**Electro mechanical works for groundwater well in Gaza (Um El Nasser)**

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| --- | --- | --- | --- | --- | --- |
| **Item** | **Description** | **Unit** | **Unit Price /$US** | **Qty.** | **Total**  **/$US** |
| **Electrical and Mechanical Works:**  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, mechanical and electrical control devices, cables, wiring and all accessories and ancillaries to complete the work. All to be new and not renewed in accordance with the specified specifications. The contractor should verify the design equipments by conducting field visits to the well and must be before ordering any equipment or materials as follows: the contactor must check and verify and match between the reality and the design quantities mentioned in this tender. If he notices any difference or no matching, then he must inform the supervisor engineer and find together a suitable solution to such conditions. This include checking and fitting all dimensions mentioned in the tender as the well's hole diameter, pump diameter, columns diameter, discharge head inlet and outlet. The contractor must check in particular that the size of the hole of the well is enough to install the pumping pipes, and the water level pipes together. 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. All connections including the electrical and mechanical fittings should be according to the pumping layout view. | | | | | |
| C1.1 | **Electric Motor:**  Disjoin the existing motors and fittings, and then move them outside the operation site to the place within the Gaza area (Um El Nasser) specified by the project committee. Supply, transport, deliver, install, and operate successfully according to the specifications in the tender on the reinforced concrete foundation a new vertical hollow shaft Electric Motor with suitable reinforced foundation. The motor has to be inverter duty as VFD 10:1 (6-60 Hertz) Speed Range Constant Torque voltage 220/380-480. The motor shall be of standard construction and suitable high thrust bearing to carry the loads of the rotating radial thrust, equipped with weather protection type-1 standard, insulation class F complete thermal protection unit, complete current overload unit. The motor must be not less than  **75 horsepower** at 1500 rpm, set at continuous steady state service factor 95%-100%, 1 year warranty starting from the date of the handing over certificate or 7000 working hours and whichever comes first; price involves removing existing concrete casting and casting suitable reinforced concrete base for the new motor which fits the motor dimensions and its height matches level to the last vertical shaft discharge head. The concrete used should be B-300 and the two meshes a steel box and bars diameter 10 mm. The price includes supplying all cables and materials and executing all electrical connections needed between the following elements and despite of the length required: A- cable one in between the main 3-phase power motor generator source inside the well and the other cable up-to the Main Electric Control Board inside the pumping room B- a cable between the Main Electric Control Board and the electric motor. The cable size and specifications are as follows: All above cables are to be round, blue or green color, copper conductors are solid and made of pure copper XPLE, PVC insulated, Armored with inner sheath, 600 V, conductors sizes 3x35+1x25 mm2. The price includes all materials and works to install the above cables including whatever of electric, mechanical fittings and accessories as PVC and steel trenches, anchors with clamps, jumpers, stays including base, anchors steel wires, The cables must be lay inside 4"PVC/as rubber pipes of flexible spring type two layers. The price includes excavation inside all types of soil and rock trenches not less than 40\*30 cm and lay on the cable inside these trenches and adding pure sand as backfilling to all size of the trenches and casting in the last 10 cm of the trenches with plain concrete over the pipes. The price includes supplying and installing all electric motor control devices (as RTDs thermal, over load) and any other connections including cabling inside or outside the pumping station relevant to this work and according to standard specifications for this work. The opening tender committee will receive an offer about type and motor specifications, catalogues, and an in site testing report which shows that the motor is matching with these specifications.   * The price of this item includes supplying and installing two I steel section (25\*30 cm) to hold on the motor   The price includes 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 electrical motor must be supplied with RTD (PT100) temperature protection. The type of motor connection must be suitable to present the motor temperature digitally inside the control panel. The price of this item includes all costs of materials and works to install and test the RTD control device. * The motor shall be designed and built for 24hr continuous service at any and all points within the required range of operation without overheating, cavitations, excessive vibration and strain. * Motor has to be new and furnished with a stainless steel name plate with data of the serial number, speed , KW, input voltage, Full load, Hz, power, etc . * All works necessary for transporting, supplying to the site of work, installing, connecting, running and testing are under the contractor expenses. * All works must be according to the Palestinian standards and engineers instructions and the specifications and drawings. * The price also includes any missing works not mentioned to execute this work. * The contractor must submit the motor specifications, certificate of origin , catalogs and on site testing report which shows that the motor is matching with the manufacturer specifications | Lump sum |  | 1 |  |
| C2.1 | **Main Electrical Control Panel Unit**: suitable for 70 m3/hr at 15 bars, and installing in the site for the mode of operation, a control board according to the following specifications and supervisor instructions: control panel box shall be made of three compartments and the price for this item include all equipments and works mentioned below: one for main hour meter and fusses- breaker. The second compartment for the 75 hp inverter as ABB, or equivalent as shown specifications A4-1, main breaker as Siemens, contactor, capacitor(s) bank, main cables inlet/outlet.), It shall be IP56 protected, thermally painted paint as (RAL 7302). All main cables and wiring must be closed with special plastic cover and protected against human electric shock. The third compartment includes all control circuits, and secondary contactor, breakers for the high voltage cabinet or the low voltage. The control panel must be fixed to the wall by six Jumbo screws and laid on a reinforced concrete foundation 40-50 cm above the ground. The contractor should submit as built drawing including soft and hard copy. In case the contractor will use any digital equipment including PLC he must submit the cable, the software, or any other accessories that are necessary to operate and maintain these digital equipments.  The labeled nameplate should be mounted at the front of the main board behind the doors and above every switch and group of lamps. Control electric lamps 24v must be fixed to control all operation system, the starter shall be used to start, run, stop , protect and control manually and automatically by using the general required installation of the following equipments completely:   * The power circuit must consist of the following: main circuit breaker MCCB 3\*120A, 25KA adjustable for the company and for generator (MOLLER) two pieces. The price includes supplying and installing manual change over switch 4\*120A, SOCOMEC type for manual operation. * Bus bar 200A/0.4KV (3 phases and neutral and earth) * Complete 4p \* 20KA surge arrestors of replaceable type. With box fuse 3\*63. * Digital screen inverter 75 Hp see annex A4-1 Solid state frequency converter as ABB type (see with bypass contactor 75 Hp as MOELLER type equipped with over /under load, over temperature and all control system needed with all protections rated at suitable power that matches the pump motor with (0.8-1.2) over load range.   **Capacitor Banks**: Standby capacitor banks with discharge resistors compensating reactor dry type 400v 50 Hz to reach power factor 0.97 Ducati. Three phase capacitor with resistors 20 KVAR Ducati type.   * Digital multi meter which is able to read directly from a screen (V, Hz, KW, A, PF). * No voltage phase sequence and phase failure relays of best quality as MOELLER. * On-off push button set and emergency off button. * Reset push buttons red color 22 mm. * Overload relay unit rated at 1-1.5 of motor full load including digital motor screen protection control board. * Temperature relay unit rated at the motor thermal sensor, including digital motor screen protection control board with all cables and connections. * HRC fuses 3\*63A complete Fernaz type. * WHM 50\*50mm. * 24h clock with 150 hr mechanical reserve. * Suitable automatic breaker with adjustable thermal and magnetic protection (ISC>=25KA) NZM. * (0-500V) 96\*96mm Voltmeter with selector switch between phases and neutral. * (0-300A) 96\*96mm ammeter. * 3 phase fuse holders set , 10\*38mm , with 20A fuses , * Suitable earth