

عطاء تأهيل الينر الجوفي في ذنابه

Design by Eng. Abdul-Latif M. Khalid

MSc. Hydrological Engineering

0598931783

Electro mechanical works for groundwater well no. 15-19/039 in Thenabah / Tulkarem.

Item	Description	Unit	Qty	Unit Price (USD)	Total (USD)
<b>Electrical and Mechanical Works:</b> 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. Therefore, the unit price in this tender must fit with the technical specifications; moreover, any material submittal should match with these specifications even if accepted by the open session committee. The contractor should verify the available data on the well and carry his own measurements including all equipment and materials in this tender. The contractor will conduct the field visits to the well and must be before ordering any materials or equipment as follows: the contractor must check and verify and match between the reality and the design quantities (well dimensions depth-diameter, water level, length of pumping pipes, electric and mechanical data) ,as 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, well crookedness, pump diameter, electric connections, cables, pipes 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 and information we got for this well from Thenabah well committee. 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 PWA and general (PSI) pumping standards and according to the attached tender specifications for all items,					
1	<b>Electric Motor (inverter duty continuous):</b> Disjoin the existing motor and all fittings, and then move them outside the operation site to the place within <b>Thenabah</b> area 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 <b>vertical hollow shaft Electric Motor (50/60 hz)</b> as US motors with suitable reinforced foundation. The motor has to be inverter duty turndown as speed range 10:1 ,	L.S	1	14000	14000

	<p>ability to run at variable or constant torque and voltage range between 190-220 line- neutral voltage &amp; /380-440 between lines (see attached annex). 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 as IP55 type-1 standard, insulation <b>class F</b> complete thermal protection unit, complete current overload unit service factor 1.15, axial double thrust bearing design, spike resistant wiring, and full load efficiency not less than 94%.</p> <p>Supply and install inductive absorbers (voltage spike and circulating currents) as <b>CoolBlue - NaLA</b> noise line absorbers installed directly on the lead wires only between VFD and the system's electric motor inside the drive cabinet. The number of cores and sizes should be according to the manufactures recommendations.</p> <p>The motor must be not less than <b>125 horsepower</b> at <b>1500 rpm</b>, set at continuous steady state, 1 year warranty starting from the date of the handing over certificate or 7000 working hours and whichever comes first; price involves (if necessary) 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 lengths require: cable between the Main Electric Control Board and the electric motor. The cable size and specifications are as follows: All cables should be round, blue or green color. The conductors are stranded and made of pure copper</p>				
--	---	--	--	--	--

	<p>&amp; XPLE insulated, armored with inner sheath, to run continuous at 600 V. The conductors sizes not less than <b>3x95+1x50</b> mm<sup>2</sup>. The price includes all materials and works to install the above cables including whatever of electric, mechanical fittings and accessories as PVC and steel ducts or 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 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.</p> <ul style="list-style-type: none"> <li>• The price of this item includes supplying and installing where necessary two I steel section (25*30 cm*8mm) to hold on the motor and discharge head.</li> <li>- The electrical motor must be supplied with <b>RTD (PT100)</b> 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.</li> </ul>				
--	---	--	--	--	--

	<ul style="list-style-type: none"> <li>- The motor shall be designed and built for 24hr continuous service at any and all range of loads and pumping points within the required range of operation without overheating, or loss of insulation or excessive vibration and strain.</li> <li>- 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 .</li> <li>- All works necessary for transporting, supplying to the site of work, installing, connecting, running and testing are under the contractor expenses.</li> <li>- All works must be according to the Palestinian standards and engineers instructions and the specifications and drawings.</li> <li>- The price also includes testing and any missing works not mentioned to execute this work.</li> </ul> <p>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</p>				
2	<p><b>Main Electrical Control Panel:</b> Price includes all works to carry on the electrical connections and cables to main grid and panels and supply and install suitable new control panel for pumping <b>85m<sup>3</sup> @ 190</b> meter dynamic head 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 <b>three major compartments</b> and the price for this item include all equipment and works mentioned below: <b>The first</b> compartment is for the main hour meter and company fuses- Main Company Breaker. <b>The second</b> compartment is for the <b>125 hp inverter</b> as ABB, or equivalent as</p>	L.S	1	12000	12000

	<p>shown specifications, main breaker as Siemens, contactors, capacitor(s) bank, main cables inlet/outlet.), It shall be <b>IP66</b> protected, thermally painted paint as (RAL 7302). All main cables and wiring are inside ducts and must be closed with special plastic cover and protected against human electric shock. <b>The third</b> 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 drawings. In case the contractor will use any digital control equipment including as PLC, HMI screen; then he must submit the cable, the software, and new version of computer laptop as hp i7- double core and any other accessories that are necessary to operate and maintain these digital equipment; meanwhile the price for this item includes to train the well's operator and technical staff on how to use and program the PLC and control panel and all installed equipment in this tender. The training period should not be less than 9-hours training hours over three separate days including safe operation, manual instructions, faults and calibration of equipment (inverter, breakers, timers, etc..) .</p> <p>The labeled nameplates 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 equipment completely. The price for this item includes (see</p>				
--	--	--	--	--	--

