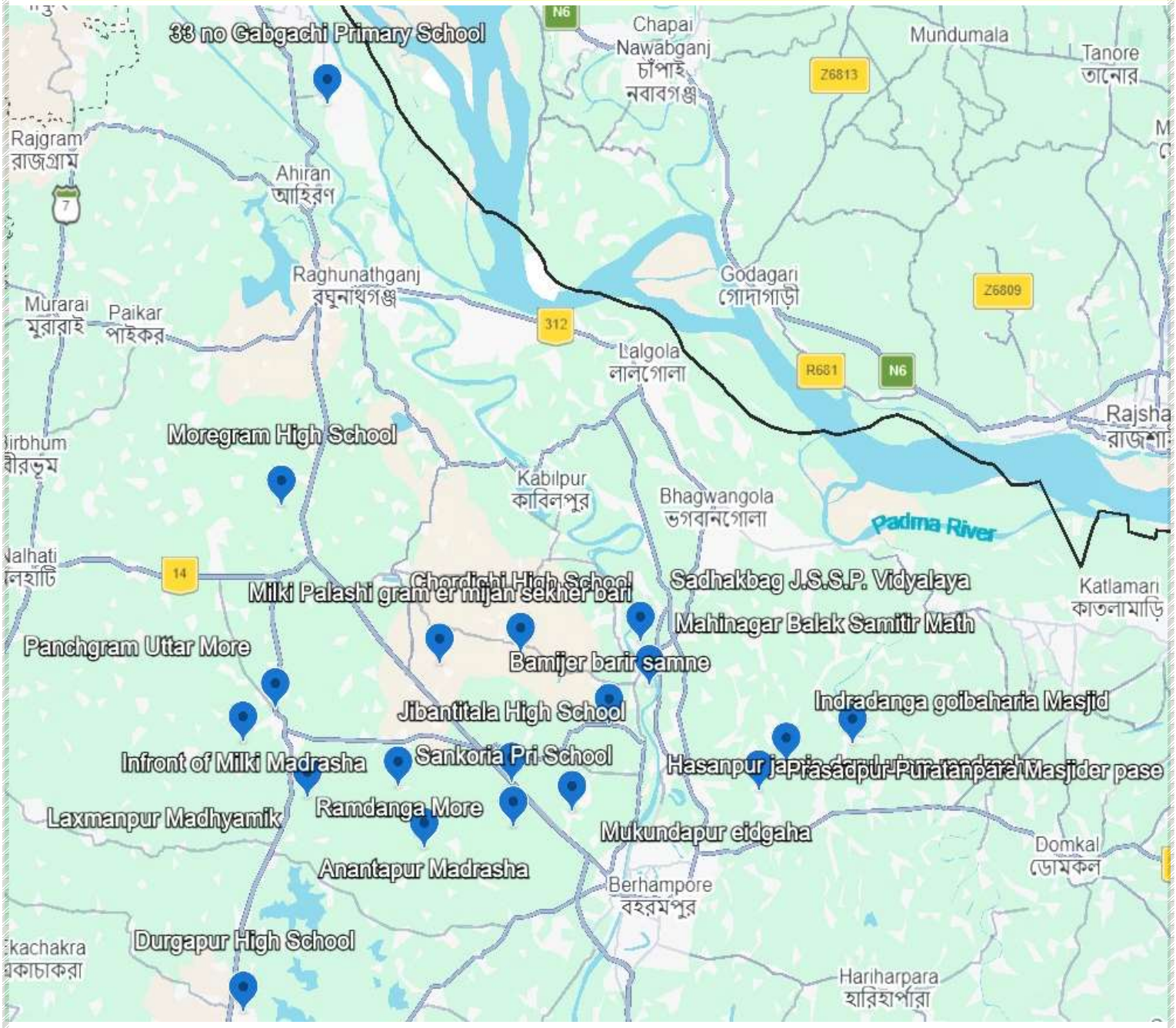
Installation of Solar operated Arsenic free drinking water plant with two years Operation & Maintenance at Different Blocks under Murshidabad Zilla Parishad



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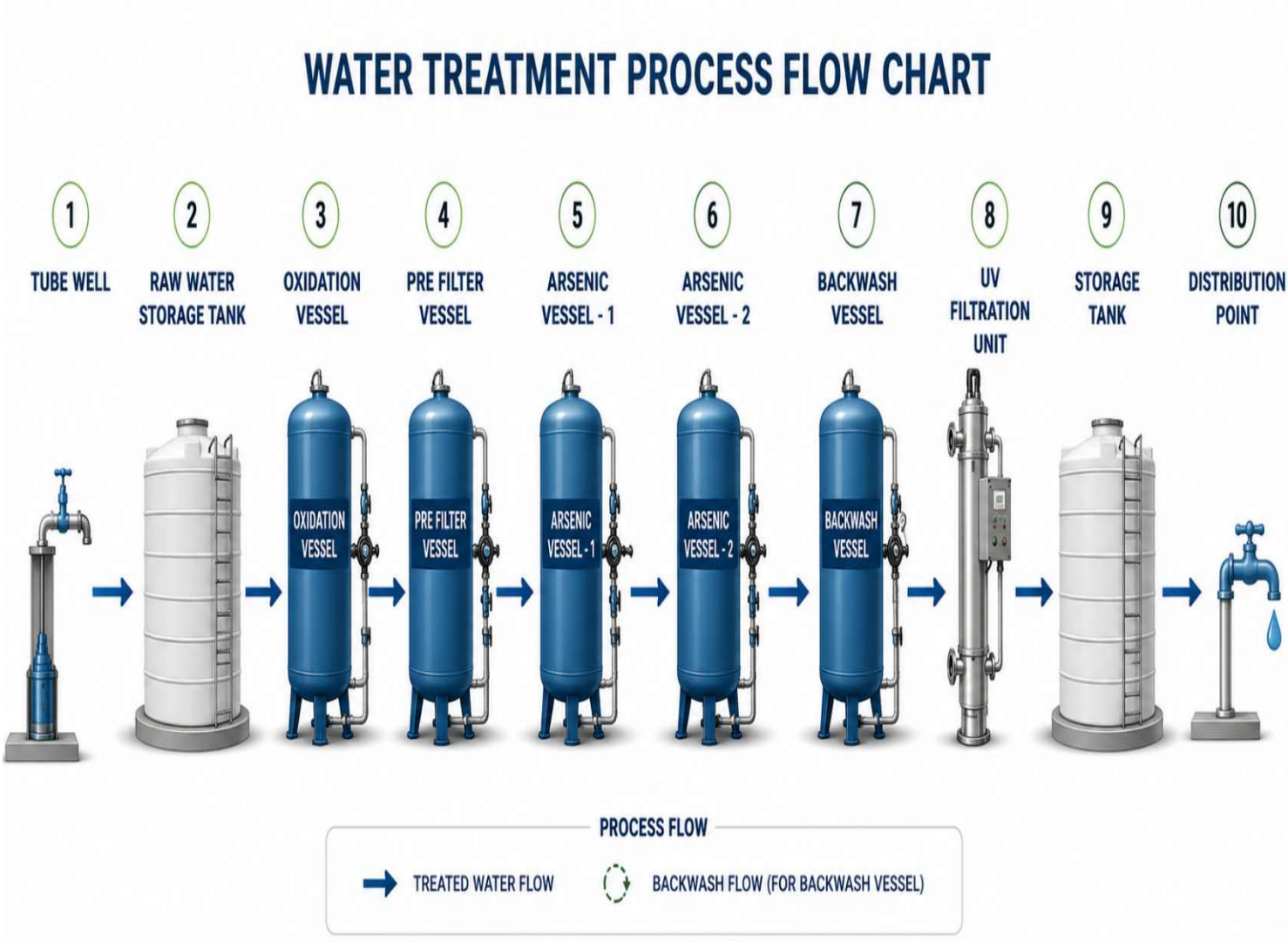
Solar operated Arsenic free drinking water plant

An Arsenic-Free Drinking Water Scheme with Solar System is a rural/community water purification plant (CPP) model that combines arsenic removal treatment + solar power + water distribution, especially useful in arsenic-affected regions of West Bengal, Bihar, Assam, and Bangladesh-border areas. Arsenic contamination in groundwater is a major public health issue in many areas of West Bengal, particularly districts such as Murshidabad, Nadia and North 24 Parganas. Long-term exposure to arsenic-contaminated water causes severe health problems.

The Basic Objectives of this government initiative reflex:

- *Remove arsenic from groundwater.*
- *Supply safe drinking water to Consumers.*
- *Use renewable solar energy.*
- *Reduce electricity and operating cost.*
- *Ensure sustainable and safe drinking water supply*

Process flow:



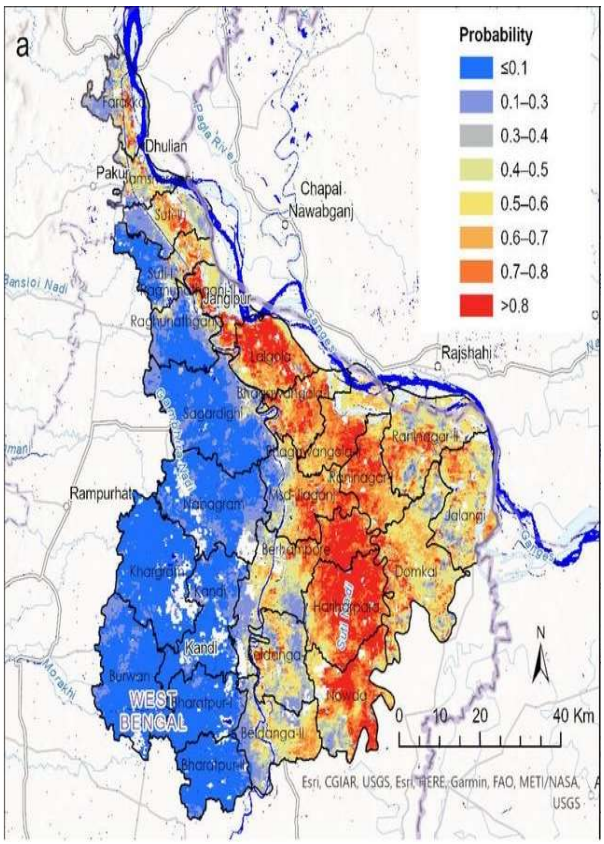
Details of Department

Murshidabad Zilla Parishad (MZP) is the district-level Panchayati Raj institution responsible for rural administration and development in Murshidabad. It operates under the West Bengal Panchayat Act, 1973 and administers development activities across the rural blocks and Gram Panchayats of the district. Its headquarters is located at Panchanantala, Berhampore (Baharampur).

Murshidabad Zilla Parishad works on:

- Rural roads and infrastructure
- Drinking water and sanitation
- Agriculture and irrigation support
- Health and primary education
- Social welfare schemes
- Women empowerment and livelihood programs
- Rural electrification and renewable energy (including solar initiatives)

The district comprises 26 Community Development (CD) blocks:
Berhampore, Beldanga I, Beldanga II, Hariharpara, Naoda, Domkal, Raninagar I, Raninagar II, and Jalangi, Murshidabad-Jiaganj, Bhagawangola I, Bhagawangola II, Lalgola, Nabagram, Kandi, Khargram, Burwan, Bharatpur I, Bharatpur II, Raghunathganj I, Raghunathganj II, Suti I, Suti II, Samserganj, Sagardighi, and Farakka.



Murshidabad is one of the most severely groundwater arsenic-affected districts in West Bengal. Out of 26 administrative blocks, 25 are contaminated, with testing revealing arsenic above the safe threshold. An estimated 2.5 million residents are exposed to unsafe levels. Large-scale surveys reported that around 53.8% of tested tube wells had arsenic above 10 µg/L, and about 26% exceeded 50 µg/L. Arsenic concentration has been reported from 0.001 to 1.85 mg/L (1–1850 µg/L) in some groundwater sources.

Health impacts observed include Melanosis (skin pigmentation), Keratosis on palms and soles, Peripheral vascular problems Increased risks of cancers (skin, lung, bladder) under long exposure. Not only Health the Agricultural effects like Arsenic enters the soil–paddy–rice system through irrigation.

The contamination is mainly geogenic (natural). Arsenic-bearing sediments deposited in the Gangetic delta. Release of arsenic under reducing conditions in aquifers.

Project Details

Installation of Solar operated Arsenic free drinking water plant with two years Operation & Maintenance at Different Blocks under Murshidabad Zilla Parishad.

A Solar Operated Arsenic-Free Drinking Water Plant is a decentralized community water system that uses solar energy to pump, treat, and distribute safe drinking water in arsenic-affected areas such as parts of Murshidabad. Solar-powered community plants and Water ATMs are already being used in India for arsenic removal and rural water supply.

Arsenic contamination in drinking water can cause serious health, social, and environmental impacts, especially with long-term exposure. Chronic arsenic poisoning from groundwater has been a major concern in parts of West Bengal, including Murshidabad. Most rural households depend on tube wells and hand pumps, and prolonged use of contaminated water has resulted in serious health problems and socio-economic impacts.

Several groundwater surveys have revealed that arsenic concentration in many areas of Murshidabad exceeds permissible limits prescribed for drinking water. Investigations conducted by research institutions and government agencies found elevated arsenic levels in groundwater samples collected from different blocks of the district.

Studies reported arsenic concentrations ranging approximately from 0.078 mg/L to 0.539 mg/L, which are significantly above the guideline value of 0.01 mg/L recommended by the World Health Organization. These studies identified extensive contamination in various parts of the district.

Block-level surveys indicated severe contamination in areas such as Raninagar, Jalangi, Domkal, Hariharpara, Suti, Lalgola, Nabagram, Bhagawangola, and Raghunathganj, where groundwater is the primary source of drinking water.

A large health survey covering 139 villages and more than 25,000 people in Murshidabad reported thousands of individuals showing arsenic-related skin lesions and other health complications. Long-term arsenic exposure may also increase the risk of cancer, cardiovascular diseases, liver damage, kidney disorders, and developmental problems in children.

