

**Rehabilitation of seven groundwater wells in Nablus and Jericho Districts**

**Supporting economic growth through optimized agricultural value chains in the West Bank**

**Needs Assessment Report and Draft Design Report**

**Date: 31-7/2016**

**Prepared by: Eng. Abdul-Latif Khalid**

The Food and Agriculture Organization of the United Nations (FAO) is an intergovernmental Organization with more than 192 [member countries](http://www.fao.org/unfao/govbodies/membernations3_en.htm). Since its inception, FAO has worked to alleviate poverty and hunger by promoting agricultural development, improved nutrition and the pursuit of [food security](http://www.fao.org/spfs/) - defined as the access of all people at all times to the food they need for an active and healthy life. (Further and more detailed information on FAO can be found on the internet site: [http://www.fao.org)](http://www.cern.ch)/).

This project entitled as:”supporting economic growth through optimized agricultural value chains in the West Bank”. It is funded by the Government of Canada through the Department of Foreign Affairs Trade & Development (DFATD). It intends to sustainably contribute to economic growth and welfare of Palestinian People through the improved income and labor productivity in agribusiness. The project envisages the achievement of five outputs along with agricultural value chains of which output number one aims to improve viability and management of land and water resources. For this purpose this activity of the wells’ need assessment for 7-wells was carried out.

**وثائق عطاء مشروع تأهيل الآبار الجوفية في مناطق محافظتي نابلس وأريحا**

Tender documents for the Project:

**“Groundwater Wells Rehabilitation Project in** **Nablus, and Jericho Districts”**

**Article 1: INVITATION TO TENDER**

Within the framework of the above mentioned project, the The Food and Agriculture Organization of the United Nations (FAO and in coordination with the Ministry of Agriculture (MoA) are working to rehabilitate 7- groundwater wells in Nablus, and Jericho Districts. The project is funded by the Government of Canada.

**The following instructions have to be taken into consideration for tendering:**

* The Tenderers must have valid company registration and classification at the Palestinian Contractors Union at least 2rd degree in water works.
* Tenderers should provide a Valid Discount Certificate issued by the Income Department.
* Tenderers should submit a guarantee of 5% bid bond, valid for 90 days from the closing date in the form of a bank guarantee or a certified bank cheque forms only.
* Tender includes zero vat,
* All expenses related to advertisement shall be paid by the successful bidder.
* The Tender Dossier is available at a non-refundable cost of ………….. $US at ………… office in ………. from ………..to ……… 2016, from 9:00 to 15:00 during the workdays.
* The tenderers should present its valid classification and registration documents upon the collection of the tender dossier. We will not hand the tender dossier in case of no valid documentation.
* The tenderer may himself conduct field visits and find where exactly the cisterns will be constructed.
* Tenders will be submitted at ………… office in ……….. only at the address below on …………. ……… 2016, before 12:00. Bids will be opened in the presence of the bidders’ representatives at 12:30.

For further information you can contact

FAO Jerusalem,25 Mount of Olives Street, Sheikh Jarrah, P.O. Box: 22246

Tel: (+972) (0)2 532 1950 / 532 2757/ 581 5517, Fax: (+972) (0)2 540 0027

**All the best,**

**Article 2: General Instructions:**

1. The tenderer must read the whole tender documents and stamp each page inside.
2. The third and fourth parts of this tender must be filled and stamped where stated and the whole tender will be canceled if they were no completed.
3. The tenderer could attend or send someone to represent him during the opening session.
4. Opening session of tenders
   1. Every tenderer may attend the opening session of the tenders mentioned in the Invitation for tender or send a representative with a letter that authorizes the representative to act on behalf of him.
   2. The coordinators of the project have the right to recall the tender if the number of participating tenderers is less than three.
5. The following issues will be taken into consideration in the phase of evaluation and selection of the contractor:
   1. Unit price in bill of quantity items;
   2. Timetable for completing the works;
   3. Experience of the contractor especially in the field of sanitation and hygiene construction. He should attach in his offer the technical capabilities and power to accomplish this project.
   4. The work plan
6. Tender documents: the tenderer will get the text copy and he will pay for that 100 NIS and this is not refundable in case he failed to win the contract.
7. Main contents: The contractors should be entitled to accomplish all activities mentioned in this tender. Any missing or rejection to implement whatever of the activities in this tender will make him lose the tender. The contractors should submit their offers on the original documents supplied to him. All figures and words must be clear and consistent. In case their inconsistency, the tender opening session will consider the written value.

The contractors should be hand filled and all the writings in black –pen colors which include the following:

* The tender documents
* The bid bond
* The BOQ
* The field visit
* The contractor profile pages

1. **The field visit**: The contractors should visit the worksite and receive all information necessary to enable them to supply the materials and implement the project; and this should be done upon their responsibilities to inquire and investigate the whole project area. They are free to ask for clarification at any point mentioned in tender taking into consideration the risks and responsibilities to carry the project in such remote distance in area C.

The contractor will not be paid for any visits or data gathering and logistics to submit this tender.

1. **Quantities:** The quantities declared in this tender are best estimates for the reality. Therefore, they are not fixed to the value mentioned in the BOQ. Any change (increase or decrease) should not affect on the unit price up to + or - 25%. If such change will happen, the contractor and the project committee will agree to set the new unit price for such items. . Payments and final prices will be determined according to the unit price, which is presented by the contractor and to the actual measured quantities.
2. **Work plan:** the contractor is obliged to submit a full work plan to carry all the activities in this tender. The work plan is a main criterion in evaluation selection for the wining tender. The contractor should submit daily plan of activities, and get approval by the supervising engineer. The contractor should provide the supervisor engineer by shop drawings for implantation.
3. **Plants and equipments:** Each tenderer shall submit a table describing the main plants and equipment that he will use for the implementation of the works, complete with description, use period and number by filling form as shown in article 5
4. The contractor shall submit a list of names and qualifications of all the expert persons who will take part into or follow the implementation of the works, specifying their qualification and experience by filling form article 5

1. **The bank guarantees:**

a. **Bid bond guarantee:**

* + 1. The tenderer shall submit together with the tender documents a certified check or a bank guarantee equivalent to 5% of the total tender value to the order of FAO. The bank guarantee will be issued by a bank duly licensed in Palestine and shall be valid for 60 calendar days. Any tender with no certified check or bank guarantee attached will not be accepted.
    2. If the Tenderer’s offer is rejected, then the Opening tender committee will return the guarantee to the tenderer.

b. **Performance guarantee:**

The successful tenderer shall submit a performance guarantee or a certified check of 10% of the total amount of his tender to the order of FAO, valid for the duration of the works.

c. **Maintenance guarantee:**

After finishing all works and issuing the final Handing over Certificate, the contractor shall submit to the order of FAO a maintenance guarantee for the project of an amount equivalent to 5% of his tender and valid for one calendar year starting from the date of the final Handing over. During the maintenance period the contractor will be informed by the Project committees and by FAO about the technical damages that he shall repair immediately. If the contractor will not respond within two days, then the Project committee will repair the damages on contactor own expense and the money will be taken from the performance guarantee through a payment order issued by FAO to the bank that issued the guarantee.

1. **Liability and Insurance:** For the whole period of the project, the Contractor shall be liable for all damages caused by himself, his agents or persons employed or Third Party in any way engaged by him for the execution of the works including the engineering staff. Therefore, the contractor must submit valid work insurance for the whole period of work and cover all works, machines his workers and including the contracting authority engineering staff. The upper coverage limit should be not less than 150000 dollars.
2. **Contractor’s experience:**

The contractor shall submit Curriculum Vitae of the company, as in attached form article 5including the following information:

* + 1. Name of the organization and address. The address will be considered the official address to which all the correspondence and notices will be sent;
    2. Description of achieved and ongoing works (especially in the field of water works and equipments) including their value;
    3. List of the permanent staff of the company (engineers, technicians and general staff)
    4. List of main equipments rented and owned, attaching the rental contract if rented.

1. **The unit rate and prices** shall be quoted by the tenderer entirely in NIS including the submission of zero VAT bills and a valid Discount Certificate issued by the Income Department.
2. **Amendment of mistakes:**

a. If there is any contradiction between the rates written in numeral and those written in words, then the rate written in words shall be considered binding and the tender sum should be adjusted accordingly.

b. If there is any error or contradiction was found between the given total of any item or the total tender value and what is actually derived from application of the unit rates and prices. Then, the opening tender committee has the right to amend the total of such an item and the total of all amounts (tender sum) according to the unit rates and prices of such item(s).

c. If there should be any error in mathematical operations, then the sums should be corrected by the opening tender committee and the correct tender sum should be binding to the tender.

d. If there is mistakenly written number or word, the contractor should rewrite correctly and clearly, followed by his signature and stamp.