	<p>attached annex):</p> <ul style="list-style-type: none"> <li>• The power circuit must consist of the following: two <b>main circuit breakers</b> MCCB 3*<b>200 A</b>, 25KA thermal / magnetic adjustable one for the <b>company</b> and the second one for <b>generator</b> (as MOLLER). The price includes supplying and installing <b>manual change over with mechanical and electrical interlocks</b> switch 4*<b>200 A</b>, SOCOMEC type or equivalent for manual operation.</li> <li>• Bus bar <b>300A/0.6KV</b> (3 phases and neutral and earth)</li> <li>• Complete unit 4p * 20KA <b>surge arrestors</b> of replaceable type. With box fuse <b>3*63A</b>.</li> <li>• Digital screen inverter <b>125 hp</b> see the annex. Solid state frequency converter as ABB type (with <b>bypass contactor 125 hp</b> 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). The inverter must be programmed to meet with manufacturers obligations for start-up and shut down. <b>Capacitor Banks:</b> Standby capacitor banks with discharge resistors compensating reactor dry type 400v 50/60 Hz to reach power factor not less than 0.95 Ducati. Three phase capacitor with fuses /resistors <b>20 KVAR</b> Ducati type.</li> <li>• <b>Digital multi meter</b> which is able to read directly from a screen (V, Hz, KW, A, PF).</li> <li>• <b>Low and high voltage controllers, phase sequence and phase failure controllers and relay(s)</b> of best quality as MOELLER.</li> <li>• <b>On-off push</b> button set and emergency off button.</li> <li>• <b>Reset</b> push buttons red color 22 mm.</li> </ul>				
--	---	--	--	--	--

	<ul style="list-style-type: none"> <li>• <b>Overload</b> relay unit rated at 1-1.5 of motor full load including digital motor screen protection control board.</li> <li>• <b>Temperature relay</b> unit and rated for the motor. It includes thermal protection relay and thermistor sensor, including cable screened twisted pair (screen earthed at one end only) digital motor screen protection control board with all cables and connections.</li> <li>• HRC fuses <b>3*63 A</b> complete Fernaz type.</li> <li>• WHM 50*50mm.</li> <li>• <b>24 h clock</b> with 150 hr mechanical reserve.</li> <li>• Suitable <b>automatic breaker 200 A</b> with adjustable thermal and magnetic protection (ISC&gt;=25KA) NZM.</li> <li>• (0-500V) 96*96mm <b>Voltmeter</b> with selector switch between phases and neutral.</li> <li>• (0-300 A) 96*96mm ammeter for the three phases.</li> <li>• 3 phase fuse holders set , 10*38mm , with suitable fuses ,</li> <li>• <b>Suitable earth leakage relay</b> class <b>A (AC and Dc trip)</b>.</li> <li>• Contactor with discharge 20 KVAR Moeller type.</li> <li>• <b>Running hour</b> timer</li> <li>• <b>Manual motor speed</b> controller and mouthed on outside board (range 0.8-1.2 normal speed)</li> <li>• <b>On-off</b> lamps for inside doors cabinets</li> <li>• <b>Breakers</b> for service as Siemens type.</li> <li>• <b>Relays</b> and timers 24 V for no flow switch and high-pressure, low-pressure sensors, temperature.</li> <li>• Three phase 50/60 Hz 390-440V (<b>KWh-meter</b>), /5A-200/5 CT's. The KW-h meter as electromechanical meter or solid state</li> </ul>				
--	---	--	--	--	--

	<p>and pre-paid card electric type.</p> <ul style="list-style-type: none"> <li>• 24V/ 50/60 Hz <b>indication lamps</b> installed in front of the control cabinet..</li> <li>• 3 position selector switch <b>A-O-M</b>.</li> <li>• 220-2* 12V (AC) <b>transformer 100VA</b>.</li> <li>• The price includes <b>all cables</b> to be used for control purposes shall have the following cross section:</li> <li>• <b>(3*95 mm<sup>2</sup> +50 mm<sup>2</sup>)</b> for the internal connections inside main board and the contractor has to check and order the exact required length (as item 2 properties).</li> <li>• 1.5 mm<sup>2</sup> for the coil driving wheel circuits.</li> <li>• 2.5 mm<sup>2</sup> for the circuits of tension measurements.</li> <li>• 1.5 mm<sup>2</sup> for the sensors.</li> <li>• 4.0 mm<sup>2</sup> for the circuits of intensity measurements.</li> <li>• All terminals shall be carefully protected to assure electrical insulation.</li> <li>• Switches, measuring instruments, and warning lights shall be installed in the front side of the panel.</li> <li>• The control panel shall be manufactured with enough space <b>(minimum 40% free space of the total size)</b> to insure easy maintenance and no interface between the wiring for all circuits.</li> <li>• <b>All wires must be coded clearly</b> and fixed with special wire heads to avoid loose connection.</li> <li>• All timers (PSK), relays and contactors shall be of best quality as Siemens</li> <li>• 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.</li> </ul>				
--	---	--	--	--	--



	<ul style="list-style-type: none"> <li>• The control panel must be equipped with an alarming bell (100 dB at 50 meters distance) and flashing red alarm (should be visible from 300 meter during day time). <b>Alarms for all cases of failure as: voltage drop, low or high voltage or phase failure, phase sequence, high or low pressure and no flow, high temperature etc...</b></li> <li>• The control panel <b>must be equipped with</b> control circuit for either the probe water sensor or to build digital screen for hydrostatic water level sensor.</li> <li>• <b>Temperature control</b> as digital screen</li> <li>• The alarm must be muted with/without general reset and there should a special button in the front door to stop/reset it alone.</li> <li>• 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.</li> </ul> <p>The control panel deign should include:</p> <ul style="list-style-type: none"> <li>• Transformer 230/24V 150VA</li> <li>• Water level relay HK type.</li> <li>• 220V AC /120 Watt and <b>two fans</b> with filter 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.</li> <li>• SIREN (alarm system)</li> </ul> <p>Alarm system 24V are equipped <b>ON-delay timers</b> for :</p>				
--	--	--	--	--	--

