

	PURCHASE SPECIFICATION GROUP : BDC	BDC1617 -1801 REV NO: 00
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BDC1617-1801

**SPECIFICATIONS FOR SUPPLY OF BOS, ERECTION & COMMISSIONING AND 05 YEAR COMPREHENSIVE
MAINTENANCE FOR 18 Kwp ROOF TOP GRID CONNECTED SPV POWER PLANT**

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1.0 INTRODUCTION:

This specification defines the scope of the Bidder in **Supply of Balance of System (BOS)** except solar PV modules for a 18 kW_p and **Erection & Commissioning (E&C)** of the Power Plant including 5 Year comprehensive Maintenance contract.

Bidder should visit the site before quoting to fully understand the site conditions. Bidder is required to furnish clause-wise response for this specification furnished below.

2.0 BIDDER'S SCOPE:

2.1 Supply & Installation of following

Note: The SPV Modules shall be provided By BHEL.

Sl. No.	ITEM DESCRIPTION	Qty	SUPPLY	E&C	MAKE/ REMARKS
1.	Galvanized MS Module Mounting Structures with precast PCC pedestals of 350x350x350 (in mm) with galvanized MS foundation bolts and SS Hardware for 18 KWp (60 Nos) SPV Panels	1 lot	✓	✓	As per the indicative Structure drawing (Drg. No: 3-679-05-00683) attached. Actual configuration may vary based on the array layout. However Bidder Shall ensure the structure stability.
2.	Grid Connected Solar String Inverter 20 kVA with mounting accessories, AC output 3Ø, 400V, 50 Hz	1 No.	✓	✓	Refusol / Delta / Sungrow / Growatt / Fronius / Power one / Danfoss / SMA / ABB / Schneider.
3.	1.1kV grade heavy duty PVC insulated, Double sheathed, UV protected FRLS stranded copper cables as per IS 1554 (a). 1 core 4 sq. mm Unarmored red cable from series string to string inverter for +ve side	100 Mtrs	✓	✓	Reputed makes viz., Polycab / Pagoda/ KEI / LAPP / Advance Cables / Equivalent. Test reports confirming to IS should be submitted Length is indicative and can vary upto ±10%. Any variation beyond 10% shall be payable/recoverable @ Rs. 35/ meter.
	(b). 1 core 4 sq. mm Unarmored black cable from series string to string inverter for -ve side	100 Mtrs	✓	✓	
4.	1.1kV grade heavy duty PVC insulated galvanized strip/wire armored FRLS stranded Aluminum conductor cables as	35 Mtrs	✓	✓	Reputed makes viz., Polycab/KEI/LAPP/Advance Cables/equivalent. Length is indicative and can vary upto ±10%. Any variation

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	per IS 1554 3.5 C x 70 sq.mm cable (from PCU to Distribution Board)				beyond 10% shall be payable/recoverable @ Rs. 200/ meter.
5.	PVC Pipe 10 kgf/cm ² 1" pipe for 4 sq.mm series wiring & earthing strip/wire With necessary connectors C,T, flexible bends, clamps & fixtures for proper routing.	200 Mtrs	✓	✓	Length is indicative. Bidder to supply any excess length to complete the project if required. Make: Supreme/Finolex/Flow guard/equivalent make
6.	Miscellaneous items viz., 200 mm length Cable ties (UV protected), insulation tapes, ferrules, Weather proof Male / Female Snap-on(MC4 type) Connectors, Lugs for termination along with contact compound tube, cable glands	1 set	✓	✓	Quantities as required for project completion, Bidder has to organize without any additional cost.
7.	Lightning Arrestor (Globe type) with earthing for roof top system along with mounting arrangement and pedestal casting	1 set	✓	✓	As per the attached drawing No. 3-679-05-00037
8.	8 SWG GI wire for Structures, LA ,PCU earthing with necessary clamp fixtures for proper routing	200 mtr	✓	✓	
9.	DISTRIBUTION BOARD: Consisting of 02Nos of 4P 630A, 35 KA MCCB & 01 No. 63A MCCB, Digital MFM- 1 No complete with CTs and accessories.	1 No.,	✓	✓	Board Panel shall be of min.16 Gauge powder coated MS Sheet. MCCB make: ABB, L&T, C&S, SCHNIDER or reputed make. MFM Make: Secure, Rishabh or reputed make.
10.	Dismantling of 07 Antennas & 01 Solar water heating System from Rooftop.	1 Lot			The Dismantled System Shall be property of Bidder. Bidder should keep this fact in-consideration while quoting the Price.

Note: SPV Modules shall be supplied by BHEL; However I&C of SPV modules shall be in scope of Bidder.

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1. Bidder may have to modify the pedestal and Mounting structure design depending upon the site requirement with prior approval of BHEL.
2. The technical particulars, installation procedures and drawings of the bought out items like String inverter, Snap-On-Connectors, distribution board etc. shall be submitted for approval to BHEL before procuring.
3. Bidder has to procure materials as per listed make. Whenever equivalent make has to be procured prior approval has to be taken from BHEL submitting the make and technical particulars of the component.
4. Test Certificates of raw material and dimensional test reports of structures confirming to IS should be submitted to BHEL for PSI.

