Indicative Technical Specifications of Solar Deep well (submersible) Pumping Systems with A.C. Induction Motor Pump Set

Description	Model-I	Model-II	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII	Model-IX	Model-X	Model-XI	Model-XII	Model-XIII	Model-XIV
PV array (Wp)	1200	1800	3000	3000	3000	4800	4800	4800	6750	6750	6750	9000	9000	9000
Motor Pump-set capacity (HP)	1	2	3	3	3	5	5	5	7.5	7.5	7.5	10	10	10
Shut Off Dynamic Head (meters)	45	45	45	70	100	70	100	150	70	100	150	70	100	150
Water output * (Liters per day)	42000 (from a total head of 30 meters)	63000 (from a total head of 30 meters)	105000 (from a total head of 30 meters)	63000 (from a total head of 50 meters)	42000 (from a total head of 70 meters)	100800 (from a total head of 50 meters)	67200 (from a total head of 70 meters)	43200 (from a total head of 100 meters)	141750 (from a total head of 50 meters)	94500 (from a total head of 70 meters)	60750 (from a total head of 100 meters)	189000 (from a total head of 50 meters)	126000 (from a total head of 70 meters)	81000 (from a total head of 100 meters)

* Water output figures are on a clear sunny day with three times tracking of SPV panel, under the "Average Daily Solar Radiation" condition of 7.15 kWh/ sq.m. on the surface of PV array (i.e. coplanar with the PV Modules).

Guidelines on Testing Procedure for Solar Photovoltaic Water Pumping System

1. SCOPE

These Guidelines lays down basis for testing set up and testing procedures for Solar Photovoltaic (SPV) water pumping system. The SPV water pumping system are covered centrifugal pumps of all types 1 HP & 7.5 HP capacity as per BOQ.

2 REFERENCE STANDARDS

The Indian and IEC Standards listed at Annex A contain provisions which, through reference in this text, constitute provision of this standard. Latest editions of the indicated standards should be considered.

3 DEFINITION OF SYSTEMS AND PARAMETERS

3.1 Systems

3.1.1 *Stand-Alone Solar PV Water Pumping System*

A Solar PV Water Pumping System in stand-alone operation is neither connected to the grid nor to battery bank and is comprised mainly of the following components and equipment:

PV Modules, cabling, controller, motor pump-set and hydraulic piping. Combination of all these components shall be unique. Any change in combination will be treated as different model of pumping system.

3.1.2*Motor-PumpSet*

The Motor-pump set consists of the pump (centrifugal pump) and the driving motor.

3.1.3*Controller*

The controller converts the DC power (DC voltage & Current) of the PV array into a high or low DC voltage power, or converts this DC power into single -phase or multi-phase alternating-current power (voltage or alternating current) suitably for driving the motor of Motor-pump set.

NOTE — The Controller may also include equipment for MPPT, monitoring, metering and for protection purposes.

3.2 Parameters

Following parameter shall be referred during testing of SPV pumping system:

Table 1 – Parameters		
Parameter	**Symbol**	**Unit**
(1)	(2)	(3)
Array voltage (DC)	V_a	V
Array current (DC)	I_a	A
Array open circuit voltage (DC)	V_{oc}	V
Array short circuit current (DC)	I_{sc}	A
Array maximum power point voltage(DC)	V_{mpp}	V
Array maximum power point current (DC)	I_{mpp}	A
Pressure as measured	p	kg/cm^2
Flow rate	Q	Lps /Lpm /m^{3}h
Motor voltage DC or AC	V_m	V
Motor current DC or AC	I_m	A
Motor voltage (multi-phase AC)	V_{rms}	V
Motor current (multi-phase AC)	I_{rms}	A
Power factor	$cos\emptyset$	-
AC frequency (or DC switching frequency)	F	Hz
Motor speed	N	min–1
Radiation	E_e	W/m^2
Temperature	T	°C

4 TEST SET UP

4.1Test Set-Up

Illustration(s) of test set-ups are shown in Figure 1 & Figure 2, and a block diagram of required test set-up is shown in Figure 3. All test set-ups shall conform to applicable model test set-ups referred above and the water level in the sump well, locations of throttle valve, flow meter and pressure gauge/sensor connections as indicated in the test set-up(s) shall conform to Figure 1, Figure 2 & Figure 3 accordingly.

4.2 Precautions for Test Setup:

Before initiating testing of SPV pump the following precautions must be followed:

a) In case of direct coupled pump-set, proper alignment of input pipe, output pipe and the sensors shall be ensured.

b) Air tightness in suction line shall be ensured and the general layout of the system pipe work should be designed to avoid airlocks.

c) The offset pipe of suction line shall either be horizontal or inclined upward towards the pump and shall never be inclined downward towards the pump to avoid air trapping.

d) For the delivery head, a pressure gauge/sensor shall be connected to the delivery line with tapping as

shown in Figures 1 or 2 or 3. The tapping shall be flush with the inside of the pipe and shall have its axis at right angles to the direction of flow. The pipe set up between the pump outlet and the pressure sensor should be the same diameter as the manufacturer's outlet fitting. Sensor/gauge may be connected to the tapping point through a flexible hose.

e) Preferably, Digital Pressure sensor/gauges of suitable range need to be used for the measurement of head. Care shall be taken to eliminate any leaks in the connecting pipes and to avoid the trapping of air in the connecting pipe or hose.

f) It is assumed that over the normal operating range of the pump the pressure drop due to frictional losses between the pump outlet and the pressure sensor will be negligible and the kinetic energy component of the water at the pump outlet will be small compared to the increase in potential energy due to the increased pressure across the pump.

g) For instantaneous performance testing, pressure can be sustained by means of a simple gate valve in which a backpressure is sustained by restricting the flow. An automatic control valve(s) may be used to sustain a constant upstream pressure. Pressure may also be sustained by means of a pre-pressurized air chamber operating with a pressure maintaining valve at the outlet. A real water column may also be used.

h) A good quality digital flow meter with electrical output linearly proportional to flow rate shall be connected at the other end of the delivery pipe. The distance between the auto control valve and flow meter shell be minimum 1.5 meters to ensure laminar flow of water.

i) After flow meter the end of the discharge pipe should be beneath the water surface to prevent splashing. This could cause a mixed water / air bubbles fluid entering the pump inlet and affecting its proper operation. If so then a vertical baffle or a similar arrangement shall be inserted in the tank between the pump intake and the return pipe such that water does not make any splash and avoid any bubbles when spread to the bottom of tank to reach the input pump. In this way any small bubbles will be excluded, as they will remain near the surface. Alternatively a large pipe can be placed around the pump with its top breaking the surface and an arch cut in its base to allow water entry.

4.3 Priming Arrangement

A non-return valve/ foot valve shall be used in suction line, further it may also require suction pipe need to be filled with water for priming purpose in case of surface pumps.

4.4 PV Module Array Structures:

For testing the SPV pump using the actual solar array, outdoor PV array structures with different module mounting capacity (4,6,8,10, etc.) should be used. The modules are mounted on the structures with tracking facility to optimize irradiance, power output and accordingly, the total quantity of water pumped in a day.

4.5 Sun Simulator PV Module Tester:

To estimate the wattage of the PV modules under STC, a high precession (at least class AAA as per IEC 60904-9) sun simulator module tester is required in the pump testing lab. Alternatively, all PV modules should have STC testing certificate from an NABL accredited test laboratory and the date of testing should not be later than a year. In the STC testing, if the module is found degraded, the degraded data should be used.

4.6 Simulator (Electrical) Testing

Ideally, the SPV pump should be tested as per the site conditions where it is designed to operate. The details of outdoor testing are discussed in the next sessions. However, for testing under simulated conditions, a programmable Solar PV (SPV) array simulator capable of simulating a given solar PV array configuration (i.e. the number of modules, the type and the series / parallel combination), site radiation and temperature conditions shall be required for laboratory.

Measurement equipment with acceptable accuracy and precision shall be used for detection and data logging of the parameters listed in Table 2.

Table 2 – Core Parameters to be Measured and Recorded			
Parameter	**Symbol**	**Unit**	**Measurement Uncertainty**
(1)	(2)	(3)	(4)
SPV Array voltage	*Va*	V	≤1 percent
SPV Array current	*Ia*	A	≤1 percent
Pressure/head as measured	*p*	Kg/cm^2	≤2 percent
Flow rate	*Q*	lps	≤2 percent
Solar irradiance	E_e	W/m^2	≤2 percent

4.7 Sump Well (Hydraulic Testing)

For the performance testing of SPV pumps a sump well with sensors for sensing, monitoring and recording of pump parameters will be required. The details of the resources required are given below:

a) Water tank / sump of required dimensions,
b) PV Modules, Controller, Motor-pump set, and Other Accessories (Test Sample)
c) Pressure transducer with data logging system
d) Flow Meter with data logging system
e) Suction pipe(s) (if applicable)
f) Discharge pipe(s)
g) Pyranometers and Temperature sensors with data logging system
h) Auto control valves
i) SPV array Simulator(s) for simulation of module arrays for testing
j) SPV array for realistic testing
k) Structure for mounting modules for realistic condition testing
l) AAA class Sun simulator for testing of modules performance at STC

Refer to the block diagram at Figure 3.

4.8 Constant Head Requirement

Dynamic head variation during test shall be within limit as specified in column 2 of table 3 and the allowable variation in arithmetic average (from start of flow point to end of flow point refer figure 5) of dynamic head shall be within value specified in column 3 of table 3. Any data with head variation during the test beyond the limit specified in column 2 of table 3 shall be treated as garbage data and shall not considered in calculations of daily water output.

