execution Bank Guarantee (CEBG) for 10% of the Total PO value in the prescribed format within 30 days from the date of P.O. but before L/C opening. CEBG shall be from one of the Consortium Banks of BHEL or from a reputed Bank and confirmed by any Consortium Bank of BHEL. All bank charges on account of issuance and confirmation of CEBG whether incurred in India or outside India will have to be borne by the vendor.

CEBG shall be kept valid until 30 days after the date of E&C Certificate, which will be issued on completion of Erection & Commissioning of equipment which includes erection, commissioning, job proving, performance tests, and training to operators etc. as prescribed in PO.

If the supplier fails to submit the CEBG even within 60 days from the date of PO, BHEL reserves the right to cancel PO & forfeit the EMD given by the supplier. In addition, in such case, action will be initiated in line with extant guidelines for Suspension of Business dealings with Suppliers.

20. PBG: Performance Bank Guarantee (PBG) (If applicable): The vendor shall submit a PBG worth 10% of basic equipment value in the form and substance acceptable to BHEL from any of the Banks indicated in **ANNEXURE-G**. Such PBG shall be as per the format provided at **ANNEXURE - E/ ANNEXURE - F** and drawn on a non-judicial stamp paper of value Rs.100/-.

PBG shall be valid for 30 days beyond the warranty period of 12 months from the date of commissioning or 18 months from the date of dispatch whichever is earlier or as mentioned in the RFQ. The PBG shall also have 6 months claim period from the date of expiry of such validity of bank guarantee.

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.

21. WARRANTY: Goods dispatched shall have warranty period of 18 months from the date of dispatch or 12 months from the date of commissioning whichever is earlier or as mentioned in the RFQ.

22. TERMS OF DELIVERY:

(a) FOR IMPORTED PURCHASE:

Price offered shall be for goods packed and delivered F.O.B. (named international Airport / sea port) including packing, forwarding, Handling, Ancillary charges like processing of Sight Draft, Letter of credit (L/C) if applicable, negotiation of bank documents, Export declaration, Certificate of origin etc.

Packing shall be Road / Rail / Air / Sea worthy, best suitable for transshipment and to take care of transit damages. If containerized, no. of containers & size of container shall be mentioned. Packing weight (gross & nett) 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, AWB, packing list etc.

Vendors shall indicate the name of International Airport/ Seaport. The consignment shall be handed over to BHEL approved freight forwarded as mentioned in PO.

Note: Name of International Airport has to be selected from any one of the airports indicated in the table provided in ANNEXURE –C.

(b) FOR INDIGENOUS PURCHASE:

Equipment shall be delivered on Ex-EDN/ Ex-ESD BHEL, Bangalore basis, inclusive of freight, packing, insurance & forwarding charges.

Packing shall be Road / Rail / Air / Sea worthy, best suitable for transshipment and to take care of transit damages.

Smaller consignments can be dispatched through Courier services/ RPP with the prior approval of the purchasing Executive.

23. DELIVERY REQUIREMENT: The bidders should quote their earliest schedule for Supply and E&C against the schedule indicated in the RFQ. BHEL, however, reserves the right to accept an offer not meeting the RFQ schedule.

In the quotation, earliest firm delivery (number of days or weeks) by which material will be dispatched from the date of Purchase order must be indicated. It is recommended to avoid Quotations with delivery term such as `ex-stock`, `subject to prior sale`, or `delivery at the earliest`. Date of BHEL PO is the reference for all purposes.

24. VALIDITY: Quotation should remain valid for a period of **90 days** from the date of technical bid opening. Offer with Non-conformance is liable for rejection.

25. 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/Road/Rail/Sea 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 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. The following shall be ensured by the vendor:

a) Vendor/contractor shall ensure that the vendor/contractor's workmen always follow safe work procedure during erecting/ commissioning activities.

b) Vendor/contractor shall ensure that the vendor/contractor's workmen wear safety PPEs (shoes, helmets, safety belt etc.) while on erecting/ commissioning work and similar works.

c) Vendor/contractor shall ensure adequate supervision of the activity by his/her supervisor/engineer during the erecting/ commissioning activities.

d) Vendor/contractor shall ensure that vendor/contractor's workmen meet legal requirement such as ESI/Workmen Compensation Act/Accident/medical insurance etc.

e) Vendor/contractor shall take work permit before commencement of the non-routine works of this nature.

f) Undertaking that vendor/contractor will adhere to necessary legal/safety requirements and BHEL shall be kept indemnified against any untoward events taking place during the course of work.