	<ul style="list-style-type: none"> <li>- High pressure outlet</li> <li>- Low pressure outlet</li> <li>- No flow</li> <li>- Soft start faults</li> <li>- High temperature</li> <li>- Low, high voltage, phase sequence , failure</li> </ul> <p>The motor must not restart more than the recommended number of starts per hour and day by the manufacturers.</p> <ul style="list-style-type: none"> <li>• The price includes <b>all works, as excavation</b> works for installing pressure switches, flow switch and level sensor and all the electrical parts with suitable conduits and metal ducts to complete the works.</li> <li>• 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.</li> <li>• <b>Earthing:</b> The price of the control panel includes supplying and installing complete earth unit with earth equalizer compressing C40 box copper B.B. 25 mm<sup>2</sup>, with minimum two underground concrete manholes including coal and salt materials suitable for foundation lines , two earth electrodes, D&gt;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.</li> <li>• The price also include supply all materials (as cables, in-out sockets and install, two outlets as 3-phase complete service unit for the pumping room including Main MCB 5*20A -10 KA MOLLER type.</li> </ul>				
--	---	--	--	--	--

	<p>MCB 2 *10A – 10KA Moeller type the control</p> <ul style="list-style-type: none"> <li>• The price include all cable materials and works to conduct the electrical connections of the thermistor sensor inside the motor - (the cable 3x1.5 mm<sup>2</sup> , the cable should be of suitable length. Use flexible thermal conduits, cable glands, wire terminals&amp; labeling at both ends and all the accessories needed to complete the work as excavation &amp; backfilling, the cable from the control panel to the head of pump motor.</li> <li>• <b>Wiring and Lighting the pumping room</b> Supplying and executing all materials needed for inside and outside lighting of the station (pump and station yard) including all works, trenches, cables, sockets etc. according to the following:</li> <li>• Supply and install 2x36 W flourcent surface mounted (water proof) IP56 for outside the room</li> <li>• Supply and install single split one air conditioner inside the pumping room, size 2-ton (24000 BTU/hr) inverter technology and <b>EER &gt; 13</b>.</li> <li>• One phase sockets number four</li> <li>• Lighting the room from inside by four double-glass fluorescent lamps (36 w) in each room (water proof).</li> <li>• 3x30 w emergency 10 hours duration lighting fixture to be fixed in accordance with the supervisor engineer's instructions.</li> <li>• The lighting service should be controlled by a separate DGB. Its power source is directly controlled through a double pole MCB.</li> </ul> <p>Lighting the outside of the rooms by External four projectors each of 60 Watt HyLite <b>LED</b> Prizm, as Philips. water proof IP 56 with aluminum body</p>				
--	---	--	--	--	--

	(high quality) (the price includes all materials and works to carry the inside and outside wiring and lighting. The projectors, will be switched on from the service DGB. Distribution box for lighting suitable for 24 v circuit breaker (DBG). Also the price includes conduits, (3x2.5mm) and all size of cables& all accessories needed to complete the work. Supplying materials and executing 5 intake power sockets: one as three-phase and the other four as one-phase. The price includes supplying electric cables, leads, on-off keys, power sockets, trenches...etc. The price includes all any other missed works or materials to execute the lightening item.				
3	<b>Flow Control switch:</b> 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,	Num.	1	100	100
4	<b>Pressure Control switch</b> Supply and install two pressure switches 1-25 bar. Price includes all cables and protection conduits required to connect it with the control panel.	Num.	2	50	100
5	<b>Vertical Turbine Pump;</b> Supply and install a multi stage vertical pumping turbine complete (pump, screen, shaft bowels, stages, connection head to the <b>5 inch</b> riser 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 (see attached annex).. The main pumping data as follows: Current well total well depth is <b>136</b> meters; and the well hole is <b>10"</b> and must be checked and verified. The intended pumping pipes diameter is <b>5"</b> ; and the total pumping pipes length inside the well is <b>120</b> meters, and dynamic drawdown is not	L.S	1	19000	19000

	<p>known. Static water level is around <b>107</b> meters below surface. The turbine properties is fit as follows:</p> <ol style="list-style-type: none"> <li>1) Liquid water is potable for human drinking and suitable for field crops and vegetables irrigation.</li> <li>2) Design capacity <b>85m<sup>3</sup>/hr</b></li> <li>3) Design anticipated total head at the intended turbine discharge <b>190</b> m.</li> <li>4) Maximum pump column and discharge head assembly head losses (m): 3</li> <li>5) Shut-off head limits (m) min not less than <b>245 m.</b></li> <li>6) Turbine overall efficiency at the working point is not less than 73%.</li> <li>7) Min bowl efficiency at run out capacity 80%.</li> <li>8) NPSHA at max run out capacity (m) :8</li> <li>9) NPSHA at max anticipated TDH (m): 5.</li> <li>10) Pump operating speed (rpm) : <b>1500</b></li> <li>11) Maximum pump diameter (inch): <b>8" diameter:</b></li> <li>12) Closed impellers manufactured from bronze and cast iron bowls.</li> <li>13) Stainless steel column, stainless steel screen filter</li> <li>14) The well pump shall be capable to run at shutoff head for a few minutes without mechanical problems.</li> <li>15) The turbine torque design should be duty inverter at speed range the design values between 1:10</li> <li>16) 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, discharge head etc.. The price also includes</li> </ol>				
--	--	--	--	--	--

	<p>(if necessary) 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.</p> <p>The contractor shall do in site testing the turbine in accordance with well hole, static water level, dynamic water level, well over all depth, and submitting the test report. Before ordering or installing any new materials, the contractor must get the initial records for existing conditions of the well including: the well pumping capacity in m<sup>3</sup>/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.</p>				
6	<p><b>Pumping pipes:</b> Supply and install new seamless iron pumping pipes with the following specifications should be supplied: (SCH 40) <b>Diameter 5"</b>, 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. The number of teeth should be enough to cover the whole length of the intended coupling joint is not less than 12 cm length. The price includes threading cutting and adding reducers, or flanges, bolts to connect between the new rising pipes and the pump and the discharge head. Taking in consideration that the quantity estimated in this tender may increase or decrease.</p>	M.L	9	110	990
7	<p><b>Supply and Install Shafts as carbon steel 1040/1045 or equivalent as 304/306 stainless steel.</b> Diameter <b>38</b> mm and including all required fastenings and connections: the joints should be covered by stainless steel sleeves, and ended with a threaded stainless steel couple. The price includes threading, cutting, adding suitable line</p>	M.L	120	80	9600

