



ಭಾರತ್ ಹೆವಿ ಎಲೆಕ್ಟ್ರಿಕಲ್ಸ್ ಲಿಮಿಟೆಡ್
भारत हेवी इलेक्ट्रिकल्स लिमिटेड

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Bharat Heavy Electricals Limited
(A Government of India Undertaking)
ELECTRONICS DIVISION

P.O. Box No. 2606, Mysuru Road, Bengaluru - 560 026

An ISO 9001, ISO 14001, OHSAS 18001 & ISO/IEC 27001:2005 Company

E-Tender

The Quotations are invited under two part bid system for Supply and I&C of Module Cleaning System for 129MW Solar PV power plant for SCCL.

RFQ NO and date	TGPBOS0027 dated 02.07.2019 (e-tender)
RFQ due date & time	12.07.2019 up to 13.00 hrs (IST)
Corrigendum 01	19.07.2019 up to 13:00 hrs. (IST)
Date, Time & Venue of Part-I Bid Opening	12.07.2019 after 13.30 hrs (IST)
Corrigendum 01	19.07.2019 after 13:30 hrs. (IST)
Date, Time & Venue of Price Bid opening	Will be intimated later for technically accepted vendors
Address for Commercial Communication & Contact Person in BHEL (MM dept)	Mr. T.G.Pragadeesh (09742576787) Manager Mr. Ramachandra (09980958476), SDGM SC&PV MM Department, BHEL Electronics Division, PB NO 2606, Mysuru road, Bengaluru-560 026. INDIA Email: pragadeeshtg@bhel.in ramachandra@bhel.in Telephone number: +91 80 26998377, +91 80 26998476
Address for Technical Communication & Contact Person in BHEL with CC to MM dept	Mrs. Punam Mishra (9448987217) Sr. Manager Mr. Yaswanth N (9642986518), Dy. Manager SC&PV ENGINEERING Department, BHEL Electronics Division, PB NO 2606, Mysuru road, Bengaluru-560 026. INDIA Email: punammishra@bhel.in yaswanth@bhel.in Telephone number: +91 80 26998991, +91 80 26998251



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Name and address of the Independent External Monitor for this tender	1. Shri D.R.S Chaudhary, IAS (Retd.), Flat No. L-202 & L-203 (1st Floor) Ansal Lake View Enclave Shamla Hills Bhopal- 462 013 (M.P.) Ph: +91 755 4050495 Email - dilip.chaudhary@icloud.com 2. Mrs. Pravin Tripathi, IA and AS (Retd.) D-243, Anupam Gardens, Lane IB, Sainik Farms, New Delhi- 110 068, Email: pravin.tripathi@gmail.com .
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Any Deviations from or additions to the "General Conditions of Contract" or "Special Conditions of Contract" require BHEL's express written consent. The General Terms of Business or Sale of the Bidder shall not apply to this tender.

The Phrase “PLEASE DROP THE OFFER IN THE BOX PROVIDERR AT RECEPTION” mentioned in the RFQ DO NOT PERTAIN TO THIS TENDER.