2.1.1 PV ARRAY PEDESTAL FOUNDATION

Mobile precast PCC pedestals (1:2:4) of 0.35x0.35x0.35 (in m) should be supplied. The cement used for PCC pedestal casting should be Ordinary Portland Cement of reputed make. The sand used should be free from organic matter and clay content. The aggregate used should be 20 mm nominal size. No hand mixing for the concrete is allowed. Bidder has to ensure good finish of the pedestal without any honey combs otherwise BHEL has right get the entire pedestal reworked at no extra cost. Bidder has to ensure proper curing for at least 7 days after casting. All the necessary arrangements for proper casting, if casted at site will be in the scope of Bidder.

2.1.2 MODULE MOUNTING STRUCTURE:

The module mounting structure should be in line with the drawing enclosed. Array support structure shall be fabricated using corrosion resistant GI metal sections. Array support structure welded joints shall be adequately treated to resist corrosion and fasteners should be SS304.

The support structure shall be free from corrosion when installed. PV modules shall be secured to support structure using screw fasteners. Screw fasteners shall use existing mounting holes provided by module manufacturer. No additional holes shall be drilled on module frame. Module fasteners/clamps shall be adequately treated to resist corrosion. Adequate spacing shall be provided between any two modules secured on PV panel for improved wind resistance. Zinc rich spray paint shall be applied in scratches of the structures for preventing corrosion.



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2.1.3 STRING INVERTER:

String inverter should cater to the following requirements. Bidder should ensure compatibility of inverter with SPV modules and system. The technical particulars of the inverter have to be submitted to BHEL for approval before procurement.

Sl.No	Technical parameter	Specification
1	Make	Make and Model No. shall be furnished by the Bidder
DC parameters		
2	DC Input Voltage	BHEL make SPV Module of 300Wp (L24270) shall be used in this system as per attached data sheet.
3	MPPT Feature	MPPT feature shall be available. Details of MPPT shall be furnished.
4	MPPT range	MPPT range of voltages shall be furnished by the Bidder.
5	DC side connection arrangement	Details of No. of DC input connections and type of DC side connections shall be furnished by the Bidder.
6	DC disconnect switch	Integrated Disconnect switch shall be provided on DC side
AC Parameters		
7	AC Output Voltage	3 Phase 400 V AC, minimum 4 wire output
8	No. of phases/wires	RYBN or RYBN+PE
9	Grid voltage range	Output grid voltage range shall be furnished by the Bidder. However, offered Inverter shall work within the range of Vnominal $\pm$ 15%
10	Grid frequency & its range	50 Hz with $\pm$ 5%
11	Total Harmonic Distortion	< 3%



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	(THD)	
12	AC side connection	AC side connection arrangement and output cable size details shall be furnished by the Bidder.
13	Remote & Local Monitoring	Remote and Local monitoring of Inverters shall be available. Bidder shall furnish the communication protocol details.
14	Standby power consumption	Standby power consumption of Inverter shall be furnished by the Bidder.
15	Maximum inverter efficiency and rated power factor	Bidder to mention
16	Maximum overload capacity	Bidder to mention
Protection Features		
17	Anti-Islanding, Grid Islanding Protection	Shall be provided.
18	DC Reverse polarity protection	Shall be provided.
19	AC side short circuit protection	Shall be provided.
20	Governing Standards	Shall be provided.
Mechanical Features		
21	Operating Temperature	-20 Deg. C to + 55 De. C
22	Dimensions	Shall be provided by the Bidder.
23	Weight	Shall be provided by the Bidder.
24	Cooling	Cooling arrangement (if any) details shall be furnished by the Bidder.



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25	Ingress protection (IP)	IP 65 or better (outdoor installation)
26	Maximum altitude	Bidder to mention up to what altitude above sea level inverters will work without de-rating.

Bidder shall provide for installation & commissioning of the string inverters. Bidder shall depute their service engineer to site during I&C of the string inverters. If Bidder engineers are not competent, Bidder has to arrange engineers from Inverter supplier during commissioning of the plant.

2.1.4 Distribution Board

AC power output of inverter shall be fed to distribution board panel (Consisting of 02Nos of 630A MCCB & 01 No. 63A MCCB, Digital MFM- 1 No complete with CTs and accessories).

Distribution Board shall be floor mounted type and shall have Digital MFM to measure voltage, current, frequency, energy. Panel shall be made of min.16 Gauge powder coated MS Sheet metal, totally enclosed, rigid, floor mounted, cubical type suitable for operation on three phase 415 V, 50 Hz.

All power cables shall be taken through top or bottom of panel as per site requirement.

Distribution Board shall be fitted with suitable rating and size Al/Cu bus, MCCB, HRC fuses, Accessories etc.

Note: Panel should be designed so as to fit into the space available at site (ducting for cables parallel to lift at ground floor). Connection & termination of Cables of main supply line & solar PV Power to DB Panel shall be in scope of bidder. Bidders are encouraged to Visit site before quoting.

