

Bharat Heavy Electricals Ltd.,

(A Government of India undertaking)

Electronics Division

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

Tel **080-26998476** / email: **ramachandra@bheledn.co.in**

Sealed tenders are invited under Two part bid system (Part-I Techno- Commercial Bid & Part-II Price Bid) from reputed Indian manufactures for “manufacturing and Supply of 245 Wp/ 275 Wp PV Modules (Mono Crystalline Silicon)” as per technical specifications and quantity mentioned in the Quotation format below. Tender document can be downloaded at free of cost from www.bheledn.com , www.bhel.com, www.tender.gov.in Tender document should be dropped in Tender box provided in the Reception of BHEL EDN Bangalore super scribed “SC&PV-MM and Friday” or BOX NO: 08 sent by post before due date and time.

Date of Advertisement	10.02.2014
RFQ NO	RCRSCPV102 dated 10.02.2014
Last date for submission of tenders	21.02.2014 up to 13.00 hrs. of IST (Indian Standard Time)
Date, Time & Venue of Technical Bid Opening	21.02.2014 at 13.30 hrs. IST New Engineering Building 2nd Floor Bharat Heavy Electricals Limited PB NO 2606, Mysore road, Bangalore-560 026. INDIA
Date, Time & Venue of Price Bid opening	Will be intimated later for technically accepted vendors
Address for Communication & Contact Person in BHEL	Mr. Ramachandra Sr. Manager (MM-SCPV) Bharat Heavy Electricals Limited PB NO 2606, Mysore road, Bangalore-560 026. INDIA Email: ramachandra@bheledn.co.in Telephone number: +91 80 26998476, Handset Number: +91 9980958476 Fax: +91 80 26989217
Name and address of the Independent External Monitor for this tender	Sh D. P. Bagchi, IAS (Retd.)

The bidder shall sign an “INTEGRITY PACT” in the formats enclosed. Only those vendors / bidders who have entered into such an Integrity pact with BHEL would be competent to participate in the bidding. In other words, entering into this pact is a preliminary qualification.

The Name & Address of Independent External Monitor (IEM) is given below:

Sh D. P. Bagchi, IAS (Retd.),

Y-165, Regency Park-II,

DLF City, Phase IV,

Gurgaon- 122009

REQUEST FOR QUOTATION

	BHARAT HEAVY ELECTRICALS LIMITED Electronics Division PB No. 2606, Mysore Road Bangalore - 560026 INDIA	RFQ NUMBER: RCRSCP102 RFQ DATE : 10.FEB.2014	Due Date 21.FEB.2014 Time: 13:00 HRS VENUE : NEW ENGG. BLDG
MMI:PU:RF:003			

	(for all correspondence) Purchase Executive : RAMACHANDRA Phone : 26998476 Fax : 00918026989219 E-mail: ramachandra@bheledn.co.in
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Please submit your lowest quotation subject to our terms and conditions attached for the material mentioned below. The quotation must be enclosed in a sealed envelope / Fax superscribed with RFQ no. and due date, should reach us on or before the due date by **13.00** hours IST and will be opened on the same day at **13.30** hours at the venue mentioned above. **PLEASE DROP THE OFFER IN THE BOX PROVIDED AT RECEPTION.**

Sl No.	Description	Qty	Unit	Delivery qty	Delivery Date
1	PV0679038949 245-Wp /275Wp PV Module (mono)	105,000	NO	105,000	Tentative

Total Number of Items - 1

Please note that the tender will be opened in the presence of the bidders or his authorised representatives (maximum two per organisation) who choose to be present with authorisation letters. Refer annexure for the terms and conditions.
Preference will be given to vendors who accepts our standard payment terms i.e.100% payment - 45 days after receipt of material at our works subject to acceptance. Please specify Terms of delivery, Excise duty, sales tax, Ex-BHEL, Ex-works surcharge, Insurance,P&F, Freight and other taxes very clearly .
For evaluation,exchange rate(TT selling rate of SBI) as on scheduled date of tender opening (Part-I bid incase of two part bid) shall be considered.
The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected.The list of banned firms is available on BHEL web site www.bhel.com

- i). This is only RFQ not an order.
- ii). In all correspondence quote RFQ No. & due date.
- iii). In Quotation BHEL material code / RFQ Sl. No. should be mentioned clearly.
- iv). Quotation Envelope / Fax not superscribed with RFQ No. and due date is liable for rejection.
- v). Quotation should remain valid for a minimum period of 90 days from due date.
- vi). In case of non-receipt of Quotation or regret letter for 3 consecutive RFQs you are liable to be removed from our vendors list.
- vii). All Prices should be written in words and numbers.
- viii). Excise Chapter Heading should be mentioned for all items where VAT is applicable .



Pre-qualification criteria

Sl No.	Item	Remarks	Vendor Confirmation
1	Design Qualification and Type Approval as per IEC 61215: 2005 (Edition 2) & IEC 61730: 2004 (Part 1 & Part 2) for mono crystalline PV Modules	Valid IEC Test Certificate to be attached with the offer	Certificate Enclosed: Y/N
2	Vendor should have a minimum of 30 MW PV module automated in-house manufacturing facilities in India.	Production Capacity \geq 30 MW Manufacturing facilities located in India.	Y/N (Please state existing capacity) Y/N Address of the manufacturing plant:
3	Degree of automation in manufacturing facilities. a. Automated tabber-stringer and layup b. Automated laminator c. Automated framing	Automation in tabber-stringer, layup, lamination and framing a. Y/N b. Y/N c. Y/N	Y/N Eqpt. Make:
4	Vendor should have manufactured and supplied a cumulative of 10 MW of 230-260Wp (60 cells) or 275-320 Wp (72 Cells) PV modules (mono/multi) during last two financial years.	Details of dispatches in the mentioned period to be validated with customer Purchase Orders.	Y/N Enclosed: Y/N

NOTE:

1. Pre-qualification will be carried out based on the details furnished by the vendor / feedback from their customers / inspection of the company / product if required by BHEL and at its sole discretion.
2. The Pre-qualification criteria are mandatory requirements and the technical bids will be evaluated only when the Pre-Qualification criteria are met.

Terms and conditions:

- All the Bidders shall comply with **Pre-qualification criteria. The Pre-qualification criteria are mandatory requirements and the technical bids will be evaluated only when the Pre-Qualification criteria are met.**
- All the Bidders shall comply with **Technical Specifications** mentioned in this specific tender. **(Technical Specification is provided under ANNEXURE-B). Bids not qualifying as per BHEL Technical Specification shall not be considered.**
- Bidders are required to comply with the **General Terms and Conditions** as per ANNEXURE-A

GENERAL TERMS & CONDITIONS

Bidders are required to read the general terms & conditions carefully and submit their quotation covering all the points. Any order resulting from this enquiry shall be governed by the general terms and conditions listed below.

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 (BHEL – EDN).
- (b) Any of the terms and conditions not acceptable to supplier, 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 supplier, 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 supplier 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 shall be at liberty to cancel the tender at any time, before ordering, without assigning any reason.

1. **Quotation:** Quotation shall be submitted in two parts:

(a) Techno-Commercial i.e., Un-priced Bid:

Techno-commercial bid shall be submitted with complete description of the item, specification compliances to the enquired specification and all the commercial terms & conditions indicated in the ANNEXURE – A. Any other enclosure, which the supplier 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.** Techno- commercial bid format is provided as ANNEXURE C

Compliance to Pre-qualification criteria shall also be enclosed 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.

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.

Details to be furnished along with the technical offer

- i. Valid IEC 61215: 2005 (Edition 2) & IEC 61730: 2004 (Part 1 & Part 2) Test Certificate to be attached with the offer
- ii. A clause wise deviation, if any, has to be brought out clearly. If there are no deviations, the vendor has to positively certify compliance to the specifications in Toto.
- iii. The complete technical information and catalogue shall be given.
- iv. Customer POs to be furnished.

(b) Price Bid:

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

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

(c) Bid Submission: 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 No. 08 and mentioned as "**SC &PV- Friday**" kept at BHEL-EDN's Reception area of our works. Quotations also can be dispatched by Couriers / Registered post / to the Purchase Executive.

BHEL EDN is not responsible for any delay in receipt of quotation sent by supplier through post.

Late Tenders i.e., Tenders received after due date will not be considered and stand **rejected**.

3. The rate quoted against each item shall be in units stated in the enquiry (**price per PV module and not per watt**). Please use ANNEXURE D format for 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.

5. Quotations are to be duly signed. Unsigned bids / offers are liable for rejection.

6. Tenders will be opened at **13:30 hrs**. 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. BHEL may go for **Reverse Auction** to arrive at L1 at any point of time with due information to vendors.

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. Withdrawal from the quotation after submission till order is placed will entail cancellation of the enquiry. Such supplier is liable for de-listing for future enquiries at the sole discretion of BHEL EDN.

10. 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. Seeking price amendments for change in Excise duty due to crossing of turnover limits will not be considered under any circumstances.

11. **PURCHASE ORDER:** Purchase order will be placed on the lowest bidder (L1) only among the technically & commercially accepted quotations. Lowest quotation (L1) is determined on the basis of the **total cost to BHEL**.

BHEL reserve the right to Split the order quantity in the ratio of 60:40 to L1 and L2 vendors respectively, in case L2 accept to supply as per L1 negotiated price. In case, L2 does not accept to supply as per L1 negotiated price, full quantity shall be ordered on L1.

COST TO COMPANY:

Total cost to BHEL = Total basic value including Packing & forwarding charges + Excise duty + Education Cess + Sales Tax/VAT + Octroi + Exit/Entry tax + Service Tax (if applicable).+ Loading factors

12. **FIRM PRICE:** Rates quoted should be firm 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.

TERMS OF PAYMENT:

100 % with 45 days credit after receipt and acceptance of item at BHEL.

13. **ADVANCE PAYMENT:** Quotations with "Advance payment" or "Inland credit" will be rejected.

14. **WARRANTY:** Goods dispatched shall have warranty period of 36 months from the date of supply.

15. **TERMS OF DELIVERY:**

FOR BHEL Bangalore

DELIVERY REQUIREMENT: First Lot of 3000 nos within 4 weeks of receipt of BHEL purchase order, subsequently at the rate of 3000 nos of PV Modules per week.

16. **VALIDITY:** Quotation should remain valid for a minimum period of 60 days from the date of technical bid opening. Quotation with validity period less than 60 days is liable for rejection.

17. BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit „online sealed bid“ in the Reverse Auction. Non-submission of „online sealed bid“ by the bidder will be considered tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.”

18. **POST-ORDER REQUISITES:**

- a) Pre-shipment inspection at vendor's works will be carried out by BHEL / BHEL's customer. Required assistance will have to be provided by the vendor at the time of pre-shipment inspection.
- b) Test certificates, Calibration certificates and warranty certificates as stipulated at the time of ordering shall be furnished.
- c) Items shall be dispatched by Road-worthy packing. Any damage and later rejection, due to poor / improper packing shall be to supplier's account.
- d) Any damage/rejection should be made good or replaced immediately without any extra cost to BHEL.