(h) Suitable markings & damage control indicating devices shall be provided where applicable.

26. Equipment shall comply with the standard requirements of ISO 14001 & OHSAS 18001.

27. **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

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

(a) Against this enquiry for the subject item/system with detailed scope of supply as per enquiry specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING ON INTERNET. • For the proposed RA, technically and commercially acceptable bidders only shall be eligible to participate.

(b) In case of RA, BHEL will engage the services of a service provider for conduct of the RA who will provide all necessary training and assistance to the bidders before commencement of on line bidding on internet.

(c) Business rules governing the RA will be communicated to the bidders through service provider for compliance.

(d) Vendors have to fax the Compliance form in the prescribed format (provided by Service provider) before start of RA. Without the compliance, the vendor will not be eligible to participate in the event.

(e) BHEL will provide a sample calculation sheet (in EXCEL format) which would help the bidders to arrive at "Net Cash outflow to BHEL" considering various price / cost elements like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) etc. for each of the bidders to enable them to arrive at "Net Cash outflow to BHEL (Total Cost to BHEL)" which is the amount the bidder would be bidding during the RA.

(f) RA will be conducted on scheduled date & time and at the end of event, the lowest bidder value will be known on the network.

(g) The lowest bidder has to Fax the duly signed "Price Break-up" in prescribed format as provided on case-to-case basis to BHEL through Service provider within 24 hours of Auction without fail.

(h) Any variation between the on-line bid value and the signed document will be considered as sabotaging the tender process and will invite disqualification of vendor to conduct further business with BHEL, as per the prevailing procedure.

29. REGRET LETTER: In case any vendor is unable to quote, vendor shall send a regret letter without fail. In case of non-receipt of quotations or regret letters for three consecutive enquiries, such vendor is liable to be removed from our vendor list.

30. 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.

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

32. 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 terms.

A: Bank Guarantee and Loading against non-acceptance of BHEL's Payment Terms:

If payments terms as mentioned by BHEL are not agreed by bidder, such bidder have to submit Bank Guarantee at the time of payment / opening of LC in the prescribed Format of the amount, exceeding 80% of the PO value, valid till issue of E&C Certificate for the equipment. However, in no case, payment against dispatch shall exceed 90% of the PO Value.

Additionally, for any deviation sought including as mentioned above, in Payment Terms by bidder w.r.t. tender conditions, following loading shall be followed:

- (a) Benchmark Prime Lending Rate (BPLR) of SBI as applicable on the scheduled date of tender opening + 2%, for the amount & period of relaxation sought by bidder.
- (b) On account of payment through LC, if insisted by bidder, Bank charges shall also be loaded for the deviation in (i) opening of LC by BHEL and (ii) period and amount of LC w.r.t. NIT norms, as per the prevailing bank rates.

(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	90% against "SIGHT DRAFT" + 10% against PBG (where PBG only is applicable)	Payment through Letter of Credit (LC) with bank charges to respective accounts	(BPLR+2%) x Percentage quoted through LC
2	80% against "SIGHT DRAFT" + 10% after commissioning +10% against PBG (where both E&C and PBG are applicable)	Payment through Letter of Credit (LC) with bank charges to respective accounts	(BPLR+2%) x Percentage quoted through LC

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	90% basic payment + 100% taxes & duties with 45 days credit + 10% against PBG (where PBG only is applicable)	Payment through bank	(BPLR+2%) x percentage quoted through bank / proforma invoice
		Payment against proforma invoice	
		100% with 45 days credit & against submission of PBG	Nil
2	80% basic payment + 100% taxes & duties with 45 days credit + 10% after commissioning +10% against PBG (where both commissioning & PBG are applicable)	Payment through bank	(BPLR+2%) x percentage quoted through bank / proforma invoice
		Payment against proforma invoice	
		100% with 45 days credit after commissioning & submission of PBG	Nil

B. For non compliance of Penalty clause for in 'SUPPLY' and 'E&C':

For the purpose of penalty for delay E&C of the equipment the duration will be reckoned from the date of intimation by BHEL to vendor for readiness of site

Penalty on delay in 'Supply' and/or 'E&C' will be applicable to the delays attributed to vendor. Penalty will be considered separately for 'Supply' and 'E&C'.