2.1.5 LA and EARTHING

The earthing for lightning arrestor, plant equipment and LT power system shall be required as per provisions of IS: 3043. The requirement of earthing system for the Plant shall be as furnished in the above table.

Installation of earth stations:

The electrode has to be completely buried in to the earth pit. Bidder has to supply and fill all around the electrode earth enhancing mixture i.e., coal and salt. Bidder has to organize the required machines & tools for earthing kit installation. There should be a test point provided for each earth pit for regular testing. Masonry enclosure (identified with labels) with cast iron cover plate shall be provided for each earth pit.

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The structures, string inverter shall be inter-connected by means of GI wire/strip and finally connected through 25 x 3 mm thick GI flat to the respective earth pits from roof top. This GI strip is to be properly routed from terrace to corresponding earthing pit properly by clamping to wall at regular intervals. There will be a separate path for the lightning arrestor. Bidder has to make necessary arrangements to ensure proper routing and maintain the aesthetic look of the building.

Earth resistance of the earth pits shall be tested in presence of the representative of BHEL as per applicable IS before commissioning and value to be less than 3Ω for structures and to be less than 1Ω for equipment body earthing for acceptance.

2.1.6 ERECTION & TESTING OF 18KWp SYSTEM:

A) The storage, watch & ward responsibility of all the materials including BHEL supplies at site will be in Bidder's scope until the commissioning of the plant. Any deficit occurring due to misplacement/mishandling will be borne by the Bidder at no extra cost. The shifting of all the materials to the roof-top from storage location for erection will be in the scope of the Bidder and he has to make necessary arrangements for the same.

B) Pre-cast finished pedestals with foundation Bolts shall be supplied as per the drawing no 3-679-05-00683 enclosed. Aligning and positioning of each precast block to get uniform appearance of PV array is to be ensured. If required, filler material by way of filling concrete is required to be applied to get flat level of pedestals.

Note: Bidder has to do necessary pretreatment by chipping (nearly 10 mm) & grouting the PCC pedestal into the roof top floor. This should enhance the stability of the SPV structure on the roof top. The necessary water leak proof compound such as Dr. Fixit/equivalent approved by BHEL is to be used in the mortar, to arrest the water seepage, before fixing the pedestal on the roof. Necessary treatment to avoid water seepage will be in the scope of Bidder. Alternative Concrete adhesive compound can be used to provide bonding between existing roof and PCC pedestal.

Bidder is required to assemble all the structures on the roof top as per the structure drawing and PV array layout drawings enclosed.

C) Each module will be fitted at four locations on to the structure by using SS 304 grade screws have. Earthing strip has to be run through separate M6X80 mm foundation bolts provided at precast cement pedestals. Interconnection of structures for earthing has to be done using 8 SWG GI wire up to the earthing kit.

Any activities requiring hole drilling, cutting of structures for completing the installation and mounting of PV modules on the structures is in the Bidder's scope. Bidder has to make

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necessary arrangement for the drilling machine/gas cutting machine, if required.

**D) 60 Nos of 300Wp SPV modules have to be assembled using structure materials.
SPV Modules shall be provided by BHEL.**

E) Before mounting the PV modules on to the structures, each PV module have to be tested during peak sunshine period. Short circuit current (I_{sc}) & Open circuit voltage (V_{oc}) of the module has to be checked & recorded using multimeter and Clamp meter. Ensure the modules are electrically OK.

F) Approx., 20 numbers of PV modules of each 300 Wp are to be connected in series using quick connects with cables supplied along with PV modules. +ve & -ve terminals of each string has to be routed to string inverter + ve & - ve inputs through the PVC pipes. Bidder shall supply the MC4 type male / female connectors and the suitable crimping tool required for making interconnection. From the end terminals of each string, 4 sq. mm cable shall be drawn to string inverter. On either side and throughout the routing of the cables through pipes marking has to be done.

Special crimping tools required for crimping to be arranged by Bidder as per this specification, have to be used to crimp 4 sq.mm cables to quick connects for connecting output of series strings to inverter inputs. **This crimping tool has to be kept at site permanently even after completion of project.**

G) Each string Open circuit Voltage & Short Circuit Current (with a testing jig having appropriate load) to be checked and recorded as directed by the BHEL site engineer at site.

H) Mounting of string inverter at site is in the scope of Bidder. Bidder has to mount the inverter at an appropriate place where a shade cover or canopy cover is available above string inverter. If canopy cover is not available, Bidder to provide necessary canopy to cover the string inverter.

I) Cable laying and termination at all areas shall be carried out in such a way that there shall be no stress on the cables / lugs at the entry / exit points.

J) 1 run of 3.5CX70 mm² armoured cable from the 3Ø AC output of inverter have to be terminated on to a DB Panel. Cabling shall be done from inverter through already available ducting for cables parallel to lift to DB Panel. The output of the Inverter has to be routed through PVC pipe, to the DB panel in the ground floor of the building. Marking of the cables has to be done on either ends and throughout the routing of the cable through PVC pipes for easy tracing of the cable. Appropriate cable lugs and crimping tools for terminations have to be arranged by Bidder.