	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.				
8	<b>Retainers and bearings:</b> supply and install new bearing retainers suitable for 5" pipes made of bronze and taking in consideration that the quantity in this tender is estimated and may increase or decrease.	Num.	40	60	2400
9	<b>Rubber Joints:</b> supply and install new rubber joints suitable for 5" pipes and taking in consideration that the quantity in this tender is estimated and may increase or decrease.	Num.	40	10	400
10	<b>Discharge head:</b> Supply and assemble a new steel discharge head complete type F. The intake and outlet dimensions are 5" rising pipes and 6" outlet pipes. 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,.	L.S	1	1200	1200
11	Supply and install pressure 2" <b>Relief Valve</b> , 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/ S7. The Price also includes supplying and installing 2" coupling, 2" conical record, 2" nipple and 2" gate valve,	piece	1	500	500

12	<b>Old Pump lifting and installation new pump &amp; pipes.</b> All works related to prepare the site including all mechanical installations, the discharge head, pumping pipes, turbine, shafts, rubber joints, access pipes, retainers and all related accessories (see attached annex). The price involves checking and operating the pump after finishing all project works to insure no vibration or unusual sound. The price includes all machines and labor works related to well's installation.	L.S	1	2000	2000
13	<b>Accesses Pipes:</b> Sully and install HDPE pipes or roll outside diameter 32 mm & <b>NP 10 bars.</b> , These pipes should fixed to the pumping pipes using stainless steel clamps. The price includes suitable couplings and connections to the riser pipes each two meters maximum. At least 6 meters of pipes inside water must have holes (10 mm) diameter each 20 cm of the pipe.	M.L	125	4	500
14	<b>Gate valve 6":</b> 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 Annex, S2 ,	Num.	1	400	400
15	<b>Gate valve 3":</b> 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 Annex, S2.	Num.	1	200	200
16	<b>Gate or ball valve 2":</b> 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.	Num.	1	50	50



17	<b>Non return valve 6"</b> : Supply and assemble a non return valve, 6" complete, 16 bar of the swing type with counter weight. 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 / S1,.	Num.	1	800	800
18	<b>Compound air valve 2"</b> :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 , S3. The Price also include supplying and installing 2" coupling, nipple and 2" gate /ball valve.	Num.	1	300	300
19	<b>Pressure gauge</b> : Supply and assemble pressure gauge, 16/25 bar with oil liquid Rotal ASME, B40. Price includes excavation, cutting, welding, adding coupling, and accessories that are needed to assemble the gauge,	Num.	1	50	50
20	<b>Dresser-Universal Coupling 6"</b> : 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,	Num.	1	300	300
21	<b>Dresser 3"</b> : 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,	Num.	1	100	100
22	<b>Dresser conical record 2"</b> :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 16 bar,	Num.	1	50	50
23	<b>Steel pipes 6"</b> : 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	M.L	6	40	240

	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				
24	<b>Galvanized 3" pipes</b> Supply and install 3" diameter galvanized steel pipes thickness 3.96 mm, and according to specifications Annex / S1-9,	M.L	6	20	120
25	<b>Galvanized 2" pipes</b> Supply and install 2" diameter galvanized steel pipes thickness 3.96 mm, and according to specifications Annex / S1-9,	M.L	3	15	45
26	<b>Elbows, T or Saddle or Elbows 6"</b> : 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.	1	50	50
27	Supply and install a complete 6" <b>cast iron water meter</b> according to ISO 4064 (class B) or equivalent Annex/ S5. Capacity 200 m <sup>3</sup> /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.	Num.	1	700	700
28	Supply, install a screen <b>digital hydrostatic level meter</b> (submersible digital level sensor) with the following characteristics: <ol style="list-style-type: none"> <li>1. Water Level Measurement: 40 m (min) and suitable cable length &gt;135m</li> <li>2. Excitation: 9 to 30 Vdc, reverse polarity protected</li> <li>3. Output: 4 to 20 mA DC, 2 wire, short circuit protected</li> <li>4. Input Current: 20 mA max</li> </ol>	L.S	1	2000	2000

	<p>5. Accuracy: 0.50% FS BFSL (includes linearity, hysteresis and repeatability)</p> <p>6. Response Time: 2 ms</p> <p>7. Operating Temperature: -10 to 60°C</p> <p>8. Proof Pressure: 150%</p> <p>9. Burst Pressure: 200%</p> <p>10. Wetted Parts: 316 stainless steel</p> <p>11. Electrical Connections: Submersible cable terminating in digital leads</p> <p>The price includes 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 2 sec, 6A dual relay.</p>				
<b>Total costs of all materials and works</b>					<b>68195</b>

**Company Name:** -----

**Contractor Name:** -----

**Address:** -----

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

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

**Date:** -----

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

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 must be new and not renewed in accordance with the specified specifications. The contractor should verify the existing dimensions and sizes before ordering any equipment or materials. This applies to all dimensions and figures mentioned in the BOQ including the hole diameter and depth, pump diameter and length, 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 for installation.

**The price in this tender includes supplying the materials as described in each of the items in the BOQ and all the work to disjoin the existing materials and install and test the supplied materials. The main items in this tender are:**

- 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.
- 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.
- The prices include fixing a Metallic sign on the well site according to the insructions of the supervisor engineer.
- 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.

