



**TECHNICAL SPECIFICATIONS FOR
PURCHASE OF TWO POLISH FILTERS FOR
THE EMET BORON PLANT MANAGEMENT**

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1. WORK DEFINITION AND SCOPE:

This Technical Specification covers the supply, startup, performance and acceptance tests, training and warranty issues for the 2 polish filter group with minimum 200 m³/h filtering capacity and related equipment, which shall operate on the basis of 24 hours a day and 330 days a year at the filtration units (1 each) of Boric Acid 1 (BAF-1) and Boric Acid 2 (BAF-2) factories of Emet Boron Plant Management.

In these technical specifications, each firm to submit a bid shall be referred to as the “**BIDDER**”; Eti Mine Works General Management shall be referred to as the “**ENTITY**”; Emet Boron Works Management shall be referred to as the “**PLANT**”; and the successful bidder contracted under a signed contract, as the “**CONTRACTOR**”.

There is a total of six (6) polish filters with three (3) in each factory at the existing Boric Acid Factories and the new Polish filters to be produced will be installed next to these filters (at +14 m level). Layout drawings related with the areas considered for installation are provided in the annex and the new Polish filters to be supplied will be designed to be installed at these areas. Revision and displacement works will be carried out at the areas where the filters will be installed if required (displacement of the precoat tank and lines etc.). The locations of the tanks to which the solution will be fed (BAF-1 T-107 and BAF 2 T-207) and tanks to which the solution will be transferred (BAF-1 T-108 A/B and BAF-2 T-208 A/B) will be taken into consideration during designing. Construction and detail drawings will be prepared by the Contractor.

The contractor will present the construction and detail drawings to the Plant Management within 60 calendar days following the signing of the contract. Plant Management will carry out reinforcement works if it is found to be necessary as a rest of the load calculations to be made for the platform on which the polish filter will be placed after examining the design.

The drawings provided in the attachment are only for information, and the Contractor is required to see the installation area on the site before submission of the bid. All kinds of responsibilities will be borne by the Bidders in bids presented without examination of the installation area.

2. REQUIRED CHARACTERISTICS:

The requirements for the polish filter to be produced and installed at the boric acid factories pursuant to the construction and detail drawings to be prepared by the Contractor are given below.

Pressure Filter	: To be used to filter the boric acid solution.
Quantity	: 2 units (complete with all equipment)
Type	: Fully automatic, horizontal type cylindrical filter, moving on rails

and opening hydraulically from the middle.

Filtering capacity : Min. 200 m³/h

Design temperature : Min. 100°C

Material : Must be made of AISI316 L stainless steel material.

3. OPERATION DATA

3.1. Process Description

3.1.1. Current Process:

In Boric Acid production, the slurry obtained from the reaction of the colemanite sulfuric acid and main solution mixture is filtered at the belt filters to obtain the boric acid solution. Suspended solid substances in the boric acid solution are removed from the solution through the polish filters. Polish filters are coated with perlite solution prior to startup. Perlite solution is prepared at the T-110 tank and transferred to the precoat tank at the polish level from there. Perlite solution will be circulated in a closed cycle between the precoat tank and the polish filter to be installed to ensure coating of the fabric surfaces inside the polish filter completely. Following coating with perlite, feeding is made to the polish filters through the pumps from the solution tank (BAF-1 T-107 and BAF-2 T-207) where the filtrate from the filtration is stocked. Filtered solution is taken into the concentrated solution collection tanks (BAF-1 T-108 A/B ve BAF-2 T-208 A/B).

3.1.2. New polish filters to be installed:

The new polish filters to be installed will operate according to 2 scenarios.

1st Scenario: Use as standby for the existing polish filters.

2nd Scenario: Refiltering the solution filtered by the existing polish filters.

In the 1st Scenario; the Boric acid solution in the BAF-1 T-107 and BAF-2 T-207 tanks will be taken to the polish filters to be installed with the 2 pumps to be supplied by the contractor and the new line to be installed and the filtered solution will be transferred to BAF-1 T-108 A/B and BAF-2 T-208 A/B tanks with the new line to be installed. Moreover, a connection will be made from the new polish feed line to the existing polish filter feeder collector also and equipment required for independent use of the lines (valve, flowmeter, temperature and pressure meter etc.) will be placed at suitable locations.

In the 2nd Scenario; the Boric acid solution in the BAF-1 T-108 B and BAF-2 T-208 B tanks will be fed to the polish filters to be installed with the 2 pumps to be supplied by the contractor and the new line to be installed and the filtered solution will be taken into BAF-1 T-108 A/B and BAF-2 T-208 A/B tanks with the new line to be installed.