Table 3– Allowable variation in arithmetic average of dynamic head		
Required Dynamic head in (meters)	Allowable variation in dynamic head during test	Allowable variation in arithmetic average of dynamic head
(1)	(2)	(3)
10	± 15 % = ± 1.5 meter	± 0.5 meter
20	± 10 % = ± 2 meter	± 0.5 meter
30	± 10 % = ± 3 meter	± 0.7 meter
50	± 8 % = ± 4 meter	± 0.8 meter
70	± 7 % = ± 4.9 meter	± 0.8 meter
100	± 7 % = ± 7 meter	± 1 meter

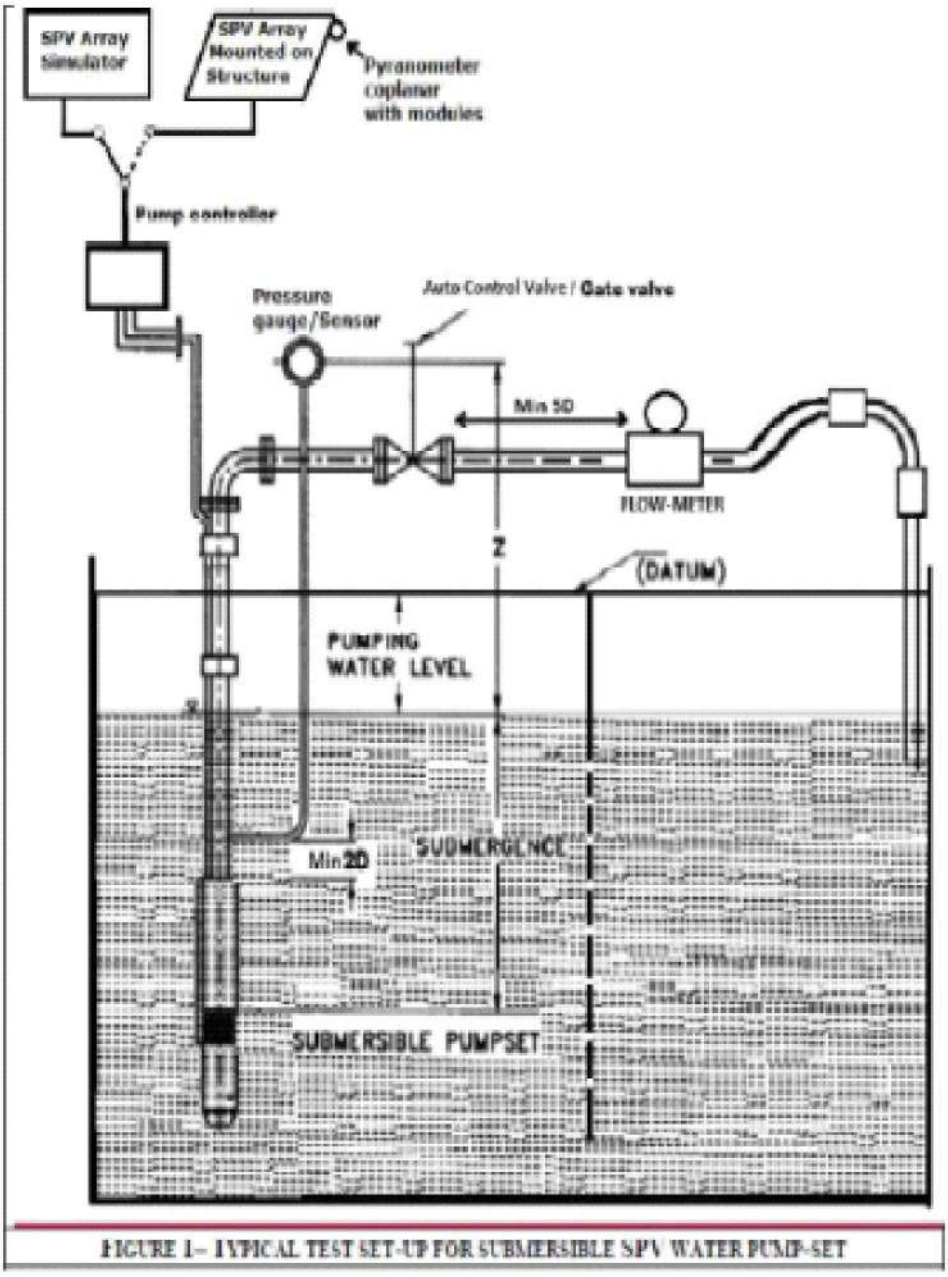

FIGURE 1– TYPICAL TEST SET-UP FOR SUBMERSIBLE SPV WATER PUMP-SET

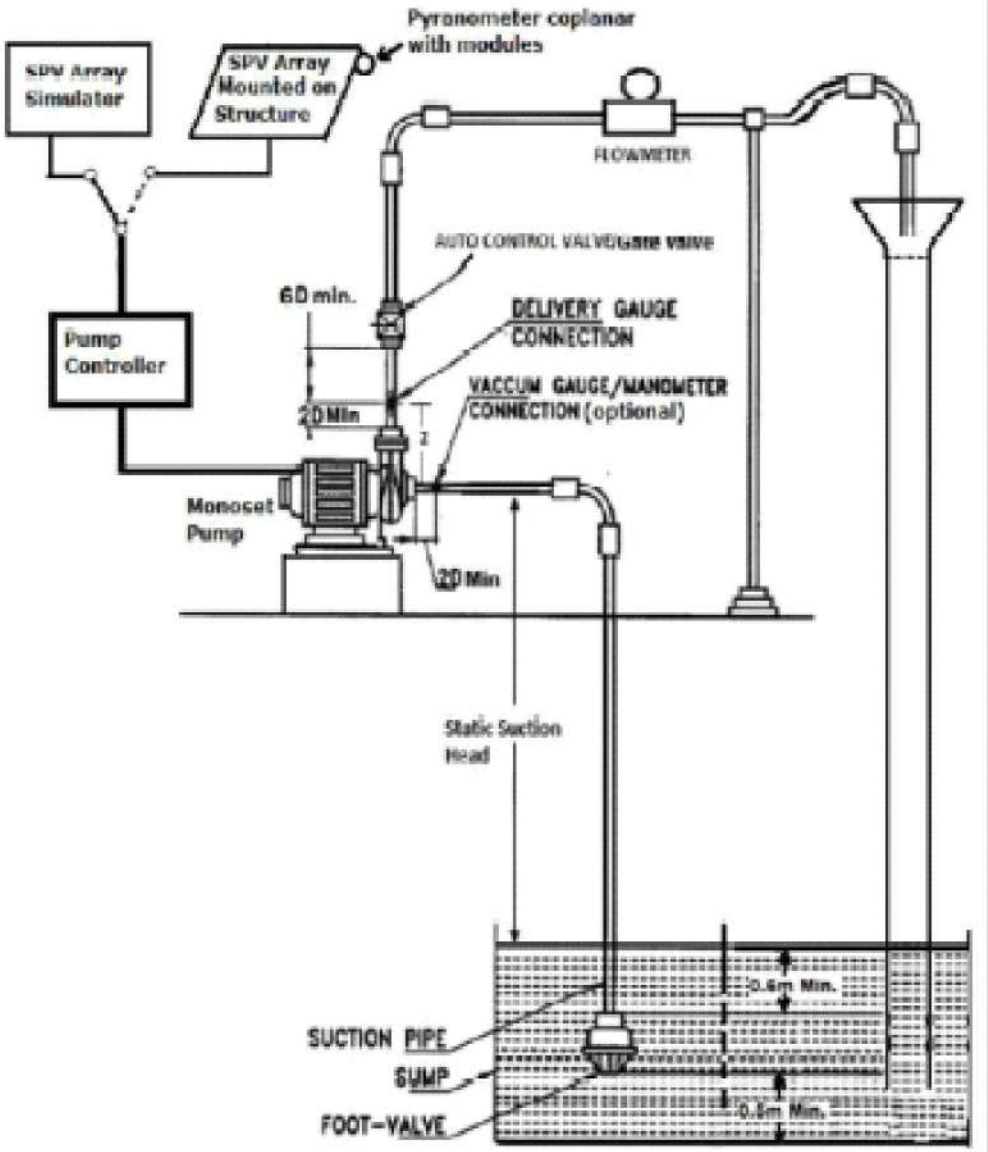

FIGURE 2 – TYPICAL TEST SET-UP FOR SPV SURFACE/MONO-BLOCK WATER PUMP SET

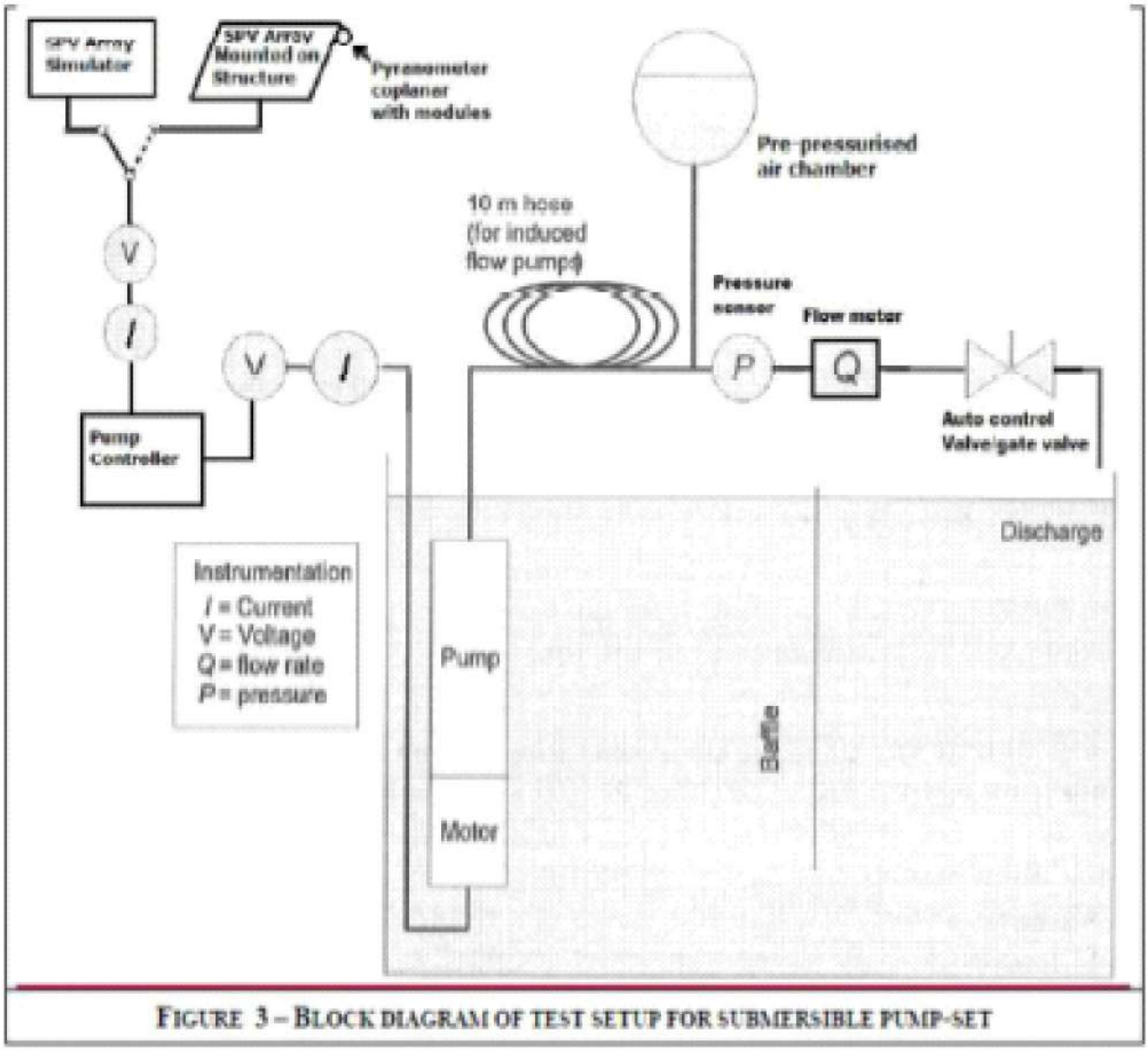

FIGURE 3 – BLOCK DIAGRAM OF TEST SETUP FOR SUBMERSIBLE PUMP-SET

5.0 Test Procedure for Performance Evaluation of SPV Pumping System:
There are three major profiles to be completed for comprehensive certification and qualification of a sample SPV water pump as per this standard. Two steps correspond to two simulation profiles, Hot & Cold. The third step corresponds to actual outdoor conditions testing using natural sun radiation. The SPV water pump sample should attain or exceed the qualification bench marks set by MNRE for the specified model & design, in all the three profiles. Before executing the three profiles testing, it is necessary to conduct the following protections test on the sample:

1. Dry running: System must shut down within one minute/manufacturer specification in dry running condition (when water level goes below pump inlet).
2. Open circuit: System should not operate if any phase become open circuited, the controller shall be tripped within one minute/manufacturer specified time.
3. Short circuit: System should not operate if any two or all three phase short circuited.
4. Reverse polarity: System should not malfunction if polarity of input power is reverse.