- 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.
- The Contractor shall take full responsibility for the adequacy, stability and safety of all operations and methods of construction under the contract.
- 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".
- 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.
- The contractor should handle all the 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 100 DOLLAR/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.
- 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.
- The winning contractor should immediately start the implementation after signing the contract; and he must complete all work within maximum of ..... calendar days.
- The contractor should submit a valid registration to the Union of Palestinian Contractors.
- 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.
- 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.
- 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
- All conditions of works, specifications in this tender are technically and financially linked to the BOQ.
- 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.

- This project will be implemented in Thenabah-Tulkarem District, therefore; the contractor is responsible to get all ways of access and supply the materials and implement the project in this area;

### **General Information:**

#### **Rehabilitation of Groundwater Well 15-19/039 Thenaah**

The listed information is gathered from local well's committee and the technical operator. Therefore it is advised to verify where necessary and double check with MoA wells' data registry files.

Well Id Number: 15-19/039

Well location: Thenabah\_ Tulkarem District

Well coordinates: X= 1554220 Y=. 190265 Z=125

Water quality: potable water and used for agriculture

Number of farmers :4 families

Total irrigated area dunum: now it is around 70 dunums, but there are hundrerds of dunums avilable for irrigation after rehabilitation and construction of supply and distribution lines.

Average number of working hours per day in summer is 5 hours

Average number of working hours per day in winter is 2 hours

Well total depth (meter): 136

Drilling hole diameter (inch): 10

Casing: no information-but open hole the entire well depth

Pump setting below surface (meter): 120

Diameter of pumping pipes (inch): 5

Well pump type and capacity at well site: closed pump 60 (m<sup>3</sup>/hr)-deterirated

Highest dynamic pressure reading (bar): 4

Pump capacity at highest pressure: 45 (m<sup>3</sup>/hr)

Well crookedness: minor

Electric Power: Available transformer and no voltage drop

Static water level below surface (m): 107

Dynamic: not known, but no air noticed

Well rehabilitation: not before 15 years

**Notes:** This well needs complete replacment of the existing pumping equipments. Partial rehabilitation or replacing part of the old equipments is not recommended as they are

deteriorated. This well is unique in its conditions; now it has low size of irrigated area and few farmers, but it is a promising well and will enable to irrigate hundreds of new dunums and tenths of farmers who will benefit of it. According to the available technical data, the design of the well is going to increase the discharge from 60 m<sup>3</sup>/hr to 100 m<sup>3</sup>/hr which makes it of the best wells in the area.

The existing pumping pipes (5") in this tender are mostly deteriorated; however, the well committee should be responsible to replace or maintain any damaged pipes during the pump lifting.

**Summary:** The well pumping equipments are very old (particularly the turbine and pumping pipes), the gear box, electric and control panel are also deteriorated as well. The well needs total replacement of the existing pumping equipments including: motor, control panel, pump, rising pipes, shafts, joints and bearings and all control fittings. Moreover, needs at least 3.5 km of 6" steel pipes (supply and distribution) and 1000 storage tank to expand the agricultural area. The well committee prepared the drawings and piece of land to construct the storage tank.

## **Annex –Technical Specifications**

### **Quality Assurance**

- A. The contractor shall offer new pumps and electric motors suitable for running the pumps from manufacturers specializing in the design and manufacturing of water pumps and electric motors in accordance with international standards for more than 20 years experience. These pumps and electric motors should have been successfully used in the West Bank.
- B. All materials and components supplied to this project including pumps, motors, controls, sensors, switches, valves, meters, strainers, fittings, shafts and pipes should pass the quality assurance tests at the factories producing these materials and components in accordance with accepted international standards. The contractor shall supply certificates indicating that the materials supplied have passed such tests.
- C. The Contractor shall prove that he has successfully implemented similar works specified in this section in at least 3 other projects.

### **Submittals**

- Pump Submittals: Provide shop drawings, pump test results, performance curves, warranty and certificate approving installation for the pump.
- Pump motor submittal: Provide shop drawing, performance characteristics, warranty and certificate approving the installation and suitability of the electric motor for the continuous successful operation of the system.
- Operation and Maintenance Manuals: Provide 4 copies of the Operation and

Maintenance manual; containing complete parts list, recommended maintenance schedules and procedures, and guide for operation.

- Contractors shall provide complete submittals for the pumping station and all installations that will be implemented at the well site, including the pipes, valves, fittings and electric control unit, for approval.

### **Reference Standards**

In these reference standards, the Palestinian Standards when appropriate to the use shall prevail. However, when the Palestinian Standards do not cover a certain part or activity, the appropriate international standard will be used. Preference will be given to ISO otherwise the US (AWWA, ANSI, ASTM, API, ACI) or English standards will be used. The following is a list of standards related to the work proposed in this project:

- American Water Works Association AWWA C200: Steel water pipe\_6 IN. (150 mm) and larger
- American Water Works Association AWWA C207: Steel pipe flanges for waterworks services – sizes 4 in. through 144 in. (100 mm through 3600 mm)
- American Water Works Association AWWA C508: Swing-check valves for water works service, 2-in through 24 in. (50-mm through 600-mm)
- American Water Works Association AWWA C509: Resilient-Seated Gate valves for water supply services
- American Water Works Association AWWA C512: Air release, air/vacuum, and combination air valves for waterworks service
- American Water Works Association AWWA C701: Cold-water meters-turbine type, for customer service
- ACIS 301-Standard Specification for Structural Concrete
- ACI 318-Building Code Requirements for Structural Concrete. ANSI/ASTM A36-Standard Specification for Carbon Structural Steel
- ANSI/ASTM A53-Standard Specification for Pipe, Steel, Black and Hot - Dipped, Zinc- Coated, Welded and Seamless
- ASTM D 751 Hydrostatic Burst Test, Section 33, Procedure A ISO 6002-1992: Bolted bonnet steel gate valves
- ISO 5781 Hydraulic fluid power - Pressure-reducing valves, sequence valves, unloading valves, throttle valves and check valves -- Mounting surfaces
- ISO 5752 Metal valves for use in flanged pipe systems -- Face-to-face and centre-to-face dimensions
- ISO 5171 Gas welding equipment. Pressure gauges used in welding, cutting and allied processes
- ISO 4126 Safety devices for protection against excessive pressure