To address the issue, government agencies and local authorities have implemented several measures, including:

Installation of arsenic removal plants, Supply of treated water, Regular water quality monitoring, Awareness campaigns, Promotion of solar-operated arsenic-free drinking water systems Use of alternative safe water sources.

Community-based treatment systems and decentralized water purification plants are increasingly being adopted in arsenic-affected villages of Murshidabad.

The arsenic survey reports of Murshidabad clearly indicate that groundwater contamination remains a major environmental challenge. Continuous monitoring, public awareness, and sustainable drinking water infrastructure are essential to ensure safe water supply and protect public health.

Establishment of solar-operated arsenic-free drinking water plants can play an important role in providing safe and sustainable drinking water in affected rural areas.

Key materials used with details

Solar Panels (Poly crystalline Solar Module): -

To implement this project, we vastly used the top manufacturers' modules with its benchmark quality & efficiency.
In this project we used the quality material with its genuine certificated affiliated by the MNRE, Govt. of India / IEC. The Solar Module of multi crystalline cell with min. efficiency of 15% and fill factor more than 70%, laminated between sheet of Ethylene Vinyl Acetate (EVA) and high transmissivity 3.2 mm tempered glass, framed in anodized aluminum frame.
The power output of individual PV modules used in the PV array, under STC. A minimum of 300-Watt peak with adequate provision for measurement tolerances. Modules supplied with the Spy system have certificates as per **IEC61215 specification** or equivalent National or International standards. Modules qualified the **IEC 61730 part I and part II for safety qualification testing and Salt Mist Corrosion Testing as per IEC61701/IS 61701**.
Having warranty for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.
Here we used 4 no's of Solar Modules which each has a capacity of **335 Wp**. Total 1340 Wp module used in each of the projects. Total 76 no's 335 Wp Solar polycrystalline modules used in this entire project. Total 76 X 335= 25460 wp / 25.46 KWp module used regarding this combined project.
The current voltage curves (IV Curve) which located the quality of the generation of the used module with its complete date to optimize the project.

HR SOLAR SOLUTION
building a greener future

HR Solar Solution Pvt. Ltd.

Polycrystalline Module

72 Cells SERIES

- Excellent power output with +ve tolerance up to 4.8Wp
- 10 years limited product warranty
- 25 years of performance warranty*
- All the modules are PID resistant
- 100 % EL Tested
- Sustain's heavy wind load 2400 Pa
- Sustain's heavy snow load 5400 Pa

*As per standard warranty terms

CONSTRUCTIONAL CHARACTERISTICS

- Solar PV modules are constructed with toughened, low iron and textured high light transmission glass with anti-reflective coating (ARC)
- Multi-layer tedlar-based back sheet and ultra fast cure EVA
- 15 micron anodised aluminium frame
- Pre-drilled frame for easy mounting
- IP67 rated junction box with MC4 compatible cable & connector

GLOBAL CERTIFICATIONS

Certified to ISO 9001 : 2015 standard

Certified to ISO 14001 : 2015 standard

CE Modules assigned CE certification

R-51001686

IS 14286 : 2010 / IEC 61215 : 2005
IS / IEC 61730 (Part 1) : 2004
IS / IEC 61730 (Part 2) : 2004

IEC 61701 - Salt Mist test
IEC 62804 - PID test

HR Solar Solution (P) Limited
Registered Address : 14 NS Road, Suite no - 102, Kolkata - 700001
Factory Address : Raghudebpur, NH 6, Panchla, Block - Uluberia II, Howrah, West Bengal - 711322
Email : info@hrsolarsolution.com **Website :** www.hrsolarsolution.com **Phone :** +91 33 2243 4540

HR Solar Solution Pvt. Ltd.

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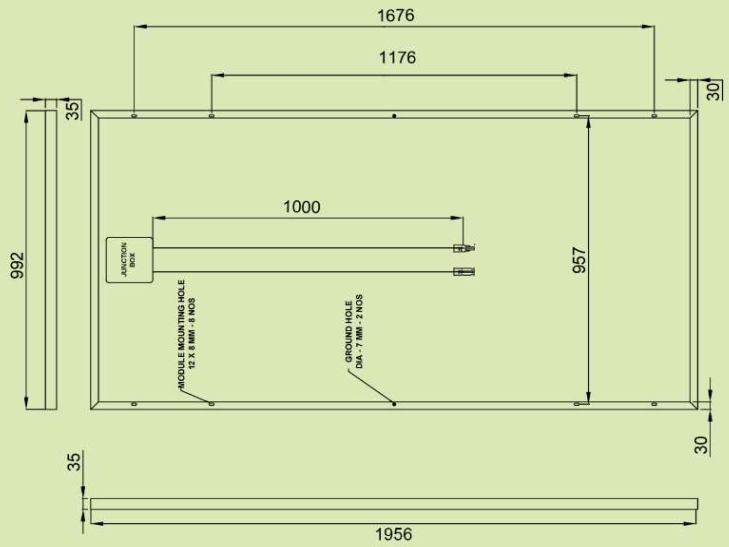
SPECIFICATIONS:

Electrical Characteristics			
Model Name	**H325P72**	**H330P72**	**H335P72**
Maximum Power Pmax (Wp)	325	330	335
Open Circuit Voltage (Voc)	45.75	45.85	46.00
Optimum Operating Voltage (Vmp)	37.45	37.76	37.85
Optimum Operating Current (Imp)	8.69	8.75	8.86
Short Circuit Current (Isc)	9.14	9.21	9.27
Fill Factor (%)	78%	78%	78%
Module Efficiency (%)	16.75%	17.07%	16.99%
Temp Co-eff for Voc / ℃ (B)		-0.35%	
Temp Co-eff for Isc/ ℃ (a)		0.05%	
Temp Co-eff for Power/ ℃ (y)		-0.40%	
NOCT		45 C ± 2 C	
System Voltage (V)		1000 V	
Fuse rating (A)		20 A	
Mechanical Characteristics			
Weight (Kg)		21 Kg	
Dimension (mm)		(1956 X 992 X 35) mm	
Static Load Wind/Snow		2400 Pa / 5400 Pa	
Fire Rating		Class C	

*Standard Test Conditions (STC) - 1000 W/m2 irradiance, Air Mass 1.5 and 25°C cell temperature.

Module Frame Assembly



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■ Submersible Water pump & motor Set (1 HP 3Φ): -

The water pump motor draws water from available water sources, including underground bore wells and other water sources, for drinking water and related applications. In this project, the pump motor set has been used to fulfill the arsenic-free drinking water requirements of the local community.

The system uses a 100 mm borewell submersible pump coupled with a 3-Phase AC induction motor, commonly known as a V4 motor. The motor is pre-filled with non-toxic liquid to ensure efficient operation under low-voltage conditions with high performance and reliability. The pump is firmly coupled with a submersible electric motor that operates completely submerged under water.

The optimized design of the impeller and diffuser provides high hydraulic efficiency, while the built-in check valve prevents backflow and minimizes the risk of water hammering.

The motor body is enclosed within a corrosion-resistant Stainless Steel (SS 304) shell, ensuring durability, hygiene, and high operating efficiency. The motor is specially designed with angular contact bearings to withstand high axial thrust loads, and the easy removal of the stator ensures convenient maintenance and serviceability. These pump sets are designed for wide voltage operation, and the non-toxic prefilled liquid motor ensures reliable performance even under low voltage conditions.

MATERIAL OF CONSTRUCTION - PUMP	
Part Name	**Material**
Suction housing	Cast iron
Impeller	Noryl / Delrin
Diffuser chamber	Cast Iron / Noryl / SS 304
Pump shaft	SS 410 / SS 431 / SS 304
Check valve housing	Cast iron
Check valve	Delrin
Outer shell	SS 304
Counter thrust pad	SS 304 / Hylem
Intermediate bearing (Sleeve / Bush)	SS 304 / NBR / LTB 4 (Gun metal with rubber)
Coupling	SS 304 / 410

MATERIAL OF CONSTRUCTION - MOTOR	
Part Name	**Material**
Shaft seal	Nitrile butyl rubber / Mechanical seal
Rotor shaft	SS 410 / SS 431
Stator shell	SS 304
Bearing	SS Ball Bearing & SS Angular contact bearing
Diaphragm	High Nitrile Butyl rubber

Detailed specification of the pump:

✓ Power range	0.37 kW - .75 kW (0.5 HP - 1 HP)
✓ Speed	2850 RPM
✓ Version	Three phase 72V, 0-50Hz, AC
✓ Maximum head	40 meters
✓ Maximum flow rate	7 lps (25.2 m3/h)
✓ Maximum outer diameter	98 mm
✓ Nominal outlet size	32 & 40 mm
✓ Degree of protection	IP 58
✓ Direction of rotation	Counterclockwise from driving end
✓ Thrust load	0.37kW - 0.75kW - 650 lbs
✓ Minimum cooling flow	0.15 m/sec
✓ Type of duty	S1 (Continuous)
✓ Method of starting	3Ph - VFD
✓ Maximum starts per hour times	20

APPLICATIONS: -

- ❖ Domestic and municipal water supply
- ❖ Rural water supply (Drinking Water)
- ❖ Sprinkler system
- ❖ Pressure boosting units
- ❖ Firefighting system
- ❖ Industrial and mining applications
- ❖ Fountains

Here is the detailed test report with its adequate performance graph of the pump certifying the quality of the material.

TC-5100

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testing & calibration laboratory

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TEST REPORT

TEST REPORT AS PER: MNRE JNNSM: 2014-15

SRF No.: 21070162

Name & Address of Customer:	ULR-TC510021000000866F Discipline: Electronic Group: Miscellaneous Products Test Report No: HPLI/Test/2107016204 Date of Issue: 05/08/2021		
M/s. KSB Limited Plot No. E-3 & E-4, MIDC Sinnar, Nashik – 422 113, INDIA.	Customer Ref. & Date : 05/07/2021		
	Date of Sample Receipt: 05/07/2021	Start of Test Date: 28/07/2021	End of Test Date: 03/08/2021

PART A -PARTICULARS OF THE SAMPLE SUBMITTED

Sample description	SOLAR PHOTOVOLTAIC WATER PUMPING SYSTEM For Drinking Water Applications (Deep Well Pumping AC 1hp - 90m Model-V)
Grade/ variety/ type/ class/ size etc.	See page 02
Declared values, if any	Nil.
Code no., BIS seal and IO's sign. if any	Nil.
Batch no., date of manufacture and Brand name	See page 02
Quantity	See page 02
Condition of the sample	OK
Reference specification (s)	As per MNRE JNNSM: 2014-15
Environmental conditions	Temperature (25±4)°C & Relative humidity<70%
Statement of Conformity	Product passing the requirements of MNRE specification
Decision Rule	Measured values including associated measurements uncertainty are within the tolerance limit as mentioned in the MNRE specification.

PART B - SUPPLEMENTARY INFORMATION

a) Deviations from the test methods as per relevant specification/ work instructions, if any: Nil
b) Details of the drawings, graphs, tables, sketches or photographs as referred in the test report, if any: Photograph attached.
c) Testing procedure according to work instruction HPLI03/Test-Solar pump/WI-01
d) The Management System is maintained in accordance with IS/ISO/IEC 17025:2017 and testing Standards/ Instruments are traceable to National/International Standards.

Notes: i) This report is not to be reproduced wholly or in part without our special permission in writing.
ii) This report refers only to the particular sample detailed above.
iii) The results reported in this certificate are valid at the time of and under the stipulated conditions of measurement.
iv) Remnants of sample will be disposed off after 30 days of issue of test report, if no any further information is received.

HI PHYSIX LABORATORY INDIA PVT. LTD.
Ashutosh Pathak
(Chief Technical Manager)

Tested by | Checked by | Approved by

Format No. HPLI 04 F31-00

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PART C- TEST RESULT

ULR-TC510021000000866F
TEST REPORT NO.: HPLI/Test/2107016204
MNRE JNNSM: 2014-15

1) PV module details :

Make	NOVASYS GREEN ENERGY PVT. LTD.					
Model No.	NOVA335P72					
Type	Poly Crystalline Silicon Modules					
Module rating	**Maximum Power (Pmax)**	**Open Circuit Voltage (Voc)**	**Short Circuit Current (Isc)**	**Voltage At Maximum Power (Vmp)**	**Current At Maximum Power (Imp)**	**Maximum System Voltage**
	335Wp	45.14V	9.26A	38.01V	8.82A	1000V
Quantity	03 nos.					

2) Motor & pump details:

Make	KSB Limited				
Brand	KSB				
Model	Motor: UMAISOL 100CH-1.1/23 Pump: CORACHROM 100-0.75-90				
Serial No.	K21060221010001				
Type	AC Submersible				
Rating	**Voltage**	**Max Current**	**kW/HP**	**Duty Head**	**Duty Discharge**
	110V	8.0A	0.75/1.0	90 m	20 lpm
MNRE model No.	V				
Quantity	1 nos.				

3) Controller:

Make	KSB Limited				
Brand	KSB				
Model/Type	AC SOLOTRAN A				
Serial No.	K21060221010001				
Rating	Maximum I/P Voltage	Maximum O/P Voltage	Maximum O/P Power	Maximum O/P Frequency	Maximum O/P Current
	400 VDC	110 V	0.75 KW / 1HP	0 – 50 Hz	10 A
Quantity	1 nos.				