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K) Pipes on the terrace have to be routed on cement brick work to ensure no water logging later on as shown in the attached Annexure-1. The necessary clamp fixtures required for routing pipes on the walls have to be procured and used by the Bidder to ensure aesthetic look.

L) All the terminations required for SPV plant viz., at the inverter and DB panel etc., will be in the scope of the Bidder. The necessary lugs and hardware required for the termination have to be arranged by the Bidder. Bidder has to ensure that terminations have been made without any tension.

Note: Bidder have to carefully measure twice the exact length of cables required for the connection before cutting the cable from cable drum. Any short fall in length of cable arising out of Bidder works should be borne by the Bidder.

For 4 mm² termination appropriate marking with red and black insulation tapes have to be done by the Bidder. The necessary tapes have to be arranged by the Bidder.

The DC cables from the array have to be terminated on the inverter with proper labeling.

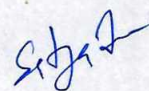
M) The installation of the Lightning arrestors and earthing pit will be in the scope of Bidder. The necessary arrangements of digging and running the earthing strip from terrace to the bottom will be in the scope of Bidder. Bidder has to neatly clamp the strip at regular intervals with necessary drum insulators/clamps and should ensure aesthetic look of the building.

N) Bidder is required to assist BHEL and associate with the other Bidder's technical team during pre-commissioning checks and in commissioning of the power plant.

O) Bidder has to do coping for all the pedestals at the structure legs and at the pedestal base on all the four sides with cement plaster of 1:6. After coping Bidder has to arrange for painting all the pedestals with weather resistant cement paint of suitable color decided by BHEL engineer at site.

Note:

1. It is advised that bidder should visit site and ascertain what type of equipment/machines needed at site for execution.
2. Supply shall be made directly to the site.
3. Bidder has to organize for unloading of all the materials and should arrange for safe storage.
4. The shifting of all the materials viz., BHEL supplied material and Bidder supplied materials from stores/storage location to the site (building rooftop) also lies in the scope of Bidder.
5. The roof is accessible through stepped staircase, but in case the materials has to be shifted avoiding staircase, pulley or other lift arrangements to shift it to



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rooftop has to be done by Bidder.

6. All tools and tackles, like power drilling machine, cutting machine, digging tools, complete set of crimping tools etc, required for installation, wiring, crimping, assembly, digging of cable trenches, if required, earth pits & megger for checking insulation resistance of cable prior to commissioning etc., have to be organized by the bidder.

2.1.7 O&M Manual and TEST CERTIFICATES

- a) 03 copy of O&M Manual shall be submitted within 10 days of E&C.
- b) Routine test certificates/Test Reports for structures (along with galvanization), string inverters to be furnished by the BIDDER. BHEL, if required will inspect the materials at Bidder place.
- c) Equipment shall not be dispatched until BHEL issues a "Dispatch clearance" to Bidder.
- c) Warranty certificates shall be submitted for all bought-out items.

2.2 Comprehensive Maintenance Contract:

All the equipments to be installed for commissioning of solar PV power plant and the power plant in whole (Except SPV Modules) shall be under Comprehensive Maintenance Contract for 5(five) years from the date of successful commissioning.

The equipments or components, or any part thereof, so found defective during Comprehensive Maintenance Contract period will be forthwith repaired or replaced within the scope of warrantee obligation to the satisfaction of the BHEL.

The maintenance of solar PV power plant includes routine & periodic maintenance, overhauling, breakdown maintenance, and repairing or replacement of defective invertors, and other components, providing of consumables.

The Down-Time of PV system should not be more than 72 hours (03 days).

The comprehensive amc will include 4 quarterly visits per year along with 2 on-call, emergency/breakdown visits. Cmc charges shall be inclusive of all to & from travel, lodging, boarding, etc.

3.0 Delivery Schedule

For Supply of BOQ and I&C (Cl.2.1): Work shall be completed within 45 days from the date of issue of PO.

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4.0 WARRANTY:

The bidder must ensure that the goods supplied under the contract are new, unused and of most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the contract.

The warrantee period of the complete PV Systems will be **60 calendar months** from the date of successful commissioning. The equipments or components, or any part thereof of the Power Plant, if so found defective during warrantee period, the bidder will remain liable to repair or replace immediately under warrantee obligation to the satisfaction of the Purchaser in order to ensure trouble free operation of the Power Plant. Within the scope of warranty, the Bidder will repair or replace of any defective part of the Plant & Equipment supplied, Works done and services rendered under the Contract and render periodic maintenance as a preventive measure to up keep performance of the power plant and also to attend breakdown maintenance as and whenever needed.