19. 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.

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

21. Item shall comply with the standard requirements of ISO 14001 & OHSAS 18001.

22. **Limitation of liability:** Limitation of liability by the vendor is limited to the value of the order.

23. **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

24. **LOADING FACTORS:**

Loading factors as below will be added to the quoted basic price to evaluate the lowest quotation for non-agreement to BHEL EDN commercial terms.

A) For non-agreement to terms of payment of 100% payment with 45 days credit.

If the quotation is 'Payment through bank': Loading factor: 10%

If the quotation is 'Payment on receipt of material at BHEL EDN': Loading factor: 10%

B) For non-agreement of penalty for delayed delivery:

If the quotation is 'Not agreeable': Loading factor 10%

If the quotation is '5% maximum agreed' : Loading factor 5%

If the quotation is other than the above: Loading factor (10% - quoted max %)

C) For non-agreement on delivery at BHEL EDN: Loading factor 10%

D) Penalty for delayed delivery will be reckoned with respect to P.O delivery as given below

If the delivery is at BHEL EDN by supplier, then Delivery date at BHEL EDN will be the reference.

If the delivery is ex-works supplier (transportation by BHEL EDN), then Invoice date will be the reference.

If the despatch is with 'Document through bank', then the Invoice date will be the reference.

If Pre-shipment Inspection at supplier's works is to be done by BHEL EDN before despatch, then, the Inspection call date given by supplier will be the reference.



**PURCHASE SPECIFICATION
GROUP: PHOTOVOLTAICS**

PS- 439 - 298

REV.00

A4-10

PAGE 01 OF 03

245-WATT PV MODULE (MONO CELLS)

Technical Specification:

Sl. No	Item	Remarks	Vendor Confirmation
1	PV Module Configuration	Single glass laminated type with 60 numbers of 156-mm Mono Crystalline silicon solar cells in 10*6 series configuration as per Module overall assembly drawing no: 36790200370 and laminate assembly drawing no: 36790200377	Y/N
2	Power Output	245 Watts (minimum)	
3	Overall Module Size (Typ.)	1656 (±3) * 996 (±2) * 50 (±1) mm	Y/N
4	Weight	20 kg. (Typ.)	Y/N
5	Bill of Materials:		
5.1	Solar cells	Three bus bar 156-mm Mono Crystalline silicon solar cells as per PS-439-267 Power Output: ≥ 4.3 watts (18 % efficiency) Visual Characteristics: Cells should be free from the following defects: a) Edge chips or cracks or deep scratches on the surface b) Misalignment and misprints in the front grid pattern c) Finger prints or stains or paste smudges on the surface d) Silicon Nitride coating color variations or inhomogeneity Front Pattern No of lines: 88 – 90 with borders closed No of bus bars : 3, Busbar Spacing: 52 mm (centre to centre) Bus bar width: 1.4 to 1.5 mm Back Pattern No of bus bars : 3, Busbar Spacing: 52 mm (centre to centre) Bus bar width: 2.5 to 3 mm	Y/N
5.2	Glass	As per PS- 439 – 142, ≥ 91 % light transmission, tempered, one-side textured, Size: 1650*990*3.2 mm	Y/N
5.3	Fast cure EVA	Thickness:0.45 to 0.50 mm Width: 1000 mm	Y/N
5.4	Back Sheet	Thickness: 0.29 to 0.37 mm Width: 1000 mm Colour: White TUV-certified for partial discharge test for system voltage ≥ 1000 V DC	Y/N Enclose certificate
5.5	PV Module Frame	Anodized Aluminum (Corner block type) as per drawing no: 36790200349, 46790200119, 46790200120 & anodizing thickness: 18±3 microns (PS-438-562)	Y/N
5.6	Frame Sealing, JB Potting	RTV / Silicone sealant, Neutral cure, White	Y/N
5.7	IP65 grade Junction Box with 3 bypass diodes (15 A, 40 V), 100 cm solar cables with quick connectors (MC4 compatible)	TUV-certified Junction Box which is mounted on the back sheet and adequately sealed for protection against possible moisture ingress. Certificate as below: Junction Box: DIN V VDE V 0126-5/05.08 Connectors: EN 50521: 2008 Cables: 2PFG 1169/08.07 Protection: IP 65, Class II Rated Voltage: 1000 V DC	Accept: Y/N Enclose Certificates
5.8	Interconnect & Busbars	Tin-Lead-Silver (62:36:2) coated ETP copper material with coating thickness: 16 to 25 microns on each side. Bus bar: 5 mm * 0.3 – 0.4 mm, IC: 1.5 – 1.7 mm * 0.13 – 0.2 mm	Y/N
5.9	RFID Tag with 2D bar code Alien Technology ALN-9640 Squiggle Passive UHF - EPC Gen 2 compliant Copper/ Aluminum antennas (with PET laminate)	RFID Tags (100 mm * 30 mm) with white polyester label as per spec. PS-439-249 containing following data shall be affixed on the backside of the PV module: • Name of the Manufacturer of PV Module & Solar cells • Month and year of manufacture for PV Module & Solar cells • Country of origin (for solar cells & PV Modules) • I-V curve, Peak Wattage, Imp, Vmp and FF for the module • Unique Serial No & Model No of the module • Date and Year of obtaining IEC certificate • Name of the test lab issuing IEC certificate The white polyester label shall have 2D barcode containing Module I-V details. The RFID software used for writing the tag shall be compatible for reading by BHEL hand held RFID reader. Note: The specimen of all stickers are as enclosed.	Y/N

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Revision: (00)

Approved By :

SR

Prepared

Issued

Date

SM

Engg.

17.01.2014



A4-10

PURCHASE SPECIFICATION GROUP: PHOTOVOLTAICS

PS- 439 - 298

REV.00

PAGE 02 OF 03

Sl. No	Item	Remarks	Vendor Confirmation
6	Typical electrical characteristics:		Y/N
6.1	Open Circuit Voltage (Voc)	36.0 V	
6.2	Short Circuit Current (Isc)	8.5 A	
6.3	Voltages at Peak Power Point (Vmp)	30 V	
6.4	Current at Peak Power Point (Imp)	8.2 A	
6.5	Peak Power Output (Pmax.)	245 Wp (minimum)	

Note: Electrical specifications mentioned above should be at standard test conditions of 100 mw/sq. cm solar insolation (AM 1.5) and at 25 deg. C cell temperatures.

Functional Specification:

Sl No.	Item	Remarks	Vendor Confirmation
1	Power Output	1) Test Report: 245 Wp (minimum). Shall be inspected/verified at Vendor's works under STC by BHEL. 2) Sun simulator should be calibrated with PV Module measured at BHEL sun simulator.	Accept: Y/N Accept: Y/N
2	Visual Characteristics	Each PV module shall be free from the following visual rejects: Cell breakage/cracks, Air bubbles or de-lamination, Cells overlapping one another or cells touching the edge frame.	Accept: Y/N
3	Product warranty	5 Years from the date of supply against manufacturing defects Free replacement against defects.	Accept: Y/N
4	Product performance (power) warranty	From the date of supply of the PV Modules: 90% output for first 10 years. 80% output for next 15 years. Free replacement against non-performance.	Accept: Y/N
5	Grouping of PV Modules	PV Modules shall be grouped in the following power output bands and colour sticker (20mm * 10 mm approx.) to be affixed on the module frames accordingly. Power Output Colour Sticker 245 – 249.9 watts Blue >= 250 watts Orange	Accept: Y/N Enclose Certificates
6	Packing	Modules (18 in 1) to be packed in 7 ply carton box as per BHEL Drawing No: 36790200368 . Modules of the same group (colour band) to be packed in a box. Same colour code sticker (100*100 mm) shall be affixed on the carton box.	Accept: Y/N
7	BHEL Sl. No. Sticker and Rating Sticker	BHEL serial number sticker shall be laminated inside the module (as per Spec. no PS-439-269). Module Rating / Safety warning sticker (as per Spec. no PS-439-295) shall be affixed externally.	Accept: Y/N
8	Incoming material checks, in-process checks & routine production tests	To be carried out as per vendor's internal procedure. BHEL shall verify records of raw materials and in-process checks.	Accept: Y/N Enclose Sample Quality Reports
9	Insulation, Robustness of Terminations, Mechanical Load test	As per IEC 61215: 2005 As per MI CD-4-4112-011A	Accept: Y/N

Sampling Size for Inspection by BHEL at Vendor's works:

I. Visual Inspection:

Single Sampling Plan as per IS: 10673-1983, General Inspection Level II, AQL 2.5%

II. Electrical Inspection (I-V Testing of PV modules):

Single Sampling Plan as per IS: 10673-1983, Special Inspection Level S-4, AQL 2.5 %

Note: 1. Any deviation from the above specifications shall be clearly brought out by the supplier.

2. Documents required are to be attached along with the offer.

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A4-10

**PURCHASE SPECIFICATION
GROUP: PHOTOVOLTAICS**

PS- 439 - 298

REV.00

PAGE 03 OF 03

BHEL Approved Bill-of-Material/ Supplier List

Sl. No.	Item	Supplier List	Vendor Confirmation Please indicate vendor name.
1.	Solar Cells	Jiangsu Aiduo Photovoltaic, China Hangzhou Dahe Thermo Magnetics, China Magi Solar Power Technology, China NBS Energy, Taiwan BHEL, Bangalore	
2.	Fast cure EVA sheet	Changzhou SVECK, China Hangzhou First PV, China STR, USA Renewsys, Bangalore Etimex, Germany	
3.	Back sheet	Coveme, Italy Keiwa, Japan SFC, Korea Toyo Al., Japan Krempel, Germany Renewsys, Bangalore Isovolta, Austria	
4.	Junction Box (4 terminals, 3 diodes)	Bizlink, China (S419-2C2218-317A, SB1540 diodes) Renhe Photovoltaic (PV-RH701, PVS105 diodes) Shanghai Sunlont, China (SL15A3-1, 15SQ045 diodes) Only the above part numbers are acceptable.	
5.	RFID & Barcode Software	Great Eastern, Bangalore	

Note:

- Vendors shall source the above mentioned materials only from respective approved BHEL suppliers as indicated.**
- Sample Module approval required from BHEL before bulk manufacturing and supply.**