The performance testing of SPV Pumping System for the three procedures are discussed in following sections:

5.1 Simulator Methods:

Simulation methods are the easiest and fastest way of estimating SPV pump performance. However, in these methods actual PV array is not used, instead a PV array simulator is used. Here, a Programmable SPV array simulator capable of generating power output equal to actual SPV array under the given radiation and temperature conditions for given SPV array configuration (i.e. the number of modules, the type and the series / parallel combination) will be used. Although any radiation & temperature can be created, for the purpose of testing, two conditions one Hot summer day conditions (hot profile) and the other Winter day conditions (cold profile) shall be used.

Hot & Cold Profiles:

The typical Hot & Cold day profiles are shown Figure 4. These profiles of full day Solar irradiance and temperature shall be loaded in PV array simulator, sequentially one after the other. The simulator output is connected to the motor & pump through the pump controller and the profiles are run on real time basis. The performance parameters as given in table 2 are collected every minute for the entire duration of run time (per day). The total water output and output in liters /watt STC/ day can be estimated at desired constant head / dynamic head for complete duration of profiles

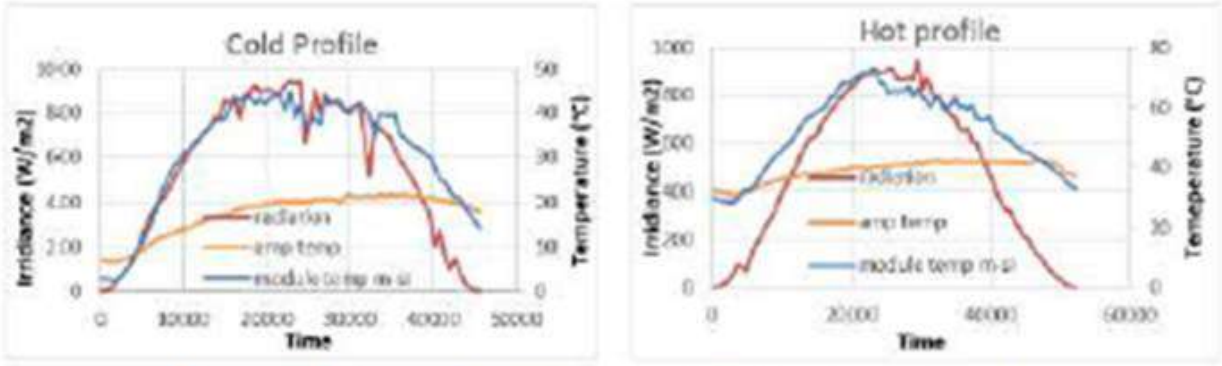

FIGURE 4 – TYPICAL SOLAR RADIATION HOT AND COLD PROFILE

Note: Per second data for hot and cold profile may be downloaded from MNRE/NISE website

5.2 Outdoor Condition using sun radiation:

To operate the motor-pump set using actual PV array, an array as per the Motor-pump set HP capacity to be designed. The STC wattage of all the PV modules is measured first, as per IEC 60904-1/ IS 12762-1 or clause number 11.6 of IEC 61215/ clause number 10.6 IS1 4286. . The modules will then be installed on the structures, both in series and parallel combinations, as required, are connected and designed PV module array is created. The array output is connected to Motor & Pump through pump controller. Then using a PV Array tester measure the PV array output and different radiation intensities starting 100W/ m2 up to 1000 W/m2 (if possible), if 1000W/ m2 is not reached, calculate maximum power output at the maximum sun radiation that can be achieved (say 900 or 800w/ m2). Always measure & record the instantaneous water flow rate at each of the radiation levels, against the PV array output power. A Table listing three parameters sun radiation, array Wattage output and water flow rate at each power output to be recorded. This data is most useful and will be used is subsequent calculations. This data can also be compared with data supplied by manufacturer.

Per day water output test to be performed at desired constant dynamic head for complete day from dawn to dusk (sunrise to sunset). Irradiance shall be measured at coplanar to modules. Tracking may be done manually or automatically. Total flow shall be corrected at reference Average Daily Solar Radiation of 7.15 kWh/m2 on the surface of SPV array (i.e. coplanar with the SPV Modules). Results of the SPV pumping system obtained under outdoor condition shall be compared with data supplied by the

applicant and also from the results obtained through simulator testing to assess the performance of the system.

NOTE:-

- Handle PV modules carefully during installation.
- PV modules to be free from dirt (sand, bird droppings etc.,) during test.
- Install PV modules in shadow free access controlled area.
- Tracking shall be minimum three time in a day for maximum performance
- Pyrono-meter should be mounted co-planer with SPV modules.

Recoding, measurement & logging of flow for the period of hot profile, cold Profile and Realistic condition need to be done.

5.3 Remote Monitoring System Verification

Provision for remote monitoring of the installed pumps must be made in the controllers through an integral arrangement and it should be capable of providing live status/parameters through online portal.

6 MEASUREMENTS AND APPARATUS

6.1 Solar Radiation Measurement

Solar radiation at coplanar with Module surface shall be measured using pyranometer. Response time of pyranometer should not be more than 15 seconds. Interval between two readings should not be more than one minute for the calculation of average daily solar radiation.

6.2 Measurement of Head

6.2.1 *Delivery Head*

Digital pressure gauge/sensor shall be used, also a data logging system must be used for calculation of average head through day. Interval between two readings should not be more than one minutes for the calculation of average head. Accuracy for pressure sensor shall be within ± 0.5 percent.

6.2.2 *Suction Head*

Suction head shall be kept constant by mean of vertical distance from sump water level to centre of pump impeller. Correction in head shall be applied as per atmospheric pressure at the testing place. Distance measuring scale or laser based sensors may also be used for suction head measurement. For reference a vacuum gauge/absolute pressure gauge/manometer may also be used, if used, then shall be of suitable range for measuring suction head and delivery heads. Instead of mounting gauges directly on the pipes, they may be placed on separate stand.

6.3 Measurement of Rate of Flow

A good quality Magnetic flow-meter is desirable for flow measurement, data logging system must be used for calculation of cumulative water volume throughout the day. The maximum flow rate of flowmeters should be at least 1.5 times the maximum flow rate of pumps. Instrument can be selected as per 3.2 of IS 11346. Interval between two readings should not be more than one minutes for the calculation of cumulative flow. Accuracy for flowmeters shall be within ± 0.5 percent.

7 CALIBRATION OF APPARATUS

All measuring instruments are to be calibrated periodically as per requirement.

8 STEP-WISE TEST PROCEDURE

8.1 Per Day Water Flow Test of Submersible Pumps

a) Install the Pump-set as per Figure 1.
b) Connect Pump-set with controller as per manufacturer instruction
c) Use Solar PV Array Simulator Or actual output from SPV array, for testing of pump-set at given profile.
d) Connect controller with PV array Simulator or with actual SPV array output as per requirement of profile
e) Input STC performance data of each module in the array, into simulator and invoke the desired profile and run the same.

f) For realistic condition test, make array by mounting all SPV modules on structure(s) by connecting modules in series or parallel as per requirement.
g) Start controller after connecting it with array or array simulator.
h) Use head control valve or pre-pressurize tank to keep constant desired dynamic head.
j) Record parameters as given in table 2 recording interval shall be ≤ 1 minute.

8.2 Per Day Water Flow Test of Surface Pumps

a) Install pumps as per Figure 2
b) Maintain height to get desirable static suction head as per requirement
c) Install of foot valve or non-return valve as per manufacturer instructions;
and d) Follow steps (b) to (j) of para No. 8.1

9. OBSERVATIONS

The following observations of complete day profile shall be recorded in a test record sheet. These observations shall be used to derive pump characteristics:
a) Instantaneous Solar irradiation (W/m2), pyranometer reading
b) Delivery gauge/sensor readings
c) Suction gauge/sensor readings / Distance between water level to impeller eye, if applicable)
d) Gauge distance correction factor, Z
e) Calculate cumulative daily solar radiation coplanar with solar modules
(kWh/m2), f) Calculate total water discharge in a day at desirable constant head
(Liters per Day) g) Water output per day per watts peak (Liters/Wp)

10 COMPUTATION OF TEST READINGS

10.1 Computation of Total Head for Surface (Mono-set) Pumps

Total Head H = HSSL + Hd + Z + $((Vd^2 – V^2) / 2g)$
HSSL = Total Static suction Lift in meters of water column (measured by calibrated measuring tape or any distance measuring sensors)
Hd = Delivery gauge/sensor reading in meters of water column
Z = Gauge distance correction factor for delivery gauge centre and inlet pipe centre in meters (refer figure 3). If the delivery gauge centre is below the inlet pipe centre, Z is subtracted from the delivery gauge reading and if the delivery gauge centre is above inlet pipe centre, Z is added to the delivery gauge reading; the gauge distance correction factor shall never be applied to the suction vacuum gauge or mercury manometer reading irrespective of their positions:
Vd = Velocity at delivery gauge/sensor connection, m/s;
Vs = Velocity at suction gauge/sensor connection, m/s; and g = Acceleration due to gravity in m/s2.

The Total Static Suction Lift in surface pump (HSSL)

HSSL = Height in meter from water level to impeller + Altitude correction in meter + water temperature correction in meter.

10.1.1 Correction for Altitude

Barometric pressure shall be recorded at test place. The difference between atmospheric pressure at the test place and 10.33 mWC (that is atmospheric pressure at MSL) shall be deducted from Static suction lift.

10.1.2 Correction for Water temperature

Static suction lift specified in below Table shall be increased or reduced as given below when water temperature is below or above 33°C.

Hourly Average of Water Temperature	Vapour Pressure mWC	Correction in Static suction lift above and below 33°C water temperature mWC
10	0.13	+0.39
15	0.18	+0.34
20	0.24	+0.28

25	0.33	+0.19
30	0.43	+0.09
33	0.52	0.00
35	0.58	-0.06
40	0.76	-0.24
45	1.00	-0.48
50	1.28	-0.76

Suction head shall be adjusted minimum 3 time in a day as per average water temperature and barometric pressure, by adjusting water level of tank.
Following formula can also be used on behalf of
table 4 $y = -0.0007 x^2 + 0.0130 x + 0.3079$
Where y = Correction in Static suction lift x = Average of water temperature.

10.2 Computation of Total Head for Submersible Pump-sets
Total head $H = Hd + Z + ((Vd^2) / 2g)$
Where:
Hd = Delivery gauge/sensor reading in meters of water column;
Z = Gauge distance correction factor for delivery gauge. Distance between gauge/sensor center to tank water level (refer figure 1).
Vd = Velocity at delivery gauge/sensor connection in m/s;
g = Acceleration due to gravity in m/s2.