Tested By

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PART C- TEST RESULT

ULR-TC510021000000866F
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MNRE JNNSM: 2014-15

Sl. No.	Test Description	Requirements as per JNNSM, MNRE Specifications 2014-15	Results
1	**PV Module/ Array**		
1.1	PV Array Capacity at STC	PV array capacity at STC required 900Wp. Output of PV module should be minimum of 74Wp	1010.394Wp for the SPV array PV module, minimum STC wattage 335.830 Wp (see also table 1)
1.2	PV modules design qualification and type approval	Modules should be IEC 61215 & IEC 61730 Part I & II qualified	IS 14286/IEC 61215 & IEC 61730 Part I & II is qualified with BIS R Number (R-71010499)
1.3	Type of modules	Crystalline Silicon solar cell module.	Poly Crystalline silicon modules
1.4	Module efficiency and fill factor	The module efficiency should be minimum 14 percent and fill factor shall be more than 70 percent	Module efficiency: 16.968% and Fill factor: 76.9%
1.5	Terminal box	Provision for "opening" for replacing the cable	Provided
1.6	Name plate	As per JNNSM, MNRE Specifications 2014-15	Provided (see also page No. 09)
2	**Motor & Pump Details**		
2.1	Make, model & Serial No.		**Pump/motor:** Make: KSB Limited Model No: Motor: UMAISOL 100CH-1.1/23 Pump: CORACHROM 100-0.75-90 Serial No: K21060221010001
2.2	Type of pump	DC/AC	AC type
2.3	Operation	Deep well pumping system: Model-III to Model-V as per MNRE specification	Deep well Pumping system: Model-V
2.4	MODEL specifications		Deep well Pumping AC 1hp -90m Model-V
2.5	Material of construction of motor-pump set and warranty	Should be made of stainless steel and 5 years warranty	Declaration provided by manufacturer

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PART C- TEST RESULT

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MNRE JNNSM: 2014-15

Sl. No.	Test Description	Requirements as per JNNSM, MNRE Specifications 2014-15	Observations
3.	**Testing of complete SPV pump**		
3.1	**Simulation Test:** Average output of water per day at Irradiation of 7.15 kWh/sq.m. at total head of 90 meters.	Not less than 5000 Liters	Hot Profile:- 5941 L Cold Profile:- 6257 L
3.2	Shut off dynamic head	120 meters	123 meters
3.3	**Outdoor Test:** Average output of water per day at Irradiation of 7.15 kWh/sq.m. at total head of 90 meters.	Not less than 5000 Liters	6189 L (Irradiation of 4.98 kWh/m2/day is extrapolated to 7.15 kWh/m2/day)
4.	**Tracking system**	Continious, Manual Passive or Electronic tracking are permitted.	Manual tracking (Declaration provided by manufacturer)
5.	**Protections**		
5.1	MPPT shall be included	MPPT should be there and operational	MPPT Provided
5.2	Against dry running	Required	Provided
5.3	Against open circuit	Required	Provided
5.4	Against short circuit and reverse polarity	Required	Provided
6.	**Others**		
6.1	Design of PV array	Should be modular for easy replacement.	Modular
6.2	DC/AC switch	Required	Provided
6.3	Connection cable	Required	Provided
7.	**Warranty**		
7.1	Warranty for PV module for output wattage	Warranty for output wattage of modules for 25 years	Declaration provided by manufacturer
8.	**Operation and maintenance manual**		
8.1	Operation and maintenance manual	An Operation and maintenance manual in English and local language	Provided

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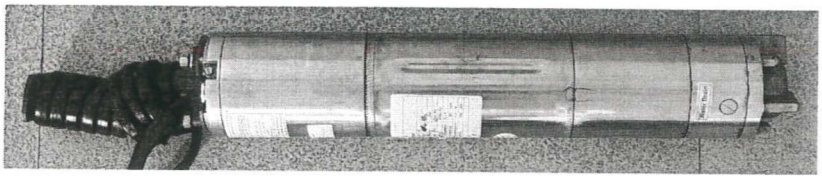
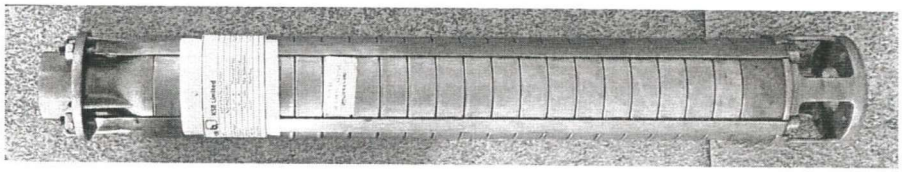
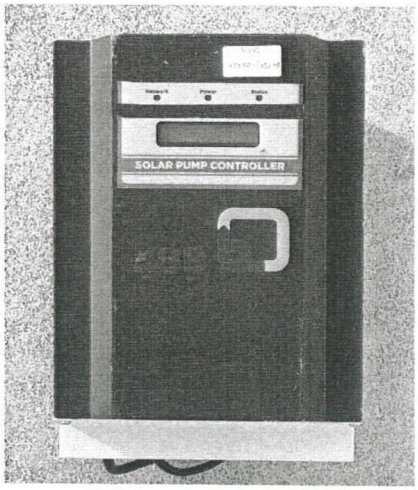
PART C- TEST RESULT

ULR-TC510021000000866F
TEST REPORT NO.: HPLI/Test/2107016204
MNRE JNNSM: 2014-15

PHOTOGRAPHS OF EQUIPMENT UNDER TEST
Motor

Pump

Controller


Tested By

Checked By

- **Pump controllers / VARIABLE Frequency Drive: -**

A photovoltaic solar powered pump system has three parts:

Pump » Controller » Solar Panels

The size of the PV-system is directly dependent on the size of the pump, the amount of water that is required (m*/d) and the solar irradiance available.

The purpose of the controller is two-fold. Firstly, it matches the output power that the pump receives with the input power available from the solar panels. Secondly, a controller usually provides a low voltage protection, whereby the system is switched off, if the voltage is too low or too high for the operating voltage range of the pump. This increases the lifetime of the pump thus reducing the need for maintenance.
Traditional DC motors are not suitable for submissible pumps because of maintenance implications. Hence a converter which converts DC generated by PV cells into variable frequency AC is more suitable for AC motors, which are more reliable.

VFD or Controller regulate the water pump and allow it to be turned on and off as per its program. They can increase the life of the water pump by protecting it from electrical irregularities or motor damage if it keeps running when a water source runs dry. That is the major reason to call it the HEART of the system. A typical solar pumping system contains a solar array, which converts sunlight into electricity. The controllers, which control the array and the pump synchronously. An electric motor, which drives the pump and a water pump, which moves water to where it is required.

VFDs allow solar PV to be used for standard AC industrial motors, doing away with the need for dedicated DC solar pumps that are a more specialized and expensive product. AC induction motors are usually easier and cheaper to maintain or replace. Using VFDs it is also possible to operate motors in a changeover configuration, with solar PV used in combination with either diesel generators or the commercial electric grid.

VFDs offer high efficiency conversion from DC to AC power with very little electrical loss and is therefore the ideal control solution for any application isolated from the commercial grid where variable motor speed can be tolerated. Controllers also maximize the water delivery & provide complete protection to the pump. A proportional-integral-derivative (PID) allows a VFD to get feedback from a flow or level sensor to maintain a desired flow rate form a pump. This provides a reliable, closed loop control system.

Hardware Design

Compact design and user-friendly interface

Removable Keypad

Press to remove; supports remote operation away from drive

5 digits 7 segments LED display, frequency knob, Up and Left/Down function keys

Removable RFI Jumper

Applicable for different application needs

Built-in USB Port

Easy and fast programming setting, update and real-time monitoring and tuning

Specified Product Label

Input/output current, voltage and protection rating

Screwless Top Cover Design

Press on both side tabs to remove the cover

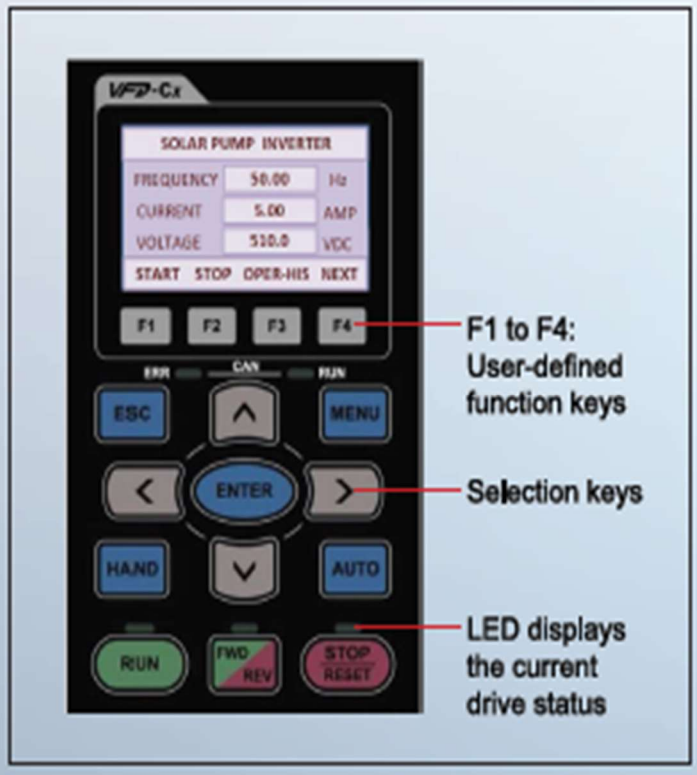
Removable Fan

Easy to replace and maintain for a longer lifetime

MS 300 IP 66

Quick and Easy Parameters Setting via the LCD Keypad

- Multi-column display for the drive status
- Simple and intuitive operation
- User-defined parameter groups
- Real Time Clock and calendar function
- Language selection for display
- Copy function saves parameters and PLC programs to the keypad memory for later transfer to another drive
- IP66 protection level

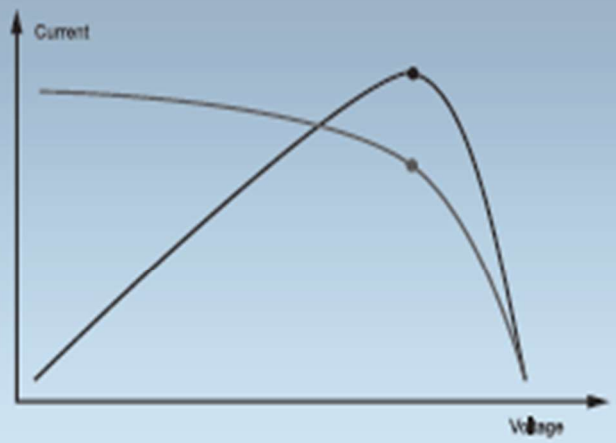


Special Functions

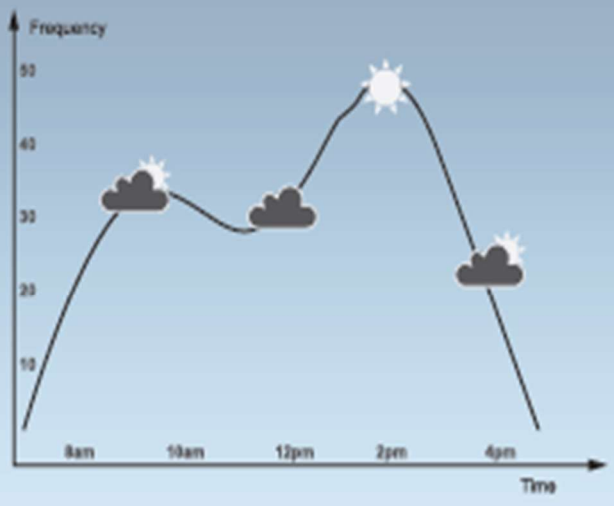
- Low frequency
- Dry run
- Over current of pump
- Minimum power
- PQ curve
- Dormancy

Advanced MPPT Technology

MPPT efficiency up to 99.99%



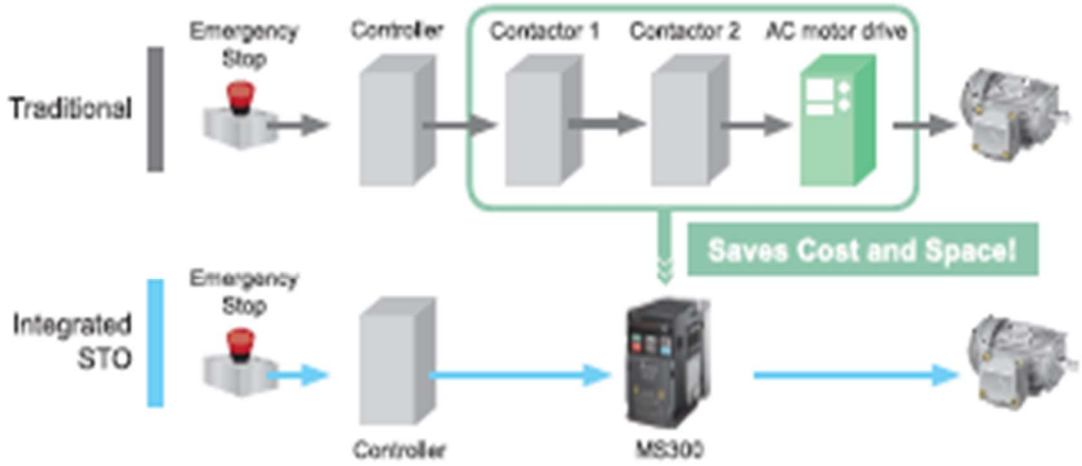
Auto-track at any daytime



Safety Standard

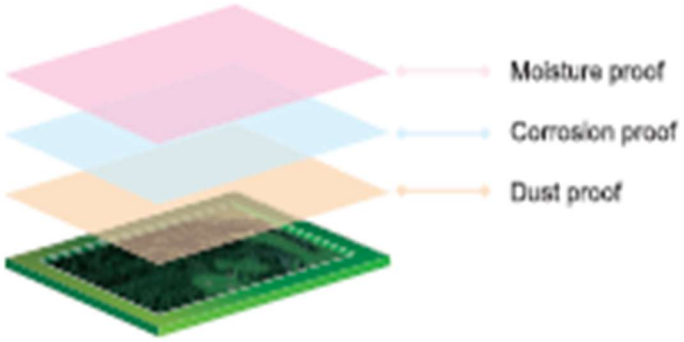
Integrated Safe Torque Off (STO), compliance with:

- ISO 13849-1:2015 Category 3 PL d
- EN 61508 SIL2
- EN 60204-1 Category 0
- EN 62061 SIL CL 2



PCB Coating

100% PCB coating (IEC 60721-3-3 class 3C2 standard) ensures drive operation stability and safety in critical environments

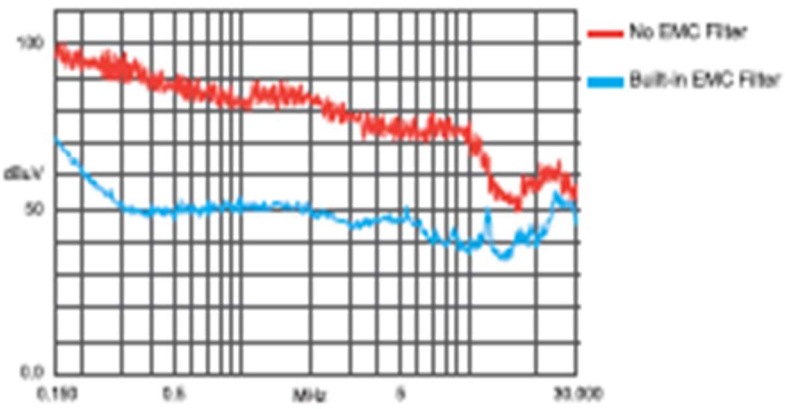


IP40 Models

Strengthened fan coating and concealed air vent prevent dust and other particles from entering the drive, suitable for critical environment applications

Built-in EMC Filter

Built-in Class A (C2) standard EMC filter; saves on additional procurement cost and wiring time, and provides more cabinet space for other devices to use



Complete data sheet with its test results which indicates the efficiency of the drive issued in this project.