1. **Submission of offers:** The Tenderer should complete, sign, stamp and date all the pages of all the Tender’s documents. He should submit them to the right address and the specified time as mentioned in the invitation letter. The tender opening session committee will cancel any tender that doesn’t meet these criteria.
2. **Signing the tender offer and the contract:**

The tender opening committee will cancel any tender contains vague- irrespective information and documents or unnecessary comments on the project value and formats. Only, those audited tenders will pass to the final evaluation phase. The tenderer should clearly indicate the following:

* 1. If the presenting tenderer is one person, he shall write his full name and stamp.
  2. If the presenting tenderer is more than one partner, he shall sign and attach a formal document to prove that he is authorized to sign on behalf of his partners. He shall also write name and address of the partners.
  3. If the presenting tenderer are companies, or he is a subcontractor and a part of the works to another company, then the manager(s) of this company will also sign the tender documents and submit their CV as in form article 5 and attach a formal document to prove that he is authorized to sign on behalf of his partners.

1. **Rejecting the tender:** The tender opening session has the authority accept and reject any tender without the need to justify such action. The contract will be awarded to the tenderer whose tender has been determined and proven to be the most advantageous and the best offer. This shall not necessarily be the tender with the lowest submitted price.
2. **Price analysis:** The tender opening session has the right to ask for price analyses for any item or the whole tender prices. Meanwhile, the tender opening session is not obliged to accept the lower prices as the wining tender.
   1. The tenderer shall submit together with the tender documents all the useful documentation (catalogues, price lists etc.) and contact addresses of the manufacturing companies supplying the materials mentioned in the bill of quantity, in order to allow the opening tender committee to evaluate the offers.
   2. If the Opening tender committee notices unreasonable unit rates and prices, then the committee has the right to request an explanation and analysis of the presented prices from the tenderers and to have a response.
3. **Penalty for delay**: The contractor shall complete the works within the agreed period. If the contractor failed to achieve the completion of the works within this period, the contractor shall pay to the contracting authority a penalty of 200 dollars for every calendar day. The penalty will be applied starting from the first day of delay without the need of any notification. The contractor can present an explanation for his delay within 3 calendar days, which will be evaluated by the FAO together with Project Representative. If he does not present a written explanation within the above mentioned period, so the FAO and he local committee will not consider any reason for delay.
4. **Payments:**
   1. There are no advance payments for the project.
   2. All payments shall be made by FAO after submission of original invoices and a valid no reduction certificate by the contractor and following the authorization and approval of the field engineers about the completed works (conforming to the technical specifications and the achieved quantities).
   3. The total amount of the invoices should be 100% of the work and materials in any payment. FAO will pay only 90% of the requested amount within four weeks after the engineers’ approval and authorization and after the contractor has issued an invoice for this amount.
   4. Upon completion of the works the contractor shall submit a request of payment which will include the 10% still unpaid of the previous payments.
5. **The contractor** should keep a daily record of all works and actions at the project site. Meanwhile he should inform the supervisor engineer with the list names of the worker at the site or any change in the plan of work.
6. **The contractor** should document all works through digital or card pictures. At least these pictures should reflect the initial conditions, during implementation and the final shape of the project.
7. **The contractor** should handle all the traffic safety measures during work and insure secure working times. The contractor who fails to be adequate to these safety rules will pay a penalty of 200 $US/day. The contractor is the only party who is responsible for the safety of his workers, machines for the project. The supervisor engineer(s) is not responsible for any accident that may happen during the work, and the contractor is eligible to ask for any kind of compensation to any kind of harm that may happen to him during the work.
8. **The prices** in this tender include the reparation and/or compensation for any damage that may happen to the surrounding environment during the project implementation. This includes damages to the roads, stone walls, asphalt and concrete structures, cesspits…etc. The contractor should bring back the effected structure to its original conditions and function.
9. The wining contractor should immediately start the implementation after signing the contract; and he must complete all work within maximum of 30- calendar days.
10. The contractor should submit a valid registration to the Union of Palestinian Contractors.
11. The contractor must provide the tender opening committee with all useful documentation (catalogues, price lists etc.) and contact addresses of the manufacturing companies supplying the materials mentioned in the Bill of quantity.
12. The winning contractor must submit implementation work plan and shows clearly how he will accomplish each activity. He should first get the supervisor engineer approval before going to work.
13. **Disputes and Arbitration:** Any dispute arising out of the interpretation or application of the terms of this contract shall, unless settled by direct negotiations, be referred to an arbitrator who shall be appointed jointly by the parties. The decision of the arbitrators shall be final and binding upon both parties. The costs of arbitrations will be paid by the contractor
14. **All conditions of works, specifications in this tender are technically and financially linked to the attached drawings.**
15. The contractor should prepare materials **samples, according to the attached specifications and drawing. Then** the supervisor engineer will inspect its details and see if there is any thing missing or requires modification. After making all changes, the contractor will get an approval letter by the supervisor engineer to supply the materials with specified quantities and should be exactly as the final approved sample.
16. This project will be implemented in several communities including seam zone in area C, therefore; the contractor is responsible to get all ways of access **and supply the materials and implement the project in these areas; moreover the contactor must be aware that he may face work stoppage or seizing of his equipment; the contractor must be prepared for all that and the contracting authority is not responsible for any kind of loss or damages (and with no financial compensation) that may happen to the contractor working staff or equipment and power plant and machines. The contractor should put a flexible work plan (choose the suitable times and machines of work) that takes into consideration the worksite conditions and avoid as possible all such warns to stop the work.**
17. The prices include fixing a logo sign on each well according to the specifications shown below. It also includes documentation of the work by having 10-digital photos and a 5-minutes video film for each stage of work.
18. The Contractor should start immediately and after signing the agreement with the project implementation. Knowing that the total permissible period to complete the whole activities and submit the project is **150** Calendar days. If the contractor fails to accomplish the work during this period he will pay a penalty of 200 dollars per day of delay. The working hours are defined as the time every day except the official holidays between 7:00 am and 4:00 pm. If the contractor wants to work out of the days and time shown above, then he should get a permission letter from the contracting authority showing exactly the new working times. Under whatever the conditions the contractor is not allowed to install the turbine without the consent and witness of the supervisor engineer.
19. After completing all activities, the contractor must submit as built drawing for mechanical and electrical works including the control panel detail design for power and control. The contractor should test the well for safety operation including the human and technical safety. The contractor should submit a technical report for the first 10-working hours and another report for first 100 working hours. These reports should reflect all electrical measures as voltage, ampere, hertz; moreover, well’s discharge, static and dynamic water levels, electric motor temperature, power consumption..etc. The contactor will cover all costs of operation during the first 10 working hours including the diesel cost and all power costs. The contractor must be available on call for the first100 working hour.

**Article 3: Technical Specifications, Bill of Quantity and Pricing**

###### Description of the Works and Technical Specifications

The contractor shall submit in his offer and supply maintenance manuals, catalogs, characteristic curves, testing certificates, shipping, forms of lading documents and specifications of pumps, motor, fittings, mechanical and electrical control devices, cables, wiring and all accessories and ancillaries to complete the work. All materials must be new and not renewed in accordance with the specified specifications. The contractor should verify the existing dimensions and sizes for each well before ordering any equipment or materials. This applies to all dimensions and figures mentioned in the BOQ and particularly the hole diameter and well depth, pump diameter and length of pumping pipes, shafts diameter, discharge head inlet and outlet. The sizes mentioned in this contract are the best estimate of information we got for this well, and the contractor should be responsible technically and financially to supply the suitable materials sizes for installation. Moreover, the contractor should check for the adequacy of the electric supply sources (the transformers capacity and output voltage and power) and to make all tests to verify that they are suitable for the supply materials

**The price for any item in this tender includes supplying the materials as described in each of the items in the BOQ and all the works related item including works to excavation, painting, cleaning, backfilling, to disjoin the existing materials and install and test the supplied materials. The main points that the contractor should consider in this tender are:**