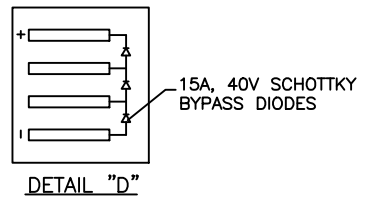
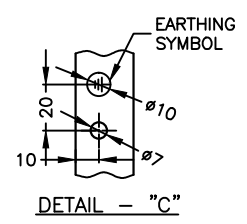
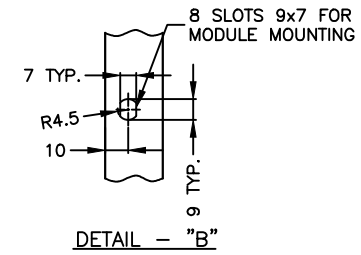
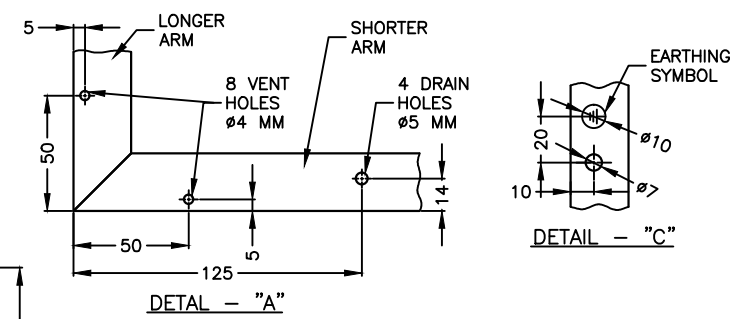
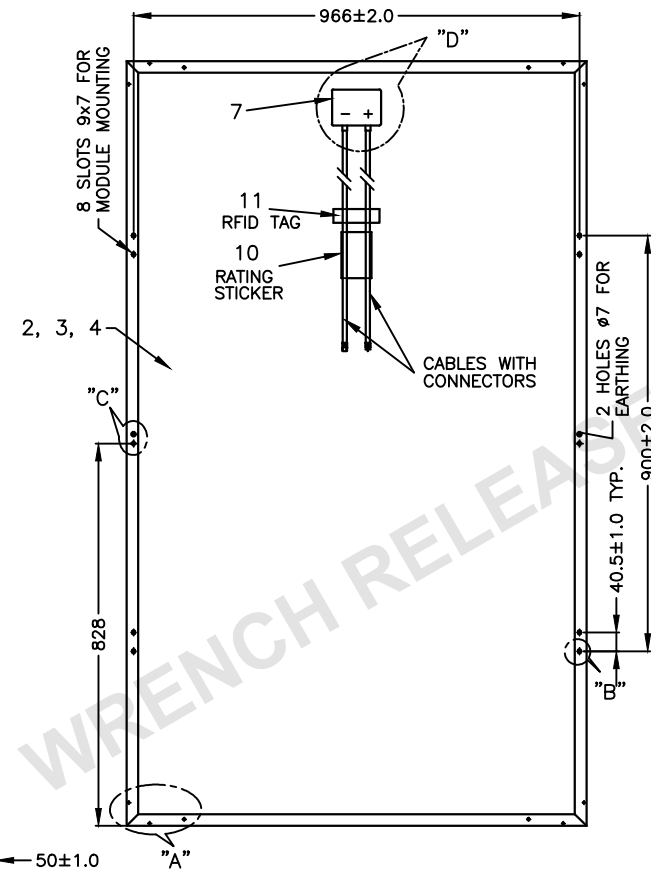
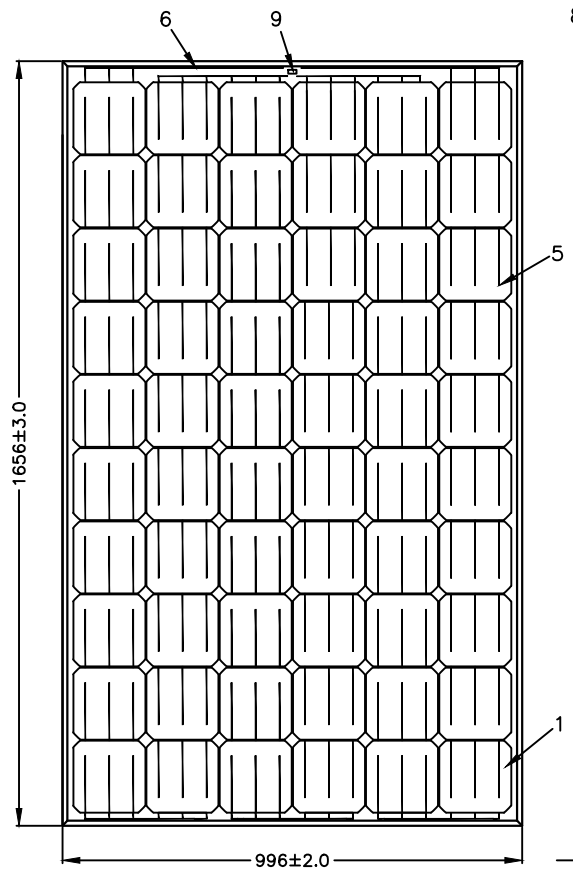
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PART	DESCRIPTION
11	RFID TAG
10	MODULE RATING STICKER
9	PV MODULE SL. NO. STICKER
8	ANODISED ALUMINUM EDGE FRAME
7	JUNCTION BOX WITH CABLES & CONNECTORS
6	BUS BAR
5	INTERCONNECTS
4	BACK SHEET
3	EVA SHEET
2	HIGH TRANSMISSION TEMPERED GLASS
1	60 Nos. OF 156 mm MONO CRYSTALLINE SILICON SOLAR CELLS CONNECTED IN SERIES

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

	BHARAT HEAVY ELECTRICALS LIMITED. ELECTRONICS DIVISION, BANGALORE		DRN	NAME	SIGN.	DATE	No. OF VAR
	CKD	SM	Sd/-	22.06.2013			
	APPD	SR	Sd/-	22.06.2013			

REV.	DATE	ALTERED	CHECKED	APPROVED	REV.	DATE	ALTERED	CHECKED	APPROVED	REV.	DATE	ALTERED	CHECKED	APPROVED
										00				
FIRST ISSUE														

DEPT. SC&PV	FOR UNSPECIFIED-TOLERANCES REFER ED 0230499	SCALE	1 : 10	WEIGHT(Kg)	REF. TO ASSY. DRG.	ITEM NO.	No. OF ITEM
CODE 439							
TITLE PHOTOVOLTAIC MODULE-L20220 156mm Mono Solar Cell (Corner Block Type)						DRAWING NO. 3 679 02 00370	
SHEET NO. 01						NO. OF SHEETS 01	

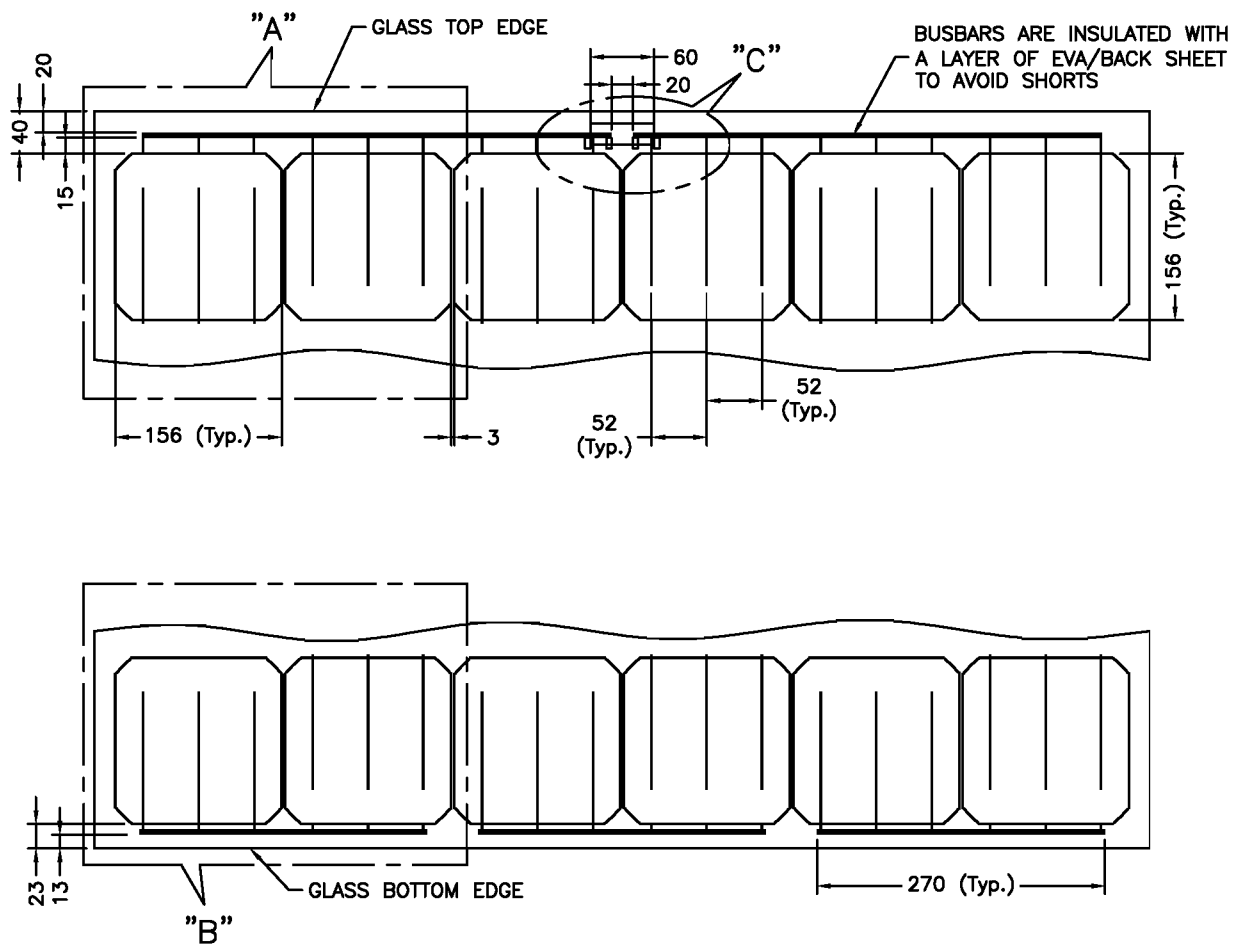
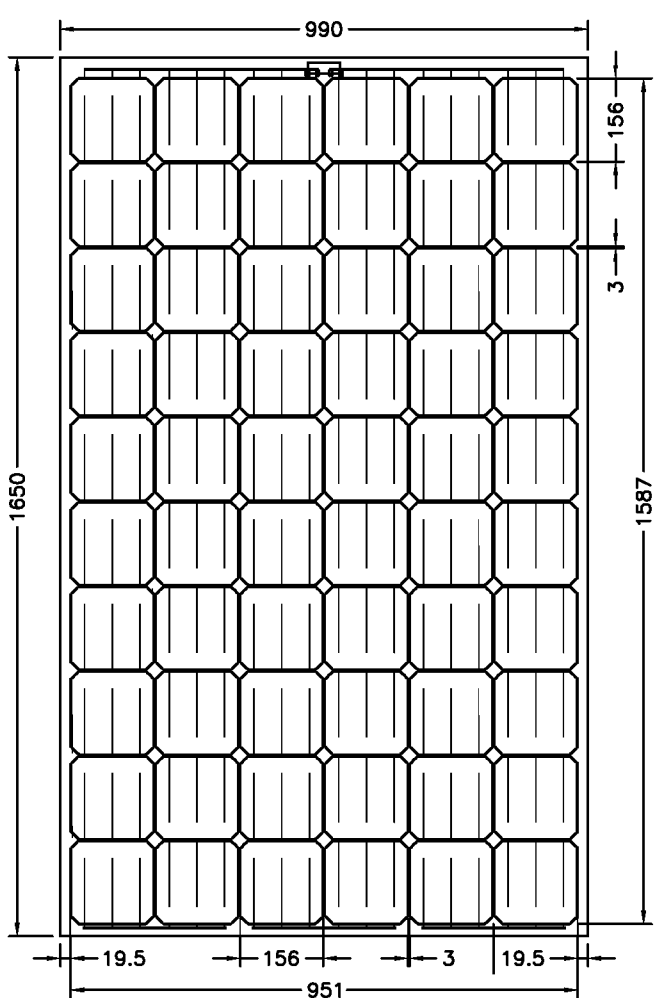
DRG. No. 3 679 02 00377

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REF. DRG. No.

