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Tender Ref. EP: MM: SPV: NIT: 01
Tender Date 04.12.2015

ADDENDUM / CORRIGENDUM Issued FOR PURCHASE SPECIFICATION FOR SOLAR PHOTOVOLTAIC MODULE MANUFACTURING LINE SPEC No: EPD-PVM-EQS-01 Rev 00 dated 3.12.2015 pursuant to the pre-bid meeting held on 11.12.2015. Vendors / bidders shall consider these changes while formulating their offers.

S.No	NIT Spec Ref	Original Clause of NIT	Amended Clause of the NIT
1	Pg No 3 , Pre-Qualification Criteria	The turnkey supplier shall necessarily meet the following pre-qualification criteria.	The turnkey or consortium supplier shall necessarily meet the following pre-qualification criteria.
2	Pg No 3 , Pre-Qualification Criteria	Turnkey bidder shall have the experience of turnkey installations of Solar PV Module Manufacturing line(s)	Turnkey / consortium bidder shall have the experience of turnkey installations of Automated Solar PV Module Manufacturing line(s)
3	Pg No 3 , Pre-Qualification Criteria 2.(i)	Of not less than 500 MW cumulative capacity during the period from 01.12.2010 to 30.11.2015, of which there shall be minimum 3 installations of manufacturing lines of minimum 100 MWp Annum capacity.	Of not less than 500 MW cumulative capacity during the period from 01.12.2010 to 30.11.2015, of which there shall be minimum 3 installations of automated manufacturing lines of minimum 100 MWp annum capacity.
4	Pg No 3 , Pre-Qualification Criteria 2.(ii)	With relevant business presence in India and having a reference of at least one (1) Turnkey Solar PV module manufacturing line installation in India working satisfactorily.	With relevant business presence in India and having a reference of at least one (1) automated Turnkey Solar PV module manufacturing line installation in India working satisfactorily.
5	Pg No 3 , after Pre-Qualification Criteria 2.(iii)	Documentary evidence for the above shall be provided in the form of the satisfactory certificate issued by the customer, purchase order, commissioning certificate and the performance certificate from the customers.	Documentary evidence for the above shall be provided in the form of the satisfactory certificate issued by the customer, purchase order, commissioning certificate and the Performance certificate from the customers. Consortium bidders must submit the 'Memorandum of Understanding' entered between the members for meeting the qualification criteria, conformance to the technical specifications and the period of understanding till the completion of warranty.
6	Page No 4 , Pt No 4	Turnkey supplier shall be the original equipment manufacturer or are their authorized company / organization for at least one of the following process equipment for Solar PV Module manufacturing. 1. Automatic Tabber & Stringer 2. Automatic Layup station	Turnkey / Consortium supplier shall be the original equipment manufacturer or are their authorized company / organization for at least one of the following process equipment for Solar PV Module manufacturing. 1. Automatic Tabber & Stringer 2. Automatic Layup station
7	Page No 4 , Pt No 5	Turnkey supplier shall take full responsibility for successful integration, performance proving,	Turnkey / Consortium supplier shall take full responsibility for successful integration,