3-phase 460V (Models with Built-in EMC Filter)												
Frame			B			C		D		E		F
Applicable Motor Output (kW)			0.4	0.75	1.5	2.2	3.7/4	5.5	7.5	11	15	18.5	22
Applicable Motor Output (HP)			1/2	1	2	3	5	7.5	10	15	20	25	30
Inverter Output	Heavy Duty	Rated Output Current (A)	1.5	2.7	4.2	5.5	9	13	17	25	32	38	45
	Normal Duty	Rated Output Current (A)	1.8	3	4.6	6.5	10.5	15.7	20.5	28	36	41.5	49
Input	Rated Voltage/Frequency		3-Phase AC 380V~480V (-15%~+10%), 50/60Hz										
	Mains Input Voltage Range		323~528V										
	Mains Frequency Range		47~63Hz										
Carrier Frequency (kHz)			2~15 (default 4)										
Brake Chopper			Built-in										
DC Reactor			Optional										
AC Reactor			Optional										
Cooling Method			Fan cooling										
Size: WxH (mm)			72×142			87×157		109×207		130×250		175×300	
Size: D (mm)			159			179		187		219		244	

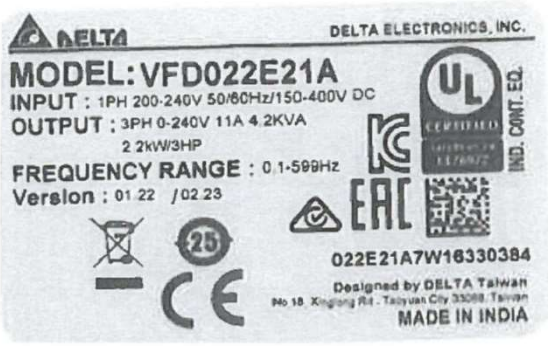
Power Conditioning Unit including *MPPT, Data logger and IP54 protected enclosure* Inverter Unit qualified the IEC 61683, Efficiency measurement and IEC 600682 Environment Standard, Safety standard suitable for 1-Phase A.C. motor, IGBT based high voltage switching inverter with MPPT Technology, to take care of the variation of Sun light and will be suitably mounted inside the metal enclosure. Inverter has protection against Dry run Over Current, Under current, Over voltage, Under Voltage Short circuit etc. System is able to run at low sunshine and minimum 7 to 8 Hours a day run during normal sunshine condition. The VFD having auto start for any short trip off due to low light / cloudy situation except for dry run. The VFDs provided with a display to show the various parameter by the user such as Voltage, Current, Solar panel DC voltage inverter IGBT temperature, output AC voltage, output frequency. Pump flow (direct or calculated method), irradiation etc. The system is capable to store the data at a set interval and transfer it in a pen drive through USB port. It also monitors and save total run time, total water pumped etc.
The controller having AC-DC changeover switch of current 25Amp.

Test certificate of VFD IEC and CE certificate are here :

TEST REPORT ENVIRONMENTAL TESTING	
Report reference No ..... :	19675611 001
Tested by (printed name and signature) ..... :	(see cover page) .....
Approved by (printed name and signature) ..... :	(see cover page) .....
Date of issue. ..... :	(see cover page)
Testing Laboratory Name ..... :	TÜV Rheinland (India) Pvt. Ltd.
Address ..... :	Plot No. 328, Udyog Vihar, Phase – IV, Gurgaon – 122015, Haryana, India.
Applicant's Name ..... :	Delta India Electronics Pvt. Ltd.
Address ..... :	Plot No.43, Sector-35, HSIIDC, Gurgaon-122001, Haryana (India)
Test specification ..... :	
Standard ..... :	IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-14, IEC 60068-2-30 (As per customer`s specifications)
Test procedure ..... :	QMA 36.201.01
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	TUVR_ENV_R2
TRF originator ..... :	TUVR
Master TRF ..... :	2009.08.20
Copyright © 2008 TUVR PSQ for Conformity Testing and Certification of Electrical Equipment. All rights reserved. This publication may be reproduced in whole or in part for non-commercial purposes as long as the TUVR is acknowledged as copyright owner and source of the material. TUVR takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.	
Test item description ..... :	VFD
Manufacturer ..... :	Delta Electronics Inc.
Model and/or type reference ..... :	VFD022E21A
Serial number ..... :	022E21A7W16330384
Rating(s) ..... :	Input: U1→ 1PH, 200 – 240V AC 50/60Hz 24.0A /150 - 400V DC Output: U2→ 3PH, 0 - 240V, I2→ 11A, 4.2KVA, 2.2kW/3HP f2→ 0.1 - 599Hz

Environmental Testing

Copy of marking plate:



General product information:

EUT under test is a VFD.

Summary of testing:

This report covers Environmental Tests undertaken as per customer's specifications with reference to the listed standards.

EUT continues to work after each test and no physical damages were observed.

Particulars: test item vs. test requirements

Operating condition ..... : OFF during testing

Condition of the equipment at the time of receipt..... : Good

Test case verdicts

Test case does not apply to the test object .. : N/A

Test item does meet the requirement ..... : P(Pass)

Test item does not meet the requirement .... : F(Fail)

Testing

Date of receipt of test item ..... : 07.11.2016

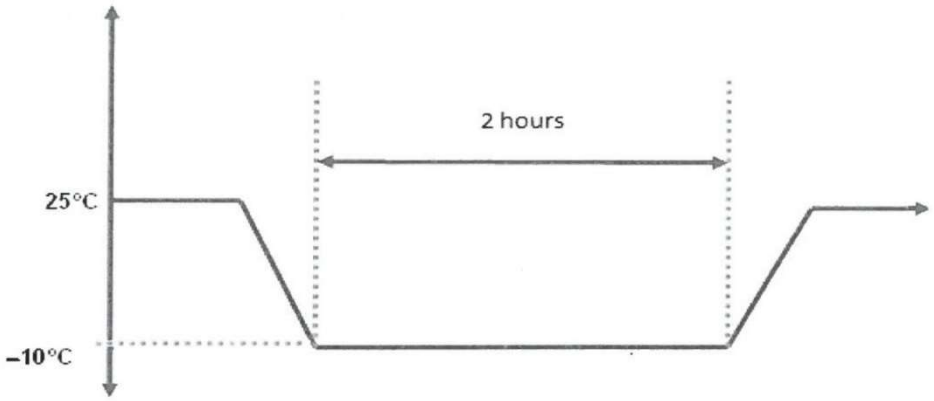
Date(s) of performance of test ..... : 08.11.2016 to 15.11.2016

General remarks

The test result presented in this report relate only to the object(s) tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(see appended table)" refers to a table appended to the report.
Throughout this report a point is used as the decimal separator.

Environmental Testing

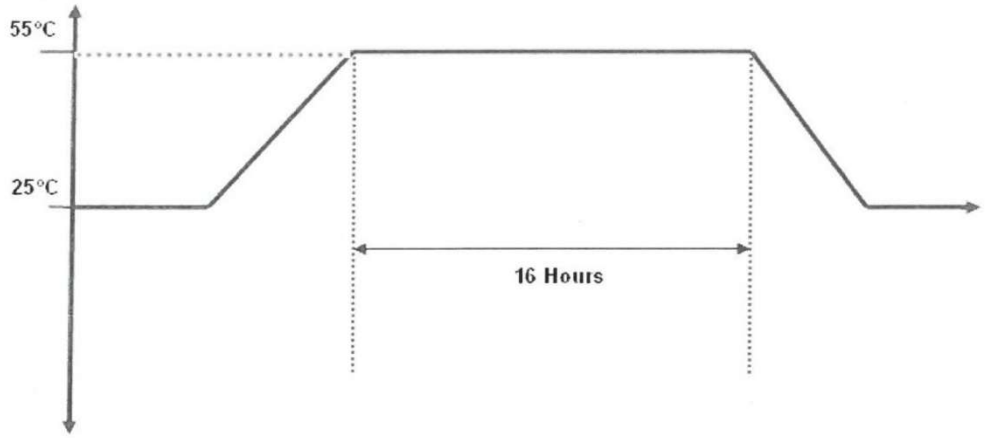
1	**Cold Test**	P
1.1	Cold Test specification	



1.1.1	EUT Operating Condition	Powered OFF	-
1.1.2	Test Temperature	- 10°C	-
1.1.3	One Cycle duration	2 hours	-
1.1.4	No. of cycles	1 cycle	-
1.2	Post check: Examination after environmental conditioning		P
1.2.1	Physical damages	No physical damages observed	P
1.2.2	EUT working condition	Rated: Input: 1PH, 200 – 240V AC 50/60Hz 24.0A /150 -400V DC Output: 3PH, 0-240VAC, 11A, 4.2kVA, 2.2kW/3HP 0.1-599Hz.	P
		Measured Without load: Input: 340VDC Output: U-V- 241.3VAC U-W- 241.4VAC V-W- 241.6VAC Frequency: 50Hz	

Environmental Testing

2	**Dry Heat Test**	P
2.1	Dry Heat Test specification	

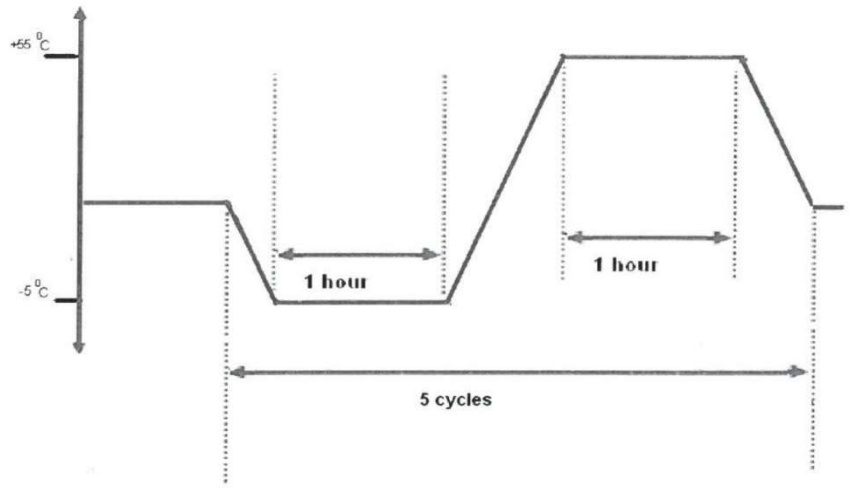


2.1.1	EUT Operating Condition	Powered OFF	-
2.1.2	Test Temperature	+55°C	-
2.1.3	One Cycle duration	16 hours	-
2.1.4	No. Of cycles	1 cycle	-
2.2	Post check: Examination after environmental conditioning		P
2.2.1	Physical damages	No physical damages observed	P
2.2.2	EUT working condition	Rated: Input: 1PH, 200 – 240V AC 50/60Hz 24.0A /150 -400V DC Output: 3PH, 0-240VAC, 11A, 4.2kVA, 2.2kW/3HP 0.1-599Hz.	P
		Measured Without load: Input: 340VDC Output: U-V- 241.3VAC U-W- 241.2VAC V-W- 241.4VAC Frequency: 50Hz	

Environmental Testing

3	**Change Of Temperature**	P
3.1	Change Of Temperature Test specification	

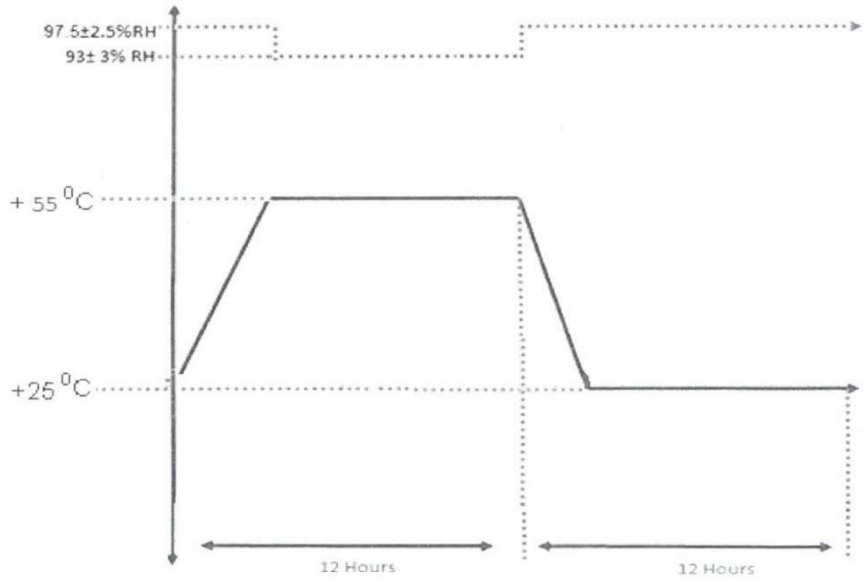
Graph:



3.1.1	EUT Operating Condition	Powered OFF	-
3.1.2	Test Temperature	Upper: +55° C Lower: -5°C	-
3.1.3	Rate of change of temperature	3°C/min	-
3.1.4	Dwell Time	1 Hr. at each temperature	-
3.1.5	No. of cycles	5 cycle	-
3.2	Post check: Examination after environmental conditioning		P
3.2.1	Physical damages	No physical damages observed	P
3.2.2	EUT working condition	Rated: Input: 1PH, 200 – 240V AC 50/60Hz 24.0A /150 -400V DC Output: 3PH, 0-240VAC, 11A, 4.2kVA, 2.2kW/3HP 0.1-599Hz.	P
		Measured Without load: Input: 340VDC Output: U-V- 241.3VAC U-W- 241.2VAC V-W- 241.4VAC Frequency: 50Hz	

Environmental Testing

4	**Damp Heat cyclic**	P
4.1	Damp Heat Cyclic Test specification	



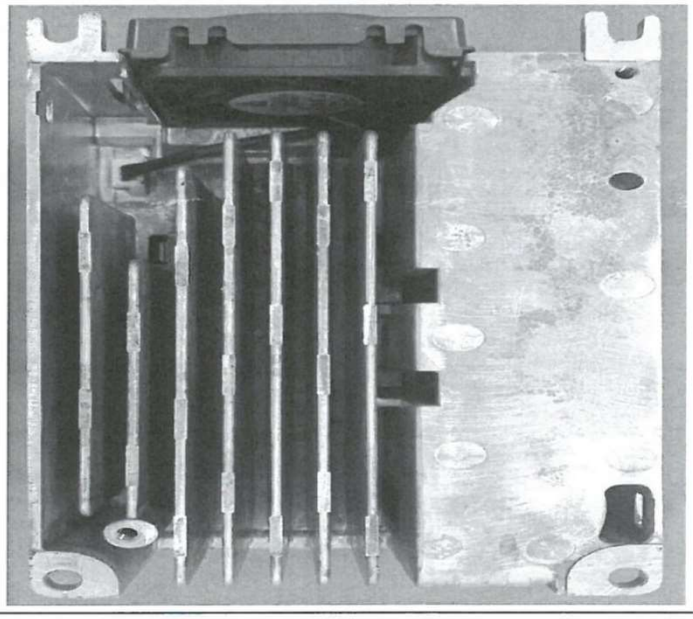
4.1.1	EUT Operating Condition	Powered OFF	-
4.1.2	Ramp –up / -down time	3 Hrs.	-
4.1.3	One Cycle duration	12 hours +12 hours	-
4.1.4	No. of cycles	2 cycle	-
4.1.5	Total Test Duration	48 Hrs.	-
4.2	Post check: Examination after environmental conditioning		P
4.2.1	Physical damages	No physical damages observed	P
4.2.2	EUT working condition	Rated: Input: 1PH, 200 – 240V AC 50/60Hz 24.0A /150 -400V DC Output: 3PH, 0-240VAC, 11A, 4.2kVA, 2.2kW/3HP 0.1-599Hz	P
		Measured Without load: Input: 340VDC Output: U-V- 241.6VAC U-W- 241.3VAC V-W- 241.4VAC	

Environmental Testing

		Frequency: 50Hz	

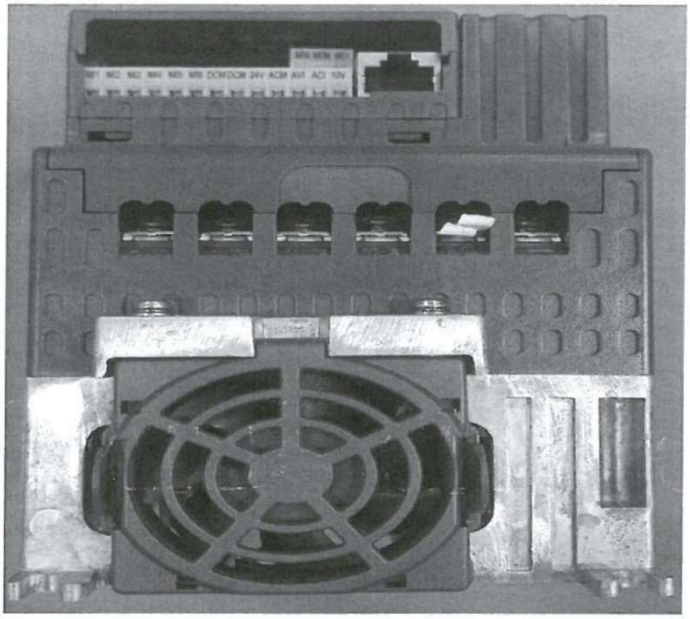
Photo Document

Front View



Back View

Environmental Testing



Terminals

*** End of Report ***

▪ Civil Construction: -

As per work estimate & PWD schedule the work is executed with the parameters mentioned in the work estimate provided by the department with its highest possible quality & perfection.

It's the most important part of this scheme to inspect the site before starting any Excavation or Foundation work. Because total scheme depends on Sun light, without this the work can't be completed successfully. So, for this reason it's very important to select site where you get available sunlight at the maximum time of the day.

After selecting the appropriate site now it's the time to excavation of earth. As per the Govt. estimate 4 no's of pocket excavate of 900 mm X 900 mm X 1100 mm (Length/ Breadth/ Height).

After completion of digging & ramming work, Sand filling with adequate quantity has been done after that brick soling done over the sand filling area. This is for filling the gaps with sand and brick.

After sand filling and brick flat soling work 100 mm PCC done for each pocket. PCC, or Plain Cement Concrete, is a construction material used in engineering for various applications. Some of its common uses include foundation of construction. PCC is used as a base material for the foundation of buildings and structures. It provides a strong, stable, level surface for constructing the superstructure.

To cast a concrete column, it is necessary to prepare the formwork, place the reinforcement, pour and compact the concrete, remove the formwork, and finally, properly cure the column to ensure its strength and durability. One day after the PCC work, Rod cutting, Ring binding work done for 4 no's Column casting purposes. The maximum height of the column is 1600 mm. But this casting work, shuttering work, take 2-3 days, because it requires rest period as well as water cure periods.

Brick and Floor work achieved by manually agitating the concrete with tools such as trowels or rakes. Ensure that the concrete is uniformly compacted to achieve maximum strength and durability. Once the concrete is consolidated, it needs to be finished to achieve the desired surface texture and appearance. Floor casting and brick work done as per Govt. estimate. Boring guard and pedestal work are also done in this scheme.

As we know Plastering and net cement punning are process of applying one or more coats of mortar to a concrete surface, brick works, and stone masonry then polishing it with liquid cement. It must be durable such that it resists the penetration of moisture and should be able to resist weather conditions uniformly. It should also be pleasing in appearance. After floor casting and Brick work the plastering and net cement punning work done in all aspect.

- ## Structure & Its details: -

After execution of the above-mentioned work, a two-storied Mild Steel (MS) structural framework has been successfully fabricated and erected for supporting the Solar Photovoltaic (SPV) modules along with two PVC water storage tanks of different capacities. The structure has been designed considering adequate strength, stability, durability, and long-term performance under outdoor environmental conditions.

The complete supporting arrangement has been fabricated using high-quality structural steel components such as **MS angles, channels, square tube sections**, **MS sheets, and base plates**, strictly in accordance with the approved structural drawings and technical specifications. The structure is intended to safely withstand dead load, live load, wind load, and operational vibration during service conditions.

The primary vertical load-bearing members of the structure consist of **100 mm × 100 mm × 8 mm MS square tube columns**, which provide the main support and rigidity to the entire framework. These columns are securely connected to reinforced cement concrete (RCC) foundations through heavy-duty MS base plates fixed with **4 nos. J-bolts at each footing location**, ensuring proper anchoring and safe transfer of structural load to the foundation.

To enhance structural stability and resistance against lateral movement, cross torsion bracing members have been provided throughout the framework using **65 mm × 65 mm × 6 mm MS angle sections**. These cross-bracing arrangements improve the overall rigidity of the structure and minimize deformation due to wind pressure and operational stress.

The structure accommodates two separate water tank platforms arranged vertically. The upper platform is designed for supporting the **3000-litre PVC water tank**, while the lower platform supports the **2000-litre PVC water tank**. The resting platforms for both tanks are fabricated using **7 nos. structural support members** made of **65 mm × 65 mm × 6 mm MS angle sections**. In addition to the structural framing, **5 mm thick MS sheets** have been installed over the supporting members to provide a uniform and stable resting surface for the water tanks and to ensure even load distribution.

The top portion of the structure is designed for installation of Solar Photovoltaic modules. The solar panel mounting arrangement consists of properly aligned purlins and rafters fabricated from MS structural members. The SPV modules are securely fixed to the mounting structure using stainless steel nuts, bolts, and washers of Grade 304 quality, which are corrosion-resistant and suitable for prolonged outdoor exposure. This arrangement ensures firm fixing of the solar panels and minimizes the possibility of loosening or rusting over time.

All MS structural components have been properly cut, aligned, welded, and finished before erection at site. Welding works have been carried out as per standard engineering practices to ensure structural integrity and durability. After fabrication, the entire MS structure has been cleaned and treated with suitable anti-corrosive protective coatings and paint to prevent rust formation and to enhance service life under varying climatic conditions.

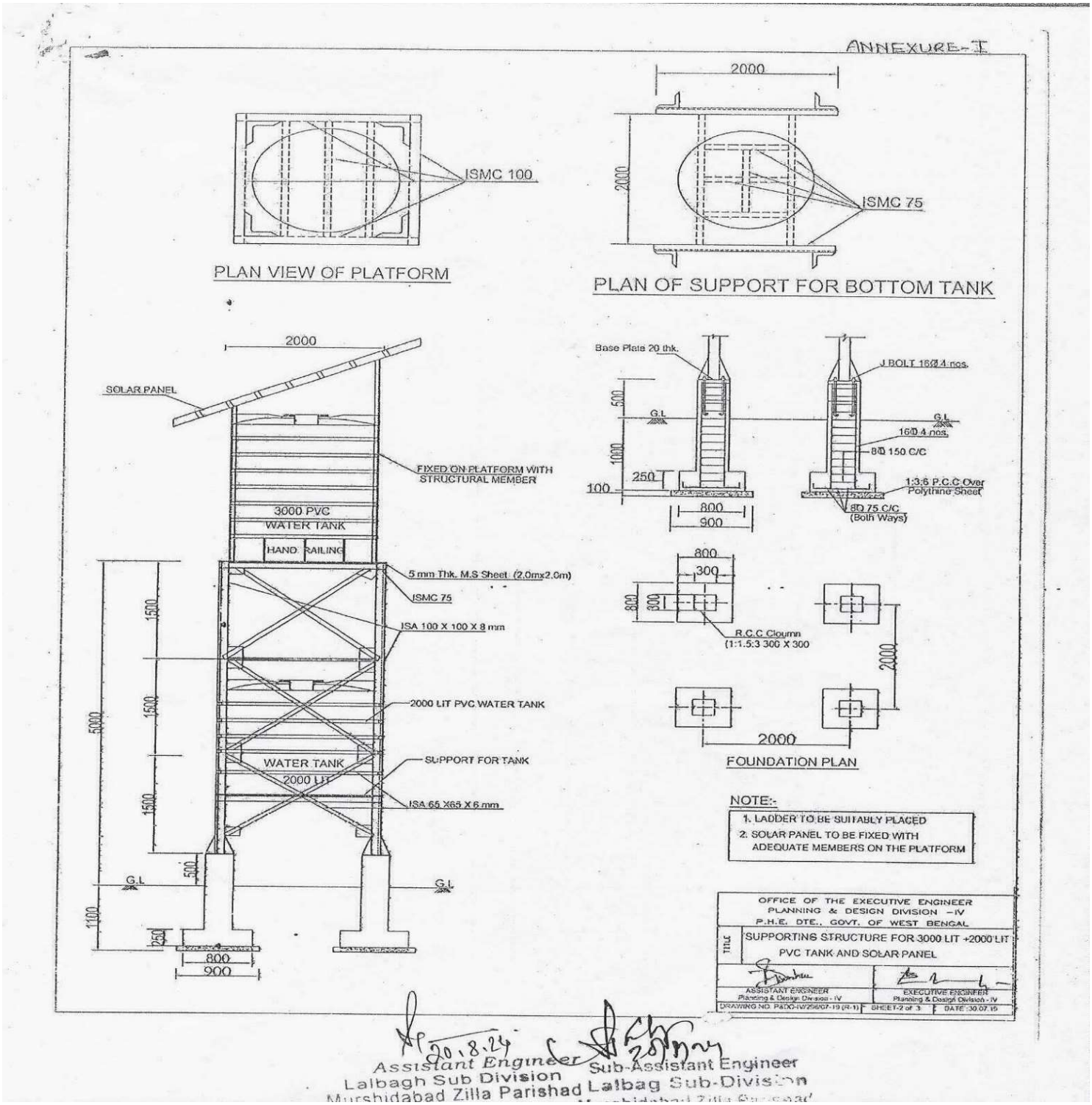
The entire structure has been erected over RCC foundations designed as per load requirements and site conditions. Proper alignment, verticality, and levels have been maintained during installation to ensure safe and efficient operation of the complete solar water supply system.