The rate of penalty for delayed Supply shall be @ 0.5% per week of delay of total PO value (Supply + E&C) in supply subject to a maximum of 10% of total PO value (Supply + E&C).

The rate of penalty for delayed E&C shall be @ 0.5% per week of delay of total PO value (Supply + E&C) in E&C subject to a maximum of 10% of total PO value (Supply + E&C).

Maximum penalty for delay in Supply and E&C together shall be limited to 15% of total PO value (Supply + E&C).

In case PO includes more than one machine, the penalty shall be @ 0.5% per week of delay on total PO value (Supply + E&C) for the delayed machine.

In case any bidder is not accepting the above penalty for delayed Supply and/or E&C, the offer of bidder shall be loaded to the extent to which it is not agreed by the bidder.

Sl. No.	BHEL standard term	If you quote	Loading factor for non-compliance
1	The rate of penalty for delayed Supply shall be @ 0.5% per week of delay of total PO value (Supply + E&C) in supply subject to a maximum of 10% of total PO value (Supply + E&C).	Not agreed.	10%
		Other than the above.	10% - (minus) agreed max. %
2	The rate of penalty for delayed E&C shall be @ 0.5% per week of delay of total PO value (Supply + E&C) in E&C subject to a maximum of 10% of total PO value (Supply + E&C).	Not agreed.	10%
		Other than the above.	10% - (minus) agreed max. %

In case, any shortage is noticed viz-a-viz PO requirement in the main equipment / spares, such shortages shall be replenished by supplier on FOR destination basis without any cost implication to BHEL i.e. Custom Duty and freight charges etc. up to destination for such short supplies shall be borne by the supplier.

Supply period indicated by bidder should include reasonable time required for approval of drawings and other inputs from BHEL. In the Techno-Commercial Bid, the bidder shall submit milestones for various activities in co-relation with Supply and E&C period quoted by him.

C. For non compliance of Performance Bank Guarantee (PBG) (If applicable):

Sl. No.	BHEL standard term	If you quote	Loading factor for non-compliance
1	PBG for 10% of the basic material cost shall be furnished in the BHEL prescribed format.	Not agreed.	10 %
		Other than the above.	10% - (minus) agreed max. %

D. For non conformance to delivery requirement indicated in the RFQ:

Sl. No.	BHEL standard term	If you quote	Loading factor for non-compliance
1	Delivery requirement as indicated in the RFQ in number of weeks from the date of issue of PO	Not agreed for the stipulated delivery in the RFQ	0.5 % per week up to max., of 10% for the difference in delivery period

E. For non compliance of Warranty:

Sl. No.	BHEL standard term	If you quote	Loading factor for non-compliance
1	18 months from the date of dispatch or 12 months from the date of commissioning whichever is earlier or as indicated in the RFQ	Not agreed.	6%
		Less than 12 months or as indicated in the RFQ	0.5 % per month for the difference in period

F (i) For Non- agreement on delivery at BHEL-EDN/ESD (For Foreign Purchase Orders):

Sl. No.	BHEL standard term	If you quote	Loading factor for non-compliance
1	FOB / CIF to nearest international Airport/Seaport	Not agreed for the standard term of delivery	10 %

F(ii) For Non- agreement on delivery at BHEL-EDN/ESD (For Indigenous Purchase Orders):

Sl. No.	BHEL standard term	If you quote	Loading factor for non-compliance
1	Ex- EDN or ESD / BHEL, Bangalore (Free delivery to BHEL Bangalore including freight, packing & forwarding charges)	Not agreed for the standard term of delivery	10 %

ANNEXURE-A

COMMERCIAL TERMS (to be enclosed with TECHNO-COMMERCIAL BID)
(for Foreign Purchase Orders)