REQUEST FOR QUOTATION

	BHARAT HEAVY ELECTRICALS LIMITED Electronics Division PB No. 2606, Mysore Road Bangalore - 560026 INDIA	RFQ NUMBER: TGPBOS0027 RFQ DATE : 02.JUL.2019	Due Date 12.JUL.2019 Time: 13:00 HRS VENUE : NEW ENGG. BLDG		
MMI:PU:RF:003					
To: BHEL, Electronics Division (X563699) MYSORE ROAD,, BANGALORE - 560026 Karnataka India		(for all correspondence) Purchase Executive : TG Pragaadeesh Phone : 080 26998377 Fax : E-mail: pragaadeeshtg@bhel.in			
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	PS0679079963 RG-50MW Supply of Module Cleaning system PS-439-1278 Test Certificate	1	ST	1	18.OCT.2019
2	PS0679079971 RG-50MW I&C of Module Cleaning systems PS-439-1278	1	AU	1	18.OCT.2019
3	PS0679079980 MNG-30MW Supply of ModuleCleaning system PS-439-1278 Test Certificate	1	ST	1	18.OCT.2019
4	PS0679079998 MNG -30MW I&C of Module Cleaning system PS-439-1278	1	AU	1	18.OCT.2019
5	PS0679080007 YLND-39MW Supply of ModuleCleaning systm PS-439-1278 Test Certificate	1	ST	1	18.OCT.2019
6	PS0679080015 YLND-39MW I & C of Module Cleaning systm PS-439-1278	1	AU	1	18.OCT.2019
7	PS0679080112 Water treatment plant -50 MW Ramagundam Test Certificate	1	ST	1	18.OCT.2019
8	PS0679080120 Water treatment plant -39 MW Yellandu Test Certificate	1	ST	1	18.OCT.2019
9	PS0679080139 Water treatment plant -30 MW Manuguru Test Certificate	1	ST	1	18.OCT.2019
10	PS0679080147 RG50MW SCADA integr. for module cleaning Test Certificate	1	ST	1	18.OCT.2019
11	PS0679080155 YL39MW SCADA integr. for module cleaning Test Certificate	1	ST	1	18.OCT.2019
12	PS0679080163 MNG30MW SCADA integr. formodule cleaning Test Certificate	1	ST	1	18.OCT.2019
13	PS0679080767 Construction of RCC tank for-10 MW STPP PS-439-1278	1	AU	1	18.OCT.2019

For and On behalf of BHEL.

REQUEST FOR QUOTATION

	BHARAT HEAVY ELECTRICALS LIMITED Electronics Division PB No. 2606, Mysore Road Bangalore - 560026 INDIA	RFQ NUMBER: TGPBOS0027 RFQ DATE : 02.JUL.2019	Due Date 12.JUL.2019 Time: 13:00 HRS VENUE : NEW ENGG. BLDG
MMI:PU:RF:003			

To:
 BHEL, Electronics Division (X563699)
 MYSORE ROAD,,
 BANGALORE - 560026
 Karnataka India

(for all correspondence)

Purchase Executive : TG Pragadeesh
 Phone : 080 26998377
 Fax :
 E-mail: pragadeeshtg@bhel.in

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
14	PS0679080775 SCADA integr. for mod cleaning10MW STPP PS-439-1278 Test Certificate	1	ST	1	18.OCT.2019
15	PS0679080783 RG-50MWConstruction of bore well&RCctank PS-439-1278	1	AU	1	18.OCT.2019
16	PS0679080791 YLND39MWConstructionof bore well&RCctank PS-439-1278	1	AU	1	18.OCT.2019
17	PS0679080805 MNG30MWConstruction of bore well&RCctank PS-439-1278	1	AU	1	18.OCT.2019
18	PS0679080872 Water treatment plant -10MW STPP Pdpl	1	ST	1	18.OCT.2019

Total Number of Items - 18

RFQ sent to :(X563699, BHEL, Electronics Division, BANGALORE, IN)

Please note that the tender will be opened in the presence of the bidders or his authorised representatives (maximum two per organisation) who choose to be present with authorisation letters. Refer annexure for the terms and conditions.

Preference will be given to vendors who accepts our standard payment terms i.e.100% payment - 30 days after receipt of material at our works subject to acceptance.

Please specify Terms of delivery, Excise duty, sales tax, Ex-BHEL, Ex-works surcharge, Insurance,P&F, Freight and other taxes very clearly .

For evaluation,exchange rate(TT selling rate of SBI) as on scheduled date of tender opening (Part-I bid incase of two part bid) shall be considered.

The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected.The list of banned firms is available on BHEL web site www.bhel.com

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 peiod of 90 days from due date.

vi). In case of non-receipt of Quotation or regret letter for 3 consecutive RFQs you are liable to be removed from our vendors list.

vii). All Prices should be written in words and numbers.

viii). Excise Chapter Heading should be mentioned for all items where VAT is applicable .

For and On behalf of BHEL.