10.3 Total Water Per-Day
Total per day water output shall be calculated by Integration (Sum) of flow rate with respect to time. Integration shall start from the time when pump set achieve desired constant head in morning time (start point refer figure 5) and end at the time when pump set unable to achieve desired constant head in evening time (End point refer figure 5).

In case if Average Daily Solar Radiation found less than requirement then test shall be performed on next sunny day.

10.4 Water Output Per Day Per Watt Peak
Water output per day per watts peak (ltr/Wp) = Water output (Liters) per day at specified head / Array STC power in watts-peak

10.5 Cumulative Daily Solar Radiation
Cumulative Solar Radiation (kWh/m2) in a day= Average of instantaneous irradiance reading from Dawn to Dusk (kW/m2) X period of time in hours.
This can be obtained through time weight summation of pyranometer readings. Dawn = Time of sunrise when irradiance become positive from zero value.
Dusk = Time of sunset when irradiance become zero from positive value.

10.6 Mismatch in maximum power at STC among modules of array
The mismatch shall be calculated as under:

%Power mismatch in array = $(P_{Max}-P_{Min})/(P_{Max}+P_{Min}) \times 100$

PMax = Maximum power among modules in array
PMin = Minimum power among modules in array

10.7 Efficiency of Array
Efficiency of Array = The power output from array / (total area of modules in m^2 X Sun radiation in watts/ m^2)

10.8 Fill Factor of Array
Fill factor of Array = This has to be measured using a PV array tester. This depends on the overall series resistances and shunt resistances of modules in the array.

10.9 Output Voltage of Array
Output Voltage of Array = Sum of voltages of modules in series
In parallel connected module strings, the lowest voltage generating strings will set the voltage.

10.10 Output Current of Array
Output Current of an Array = Sum of currents of the parallel strings in the array. The output current of a string is controlled by the lowest current generating module.

10.11 Output Power of Array
Output Power of Array = Sum of power of all modules- mismatch loss
This can be measured by PV array tester.

11 EXAMPLES:

11.1 Total per day flow

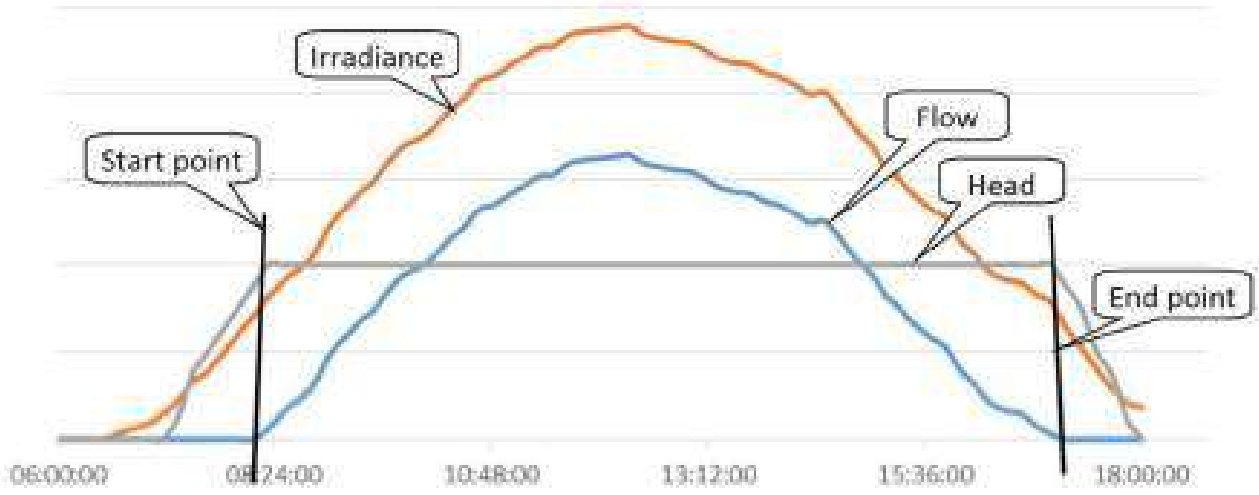

FIGURE 5- TYPICAL GRAPH FOR UNDERSTANDING CALCULATION

If pump achieved constant head at 8:15:30 AM (Start point in figure 5) and in evening pump unable to keep constant desired head at 17:45:30 PM (End point in figure 5).

Flow rate in lps is recorded from 08:15:30 AM to 17:45:30 PM (start point to end point) If the average lps calculated is 3.55 lps then total flow will be

Total duration of flow = End Time - Start time
= 17:45:30 – 8:15:30
= 9 h: 30 m : 0 s
Total duration from start to end seconds:
= (9x3600) + (30x60) + (0x1) = 34200 seconds

Total per day flow in liters = Average flow in lps x total seconds
= 3.55 x 34200 = 121410 liters
For realistic test, correct total flow at reference Average Daily Solar Radiation as specified in MNRE specifications.

12 TEST REPORTS
In order to have uniformity, the test reports issued by the Labs shall use common format developed by NISE. The test report shall be issued only in the name of applicant and shall clearly indicate whether the Solar PV water pumping system qualifies as per MNRE specifications or not along with details. A soft copy of test report shall also be provided to the applicant and shall be made available on web-portal of test lab, which may be accessed by the implementing agencies to verify the authenticity of the report. Test Reports of SPWPS are to be submitted as per MNRE technical specifications and testing procedures issued in 2019 and its subsequent amendment(s) if any.

13 LABS AUTHORISED FOR SOLAR PUMP TESTING
The National Institute of Solar Energy or and any other lab accredited by NABL for testing of solar PV water pumping system as per MNRE specifications and testing procedure are authorized to issue approval certificate on successful testing of a solar PV water pumping system.

LIST OF REFERRED STANDARDS

IS NO.	*Title*
14286 : 2010	Crystalline Silicon Terrestrial Photovoltaic (PV) Modules — Design Qualification and Type Approval
3043:1987	Code of Practice for Earthing
5120:1977	Technical requirements for rotodynamic special purpose pumps (First revision)
11346:2003	Tests for Agricultural and Water Supply Pumps - Code of Acceptance
6603:2001	Stainless Steel Bars and Flats
6911:2017	Stainless steel plate, sheet and strip Stainless steel plate, sheet and strip
7538:1996	Three-phase squirrel cage induction motors for centrifugal pumps for agricultural applications
8034:2002	Submersible pump sets - Specification (second revision)
9079:2002	Electric monoset pumps for clear, cold water for agricultural and water supply purposes - Specification (second revision)
9283:2013	Motors for submersible pump sets
11346:2002	Code of acceptance tests for agricultural and water supply pumps (first revision)
14220:1994	Open well submersible pump sets - Specification
14582:1998	Single-phase small AC electric motors for centrifugal pumps for agricultural applications
ISO 9905:1994	Technical specifications for centrifugal pumps -- Class I
IEC 60068-2-6:2007	Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)
IEC 60068-2-30:2005	Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 + 12h cycle)
IEC 60146-1-1:2009	Semiconductor converters - General requirements and line commutated converters - Part 1-1: Specification of basic requirements
IEC 60364-4-41:2005	Low-voltage electrical installations - Part 4-41: Protection for safety – Protection against electric shock
IEC 60364-7-712:2017	Low voltage electrical installations - Part 7-712: Requirements for special installations or locations - Solar photovoltaic (PV) power supply systems

IEC 60529:1989	Degrees of protection provided by enclosures (IP Code)
IEC 60947-1:2007	Low-voltage switchgear and control gear - Part 1: General rules
IEC 61000-6-2:2016	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards – Immunity standard for industrial environments
IEC 61000-6-3:2006	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards –Emission standard for residential, commercial and light-industrial environments
IS/IEC 61683 :1999	Photovoltaic Systems — Power Conditioners — Procedure for Measuring Efficiency
IS/IEC 61730-1 : 2004	Photovoltaic (Photo Voltaic (PV)) Module Safety Qualification Part 1 Requirements for Construction
IS/IEC 61730-2 : 2004	Photovoltaic (Photo Voltaic (PV)) Module Safety Qualification Part 2 Requirements for Testing
IEC 61800-3:2017	Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods
IEC 62109-1:2010	Safety of power converters for use in photovoltaic power systems - Part 1: General requirements
IEC 62305-3:2010	Protection against lightning - Part 3: Physical damage to structures and life hazard
IEC 62458:2010	Sound system equipment – Electro-acoustical transducers – Measurement of large signal parameters

Universal Solar Pump Controller (USPC) Specifications for Stand-alone applications

1.Preamble:

The Controller for Solar PV pumping system is the heart and brain of the system. The Solar PV pumping system deployed at huge cost to the farmer and the exchequer for the Government is currently utilised only for half of the days in a year (around 150 days per year) on an average. It's upto the farmer's choice whether he/she would like to buy USPC or not. The payment for USPC will be done by CEL in the same way after getting the payment from the customer how the payment will be done for a system without USPC. Farmer will pay to Implementing Agency for his/her contribution.

In order to optimally utilize the solar photovoltaic system that generates the electricity throughout the year during sunshine hours, the controller supplied for installation of solar pumping system should be able to perform several other tasks for agricultural and other needs of a farmer. This will increase the productivity of agriculture sector and income of farmer. With the use of USPC the solar system could be used effectively throughout the year.

2. Technical Specification for Stand Alone Application

The USPC with SPV modules and structure can be used for agrarian applications such as water pumping, apple grading and polishing system, wheat (grain) flour grinding machine / aata chakki, cutter/chaff, deep-fridger / cold storage, blower fan for cleaning of grains, heating loads and any other standard voltage (400/415V) three phase motor/equipment of capacity not more than the capacity of Solar PV pumping system.

The USPC operation schematic diagram is shown in Fig. 1. Further, the applications are not limited upto the few shown in the figure.

I. Following table gives specifications of electrical supply from USPC for motors other than the solar pumps. For operating the pump the USPC must follow the MNRE specifications for SPV pumping systems.

Sr No.	Description	Desired requirement
1	Motor Supply Phases	Three phase R-Y-B
2	Rated motor frequency	48-50Hz
3	Frequency operation	0 to 52Hz
4	Rated motor voltage	415V ± 5%
5	Desired motor operation	Constant V by F or constant motor flux control

II. Proposed electrical properties of USPC when operating motors other than motor-pump set:

Sr No.	Description	Desired requirement
1	Characteristic of voltages	Pure sinusoidal or Filtered AC output voltage at motor terminal. No PWM pulses allowed at the motor terminal, as it generates pronounced voltage spikes. The USPC output is intended to use for the traditional induction motors based applications which are design for sinusoidal grid supply.
2	THD of motor terminal voltages	Below 3%
3	THD of motor current (in case of balance/linear motor)	Below 5%
4	Balance supply	Three phases should be balanced and no negative sequence components to be allowed
5	Voltage spikes	Recurring or non-recurring voltage spikes more than 620V (peak of 440V AC supply) is not allowed between any two terminals
6	Alarms and Protections	Output voltage low, Output frequency low/high, Low irradiance/PV power, Current overload, Peak Torque overload

III. Controller should be able to run SPV pumping system as per MNRE specifications as well as any other type of motor of suitable rating, subject to the load characteristics of the equipment in which the motor is used is any of the following:

a) Constant torque loads
b) Constant power loads
c) Quadratic loads

d) Impact loads
e) Hydraulic loads

Subject to the maximum torque being not more than 150% of the rated torque of the motor.