5.0 GENERAL TERMS AND CONDITIONS:

- 1) Bidder's responsibility, right and liabilities under this project will commence from the date of acceptance of the purchase order.
- 2) The installation activity will have to be carried out in such a manner that will not cause any inconvenience to the other agencies working in the site. Any permits from the customer, if required, are to be arranged by the Bidder for his personnel.
- 3) After completion of the I&C, the entire site/area will be cleaned of debris etc. by the Bidder prior to handing over of the site to BHEL.
- 4) All the materials brought to site has to have proper paper work like DC, Invoice etc. duly verified & signed by BHEL/BHEL's customer to be submitted to BHEL for payment.
- 5) Any damage to the buildings/structures/area made by Bidder's work men or by Bidder's agent will be made good by Bidder at Bidder's cost.
- 6) Bidder shall take work permit before commencement of all types of non-routine works as per the statutory procedures followed at the work place.
- 7) Bidder shall explain the job, associated hazards and precautions to his workmen.
- 8) Bidder shall ensure one person who should have the skill, knowledge and experience of performing the allotted task and shall be able to guide his team.
- 9) Bidder shall ensure safe procedure is followed during execution of the job.
- 10) Bidder shall ensure that his workmen wear appropriate safety Personal Protective Equipment.
- 11) Bidder shall ensure adequate supervision of the activity by his supervisor.
- 12) Bidder has to adhere to necessary legal/safety requirements and BHEL shall be kept indemnified against any untoward events taking place during the course of work.
- 13) No child labour should be employed for executing the project.
- 14) In case project is not completed as per BHEL scope due to reasons arising out of materials from BHEL end/Bidder's end, bidder has to complete the job at later stage

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without any extra charges. No over run charges shall be paid in case of extension of project schedules.

- 15) Any miscellaneous materials that have not been mentioned specifically in the specification/tender which are required for I&C of the plant, shall be deemed to be included in the specification and shall be supplied by the Bidder without any extra charges. Any scope of activities which are not specifically mentioned in this specification but required for the completion of the I&C of the SPV plant for safe, trouble free, normal operation shall be provided at no extra cost by the Bidder, unless explicitly excluded in the specification. Any charges for the electricity/water used for the construction work at site will be in the scope of Bidder.
- 16) **Scaffolding:** Bidder have to employ scaffolding, belts/safety accessories for safety of personnel **working on high rise building during erection**, routing of earthing strips, use lifeline ropes while walking on height, and cabling through PVC pipes from roof top of the terrace to control room. Safety shall be ensured for workmen during Erection, testing & Commissioning against electrical hazards.
- 17) The design and operational features of the equipment offered shall also comply with the provisions of latest issue of the Indian Electricity Rules and other statutory regulations.
- 18) **Statutory obligation:** Bidder is required to meet all the statutory obligations/ legal requirement with regard to workmen deployed by Bidder for the project such as ESI, PF, Minimum wage act, Work man compensation act//Accident/medical insurance, Income Tax act, Employees Insurance act etc.
- 19) The installation should strictly conform to this specification. All the works shall be executed strictly as per the direction of BHEL engineer at site.

6.0 LIST OF ENCLOSURES:

- 6.1 Typical Module Mounting structure- 3-679-05-00683
- 6.2 SPV Module drawing- 3-679-02-00352
- 6.3 SPV Module Data Sheet – CD- 4-4001-128
- 6.4 Schematic of Lightning Arrestor – 3-679-05-00037

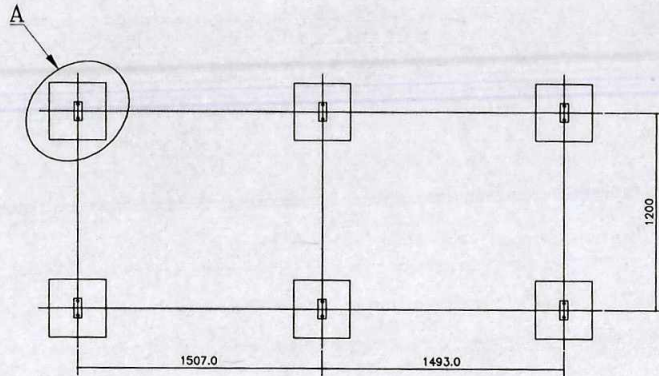
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- (1) 1 SET OF HARDWARE INCLUDES 1 BOLT, 1 NUT,
1 PLAIN WASHER AND 1 SPRING WASHER
- (2) STEEL PROPERTY IS AS PER IS:2062 GRADE-E250 C
- (3) GENERAL TOLERANCE ARE ACCORDING WITH ISO:2768
(OR EQUIVALENT IS:7215)
- (4) SPECIFICATION FOR CHANNEL ANGLE AND 1-SECTION
AS PER IS:808
- (5) SPECIFICATION FOR HOT DIP COATING ON STRUCTURAL
STEEL MIN. 90MICRONS
- (6) SPECIFICATION FOR WELDING-WELD THICKNESS SHOULD
BE MINIMUM 5mm