leakage relay class A (AC and Dc trip). * Contactor with discharge 25KVAR Moeller type. * Breakers for service Siemens type. * Relays and timers 24 V for no flow switch and high-pressure, low-pressure sensors. * Three phase 50 Hz 380V (KWh-meter), /5A-200/5 CT’s. The KW-h meter as electromechanical meter or solid state and pre-paid card electric type. * 24V/ 50Hz indication lamps installed in front of the control cabinet.. * 3 position selector switch A-O-M. * 220-2 12V (AC) transformer 100VA. * the price includes all cables to be used for control purposes shall have the following cross section: * \*(3\*35 mm2 + 25 mm2) for the internal connections inside main board and the contractor has to check and order the exact required length. * \*1.5 mm2 for the driving wheel circuits. * \*2.5 mm2 for the circuits of tension measurements. * \*1.5 mm2 for the sensors. * \*4.0 mm2 for the circuits of intensity measurements. * \*All terminals shall be carefully protected to assure electrical insulation. * Switches, measuring instruments, and warning slights shall be installed in the front side of the panel. * The control panel shall be manufactured with enough space (minimum 40% free space of the total size) to insure easy maintenance and no interface between the wiring for all circuits. * All wires must be coded clearly and fixed with special wire heads to avoid loose connection. * All timers (PSK), relays and contactors shall be of best quality as Siemens * the contractor shall supply any other materials and devices that might be missed here and considered to be essential to complete the work without claiming any changes in unit prices. * The control panel must be equipped with an alarming bell (100 dB at 8 meters distance) and flashing red alarm (should be visible from 300 meter during day). Alarms for all cases of failure as: voltage drop, no voltage or phase failure high or low pressure and no flow, high temperature etc. * The alarm must be muted without general reset and there should a special button in the front door to stop it alone. * Circuits must consist of the all necessary materials to operate and protect the system automatically and manually, the wiring color system, numbering all the components. The price includes the design of the whole system of control the contractor is intending to carry. The contractor should also submit at the end of work a s built drawing.   The control panel deign should include:   * Transformer 230/24V 150VA * Water level relay HK type. * 220V AC /80 Watt with 2 fans in each compartment, one for taking in air and the other for taking out the air with grid ( for the panel) complete with thermostat protection. * SIREN (alarm system)   Alarm system 24V for :   1. High pressure outlet 2. Low pressure outlet 3. No flow (non return valve) 4. Soft start fault 5. High temperature  * The price includes the excavation works installing pressure switches, flow switch and level sensor and all the electrical parts with suitable conduits and metal ducts to complete the works. * The price includes installing and testing for the mode of operation all mentioned devices and sensors. The control panel must be equipped with earthing unit so the price includes. * **Earthing** : The price of the control panel includes supplying and installing complete earth unit with earth equalizer compressing C40 box copper B.B. 25 mm2, with minimum two concrete manholes as foundation lines , two earth electrodes, D>19m, L=1.5m and any other missing materials to earth the pumping station . The price includes testing earth unit so as to fulfill the standard requirements (resistance less than 1.5-2 ohm). The across different fittings in the piping system. * The price also include supply all materials (as cables, in-out sockets and install, two outlets as 3-phase Service unit for the pumping room including Main MCB 5\*20A -10 KA MOLLER type. MCB 2 \*10A – 10KA Moeller type the control * The price include all cable materials and works to conduct the electrical connections of the thermal sensor inside the motor -(the cable 3x2.5 mm2 , the cable should be of suitable length. Use flexible thermal conduits, cable glands, wire terminals& labeling at both ends and all the accessories needed to complete the work(excavation &backfilling),the cable from the MDB to the head of pump motor. | L.S |  | 1 |  |
| C3.1 | **Flow Control switch**: Supplying and installing an electrical flow switch suitable for 6" pipes, powered by a 24v-dc power source. Price includes all cables and protection conduits required to connect it with the control panel, as shown pumping layout view. | Num. |  | 1 |  |