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		warranty, TS & M contract, AMC for the entire Solar PV module manufacturing line.	performance proving, warranty, TS & M contract, AMC for the entire Solar PV module manufacturing line.
8	Page No 4 , Pt No 6	All Major equipments as mentioned in S.No 3 above shall bear the 'Conformite Europeenne (CE)' Marking. The relevant certificates and technical documentation shall be made available in the techno-commercial bid.	The 'Automatic Tabber & Stringer' and "Automatic Layup station with 6 axis robot" shall bear the 'Conformite Europeenne (CE)' Marking. The relevant certificates and technical documentation shall be made available in the techno-commercial bid.
9	Page No 4 , Pt No 2(a)	Overall line yield: $\geq 99\%$ (excluding electrical rejects)	Overall line yield: Minimum 99% (excluding electrical rejects & process rework)
10	Page No 4 , Pt No 2(a)	Technical line availability : $\geq 95\%$ with 24x7 operation	Technical line availability: Minimum of 7260 Hrs per annum, producing 100 modules per hour for 72 cell module or 120 modules per hour for 60 cell module.
11	Page No 6 Point 2 (b)	Plant uptime : $\geq 95\%$ Plant Yield : $\geq 99\%$	Plant uptime : Minimum of 7260 Hours per annum. Plant Yield : Minimum 99%
12	Page no 6 Pt no 3	The equipment must be chosen to deliver the required minimum throughput for each of the station. The detailed equipment specifications are given in section 9. The number of equipment shown is only indicative and may vary according to through output of the equipment and line configuration offered.	The equipment must be chosen to deliver the required minimum throughput for each of the station. The detailed equipment specifications are given in section 9. The number of equipment at each of the stage in the automated module manufacturing line is indicated below.
13	Page no 7: Point no 3	Auto EVA Cutting & Layup No of Equipment : 01 for 1 line And No of equipment for 2 lines : 02 for 2 lines.	Auto EVA Cutting & Layup : No of equipment 01 for 2 lines
14	Page no 7: Point no 4	Bussing Station 06 inline stations per line ,12 inline stations for 2 lines	Bussing Station 04 inline stations per line, 08 inline stations for 2 lines
15	Page no 7: Point no 5	EVA & Back sheet Layup Station 03 per line and 06 for 2 lines	EVA & Back sheet Layup Station 02 per line and 04 for 2 lines
16	Page no 8: Point no 11	Framing of panel laminate in Aluminium sections with corner block Punching type securing.	Framing of panel laminate in Aluminium sections with corner block Punching type securing. Loading of frame elements should also be Automatic.
17	Page no 8: Point no 13	Hi Pot Tester	Not required separately as the specification of SUN SIMULATOR includes inbuilt hi pot tester
18	Page no 8: Point no 14	Xenon / LED lamp light source evaluation of module output with computer interface for data acquisition and monitoring.	Xenon / LED lamp light source evaluation of module output with computer interface for data acquisition and monitoring. In built IV tester for online hi-pot testing (Upto 5000 V) with provision of time adjustment. Also capable of measuring Insulation Resistance (upto 1000 V DC) & Continuity testing
19	Page no 8: Point no 15	Automatic Packing station: Pick, overturn, stack and pallet loading of	Automatic sorting & Packing station : Automated sorting based on pre-defined module wattage in 4 rating slabs with 4+2

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		the modules into carton box. Lift and place for transport.	bins. Pick, overturn, stack and pallet loading of the modules into carton box. Lift and place for transport.
20	Page no 9: Point no 16	To match above and minimum of 30 minute of buffer at the all critical stations	To match above and minimum of 15 minute buffer at the following stations: - Before Layup - After layup - Before Laminator - Before Framing However, the buffers at each station defined in section 9 shall also prevail.
21	Page no 9: Point no 18 (D)	Panel repair station :02 per line and 04 for 2 lines	Panel repair station :01 per line and 02 for 2 lines
22	Page no 11: Point no 5b	Laminate storage racks, EVA & Back sheet Storage Racks, Trolleys for manual material Movement from one station to other, manual repair station to automated line for string & panel repair etc., as appropriate for each of the line. Bids to indicate the technical details of such auxiliary equipment offered.	Laminate storage racks, EVA & Back sheet Storage Racks, Trolleys for manual material movement from one station to other, manual repair station to automated line for string & panel repair etc., as appropriate for each of the line. Bids to indicate the technical details and quantity of such auxiliary equipment offered.
23	Page no :11 Point No 7.1	Environment Test Chamber and its specification	Not Required / Not Applicable
24	Page no :12 Point No 7.2	Mechanical Load Tester Equipment and its specification	Not Required / Not Applicable
25	Page no :12 Point No 7.3,	Gel Content Test Setup	Gel Content Test Setup : Bidders to provide the technical specifications and BOQ of offered instruments
26	Page no :12 Point No 7.4	Solder Peel Strength tester	Solder Peel Strength tester : Bidders to provide the technical specifications of offered instruments.
27	Page no :12 Point No 7.5	EVA Pull Strength Tester	EVA Pull Strength Tester : Bidders to provide the technical specifications of offered instruments.
28	Page no :15 Point No 9.1	Interconnect spacing: 26-78 mm. The preset standard sizes may be defined in the technical offer.	Interconnect spacing to suit the number of bus-bars as indicated in SI no. iii. The preset standard sizes may be defined in the technical offer.
29	Page no :15 Point No 9.1 xiii	Conveyor Direction : bi directional	Conveyor Direction : uni directional
30	Page no :17 Point No 9.2 xvi	Camera assisted alignment of the string	Camera or Optical sensor assisted alignment of the string
31	Page no :17 Point No 9.2 xvi	Camera for string inspection system with following features a.High Resolution camera min 8 Megapixel	Camera for String Inspection : Not Required Additionally a suitable glass loading system shall also be included to feed both the lines and integrate with an automatic EVA cutting and layup equipment in line.