- EN 1074-4 Valves for water supply - Fitness for purpose requirements and appropriate verification tests - Part 4: Air valves
- PSI 186-97: Steel pipes for general use.
- PWA, 2000: Planning and design guidelines “ pumping stations for water”
- PWA, 2003. Construction and installation of pipes in water supply and sewerage trenches.

**Vertical Pump:** Vertical Multi Stage Centrifugal Pump and all the accessories it needs to get a working system with design discharge (Q) at a total pumping (dynamic) head (HT ) as specified in the BoQ for each well . Efficiency of this pump should not be less than 73% at the design point.

**Pump Assembly:** Bowls-Cast Iron A48 Class 30/ DIN GG20, BS 1452 Grade 220, free from blowholes, sand holes and other faults, internally epoxy or porcelain coated, externally coated with backed epoxy. Impellers are of enclosed type and of Zinc Free Bronze unless specified otherwise in the Bill of Quantities. Bowl Bearings- High-lead Tin bronze B584 C937. Turbine Shaft Stainless steel- A582 type 416, with diameter as given in BoQ, Bowl Bolts-SS A276 Type316. Suction Strainer-SS A276 type 316. The recommended maximum outside diameters are defined in the BoQ, the Outside and internal pump diameters and all materials of pump elements and the diameter of the SS- shaft should be clearly identified in the catalogues presented and also in the offer. Out Diameter of pump should be appropriate to the diameter of the well casing, shut off head should be also clearly identified through the H-Q performance curves that should be submitted with the (Efficiency- Q) curves of all pumps.

The pump should be supplied with a pump nameplate easy to read and corrosion resistance containing complete pump information including: pump manufacturer's name, serial number, pump model number, number of stages, speed, total dynamic head and discharge in m<sup>3</sup>/hr or liters per second the middle design point, year manufactured, etc.

**Electric Motor:** Shall be a vertical hollow shaft 3 phase induction motor with enclosed fan cooling (squirrel cage) with maximum speed  $n = 1500$  r.p.m. rated at an output power according to the BoQ, Supply voltage =380-440 Vrms, inverter duty 50/60Hz, turn down 10:1 Efficiency premium >94%, P.F>0.87. Thrust Load minimum=1.5xRated Load, water proof with high protection degree IP55 and insulation class F, including none –reverse ratchet with all protections needed, suitable to drive the above mentioned pump without over loading, with multiple thermal protection thermostors, space heater (max temp. at well site 46°C), drive shaft, couplings, flanges, nuts, bolts,...etc, and all necessary fittings and cables for installation of the pumping unit. Complete thermal protection unit, complete

current overload unit service factor 1.15, double thrust bearing design, spike resistant wiring, and full load efficiency not less than 94%. Steady bushing if needed. It is designed as continuous duty cycle and direct on line start if needed. The maximum number of starts is as NEMA. Maximum altitude is 1000 m above sea level. The column shaft (connecting the pump) shall be directly connected to driver motor by means of an adjustable flanged spacer coupling, suitably sized to transmit the required driving torque and be easily accessible for adjustment, packing or mechanical seal replacement.

### **Electric Power Control, Switch and Distribution Board**

The main power control switch and distribution board should be built in a dust tight, water proof IP65 steel sheet cabinet (2mm thick) rust free, factory made with front door and lock (gray thermally painted). The top of the three cabinets should be 180-220cm from finished floor and its base is protected by min 20cm cement block. All wiring, bus bars and marking terminal unit and electric company kWh meter are to be in this power cabinet. On/Off push button, emergency button, warning lamps, alarm, digital multi-meter for measuring Current, Voltages and Power. Cabinet dimensions have to be not less than 30% free space as specified in the BoQ (200 X 180 X 40 cm). The cabinet should include inverter starter (appropriate for the rated motor power and torque) with all protection relays timers, fuses, circuit breakers, bypass contactors and any other components necessary for protection of the 3 phase motor and the pump according to the attached technical drawings and the engineer's instructions. All circuit breakers must be secured through thermal and magnetic combination action while over load release should be of thermal type with calibration adjustable between 0.8 and 1.5 of the motor full current. Relays, circuit breakers, contactors, timers and any other protection components should be of best quality as Merlin Gerlin, Moeller, ABB , Schneider or other approved equivalent type. Transformer 220/ 2x12Vrms should be included in the control cabinet.

The Cabinet shall be manufactured in approved Factory with at least five similar jobs of the same level

### **In addition to the above, the cabinet should include at least the followings:**

- a) **Over load protection spikes and loose connections** adjustable 0.8 – 1.5 Nominal motor current, short circuit capacity 4PX20 kA surge arrestors of replicable type.
- b) **Protection relays** for: phase failure, phase sequence, short circuit and earth leakage.
- c) **Digital multimeter:** Digital screens to be installed on the front door of the cabinet for presentation of the measuring variables : V, A, kW, Hz, PF , Water level above the pump in (m) and pressure in bar at the well ground surface level .
- d) **Analogue Multimeters:** Analogue multimeters for measuring the three phase supply

voltages and three phase supply currents of the induction motors are to be installed on the front panel of the control cabinet as specified in the BoQ.