| C4.1 | **Pressure barrel**: Supplying and installing of a pressure barrel. The contractor shall supply and install all the pipes and fittings to connect with outlet main 6” pipes of the pump and should be according to specifications. The price include, complete instrumentation of the pressure barrel including all fittings and steel pipes ½” , and two-1/2 inch ball valves, pressure stabilizer needle valve at the entrance, foot valve-4directions, couples, nibbles, elbows with nuts, bolts, flanges and gaskets as needed to install the pressure barrel. The price includes supplying and installing all necessary materials and works to connect to the pressure switches and casting a suitable reinforced foundation under barrel, and above the pump ground level, as shown pumping layout view. | Lump  sum |  | 1 |  |
| C5.1 | **Pressure Control switch** Supply and install two pressure switches 1-25 bar. Price includes all cables and protection conduits required to connect it with the control panel, as shown pumping layout view. | Num. |  | 2 |  |
| C6.1 | Supply and install pressure 2” pressure **Relief Valve**, 16 atm, complete, The price includes excavation, cutting, welding, adding screws, bolts and accessories that are needed to assemble the valve and according to specifications Annex 1/ S7. The Price also includes supplying and installing 2" coupling, 2”conical record, 2”nipple and 2" gate valve, as shown pumping layout view. | piece |  | 1 |  |
| C7.1 | **Pump lifting and reinstallation**: All works related to disjoin the existing discharge head, pumping pipes turbine, shafts, retainers, etc and reinstall the new pumping pipes, turbine, shafts, retainers and all related accessories. The price involves checking and operating the pump after finishing all project works to insure no vibration or unusual sound, as shown pumping layout view. | Lump sum |  | 1 |  |
| C8.1 | **Vertical Turbine;** Supply and install a multi stage vertical pumping Turbine complete (pump, screen, shaft bowels, stages, connection head to the 6” and 6”pipes, and all related accessories ) all as specified in the technical specifications attached with the tender. The price includes any other works to achieve the required head and quantity and efficiency. The main pumping data as follows:  Current well total well depth is 60 meters; Static water level is around 45 meters below surface. The turbine properties is fit as follows:   * Liquid as for Agricultural and water is little brackish * Design capacity 70 m3/hr * Design anticipated total head at the intended turbine discharge 150 m. * Maximum pump column and discharge head assembly head losses (m): 3 * Shut-off head limits (m) min not less than 220 m. * Turbine overall efficiency at the working point is not less than 75%. * Min bowel efficiency at run out capacity 80%. * NPSHA at max run out capacity (m) :8 * NPSHA at max anticipated TDH (m): 5. * Pump operating speed (rpm) :1500 and inverter duty as for higher speeds * pump diameter (inch) :to be verified in the field * Closed impellers manufactured from bronze and cast iron bowels. * Stainless steel column, stainless steel screen filter * The well pump shall be capable to run at shutoff head for a few minutes without mechanical problems. * The turbine torque design should be duty inverter at speed range the design values between 1:10 * The price includes supplying and installing all required flanges, coupling, reducers, bolts, spacers, sleeves, nuts, etc. to connect between the turbine outlet, turbine column and the rising pipes and shafts accordingly. The price also includes casting concrete foundation and I steel sections to should the turbine. The price includes all repair works as a result of old turbine disjoin or new turbine installation. * The contractor shall do in site testing the turbine in accordance with the performance curve and submitting the test report. 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). Therefore, the contractor must prepare suitable water meter and water level meter to carry on these measures. Therefore, the price of the turbine includes the costs of all these tests. In case the contractor failed to get these measurements, the turbine price will be less by 30% than the price proposed in his tender. | Lump sum |  | 1 |  |
| C9.1 | **Pumping pipes**: Supply and install new seamless iron pumping pipes with the following specifications should be supplied: (SCH 40) Diameter 6", thickness not less than 7.1 mm; and teeth not less than 8 teeth in 1" and painted with epoxy from outside and inside or galvanized by factory from source of supply. The number of teeth should be enough to cover the whole length of the intended coupling and not less than 15 cm length. The price includes threading cutting and adding reducers, or flanges, bolts to connect between the new rising pipes and the pump. Taking in consideration that the quantity estimated in this tender may increase or decrease. | M.L |  | 57 |  |