Sl. No.	Particulars	Bidder's confirmation
1	Price basis: Firm i.e., from the date of PO to completion of supply [Price Variation Clause (PVC) not acceptable]	Acceptable / Not acceptable
2	EMD as mentioned in RFQ	Submitted/Not submitted
3	CEBG as detailed in clause 19	Acceptable / Not acceptable
4	Terms of Payment: Against "SIGHT DRAFT" on presentation of documents to our bankers. (a) 90 % is payable on negotiation of complete set of original documents balance 10 % after completion of commissioning or on submission of PBG (b) 80 % is payable on negotiation of complete set of original documents, 10% after commissioning & balance 10% against submission of PBG (where both Commissioning & PBG are applicable). (c) Deviation if any please specify	(a) Acceptable / Not acceptable (b) Acceptable / Not acceptable (c)
5	BHEL's penalty clause: (a) Delay in delivery as per PO delivery date will result in penalty of penalty of 0.5 % (half percent) per week at the basic price of the goods/E&C for the undelivered quantity, subject to a maximum of 10% individually. (b) Deviation if any Please specify	(a) Acceptable / Not acceptable (b)
.6	Performance Bank guarantee (If applicable): PBG for 10% of the basic material cost shall be furnished in the BHEL prescribed format as detailed in clause 20.	Yes / No
7	Terms of delivery: (a) F.O.B international Airport/Seaport as per clause 19 (a)(Indicate name of International Airport/Seaport) (b) Deviation if any Please specify	(a)Acceptable / Not acceptable (b)
8	Warranty: (a) 18 months from the date of dispatch or 12 months from the date of commissioning or as specified in RFQ (b) Deviation if any Please specify	(a)Acceptable / Not acceptable (b)
9	Delivery period: Indicate number of weeks from the date of issue of Purchase order	_____Weeks
10	Validity: (a) Quotation should remain valid for a period of 90 days from the due date (b) Deviation if any Please specify	(a) Acceptable / Not acceptable (b)
11	Bank charges(If applicable): (a) Bank charges within India is to BHEL account and outside India is to Vendor's account (b) Deviation if any Please specify	(a) Acceptable / Not acceptable (b)
12	Weight and Dimension of consignment with packing	Furnished / To be furnished

Signature of tenderer / with seal

ANNEXURE-B

COMMERCIAL TERMS (to be enclosed with TECHNO-COMMERCIAL BID)
(For Indigenous Purchase Orders)

Sl.No.	Particulars	Bidder's confirmation
1	Price basis: Firm i.e., from the date of PO to completion of supply [Price Variation Clause (PVC) not acceptable]	Acceptable / Not acceptable
2	EMD as mentioned in RFQ	Submitted/Not submitted
3	CEBG as detailed in clause 19	Acceptable / Not acceptable
4	Excise duty: If applicable indicate %.	Applicable / Not applicable ED: _____%
5	Sales tax: If applicable indicate %	Applicable / Not applicable (a) VAT _____% (b) CST _____% against form C
6	Service tax: If applicable indicate %	Applicable / Not applicable ST: _____%
7	Payment terms: (a) 90 % basic payment + 100% taxes, duties & freight charges with 45 days credit & balance 10 % after completion of commissioning or on submission of PBG (b) 80 % basic payment + 100% taxes, duties & freight charges with 45 days credit, 10% after commissioning & balance 10% against submission of PBG (where both commissioning & PBG are applicable) (c) Deviation if any please specify	(a) Acceptable / Not acceptable (b) Acceptable / Not acceptable (c)
8	BHEL's penalty clause: (a) Delay in delivery as per PO delivery date will result in penalty of penalty of 0.5 % (half percent) per week at the basic price of the goods/E&C for the undelivered quantity, subject to a maximum of 10% individually. (b) Deviation if any Please specify	(a) Acceptable / Not acceptable (b)
9	Performance Bank guarantee (PBG) (If applicable): PBG for 10% of the basic material cost shall be furnished in the BHEL prescribed format as per clause 20.	Yes / No
10	Terms of delivery: (a) Ex- EDN or ESD / BHEL, Bangalore (Free delivery to BHEL Bangalore including freight, packing & forwarding charges) (b) Deviation if any Please specify	(a) Acceptable / Not acceptable (b)
11	Warranty: (a) 18 months from the date of dispatch or 12 months from the date of commissioning or as specified in RFQ (b) Deviation if any Please specify	(a) Acceptable / Not acceptable (b)
12	Delivery period: Indicate number of weeks from the date of issue of Purchase order	_____ Weeks
13	Validity: (a) Quotation should remain valid for a period of 90 days from the due date (b) Deviation if any Please specify	(a) Acceptable / Not acceptable (b)
14	Bank charges (If applicable): (a) All Bank charges to vendor's account (b) Deviation if any Please specify	(a) Acceptable / Not acceptable (b)
15	Weight and Dimension of consignment with packing	Furnished / To be furnished