	Technical specification for supply and I&C of Module Cleaning system For 129 MW Solar PV power plant for SCCL.	PS-439-1278
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**Technical Specification for
Supply and I&C of Module Cleaning System for
129MW Solar PV power plant for SCCL.**

Revision details :R 02	Prepared	Approved	Date
	NY	PM	12.07.2019

 N. YASHWANTH, SR. ENGINEER/SC & PV-ENCL BHEL-SON, MYSORE ROAD, BANGALORE - 560 028	 P. NAM MISHRA, MANAGER/SC&PV-ENCL BHEL-SON, MYSORE ROAD, BANGALORE - 560 028
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	Technical specification for supply and I&C of Module Cleaning system For 129 MW Solar PV power plant for SCCL.	PS-439-1278
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1.0 Introduction

Bharat Heavy Electricals Limited (BHEL), Electronics Division, Bangalore is setting up a 129MW Solar PV grid connected power plant at STPP(10MW), Manuguru (30MW) , Ramagundam (50MW) and Yellandu (39MW) for SCCL. This specification defines the scope of the vendor for Design, Supply and I&C for the Module Cleaning system for the Entire Solar Plant.

Dust and Dirt particles accumulate on the surface of the PV-Module and this can reduce the optimal performance of the Solar Modules and hence Periodic cleaning of PV Modules is mandatory for the optimum performance of the Solar Plant. Periodic Cleaning of PV-Modules is carried by O&M Contractor of the Plant.

2.0 Scope of vendor for this tender includes the following :

- a.) Design an effective Module Cleaning system for 129MW SPV Plant.
- b.) Construction of Bore-Well.
- c.) Supply of all the module cleaning system parts as per the approved BOM.
- d.) I&C for the module cleaning system.

3.0 BHEL Scope:

- a.) Periodic Cleaning of PV-Modules.
- b.) Unloading of Material.
- c.) Security of Material.

4.0 Annexure to this Document:

- a.) Tentative Array layout for all three sites.
- b.) MMS-GA.
- c.) Tentative BOQ.



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Approx No of PV-Modules at each site are as follows:

Sl.No	Site	Rating-MW	No of PV Modules(Approx)
1	Ramagundam	50	166666
2	Yellandu	39	130000
3	Manuguru	30	100000
4	STPP	10	33360

5.0 Vendor Scope Broadly:

SITE	Module cleaning System supply &(I&C)	Construct ion of Borewell	Construct ion of RCC Tank	Scada Integrati on	Supply of Water treatment plant -
10MW-STPP	No	No	Yes	Yes	Yes
30MW-MNG	Yes	Yes	Yes	Yes	Yes
39MW-YLD	Yes	Yes	Yes	Yes	Yes
50MW-RMGD	Yes	Yes	Yes	Yes	Yes

6.0 Vendor Scope in Detail :

Vendor shall provide permanent arrangement for module washing in the SPV Plant. The vendor shall design and install an effective module cleaning system. Design and Drawings shall be submitted for these arrangements to BHEL for approval .

A regular supply of suitable quantity of water shall be ensured by the contractor to cater to day-to-day requirement for cleaning of PV modules during entire O&M period.

The vendor shall estimate the water requirements for cleaning the photovoltaic modules at least once in two week or at closer frequency as per the soiling



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conditions prevailing at site, in order to operate the plant at its guaranteed plant performance. However, min. consumption of 2 Ltr / Sqm of surface area of SPV module shall be considered in estimation of required quantity of water storage.

Water used for PV module cleaning purpose shall generally be of potable quality and fit for cleaning the modules with TDS generally not more than 75 PPM. In case of higher salt contents, the water shall be thoroughly squeezed off to prevent salt deposition over module surface. However, water with TDS more than 200 PPM shall not be used directly for module cleaning without suitable treatment to control the TDS within acceptable limits. The water must be free from any grit and any physical contaminants that could damage the panel surface.

If required, for settlement of any grit/ unacceptable suspended particles in the water a settling tank shall be installed before the inlet of the storage tank. Suitable arrangement for discharge/ disposal of sediment/ slush shall be provided in silting chamber by gravity disposal in surface drain or with provision of sludge sump and pump of adequate capacity.