| C10.1 | **Shafts:** Supply and install new shafts of carbon steel 1040, of 35 mm diameter and at the joints should be covered by stainless steel sleeves, and ended with a suitable couple according to Annex 1/S8. The price includes threading, cutting, adding suitable line shaft coupling, stabilizers to connect between the new shafts and the pump. Taking in consideration that the quantity estimated in this tender may increase or decrease. | M.L |  | 57 |  |
| C11.1 | **Retainers and bearings:** supply and install new bearing retainers made of bronze and taking in consideration that the quantity in this tender is estimated and may increase or decrease. | Num. |  | 19 |  |
| C12.1 | **Rubber Joints**: supply and install new rubber joints and taking in consideration that the quantity in this tender is estimated and may increase or decrease. | Num. |  | 19 |  |
| C13.1 | **Discharge head:** Supply and assemble a new steel discharge head complete type F. The intake and outlet dimensions are 6"\*6" the price includes supplying and installing wick and box, and suitable stainless steel column for the last riser pipe and connect with and up to motor shaft. The basic dimensions for the discharge head are 45\*65 cm. The price includes supplying and installing a suitable stainless steel column for the last riser pipe. This column will connect with motor shaft. And it includes also supplying 2 suitable I steel section and casting new reinforced concrete foundation underneath the discharge head, as shown pumping layout view. | Lump sum |  | 1 |  |
| C14.1 | **Accesses Pipes**: **PVC, polyvinyl chloride sch. 80 pipes NP 25 bars of one Inches Diam.**  Supply, install and test in the well access PVC, pipes sch. 80/1" size threaded and suitable coupling at joints ,These pipes should fixed to the pumping pipes using stainless steel clamps.  The price includes suitable couplings and 2\*2.5 mm2 level submersible cable (>= 55 meter) and electrode to test the water level. The control panel must equipped to connect this electrode. | M.L |  | 57 |  |
| C15.1 | **Gate valve**: Supply and assemble gate valve, 6"complete, 16 bar. Price includes excavation, cutting, welding, adding screws, bolts and accessories that are needed to assemble the valve. The valves could be installed anywhere within the project area and according to specifications. mentioned in Annex1, S2 , as shown pumping layout view. | Num. |  | 2 |  |
| C16.1 | **Gate valve**: Supply and assemble gate valve, 3"complete, 16 bar. Price includes excavation, cutting, welding, adding screws, bolts and accessories that are needed to assemble the valve. The valves could be installed anywhere within the project area and according to specifications. mentioned in Annex1, S2 , as shown pumping layout view. | Num. |  | 1 |  |
| C17.1 | **Gate valve**: Supply and assemble gate valve, 2"complete, 16 bar. Price includes excavation, cutting, welding, adding screws, bolts and accessories that are needed to assemble the valve. The valves could be installed anywhere within the project area and according to specifications. mentioned in Annex1, S2 , as shown pumping layout view. | Num. |  | 1 |  |
| C18.1 | **Non return valve**: Supply and assemble a non return valve, 6" complete, 16 bar of the swing type .Price includes excavation, cutting, welding, adding screws, bolts and accessories that are needed to assemble the valve. The valves could be installed anywhere within the project area according to specifications mentioned in Annex 1/ S1, as shown pumping layout view. | Num. |  | 1 |  |
| C19.1 | **Compound air valve**: Supply and assemble 2" compound air valve complete, 16 bar. The price includes excavation, cutting, welding, adding screws, bolts and accessories that are needed to assemble the valve. The valves could be installed according to specifications mentioned in Annex 1, S3. The Price also include supplying and installing 2" coupling, nipple and 2" gate valve. , as shown pumping layout view. | Num. |  | 1 |  |
| C20.1 | **Pressure gauge**: Supply and assemble pressure gauge, 25 bar with oil liquid Rotal ASME, B40. Price includes excavation, cutting, welding, adding coupling, and accessories that are needed to assemble the gauge, as shown pumping layout view. | Num. |  | 3 |  |
| C21.1 | **Dresser:** Supply and assemble 6" dresser complete. Price includes ears 60 cm rods and screws, bolts, excavation, cutting, welding, and adding accessories that are needed to assemble the dresser with NP 16 bar, as shown pumping layout view | Num. |  | 2 |  |