SIGN. & DATE

INVENTORY No.



REV.	DATE	ALTERED	REV.	DATE	ALTERED	DRAWN	NAME	SIGN	DATE	
		CHECKED	00		CHECKED					
		APPROVED			APPROVED					
FIRST ISSUE						CHECKED	SAN		281213	
						APPROVED	NAR		281213	
						APPROVED	SR		281213	
DISTRIBUTION OF PRINTS						DEPT.	CODE			
						439	SC&PV			

BHARAT HEAVY ELECTRICALS LIMITED. ELECTRONICS DIVISION, BANGALORE		CARD CODE	
TITLE: PHOTOVOLTAIC MODULE LAMINATE LAYOUT - L20220 (3 BUSBAR, 52 MM PITCH)		No. OF SHEETS	03
		SHEET No.	01
		REV	00

M.O. No. AS PER OPEN TOLERANCE TO ED 0230499 DRG. No. 3 679 02 00377

DRG No. 3 679 02 00377

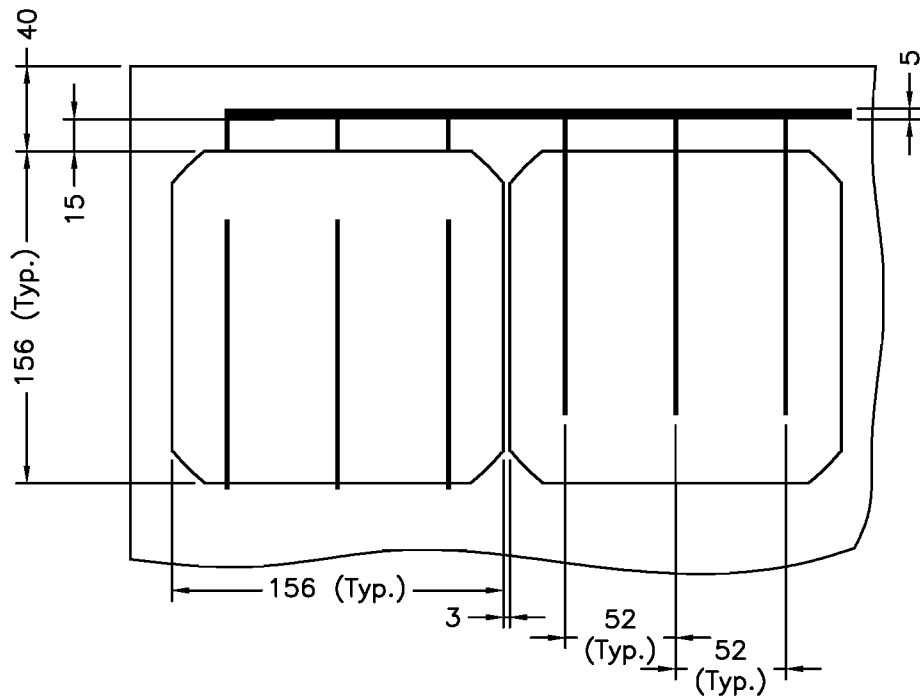
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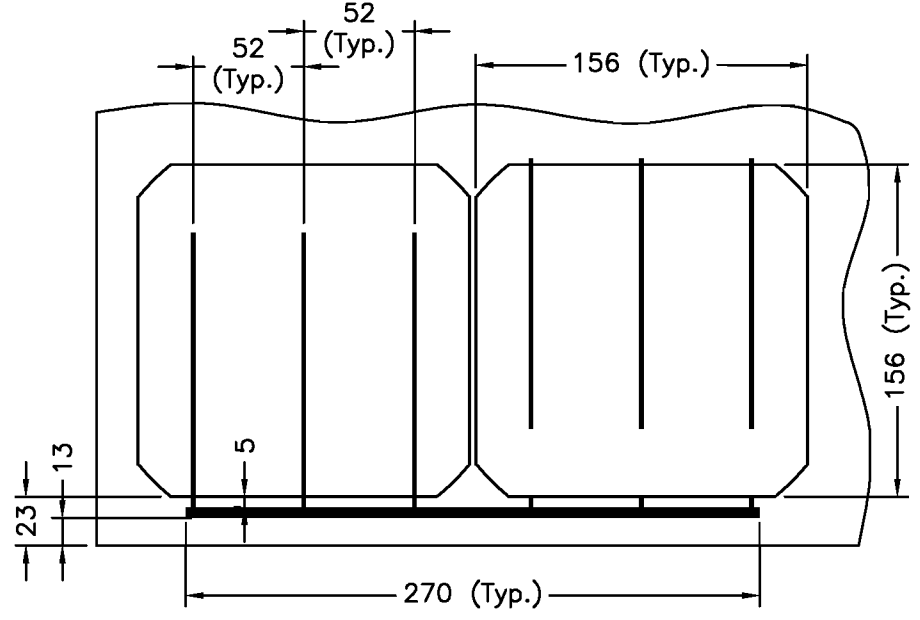
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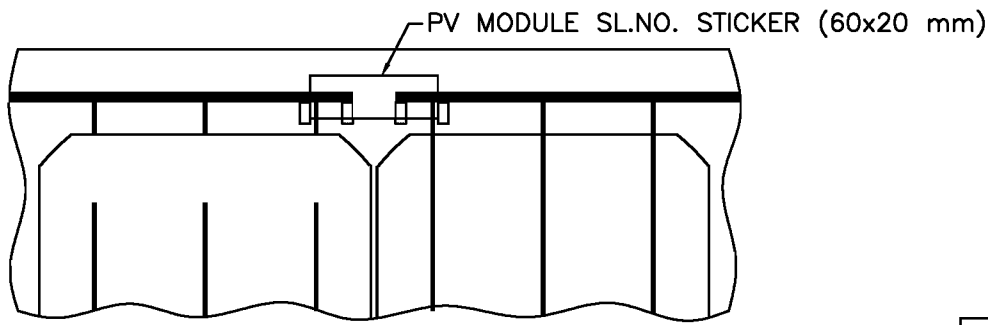
DETAIL "A"



DETAIL "B"



DETAIL "C"



REV.	DATE	ALTERED	REV.	DATE	ALTERED	DRAWN	NAME	SIGN	DATE
		CHECKED	00		CHECKED				
		APPROVED			APPROVED				
FIRST ISSUE						DRAWN	SAN		281213
						CHECKED	NAR		281213
						APPROVED	SR		281213
DISTRIBUTION OF PRINTS									
DEPT. CODE									
439 SC&PV									



BHARAT HEAVY ELECTRICALS LIMITED. ELECTRONICS DIVISION, BANGALORE		CARD CODE
TITLE: PHOTOVOLTAIC MODULE LAMINATE LAYOUT - L20220 (3 BUSBAR, 52 MM PITCH)		No. OF SHEETS 03
		SHEET No. 02
		REV 00

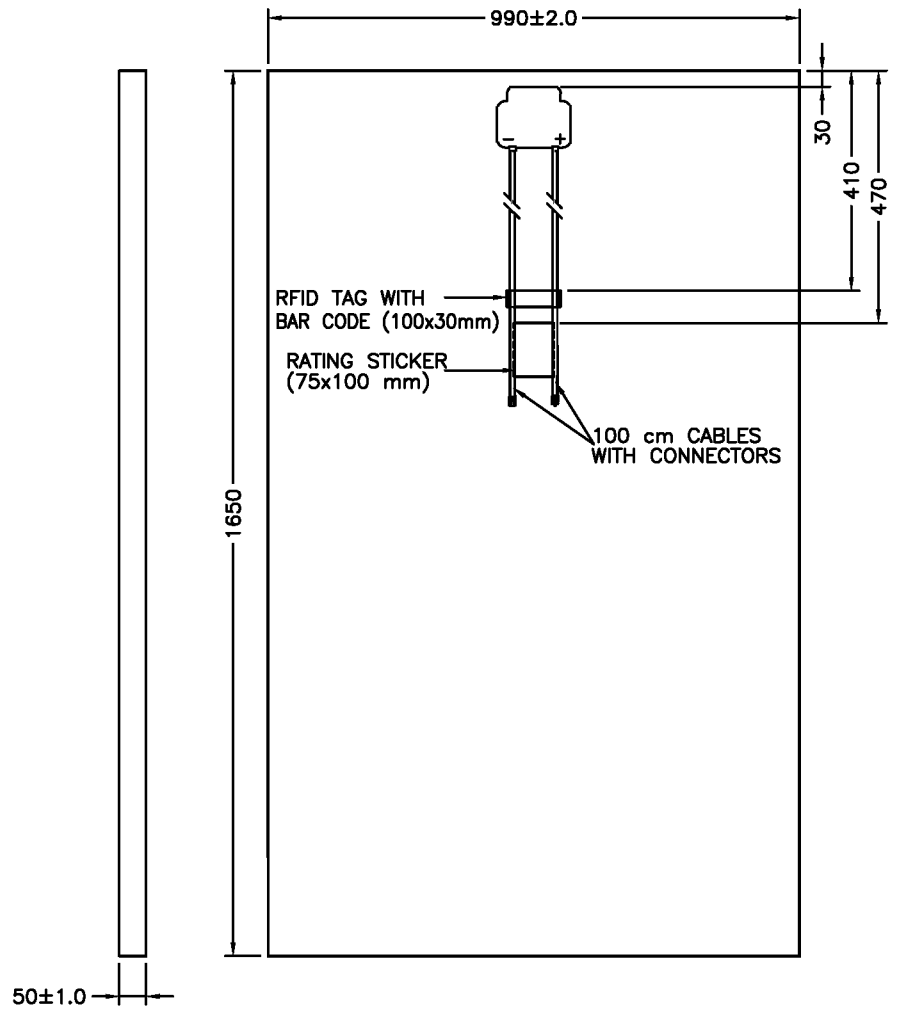


M.O. No.	AS PER OPEN TOLERANCE TO ED 0230499	DRG. No. 3 679 02 00377
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DRG. No. 3 679 02 00377

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LAMINATE BACKSIDE WITH JUNCTION BOX AND STICKERS



SIGN. & DATE
REF. DRG. No.