The completed MS structural framework now provides a strong, stable, and reliable platform for supporting both the water storage tanks and the solar power generation system, thereby

ensuring efficient operation of the integrated solar water pumping arrangement for long-term field application.

Pigments provide color and hide, while binders work to "bind" the pigment together and create the paint film. Solvents are the liquids that suspend the ingredients and allow you to place the paint on the surfaces, and additives are ingredients that provide specific paint properties such as mildew resistance. At the end of this scheme, paint work is done with proper procedure.

Here is the schematic & model drawing of construction details provided by the department



20.8.24
Assistant Engineer
Lalbagh Sub Division
Murshidabad Zilla Parishad

Sub-Assistant Engineer
Lalbag Sub-Division

- ## Boring & Its details: -

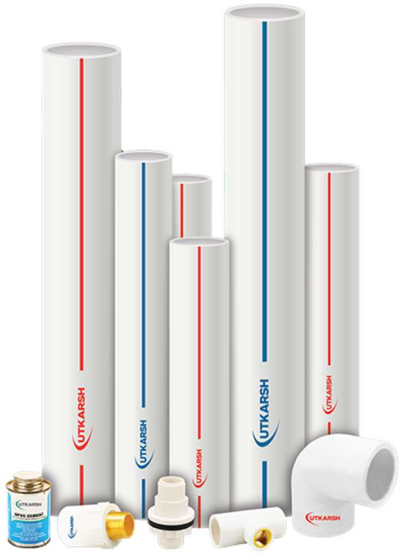
PVC Well Casing Screen Pipes For deep, medium and shallow borewell as per IS 12818-2010 / ASTM D-1785 / DIN 4925. Appropriate medium for getting clean water from deep and shallow borewell e Threaded terminals, thus easy to join and economical. Can be installed even in deep bore well due to good elastic joints Rust free, chemical resistant and long-lasting Nontoxic parts ensure unaltered taste of water Strong, thus are chances of bore well sinking in the ground Weighs five times less than steel pipe. Hence, easy to transport at lesser cost Easy to cut and install. Here we used 5" or 125 mm cashing pipe followed by the 3" or 80 mm blank pipe & 3" or 80 mm Jacket Ribbed Filter pipe.

In this project we used (Minimum):

a)	*5" / 125 mm Cashing Pipe-*	*120 Ft / 36 Mtr*
b)	*3" / 80 mm Cashing Pipe-*	*90 Ft / 27 Mtr*
c)	*3" / 80 mm Ribbed Strainer Pipe-*	*30 Ft / 9 Mtr*

Also used Nipple, Plug Cutter, Reducing Socket & others essential material of adequate size to complete the boring with good quality water layer for drinking water.

uPVC Column Pipes used for lighting the water through submersible pump. PVC pipes are light in weight hence transportation and installation become much easier. As uPVC is immune to galvanic and electrolytic erosion, both pipe and water passing through it is not affected and hence water is not contaminated. Mirror-smooth inside surface of pipe and corrosion resistance property prevents scale formation which ensures high flow rate resulting in substantial power saving. They installed in all types of acidic or alkaline medium which badly affect metal pipes. Column pipes are manufactured with latest technology under stringent quality control. Specially imported additives are used for higher strength and trouble-free long service life. High tensile load capacity. Specially designed square threads (male and female) are manufactured to provide smooth fitment / refitment. The design of threads along with the pipe material makes it strong enough to take high tensile loads. Leakproof joints sealing rings are made from best quality rubber which ensures long service life, absorption of pump vibration and leak proof joints. Overall economy in addition to the above benefits.



■ Water tank (2000 Liter & 3000 Liter): -

The Arsenic Removal Plant will often include 2 nos water tank 1 of 3000 liter to store water from the Solar Submersible pump and other of 2000 liter to store Purified water that used as the Purified Drinking Water.

Here we used 3000 and 2000 Liter 2 Layer Black water Tank made of Shyam Sundar Polymers firmly known as PENGUIN. The details of the Material are mentioned below:

Model: PNCVT – BK2 & CL2

This PENGUIN TANK model consists of a double layer polymer construction, with dark pigmented UV protected outer layer and food grade aqua colour layer inside, for better visibility. This is the most economically viable long-term solution to store water in a healthy manner.

Dimensional specification of cylindrical vertical tank in cm-

Tank size	Model No.	Height	Width	Manhole	Tank size	Model No.	Height	Width	Manhole
225	PNCVT 22.5	71.5	65.0	28.5	1500	PNCVT 150	113.0	130.0	39.0
330	PNCVT 33	84.0	75.0	39.0	2000	PNCVT 200	150.0	136.0	39.0
500	PNCVT 50	88/87/90/91	87/86/85/86	39.0	3000	PNCVT 300	180.0	145.0	39.0
750	PNCVT 75	110/109/108/108	95/97/97/97	39.0	5000	PNCVT 500	219.0	198.0	39.0
1000	PNCVT 100	117/117/118/117	107/104/105/106	39.0	10000	PNCVT 1000	248.0	255.0	39.0

▪ Vessels: -

The Arsenic Removal Plant is designed for the population of 300 to 500 people and arsenic concentration of upto 0.15 PPM

The Arsenic Removal Plant includes 5 no's Arsenic treatment vessels of different Sizes each consisting of different Arsenic removal media to remove different types of impurities from the ground water and make it Purified Drinking Water.

Here we used 3 no's 350 X 1200 mm, 1 No's 250 X 1200 mm and 500 X 1200 mm Vessel made of Mild Steel. The details of the Arsenic Removal Media are mentioned below:

- **Vessel 1** is used for Oxidation, it consists of gravel, quartz sand and Manganese Die Oxide, which is used to filter out any large debris and slit.
- **Vessel 2** is used as a prefilter. It consists of gravel, green sand, MnO_2 etc. Which filters heavy metals like iron through oxidization process.
- **Vessels 3 and 4** are the heart of the purification system. It consists of alumina balls which soke up all the Arsenic from the water and give clean Arsenic free water.
- **Vessel 5** is here for backwashing. And its massive size ensures stable water buffer and maintained back pressure.

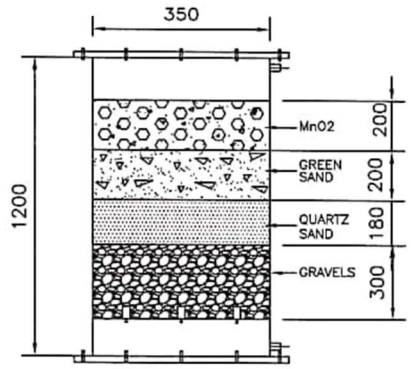
Dimensional specification of cylindrical Vessels-

Vessel 1: - 350 X 1200 X 10 MM
Vessel 2: - 350 X 1200 X 10 MM
Vessel 3: - 350 X 1200 X 10 MM
Vessel 4: - 250 X 1200 X 10 MM
Vessel 5: - 500 X 1200 X 10 MM

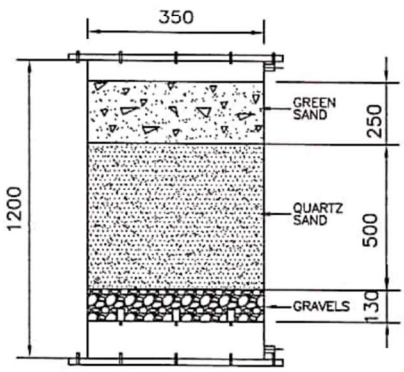
As the Arsenic Removal Plant is designed for the population of 300 to 500 people and arsenic concentration of up to 0.15 PPM, we have used the type II model including 3 Nos 350 MM Dia Vessel 1 Nos 250 MM Dia Vessel and 1 Nos 500 MM Dia Vessel.

The details are listed below

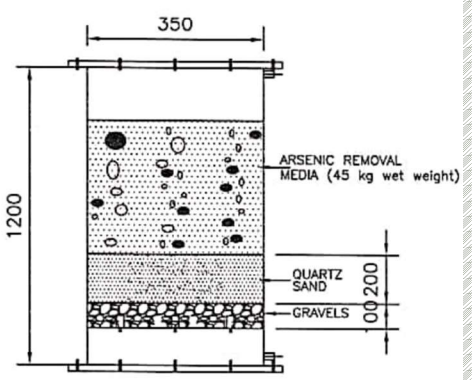
TYPE - B



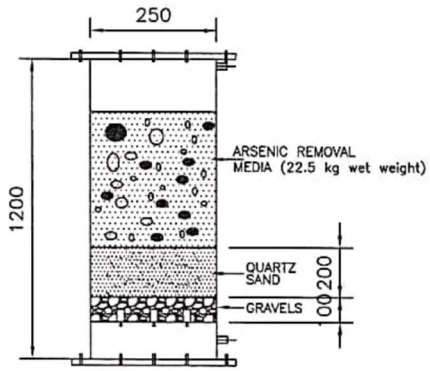
OXIDATION CHAMBER
(SIZE: 350mm dia x 1200 mm height)



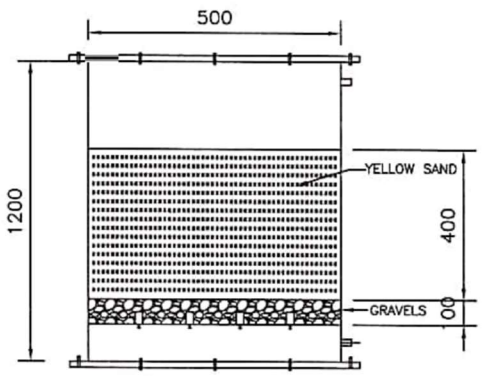
PRE FILTER
(SIZE: 350mm dia x 1200 mm height)



ARSENIC TREATMENT UNIT–1
(SIZE: 350mm dia x 1200 mm height)



ARSENIC TREATMENT UNIT–2
(SIZE: 250mm dia x 1200 mm height)



BACKWASH CHAMBER
(SIZE: 500mm dia x 1200 mm height)

Specification & Test Reports of Filtration Media-

1. **Gravels** – Used as the bottom support layer in the filter bed to hold other media layers properly and remove large, suspended particles and sediments from water.

R. V. BRIGGS & CO. PRIVATE LTD.
ANALYTICAL CONSULTING & TECHNICAL CHEMISTS
6, SIRAJ-UD-DOULA SARANI, WATERLOO STREET,
GROUND FLOOR, KOLKATA - 700069
Phone : (033) 4601-8607, Mob. : 9830076328
E-mail : info@rvbriggs.com, Website : www.rvbriggs.com
CIN : U51109WB1931PTC007007

TEST REPORT

Certificate No. G/25-26/116 | **Issue Date: 30 May 2025** | **Page 1 of 1**

Issued to	:	M/s. LAXMI ENTERPRISES 15, Krishna Kamal Bhattacharjee Lane, Howrah - 711102
Your Ref. No.	:	E mail dtd.22.05.2025
Description of sample	:	Gravel
Mark on Sample	:	Filter Media Gravels, Quantity: 500 gm.
Sample Submitted by the Party on	:	22.05.2025
Analysis Started on	:	22.05.2025
Analysis Completed on	:	30.05.2025

TEST FINDINGS:

Sl. No.	Test Parameters	Test Method	Unit	Results
1.	Sodium Oxide (Na_2O)	IS: 8419 (Part-1)1977	%	0.15
2.	Silicon Dioxide (SiO_2)	IS: 8419 (Part-1)1977	%	94.30
3	Aluminum Oxide (Al_2O_3)	IS: 8419 (Part-1)1977	%	1.51
4.	Ferric Oxide (Fe_2O_3)	IS: 8419 (Part-1)1977	%	2.27
5.	Calcium Oxide (CaO)	IS: 8419 (Part-1)1977	%	0.49
6.	Magnesium Oxide (MgO)	IS: 8419 (Part-1)1977	%	0.11
7.	Insoluble Residue (IR)	IS: 8419 (Part-1)1977	%	0.99

(M. CHATTERJEE)
Technical Manager
Authorised Signatory

-: END OF TEST REPORT :-

LAXMI ENTERPRISES

2. **Quartz Sand** – Acts as a filtration media to remove fine suspended impurities, dust particles, and turbidity from raw water.

3. **Green Sand** – Special filter media used for removal of iron, manganese, and hydrogen sulphide impurities present in groundwater.

R. V. BRIGGS & CO. PRIVATE LTD.

ANALYTICAL CONSULTING & TECHNICAL CHEMISTS

6, SIRAJ-UD-DOULA SARANI, WATERLOO STREET,
GROUND FLOOR, KOLKATA - 700069
Phone : (033) 4601-8607, Mob. : 9830076328
E-mail : info@rvbriggs.com, Website : www.rvbriggs.com
CIN : U51109WB1931PTC007007

TEST REPORT

Certificate No. MRL/25-26/27 **Issue Date: 30 May 2025** **Page 1 of 1**

Issued to	:	**M/s. LAXMI ENTERPRISES** 15, Krishna Kamal Bhattacharjee Lane, Howrah - 711102
Your Ref. No.	:	E mail dtd.22.05.2025
Description of sample	:	Sand
Mark on Sample	:	Quartz Sand, Filter Media, Quantity-500 gm.
Sample Submitted by the Party on	:	22.05.2025
Analysis Started on	:	23.05.2025
Analysis Completed on	:	30.05.2025

TEST FINDINGS:

Sl. No.	Test Parameters	Test Method	Unit	Results
1.	Calcium Oxide (CaO)	IS: 1917 (Part 4)	%	0.35
2.	Magnesium Oxide (MgO)	IS: 5949 - 1990	%	0.12
3	Alumina (Al_2O_3)	IS: 1917 (Part – 6)	%	1.41
4.	Oxide of Iron (Fe_2O_3)	IS: 1917 (Part-1)1991	%	1.73
5.	Sodium (Na_2O)	IS: 1917 (Part-7)1991	%	0.09
6.	Potassium (K_2O)	IS: 1917 (Part-7)1991	%	0.12
7.	Silica (SiO_2)	IS: 1917 (Part – 5)	%	95.47
8.	Loss on Ignition (LOI)	IS: 1917 (Part-3)1992	%	0.11

(M. CHATTERJEE)
Technical Manager
Authorised Signatory

LAXMI ENTERPRISE

-: END OF TEST REPORT :-

4. **Manganese Di Oxide (MnO_2)** – Functions as an oxidizing media that helps in effective removal of iron, manganese, and trace arsenic contaminants from water.