| C22.1 | **Dresser:** Supply and assemble 3" dresser complete. Price includes ears 60 cm rods and screws, bolts, excavation, cutting, welding, and adding accessories that are needed to assemble the dresser with NP 16 bar, as shown pumping layout view. | Num. |  | 2 |  |
| C23.1 | **Dresser conical record:** Supply and assemble 2" dresser complete. Price includes rods and screws, bolts, excavation, cutting, welding, and adding accessories that are needed to assemble the dresser with NP 25 bar, as shown pumping layout view. | Num. |  | 1 |  |
| C24.1 | **Steel pipes**: Supply and install 6" steel pipes for irrigation network. The minimum thickness of pipes is 4 mm as shown in Annex 1 /S9. The price includes, all costs of transportation, pipes distribution, excavation, cutting, shaping, welding, painting two faces (red oxide priming paint and zinc oxide base oil paint). The price includes reconnecting the new installed pipes with old network pipes and adding new connections (2", 3" or 4") of similar sizes for all farms which exist on the old pipe line. | M.L |  | 24 |  |
| C25.1 | **Galvanized 3” pipes**  Supply and install 3” diameter galvanized steel pipes thickness 3.96 mm, and according to specifications Annex 1/ S1-9, as shown pumping layout view. | M.L |  | 12 |  |
| C26.1 | **Galvanized 2” pipes**  Supply and install 2” diameter galvanized steel pipes thickness 3.96 mm, and according to specifications Annex 1/ S1-9, as shown pumping layout view. | M.L |  | 6 |  |
| C27.1 | **Elbows, T or Saddle:** Supply and install 6"/90 or 45 degree black steel elbows or T and Saddle for welding SCH 40 anywhere within the project area | Num. |  | 5 |  |
| C28.1 | Supply and install a complete 6" **cast iron water mete**r according to ISO 4064 (class B) or equivalent annex 1/ S5. Capacity 200 m³/hr, 16 bar painted with epoxy coated from both inside and outside, the measuring unit should be removable type without removing the body Price includes excavation, cutting, welding, adding dresser, flanges, screws, bolts, gaskets and adding accessories that are needed to assemble the valve with the dresser, as shown pumping layout view. | Num. |  | 1 |  |
| C29.1 | **Provisional item Supply and install water meter with the following specifications as ABB type :**   * Built-in earthing (grounding) electrode * Diameter 6” 16 bars. * Remote communications– including Profibus DP v0 * Electronic Display Unit: Forward, reverse and net totals \_ 4 digital outputs and Communications: serial data (RS232), HART and Profibus DP v0. Remote communication up to 100m length and built in memory 8 GB. Adjustable reading frequency up to 2 s. PLC programmable. * High accuracy as normal between 1-500 m3/hr * Housing IP65 (NEMA4) * Power supply AC/DC | L.S |  | 1 |  |
| C30.1 | Supply, install a screen digital hydrostatic level meter (submersible digital level sensor) with the following characteristics:   * Water Level Measurement: 40m (max.) * Max. Sensor probe diameter to fit with the PVC. Access Pipes ass less than 20 mm. * Excitation: 9 to 30 Vdc, reverse polarity protected * Output: 4 to 20 mA DC, 2 wire, short circuit protected * Input Current: 20 mA max * Accuracy: 0.50% FS BFSL (includes linearity, hysteresis and repeatability) * Response Time: 2 ms * Operating Temperature: -10 to 60°C * Proof Pressure: 150% * Burst Pressure: 200% * Wetted Parts: 316 stainless steel * Electrical Connections: Submersible cable terminating in digital leads   The price include all works and materials, as cables, connections, sensor, digital screen that shows the remaining water depth above the sensor. The price includes all wiring necessary to connect the sensor inside the well’s hole to the MCB. In addition to that a process meter/controller, should be digital and programmable one, with flush mounted to be installed in the MCB 's door, step response 2sec,6A dual relay | L.S |  | 1 |  |
| C31.1 | **Water Cooling Tank:** Supply and install plastic polyethylene water tank capacity 1 m3 for cooling and lubrication of the shafts and rubber joints before the start according to PSI 99-1 to 6-1999. The price includes supplying and installing all necessary connections as 1-inch galvanized steel pipes, 1-inch ball valve, 1-inch dresser, 1-inch elbows etc. to connect between the water tank and the opening of the outlet at the discharge head, as shown pumping layout view. | Num. |  | 1 |  |
| C32.1 | **Provisional item Field and Lab Tests:**   * Water quality test includes Fecal and total Coliform, nitrate, chloride, sodium and bicarbonate, total dissolved solids, Sodium Adsorption ratio. All tests should be done two times, one according to the existing situation and the other one after the project. | L.S |  | 1 |  |
| **Total costs of all materials and works** | |  | | |  |