REV.	DATE	ALTERED CHECKED	REV.	DATE	ALTERED CHECKED	DRAWN	NAME	SIGN	DATE	DEPT.	CODE						
		APPROVED	00		APPROVED												
FIRST ISSUE						CHECKED	NAR		281213								
						APPROVED	SR		281213								
DISTRIBUTION OF PRINTS										439	SC&PV						

BHARAT HEAVY ELECTRICALS LIMITED. ELECTRONICS DIVISION, BANGALORE		CARD CODE
TITLE: PHOTOVOLTAIC MODULE LAMINATE LAYOUT - L20220 (3 BUSBAR, 52 MM PITCH)		No. OF SHEETS 03 SHEET No. 03 REV 00
M.O. No.	AS PER OPEN TOLERANCE TO ED 0230499	DRG. No. 3 679 02 00377



PURCHASE SPECIFICATION

GROUP: PHOTOVOLTAICS

Spec. No PS-439-267

Rev. No 04

Page 1 of 2

ITEM : 156-mm PSEUDO SQUARE MONO CRYSTALLINE SILICON SOLAR CELLS WITH 3-BUSBARS

1.0 PHYSICAL CHARACTERISTICS


- 1.1 MATERIAL : Mono Crystalline Silicon.
- 1.2 DIMENSIONS : 156± 1 mm (Side to Side)
200± 1 mm (Corner to Corner)
- 1.3 SHAPE : Pseudo Square
- 1.4 THICKNESS : 200 ± 20 microns
- 1.5 METALISATION : **Number of Bus bars : Three (Front and Back)**
Distance between bus bars: 52 mm (centre to centre)
Front – Silver busbars shall be continuous
Back – Silver busbars shall be continuous/discontinuous with Aluminum BSF
- 1.6 AR Coating : PECVD Silicon Nitride (Deep blue color)

2.0 ELECTRICAL CHARACTERISTICS

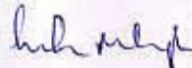
- 2.1 POWER OUTPUT (Pmax) : ≥ 4.30 Watts
- 2.2 CELL EFFICIENCY : ≥ 18.0 %
- 2.3 VOLTAGE AT MAX.POWER POINT : 510 mV (Typical)
- 2.4 OPEN-CIRCUIT VOLTAGE : 620 mV (Typical)
- 2.5 SHORT-CIRCUIT CURRENT : 8.80 A (Typical)
- 2.6 FILL FACTOR : 0.75 (Typical)


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REVISION (04)
Metalisation clause revised.

APPROVED BY
 SR 

PREPARED	ISSUED	DATE
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 SM	Engg	21-09-13
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		 <p>भारत भारती एल A4-11</p>	<p>PURCHASE SPECIFICATION</p> <p>GROUP: PHOTOVOLTAICS</p>	<p>Spec. No</p> <p>Rev. No</p> <p>Page</p>	<p>PS-439-267</p> <p>04</p> <p>2 of 2</p>
<p>COPYRIGHT AND CONFIDENTIAL</p> <p><i>The information on this document is the property of Bharat Heavy Electricals Ltd. It must not be used directly or indirectly in anyway detrimental to the interest of the company</i></p>		<p>3.0 VISUAL CHARACTERISTICS :</p> <p>3.1 Cells shall not have any edge chips or cracks or deep scratches on the surface.</p> <p>3.2 Cells shall not have any misalignment and misprints in the front grid pattern.</p> <p>3.3 Cells shall not have any finger prints or stains or paste smudges on the surface.</p> <p>3.4 Cells shall not have Silicon Nitride coating colour variations or inhomogeneity.</p> <p>4.0 PACKING CONDITIONS</p> <p>4.1 Cells shall be packed tightly with heat shrinkable sleeves, then in foam or thermocole or carton boxes. Cell boxes shall be further packed in carton box / plywood box suitable for air-freight.</p> <p>4.2 Manufacturer name, Cell type, lot number, wattage / efficiency quantity in each packet, date of manufacture to be indicated on each packet.</p> <p>4.3 Test certificate shall be provided along with each consignment.</p> <p>4.4 BHEL Purchase Order (PO) Number shall be mentioned on the plywood Boxes.</p>			
			<p>5.0 SAMPLING SIZE FOR INSPECTION AT BHEL</p> <p>I. Visual Inspection:</p> <p>Single Sampling Plan as per IS: 10673-1983, General Inspection Level I, AQL 2.5 %</p> <p>II. Physical & Electrical Measurement:</p> <p>Single Sampling Plan as per IS: 10673-1983, Special Inspection Level S-4, AQL 2.5 %</p>		



PURCHASE SPECIFICATION
GROUP : PHOTOVOLTAICS

PS- 439 - 142

REV. 02

A4-10

PAGE 01 OF 01

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- 1.0 ITEM : FRONT GLASS
- 2.0 APPLICATION : IT IS USED IN PHOTOVOLTAIC MODULES (240 W) FOR COVERING THE CELLS DURING LAMINATION.

3.0 TECHNICAL SPECIFICATIONS :

- 3.1 MATEIAL : TEMPERED
- 3.2 TYPE : TEXTURED ON ONE SURFACE.
- 3.3 VISIBLE LIGHT TRANSMISSION : > 91 %
- 3.4 DIMENSIONS : LENGTH : 1650 ± 1 MM
WIDTH : 990 ± 1 MM
THICKNESS : 3.2 ± 0.2 MM
- 3.5 ALL CORNERS TO BE ROUNDED TO R1. ALL EDGES TO BE GROUND.
- 3.6 GLASSES SHALL BE FREE FROM VISUAL DEFECTS SUCH AS EDGE CHIPS, DIGS, DIRT, STONES, GASEOUS INCLUSIONS, AIR BUBBLES, SCRATCHES, KNOTS AND DENTS.

4.0 PACKING CONDITIONS :

- 4.1 GLASSES SHALL BE INDIVIDUALLY INTERLEAVED WITH PAPER SHEETS.
- 4.2 THE GLASSES SHALL BE TIGHTLY PACKED INSIDE A WOODEN CASE (Foreign source-Seaworthy packing, Indian source- Roadworthy packing) TO AVOID TRANSIT DAMAGES.
- 4.3 EACH CRATE SHALL BE MARKED OUTSIDE WITH MANUFACTURER NAME, LOT NO., DATE OF MANUFACTURE, SIZE OF THE GLASS AND QUANTITY.

5.0 TEST CERTIFICATE : Supplier shall provide test certificate for Visible light transmission > 91 %, material as tempered glass with texture on one surface, fragmentation counts and inspection report for dimensions.

REVISION : (02)
Thickness tolerance revised.

APPROVED BY :

SR

PREPARED

SM

ISSUED

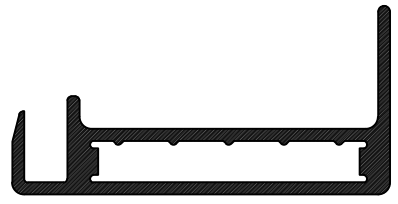
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DATE

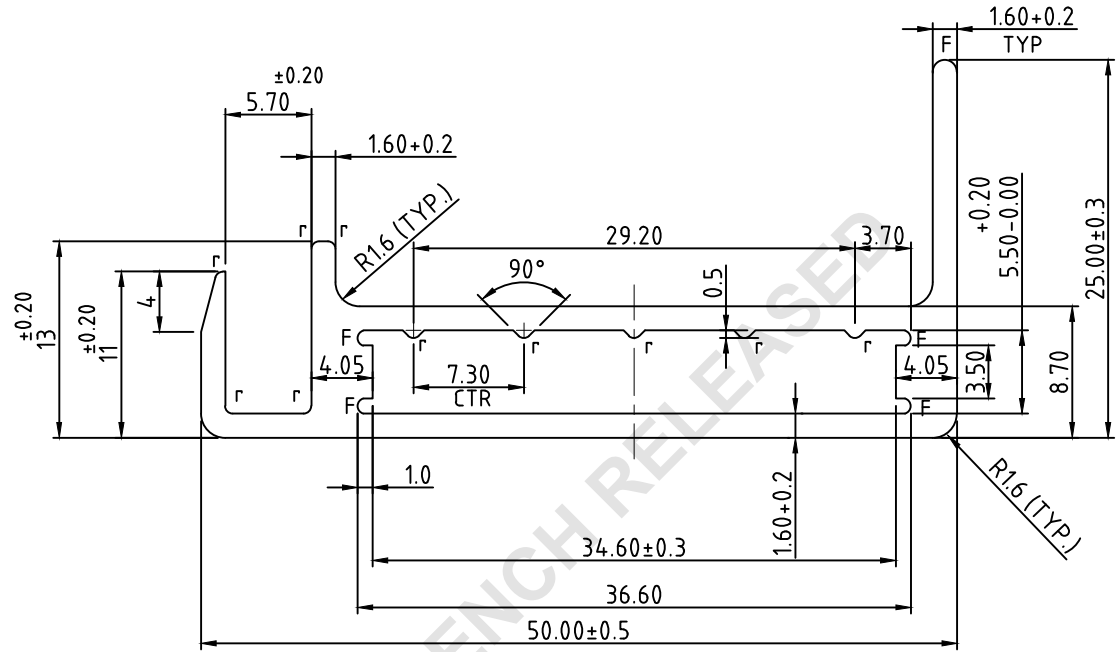
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REV. 01	DATE 130112	ALTERED SAN	REV.	DATE	ALTERED	ADDITIONAL INFORMATION
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1. DRG REVIEWED AND REVISED FOR TOLERANCES. 2. IS:733 WAS IS:63400. 3. ALUMINIUM ALLOY WAS EXTRUDED ALUMINIUM.			FIRST ISSUE			STATUS OF DRAWING
						DISTRIBUTION OF PRINTS

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SCALE=1:1



MATERIAL : ALUMINIUM ALLOY - 63400 WP/HE9 AS PER IS:733.

- NOTE :**
1. ALL UNSPECIFIED WALL THICKNESS - 1.6±0.2.
 2. r-0.50, F - FULL RADIUS.
 3. DIMENSIONAL TOLERANCES FOR EXTRUDED ALUMINIUM AS PER IS:3965-1981.
 4. HEAT TREATMENT CONDITION : WP
 5. ESTIMATED WEIGHT Kg/m = 0.644
 6. ROUND OF ALL SHARP CORNERS WITH 0.25 mm.
 7. VENDOR EXTRUSION DRAWING TO BE APPROVED BY BHEL.