IV. To ensure energy efficiency of solar PV system and to maintain reliability of PV installation against aging effect, module mismatch with time, partial shading, etc. , the desired USPC properties and configuration should be as follows:

(a) Static MPPT efficiency of USPC should be equal or more than 98% during operation of 10 to 100% of rated STC PV power, and average MPPT tracking efficiency in the dynamic condition should be greater than 97 % with hot and cold profiles when feeding the water pumping, hydraulic or heating loads, so as to maintain MPPT irrespective of variation in solar energy or irradiance. `
(b) USPC efficiency should be as follows for the operation at 80% rated STC power of the PV array:

Sr No.	SPV pumping system capacity	Controller power efficiency should be more than or equal to
1	3 HP	93.00%
2	5 HP	93.00%
3	7.5 HP	94.00%
4	10 HP	94.50%
5	15 HP	94.50%

(c) Considering voltage variation over the year due to variation in temperature, irradiance and effect due to ageing, environmental damages to PV panels with time, USPC should have MPPT channels as an integral part of system (or externally connected part) with wide range of input PV voltage for MPPT tracking of the PV panels. Input voltage range variation should be tested as per manufacturer declaration (min, nominal or 90% of the maximum) or if no declaration is made than at least it should be tested as per the table given below.

Sr No.	Motor Pump set capacity	Input voltage range		
		Minimum	Nominal	Maximum
1	3 HP	(Vnominal-50)	Nominal	(Vnominal+50)
2	5 HP	(Vnominal-70)		(Vnominal+70)
3	7.5 HP	(Vnominal-70)		(Vnominal+70)
4	10 HP	(Vnominal-100)		(Vnominal+100)
5	15 HP	(Vnominal-100)		(Vnominal+100)

V. There should be Mode selection located on control panel of the USPC along with display and user should be able to select either to run motor-pump set of any other application. The software/firmware required to operate these applications must get automatically loaded when an appropriate position of the switch is engaged.

VI. USPC must have at least four numbers of three phase output cables to feed power to the applications. The output power cable for specific application should get selected automatically upon selection of applications via keypad or via mobile or via remote control connectivity. The manual selector switch should not be used at the output to manage different loads. This is to ensure the hassle

free operation of applications by farmer with adequate safety.

VII. USPC based Solar system must be equipped with Remote monitoring and remote fault identification:
(a) Remote monitoring features should be integral part of solar pump controller and should provide time wise remote monitoring of PV voltage, PV Power, Water output, head, when used in solar pump mode. When operated in farm equipment mode, it should show, PV voltage, PV power, motor voltage, motor current and motor frequency.
(b) Cumulative energy generation from PV panels for a month, year and 5 years should be provided.
(c) Remote monitor should show current status of system like On, Off and fault.
(d) Software associated with remote monitoring should also provide location of SPV pumping system.
(e) Controller should have support of sufficient Internal memory/ SD card / memory card to support remote monitoring in case of network failure.
USPC must have IP65 protection or must be housed in a cabinet having at least IP65 protection.

Testing Procedure for Universal Solar Pump Controller (USPC)
USPC must be tested in two principle modes:
1. As an offgrid solar pump controller: the testing should be as per MNRE specifications and Test procedure.
2. As a controller to operate motorized farm equipment: The testing should be as described below.
To test the USPC in the second mode the test centres must have standard actual mode suitable for 4 loading modes. The input to the USPC must be from a solar PV simulator using the hot and cold profiles issued by MNRE. Following tests may be performed on USPC driving the agrarian load like Atta Chakki, Chaff Cutter and Deep Freezer under test. The USPC must be able to operate these motors of the attached agrarian load, so that they deliver the rated torque and are able to also operate till 150% of the rated torque for 30 seconds.

S.No.	Test Performed	Expected result	Test Lab Observation	Remarks
1	Application description on screen and selection of applications	LCD screen provided on controller need to shows various applications which can be selected by keypad using up-down and enter key		
3	Mode operation of applications (Automatic: through keypad or remote / Manual: control switches)	Universal Solar Agriculture controller should come with multiple outputs which can be permanently connected to the application by selecting appropriate options for example following applications should automatically started by USPC by appropriate mean such as keypad or remote for selection. (i) Water Pumping (ii) Chaff Cutter (iii) Deep fridge/ Cold Storage (iv) Atta Chakki Manual changeover is not allowed.		
4	Application Specific output (Application specific software)	USPC should have inbuilt individual application specific software to run the agrarian applications other than pumps and output of the controller should be suitable for above mentioned applications	-	

5	Input PV voltage range Minimum – Voc at STC Nominal – Voc at STC Maximum – Voc at STC			
6	USPC Efficiency measurement in Hot and cold profile should be measured as per BS EN 50530/IEC 62891	**Efficiency of the UPSC at minimum..... VOC**		
		Load %	**Charge controller eff (%)**	**Power tracking Efficiency (%)**	**Overall charge controller efficiency (%)**
		10			
		25			
		50			
		75			
		100			
		Efficiency of the UPSC at Nominal ..... VOC			
		10			
		25			
		50			
		75			
		100			
		Efficiency of the UPSC at 90 % of Max ..... VOC			
		10			
		25			
		50			
		75			
		100			
		Dynamic MPPT Efficiency			
		Hot Profile			
		Cold Profile			
7	Ripple and distortion at output on full load	Should below 5 % after 25 % loading condition			
8	Measurement of Output voltage waveform	Three phase output with up to 440 V rms pure Sine Wave to be measured at least 4 times between 300W/m2 irradiance and maximum irradiance as per the irradiance profile.		CF value should be provided by lab for voltage and current	

9	Operation at different output from array with all four load types (Array wattage as per MNRE model:	Above ..... Watt DC output Should not stop functioning at any load condition. Observation should be recorded.	Power value should be recorded by the lab with all agrarian load	Motor current should be recorded (for torque behavior) It must be almost constant
	Example 4800 Wp array) At 40% Power At 50% Power At 75% Power At 100% Power		supported by USPC	irrespective of available DC power from array (motor running condition). This is for Impact loading condition (such as Chaff cutter) current variation need to be recorded by laboratory.
10	Operation at different output from array with all four load types (Array wattage as MNRE model: Example 4800 Wp array) At 10 % Power At 25 % Power At 30 % Power	USPC need to run all the agrarian load in variable frequency at the lower irradiance value The load may be increased beyond 150% of rated torque to determine at what level the motor is stalling and stopping and it must trigger 'torque overload' alert. If it goes beyond 150% of the motor rated torque the USPC must trip indicating an 'overload tripping'.	Motor current should be recorded (for torque behavior) as it is a function of V/F ratio controlled by USPC	
11	Total circuit protection observation	- Soft Startup, - low radiation protection, - overload protection, - Open circuit protection - Reverse polarity protection		

Expected output of individual applications must be specify as per their power rating and SPV capacity, such as:

1. kg/hour grinding of atta chakki, and granularity.
2. Volumetric Iceing of cold storage in x hours.
3. Output in terms of kg/hours for a specific capacity grass-cutter.
4. Output must be quantify in terms of rate of volume or weight as above for any other applications.

The National Institute of Solar Energy and any other lab accredited by NABL for testing of solar PV water pumping system as per latest MNRE specifications and testing procedure are authorized to issue approval certificate on successful testing of a solar PV water pumping system

Following test labs may also conduct testing of USPC as per procedure prescribed above and issue testing certificates:
1. Central Power Research Institute (CPRI)
2. UL India Pvt. Ltd.
3. National Institute of Solar Energy (NISE)

Requirements of Remote Monitoring System

1. State Implementing Agency (SIA) will have a common SWPS (Solar Water Pumping System) Management platform for monitoring of operation and performance of SWPS installed under PM KUSUM Scheme.

2. Remote Monitoring System (RMS) of SWPS should have following minimum features or modules:

a. Solar System Performance: DC Voltage, DC current, AC output Current, Power, Drive frequency, Energy, etc.
b. Pump Performance: Running Hours, Water Discharge (Output), etc.
c. RMS Performance: %Device Connectivity, %Data Availability, etc.
d. Geo Location: Real time latitude and longitude should be captured
e. Events and Notifications: Faults related to Pump Operation, Solar generation, Controller/Drive faults like overload, dry run, short circuit, etc.
f. Consumer Management: Name, Agriculture details, Service No. Contact Details, etc.
g. Asset Management: Ratings, Serial Number, Make, Model Number of Pump, Panel and Controller, Geo Location, IMEI number (of communication module) and ICCID (of SIM).
h. Complaint and Ticket Management

i. Consumer Mobile Application: Generation, Running Hours, Water Discharge, Complaint logging, etc.
3. RMS provided by all bidder's should connect to State Level Solar Energy Data Management platform, which will have interface with National Level Solar Energy Data Management platform. - As mentioned in above point, SIA will provide server infrastructure as well as software. SIA will maintain the same. All vendors should provide SIM card of suitable ISP having maximum Signal Strength in the respective location of SWPS and ensure connectivity as well as pushing of data to centralized platform as mentioned in specifications.
4. Communication Architecture should be as per following:
a. Communication Connectivity:

i. Pump Controller Connectivity: Communication between RMS and Pump Controller should be on UART/RS485 MODBUS RTU protocol to ensure interoperability irrespective of make and manufacturer

ii. Remote Connectivity: RMS of SWPS should be using GSM/GPRS/2G/3G/4G cellular connectivity

iii. Local Connectivity: Ethernet/Bluetooth/Wi-Fi connectivity to configure parameters, notifications, communication interval, set points etc. or to retrieve locally stored data

iv. Sensor Connectivity: RMS should have provision for at least two Analog/Digital inputs with 0.1% accuracy to address the requirement of local sensors connectivity if required by SIA/Consumer for applications such as irradiation, flow meter for water discharge, moisture sensor for micro irrigation, etc. Analog/digital sensor inputs will be required for integration of flow meter for water discharge, moisture sensor for micro irrigation, level sensor for overhead tank water storage etc. Only provision for Analog/digital inputs with 0.1% accuracy of Full Scale Range is required.

v. RMS should have provision to give remote On/Off command to pump through farmer mobile app.

b. Communication Modes:
i. Push Data on Event/Notification: such as pump on, pump off, protection operated, etc.
ii. Push Data Periodically: important parameters of solar pump (as mentioned above) should be pushed to central server on configurable interval.
Interval should be configurable for 60 sec or less.

iii. Command On Demand : It should be possible to send commands via GSM or GPRS to RMS either to control pump operations or to update configuration

c. Communication Protocol: RMS should provide data on MQTT protocol to establish communication with thousands of systems.

d. Security:

i. Communication between RMS and Server should be secured and encrypted using TLS/SSL/X.509 certificate etc.

ii. As a part of IoT protocol, Authentication and Authorization should be implemented using token/password mechanism

e. Message Format: RMS should provide data in a JSON message format as required by respective SNA

f. Data Storage: In case of unavailability of cellular network, RMS should store data locally and on availability of network it should push data to central Server. Local data storage should be possible for at least five years in case of unavailability of cellular network.

g. Firmware Over-The-Air: RMUs should have Firmware Over-The-Air (FOTA) feature. Through FOTA one should be able to update – Display, Data logging interval, IP of the server, APN, Data logging parameters etc. Software updating should be possible with 2G and even without the presence of SD card. Software updating process and/or failure to update software shouldn't disrupt pumping operations

SPECIAL CONDITIONS OF CONTRACT

TERMS OF PAYMENT: CEL generally follows project based accounting methodology and the payment shall be made on pro-rata basis as per availability of funds under the project at CEL discretion.