**Costs Summary**

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| --- | --- |
| **Description** | **Total amount /$US** |
| **All Mechanical and Electrical works for the groundwater well in Gaza (Um El Nasser)** |  |
| **Total in words (includes) –$US** | |

**Company / Contractor Name: --------------------------------------------**

**Address: -----------------------------------------------------------------**

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

**Signature and Stamp: --------------------------------**

**Date: -----------------------------**

**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, 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 the above tables include 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 Gaza area (Um El Nasser) and including the seam zone area.
* 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:

1. An efficient approved engine speed 1500 rpm and fitted to maintain engine speed at all condition of load.
2. 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.
3. The Electric Engine set shall be mounted on a suitable reinforced concrete foundation with common steel frame and no vibration and high thrust capacity
4. 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%
5. 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 10-60 Hertz), tolerance of 10% in voltage in the range 380-480 volt.
6. Rated and output power apply for standard ambient conditions of 40°C
7. Motor frame, end shields, terminal box are made of cast iron, fan made of sheet stainless steel.
8. High capacity bearing, single output shaft of stainless steel
9. Degree of protection as standard IP 55
10. The offer must be supplied with catalogue (M&O) for the motor set, curves power, efficiency, engine specification and test certificate, etc…
11. 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 pools 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), 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. Steel specifications are according to Annex, A3. 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. And, Steel specifications are according to Annex 3. 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 comprehensive idea all the necessary works for this sub –items and all other items in this project.

**Technical Specifications for cement Rooms’ 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.
* All technical instructions mentioned in the drawings are applicable to all types of rectangular sections.
* The reservoir ground base must be leveled and clean, then casting a layer of plain concrete 7 cm.
* The walls of the reservoir must be shuttered from inside and outside. In the case of shuttering from inside only the minimum thickness should not be less than 25 cm.
* The walls and base floor of the reservoir must be casted in one time. In case the cast is divided into two phases, then no leakage polyethylene strip 25 cm height; and is installed between the two casting phases. The strip is carefully installed, straight and divided equally between the cast phases. The concrete breaking capacity is B-300 kg/cm2 for base, floor and roof. The dimensions of all walls, base floor and roof are 25 cm. The details for reinforcement and dimensions are according to the attached drawings.
* 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.
* Wall and roof shutters should not be removed before five and 14 days after casting respectively.
* All concrete casting must be using ready mix concerted. Only in special site conditions it is allowed to used onsite
* For underground concrete: The insulation from outside is done as two parts. 1- the part above the ground level is insulated by three plaster faces as shown above 2- the part below the ground level is insulated by using Latex Bituminous Emulsion (LB) as nitcote from FOSROCK.
* Only steel skids are used to fix the width of walls; no wood skids are allowed in concrete walls.
* All materials and works costs and necessary for shuttering, fixing steel, casting concrete are included in the unit prices for this tender.
* The walls and roof must be cleared of steel and concrete bumps.
* All backfilling, compaction materials and works costs and necessary covering between walls and natural soil and over the ground are included in the unit prices for this tender

**Annex 1: Fittings Materials Specifications**

**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

**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,

**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

**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

**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

**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

**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

**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.

**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.

**Carbon steel line shafts: According to ASTM A576**

**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**

**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

**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

**A3-6 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 converter**

* Wide Voltage Range: 320 ~ 480V
* Input Frequency Range: 45 ~ 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