1. The winning contractor must submit implementation work plan and shows clearly how he will accomplish each activity. He should first get the supervisor engineer approval before going to work.
2. The contractor should submit shop drawings for all piping and fittings, booster design layout, concrete reinforcement, pumping layout, supply and distribution survey map….etc. Moreover, at the end of work the contractor should submit as built drawing for all works and constructions.
3. The contracting authority has the right to divide the tender between two or more contractors. The contractor should be obliged to this decision without complains or asking for compensation. The contracting authority could take this decision without explaining to the contractor/s the reason for that. The contractor must be obliged and committed to sign the contract for the part of tender works that he was chosen to implement it. The contracting authority could take this decision: a- if there is clear differences in the item prices between the contractors b- technical capacity and qualification for certain items in the tender by one contractor more than the other c- any other reason the contracting authority find it suitable for the whole project. Therefore, the contractor should analyze and have his offer price for each item independently of the other items.
4. **All conditions of works, specifications in this tender are technically and financially linked to the attached drawings and specifications.**
5. The prices include fixing a Metallic sign on each well according to the specifications …….
6. The tenderer is strongly advised to visit and inspect the site of the works and its surroundings for the purpose of assessing, at his own responsibility, expense and risk, factors necessary for the preparation of his tender and the signing of the contract for the works.
7. A clarification meeting on the administrative/technical aspect of the tender dossier together with the site visit will be held by the Contracting Authority, as per communicated in the Tender notice.
8. The Contractor shall take full responsibility for the adequacy, stability and safety of all operations and methods of construction under the contract.
9. The units prices of all items mentioned in the BOQ include all conditions and technical specifications which are shown under the item “Technical Specifications, Bill of Quantity and Pricing”

**Mechanical and Electrical Works:**

**Turbines**: The contractor should attach in his offer type of turbine and details information on it if either imported as foreign turbine or locally made one. In any of the two cases, he should include the manufacturer brand name, performance and testing curves (and due point), full specifications of manufacturing materials and dimensions of the stages, bowels, main shaft, retainers, stabilizers, lockers, etc. . The contractor must submit the turbine original performance/testing curve from the company or from an approved turbines test lab. Before installing any new materials, the contractor must get the initial records for existing conditions of the well including: the well pumping capacity in m3/hr, water level inside the (dynamic and static). These tests must be reported before start any import and supply orders. Therefore, the contractor must prepare suitable water meter and water level meter to carry on these measures. The contractor will not be paid any money for taking these records and their cost will be considered as undeclared/indirect costs that are already included in the turbine price.

**Fittings:** All fittings in this project must meet the standard specification mentioned in Annex 1. The contractor should install them wherever the supervisor engineer decides within each project area and not to claim any variation for that. The installation process includes all works such as excavation in all kinds of rocks and soils, welding, shaping, cleaning the site of work and painting.

The contractor shall submit in his offer and supply maintenance manuals, catalogs, characteristic curves, testing certificates, shipping, lading documents and specifications of pumps, motor, fittings, shafts, gear box and gear disks, retainers, pumping pipes, mechanical and electrical control devices, cables, wiring and all accessories and ancillaries to complete the work. All materials have to be new and not renewed in accordance with the specified specifications. The contractor should verify before ordering any equipment or materials, all dimensions mentioned in the following specifications including the well's hole diameter, pump diameter, columns diameter, discharge head inlet and outlet. The sizes mentioned in this contract are the best estimate of information we got for this well. The contractor should be responsible technically and financially to supply the suitable materials.

* The declared prices in this are zero VAT.
* In his offer the contractor should submit maintenance manuals, catalogs, characteristic curves, testing certificates, shipping, lading documents and specifications.
* The declared prices of the items of bill of quantity involve supplying the required materials and achieving all works related with these items.
* The unit prices involve supplying, distributing and assembling all above items.
* The Contractor must supply a Certificate of origin for all the items supplied, together with the request of payment and the invoice.
* The unit prices involve checking and operating the pumping equipment both during the implementation of the works and before the handing over successfully.
* The works will be implemented in several locations in Nablus, and Jericho Districts .
* The awarded contractor shall deliver the materials to this location and implement the works according to the tender documents and the bill of quantity.
* All dimensions and diameters mentioned in the bill of quantities which concerns the existing pumping equipment (lifting pipes, turbine, column shafts, discharge head ,etc) have to be checked and verified by the contractor and inform the supervisor engineer and take the approval from him before order or try to replace any of them with new ones. Otherwise, the contractor is responsible for supplying the wrong materials particularly the turbines and other pumping accessories.
* The contractor must supply all the electrical materials according to the brand names in the BOQ or other brands must be attached to the tender and approved by the tender opening committee.

**The Vertical Hollow Shaft Electric Motor Set** shall be complete with the accessories and ancillaries needed in accordance with the following specifications:

* An efficient approved engine speed 1500/1800 rpm inverter duty VFD and fitted to maintain engine speed at all condition of load.
* The cooling system shall be a closed type with, class F insulation, temperature rise class B, and internally built thermal senor to be connected to the MCB.
* The Electric Engine set shall be mounted on a suitable reinforced concrete foundation with common steel frame and no vibration and high thrust capacity
* Other standard parts and instruments needed for good operation. As power factor at full load not less than 90% and efficiency at full load not less than 94%
* Winding design as standard 3-phase motor 415 V, 50 Hz and permissible and preferences for variable speed motor or duty frequency motor (in the range between 10-70 Hertz), tolerance of 10% in voltage in the range 380-480 volt.
* Rated and output power apply for standard ambient conditions of 40°C
* Motor frame, end shields, terminal box are made of cast iron, fan made of sheet stainless steel.
* High capacity bearing, single output shaft of stainless steel
* Degree of protection as standard IP 56
* The offer must be supplied with catalogue (M&O) for the motor set, curves power, efficiency, engine specification and test certificate, etc…
* The contractor is responsible to issue a 1 year warranty starting from the date of the taking over certificate.

**The Diesel Engine Set** shall be complete with the accessories and ancillaries needed in accordance with the following specifications:

* The Diesel Engine shall be a multi –cylinder in line, vertical stork diesel engine, with direct injection compression, ignition continuously rated, water cooling fan drive, lubricating oil filters, air cleaner starts motor, battery charging alternator or dynamo and regulator, multi –cylinder fuel injection pump, fuel control solenoid, fuel left pump, engine speed adjustment, automatic staring and shutdown control panel, emergency stop.
* The Engine will be fitted with heavy dynamically balanced flywheel suitable for constant speed generator duty.
* An efficient approved engine speed governor is fitted to maintain engine speed at all condition of load.

The cooling system shall be a closed water type with a tropical radiator and blower type cooling fan, and with protection ,mesh outside the radiator frame.

* The engine shall be offered with an exhaust silencer, flexible pipe and the necessary piping to connect it complete as needed.
* The diesel Engine set shall be mounted on a suitable common steel frame
* Other standard parts and instruments needed for good operation.
* The offer must be supplied with catalogue (M&O) for the diesel Generator set (every unit) spare parts, curves power, efficiency, engine specification and test certificate …..etc.
* The contractor must operate the diesel, motor or generator for 100 hrs as running test before he gets approval on receiving it. During this period, the contractor is responsible to replace all necessary parts like fuel, oil and air filters, and the lubrication oil.

**Diesel Generator Control Panel**

* An Electrical Board (waterproof) shall be fixed with the diesel generator set as one unit, which shall be, contains all of the following additional instrument and accessories needed with the engine:

a)- Suitable auto transfer switch as needed.

b)- (50-1000) Ampere Current meter

c- (0-500) volt meter

d)- Power (Kw/hr) meter

e)- 3-position, selector switch (Auto ,off , manual ) (A,O,M)

f)- (On-Off) push button set

g)- Running hour meter

h)- Water thermometer

i)- Lubrication oil pressure gauge and temperature

j)- Electrical safety devices against low oil pressure, high water temperature, no

water in radiator over speed and overload control.

k)- Suitable New Battery (2x12 volt -110/120 A.hr) or as needed with high

efficiency and quality, with suitable cables.

**Diesel Generator** of ( xxx- KVA) according to these specifications:

* phases : 3
* 4 cycle water cooled engine
* rpm/min.: 1500
* volt : 400/230
* Hz.: 50
* Production year not less than 2014
* exhaust silencer with flexible pipes, and other needed accessories
* shutdown solenoid
* insulation class F

**Air inlet system**:

Dry cartridge type air filter,

**Circuit Breakers**

3 Pole molded case circuit breaker mounted on the generating set in a vibration isolated sheet steel box

**Control Panels**

A Series Control Panel must be set mounted key start panel in a vibration water and dust proof IP65 sheet steel enclosure with a hinged lockable door. And microprocessor controller

**The control panel is equipped as follows**:

a) Instruments: Voltmeter, Ammeter, Frequency Meter, Hours run meter, Temperature, Coolant temperature gauge, Oil pressure gauge, Battery Condition Voltmeter, rpm meter, alarm horn

b) Controls: Run/Stop Auto Control switch, Voltmeter Phase selector switch

* Ammeter Phase Selector Switch Emergency Stop Button, Lamp test button,
* Electronic voltage regulator with no load to full load deviation -+ 2%.