REF. DRG.NO.	REMARKS	ITEM NO.	DESCRIPTION	STD.	MATERIAL CODE	A	UNIT	UNIT Wt.(Kg)
					MATERIAL SPECN.	C		QUANTITY

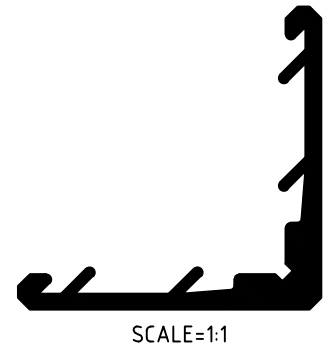
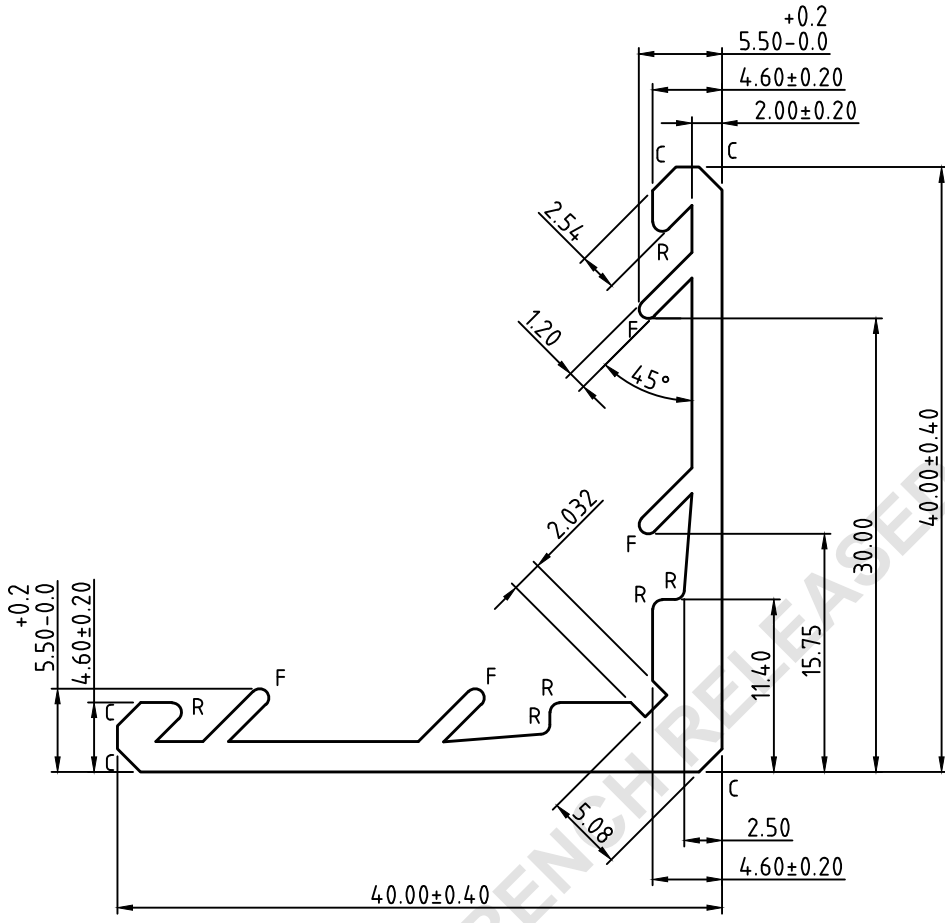
SIGN & DATE		BHARAT HEAVY ELECTRICALS LIMITED, ELECTRONICS DIVISION, BANGALORE	DRN	NAME	SIGN.	DATE	No. OF VAR
			CKD	NAR	Sd/-	250811	
			APPD	SR	Sd/-	250811	

DEPT. SC&PV	FOR UNSPECIFIED TOLERANCES REFER ED 0230499	SCALE 2 : 1	WEIGHT (Kg)	REF. TO ASSY. DRG.	ITEM NO.	No. OF ITEM
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INVENTORY NO.	TITLE	DRAWING NO.		REV.	
		4 679 02 00119			01
		SHEET NO. 01	NO. OF SHEETS 01		

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01	130112	CHECKED	NAR			CHECKED		
		APPROVED	SR			APPROVED		
1. DRG REVIEWED AND REVISED FOR TOLERANCES. 2. IS:733 WAS IS:63400. 3. ALUMINIUM ALLOY WAS EXTRUDED ALUMINIUM.				FIRST ISSUE			STATUS OF DRAWING	
							DISTRIBUTION OF PRINTS	



MATERIAL : ALUMINIUM ALLOY – 63400 WP/HE9 AS PER IS:733.

- NOTE** :
- R – 0.635, F – FULL RADIUS, C – 1.524x45°
 - DIMENSIONAL TOLERANCES FOR EXTRUDED ALUMINIUM AS PER IS:3965–1981.
 - HEAT TREATMENT CONDITION : WP
 - ESTIMATED WEIGHT Kg/m = 0.639
 - ROUND OF ALL SHARP CORNERS WITH 0.25 mm.
 - VENDOR EXTRUSION DRAWING TO BE APPROVED BY BHEL.

REF. DRG.NO.								
REMARKS	ITEM NO.	DESCRIPTION	STD.	MATERIAL CODE	A	UNIT	UNIT Wt.(Kg)	
				MATERIAL SPECN.	C		QUANTITY	

SIGN & DATE		BHARAT HEAVY ELECTRICALS LIMITED, ELECTRONICS DIVISION, BANGALORE	DRN	NAME	SIGN.	DATE	No. OF VAR
			CKD	SAN	Sd/-	290811	
			APPD	NAR	Sd/-	290811	
				SR	Sd/-	290811	

DEPT. SC&PV	FOR UNSPECIFIED TOLERANCES REFER ED 0230499	SCALE 2 : 1	WEIGHT (Kg)	REF. TO ASSY. DRG.	ITEM NO.	No. OF ITEM
CODE 439						

TITLE	DRAWING NO.	REV.
CORNER BLOCK EXTRUSION	4 679 02 00120	01
SHEET NO. 01	NO. OF SHEETS 01	



A4-10

**PURCHASE SPECIFICATION
GROUP: PHOTOVOLTAICS**

PS- 438 - 562

REV. 14

PAGE 01 OF 02

ANODIC COATING FOR ALUMINIUM

1.0 SCOPE :

This specification covers the requirements of electrolytically formed anodic coatings on Aluminum & Al alloy parts which are exposed to direct action of climatic elements (viz SUN, WIND, RAIN, DUST, SALT, and WATER)

2.0 GENERAL

- 2.1 Aluminum parts to be anodized are made of Al. alloy (63400-HE9) as per IS 733-1975 and supplied in Wp (temper) condition.
- 2.2 End use of component is for Photovoltaic module framing.
- 2.3 Anodizing process as per Type-I: IS 7088-1973.
- 2.4 Type of sealing as per IS 7088-1973 (CLAUSE 7).

3.0 REQUIREMENTS:

3.1 VISUAL :

The anodic coating shall be continuous, smooth, adherent, uniform in appearance and shall be free from powdery areas, loose films, and discontinuities such as breaks, scratches or other damages.

3.2 DIMENSIONAL :

After anodic coating, the parts shall comply with dimensional requirements of the applicable drawings.

3.3 Extent of surface to be anodized : All over

3.4 **Anodic Coating Thickness: 18±3 microns** as per IS 1868-1982 (AC 15 grade), Table 1.

3.5 **Surface Texture:** Natural matte finish.

REVISION: (14)

Anodising thickness revised to 18±3 microns for all the modules.

APPROVED BY :

SR

PREPARED

SM

ISSUED

ENGG

DATE

02.09.2011

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A4-10

**PURCHASE SPECIFICATION
GROUP: PHOTOVOLTAICS****PS- 438 - 562**

REV. 14

PAGE 02 OF 02

3.6 Continuity:

As per IS 8375-1977.

3.7 Insulation:

As per IS 8554-1997, when anodic parts are checked, the break down potential of the coating is to be not less than 500 V DC.

3.8 Corrosion resistance :

Each anodised and sealed member when tested as per IS 9000 (part XI)-1983 as per procedure 1 (5% salt solution) shall not show more than 5 isolated spots or pits (0.8 mm dia max).

Note : Supplier shall produce test certificate from reputed labs for Sl. nos. 3.6, 3.7 and 3.8 which shall not be older than two years as on the date of material supply.**4.0 TEST METHOD****4.1 Visual & dimensional :**Parts selected in accordance with the sampling plan (**Table 1**) and tested for visual and dimensional checks shall comply with clause 3.1 & 3.2.**4.2 Coating thickness:**Parts selected as per sampling plan (**Table 2**) and tested for coating thickness in accordance with IS 6012-1970 shall comply with clause 3.4.**5.0 SAMPLING PLAN:**5.1 Samples for inspection shall be selected as given in **Table 1** & **Table 2**.

5.2 Accept the lot if the number of defectives is less than or equal to the acceptance number (Ac) given in the table for that particular batch size, reject the lot if the number of defectives is equal to or greater than rejection number [Re].

6.0 TABLE 1**VISUAL AND DIMENSIONAL**

Batch Size	Sample Size	Ac	Re
Upto 5	100 %	-	-
6-50	5	0	1
51-150	20	1	2
151-280	32	2	3
281-500	50	3	4
501-1200	80	5	6

TABLE 2**ANODIC COATING THICKNESS**

Batch Size	Sample Size	Ac	Re
Upto 8	100 %	-	-
9-1200	8	0	1

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PURCHASE SPECIFICATION

GROUP: PHOTOVOLTAICS

Spec. No PS-439-249

Rev. No 02

Page 1 of 1

TECHNICAL SPECIFICATION

Passive UHF RFID Tags for PV Modules

1. ITEM: Passive UHF RFID Tags for PV Modules with White Polyester Label.
2. PURPOSE: For storing PV Module data in it & fixing it on to the PV module as per Jawaharlal Nehru National Solar Mission (JNNSM) guidelines for traceability. The module Sl. No., Power output shall be printed on the Polyester label by BHEL and storing of module data into RFID tag shall be carried out by BHEL. The RFID tag, label and adhesive shall be suitable for sustaining outdoor environment.
3. SCOPE OF SUPPLY: Supply of blank RFID tags with polyester white label for writing the required PV module data into each tag as per JNNSM and printing the Module Sl. No. and Power output on the white polyester label.
4. RFID TAG TECHNOLOGY: Alien Technology ALN-9640 Squiggle
 Passive UHF - EPC Gen 2 compliant
 ISO/IEC 18000-6C compliant
 Operating Frequency 840-960 MHz
 Copper/Aluminum antennas (with PET laminate)
5. FORM FACTOR: Wet Inlay
6. RFID TAG DIE-CUT SIZE: (95 – 100) mm * (25 – 30) mm
7. RFID TAG USER MEMORY SIZE: 512 bits
8. The RFID tag shall be compatible for writing data as per JNNSM guidelines with fixed RFID printer-cum-writer station using the software interfaced with the PV Module tester. The written tag shall also be read by a portable RFID reader at the site.
9. RFID tags to be supplied with white polyester label with acrylic adhesion along with peel off paper **in roll form** for affixing the tag on the PV Module back sheet.

Note: Any deviation from the above spec. shall be clearly brought out by the supplier in their offer.

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REVISION (02)
 Spec. completely revised

APPROVED BY
 SR

PREPARED	ISSUED	DATE
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SM	Engg.	30-10-2013
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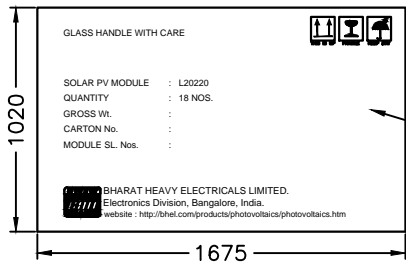
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DRAWING NO.