New polish filters to be installed will be placed on the platform on which the existing polish filter are located (+14 m level). The displacement works related with tanks and lines that hinder the installation during placement on the platform will be carried out by the contractor

and changes that may lead to interruption of production will be carried out during the general maintenance repair shutdowns of the factory subject to approval of the Plant Management.

A connection will be made to the existing waste line for the effluent from the cycle that is used in washing of the polish filters, and this will be taken into the remix tanks (T-118 and T-206) by gravity.

Flow and temperature measurements will be made on all lines (input-output-precoat solution lines and water lines) to be used for the new polish filter to be installed

3.2. Feed Solution Characteristics

Capacity (Flow Rate): Minimum 200 m³/h

Solution Composition

H₃BO₃	:160-190 g/l
H₂SO₄	:0-3 g/l
pH	:1-4
Solution Temperature	: 75 - 90 °C
Suspended solid substances	: 0.02-0.05%
CaO	: Max. 900 ppm

3.3. Auxiliary Units:

The plant where the filter will be installed is at an elevation of 1000 meter, in an indoor factory environment.

Steam	: 150-175 °C, 5-7 bars,
Electrical Energy	: 220/380 V, 50 Hz,
Instrument Air	: 5-6 bars
Hot water	: 70-90 °C

4. MINIMUM MACHINERY, EQUIPMENT AND DEVICES CONSIDERED IN THE BID SCOPE

4.1. Bid Scope:

In the scope of the purchase of 2 polish filter systems with minimum 200 m³/h capacity,

- a) 2 Polish filter systems
- b) Mechanical, Electrical and Automation Works
- c) Engineering Services
- d) Manufacture, supply/production, installation, startup
- e) Performance test, training and acceptance will be included into the scope.

4.2. Design Parameters

Polish Filter General Operation Parameters

No. of Filters	: 2
Filtering capacity	: Minimum 200 m ³ /h
Operation temperature	: 75 - 90 °C

Design Temperature : 100 °C
Precoating Material : Micronized Perlite
Filtration Cycle Period : Not less than 7 hours.
Precoat Solution amount : Max. 0.3 m³/h (to be confirmed by the Contractor.)
Rate of Suspended Solid Substances
Required in the solution after Filtering: Maximum 0.015%
CaO : Max. 620 ppm
(17-19% H₃BO₃ solution at about 75-90°C will be fed to the precoat tank and micronized (7-10%) perlite will be used for precoating)

4.3. Characteristics of the Polish Filters

- a) Polish (pressure) filter will consist of four (4) stages: precoating, filtration, washing and drainage. All surfaces in contact with the solution will be made of AISI 316 L and the other filter components will be made of AISI 304L grade stainless steel material and the filter body and the carrying frames will be made of steel material painted with acid resistance paint in two coats.
- b) For the polish filter; the filter area, filter dimension and weight, filter fabric type, air permeability of the filter fabric, fastening of the filter fabric, coating period of the filter fabrics, pressure vessel design code (code used by the manufacturer will be given), permitted corrosion, welding quality and control, machine-equipment, **site instruments and electrical-automation system details and list of classified materials** (brand, type/model, origin, technical information and related standards), origin, material, type/model, technical information, Electrical-Automation and Control System Information and the Quality Management System certificate of the Manufacturer firm will be presented to the approval of the Plant Management prior to order placement.
- c) Filter system will be equipped with necessary measuring and control devices along with insulation (stonewall and sheet metal) for keeping the temperature during the filtering operation and washing. A fixed nozzle system will be used for washing of the filter fabric. All valves to be used on the solution lines will be installed as close to the distribution points as possible to prevent crystallization. Safety vent systems (blowdown system) (min. 2 stages), capable of discharging the solution inside the filter in a safe manner in terms of the machine and human health against sudden increases that may occur in the filter internal pressure. Vents will have on-off modes and first the lower ones will be opened and then the upper ones. An audio-visual warning system will be provided when the blowdown vents are opened for safety. Following activation of the blowdown system, the polish feeder pumps will be stopped automatically in a safe manner and polish filter will be deactivated. Output of the safety blowdown pipes will be fed back to (BAF-1 T-107 and BAF-2 T-207) tanks.
- d) O-rings and seals to be used on the polish filters will be cast-type. O-rings produced by adhesion will strictly not be accepted. O-rings and seals will be made of viton material.