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		b.Front and Backlight imaging and analysis with Software with failure diagnosis. c.The system should be able to Perform the identification of the broken cells, ribbon presence, ribbon misalignment, distance between cells and string dimensions	
32	Page no :17 Point No 9.3 ii	The manual bussing station shall have multiple stations - minimum 6 work stations and 2 additional stations for off-line repair per line.	The manual bussing station shall have multiple stations - minimum 4 work stations per line and 1(one) additional stations for off-line repair per line.
33	Page no :18 Point No 9.5	There Should be two stations for the each of the manufacturing line.	There Should be 1 (one) stations for the each of the manufacturing line.
34	Page no :19 Point No 9.7 xxii	Standby vacuum pump shall be provided for uninterrupted operation	1 (one) standby vacuum pump shall be provided for uninterrupted operation as a mandatory spare. Preferred Make of Vacuum Pump : BUSCH
35	Page no :20 Point No 9.9	2 Nos online and 2 no. off-line Automatic film cutting machine for EVA and back sheet.	1 (one) No online automatic cutting & layup for both the lines combined and 2 no. off-line Automatic film cutting machine for EVA and back sheet
36	Page no :20 Point No 9.11	A fully automated framing station should perform the following operations: Automatic positioning of the laminated, trimmed and taped module panel, sunny side down, Placement of the four frame section on the pressing plates and automatic profile positioning via proximity sensors, Automatic Centring of the module in the fix reference, Gripping and lifting of the module to the framing level Frame application to the module and punching of the four corners for a tight fit by self-centring devices. It should have the option of adjustable panel dimensions and be able to handle both the 60 cell and 72 Cell Module of maximum size 2000x1000 mm.	A fully automated framing station should perform the following operations: Automatic positioning of the laminated, trimmed and taped module panel, sunny side down, Placement of the four frame section on the pressing plates and automatic profile positioning via proximity sensors, Automatic Centring of the module in the fix reference, Gripping and lifting of the module to the framing level Frame application to the module and punching of the four corners for a tight fit by self-centring devices. It should have the option of adjustable panel dimensions and be able to handle both the 60 cell and 72 Cell Module of maximum size 2000x1000 mm. Loading of frame elements should also be automatic.
37	Page no :20 Point No 9.12	Curing Station for assembled PV modules with Silicone Sealant :The bidders have to incorporate PV Module curing station / line for the minimum prescribed time (Approx. 2 Hours). The curing station may have environment controlled for accelerated curing. The curing station could be of tunnel type wherein the modules progressively move and get cured while passing through. The	Curing Station for assembled PV modules with Silicone Sealant :The bidders have to incorporate PV Module curing station / line for the minimum prescribed time (Approx. 2 Hours). The curing station may have environment controlled for accelerated curing. The curing station could be of tunnel type wherein the modules progressively move and get cured while passing through. The construction details for enclosure, temperature & humidity control and mechanical