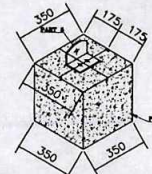
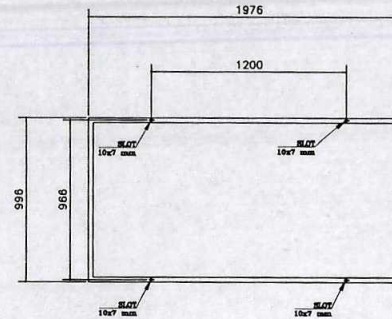
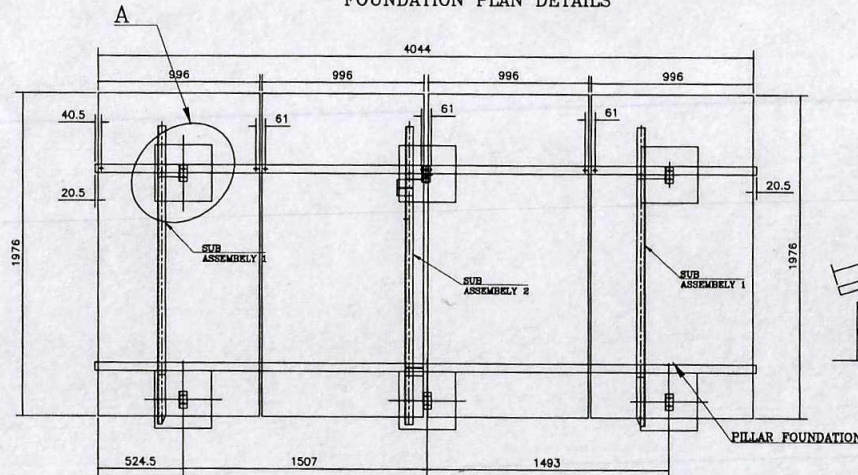
DRAWING NO. 3-679-05-00683

FIRST ANGLE PROJECTION

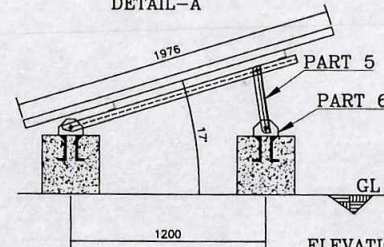
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FOUNDATION PLAN DETAILS



DETAIL-A



ELEVATION VIEW OF STRUCTURE

NOTE:- MATERIALS:- PLAIN CEMENT CONCRETE (1:2:4) CEMENT PLASTE (1:6)

- (1) SLOPING FINISH TO COVER FOUNDATION BOLTS & STRUCTURE MEMBER TO BE DONE AFTER FIXING STRUCTURE ON PEDESTAL
- (2) SLOPING FINISH AT THE PEDESTAL BASE ALSO TO BE DONE.

ALL DIMENSION ARE IN mm

REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED			CHECKED

		PROJECT/PRODUCT			
		SPV SYSTEM			
		NAME	SIGN.	DATE	NO. OF VAR.
		DRN.			
DEPTT. BDC UNTOL. DIM. GR. C/M/F SCALE N.T.S. WEIGHT-KG - TITLE MODULE MOUNTING STRUCTURE SPV SYSTEM		CKD.			
		APPD.			
		REF. TO ASSY. DRG.		IT. NO.	NO. OF ITEM
		DRAWING NO.	3-679-05-00683		REV. 00
		SHEET NO.- 01	NO. OF SHEETS- 02	SIZE- A3	

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REF. DRG. No.

SIGN. & DATE

INVENTORY No.