The module cleaning system shall include construction of RCC tank or supply and installation of Ground mounted PVC tank (s) of required storage capacity, installing tube well(s) / bore well(s) with pump(s) and motor (including 1 set as standby), and laying network of GI pipe. System shall also include booster pumps, valves (NRV, Butterfly valve, Ball valve, Gate valve, PRV, scour valve etc.), Water hammer arrester(s), pressure gauge, flow meter, GI pipelines, bends/ joints/ couplers, tap assemblies (at delivery points), nozzles, hose pipes etc. Opening from the GI pipe with manual isolating valves should be provided at regular intervals. Vendor shall install flow meter for measurement of water consumption. Water level indicator shall be provided for automatic stopping of water pumping. Pressure gauge shall be installed at every pump end. Water hammer arrester(s), pressure gauge, flow meter etc. as per the planning & design.

In case the vendor proposes to provide ground mounted PVC Tanks then vendor to locate the PVC storage tank in the Array layout so as to minimize it's shadow effect on the Array layout. The PVC storage tank shall conform to IS:12701. The valves shall conform to IS: 778. A suitable metal sheet canopy for protection from direct sunlight shall be provided over the tank area.

The water supply mains could be either of GI, UPVC or HDPE, however, the vertical pipe connecting supply main to the discharge point shall be of GI.

Masonry chamber shall be provided for Main gate valve at pump end. Whereas, as per requirements, at other locations either a masonry or GI/ HDPE pipe chamber may be provided.

Module cleaning procedure and pressure requirement at discharge point shall be as per the recommendation of PV module manufacturer. However, discharge pressure at outlet shall not be less than 50kg/cm² (5 MPa)



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All the pipes thus laid shall be buried in ground at least 150mm below FGL or laid above ground clamping on suitable concrete support blocks. In case of above ground piping only GI pipes shall be used.

Water supply pipe for module cleaning crossing the road shall be laid through Medium class GI steel pipe conforming to IS: 1161 of dia minimum 150 mm.

Suitable RCC pedestals shall be constructed for mounting the booster pumps that shall be housed within suitable shed/shelter arrangement.

Supply, laying and termination of electrical cables shall be in vendor scope. Cables from inverter/CMCS rooms to the pumps/motors shall be laid underground as per “**cable installation methodology**” section of this specification.

6.1 Specifications for Underground Water Tank.

The top of the UG tank shall be 250 mm above FGL.

The tank shall have clear free board of 300mm above MWL.

The tank bottom shall have a slope of 1:100 towards drainage sump (500x500x500 mm deep). The slope shall be provided either in structural slab or in screed concrete (1:2:4) trawl finished. 1000x1000 mm size Manhole in roof slab and 20 mm MS rung ladder shall be provided for easy access to the storage tank and silting chamber for periodic cleaning. The manhole shall be covered with RCC precast cover. 50x50x6 mm MS angle with lugs shall be provided around precast cover and tank slab opening for edge protection. Rungs shall be painted with 2 coats of epoxy paint over 2 coats of primer.

The underground RCC tank shall be designed for following load conditions:

External earth pressure + hydrostatic pressure due to ground water table (to be considered at FGL for design purposes) + Surcharge of 20 kN/ Sqm and Tank Empty.

Tank full up to MWL and no external loads

The design shall conform to IS: 3370 with maximum crack width of 0.1mm for wall, bottom slab and roof slab. Min. grade of concrete shall be M30 (M35 in coastal areas, marshy and saturated soils) conforming to IS: 456. Suitable construction joints shall be provided as per provisions of IS: 3370 (Part 1). Water proofing admixture conforming to relevant BIS standard and of approved make shall be added to concrete as per manufacturer's recommendations.

The underground water tank shall be tested for water tightness as per the provisions of IS 3370 (Part-4). In case any leakage is noticed the same shall be repaired by injection of cement grout installing suitable nozzles around affected areas. Outside face of water tank in contact with water and soil and underside of roof slab shall be painted with 2 coats of epoxy paint.

6.2 Construction of bore wells including hydro survey, water analysis, electrical cabling and plumbing works.

(1) Hydrological survey shall be carried out for identification the right locations for bore wells.