**e) Warning lamps** for soft start fault, over load, No flow, High pressure, Low pressure and Low water level in the well and high temperature .

**f) Capacitor bank** with discharge resistors, reactors and contactor operating at 3phase 400V, 50 Hz to improve the power factor of the motor to achieve 0.95 lagging as specified in the. The capacitors have to be connected in DELTA-connection, the capacity of each capacitor have to be based on the supply voltage of 400V(rms-Value).

**g- Earthing unit:** Earth equalizer, Comprising C14 box, Copper B.B. 70 mm<sup>2</sup> foundation line 3 earth electrodes (D> 19 mm, L = 1.5m) and any other necessary material or components to achieve an earthing resistance of R<sub>Earth</sub> <1.5 Ohm for the whole pumping station. Earthing unit should be properly connected to the power/control cabinet of the booster pump and to other components according to the technical drawings.

#### **Accessories:**

**Water Level Sensor:** ( Out Diam.<19mm to fit in the 25 /or 32mm PVC sleeve pipe), 4-20 mA with all necessary components for proper operation and the cable (with enough length>180m or as specified ) which includes the wires and thin pipe. The sensor will be connected via its cable with the electric board to measure continuously the water level above the pump. The measured value in m should be shown digitally on the front panel of the control cabinet in accordance with technical specifications and/or engineer's directions. This water level sensor have to be used also for protection of the motor against dry running by switching the motor OFF if the water level above the pump sinks to a definite adjustable limit.

**Pressure Switches:** A set of low and high pressure switches 0-30 bar to be connected with the control panel unit including all required cables and accessories in accordance with drawings and/or engineer's directions.

**Flow Switch:** Electric flow switch (at least 16bar) suitable for the pipe to be installed in (6" or 4" steel pipes) powered by a 24 V source. Flow switches shall have no moving parts, include 316 Stainless Steel Sensor, suitable for water temperatures up to 40°C, and Pressures of 40 bars or more, Exotic Alloys for Corrosion Resistance including all cables and accessories to connect it to the control unit in accordance drawings and/or engineer's directions.

**Water Flow Meter:** Turbine water flow meter (6" or 4" as specified in BoQ, cast iron body, at least 16 or 25 bars as BoQ) complete with flanges, gaskets, bolts and nuts all according to AWWA C207, AWWA C701, or appropriate ISO standards. The meter shall have an accuracy of ±1.5% or better, maximum pressure drop at maximum discharge 0.3 bar. Materials: meter housing (cast iron epoxy coated or cast bronze), rotor (thermoplastic or stainless steel), rotor bearing pivots (stainless steel type 316). The standard register is a straight-reading, permanently sealed magnetic drive register. The meter to include an

automatic reading through 100 mA @ 24 V ac/dc reed switch, cable length 5 meters and an LCD to display meters reading in SI units.

**Strainers** (cast iron, at least 16/25 bars as BoQ). Strainers body will be made of cast iron. Strainer body will be coated with an epoxy powder minimum thickness 120 microns. Screen shall be made of stainless steel. For maintenance purposes, covers shall be provided to allow ample access to inspection, cleaning and servicing. A drain bend at the bottom of the body, fitted with a stopcock shall be incorporated. Head loss shall not be more than 0.1 bars, when clean, at the nominal flow rate of the control valve or water meter protected by the strainer box.

**One Way (check) Valves**, cast iron, swing type: Check valves shall be swing type and shall meet the material requirements of ISO 5781 or EN 1074-3. The valves shall be iron body, bronze mounted, single disc, 16/25 bars as BoQ working water pressure, nonshock, and hydrostatically tested at a minimum of 36 bars (525 psi). The check valve shall BE:

- A. When there is no flow through the line the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the waterway.
- B. Check valves shall have bronze seat and body rings, extended bronze hinge pins and bronze nuts on the bolts of bolted covers.
- C. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and spring. Springs with various tensions shall be provided and springs approved by the Engineer shall be installed.

**Gate Valves:** (Resilient seated Rising Stem Gate Valves, metal seal, at least 16 bars) complete with flanges, gaskets, bolts and nuts according to AWWA C509, AWWA C207 standards and drawings. The Gate valve shall be of iron body, have flanged ends, and shall be bronze, solid wedge, non rising-stem-type gate valve. The valve shall be rated for 16/25 as BoQ-bar pressure and a minimum of 36 bars test pressure. The valve should have the following characteristics:

- A. Valves shall be outside screw and yoke type with rising stem.
- B. Face to face metal valves dimension shall conform to ISO 5752 or EN 558-1,2.
- C. Bronze gate rings shall be fitted into grooves of dovetail or similar shape in the gates. For grooves or other shapes, the rings shall be firmly attached to the gates with bronze rivets.
- D. Hand wheels shall turn counterclockwise to open the valves. Hand wheels shall be of ample size and shall have an arrow and the word OPEN cast thereon to indicate the direction of opening.
- E. Stuffing box follower bolts shall be of steel and the nuts shall be of bronze.
- F. The design of the valves shall permit packing the valves without undue leakage while they are wide open and in service.
- G. O-ring stuffing boxes may be used.

**Analog Pressure Gages (range: 0- 20 bar):** Pressure gauges ( with Analog Scale) shall be manufactured in accordance with ISO 5171 or EN 837-1,2,3 and shall be furnished and installed in each pump suction and discharge nozzle and in accordance with the bill of quantities. Where gauge taps are not available in the pump's suction or discharge nozzle, the necessary taps in the adjacent piping shall be made for installation of gauge connections. Each pressure gauge should be equipped with a stop valve of the same pressure rating.