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

3 679 02 00352

2

3

4

5

6

7

8

A

B

C

D

E

F

A

B

C

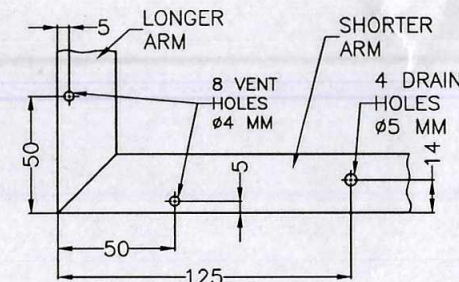
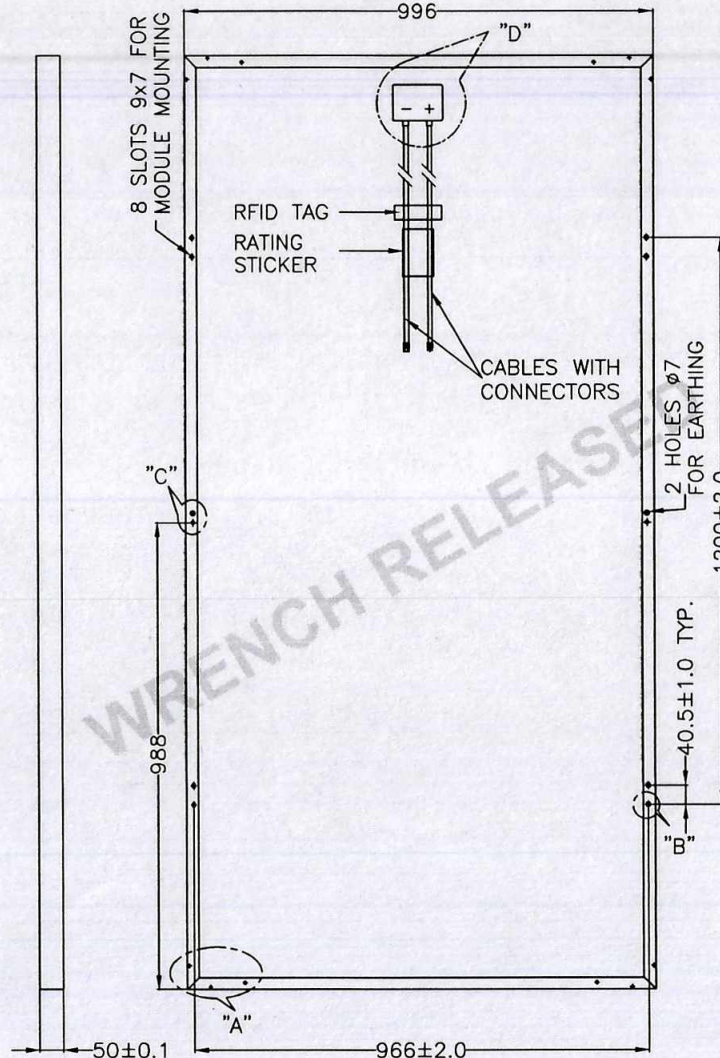
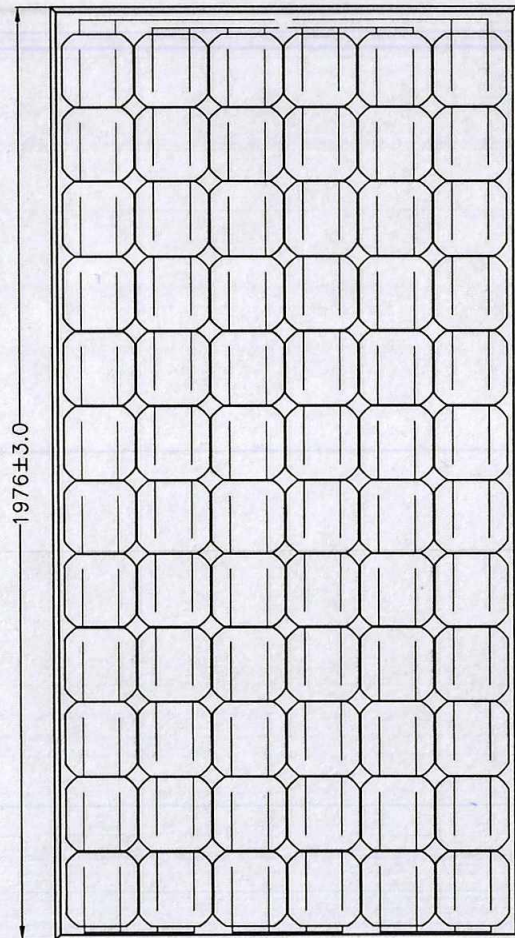
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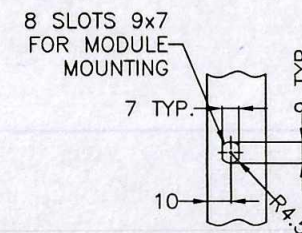
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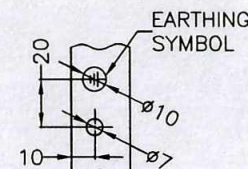
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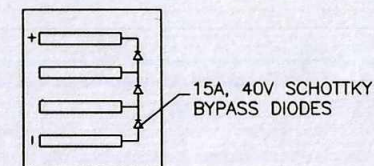
DETAIL - "A"



DETAIL - "B"



DETAIL - "C"



DETAIL "D"

REV.	DATE	ALTERED	REV.	DATE	ALTERED	NAME	SIGN	DATE	DEPT.	CODE
		CHECKED			CHECKED					
		APPROVED			APPROVED					
			00							
				FIRST ISSUE		DRAWN	SAN	Sd/-	020911	
						CHECKED	NAR	Sd/-	020911	
						APPROVED	SR	Sd/-	020911	SCPV 439



BHARAT HEAVY ELECTRICALS LIMITED.
ELECTRONICS DIVISION, BANGALORE

TITLE: PHOTOVOLTAIC MODULE - L24270
156 mm MONO SOLAR CELLS (Corner Block Type)

M.O. No.