Signature of tenderer / with stamp

ANNEXURE- C

LIST OF INTERNATIONAL AIRPORTS

Sl. No	Country	Air Ports
1	Austria	Vienna, Linz, Graz
2	Australia	Sydney, Melbourne, Perth
3	Belgium	Antwerp, Brussels
4	Canada	Toronto, Montreal
5	China	Shangai
6	Cyprus	Lamaca
7	Czech Republic	Prague (Via Frankfurt)
8	Denmark	Copenhagen
9	Egypt	Cairo
10	Finland	Helsinki
11	France	Paris (Rossy), Lyon
12	Germany	Darmstadt, Manihem, Nurnberg, Hamburg, Stuttgart, Munich, Koln, Dusseldorf & Hannover, Frankfurt, Berlin
13	Hongkong	Hongkong
14	Italy	Rome, Milan, Turin, Bologna, Florence
15	Ireland	Dublin
16	Isrel	Telaviv
17	Japan	Tokyo, Osaka
18	Malaysia	Kaulalampur, Penang
19	Neatherlands	Amsterdam, Rotterdam
20	Newzealand	Auckland
21	Norway	Oslo
22	Oman	Muscat
23	Philiphines	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, Wellingborough, Birmingham, East Midland, Manchester, Leeds, Glasgow.
37	U.S.A.	Newyork, Chicago, Sanfrancisco, Los Angeles, Atlanta
38	Ukraine	Kiev



ANNEXURE – D

CONTRACT EXECUTION BANK GUARANTEE BOND

This deed of guarantee made this day of 20... by the..... Bank Ltd, (hereinafter referred to as “the Bank”) in favour of Bharat Heavy Electricals Limited, Bangalore having its registered Office at New Delhi with its Unit Office at Bangalore where as M/s..... having its registered office at (hereafter called the “the Contractor”) have entered in to contract with Bharat Heavy Electricals Limited, Bangalore for the supply of vide Purchase Order No dated

1. We Bank Ltd, do hereby undertake to pay to Bharat Heavy Electricals Limited, Bangalore an amount not exceeding Rs..... against any loss or damage caused to or suffered or would be caused to or suffered by Bharat Heavy Electricals Limited, Bangalore by reason of any breach by the said Contractor of any of the terms or conditions contained in the said Purchase Order.

2. We, Bank Ltd, do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from Bharat Heavy Electricals Limited, Bangalore stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by Bharat Heavy Electricals Limited, Bangalore by reason of any breach by the said Contractor of any of the terms or conditions contained in the said Purchase Order or by reason of the Contractor’s failure to perform the said Purchase Order. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs.....

3. We, Bank Ltd, further agree to the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Purchase Order and that it shall continue to be enforceable till all the dues of Bharat Heavy Electricals Limited, Bangalore under or by virtue of the said Purchase Order have been fully paid and its claims satisfied or discharged or till Bharat Heavy Electricals Limited, Bangalore certifies that the terms and conditions of the said Purchase Order have been fully and properly carried out by the said Contractor and accordingly discharges the guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the we shall be discharged from all liability under this guarantee thereafter. But where such claim or demand has been preferred by the Company with the Bank before the expiry of the said date the claim shall be enforceable and Payable only by any one of the BHEL Consortium Banks in India (List is attached herewith) notwithstanding the fact that the said enforcement is effected after the said date

For the purpose of this clause, any letter making demand on the Bank by Bharat Heavy Electricals Limited, Bangalore dispatched by Registered Post with Ack. Due or by Telegram or by any Electronic media addressed to the Bank (**any one of the BHEL Consortium Banks as per list attached as selected by the vendor**) shall be deemed to be the claim / demand in writing referred to above irrespective of the fact as to whether and when the said letter reaches the Bank, as also any letter containing the said demand or claim is lodged with the Bank personally.