3 Attempt start timer,

c) Shutdown Protection Devices with Indicators for: Fail to start protection, High Coolant Temperature, Low oil pressure, Over speed shutdown.

d) DC and AC Wiring looms

**Cooling System**

Tropical water radiator and Cooling fan, to cool the engine in ambient temperatures up to 50 deg C (122deg F)

* Coolant Drain valve
* 50% Anti-freeze (Protection to -36 deg C)

**Fuel System**

Daily Fuel tank as recommended by the manufacturer complete with contents indicator, fuel fill cap with breather, fuel feed and return lines to engine and drain plug, including alarm to indicate the low level of fuel. Fuel hydra-mechanical governor or approved equal.

**Literature**

Full set of operation and maintenance manuals circuit wiring diagram and commissioning/ fault finding instruction leaflets,

**Lube System**

* Full pressure flow lube oil filters
* Lube oil drain valve

**Mounting System**

Engine and alternator assembly isolated from the steel base frame using anti-vibration mounts. Fan, fan drive and battery charging alternator drive fully CE guarded for personal protection. Base frame incorporates integral fuel tank with capacity for approx. 8 hours running

**Starting/Charging System**

* 24 Volt system with battery charging alternator guaranteed for 2 years
* Axial type starting motor
* High capacity maintenance free lead acid starting battery
* Battery rack mounted on the generating set base frame . Heavy duty interconnecting cables with terminations

**General**

All equipment must be guaranteed for a period of (3,000 working hours or two years which ever finishes earlier) from the date of commissioning

**Alternator System**

* Screen protected and drip-proof
* Self exciting, self regulating brushless alternator with fully interconnected damper windings

**Tests**

Generating set is load tested and all protective devices and control functions are simulated and checked before dispatch

Supplying Main Diesel Generator:

Supplying transporting delivering and installing, and operating on the concrete foundation a new diesel Generator (Two meshes of each of 8 mm steel bars in all directions. The length and width and depth should match the D.G dimensions)

Set at continuous steady state rating at site in ambient temperature at site in ambient temperature of (45 Co) at elevation of -260 b.s.l) and 60% relative humidity without de rating complete as following :

1- Gross continuous power (output) = … K.V.A.

2- At power factor (cos ∅ )= 0.95

3- With voltage = 220/400 V.

4- Phase with frequency =3 ph-50/60 HZ.

5- Engine operation speed (n) = 1500 r.p.m.

6- The general specification shall be complete as the specification attached with tender.

**The prices shall includes :**

a) –Installing and fixing the D.G. set on the concrete foundation inside the proposed room.

b) - Executing and fixing the exhaust silencer, flexible pipes needed 4” and the necessary piping 4” to connect it complete as required.

c)- Executing all 1/2” fuel connections pipes as needed and operating the unit as required.

d)- The D.G. set must supplies with new battery (as 2x24v-160/180A.H.) or as needed with high efficiency and quality, with suitable cables

e)- Other standard parts and instruments needed for good operation.

f)- Supply and install concrete and steel materials to build a sun and rain protection steel cover 5 m\*4 m \*3 m as follows:1- supply and casting below the ground level a concrete beam 40x20 cm of reinforced concrete. The tie beam concrete is B300, 4 bars diameter 12 mm and stirrups 5 diameter 8mm build overall the room foundation from the 4-sides 2- supply and casting concrete floor B300 and thickness 10 cm, reinforced by mesh steel bars 10 mm diameter. Install inside the concrete beams 4- steel box 10x10 cm x 3mm thickness at 3 –meters above the ground level. 3- supply and Install two steel box on top of beams 8x8 cm length 5m; and install steel box 6x4 cm each meter along the 5-m; supply and install corrugated sheets 1 mm thickness to cover the room roof. The price include painting two faces one as primer coat and the second oil base.

The DG must have 1 year warranty starting from the date of the taking over certificate; price includes: supply and assembles an automatic control panel for the motor, and all the additions, battery 110 ampere, protection mesh for radiator. Casting a suitable reinforced concrete base for the new motor. Executing and fixing the exhaust silencer, flexible pipes needed 4" and the necessary piping to connect it complete as required. Executing all 1/2” fuel connections pipes as needed and operating the unit as required price includes changing oil, oil filters, fuel filters, and any other parts necessary to change within the first 100 operating hours, and the including the diesel required to run the first 10 hours only . The opening tender committee will receive an offer about type and motor specifications, catalogues, and an in site testing report which shows the motor is matching with these specifications.

**The Horizontal Electric Motor Set** shall be complete with the accessories and ancillaries needed in accordance with the following specifications:

* An efficient approved engine speed 1500 rpm inverter duty and fitted to maintain engine speed at all condition of load.
* The cooling system shall be a closed type with, class F insulation, temperature rise class B, and internally built thermal senor to be connected to the MCB.
* The Electric Engine set shall be mounted on a suitable reinforced concrete foundation with common steel frame and no vibration
* Other standard parts and instruments needed for good operation. As power factor at full load not less than 89% and efficiency at full load not less than 94%
* Winding design as standard 3-phase motor 415 V, 50 Hz and permissible and preferences for variable speed motor, tolerance in voltage, and permissible for variable speed motor or duty frequency motor (in the range between 10-70 Hertz), tolerance of 10% in voltage in the range 380-480 volt.
* Rated and output power apply for standard ambient conditions of 40°C
* Motor frame, end shields, terminal box are made of cast iron, fan made of sheet stainless steel.
* High capacity bearing, single output shaft of stainless steel
* Degree of protection as standard IP 56
* The offer must be supplied with catalogue (M&O) for the motor set, curves power, efficiency, engine specification and test certificate, etc…

The contractor is responsible to issue a 1 year warranty starting from the date of the taking over certificate

**Civil works: The rate of the items in this tender includes all the materials and works specified below and as follows:**

* The price of construction includes all works and materials necessary to accomplish all activities according to works standards and supervisor engineer instructions and as follows:
* The price for the material item includes but not limited to the following types of materials. Any other material necessary to maintain the wells, to construct the booster pumps and service rooms; all works and materials must be prepared and its price is included in price for item unit.
* **Aggregates** for casting concrete and plastering materials: Supply all materials as crushed aggregates (fine and coarse materials as clean silica sand and medium size well graded gravel according to Annex, A3-4), sand, water for the construction, floors, plastering the walls, and casting catchment area. All costs of transportation and any other costs for supply are included in the unit price. Concrete specification is according to Annex A3-1 Steel specifications are according to Annex, A3-2 The materials will be used for casting concrete for the pools floors, walls, are reinforced with steel bars mesh according to the attached drawings.
* **Cement:** for casting, plastering the walls, and any other types of cement works around the well area . All costs of transportation and any other costs for supply are included in the unit price. Concrete specifications are according to Annex, 3-1 And, Steel specifications are according to Annex 3-2 Rate also includes the supply of clean water suitable for drinking to be used for all concrete work (casting, plastering and curing).
* **Steel:** all sizes of bars for reinforcing the pools floor, walls, roofs and any other concrete works.
* **Painting**: For water proofing material as epoxy/or nitcote resin or other materials suitable for water proofing inside the water tanks. The materials should be suitable for the insulation of the walls. The quantity must be enough to carry two faces all over the walls. The painting materials must be mixed and prepared and installed according to the manufacturer instructions. The tenderer must supply brand names of such product and catalogues including manufacturing company for the intended painting materials that are going to be used for pools construction. The price of materials painting includes the materials necessary to paint the steel cover as two faces (red oxide priming paint and zinc oxide base oil paint. All costs of transportation and any other costs for supply are included in the unit price.
* **Steel , ladder**, covers: All materials that are necessary to install a steel, ladder and cover should be made of 4 mm thickness suitable for the water tanks. The price includes materials as steel frame angles 5\*5 cm \* 4 mm thickness and installing the lock as walley. The rate includes all fixing works

**The rate in each of the BoQ items includes all labor costs as workers and all machine works costs that are necessary to construct the civil works; the rate includes but not limited to the following types of works and labor. The units prices of all items mentioned in the BOQ include all conditions and technical specifications which are shown under this item below.**

* The unit price in the items below includes the transportation of materials to the work site. Therefore, the contractor should visit the sites and put his prices according to a all the necessary works for this sub –items and all other items in this project.
* Cleaning the site from any excess of building materials, sediments stones or rocks accumulated inside or outside the well’s site.
* The rate of the items in this tender include all works and water prices to prepare concrete mix, walls’ plaster and to cure the casting concrete and plaster for three days at least and where necessary within the project area.
* All works necessary for casting reinforced and non reinforced concrete layers: include floors walls, roofs…etc.
* All works necessary for paintings: Includes two coats of water proofing materials according to the manufacturer’s instructions.
* All works to install the ‘steel ladders, covers: including the frame, main cover, lock The rate also includes all works necessary for testing the reservoirs for no leakage before it is filled by water by the owner. The price for this item includes all works and costs to fill the reservoirs. In the case of any noticeable leakage, the contactor should maintain the leaky place and redo the test and painting two coats one as primer and the other as oil based.
* All works necessary to clean the site from any waste and extra building materials.