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(2) Minimum 2 bore wells for each 10MW shall be dug at locations as identified by hydrological survey and as certified by BHEL. Exact number of bore wells shall be decided during detailed engineering.

(3) Bore wells shall be of necessary depth based on water table at the identified locations.

(4) Water analysis shall be carried out at a reputed laboratory. Report on its constituents, potable quality etc. shall be submitted to BHEL.

(5) Bore wells shall be fitted with submersible AC centrifugal pump of appropriate capacity/rating with all necessary electrical cabling up to main ACDB panel of CMCS room (or) the ACDB panels of the nearest inverter room.

Vendor shall design and submit layout drawings (showing locations of tubewells/ bore wells, pipelines, valves, delivery tap points etc as superimposed on the solar array layout), Bill of materials (item-wise description, type / rating, make, model number / part number, quantity) of water washing arrangement with necessary calculations of water flow / pressure / discharge etc for BHEL / SECI approval during detailed engineering.

7.0 SCADA Integration:

For SCADA integration of the Module cleaning system, the following data is required to be acquired by the SCADA system. The vendor should ensure to provide at least the following data on Modbus protocol –(PLC) .

Water consumption.

Pump on-off status.

Water level status.

Scada has to monitor the water usage and efficacy of cleaning process.

8.0 General guidelines for design of Module cleaning system.

8.1 Specifications for Design of Module cleaning system:

The number of Storage tanks , pumps and piping network shall be decided for the following optimum parameters:

Water Storage capacity.

Pump flow rate and discharge pressure.

Economic header and distribution pipe network.

Minimum and trouble free operation convenience.

8.2 Pump Station:

a.) At Each 5MW.



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b.) Isolation valve to be considered to interconnect the adjacent pump.

8.3 Network:

a.) Maximum five no. of tap used simultaneously for each network.

8.4 Factor of safety:

a.) Appropriate factor of safety to be considered in the design of Module cleaning system for the 129MW Plant.

8.5 Instrumentation:

a.) Level gauge to be provided in the water storage tank.

b.) Pressure gauge provided at the Pump Delivery Side.

Supply of Module cleaning System to be as the approved BOQ only. A reference BOQ is attached at Annexure 3. The GTP of all the supply items have to be submitted to BHEL for approval and supply of items to be as per approved make only.

9.0 I& C of the Module cleaning system.

a.) Vendor to submit the procedure for PVC pipe laying methodology to BHEL for approval.

b.) The whole piping system has to be tested and shown to BHEL representative.

c.) The O&M methodology of the Module cleaning system has to be shown to BHEL Site Representative.

Demonstration of the Module cleaning system: Vendor has to install the entire Module cleaning system layout and demonstrate the working of the entire system to the satisfaction of the BHEL Engineer.

Vendor shall organize for the following:

Required tools and tackles for digging trenches and laying piping. Safety:

The vendor shall employ all safety related equipment such as safety ladder, safety harness, scaffolds, and PPE's for workmen for working at site. Statutory obligation:

Vendor is required to meet all the statutory obligations with regard to workers employed by him for the contract.

The Contractor shall provide and employ on Site in the installation of the Facilities such skilled, semiskilled and unskilled labor as is necessary for proper and timely execution of the Contract. The Contractor is encouraged to use local labor that has the necessary skills.

Unless otherwise provided in the Contract, the Contractor shall be responsible for the recruitment, transportation, accommodation, sanitation, first aid facility and catering of all labor, local or expatriate, required for the execution of the Contract and for all payments in connection therewith.



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The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the entry of all labour and personnel to be employed by contractor on the Site including that of his sub-contractors.

The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous or disorderly conduct or behavior by or amongst its employees and the labour of its Subcontractors.

The Contractor shall, in all dealings with its labour and the labour of its Subcontractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the employment of labor.

 N. YASHWANTH, SR. ENGINEER/SC & PV-ENCL. BHEL-SON, MYSORE ROAD, BANGALORE - 560 025	 P. NAM MISHRA, MANAGER/SC&PV-ENCL. BHEL-SON, MYSORE ROAD, BANGALORE - 560 025
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