Payments terms are as:

"Stage I: - 90% of the Supply and Installation value as per rate contract of month-wise nos. of SPWPS installed at site and 100% applicable taxes
there upon based on:

 Submission of detailed work plan (Project Execution plan) with timeline for the lot supplied duly approved by SNA's representative/CEL representative;

 Submission of evidence in hard copy regarding completion of installation of SPWPS in good condition at site, duly verified and acknowledged by EIC, CEL,SNA and Farmer.

 All the relevant Warranty and quality (performance test reports) of the lot to be submitted.

Submission of Contract Performance Guarantee (CPG) as per relevant CPG clause
Submission of original supply Invoices/Bills duly verified/certified by EIC,CEL.
Submission of report supported with labelled photograph on completion of village community training, awareness/ sensitization, capacity building measures undertaken and development of entrepreneurship etc. in each village with relevant photographs

Submission of installation report as per prescribed format of SNA.
Operation and Maintenance manual to be provided to each beneficiaries on behalf of CEL. A proof of same has to be submitted in CEL.
Submission of handing over certificates of solar photovoltaic water pumping system signed by Farmer and duly certified by SNA's representative & CEL representative;
 Performance report for 1 day after commissioning based on data received has from remote monitoring system or data logger in cases, where internet services are not available
 An undertaking shall need to be submitted by the Contractor certifying that the civil work will withstand the wind speed of 150 km/hr in all weather conditions

Stage II: - Balance 10% of supply and installation value as per rate contract on completion of one month from the date of completion certificate
Note: -
Ø CEL has the right to seek any additional documents / information / certification it deems fit prior to the release of any payment relevant to the SPWPS.
Ø Payment will be made to the bidder after submission of Invoice complete in all respect i.e. with all the required documents and compliance of relevant terms & conditions of PO duly accepted & certified by EIC, SNA/EIC,CEL
Ø If the invoice is incomplete in any respect or if there is any non-compliance with relevant Terms & Conditions of PO, payment due date shall start from the date of submission of all necessary documents provided relevant terms & conditions of PO have been fulfilled.

Submission of installation report as per prescribed format of CEL/SNA. Submission of report supported with labelled photograph on completion of village community training, awareness/ sensitization, capacity building measures undertaken and development of entrepreneurship etc. in each village with relevant photographs and videos; Operation and Maintenance manual to be provided to each beneficiaries, CEL and should submit the same with SNA on behalf of CEL. A proof of the same to be submitted along with the documents.

In case total supply of SPWPS is less than 100 no.s then the actual quantity of supply shall be considered for release of payment.

In case last lot of supply of SPWPS is less than 100 no.s then the actual quantity of supply in last lot shall be considered for release of payment.

Note: -
 CEL has the right to seek any additional documents / information / certification it deems fit prior to the release of any payment.
 Weekly as well as consolidated quarterly reports to SNA & CEL are expected to be submitted by the bidder.
 Payment will be made to the bidder after submission of Invoice complete in all respect i.e. with all the required documents and compliance of relevant terms & conditions of PO duly accepted & certified by EIC, SNA on behalf of CEL & EIC,CEL

If the invoice is incomplete in any respect or if there is any non-compliance with relevant Terms & Conditions of PO, payment due date shall start from the date of submission of all necessary

documents provided relevant terms & conditions of PO have been fulfilled."

Stage-III : Payment for O&M shall be released @20 % per year (on yearly basis)of the O&M prices within 45 days from the date of successful completion of O&M of respective year and submission of requisite documents including certificate/ acknowledgement of satisfactory working from beneficiary/ SNA.

PROCESS FOR RAISING INVOICE/BILL: -

The successful Bidder's request (s) for release of payment shall be made to the Engineer-In-Charge in writing, upon fulfillment of required obligations stipulated in the contract.

The successful Bidder shall submit the invoice in triplicate showing description, quantity, Unit rate and total amount with all supporting documents as per terms of the Contract. After due verification by Engineer-In-Charge, CEL shall process the verified Bill (s)/Invoice (s) for release of payment. In case successful Bidder fails to submit the Invoice/Bill with all the required documents, CEL reserves the right to hold the payment against such Bills/Invoices.

The successful Bidder shall be responsible for submitting all the requisite documents for processing the Bill (s)/Invoice (s). The successful Bidder shall submit the Bills/Invoices for the work executed showing separately, GST and any other statutory levies in the Bill (s)/Invoice (s).

Note: CEL has the right to seek any additional documents / information / certification it deems fit prior to be release of any installment.

3. Price Basis: To be quoted as Firm at FOR Destination Basis.

4. CONTRACT PERFORMANCE GUARANTEE

Selected bidders shall submit Contract Performance Guarantee as per Letter of Award (LoA) of CEL to vendor on back to back basis as per the following conditions:

"Bidder shall submit a bank guarantee (BG) of 10% of the amount equivalent to the 20% of the value of total allocation from SNA or 250 nos. of SPWPS of each capacity, whichever is lower, to CEL with the validity of 1 year to be rolled over every year for the first five years. However, if total number of SPWPS is more than 20% of the value of total state-wise allocation or 500 nos. in the first list of consent of beneficiaries in bidder's favor, bidder shall submit another CPG equivalent to differential value of order as per NTP.

Illustration:

For Madhya Pradesh bidder has submitted the CPG equivalent to the order value of 250 nos of SPWPS to Implementing Agency (as 20% of state allocation i.e, 20000 is equal to 4000 which is higher than 250). After getting a list of beneficiaries, bidder submits consent of 1500 beneficiaries in CEL favor from SNA. In this case, bidder shall also submit a CPG of 10% of the amount equivalent to the 1250 (1500-250) nos. of SPWPS in addition to the previously submitted CPG equivalent to the order value of 250 nos of SPWPS to respective Implementing Agency to get NTP.

In case, if consent of beneficiaries in bidder's favor on behalf of CEL is less than the value of submitted CPG, Implementing Agency shall return the original CPG within 15 days of receiving the new CPG equivalent to total awarded quantity to the bidder. However, such request for return of the CPG equivalent to unawarded capacity shall be considered only after 12 months of issuance of PO.

Illustration:

For any state, Bidder has submitted the CPG of 10% of the amount equivalent to the order value of 250 nos of SPWPS to Implementing Agency. However, in 12 months, bidder can only get 200 no.s of consent of beneficiaries in his favor. In this case, bidder can claim the return of CPG equivalent to the un-awarded capacity i.e, 50 (250-200) after submitting the CPG equivalent to the 10% of the amount of

awarded capacity i.e, 200 no.s of SPWPS. "

Any delay in submission of CPG shall be deemed as accruing of financial benefit to the supplier and CEL may take necessary interest penalty recovery action (interest @ SBI's MCLR + 2 %) from the payments due to the supplier for the period of delay. However, this provision does not bind CEL in any way from proceeding against the supplier (including cancellation of the PO, etc.) for non-compliance towards non-submission of the CPG.

In case bidder does not submit CPG, whenever payable, equivalent payment shall be retained by CEL during warranty period (5 years + 3 months claim period). In case Bidder provides CPG for shorter duration, it shall be for a minimum period of 3 (three) years + 3 (three) months claim period, which is to be further extended for further period till warranty period plus three months claim period and CEL reserves right to encash the CPG in case extended CPG/fresh CPG is not furnished by the bidders at least 60 days prior to expiry of original CPG. Bank guarantee (in CEL's format) shall be issued from any Nationalized Banks/other scheduled private banks. CEL shall at its own discretion have recourse to the said Bank Guarantee for the recovery of any or all amount due from the bidder in connection with the contract including guarantee obligations. CPG format may be requested from MMD, CEL through mail on mmd_spvm@outlook.com. Failure of the Successful Bidder to comply with the requirements of tender shall constitute sufficient grounds for the annulment of the purchase order and forfeiture of the Contract Performance Guarantee.

4. Warranty and Maintenance: As per Scope of work.

6. Successful bidder, on whom PO is placed, is to ensure all safety guidelines, rules and regulations, labor laws etc. Successful bidder indemnifies CEL/Customer for any accident, injury met by its labour, employee or any other person working for him. Any compensation sought by its labour, employee or any other person working for him shall be paid by successful bidder as per settlement solely. CEL/Customer has no role to play in this matter.

7. Successful bidder is to comply, and to procure that its sub-contractors (if any) comply, with international standards for the protection of the environment and labor laws, including the fundamental conventions of the International Labor Organization and the international environmental conventions, in accordance with the applicable laws and regulations of India.

8. Successful bidder is to submit interchangeability certificate for its product supplied for replacement during warranty and maintenance period and even when it is purchased from open market. In case due to change in technology, the supplied product is not available during warranty/ maintenance period than the improved version of product can be used in warranty/ maintenance period with same or improved technical parameters or the combination thereof after written communication of Engineer in Charge of SNA at same Cost & terms and conditions. Successful Bidder, on whom letter of award has been placed, has also to confirm that the price of improved version of product is not lesser than the original product or its parts in comparison.

9. The Bidder shall be deemed to have examined the Bid document, to have obtained his own information in all matters whatsoever that might affect carrying out the Works in line with the Scope of Work specified in the document at the offered rates and to have satisfied himself to the sufficiency of his Bid. The bidder shall be deemed to know the scope, nature and magnitude of the work and requirement of materials, equipment, tools and labour involved, wage structures and as to what all works he has to complete in accordance with the Bid documents irrespective of any defects, omissions or errors that may be found in the Bid documents. In case of non-performance of any bidder, work will be awarded to third party at the risk and cost of the existing bidder.

10. Insurance: The Goods (including SPV modules supplied under the Contract shall be fully insured in Indian Rupees against loss or damage incidental to manufacture or acquisition, transportation, storage and delivery. For delivery of goods at site, the insurance shall be obtained by the Contractor on behalf of CEL, for an amount as declared by CEL of all the goods (including SPV Modules) from "warehouse to warehouse" (final destinations) on "All Risks" basis including War risks and strikes. The Comprehensive insurance of Solar Photo Voltaic Water Pumping System (including SPV modules) on behalf of CEL for an amount declared by CEL shall be provided for natural calamities, theft & burglary etc. during 5 years warranty period and O&M.

11. Transportation, Demurrage Wharfage, Etc.
Contractor is required under the Contract to transport the Goods to place of destination defined as Site. Transport to such place of destination in India including insurance, as shall be specified in the Contract, shall be arranged by the Contractor, and the related cost shall be included in the Contract Price.

12. Subsequent to an order being placed against bidder's quotation, received in response to this 'enquiry', if it is found that the materials supplied are not of the right quality or not in accordance with our specifications (required by this tender document) or received in damaged or broken conditions, not satisfactory owing to any reason of which we shall be the sole judge, we shall be entitled to reject the materials, cancel the contract and buy our requirement from the open market / other sources and recover the loss, if any, from the bidder reserving to ourselves the right to forfeit the security deposit, furnished by the bidder against the contract. The bidder will make his own arrangements to remove the rejected material within a fortnight of instruction to do so. Thereafter material will lie entirely at the bidder's risk and responsibility and storage charges, along with any other charges applicable, will be recoverable from the bidder.