**Technical Specifications for cement plastering**

* The plaster materials should be clean of impurities and fixed percentage of water, cement, and sand and crouched limestone.
* Its finish must be smooth with no cracks according to the supervisor instruction
* The walls must be cured and cleaned with water to insure the walls stability. Any organic materials including oils and stone or concrete bumps. The thick grooves must be cleaned and grouted with small stones and cement before plastering.
* The first face must be rough as nails composed of crushed limestone, silica and cement (1:1)
* Any casted concrete or plaster must be cured with water for three days three times a day.
* The second face is smooth and composed of cement /lime and very fine crushed limestone respectively as 1:1:1.
* The third face is composed only of liquid cement
* The fourth face is composed of water proof materials as epoxy l.
* In case parts of the walls are loose, then the walls must be reinforced by steel mesh to avoid block collapsing.
* Technical specification for concrete works. The dimensions are according to the supervisor engineer instructions.
* The steel development length is not less than 60 D. Casting concrete of slump 5 cm and testing concrete by having 2-cubes 10\*10 cm of each patch or car mixer. Any casted concrete or plaster must be cured with water for three days three times a day.
* Any casted concrete must be done by using vibrator and skilled operator. In case of segregation it must be treated with special filler-expansion materials and according to the supervisor engineer instructions. If segregation too much, then the contractor must be alleged to remove the casted structure and redo the work.
* All concrete casting must be using ready mix concerted. Only in special site conditions it is allowed to used onsite
* All materials and works costs and necessary for shuttering, fixing steel, casting concrete are included in the unit prices for this tender.

**Article 4:** **Confirmation of Site Visit and Of Understanding of the Terms of the Tender**

I, the undersigned, ………………….………………………………… declare that I read carefully the technical specifications and bill of quantity and I understood all the tender documents. I also declare that I visited the locations of the works and understood the nature of the works. It is upon my understanding and full knowledge of the activities mentioned in the tender documents that I submit my attached offer.

I commit to implement all the works specified in the tender documents according to the mentioned specifications, conditions and to the prices stated in the bill of quantity.

The total amount of the tender Includes ZERO VAT and is: (in numeral) …………………..$US, (in words)……………………………….………………………………….….. $US

I commit myself to complete the work within 30- calendar days starting from the start-up order. My prices include zero VAT or any other taxes. The tender value will not be affected by inflation rate or any changes in currencies or materials rates. If I failed to achieve the completion of the works within the agreed period, I commit to pay a penalty of 200 $US for every calendar day of delay.

Find attached a certified bank guarantee/ bank check of the amount of ………………… $US, and which is equivalent to 5% of the total tender amount.

**Place/Date**

**Signature and stamp of the Contractor**

**Article 5: Contractor’s CV and Profile**

1. **Company / Contractor Name:** ----------------------------------------
2. **Address:** -------------------------------------------------------------

----------------------------------------------------------------------------

**Telephone:** ------------------------**Fax:** ------------------------------

1. **Contact Authorized Person:** ------------------------------------------------------

**Job Description:** ------------------------------------------------------

**Qualifications:** --------------------------------------------------------

1. **Permanent Staff:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Job Description | Qualifications | Experience Period | Employed on the project yes/no |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

1. Past and ongoing works, especially in the water and sanitation sector and in particular in the field of the implemented project by the Company / Contractor:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Project Location | Project Description | Cost | Project Owner | Address of Project Owner |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 6 |  |  |  |  |  |

1. **Plants and equipment owned by the Company (specify if used in this project):**

1. 6.

2. 7.

3. 8.

4. 9.

5. 10.

1. **Rented Equipment (specify if used in this project and attach the renting contract):**

1. 4.

2. 5.

3. 6.

**8**. I here attach a Certificate of nationality (copy of ID card), proving that I am a national of the Palestinian Authority.

**9**. I here attach a valid certificate proving that his company is registered at the Union of Palestinian Contractors, or equivalent certificate proving he is officially recognized and authorized by the PNA to carry out the tasks required in this contract

**Place/Date**

**Signature and stamp of the Contractor**

**Article 6: Timetable for the Execution of The Works**

|  |  |  |
| --- | --- | --- |
| **PERIOD** | **ACTIVITIES** | |
| **1st month** | |  | |
| **2nd month** | |  | |
| **3rd month** | |  | |
| **3rd month** | |  | |
| **3rd month** | |  | |

**Place/Date**

**Signature and stamp of the Contractor**

**Annex 1: Fittings Materials Specifications**

**A1-S1: Check valves**

1. Body: Cast Iron
2. Disc: Cast Iron
3. Cover: Cast Iron
4. Seat Holder Cast: Iron
5. Body Seat Ring: Bronze ASTM B62
6. Disc Seat Ring: Rubber (BUNA-N) ASTM D 2000 AA 7008
7. Hinge Pin: Stainless Steel
8. Plug: Malleable Iron
9. Cover: Bolt & Nut: Steel
10. Seat Holder Bolt: Stainless Steel
11. Cover Gasket: Rubber (BUNA-N)
12. Coating: fusion bonded epoxy inside and outside

**A1-S2: Gate valves none rising stem:**

1. Body: Cast Iron
2. Bonnet: Cast Iron
3. Packing Box: Cast Iron
4. Disc Cast: Iron
5. Hand Wheel: Cast Iron
6. Body Seat Ring: Bronze
7. Disc Seat Ring: Bronze
8. Gland Cast: Iron
9. Stem Nut: Bronze
10. Stem Bronze
11. Bonnet Gasket: steel
12. Packing Box Gasket: steel
13. Bonnet Bolt & Nut: Steel
14. Gland Stud & Nut: Steel
15. Packing Box Stud & Nut: Steel
16. Top Nut: Steel
17. Washer: Steel
18. Packing: Graphite Fiber Commercial
19. Operating Nut: Cast Iron A 126 Class B
20. Coating: Electro statically applied epoxy inside and outside,

**A1-S3: Combination Air Valve**

1. Body: PN21 Sphere Nodular ASTM-536 60-40-18
2. Rolling Seal: Rubber E.P.D.M
3. Clamping Stem: Reinforced Nylon
4. Float: Foamed Polypropylene
5. Base: Brass ASTM B-124
6. O-Ring: Buna-N
7. Cover : PN21 Cast iron ASTM A-48 CL-35B
8. Nozzle Seat: Bronze ASTM B-62 B-271 C83600
9. Nozzle Seal: Rubber E.P.D.M
10. O-Ring: Buna-N
11. Bolt and Nut: Galvanized Steel, Chromate Plated
12. Float: Stainless Steel 304L
13. Body: PN21 Cast iron ASTM A-48 CL-35B
14. Sleeve: Reinforced Nylon
15. Threaded Outlet: Brass
16. 16: Coating: fusion bonded epoxy inside and outside

**A1-S4: Butterfly Valves: (GEAR)**

1. Stem: Stainless steel
2. Body: Cast iron
3. Bushing: Brass
4. O ring: EPDM
5. Bushing (spacer): Polymeric
6. Disc: Stainless steel
7. Liner: EPDM
8. Washer: Bronze
9. Retaining ring: Spring steel
10. Plug: Plastic
11. Coating: Fusion bonded epoxy inside and outside

**A1-S5: Water meter specification and materials.**

1. Working pressure 16 or 25 bars as required.
2. Max. temperature 60 C
3. Body: cast iron
4. Coating: epoxy
5. Connection: Flanged ends

**A1-S6:** **Strainers Specifications:**

1. Body: cast iron ASTM 126 class B
2. Cover: cast iron ASTM 126 class B
3. Screen: stainless steel
4. Gasket: Buna -N
5. Plug: steel
6. Bolts: steel
7. Coating: fusion bonded epoxy inside and outside

**A1-S7: Control Valves specifications (float valves and pressure reducing valves)**

1. Connection: flanged
2. Water temperature up to 60 C
3. Working pressure 25 bars
4. Valve body and cover ductile iron (ASTM A-536)
5. Valve internals: stainless steel and bronze
6. Control trim: brass
7. Elastomers: Buna-N
8. Coating: fusion bonded epoxy

**A1 S-8: Painting works include** adding two faces (red oxide as priming paint and zinc oxide base oil paint for finish). The pipe surface must be painted with two coats from all sides, particularly lower part to the ground. Therefore, the pipe must hold on supports above the ground minimum 30 cms, and then released to ground down after the paint was dry. Prepare the surface and stir the paint before use or mix using a power agitator. Before applying paint, a thinner liquid has to be added to the pipes surface to clean away oil and grease, use a detergent to remove excess dirt and contaminants. Remove the metallic debris such as mill scale and rust using disc sanders, sandpaper or wire brushes which ensures an adhesive surface.