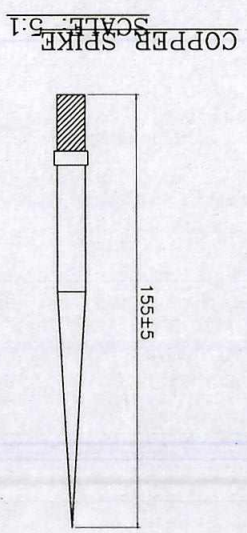
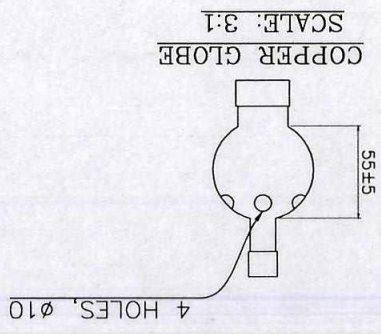
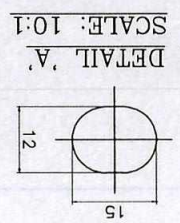
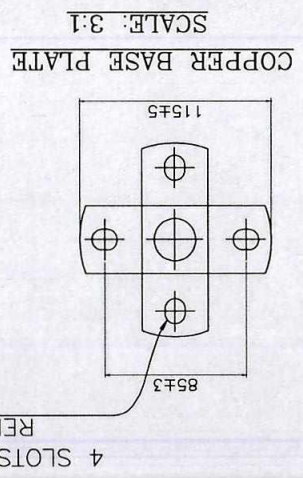
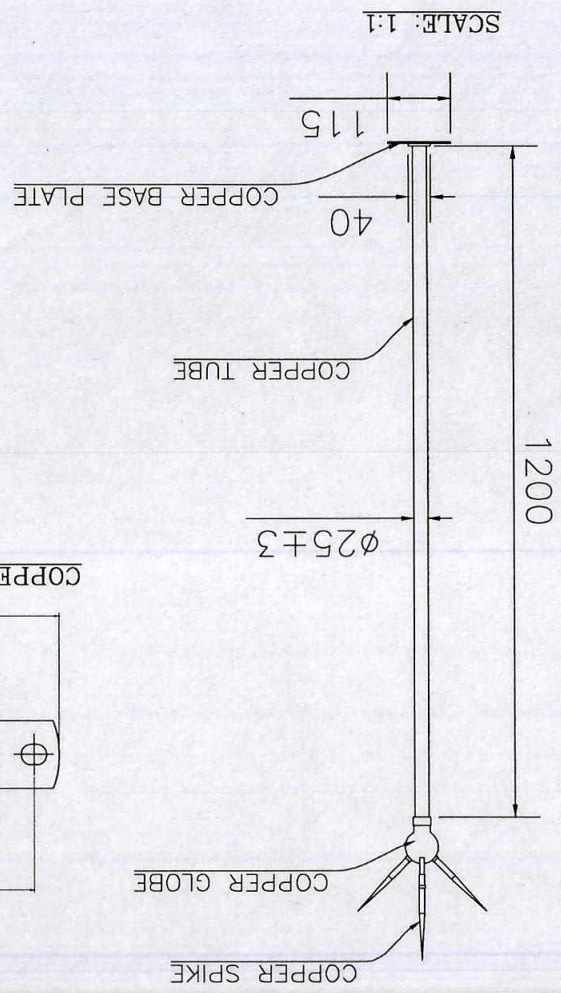
DRG. No.

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CARD CODE

No. OF SHTS 01
SHT No. 01

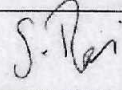
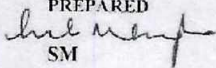
REV 00

[illegible]

NOTE:-

- (1) LIGHTNING ARRESTOR: 25±3MM DIA
1.2 MTRS. (MIN.) LONG COPPER TUBE
WITH COPPER GLOBE ON THE TOP. SCREW
ON TYPE COPPER SPIKES- 5 NOS. MOUNTED
ON THE COPPER GLOBE.
- (2) FOUNDATION BOLT AM10X125 AS PER IS:5624
WITH M10 HEX. NUT, M10 SPRING
WASHER & M10 PLAIN WASHER-4
SETS-FINISH, ZINCPLATED TO 12 MICRONS.

25/11/20

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	A4-10			REV. 00
			PAGE 01 OF 01	
TECHNICAL SPECIFICATION FOR PV MODULE L24270 (24 V, 300 WATTS)				
1. PV MODULE TYPE NO. : L24270				
2. CONFIGURATION : SINGLE GLASS LAMINATED TYPE WITH WITH 72 NOS. OF 156-mm MONO CRYSTALLINE SILICON SOLAR CELLS (12*6) IN SERIES CONFIGURATION.				
3. OVERALL SIZE : 1966 (±3) * 986 (±2) * 35 (±1) mm				
4. WEIGHT : 25 Kg. (Typ.)				
5. PV MODULE FRAME MATERIAL : ANODISED ALUMINIUM				
6. JUNCTION BOX : IP65 GRADE JUNCTION BOX WITH CABLES AND CONNECTORS				
7. RFID Tag : As per JNNSM Guidelines				
8. TYPICAL ELECTRICAL CHARACTERISTICS :				
8.1 OPEN CIRCUIT VOLTAGE (Voc) : 45.0 V				
8.2 SHORT CIRCUIT CURRENT (Isc) : 8.8 A				
8.3 VOLTAGE AT PEAK POWER POINT (Vmp) : 37 V				
8.4 CURRENT AT PEAK POWER POINT (Imp) : 8.11 A				
8.5 PEAK POWER OUTPUT (Pmax.) : 300 W				
8.6 CELL EFFICIENCY : 17.4 %				
8.7 MODULE EFFICIENCY : 15.5 %				
8.8 FILL FACTOR : ≥ 0.70				
NOTE :				
1. Electrical specifications mentioned above are at Standard Test Conditions of 100 mW/sq. cm solar insolation (AM 1.5) and at 25 deg C temperature.				
2. Measurement repeatability of peak power output: ± 3 %				
REVISION: (00)		APPROVED BY: 		
		SR		
		PREPARED  SM	ISSUED Engg.	DATE 18.03.2015