13. CEL reserves the right to accept or reject any quotation in full or in part without assigning any reason thereof. CEL also reserves the right to split and place order on more than one bidder.

14. The bidder should not have been black-listed by any Central / State Government or Public Sector Undertakings. If at any stage of tendering process or during the currency of the contract, any suppression / falsification of such information is brought to the knowledge, CEL shall have the right to reject the proposal or terminate the contract, as the case may be, without any compensation to the tenderer & forfeiture of EMD/CPG.

17. Period of Validity of Bid
Bids shall remain valid for a period of 180 days after the closing date prescribed by the CEL for the receipt of bids. A bid valid for a shorter period may be rejected by the CEL as being non responsive. In exceptional circumstances, the CEL may solicit the bidder's consent to an extension of the bid validity period. The request and response thereto shall be made in writing thro' letters/ e-mails. If the bidder accepts to prolong the period of validity, the EMD shall also be suitably extended. A bidder may refuse the request for Bid Validity Extension without forfeiting its EMD. A bidder granting the request will not be required nor permitted to modify its bid.

18. The bidder should not have been black-listed by any Central / State Government or Public Sector Undertakings. If at any stage of tendering process or during the currency of the contract, any suppression / falsification of such information is brought to the knowledge, CEL shall have the right to reject the proposal or terminate the contract, as the case may be, without any compensation to the tenderer & forfeiture of EMD/CPG.

19. Statutory Compliance/ Certification regarding Cyber Security Products:

A certificate is to be submitted by the bidders that the items offered meet the definition of domestically manufactured/produced Cyber Security Products as per MeitY notification vide File no. 1(10)/2017-

CLES dt. 02.07.18. The above certificate shall be on Company's letterhead and signed by Statutory Auditor or Cost Auditor of the Company.

'Cyber Security Products means a product or appliance or software manufactured/ produced for the purpose of protecting, information, equipment, devices computer, computer resource, communication device, and information stored therein from unauthorized access, use, disclosure, disruption, modification or destruction'.

SPECIAL CONDITIONS

a) The contractor/bidder shall not display the photographs & content of the work and also will not take advantage through publicity of the work without written permission of CEL. Noncompliance to this may result in removal from the EPC list and the contractor will be blacklisted.

b) Service level agreement has to be signed on 100/- stamp paper with 2 weeks (two) after award of PO.

Name of Work: - Rate Contract for Design, Manufacture, Supply, Erection, Testing and Commissioning of BOS for Stand-alone **Off Grid Solar Photovoltaic Water Pumping Systems** in Madhya Pradesh basis including complete system warranty and its repair and maintenance for 5 Years under MNRE off- grid and decentralized solar PV applications scheme.

PRICE BID-1

Sr. No.	Description of Work	Unit of Measurement (UOM)	Unit Price exclusive of GST (IGST/SGST/ CGST/ UGST) (in Rs.) on F.O.R Destination Basis
1	Design, Manufacture, Supply of BOS for Stand-alone 7.5 HP AC submersible waterfilled **Off Grid Solar Photovoltaic Water Pumping Systems** in Madhya Pradesh basis including complete system warranty and its repair and maintenance for 5 Years under MNRE off- grid and decentralized solar PV applications scheme	Set	
2	Installation & commissioning of 7.5 HP AC submersible water filled Solar Water Pumping system	Job	
3	Operation & Maintenance of 7.5 HP AC submersible water filled Solar Water Pumping system for 5 yrs	Job	
	Total Price exclusive of taxes & duties		

Note

1. GST shall be paid extra on actual as applicable.
2. Prices should be inclusive of P&F charges and inland transportation charges including loading, unloading and transfer to site, insurance and other incidental to delivery.
3. Price quoted shall remain firm for the entire project duration
4. Both Prices shall be evaluated separately
5. In price-bid table, cost of O&M (Sr. No. 3 as per Price- bid) for 5 years should not be less than 10% of the total project cost (i.e. Sr. No. 1 + Sr. No. 2) of the price bid table. This amount will be released as per payment terms defined in SCC of satisfactory service. If the prices quoted at O&M (Sr. No. 3) is less than 10% of total project cost (i.e. Sr. No. 1 + Sr. No. 2) of the price bid, then the differential amount will be subtracted proportionately from cost quoted in (Sr. No. 1 and Sr. No. 2) of the price bid and will be added to Sr. No. 3 and accordingly, empanelment/LoA of the successful bidders shall be processed.

Price Bid -2

Sr. No.	Description of Work	Unit of Measurement (UOM)	Unit Price exclusive of GST (IGST/SGST/ CGST/ UGST) (in Rs.) on F.O.R Destination Basis
1	Design, Manufacture, Supply of BOS for Stand-alone 1 HP DC submersible water filled **Off Grid Solar Photovoltaic Water Pumping Systems** in Madhya Pradesh basis including complete system warranty and its repair and maintenance for 5 Years under MNRE off- grid and decentralized solar PV applications scheme Modules shall be supplied by CEL	Set	
2	Installation & commissioning of 1 HP DC submersible water filled Solar Water Pumping system	Job	
3	Operation & Maintenance of 1 HP DC submersible water filled Solar Water Pumping system for 5 yrs	Job	
	Total Price exclusive of taxes & duties		

Note

1. GST shall be paid extra on actual as applicable.
2. Prices should be inclusive of P&F charges and inland transportation charges including loading, unloading and transfer to site, insurance and other incidental to delivery.
3. Price quoted shall remain firm for the entire project duration
4. Both Prices shall be evaluated separately
5. In price-bid table, cost of O&M (Sr. No. 3 as per Price- bid) for 5 years should not be less than 10% of the total project cost (i.e. Sr. No. 1 + Sr. No. 2) of the price bid table. This amount will be released as per payment terms defined in SCC of satisfactory service. If the prices quoted at O&M (Sr. No. 3) is less than 10% of total project cost (i.e. Sr. No. 1 + Sr. No. 2) of the price bid, then the differential amount will be subtracted proportionately from cost quoted in (Sr. No. 1 and Sr. No. 2) of the price bid and will be added to Sr. No. 3 and accordingly, empanelment/LoA of the successful bidders shall be processed.

UNDERTAKING

(To be submitted duly notarized self-certificate on company's letter head by an authorized person of the bidder's company/firm not below the rank of Director)

We, M/s_____hereby give undertaking that our firm have not been debarred/blacklisted/defaulted by any State Govt. Dept./Govt. of India , agency, PSUs/Corporate(s)/institution/agencies/any funding/partner agency/autonomous organizations/private companies and there is no legal disputes/civil/criminal case/complaint is pending against us.

Date:
Place:
Seal:

Signature of Authorized Person
Name:
Designation:

MANUFACTURERS' AUTHORIZATION FORM

Ref.No. Dated _____

To,
M/s. Central Electronics Limited
4, Industrial Area
Sahibabad-201010 (UP)

Tender No.:

Dear Sir,

We, _____, who are established and reputable manufacturers of _____ (name & descriptions of goods offered) having factories at _____ (address of factory) do here by authorize M/s _____ (Name and address of Agent) to submit a bid, and sign the contract with you for the goods manufactured by us against the above tender.

We hereby extend our full guarantee and warranty/AMC as per the Terms and Conditions of the above mentioned tender for the supply of goods and services offered by the above firm against this tender.

Yours faithfully
(Name of manufacturers)

Note: This letter of authority should be on the letter head of the manufacturer and should be signed by a person competent to legally bind the manufacturer. It should be included by the Bidder in its bid.

Annexure-B

Commercial Terms and Conditions:

1.	**This is an open tender. Eligible bidders qualifying the eligibility criteria may submit their ONLINE BID as described in the tender. Bids having deviation from our specifications, terms & conditions would be rejected.**
2.	**Basis of price: Prices should be submitted as per the scope of work described in Annexure-A. (Please also see the 'Notes' on Price Bid formats given in the tender document).**
3.	**In a tender either the Indian agent on behalf of the Principal/OEM or Principal/OEM itself can bid but both cannot bid simultaneously in the same tender. If an agent submit bid on behalf of the Principal/OEM, the same agent shall not submit a bid on behalf of another Principal/OEM in the same tender. Agent quoting on behalf of OEM /Principal shall submit valid authorization certificate along with their offer: Not Applicable**
4.	**GST: GST shall be paid extra on actual as applicable.**
5.	**Delivery Schedule: As given under "Special Terms and Conditions" in Annexure-A.**
6.	**Payment terms: As given under "Special Terms and Conditions" in Annexure-A.**
7.	**Guarantee/Warranty: As given under "Special Terms and Conditions" in Annexure-A.**
8.	**Performance bank guarantee: As given in 'Contract Performance Guarantee' clause of "Special Terms and Conditions" in Annexure-A. (To be submitted by the successful bidder in CEL's prescribed format available on demand from MMD CEL).**
9.	**Price reduction for delayed delivery: As given in "Liquidated Damages" clause under "Special Terms and Conditions" in Annexure-A.**
10.	**Inspection: As given in Annexure-A**
11.	**Price variation Clause: Price variation would not be permitted and quotations having Price variation clause would be rejected.**
12.	**Validity of offer: The quotation/tender/bid submitted by the bidder/supplier shall be valid for a minimum period of 180 days from date of opening.**
13.	**Penalty/LD Clause: As given under "Liquidated Damages" clause under "Special terms & Conditions" in Annexure-A**
14.	**Any corrections/alterations in the tender/quotation/bid are to be duly signed by the bidder. CEL does not take any responsibility for delay in receipt or non-receipt or loss of tender(s) in online submission.**
15.	**Earnest Money Deposit: An amount of ₹5,00,000/- to be submitted as Earnest Money Deposit through RTGS/NEFT. No interest shall be payable on the earnest money deposit. The earnest money may be deposited into CEL's account with Syndicate Bank. The details of account are as below:** **Beneficiary Name: Central Electronics Limited** **Beneficiary Account Number/IBAN: 87761250000014** **Beneficiary Bank SWIFT Address/BIC: SYNBINBB161** **Beneficiary Bank Name: Syndicate Bank (IFSC: SYNB0008776)** **Bank Address: Sahibabad Branch, CEL Complex, Plot No. 1, Site 4, Sahibabad 201010** **Exemption from submission of EMD: Micro & Small Enterprise registered with DIC or KVIC or KVIB or Coir Board or NSIC or DHH or any other body specified by Ministry of Micro, Small and Medium Enterprises, Govt. of India are exempted from submission of EMD subject to submission of valid registration certificate with technical bid.** **The Earnest Money Deposit (after deduction of bank charges, if any) of the unsuccessful bidders will be returned within one month of finalization of tender and the EMD of successful bidder will be returned on receipt of Contract Performance Guarantee. If the successful bidder is exempted from submitting the EMD, they have to submit Contract Performance Guarantee as per the clause given in Annexure-A.**