**Digital Pressure Measuring Sensor (range 0-20bar).** The design to measure digitally the pressure in the discharge pipe near the well opening. The digital measurement in bar should be indicated at the front panel of the control cabinet. All work should in accordance with these technical specifications, drawings and engineers directions.

**Air Release/ Air Relief Valves:** Air relief valves shall be of the double orifice pattern with cast iron bodies, the inlet flange shall be fitted and drilled in accordance with EN 1074-4. The valves shall be adequately sized for the release of air from the pipeline without restriction of rate of filling or flow due to backpressure. Air shall be allowed to enter at a rate sufficient to prevent excessive reduction of pressure in the pipe during pipeline emptying. The "aerokenetic" type shall be provided, air valves with internal operating linkages shall be avoided. Valves shall be designed to prevent the operating elements being in contact with the pipeline liquid by approved means such as the provision of an auxiliary float and chamber sufficiently large to isolate the orifice valves and seats throughout the rated operational range. Air valves shall be fitted with a separate isolating sluice or gate valve and gearing shall be provided, where necessary, to facilitate operation. EN 1074-4. All air relief valves and associated isolating valves shall be works tested and capable of withstanding the same test pressure as the pipeline or vessel on which they operate. All materials used in the manufacture of the valve shall conform to EN 1074-4.

**Pressure Relief Valves:** It is designed with adjustable setting to allow pressure relief when pressure exceeds an adjustable setting in accordance with ISO 4126. The pressure/surge relief valve shall be heavily constructed cast iron valve body, with integral end flanges and full unobstructed flow through area. The disc shall be cast iron having a replaceable resilient seat for tight shut-off. The Pivot shaft shall be stainless steel and be a single unit (not stubs), extending through the valve body with a weight and lever mounted on one or both ends. The pressure/surge relief valve shall be adjusted at the factory to hold closed against the normal operating system pressure. When the system pressure exceeds this setting, the surge relief Valve shall open immediately to relieve the pressure rise, but closes slowly at an adjustable rate as the system pressure returns to normal. A heavy-duty oil dashpot system and stainless steel oil reservoir shall be externally mounted on the valve to control the rate of closure, in such a manner, to positively prevent any slam. The closing rate shall be externally and infinitely adjustable thru a color-coded flow control valve having a locking device to prevent tampering, once the close rate is set. Prior to shipment of the

valves the manufacturer shall factory test the valves under the pressure and flow conditions specified above. The manufacturer shall submit to the Engineer with certified copies of the factory test results. Surge relief valves shall be in accordance with ISO 4126 and shall be installed on the plant water lines as BoQ.

The surge relief valve shall be heavily constructed cast iron valve body, with integral end flanges and full unobstructed flow through area. The disc shall be cast iron having a replaceable resilient seat for tight shut-off. The Pivot shaft shall be stainless steel and be a single unit (not stubs), extending through the valve body with a weight and lever mounted on one or both ends.

The surge relief valve shall be adjusted at the factory to hold closed against the normal operating system pressure. When the system pressure exceeds this setting, the surge relief Valve shall open immediately to relieve the pressure rise, but closes slowly at an adjustable rate as the system pressure returns to normal. A heavy-duty oil dashpot system and stainless steel oil reservoir shall be externally mounted on the valve to control the rate of closure, in such a manner, to positively prevent any slam. The closing rate shall be externally and infinitely adjustable thru a color-coded flow control valve having a locking device to prevent tampering, once the close rate is set. Prior to shipment of the valves the manufacturer shall factory test the valves under the pressure and flow conditions specified above. The manufacturer shall submit to the Engineer with certified copies of the factory test results. Surge relief valves shall be installed where indicated on the Drawings. Valves shall be rated 40 bars (600 psi) working pressure.

**Black Steel Pipes at least 3.96mm Thick** externally painted two faces or coated as BoQ with backed epoxy manufactured in accordance with PSI 186-97 and AWWA C-200 for connecting the riser column pipe through the well discharge head with the valves, switches, meters, strainer , gages and dressers in accordance with BoQ and drawings and engineer's directions. Price includes all jacks, accessories, material, welding, cutting and supports needed to connect and support the pipe in place and its connections. Black steel pipe should have been tested at a pressure of 55 bars or above.

**Seamless Steel Pipes:** ASTM A53 Gr. B Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Seamless cold drawn. Corrosion resistant Nickel-copper alloys length 3 meters per pipes threaded end coupling not less than 15 cm or as Specified in the BoQ. The pipes are Sch40 not less than 7.1 mm thickness. Tensile strength > 415 MPa

**Pumping Shafts:** the carbon steel (1040/1045) or stainless steel 304/316 rods are used to transmit rotational torque from the motor and down to the pump bowels. It's manufactured according ASTM A29, A510. It is composed of minimum corrosion resistant and alloys as iron medium carbon manganese-sulfur-phosphorus. Its tensile strength >620 MPa. Tested for toughness high strength and signs of misalignment.

**Flanged Dresser: 6" and 4"** complete for (16/25 bars) with two tie rods 60 cm long diameter of 5<sup>3</sup>/<sub>8</sub> and 4 ears for each dresser in accordance with drawings and engineers. Material of dresser shall be high strength steel

**Wash Out:** the main wash out end is shown in drawings. The work shall be completed according to the contract condition and the engineer approval. The material needed including a heavy duty 3" flanged cast iron gate valve (16/25 bars, all piping and all accessories, fittings, piping and joints needed as shown in the drawings.

## **Annexes: Pipes, Fittings Materials Specifications and Testing**

### **Steel Fittings:**

#### **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 Sphero 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. 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 for 4" and above diameters or records 3" and less diameters

**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 16 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

**Carbon steel line shafts: According to ASTM A510**

**Irrigation Steel Pipes Welded Black Steel Pipes, ASTM A53 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 (Grades A)