R. V. BRIGGS & CO. PRIVATE LTD.

ANALYTICAL CONSULTING & TECHNICAL CHEMISTS

6, SIRAJ-UD-DOULA SARANI, WATERLOO STREET,
GROUND FLOOR, KOLKATA - 700069
Phone : (033) 4601-8607, Mob. : 9830076328
E-mail : info@rvbriggs.com, Website : www.rvbriggs.com
CIN : U51109WB1931PTC007007

TEST REPORT

Certificate No. G/25-26/114 **Issue Date: 30 May 2025** **Page 1 of 1**

Issued to	:	**M/s. LAXMI ENTERPRISES** 15, Krishna Kamal Bhattacharjee Lane, Howrah - 711102
Your Ref. No.	:	E mail dtd.22.05.2025
Description of sample	:	Manganese Dioxide
Mark on Sample	:	Manganese Dioxide 60%, Brand- Manganese Dioxide KT, Quantity-500 gm.
Sample Submitted by the Party on	:	22.05.2025
Analysis Started on	:	24.05.2025
Analysis Completed on	:	29.05.2025

TEST FINDINGS:

Sl. No.	Test Parameters	Test Method	Unit	Results
1.	Manganese (Mn)	IS: 4032 - 1985	%	3.80
2.	Manganese Dioxide (MnO_2)	IS: 4032 - 1985	%	5.35
3	Iron (Fe)	IS: 4032 - 1985	%	35.18
4.	Silica (SiO_2)	IS: 4032 - 1985	%	36.03
5.	Acid Insoluble	IS: 4032 - 1985	%	63.97
6.	Moisture Content	IS: 4032 - 1985	%	0.34

(M. CHATTERJEE)
Technical Manager
Authorised Signatory

-: END OF TEST REPORT :-

LAXMI ENTERPRISE

5. **Arsenic Removal Media (Alumina Balls)** – High adsorption media specially used for absorbing and removing arsenic contamination from drinking water.

Dr. Sirshendu De
Professor
Department of Chemical Engineering
IIT Kharagpur, PIN - 721 302, INDIA.

CERTIFICATE OF ANALYSIS

DATE: 23.06.2025

Brand Name: CIC Activated Alumina

Manufacturer's/ Supplier's Name: Chemicals India Company

Batch No./Lot No.: 250507

TEST REPORT

PARAMETER	UNIT	TEST RESULT
Particle Size	mm	5.52 ± 0.34
Shape	NA	Round Granules
Color	NA	White
Bulk Density	g/cc	0.78 ± 0.01
pH on 10% aqueous solution	NA	7.0
Water absorption at 30°C & 60% RH	%	22 ± 1
Alumina Percentage	%	93 ± 1
Surface Area	m2/g	353 ± 2
Pore Volume	cc/g	0.4 ± 0.01

Sirshendu De

Dr. Sirshendu De
Professor
Department of Chemical Engineering
IIT Kharagpur, Kharagpur – 721302
West Bengal, India

डॉ. शिरेंदु दे / Dr. Sirshendu De
प्रोफेसर / Professor
रासायनिक अभियांत्रिकी विभाग
Chemical Engineering Department
आई. आई. टी. खड़गपुर - 721302
I.I.T. Kharagpur - 721302

Phone: 03222-283926 (O)2 83927(R) FAX: 03222-755303 *email: sde@che.iitkgp.ac.in*

6. **Yellow Sand** – Used as an additional fine filtration layer to trap small, suspended particles and improve overall water clarity.

R. V. BRIGGS & CO. PRIVATE LTD.

ANALYTICAL CONSULTING & TECHNICAL CHEMISTS

6, SIRAJ-UD-DOULA SARANI, WATERLOO STREET,
GROUND FLOOR, KOLKATA - 700069
Phone : (033) 4601-8607, Mob. : 9830076328
E-mail : info@rvbriggs.com, Website : www.rvbriggs.com
CIN : U51109WB1931PTC007007

TEST REPORT

Certificate No. MRL/25-26/28 **Issue Date: 30 May 2025** **Page 1 of 1**

Issued to	:	**M/s. LAXMI ENTERPRISES** 15, Krishna Kamal Bhattacharjee Lane, Howrah - 711102
Your Ref. No.	:	E mail dtd.22.05.2025
Description of sample	:	Sand
Mark on Sample	:	Filter Media Silica Sand, River Sand, Quantity-500 gm.
Sample Submitted by the Party on	:	22.05.2025
Analysis Started on	:	23.05.2025
Analysis Completed on	:	30.05.2025

TEST FINDINGS:

Sl. No.	Test Parameters	Test Method	Unit	Results
1.	Calcium Oxide (CaO)	IS: 8419 (Part-1) 1977	%	0.64
2.	Magnesium Oxide (MgO)	IS: 8419 (Part-1) 1977	%	0.46
3	Alumina (Al_2O_3)	IS: 8419 (Part-1) 1977	%	6.08
4.	Oxide of Iron (Fe_2O_3)	IS: 8419 (Part-1) 1977	%	3.27
5.	Potassium (K_2O)	IS: 8419 (Part-1) 1977	%	0.19
6.	Silica (SiO_2)	IS: 8419 (Part-1) 1977	%	86.21
7.	Loss on Ignition (LOI)	IS: 8419 (Part-1) 1977	%	0.44

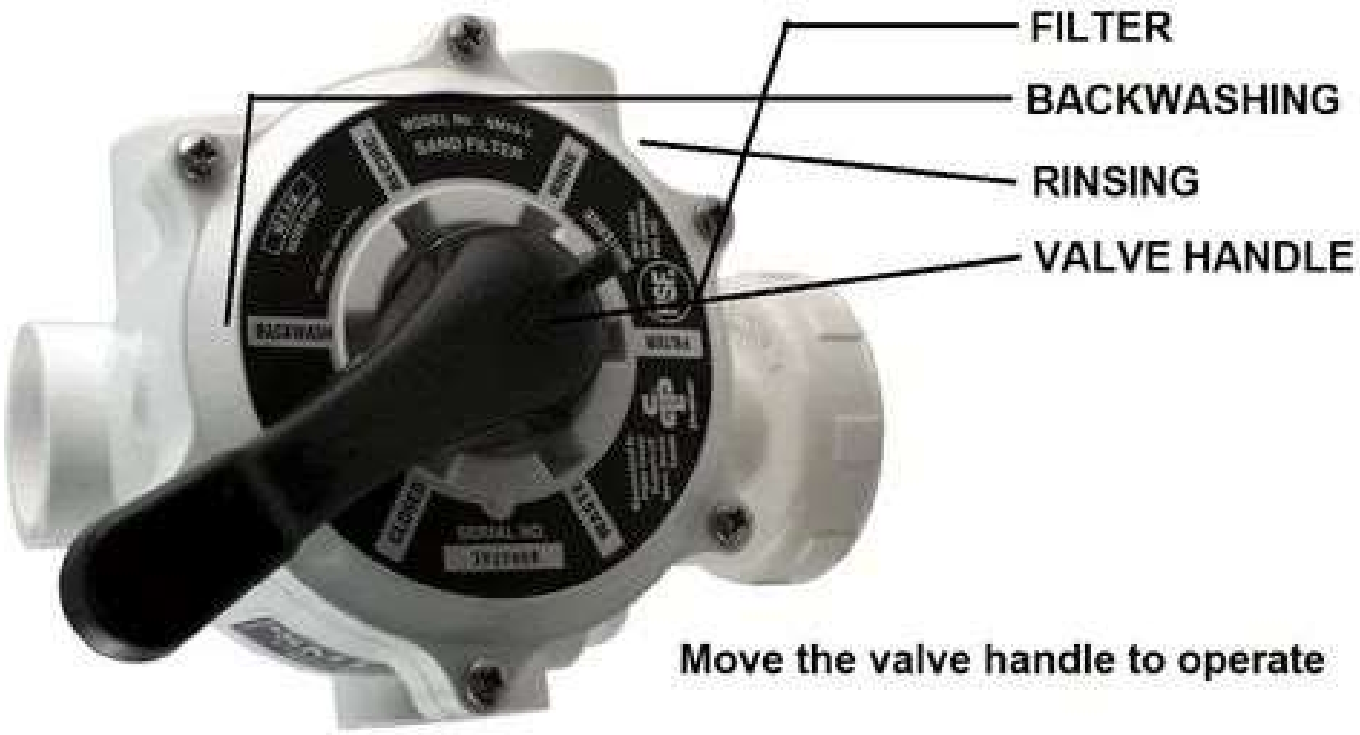
(M. CHATTERJEE)
Technical Manager
Authorised Signatory

LAXMI ENTERPRISES

-: END OF TEST REPORT :-

Multiport Valve: -

A Multi-Port Valve (MPV) has been installed in the Arsenic Treatment Plant for proper control and regulation of water flow through the filtration system. The valve connectes to the filtration vessel and is used for performing different operational functions such as filtration, backwashing, rinsing, and draining through a single operating mechanism.



The installed MPV ensures smooth distribution and direction of raw and treated water during the purification process. It plays an important role in maintaining effective operation of the filter media by allowing periodic backwashing and cleaning of the filtration bed, thereby improving the overall efficiency and service life of the treatment plant._UV Stands for Ultra Violate. Which is highly effective in killing The Arsenic Removal Plant will often include an UV Lamp for Bacterial Disinfection. to make the Drinking Water safe.

UKL Instruments Pvt. Ltd.

Office: No.232, 7th Street Astalakshmi Nagar, Alapakkam,Chennai -600 116.
Works: S.No. 62/5 & 62/3, Padur Village, Poonamallee Taluk, Thiruvallur Dist.602 105.
E Mail Id: Shreeram@uklindia.in , Website: www.uklindia.com

TEST CERTIFICATE

TEST REPORT NO	: UKL/06/25/50
BATCH NO	: 476 / 28-6-25
DATE	: 30/06/25
ITEM	: MULTIPORT VALVE
TYPE	: SIDE MOUNT FILTER - FF
SIZE	: 25 NB
QTY	: 60 NOS
HYDROTEST PRESSURE	: 6 Kg/cm2
RESULT	: OK

TEST CONDUCTED BY

(T.MURUGAN)

TEST VERIFIED BY

(S.SELVAM)

UKL INSTRUMENTS PVT. LTD. CHENNAI 600 116

- UV Purification Lamp: -

UV Stands for Ultra Violate. Which is highly effective in killing any bacteria present in the treated water. The Arsenic Removal Plant includes an UV Lamp for Bacterial Disinfection. to make the Drinking Water safe and to increase hygiene and promote public health..

Here we used 1 no’s 25W UV Lamp.

ALFA®
THE UV EXPERT
New Generation Water Purifiers

Quality Certificate

This is to certify that the Alfaa Water Purifier Model ECS007L STD bearing unit Sr. No 990698- 32566 has been Hydro-tested at 75 P.S.I. for 30 minutes without any Leakage.

The Electrical Parameters of the system were also checked and were found O.K. in all respects.

This Stainless Steel material has also been tested and conforms to SS 304 requirements.

For Ace Hygiene Products Pvt. Ltd.

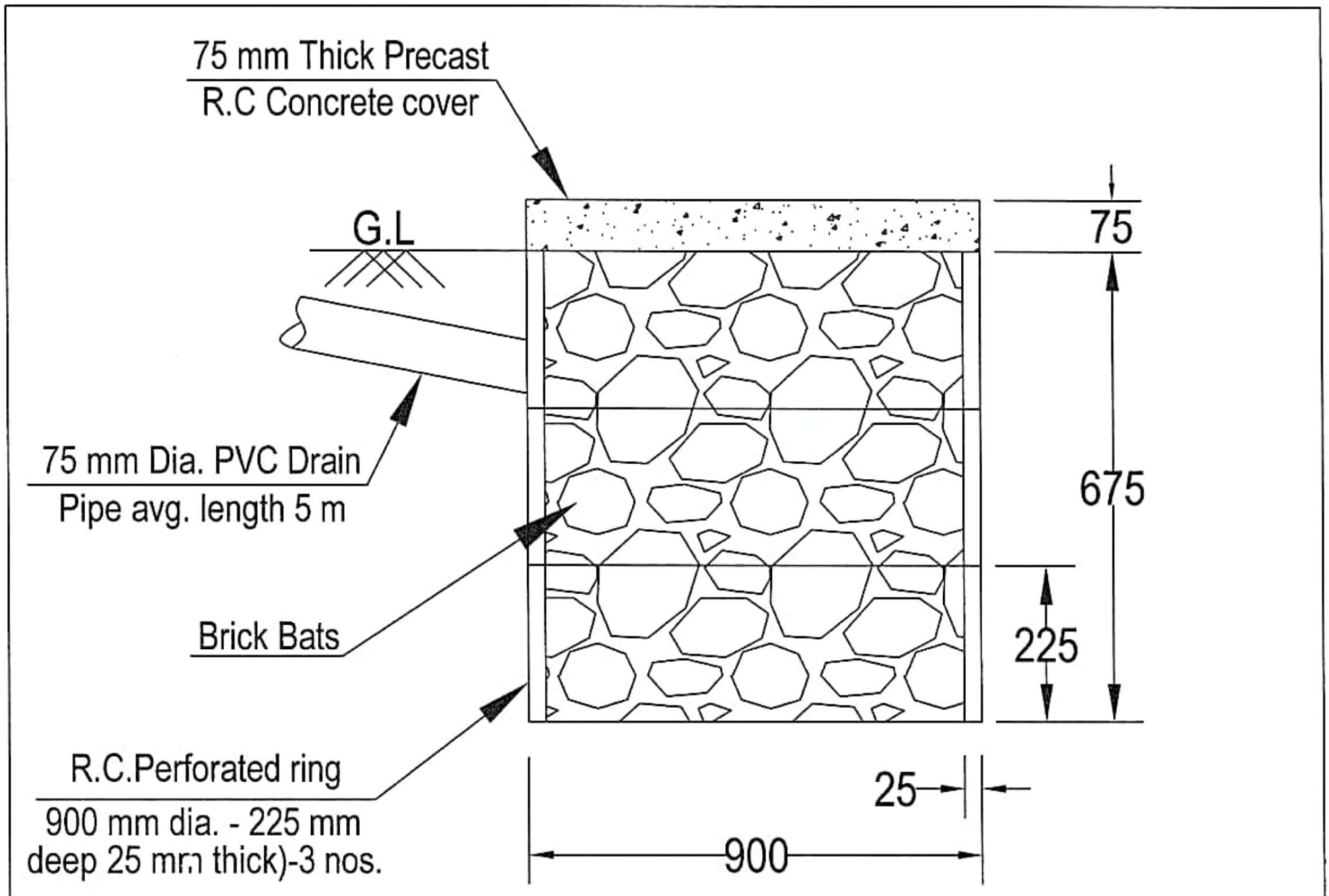
ACE HYGIENE PRODUCTS PVT. LTD.