16.	**CEL reserves the right to reject any or all tenders/quotations/bids received or accept any or all tenders/quotation/bids wholly or in part. Further, CEL reserves the right to order a lesser quantity without assigning any reason(s) thereof. CEL also reserves the right to cancel any order placed on the basis of this tender in case of strike, accident or any other unforeseen contingencies causing stoppage of production at CEL or to modify the order without liability for any compensation and or claim of any description.**
17.	**Submission of Tender: ONLINE Bids in Two Packet System to be submitted before 14:30 hours on 25.05.2020. Bids should be submitted ONLINE only in TWO part. Following are to be submitted in the bid:** **a) Technical Bid:** **i. Earnest Money Deposit RTGS/NEFT acknowledgement or EMD exemption certificate.** **ii. Documents required as per eligibility criteria given in the tender.** **iii. Filled up Format for Submission of Vendor Data as per format at Annexure C.** **iv. Tender acceptance letter as per format at Annexure D.** **b) Price Bid: Prices to be filled ONLINE in the separate BOQ file only.**
18.	**Opening of Tenders: Technical bids will be opened on 25.05.2020 at 1500 hrs (IST). Price bids of technically qualified bidders shall be opened after technical evaluation.**
19.	**Technical Clarifications: Bidders desiring any technical clarification may contact Asstt. General Manager (SPV-PE), Central Electronics Limited, 4, Industrial Area, Sahibabad – 201010 (Mob.9910666741) Phone No. 0120-2895165 Fax: 0120-2895148 email: aksingh@celindia.co.in, indu@celindia.co.in. However, the tender submission and opening dates would remain unchanged.**
20.	**In case an order placed by the CEL based on the quotation/bid/tender submitted by the bidder/supplier is not executed by the supplier/bidder, CEL may buy the ordered goods/services from elsewhere and recover the additional amount that CEL may have to spend in procuring the stores plus 10% to cover the overhead & incidental expenses.**
21.	**Banning of Business Dealings: CEL reserves the right to ban the business dealings of the supplier/bidder as per CEL's "Policy on banning of business dealings" available on CEL website (www.celindia.co.in).**
22.	**Replacement of Rejected Material: Any material supplied against order placed on the basis of this tender and found to be defective on inspection or differing from approved samples or make or specifications will be replaced by the supplier free of cost or full refund made for the amount paid by Central Electronics Limited including freight and insurance and other incidental charges at CEL's discretion.**
23.	**Arbitration: All the disputes, difference controversies/ difference of opinions, breach and violation arising from or related to this agreement between the parties, then the same shall be resolved by mutual discussion /reconciliations in good faith. If disputes, difference controversies /difference of opinions, breach and violation arising from or related to this agreement cannot be resolved within 30 days of commencement of reconciliations / discussions then the matter shall be referred to the sole arbitrator, nominated by CMD CEL, for this purpose and his/her decision shall be final binding on both the parties. The cost of arbitration, if any shall be shared equally between the parties.** **The arbitration proceedings shall be conducted by the Arbitral Tribunal in accordance with the provisions of the Arbitration & Conciliation Act, 1996 as amended from time to time. The place of arbitration shall be Delhi and language of such arbitration proceedings shall be in English.** **All disputes relating to this agreement shall be subject to jurisdiction of the courts at Delhi only.**

24.	**Force Majeure: In no event shall either Party have any liability for failure to comply with this Agreement, if such failure results directly from the occurrence of any contingency beyond the reasonable control of the Party, including, without limitation, strike or other labor disturbance, riot, major power failure, war, natural calamities including but not limited to floods, earthquakes, fire, volcanic eruptions, epidemics, National Emergency, interference by any government or governmental agency, embargo, seizure, or enactment or abolition of any law, statute, ordinance, rule, or regulation (each a " Force Majeure Event"). In the event that either Party is unable to perform any of its obligations under this Agreement because of a Force Majeure Event, the Party who has been so affected shall as soon as may be, after coming to know of the Force Majeure Event, inform the other Party and shall take reasonable steps to resume performance as soon as may be after the cessation of the Force Majeure Event. If the period of nonperformance due to a Force Majeure Event exceeds thirty (30) days, the Party whose ability to perform has been so affected may, by giving written notice, terminate this Agreement.**
25.	**All the terms & conditions mentioned in Annexure A shall also apply. In case of any ambiguity in the terms & conditions mentioned here-above and Annexure A of the tender, clause defined in Annexure A shall supersede.**

Annexure-C

Format for submission of Vendor Data

1.	Name of vendor			
2.	Registered Address			
	Postal Code		Company's Year of Establishment	
	Company's nature of Business		Company's Legal Status	
	Registration No.		Phone:	
	Fax No.		Website:	
	Name of Proprietor/ CEO/Chairman			
	Phone/Mobile No.			
	Email id			
3.	Factory Address Phone No.			
	Fax No.			
	Email id			
4.	Delhi/NCR			
	Address (if any) Phone No.			
	Fax No.			
	Email id			
5.	Correspondence			
	Address			
6.	Name of Contact			
	Person for this tender Designation			
	Date of Birth			
	Phone/Mobile no.			
	Fax No.			
	Email id			
7.0	GST related information			
7.1	GST No.			

8.0	**Income Tax related information**	
8.1	**PAN No.**	
8.2	**PAN reference no. (in case PAN applied for)**	
8.3	**PAN Status (in case PAN applied for)**	
9.	**Registration No. with Directorate of Industries**	
10.	**SSI/MSE Reg. No. (if Small Scale Industrial Unit)**	**(Please enclose certificate from DIC/NSIC along with Certificate from registered CA with value of plant and machinery)**
10.1	***Is MSE/SSI is owned by ST/SC?**	**Yes / No (If Yes please enclose relevant certificate as proof)**
10.2	***Is MSE/SSI is owned by woman?**	**Yes / No (If Yes please enclose relevant certificate as proof)**
11.0	**Bank related Information**	
11.1	**Bank name**	
11.2	**Branch name**	
11.3	**Bank address**	
11.4	**Bank phone no.**	
11.5	**Bank fax no.**	
11.6	**Bank MICR Code**	
11.7	**RTGS-IFSC Code**	
11.8	**Account type**	
11.9	**Account no.**	
11.10	**Swift Code**	

***Must be answered invariably**

Correspondence with respect to this tender may be addressed to Mr/Ms …… at email id …… and mobile no……

I/We accept that CEL may send SMS and/or email regarding this tender/any other tender, award of contract, purchase order(s) and/or any other information on any/all mobile nos. mentioned in this vendor data sheet.

I/We certify that the information given herein is correct to the best of my knowledge and belief.

Signature of Proprietor/CEO/Chairman
Seal of the company/concern

Annexure – D

TENDER ACCEPTANCE LETTER

(To be given on Company's Original Letter Head)

Date:

To,

_____
_____
_____
_____
_____

Sub: Acceptance of Terms & Conditions of Tender.

Tender Reference No: C-2(b)/RC/0700/4611/2020

Name of Tender / Work: -

_____
_____
_____
_____

Dear Sir,

1. I/ We have downloaded / obtained the tender document(s) for the above mentioned 'Tender/Work' from the web site(s) namely:

_____
_____

as per your advertisement, given in the above mentioned website(s).

2. I / We hereby certify that I / we have read the entire t en de r do cu me nt alo ng w it h t e ch n ic al sp ec i f i catio ns an d terms & conditions of the tender documents from Page No. _____to (including all documents like annexure(s), schedule(s), etc.,), which form part of the contract agreement and I / we shall abide hereby by all the terms / conditions / clauses contained therein.

3. The corrigendum(s) issued from time to time by your department/ organization too have also been taken into consideration, while submitting this acceptance letter.

4. I / We hereby unconditionally accept a l l the technical specifications and terms and conditions of t h e above mentioned tender document(s) /corrigendum(s) in its totality / entirety.

5. In case any provisions of this tender are found violated , then your department/ organization shall without prejudice to any other right or remedy be at liberty to reject this tender/bid including the forfeiture of the full said earnest money deposit absolutely.

Yours Faithfully,

(Signature of the Bidder, with Official Seal)

Instructions for Online Bid Submission

(Department User may attach this Document as an Annexure in their Tender Document which provides complete Instructions for on line Bid submission for Bidders)

The bidders are required to submit soft copies of their bids electronically on the CPP Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal.

More information useful for submitting online bids on the CPP Portal may be obtained at: https://etenders.gov.in/eprocure/app .

REGISTRATION

1) Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal (URL: https://etenders.gov.in/eprocure/app) by clicking on the link "**Online bidder Enrollment**" on the CPP Portal which is free of charge.

2) As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.

3) Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal.

4) Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / nCode / eMudhra etc.), with their profile.

5) Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSC's to others which may lead to misuse.

6) Bidder then logs in to the site through the secured log-in by entering their user ID / password and the password of the DSC / e-Token.

SEARCHING FOR TENDER DOCUMENTS

1) There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, Organization Name, Location, Date, Value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as Organization Name, Form of Contract, Location, Date, Other keywords etc. to search for a tender published on the CPP Portal.

2) Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective 'My Tenders' folder. This would enable the CPP Portal to intimate the bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.

3) The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

PREPARATION OF BIDS

1) Bidder should take into account any corrigendum published on the tender document before submitting their bids.

2) Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents - including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.

3) Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document / schedule and generally, they can be in PDF / XLS / RAR / DWF/JPG formats. Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.

4) To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use "My Space" or ''Other Important Documents'' area available to them to upload such documents. These documents may be directly submitted from the "My Space" area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.

Note: *My Documents space is only a repository given to the Bidders to ease the uploading process. If Bidder has uploaded his Documents in My Documents space, this does not automatically ensure these Documents being part of Technical Bid.*

SUBMISSION OF BIDS

1) Bidder should log into the site well in advance for bid submission so that they can upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.

2) The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.

3) Bidder has to select the payment option as "offline" to pay the tender fee / EMD as applicable and enter details of the instrument.

4) Bidder should prepare the EMD as per the instructions specified in the tender document. The original should be posted/couriered/given in person to the concerned official, latest by the last date of bid submission or as specified in the tender documents. The details of the DD/any other accepted instrument, physically sent, should tally with the details available in the scanned copy and the data entered during bid submission time. Otherwise the uploaded bid will be rejected.

5) Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. If the price bid has been given as a standard BoQ format with the tender document, then the same is to be downloaded and to be filled by all the bidders. Bidders are required to download the BoQ file, open it and complete the white coloured (unprotected) cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it and submit it online, without changing the filename. If the BoQ file is found to be modified by the bidder, the bid will be rejected.

6) The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission.

7) All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology. Data storage encryption of sensitive fields is done. Any bid document that is uploaded to the server is subjected to symmetric encryption using a system generated symmetric key. Further this key is subjected to asymmetric encryption using buyers/bid opener's public keys. Overall, the uploaded tender documents become readable only after the tender opening by the authorized bid openers.

7) The uploaded tender documents become readable only after the tender opening by the authorized bid openers.

8) Upon the successful and timely submission of bids (i.e. after Clicking "Freeze Bid Submission" in the portal), the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.

9) The bid summary has to be printed and kept as an acknowledgement of the submission of the bid. This acknowledgement may be used as an entry pass for any bid opening meetings.

ASSISTANCE TO BIDDERS

1) Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender.

2) Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk.

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