**A1 S-9: Road crossing for 6”, 4” and 3” pipes**. The price per unit length for any pipe diameter in this tender includes all excavation and backfill costs as shown below. This includes all excavation works necessary for making pipes trenches across the whole road width (whatever is the road width). The width of trench should be not less than 40 cm plus the pipe diameter. The total trench depth should be not less than 60 cm plus the pipe diameter. The backfill materials must include soft back fill as follows: fine aggregates 2-3 mm diameters (symismya) below 10 cm below the pipe bottom plus pipe diameter and 10 cm above the pipe top crown (total soft backfill thickness inside the trench equal 20 cm plus the pipe diameter). The final backfill up to the original ground level must of compacted base course grade B.

**A1-S-10: Carbon steel line shafts: According to ASTM A576**

**A1-S-11: Irrigation Steel Pipes Welded Black Steel Pipes,** [**ASTM A53**](http://www.techstreet.com/cgi-bin/detail?product_id=911886) **or as API5L:**

**A53 Type F**, which is longitudinally furnace butt welded or continuous welded (Grade A only),

**A53 Type E**, which is longitudinally [electric resistance welded](http://en.wikipedia.org/wiki/Seam_welding) (Grades A)

**Annex 2- Electric Cable Connection**

**A2-1 Splicing of electric cable should be done by a qualified person.**

* Use correct electric cable designed for submersible bore pumps.
* Peel the coating at the end of the cable and lead line of the motor about 40mm to expose the copper wire.
* Connect the bare wire about 20 mm long using a crimp link of the appropriate size. Each individual wire should be crimped and insulated individually. Use the waterproof adhesive tape for 3 to 5 layers to wrap the individual connections. The wires should then be bundled together and insulated again using adhesive tape again for 3 to 5 layers ensuring that it is totally waterproof.
* The waterproof adhesive tape should be elongated by pulling in 200% before wrapping it round the wire in spiral advantage method with half of the tape in each round being over-lapped. The shrinkage of the tape will fasten and waterproof the connected cable end better.
* The bare copper wire and adhesive tape should be kept clean.

**Annex 3:**

**A3-1: Ready Mix Concrete**

a- Standard Specification for Ready-Mixed Concrete :ASTM C94/C94M-03

b- Testing Hardened Concrete Compressive strength: BS EN 12390-4

**A3-2: Steel Bars**

1. Standard Specification for reinforcement Steel Bars. ASTM 615/ Grade 60
2. Specification for mild steel. BS 1722-9

**A3-3: Cement Specifications**

Ordinary Grey Portland Cement Grade 42.5 Conforming To Standard Gb175-1999 Having Chemical Properties:

L.O.I. : Max 5.0

Mgo : Max 5.0

So3 : Max 3.5

Fineness : 0.08mm Sieve Max 10

Soundness : Sound Setting Time

Initial Set : Min 45 Minutes

Final Set : Max 10 Hours

Compressive Strength :

3 Days : 21 Mpa ,

28 Days : 42.5 Mpa

Bending Strength

3 Days : 4.0 Mpa,

28 Days : 6.5 Mpa

**A3-4: Aggregates**

* grading As C-144 ASTM
* durability As ASTM D3744-03
* particle shape and surface texture As ASTM D 5821-01
* abrasion and skid resistance As ASTM D7428-08
* unit weights and voids As ASTM C29/C29M-07
* absorption and surface moisture As ASTM C70-06
* Fine aggregates or sand as ASTM C778-06

**A3-5 Asphalt:**

### ASTM D 449 Standard Specification for Asphalt Used in Waterproofing

**A3-6 Base course materials:** it should be a result of hard crushed rocks as dolomite limestone free of organic and soil materials as follows:

* Gypsum materials 2% maximum
* Soil materials 6%
* Dry specific weight 2.1 ton/m3

**Base course Materials gradation by weight or according to the local standards**

|  |  |  |
| --- | --- | --- |
| **Specifications Limits (%)** | | **Sieve no** |
| **Grade B** | **Grade A** |
| 100 | - | 2’’ |
| 70-100 | 100 | 1.5’’ |
| 55-82 | 75-100 | 1’’ |
| 50-80 | 60-90 | ¾’’ |
| 45-75 | 45-80 | ½’’ |
| 40-70 | 40-70 | 3/8’’ |
| 30-60 | 30-65 | 4 # |
| 20-50 | 20-40 | 10 # |
| 10-30 | 8-20 | 40 # |
| 5-12 | 5-10 | 200 # |

**A3-7 Base Course Test:**

Before starting any base course supply to work site, the contractor should carry on the following tests and show that supply source or the quarry materials matches and pass these tests **or according to the local standards**:

|  |  |
| --- | --- |
| Crushed percent by sodium sulphate | According to AASHTO –T104, maximum 10% |
| Percentage of loss by magnesium sulphate | According to AASHTO –T104, maximum 12% |
| Percentage of loss by abrasion test Los Anglos Machine | 5% |
| Absorption ratio after 24 hours of immersion in water | % 10 maximum |
| Abrasion percentage after 24 hours immersion in water | % 5 maximum |
| Plasticity index | (AASHTO T 90) maximum 6% |
| Sand Equivalent | %30 minimum |
| CBR | 3-meter |

**A3-8 Hot Applied Rubberized Asphalt Waterproofing/Roofing Membrane**

Hot-Applied Rubberized Waterproofing Membrane is a hot-applied asphalt-based composition which is specifically formulated as a fluid material which is applied to form a continuous adhered waterproofing system. It is composed of a specially selected blend of refined asphalts, synthetic rubber and mineral stabilizers. It is modified with additives to promote adhesion During application, the membrane material is simply melted in an appropriate indirectly heated melter, poured or pumped onto the prepared surface, and then leveled to thickness of at least ( 4 mm) to form a seamless waterproofing membrane. Hot-Applied Rubberized Waterproofing Membrane is generally used in the waterproofing of various types of Portland cement concrete surfaces including precast and poured in place roofs, bridge decks, tunnels, and parking structures. The physical properties of the membrane permit its use in re-roofing operations over a variety of substrates, and for waterproofing of other surfaces including gypsum and wood surfaces. Rough surfaces tend to promote air entrapment in the compound during application, which might result in pin holing through the waterproofing membrane. Such surfaces also require use of more materials. Apply primer at 1 to 1.5 m²/ l, avoiding an excessive or over-spraying application. Bonding of the primer is not permitted. The primer shall be dry before applying the hot rubberized asphalt.

|  |  |
| --- | --- |
| **Property**  Recommended Application Temperature  204°C) Flow, 140°F (60°C) | **Requirements**  380-400°F (193-  3 mm max. |
| Cone Penetration, 77°F (25°C) | 110 max. |
| 122°F (50°C)  Toughness Ratio  Rating | 200 max. Toughness  5.5 joule min.  0.04 min. Adhesion  1.0 min. |
| Water Vapor Permeance | 1.7 ng/Pa. m2.s |
| Water Absorption  0.18g max loss | 0.35g max gain or |
| Low Temperature Flexibility, -13°F (-25°C) Pass |  |
| Crack Bridging -13°F (-25°C) | Pass 10 Cycles |
| Heat Stability, 5 hours | Pass |
| Viscosity at Application Temp. | 2-15 seconds |
| Flash Point, C.O.C.  45°F (25°C) min above recommended app. temp. | 500°F (260°C) min or |