4. We,.....Bank Ltd, further agree with Bharat Heavy Electricals Limited, Bangalore that Bharat Heavy Electricals Limited, Bangalore shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Purchase Order or to extend time of performance by the said contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by Bharat Heavy Electricals Limited, Bangalore against the said Contractor and to forbear or enforce any of the terms and conditions relating to the said Purchase Order and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor or for any forbearance, act or omission on the part of Bharat Heavy Electricals Limited, Bangalore or any indulgence by Bharat Heavy Electricals Limited, Bangalore to the said Contractor or by any such matter of thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

5. Any claim or dispute arising under the terms of this document shall only be enforced or settled in the Courts at Bangalore.

We, Bank Ltd, lastly undertake not to revoke this guarantee during its currency except with the previous consent of Bharat Heavy Electricals Limited, Bangalore in writing.

In witness whereof we..... (indicate the name of Bank) have hereunto setout Bank

Seal the..... day month 201

The contact details of the Issuing Bank such as Email ID, Phone No. and Fax No. should be indicated in the CEBG. Also please note that the CEBG should be forwarded to us with the covering letter of the issuing Bank with signature and seal.

(1) It should be typed in the Rs. 100 value of stamp paper.

(2) It should be signed by TWO bank officials with Rubber stamp containing names & employee numbers of bank officials.

(3) It should be submitted with bank covering letter with sign and seal of the bank official.

Please note that issuance of the CEBG without meeting the above requirement will render the document invalid.



ANNEXURE-E

**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. _____ with 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 Authorised Signatory

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



ANNEXURE - F

**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/Nationalised 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 / authorised 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 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 it authorised 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.

ANNEXURE - G**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

The list of BHEL approved consortium bank may be updated from time to time. Please check with the purchasing executives for correctness.

ANNEXURE – H

This format is applicable only to Indian Suppliers/ Agents supplying indigenous portion of Foreign Purchases.

SEARP (SRF) Clause No	Detail
	Name & address of the firm
1.0	Products/ Systems / Services being considered for
2.0	General Information
2.2	Name of Chief Executive
2.3	Details of authorized signatory
3.0	Ownership Information
3.1	Type of firm
3.2	Nature of Business <ul style="list-style-type: none"> • Attach authorization letter and agency agreement from Principal (from whom capital equipment is procured) • Attach copy of declaration from Foreign Principal for total guarantee/ warranty of indigenous supplies
3.3	Year of establishment
3.4	Year of commencement of business
4.0	Registration particulars
4.1	Permanent Account No.
4.2 / 4.3	Sales Tax / TIN no
4.6	Service tax no. (in case of E&C)
5.0	Organisational strength
6.0	Other particulars
6.1	If the company is already registered with other units
6.2	Directors/ Partners, if related to any BHEL Employee
6.9	If any Ex BHEL Personnel employed by the Company
6.12	Details of pending legal issues with BHEL
6.13	Bank Account information
9.0	Financial information
9.6	Sales/ Turnover details of last 3 years (or from the date of incorporation whichever is less)



ANNEXURE – I

Annexure - I

Certificate by Chartered Accountant on letter head

This is to Certify that M/S
(hereinafter referred to as 'company') having its registered office at
..... is registered under MSMED Act 2006, (Entrepreneur
Memorandum No (Part-II) dtd:.....,
Category: (Micro/Small)). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as on
date..... as per MSMED Act 2006 is as follows:

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No.S.O.1722(E) dated October 5, 2006 :
Rs.....Lacs
2. **For Service Enterprises:** Investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the MSMED Act, 2006:
Rs.....Lacs

The above investment of Rs.....Lacs is within permissible limit of
Rs.....Lacs forMicro / Small (Strike off which is not applicable)
Category under MSMED Act 2006.

Date:

(Signature)

Name -

Membership number -

Seal of Chartered Accountant