SLEEVE INNER DIMENSIONS

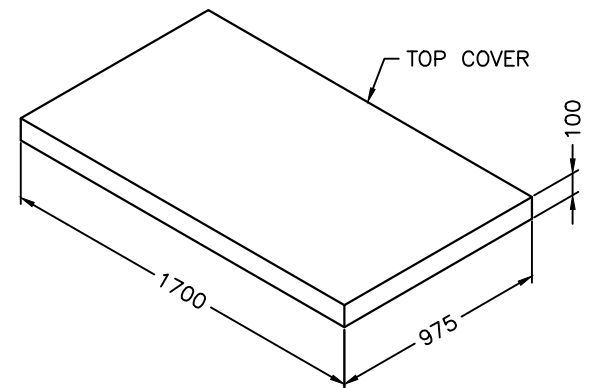
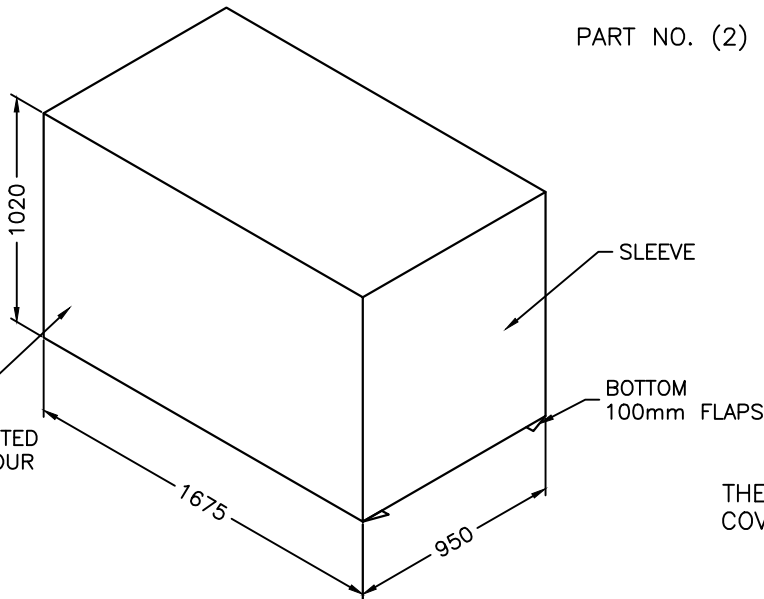
TOP COVER INNER DIMENSIONS

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PART NO. (2) TOP COVER (CORRUGATED CARTON) - 1 NO.

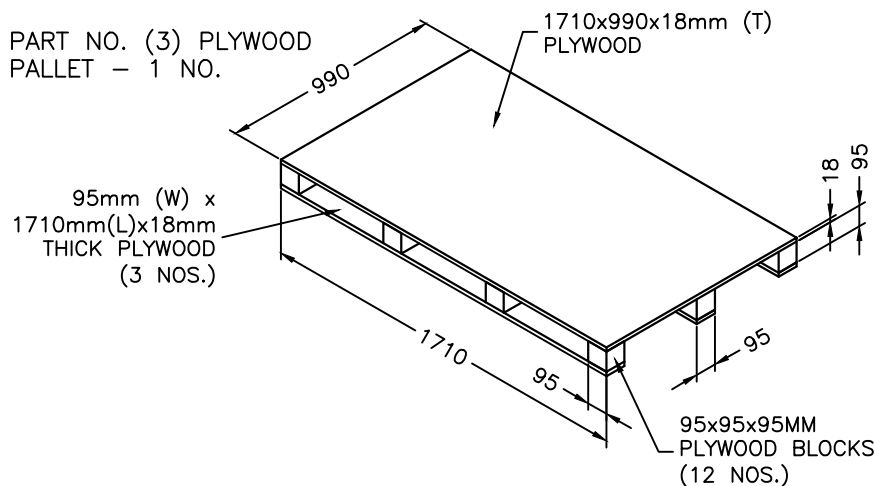


TEXT TO PRINTED IN BLUE COLOUR ON THIS SIDE



THE DIMENSIONS OF SLEEVE AND TOP COVER ARE INNER DIMENSIONS

PART NO. (3) PLYWOOD PALLET - 1 NO.



SPECIFICATIONS

SLEEVE

TOP COVER

PAPER COMBINATION :	469/200/180/200/180/200/469 GSM	300/180/200/180/200 GSM
PAPER COLOUR :	BROWN	BROWN
FLUTE TYPE :	AAA or ACB	AC
NO OF PLY :	7 PLY	5 PLY

NOTES :

1. ALL THE DIMENSIONS ARE IN MM.
2. FLUTE DIRECTION TO BE ALONG HEIGHT OF THE BOX.
3. SLEEVE & FLAP ARE TO BE FORMED FROM SAME CORRUGATED SHEET.
4. SELF ADHESIVE BHEL SPECIFIED COLOR STICKER OF SIZE 100x100 MM

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT					
	BHARAT HEAVY ELECTRICALS LIMITED. ELECTRONICS DIVISION, BANGALORE			No. OF VAR	
	DRN	NAME	SIGN.		DATE
	CKD	SM	Sd/-		13.06.2013
APPD	SR	Sd/-	13.06.2013		
DEPT. SC&PV	FOR UNSPECIFIED-TOLERANCES REFER ED 0230499	SCALE NTS	WEIGHT(Kg)	REF. TO ASSY. DRG.	
CODE 439				ITEM NO.	
TITLE			REV.		
PACKING BOX FOR L20220 - 18 IN 1			01		
DRAWING NO.			No. OF SHEETS		
3 679 02 00368			01		
SHEET NO. 01					

PART NO. (4) BOTTOM SHEET-1No OF 1665x950mm, 5 PLY 250/180/180/180/250 GSM SHEET

PART NO. (5) MODULE CORNER CAP - 72 NOS. 150x150mm, THICKNESS 0.6 TO 1.0mm

REV.	DATE	ALTERED CHECKED	REV.	DATE	ALTERED SAN CHECKED NAR	REV.	DATE	ALTERED CHECKED
		APPROVED	01	170114	APPROVED SR			APPROVED
DRAWING MODIFIED.			FIRST ISSUE					

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REF. DRG.NO.

SIGN & DATE

INVENTORY NO.



PURCHASE SPECIFICATION

Spec. No PS-439-269

GROUP: PHOTOVOLTAICS

Rev. No 01

Page 1 of 1

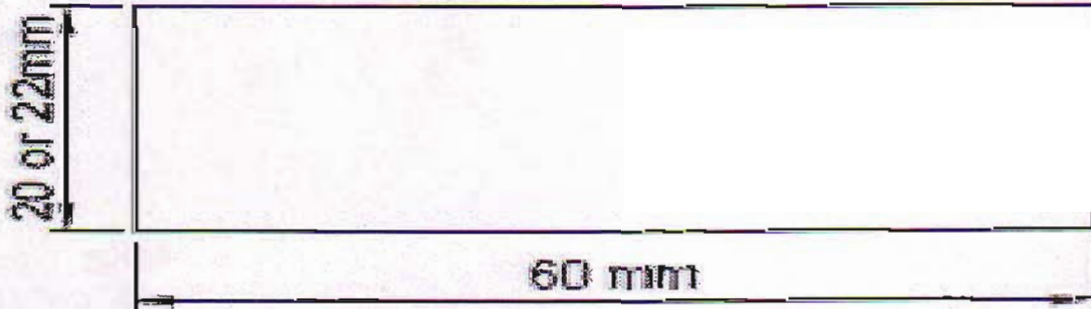
TECHNICAL SPECIFICATION

BLANK PV MODULE SERIAL NO. STICKER

- 1.0 ITEM : UL Certified Blank PV Module Serial No. Sticker (without any printing)
- 2.0 PURPOSE : For laminating inside the PV Module
- 3.0 SIZE : 60 * 20 mm or 60 * 22 mm
- 4.0 MATERIAL : White Polyester
- 5.0 ADHESIVE : Acrylic
- 6.0 THICKNESS : Polyester – 50 to 58 micron, Adhesive – 20 to 25.4 micron
- 7.0 COLOUR : White
- 8.0 Sticker to withstand Lamination temperature upto 149 °C

Note:

- 1. Stickers should be supplied in roll form along with peel off paper suitable for printing using bar-code printer.
- 2. Test Certificate to be provided certifying the material.



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REVISION (01)
Fully revised.

APPROVED BY

S.P.

SR

PREPARED

ISSUED

DATE

PJ

Pradhe

Engg

11-12-2012



A4-11

PURCHASE SPECIFICATION

GROUP: PHOTOVOLTAICS

Spec. No PS-439-295

Rev. No 00

Page 1 of 1

TECHNICAL SPECIFICATION

BLANK PV MODULE RATING STICKER

- 1.0 ITEM : Blank PV Module Rating Sticker (without any printing)
- 2.0 PURPOSE : For printing it with PV Module rating details and fixing on to the back sheet of the PV Module.
- 3.0 SIZE : 75 * 100 mm
- 4.0 MATERIAL : Polyester , 50 micron thick
- 5.0 ADHESIVE : Acrylic or rubber based
- 6.0 COLOUR : Silver-grey

Note:

- 1. Stickers should be supplied in roll form along with peel off paper suitable for printing using bar-code printer. Number of stickers per roll = 1000 max.

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It must not be used directly or indirectly in anyway detrimental to the interest of the company

REVISION (00)

APPROVED BY

SR

PREPARED

ISSUED

DATE

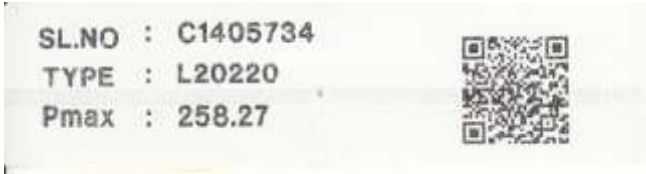
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Engg

04-03-2013



SL. NO. STICKER



RFID cum 2D BAR
CODE STICKER



RATING STICKER



A4-10

PRODUCT STANDARD
ELECTRONICS DIVISION

CD-4-4112-011A

REV. 01

PAGE 01 OF 01

RELIABILITY TESTING PROCEDURES FOR PHOTOVOLTAIC MODULE

I. INSULATION TEST (before and after HV Test)

Testing Equipment	Test Procedure	Acceptance Criteria
Hand held insulation tester DOT 771	Check the insulation between the shorted terminals of junction box and aluminum frame at 1000 V DC	IR \geq 24.25 M Ω (For 1656 mm * 996 mm Module Size)

II. HIGH VOLTAGE TEST

Testing Equipment	Test Procedure	Acceptance Criteria
HV Tester 5 kV DC DOT 458	Apply 3000 V DC for 1 minute between the shorted terminals of junction box and aluminum frame	There should not be any di-electric break down

III. MECHANICAL LOAD TEST (as per IEC 61215)

Testing Equipment	Test Procedure	Acceptance Criteria
Mechanical load test set-up	Module to be placed horizontally on the fixed structure. Three cycles of 2400 Pa uniform load to be applied for 1 hour to front and 1 hour to the back surface in turn. 245 kg/m ² weights to be uniformly spread over the entire module. Check for continuity of electric circuit during the test. Carry out Insulation test before and after the tests.	There should be no evidence of mechanical or visual damage or discontinuity of electrical circuit. Also, insulation resistance should measure \geq 24.25 M Ω (For 1656 mm * 996 mm Module Size).