**A4-1 Solid state frequency inverter**

* Wide Voltage Range: 320 ~ 480V
* Input Frequency Range: 40 ~ 65Hz
* Output Voltage Range: 0 ~ rated input voltage
* Output Frequency Range: 0 ~ 500Hz
* Overload Capacity: 60s with 150% of rated current, 2s with 180% of rated current
* From 0.75 ~ 7.5KW Plastic house; 11 ~ 630KW is metal house
* Control Mode: High Quality V/F Control
* Speed Accuracy: V/F + 0.5% of maximum speed
* 20 channels for frequency setting
* Analog signal: 0 ~ 10V,-10V ~ 10V,0 ~ 20mA.
* Pulse setting input: 0~50 KHz.
* Built-in RS485 communication port
* Solid state programmable screen and PLC configurations
* All model are integrated IGBT
* The malfunction ratio is 0.8% within 24 months warranty

**A5-1 The signboard** (lime stone) will be fixed at site of the distribution reservoir in ……. according to the following specifications:

1. The writings are carved and machine printed style as shown in text form above
2. All logos are printed in full color
3. The signboard size is 100\*120 cm \* 4 cm thickness
4. The signboard is fixed on painted steel frame angles 4\*4 cm\*3 mm thickness using Jumbo steel bolts at all sides

**Annex 6: Submersible Turbine Pump and Settings**

**Part 1 General**

**6- 1** **Scope of Work**

* Furnish all labor, materials, equipment and incidentals required, install, complete and ready for operation and field test, submersible turbine pump and motor including all details in respect to the setting in the well.
* All necessary and desirable accessory equipment and auxiliaries whether specifically mentioned in this specification *or* not shall be furnished and installed as required for an installation incorporating the highest standards for this type of service. Also included shall be supervisory services during installation and field testing of each unit and instructing the regular operating personnel in the proper care, operation and maintenance of the equipment.

**6-2 Related Work**

* Instrumentation and control work, except as specified herein are included Instrumentation and controls provided in this section shall adhere to Instrumentation and control specifications
* Mechanical work and appurtenances are included
* Electrical work, except as specified herein, is included
  1. **Submittals**
* Submit shop drawings and product data. Submittals shall include the following:

1. Certified dimensional drawings of each item of equipment and auxiliary apparatus to be furnished including: pump supports and anchor bolt plans and details.
2. Schematic electrical wiring diagram and other data as required for complete pump installation.
3. Literature and drawings describing the equipment in sufficient detail. including materials of construction, to indicate full conformance with the detail specifications.
4. Total weight of pumping unit as well as weights of individual components
   * **Design Data**
5. Manufacturer's certified rating curves, to satisfy the specified design conditions including operating speed , showing pump characteristics of discharge, anticipated field head, brake horsepower, bowl efficiency and guaranteed net positive suction head required (NPSHR). Curves shall show the full recommended range of performance and include shut-off head. This information shall be prepared specifically for the pump proposed. Catalog sheets showing a family of curves will not be acceptable.
6. Calculations for velocity of flow past the motor based on motor proposed and designated well casing shall be submitted. Should such calculations show a velocity below that required by the motor manufacturer for adequate motor cooling a design of an enclosing flow inducer (suction sleeve/shroud) shall be submitted for approval. In any case of the results of calculations the contractor should install a shroud around the motor according to the standards of shrouds installation. Therefore, the contractor should make this step before he submits his offer to import the suitable submersible pump. These decisions will be considered according to the results of the step draw down test.
   * **Test Reports**

1. Copies of all test data as described above

2. Tabulated data for the drive motors including rated horsepower, full load rpm, power factor and efficiency curves at ½ , 3/4 and full load, service factor and (Kw) input. including when the pump is at its design point. Submit a certified statement from the motor manufacturer that the motors are capable of continuous operation on the power supply without affecting their design life for bearings or windings

3. A schedule of the date of shop testing and delivery of the equipment to the job site

4. Description of pump factory test procedures and equipment

* **Operation and Maintenance Data**

The maintenance instructions shall include troubleshooting data and full preventative maintenance schedules and complete spare parts lists with ordering information

Complete operating and maintenance instructions shall be furnished for all equipment included under this section.

**6-4**  **Reference Standards**

**A**. Design, manufacturing and assembly of elements of the equipment specified herein shall be in accordance with PWA and EU standards.

**6-5**  **Quality Assurance**

* To assure unity of responsibility, the motors shall be furnished and coordinated by the pump manufacturer. The Contractor and manufacturer shall assume responsibility for the satisfactory installation and operation of the entire pumping system including pump, motor, surface discharge head and controls, as specified herein.
* The equipment specified herein is intended to be standard pumping equipment of proven ability as manufactured by concerns having extensive experience in the production of such equipment. Units specified herein shall be furnished by a single manufacturer. The equipment furnished shall be designed, constructed and installed to operate satisfactorily when installed as shown on the contractor submittals.
* Pumps shall be manufactured in accordance with the standards specified herein.
* The Contractor shall be fully responsible for the design, arrangement and operation of all connected rotating components, to ensure operation meets all specified conditions.
* The Contractor shall be fully responsible for all elements of the pump installation and pump setting so that the installation meets the requirements as shown on the contractor submittals and as specified herein including depth of setting, discharge column pipe, column check valve, installation of water level instrumentation and surface discharge head assembly.

**6-6 System Description**

The submersible pump, to be installed under this section, is a replacement pump to be set in an existing water supply well.

**6-7**  **Delivery, Storage and Handling**

* All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the unit and equipment are ready for operation.
* All equipment and parts must be properly protected against any damage during shipment. Store the equipment in accordance with manufacturer's recommendations
* Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer.
* The finished surfaces of all exposed flanges shall be protected by wooden or equivalent blank thongs, strongly built and securely bolted thereto.
* Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
* No shipment shall be made until all required submittals have been approved by the Engineer and shipment approved by the Engineer in writing.

**6-8 Maintenance**

Provide a list of recommended spare parts for 1 year operation of the pump, together with the current price of each item.

**6-9 Warranty**

The equipment shall be warranted for a period of one year from date of substantial completion as defined under the General Conditions, to be free from defects in workmanship, design or material. If the equipment should fail during the warranty period due to a defective part(s), it shall be replaced and the unit(s) restored to service at no additional cost to the Owner.

* 1. **Pumping Unit Accessories**

1. Water Level Monitoring Access Pipe
2. Furnish steel sleeve welded to the surface discharge plate to accept the access pipe for water level measuring equipment and RTD's. The sleeve shall extend through the access plate and be flush with the bottom surface of the plate. The sleeve shall extend 150 mm above the upper surface of the plate and be sized to provide a 9 mm space around the pipe within the sleeve.
3. Furnish a 25 mm internal diam sch80 (1.00 inch), 5 mm (0.200 in) wall thickness water level monitoring access pipes. Each pipe shall extend into the well to a depth equal to within 2 m of the installed depth of the top of the pump bowl assembly.
4. The 25 mm (1 in) PVC pipe shall be slotted Schedule 80 flush coupled and threaded or polyethylene pipes with the same size and NP 16 bars.
5. The access pipes shall each have a PVC cap mounted at the top of the PVC pipe. The cap shall be slipped onto the top of the access pipe to permit removal when the instrument is pulled for inspection or service. Do not attach the cap to the pipe with solvent. Cut a slot in the cap to the instrument size and seal around the cable and the slot with silicone rubber sealant to prevent debris from entering the access pipes.
6. Low Level Shut-Off

Wire a data logger with a suspended sensor and solid-state relay for low level shut-off and alarm to be installed under this section, shall be as furnished and as specified in the control panel specifications.

**Part 2: Products**

**6-11 General**

* The pumping units shall all be supplied by one manufacturer and shall be complete including pumps, motors, submersible power cable and motor RTDs.
* The pumps, motors, and devices shall be designed and built for 24-hour continuous service at any and all points within the required range of operation, without overheating, without cavitations, and without excessive vibration or strain. All parts shall be so designed and proportioned as to have liberal strength, stability and stiffness and to be especially constructed to meet the Specifications.
* Pump support and surface discharge is to be as shown in the BOQ. Each major piece of equipment shall be furnished with a stainless steel nameplate (with embossed data) securely mounted to the body of the equipment. As a minimum, the nameplate for the pumps shall include the manufacturer's name and model number, serial number, rated flow capacity, head, speed and all other pertinent data. As a minimum, nameplates for motors shall include the manufacturer's name and model number, serial number, KW/horsepower, speed, input voltage, full load amperes, Hz and power and service factors and insulation code.

**6-12 Conditions of Operation**.

* The pump shall be designed for the conditions of service tabulated as follows and shall operate within the system head curves as appended. All pumps shall have a rising head capacity curve for stable pump operation from the minimum head operating point to the shut-off head.