Manager Quality Assurance

▪ Soak-pit: -

A soak pit is a simple underground structure used in an arsenic treatment plant for the safe disposal of backwash and wastewater generated during the filtration process. It helps in gradually absorbing the discharged water into the surrounding soil, preventing waterlogging and maintaining a clean plant area. The soak pit is generally filled with layers of brickbats, gravel, and coarse sand to improve percolation and filtration of wastewater before it enters the ground. It also helps in reducing environmental contamination and ensures proper drainage management within the treatment system.

In our system we have made the soak-pit of Dia 900 MM and 675 MM deep with brick Morter and filled it with gravels, Brick Bats and Coarse Sand to form a highly porous surface so the water can pass through it and directly get absorbed into soil.



Soak Pit 900 mm dia. : 750 mm total Depth.

OFFICE OF THE EXECUTIVE ENGINEER PLANNING & DESIGN DIVISION –IV P.H.E. DTE., GOVT. OF WEST BENGAL	
TITLE	Soak Pit 900 mm dia. : 750 mm total Depth.
ASSISTANT ENGINEER Planning & Design Division - IV	EXECUTIVE ENGINEER Planning & Design Division - IV
DRAWING NO. P&DD-IV/292/12-14	DATE :31.12.14

All Dimensions are in mm

▪ Earthing & Lighting Protection: -

Earthing with 50 mm Dia GI pipe 3.64 mm thick X 3.04 Mts long and 1 X 4 SWG GI (hot dip) were (4 Mts long), 13 mm Dia X 80 mm long GI bolts, double nuts, double washers incl. S & F 15 mm Dia GI pipe protection (1 Mts long) properly filled with bitumen partly under the ground level and partly above ground level driven to and average depth of 3.65 Mts below the ground level.

Lighting protection (Pole mounted); Lighting protection with 3 “X 1.5” GI pipes of 4 Mts height with base flange in S & F Lighting Conductor Air Terminal made of 20 mm dia 100 mm long GI pipe (ISI medium) having five discharge prongs of 4 SWG GI (hot dip) were at top duly soldered with 7/16 standard GI (hot dip) were an 85 mm dia 6 mm thick GI base plate at bottom including necessary holes etc. Earthing with 50 mm dia GI pipe (medium) 3.0 Mtr long and 1 X 19/10 standard GI (hot did) wire (4 Mtr long) bolt, double nuts, double washer including socketing at both ends off standard GI (hot dip) crimping socket/ thimbles and S & F 40 mm Dia GI pipes (ISI-Medium) protection (3 Mtr long) to be filled with bitumen partly under the ground level and partly above the ground level to an average depth of 3.65 Mtr.

Benefits of Solar operated Arsenic Free Drinking Water Plant

Solar-operated arsenic free Drinking water plants have many benefits. They are:

- ✓ Provides Safe Drinking Water
  Removes harmful arsenic and other impurities from contaminated groundwater, ensuring safe and healthy drinking water for communities.
- ✓ Uses Renewable Solar Energy
  Operates using solar power, reducing dependency on grid electricity and conventional fuels.
- ✓ Suitable for Remote Areas
  Ideal for villages and rural locations where electricity supply is unavailable or unreliable.
- ✓ Low Operating Cost
  Solar energy reduces electricity expenses and minimizes long-term operational costs.
- ✓ Environment Friendly
  Produces clean energy with no air pollution, noise pollution, or carbon emissions.
- ✓ Continuous Water Supply
  Can provide regular drinking water supply during daytime with proper storage arrangements.
- ✓ Low Maintenance Requirement
  The system requires comparatively less maintenance and offers long service life.
- ✓ Improves Public Health
  Reduces the risk of arsenic-related diseases and waterborne illnesses among users.
- ✓ Energy Efficient System
  Modern solar pumps and treatment units operate efficiently with minimum power consumption.
- ✓ Sustainable Solution
  Combines water purification and renewable energy technology for long-term community development.

Remarks

Still now, we have successfully completed more than 19 Nos. of Solar Operated Arsenic Free Drinking Water Projects under Murshidabad District during the financial year 2025–2026 under the supervision of the District Engineer & SAE. All the projects have been commissioned successfully and are operating smoothly without any major interruption or technical disturbance. The systems are continuously supplying safe arsenic-free drinking water to the beneficiaries and local communities as per the project requirements. Regular monitoring and maintenance activities like backwash, cleaning etc. are being carried out to ensure efficient operation and long-term performance of the plants. Till date, no complaints regarding system performance, water quality, or operational issues have been received from the consumers, local authorities, or concerned departments, which reflects the reliability and effectiveness of the implemented projects.

Water Test Report after Installation of Treatment Plant

GOVERNMENT OF WEST BENGAL
LALBAGH SUB-DISTRICT WATER TESTING LABORATORY
Public Health Engineering Directorate
LALBAGH PHE SUBDIVISION OFFICE
Lalbagh, Murshidabad

TEST RESULT Report No-LSDL/25-26/120(P)

Date of Testing :- 13/08/2025, Sample Collection Date :- 12/08/2025 , Ref. Memo No- 2043/ZP, Dated :- 15/05/2025
Sample Sending Authority/Person:-SUSTAINABLE POWER ENGINEERING & SOLUTIONS, 6/8, KSHETRA HAZRA LANE, P.O & P.S- BERHAMPORE, DIST-MURSHIDABAD.
Sample Collected by :-BISWAJIT MONDAL (LA/LABAGH SDL), Type of Source- CWPP, Type of Sample :-Drinking Water , Grips Payment ID-130820252021072535

Chemical Test finding

Parameter	Desirable Limit*	Permissible Limit in absence of alternate Source *
pH	6.5-8.5	No Relaxation
Turbidity(NTU)	1	5
Total Hardness(as CaCO3),mg/l)	200	600
Arsenic(mg/l)	0.01	No Relaxation
Iron(mg/l)	1.0	No Relaxation
Mn(mg/l)	0.1	0.3

SL NO	LOCATION	IRON(TREATED)	ARSENIC(TREATED)
1	INDRADANGA GOIBAHARIA MASJID	0.16	0.004
2	HASANPUR JAMIA DARUL ULOM MADRASAH	0.18	0.005
3	SADAKBAG JSSP VIDYALAYA	0.29	0.005
4	PROSADPUR PURATANPARA NEAR MASJID	0.15	0.004
5	MAHINAGAR BALAK SAMITI MATH	0.16	0.002
6	INFRONT OF BAMIJER HOUSE	0.20	0.002

* Drinking Water- Bureau of Indian Standards (BIS) IS:10500:2012, Drinking Water Specification 2012 and Amendment No. 1 JUNE 2015

Signature Sample Collector

14.08.25
Asst. Engineer
Lalbagh Sub- Division
PHE Dte, Govt of WB

12/08/2025
Chemist
Lalbagh Sub District Water
Testing Laboratory

GOVERNMENT OF WEST BENGAL
LALBAGH SUB-DISTRICT WATER TESTING LABORATORY
Public Health Engineering Directorate
LALBAGH PHE SUBDIVISION OFFICE
Lalbagh, Murshidabad

TEST RESULT Report No-LSDL/25-26/120(P)

Date of Testing :- 13/08/2025, Sample Collection Date :- 12/08/2025 , Ref. Memo No- 2043/ZP, Dated :- 15/05/2025
Sample Sending Authority/Person:- SUSTAINABLE POWER ENGINEERING & SOLUTIONS, 6/8, KSHETRA HAZRA LANE, P.O & P.S- BERHAMPORE, DIST-MURSHIDABAD.
Sample Collected by :-BISWAJIT MONDAL (LA/LABAGH SDL), Type of Source- CWPP, Type of Sample :-Drinking Water , Grips Payment ID-130820252021072535

Chemical Test finding

Parameter	Desirable Limit*	Permissible Limit in absence of alternate Source *
pH	6.5-8.5	No Relaxation
Turbidity(NTU)	1	5
Total Hardness(as CaCO3),mg/l)	200	600
Arsenic(mg/l)	0.01	No Relaxation
Iron(mg/l)	1.0	No Relaxation
Mn(mg/l)	0.1	0.3

SL NO	LOCATION	IRON(TREATED)	ARSENIC(TREATED)
7	MUKUDAPUR ID GAHA	0.19	0.002
8	SANKORIA PRY SCHOOL	0.15	0.003
9	PANCHGRAM UTTOR MORE	0.17	0.002
10	INFT OF MILKY MADRASAH	0.18	0.002
11	MILKY PALASHY VILLAGE, HOUSE OF MIJAN SK	0.19	0.003
12	RAMDANGA MORE	0.15	0.002

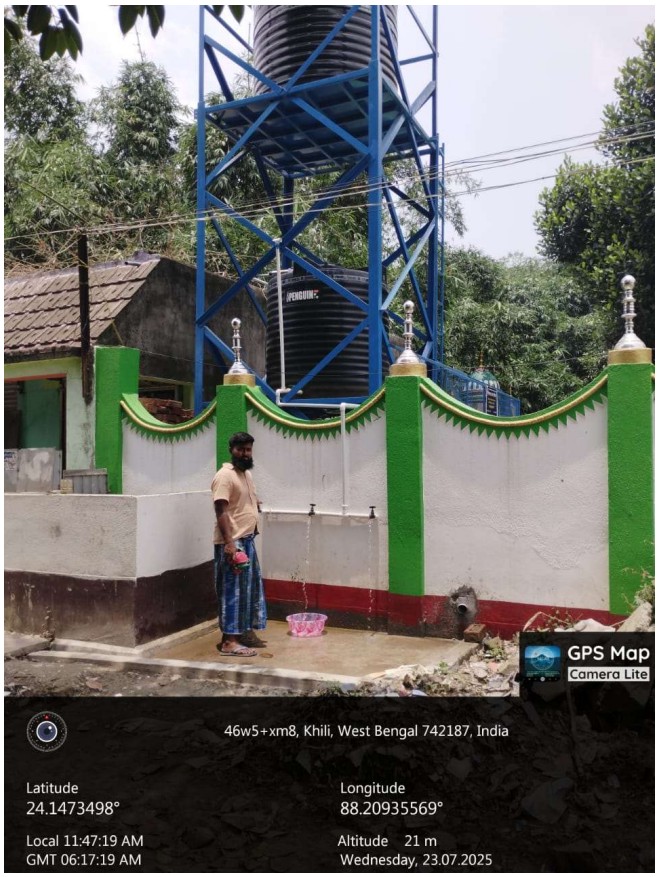
* Drinking Water- Bureau of Indian Standards (BIS) IS:10500:2012, Drinking Water Specification 2012 and Amendment No. 1 JUNE 2015

Signature Sample Collector

14.08.25
Asst. Engineer
Lalbagh Sub- Division
PHE Dte, Govt of WB

12/08/2025
Chemist
Lalbagh Sub District Water
Testing Laboratory

Photo Gallery of the Project Work




GPS Map
Camera Lite
662m+2rf মুকুন্দবাগ ঈদ গাহার ময়দান, Ghanasyampur, Mukundabag, West Bengal 742160, India
Latitude
24.19891264°
Longitude
88.2345032°
Local 02:24:40 PM
GMT 08:54:40 AM
Altitude 21 m
Wednesday, 23.07.2025


GPS Map
Camera Lite
462, Jiaganj, Azimganj, Jiaganj Azimganj, West Bengal 742149, India
Latitude
24.24726981°
Longitude
88.25597722°
Local 02:44:24 PM
GMT 09:14:24 AM
Altitude 24 meters
Wednesday, 23.07.2025


GPS Map
Camera Lite
67c6+hv9, Azimganj, Mahinagar Diar, West Bengal 742160, India
Latitude
24.22175352°
Longitude
88.26195749°
Local 03:14:48 PM
GMT 09:44:48 AM
Altitude 25 m
Wednesday, 23.07.2025


GPS Map
Camera Lite
59PX+QW4, Hulaspur, West Bengal 742302, India
Latitude
24.18703833333333°
Longitude
88.39992666666667°
Local 02:53:31 PM
GMT 09:23:31 AM
Altitude 18 meters
Thursday, 24.07.2025

- ***Bibliography & references: -*** i) www.google.com, ii) www.wikipedia.com, iii) www.ksb.com, iv) www.deltaacdrives.com, v) www.hrsolarsolution.com vii) www.penguintank.com, viii) www.utkarshindia.in, viii) www.uklindia.com etc.