IV. ROBUSTNESS OF TERMINATION TEST (as per IEC 61215)

Testing Equipment	Test Procedure	Acceptance Criteria
Robustness of Termination test set-up	Module to be placed on the fixed structure. Tensile test Ua: 40 N (4 kgs weights) applied for 10 seconds to the junction box termination. Bending test Ub: 20 N (2 kgs weights) to be applied to the Junction box terminations and swing thru 45° angle with respect to initial position on both sides for a total of 10 cycles.	There should be no evidence of mechanical or visual damage. Also, insulation resistance should measure \geq 24.25 M Ω (For 1656 mm * 996 mm Module Size).

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REVISION : (01)

APPROVED BY :

SR

PREPARED

ISSUED

DATE

SM

ENGG.

15/06/2013

TECHNICAL BID (TO BE ENCLOSED WITH TECHNO-COMMERCIAL BID)

Sl. No.	Particulars	Bidder's confirmation
1	Vendor shall manufacture PV Modules with Bill of Materials as per BHEL technical specifications	Acceptable / Not acceptable
2	Price basis: Firm i.e., from the date of PO to completion of supply [Price Variation Clause (PVC) not acceptable]	Acceptable / Not acceptable
3	Excise duty: If applicable indicate %.	Applicable / Not applicable ED:_____%
4	Sale tax If applicable indicate %	Applicable / Not applicable (a) VAT_____% (b) CST_____% against form C
5	Payment terms: 100% with 45 days credit after receipt and acceptance of item at BHEL/BHEL specified site.	Acceptable / Not acceptable
6	Terms of delivery: FOR BHEL Bangalore	Acceptable / Not acceptable
7	Warranty: 60 months from the date of supply	Acceptable / Not acceptable
8	L1 Criteria L1 vendor shall be arrived based on Total cost to BHEL	Acceptable / Not acceptable
9	Order Splitting: BHEL reserve the right to Split the order quantity in the ratio of 60:40 to L1 and L2 vendors respectively, in case L2 accept to supply as per L1 negotiated price. In case, L2 does not accept to supply as per L1 negotiated price, full quantity shall be ordered on L1.	Acceptable / Not acceptable
10	Delivery period: Delivery of modules shall be: First Lot of 3000 nos within 4 weeks of receipt of BHEL purchase order, subsequently at the rate of 3000 nos of PV Modules per week.	Acceptable / Not acceptable
11	Validity: Quotation should remain valid for a period of 90 days from the tender due date	Acceptable / Not acceptable
12	Acceptance of Reverse Auction	Acceptable / Not acceptable

Signature of tenderer / with stamp

PRICE BID FORMAT (TO BE ENCLOSED WITH COMMERCIAL BID)**1. If solar cell is provided by BHEL against BG (Refer Annexure F)****a) 245 Wp PV Module**

The vendor shall purchase the required no. of 156-mm mono crystalline silicon solar cells from BHEL (No. of modules * 60 cells / module and taking module yield into account for 245 Wp). BHEL shall sell 156-mm mono crystalline silicon solar cells to the vendor as per the above requirement at the rate of Rs.105 per cell. The power output of the solar cells supplied by BHEL shall be greater than or equal to 4.3 watts. Module materials are under the scope of the vendor and shall be as per the Technical and Functional specifications.

Sl. No.	245-W PV Module (156 mm Mono Silicon solar cells) with packing as per BHEL Specification	Quantity (in Nos)				
		Up to 21000	21001-42000	42001-63000	63001-84000	84001-10500
1	Basic Price / PV Module					
2.	Excise Duty %					
3.	VAT %					
4.	Transportation Charges to BHEL, EDN, Mysore Road, Bangalore					
5.	Total Price / PV module					

b) 275 Wp PV Module-

The vendor shall purchase the required no. of 156-mm mono crystalline silicon solar cells from BHEL (No. of modules * 72 cells / module and taking module yield into account for 275 Wp). BHEL shall sell 156-mm mono crystalline silicon solar cells to the vendor as per the above requirement at the rate of Rs.105 per cell. The power output of the solar cells supplied by BHEL shall be greater than or equal to 4.3 watts. Module materials are under the scope of the vendor and shall be as per the Technical and Functional specifications.

Sl. No.	275-Wp PV Module (156 mm Mono Silicon solar cells) with packing as per BHEL Specification	Quantity (in Nos)				
		Up to 21000	21001-42000	42001-63000	63001-84000	84001-10500
1	Basic Price / PV Module					
2.	Excise Duty %					
3.	VAT %					
4.	Transportation Charges to BHEL, EDN, Mysore Road, Bangalore					
5.	Total Price / PV module					

1. If solar cell is procured by vendor

a) 245 Wp PV Module

Sl. No.	245-Wp PV Module (Mono Silicon solar cells) with packing as per BHEL Specification	Quantity (in Nos)				
		Up to 21000	21001-42000	42001-63000	63001-84000	84001-10500
1.	Basic Price / PV Module					
2.	Excise Duty %					
3.	VAT %					
4.	Transportation Charges to BHEL, EDN, Mysore Road, Bangalore					
5.	Total Price / PV module					

b) 275 Wp PV Module-

Sl. No.	275-Wp PV Module (Mono Silicon solar cells) with packing as per BHEL Specification	Quantity (in Nos)				
		Up to 21000	21001-42000	42001-63000	63001-84000	84001-10500
1.	Basic Price / PV Module					
2.	Excise Duty %					
3.	VAT %					
4.	Transportation Charges to BHEL, EDN, Mysore Road, Bangalore					
5.	Total Price / PV module					

Note:-

- 1. Price to be provided for all the five slabs.**
- 2. Please indicate taxes applicable as on date**
- 3. L1 vendor shall be arrived based on Total cost to BHEL**

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at “BHEL House”, Siri Fort, New Delhi – 110049 (India) hereinafter referred to as “The Principal”, which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as “The Bidder/ Contractor” which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1 – Commitments of the Principal

- 1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-
 - 1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
 - 1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
 - 1.1.3 The Principal will exclude from the process all known prejudiced persons.
- 1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 – Commitments of the Bidder(s)/ Contractor(s)

- 2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
 - 2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in

order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

- 2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- 2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/ PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- 2.1.4 The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- 2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 – Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidders(s)/ Contractor(s) from the tender process or take action as per the separate “Guidelines for Suspension of Business Dealings with Suppliers/ Contractors” framed by the Principal.

Section 4 – Compensation for Damages

- 4.1 If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.
- 4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

Section 5 – Previous Transgression

- 5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- 5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-contractors

- 6.1 The Bidder(s)/ Contractor(s) undertake(s) to demand from his sub-contractors a commitment consistent with this Integrity Pact. This commitment shall be taken only from those sub-contractors whose contract value is more than 20% of Bidder's/ Contractor's contract value with the Principal.
- 6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.
- 6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 – Criminal Charges against violating Bidders/ Contractors /Sub-contractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 –Independent External Monitor(s)

- 8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
- 8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.
- 8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality.
- 8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
- 8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or

take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.

8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.

8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.10 The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

9.1 This Pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.

9.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 – Other Provisions

- 10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.
- 10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- 10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
- 10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- 10.5 Only those bidders/ contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

For & On behalf of the Principal
(Office Seal)

For & On behalf of the Bidder/ Contractor
(Office Seal)

Place-----

Date-----

Witness: _____
(Name & Address) _____

Witness: _____
(Name & Address) _____

ANNEXURE-F

To

Bharat Heavy Electricals Limited
Electronics Division
PB no.2606, Mysore Road
Bangalore-560026

Dear Sir,

Guarantee No:	Dated
Amount of Guarantee	Rs.....
Guarantee cover from	_____ to _____
Last date of lodgment of claim	_____

THIS DEED OF GUARANTEE made and executed on ___(Date)___ by the ___(Name of Bank)___ represented herein by its authorized representatives_____ and_____ [hereinafter called the 'Guarantor' which term shall mean and include its successors and assigns]:

IN FAVOUR OF BHARAT HEAVY ELECTRICALS LIMITED, a company registered under the Companies Act, 1956 and having its registered office at BHEL House, Siri Fort, New Delhi 110049 and its Electronics Division at Mysore Road, Bangalore-560026 [hereinafter referred to as the 'Company' which term shall include its successors and assigns]:

Whereas_____ is a company registered under the Companies Act, 1956 and having its registered office _____, [hereinafter referred to as the 'Purchaser' which term shall mean and include its liquidators, successors and assigns]

Whereas the Purchaser has placed an order on the Company for the purchase of Solar Cells for use in the manufacture of the said PV modules under Order No:_____

AND WHEREAS the order interalia provides that the Purchaser shall furnish a Bank Guarantee in favour of the Company by a reputed Bank for a Sum of **Rs.....** towards Security Deposit for the materials issued to the Purchaser for due and faithful performance of the contract in the manner and form specified therein.

AND WHEREAS the Purchaser,_____ is a customer of the 'Guarantor' to furnish on their behalf an irrevocable guarantee for a sum of **Rs.....** in favour of the Company for a period of 6

months commencing from _____ to _____ as Security for the materials to be issued by the Company to the Purchaser during the currency of this guarantee.

AND WHEREAS the Guarantor has agreed to furnish a guarantee for the said sum of **Rs.....** For a period of 6 months commencing from _____ to _____ in favour of the Company 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 the Company 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.....** 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 Purchaser.

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 Purchaser of any terms contained in the said order/contract/agreement. 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 Purchaser 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 under the said order are completed to the entire satisfaction of the Company or till the company certifies that the terms and conditions of the said order/contract/agreement has been fully and properly carried out by the said Purchaser and accordingly discharges the guarantee. Unless a demand or claim under this guarantee is made on the Guarantor in writing on or before _____ the Guarantor shall be discharged from all 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 Purchaser from time to time or refrain from exercising the power exercisable by the Company against the said Purchaser or to forbear 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 Purchaser or by reason of any such matter or thing whatsoever which under the law relating to sureties would but for this provision to 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:

A. The liability of the Guarantor under these presents is restricted to **Rs.....**

B. The guarantee shall be in force till its expiry on_____

C. Unless a demand is made on the Guarantor within three months from the date of expiry, all

the liability of the Guarantor under this guarantee shall stand fully discharged. The decision

of the claimant in regard to breach of contract is final and binding on the bank.

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

[Seal of the bank to be affixed]

Witness:

1.

2.

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.

Note:

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

BHEL MEMBER BANKS (CONSORTIUM BANKS)

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

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