

Appendix 6

EMS Scope of Work

- Unload, visual checkup and storage of all supplied equipment.
- Shipping of the stored equipment to the site.
- Installation of all equipment included in the WTP:
 - Pre-filtration System – F-100
 - Process Pumps:
 - Permeate pumps P-100A to P-100F
 - Pre-filtration backwash pumps P-101A to P-101B
 - Acid CIP pumps P-108A to P-108B
 - Hypo CIP pump P-109A to P-109B
 - Reject discharge pump P-110A to P-110C
 - UF backwash pumps P-111A to P-111B
 - Dosing Pumps:
 - Ferric chloride dosing pumps P-102A to P-102B
 - Sodium hypochlorite dosing pumps P-103A to P-103G
 - Citric acid dosing pumps P-104A to P-104C
 - HCl dosing pumps P-105A to P-105B
 - SBS dosing pumps P-106A to P-106B
 - NaOH dosing pumps P-107A to P-107B
 - Membrane air scour blowers – B-100A to B-100D
 - Instrument Air Compressor System.
 - Mixers:
 - Mixer in coagulation tank TK-100
 - Mixers in Flocculation tanks TK-101A to TK-101C
 - Mixer in acid CIP tank TK-104A
 - Mixer in hypo CIP tank TK-104B
 - Weir Gates in flocculation tanks TK-101A to TK-101C
 - Tanks:
 - Sodium hypochlorite dosing tank TK-105
 - Citric acid dosing tank TK-106

- HCl dosing tank TK-107
 - SBS dosing tank TK-108
 - NaOH dosing tank TK-109
 - Ferric chloride dosing tank TK-110
 - Pre-filtration backwash tank TK-111
- Installation of all UF membranes support beams, according to the supplier's instructions – 24 units in MODE 1 or 30 in MODE 2.
- Supply and install all piping and fittings (valves, check valves, etc) according to the approved supplier's isometrics and BOM.
- Supply and install lifting and transporting systems:
 - Double beam overhead crane in the UF membranes area - opening of 15 m and max lifting load of 5 tons.
 - Single beam overhead crane in the pre-filtration area – opening of 5.2 m and max lifting load of 3 tons.
 - Single beam overhead crane in the area behind the UF membranes – opening of 3.5 m and max lifting load of 1 ton.
- Control and electricity:
 - Installation of all supplied instrumentation, according the hookup drawings and piping isometrics.
 - Prepare I/O list.
 - Design, supply and install of two PLCs in the WTP (A02 and A03 according to section B.1.23 in Volume 3).
 - The supplied PLC shall be GE RX3i and the its software is Machine Edition.
 - Design, supply and install of the WTPs' MCC.
 - Control and electricity cables routing drawings, preparation of BOM and installation.
 - Calibration and installation inspection of every instrument in the WTP.
 - Writing the software program for the WTP, according to the supplied CN.
 - Design of all required HMI screens.
 - Supply HMI software – ControlMaestro.
 - Supply 3 computers – 2 for the for the plant control and 1 for the maintenance. The monitors shall be 27" and higher.
 - Design and supply One workshop for the "Karkur" control room.
 - Design and supply One workshop for the "Ramle" control room.

- Design and supply One workshop for the Desalination Unit in Mekorot Headquarters in Tel Aviv.
- Commissioning and first performance test:
 - Commissioning Site assessment:

The commissioning site assessment shall be done by the suppliers' startup & commissioning engineer, accompanied by EMS personnel for the review of the following items:

 1. As-built P&ID.
 2. Piping & Equipment installation.
 3. Review onsite issues with the startup & commissioning engineer, for example:
 - ✓ Installation questions.
 - ✓ Identification of components.
 - ✓ Locate or source missing parts.
 - ✓ Review any concerns with installation.
 4. Review with the startup & commissioning engineer all onsite commissioning activities and identify the required resources for each task.
 5. Conduct the control FAT (Factory Acceptance Test) with the startup & commissioning engineer.
 - Cold Commissioning:

Cold commissioning entails the operation of the WTP with Tap Water.

 1. Accompany the startup & commissioning engineer during the inspection of all equipment (prior to startup) for apparent installation defects or substandard workmanship.
 2. Conduct a "check and verify" for every control loop (with tap water) with the startup & commissioning engineer.
 3. Fill all six (6) membrane tanks with tap water and install all 24 (MODE 1) or 30 (MODE 2) UF membrane cassettes in the tanks.
 4. Conduct hydraulic check together with the startup & commissioning engineer for each installed equipment for duty points, control loops alarms and all other items, included in the cold commissioning program, submitted by the supplier.
 - Hot Commissioning:

Hot commissioning entails the operation of the WTP with Yarkon river water. Conduct all activities, included in the hot commissioning together with the startup & commissioning engineer, according to program, submitted by the supplier.

- First Performance Test:

Operate the entire WTP to simulate all operation modes under the guidance of the startup & commissioning engineer.