1. Depth of well 110 m
2. Pumping pipes (existing) 6”
3. Static water level 60 m below surface
4. Dynamic water level during pumping (to be determined during the pumping testy/Step Draw Down Test SDDT) around 80 m.b.s
5. Pumping capacity 70 m³/h (according to the results of the SDDT)
6. Casing diameter 10 “
7. Main beneficiaries from the well are Jordan Valley Areas and the farmers in the area.

**6-13 Column Check Valve**

The pump column shall be equipped with a stainless steel poppet check valve non-spring return located one column pipe joint above pump discharge

The check valve diameter shall be x-in and constructed of Type 316 stainless steel with disc and bushings of the same material. Fasteners shall be Type 316 stainless steel. The pressure rating of the valve shall be 1.5 times shutoff head (such as to accommodate the maximum pressure of the pump's total dynamic head through its entire performance curve from shut off run out).

**6-14 Design Data**

1. Manufacturer's certified rating curves, to satisfy the specified design conditions including operating speed , showing pump characteristics of discharge, anticipated field head, brake horsepower, bowl efficiency and guaranteed net positive suction head required (NPSHR). Curves shall show the full recommended range of performance and include shut-off head. This information shall be prepared specifically for the pump proposed. Catalog sheets showing a family of curves will not be acceptable.
2. Calculations for velocity of flow past the motor based on motor proposed and designated well casing shall be submitted. Should such calculations show a velocity below that required by the motor manufacturer for adequate motor cooling a design of an enclosing flow inducer (suction sleeve/shroud) shall be submitted for approval
   1. **6-15 Pump Support And Surface Discharge**
3. Discharge pipe system shall comply with the requirements specified herein

Disk diameter 0.8 thickness 4 cm cover over discharge pipe

1. Provide manufacturer's written documentation that all components in contact with water are non toxic and are suitable for use with potable water and meet NSF 61 Certification
2. The replacement pump shall be installed in the well utilizing the existing supporting means including column pipe, surface discharge assembly and all other accessory equipment unless the replacement or addition of certain equipment is otherwise shown on the Drawings or as specified herein.
3. The sole plate shall be replaced or the existing plate adapted (cut or drilled) to accommodate the power cable and access tubes.
   1. **Field Testing**
4. After the pump has been completely installed, a test of the equipment shall be conducted by the Contractor under the direction of the Engineer to prove compliance with the requirements set forth for the pump design. An efficiency test of the pump shall also be conducted and the Contractor shall furnish all instruments, meters, gauges and incidentals which may be required for the test.
5. Pump capacity and pump discharge head shall be recorded at a minimum of 5 capacity points along the curve. One of the capacity points shall be within plus or minus 2 percent of the design capacity as shown on the approved shop drawing submittal of a pump curve. The pump at all times shall be operated at plus or minus 5 percent of the design speed
6. Upon recording pump discharge and pressure at 5 capacity points, the pump shall be shut down and the water level recovered within I-in of static levels. At this time, the pump shall be operated within plus or minus 2 percent of the design capacity for a period of I hour. Measurements of pump capacity, discharge head. horsepower input and motor speed shall be made.
7. Pump performance shall be computed from field pump test data. After accounting for field test accuracy, the well pump shall be expected to operate within 5 percent of the approved head capacity curve and not more than 2 percent from the approved efficiency) curve. Correct an) condition to obtain performance equal to these field operating conditions

**Annex 7: Well Acidification**

**PART 1 – General**

**1.1 The Requirement**

A. The contractor shall submit a work plan and a safety plan before starting the works.

B. The Contractor shall provide all materials and equipment necessary to acidify the specified wells.

C. The Contractor shall be responsible for obtaining all required permits in a timely manner.

D. The Contractor shall provide a temporary discharge pipeline of sufficient capacity and length to convey the produced water from the well to the nearest available drainage channel and as agreed with the Engineer. It shall be the Contractor’s responsibility to prevent any damage or erosion to the site or any nearby properties from the discharged flow. The temporary pipeline shall be located so it does not interfere with traffic or other work being conducted around the well site. If circumstances so require, the Contractor shall bury or cover the pipeline so traffic and work in the vicinity are not affected.

E. Acid shall be delivered and pumped into each well as specified by a qualified and registered specialist acid Sub-Contractor. Licenses of the chemical transport company and the driver shall be provided.

F. The Contractor shall provide the Engineer with all necessary documentation for his nominated Sub-Contractor including his safety records and similar experience for formal approval.

G. The Contractor and his Sub-Contractor are responsible for provision of all necessary safety measures to perform this operation in a safe and controlled manner.

H. The Contractor shall submit safety plan and work plan prior to work execution.

I. Prior to scheduling and delivery, the method of placement, equipment and timing of acidification shall be reviewed and approved by Engineer.

J. All operations specified herein, starting with the addition of acid into the well and continuing through final test pumping, shall be in the continuous presence of the Engineer.

**Annex 7: PART 2 – Execution**

**2.1 Acidification Requirements:**

A. Supply 33 percent concentration Hydrochloric Acid with anti-foam additive and retardants for well treatment. Acid shall be formulated specifically for acidification of water wells, and chemical mixture data sheet shall be submitted to the engineer for approval.

B. Quantities of acid required (based on placement method) for each well shall be specified by the ENGINEER.

C. Provide a reliable fresh water source (water tank) for this operation for the full duration of acidification. It shall be double the acid volume as minimum.

D. Provide appropriate tubing for injecting acid and tubing for injecting fresh water into the well. Galvanized tubing is not permitted. The bottom of the acid tubing shall be placed 1 meter below the bottom of the casing of the well. The end of the water tubing shall be placed 50 meters above the end of the acid tubing or as directed by the Engineer.

E. Provide pumps, fittings and flow meters to pump both acid and fresh water into the well through the tubing during acidification.

F. Provide a steel header to seal the wellhead rated at 16 bars to withstand generated gases during the acidification process. The header shall be furnished with a pressure gage (0-17 bars) and a manual vent with a 50 mm valve. The vent shall be connected to a pipe leading to a secure area for safe release of chemical gases.

G. Provide a ball valve and a check valve to the acid line at the injection point (upper point). H. Provide a flow meter for measuring fresh water injection rates between 5 and 40 m3/hr.

I. Fresh water and / or chemicals shall be provided as necessary to buffer spent acid during well development following acidification.

**2.2 ACID PLACEMENT**

A. The header, associated valves and fittings and depth of the tubes emplacement must be assembled and approved by Engineer prior to arrival of the acid on site.

B. The acidification assembly shall be tested for leakage with fresh water and shall be approved by the engineer.

C. The specified volume of acid shall be pumped into the tubing during at a rate not to exceed 15 m3/hr. At the same time fresh water will be injected into the well at a rate not to exceed 15m3/hr. Fresh water will be injected into the acid tubing after the specified volume of acid is injected into the well to push the acid out of the acid tubing for added safety during disassembly of the system.

D. The acid shall be left in the formation until it has completely reacted with the aquifer’s rock matrix, or a maximum of 24 hours. This shall be evaluated by observing the gas pressure generated by the acid reaction with the aquifer.

E. Following acidification, the CONTRACTOR shall develop the well by air lifting and over pumping in accordance with Section 02624 under the following conditions:

* Galvanized pipe shall not be used
* Water shall be pumped until the pH of the water is >5.0 and the water is clear.
* All the pumped water shall be tread before discharging to the Wadi to ensure adequate values of pH as per the instructions of the engineer.
* During the development pumping, the CONTRACTOR shall measure and record the dynamic water level every 15 minutes and provide the record to the Engineer at completion of the development pumping, including documentation of the recovery of the level in the well to the static level obtained prior to pump development.

F. The Engineer may require additional acidification(s) of the well depending on the results of pump development or the pump tests conducted per Section 02636.

Balawy 20-12

|  |  |
| --- | --- |
| **Enhancing the resilience of farmers’ livelihoods in area C, through improved water availability and management** | |
| **Project: Supporting economic growth through optimized agricultural value chains in the West Bank** | **المشروع:** تأهيل الآبار الجوفية في مناطق نابلس وأريحا  **بئر رقم: ......................** |
| **Funded by:** Government of Canada through the Department of Foreign Affairs Trade & Development (DFATD) | **بتمويل من: الحكومة الكندية** |
| **Implemented & Supervised by:**  Food and Agriculture Organization of the United Nations (FAO) | **إشراف و تنفيذ: منظمة الأغذية والزراعة في الأمم المتحدة** |
| **In coordination with**: The Ministry of Agriculture (MoA) | **بالتنسيق مع:** وزارة الزراعة الفلسطينية |
| **Year Of Implementation: 2016** | **سنة التنفيذ: 2016** |