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		construction details for enclosure, temperature & humidity control and mechanical movement of the modules shall be indicated in the Techno-Commercial offer.	movement of the modules shall be indicated in the Techno-Commercial offer. Construction of tunnel & climatic controls inside shall be under the scope of BHEL.
38	Page No :22 Point No : 9.14 ix	Specification of inbuilt Hi Pot tester was not Available	The IV tester shall have provision for online hi-pot testing (Upto 5000 V) with provision of time adjustment. Also capable of measuring Insulation Resistance (upto 1000 V DC) & Continuity testing.
39	Page No :22 Point No : 9.15	Automatic Module Sorting & Packing Station :An Automatic Sorting & Packing station for sorting and packing the PV modules in packing case as per the packing quantity and case parameters programmable. One number sorting & packing station shall receive modules from both the lines for sorting and packing.	Automatic Module Sorting & Packing Station : An Automatic Sorting & Packing station for sorting and packing the PV modules in packing case as per the packing quantity and case parameters programmable. One number sorting & packing station shall receive modules from both the lines for sorting and packing. The sorting facility shall have provision for 4 bins to sort the modules based on the wattage as evaluated in the IV tester on-line. 2 spare bins shall also be provided.
40	Page No : 23 Point No 11 (e)	Vendor has to provide requisite consumables / input materials for the purpose of demonstration and proving at their site.	Vendor has to provide requisite consumables for the purpose of demonstration and proving at their site.
41	Page No : 23 Point No 11 (f)(g) (h)	f. The safety circuits, alarms and interlocks shall be demonstrated. g. BHEL will bear the expenses for their personnel travel and stay for the pre-dispatch inspection.	f) BHEL shall organize the input material viz., PV Cells and ribbons for the Tabber & Stringer and Lay-up station inspection at vendors works. For other stations, the input materials such as glass, EVA, backsheet, frame elements, corner blocks, junction box, silicone sealant etc., shall be organized by vendors at their works. The quantity of the material required, procedure and steps involved in the inspection and protocols if any shall be described in the techno-commercial offer. g. The safety circuits, alarms and interlocks shall be demonstrated. h. BHEL will bear the expenses for their personnel travel and stay for the pre-dispatch inspection.
42	Page No : 27 Pont No 22	General Terms & Conditions: i. The commercial terms of this tender shall be applicable for the future purchases of the spares/consumables/sub-systems and consumables for the equipment to be procured from the supplier. ii. Supplier shall confirm	General Terms & Conditions: i. The commercial terms of this tender shall be applicable for the future purchases of the spares/consumables/sub-systems and consumables for the equipment to be procured from the supplier. ii. Supplier shall confirm adequacy of the equipment and accessories quoted for the

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		adequacy of the equipment and accessories quoted for the intended use of turnkey line. Any other requirement shall not be entertained later. iii. Any deviation from the BHEL specification shall be clearly brought out. Otherwise, it is understood that BHEL specification is accepted in total and there is NIL deviation. iv. Supplier shall keep BHEL indemnified against any damage during installation, commissioning, repairs & maintenance of the equipment. Personnel deputed at BHEL shall be covered by relevant statutory provisions of ESI/Workmen compensation Act /otheracts as-applicable.	intended use of turnkey line. Any other requirement shall not be entertained later. iii. Any deviation from the BHEL specification shall be clearly brought out. Otherwise, it is understood that BHEL specification is accepted in total and there is NIL deviation. iv. Supplier shall keep BHEL indemnified against any damage during installation, commissioning, repairs and maintenance of the equipment. Personnel deputed at BHEL shall be covered by relevant statutory provisions of the ESI/Workmen compensation Act or other acts as applicable. v. The technical specifications & features indicated for the individual stations or turnkey automated line is the basic minimum. However, for higher or superior features or configuration provided / offered will not carry any weightage while evaluating price bids.
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