4.3.1. Required characteristics for the feeding pumps to be used:

- a. Quantity: 4
- b. Pump type: Single stage horizontal type centrifuge pump, with frequency converter (open fan)
- c. Sealing Type: Cartridge type double mechanical seal
- d. Seal cooling water: Soft Water (Support liquid tube unit)
- e. Drive Type: Elastic coupling (directly coupled) will be on a single frame.
- f. Shaft material: Duplex steel
- g. Fan material: ASTM A890 Gr.(3A/4A/5A)
- h. Body Material: ASTM A890 Gr.(3A/4A/5A)
- i. Brand and origin of the pumps will be specified in the bid. (Pumps will be Wilfley, Sulzer, KSB or equivalent quality.)

4.3.2. Characteristics required for the valves to be used on the solution lines:

- a. Valve Type : Sector or Segment (V-Port)
- b. Pressure class : PN16
- c. Connection Type: Sandwich-Wafer type
- d. Body Material: Stainless Steel (1.4408)(CF8M)
- e. Globe material : Hard Chrome Coated Stainless Steel (1.4404)
- f. Globe Surfaces : 68 Rockwell C
- g. Shaft material: Stainless Steel (1.4404)

4.3.3. Characteristics required for the valves to be used on the water lines:

- a. Valve Type : Full Bore Globe Valve
- b. Pressure class : PN16
- c. Connection Type : Flanged
- d. Body Material : AISI 316 grade stainless
- e. Globe material : AISI 316 grade stainless
- f. Shaft material : AISI 316 grade stainless
- g. Sealing Component : Must be Teflon with AISI 316 stainless steel plate spring reinforcing.

However, DN40 and smaller dimensions may be carbon reinforced Teflon.

- h. Seal Box : Compression on the seal box will be provided with multi-layered disk shaped Teflon and stainless steel springs.

4.3.4. Characteristics required for the check valves:

- a. Body and Cover Materials : GG-25 Iron cast
- b. Disk Seat and Spring Material : AISI 304 stainless steel
- c. Connection Type : Flanged

4.3.5. Characteristics required for the strainers:

- a. Type : Y Type
- b. Body and Cover Materials : GG-25 Iron cast
- c. Filter Material : AISI 304 stainless steel

4.3.6. Characteristics required for piping and insulation works:

- a. All welded joints on the lines will be made with argon welding.
- b. Washing and discharge lines will be provided on the pump lines.
- c. All bolts and nuts used in the installation will be supplied in conformity with 8.8 quality.
- d. All solution lines will be flanged for easy cleaning of the frozen solution in the lines. Pipes will be joined with a flange at every 6 meters. Seals to be used in the flanges will not be in layers and will be made of readymade materials cut according to the diameters.
- e. All seals will have 3 mm thickness and will be cylinder-head gasket.
- f. All pipelines will be covered with stonewool of 50 mm thickness, which will be enclosed in 0.8 mm aluminum sheet.
- g. Manual manometers of adequate size for easy visibility by the personnel will be provided on the polish filters.

4.4. Engineering Services:

Bid will cover the following engineering services.

- a) Process flow diagram and Designs
- b) P&I Diagrams
- c) Process Description and General Equipment Characteristics
- d) Site Instruments
- e) Overview of the Process Control Philosophy
- f) Process and Instrument Data Sheets

4.5. Electrical and automation system:

4.5.1 Electrical Works

General Issues

1. All works in the scope of the new machine and equipment must be in conformity with the scientific and technical norms, and all requirements necessary based on the nature of the work and conformity to the related regulations will be under the contractor's responsibility even if they are not specified in the specifications. All equipment arriving at the site will first be subjected to approval of the Plant Management.
2. Supply and installation of all electric motors, electric panels, frequency converters, cable ducts, energy and signal cables and other auxiliary devices and preparation of the related designs and documentation are included into the work scope.
3. Power supply will be made from the point designated by the Plant Management. If required for the power supply, supply and installation of the drawers of the modular type drawer blockset panels at the MCC units will be realized by the Contractor.
4. Excluding events of technical difficulties, the frequency converter panels for the new pumps will be positioned inside MCC 1-2 and MCC 21-22 with the approval of the Plant Management. Frequency converters for the motors will be installed in a way to be protected against the adverse conditions of the environment. Integration (start, stop,

rpm, automatic, manual, ready, on, fault etc.) of the drives of said motors to the control system (DCS-PLC) will be under the responsibility of the Contractor.

Electric Motors:

1. Electric motor must be designed and manufactured in conformity with IEC standard and recommendations. Motors will have minimum IE3 efficiency pursuant to IEC 60034-30. Frequency Converters will be used for the pump motors to be used. Motor may have grey cast iron body. Local control boxes containing selector switches, illuminated buttons etc. devices with minimum IP-65 protection will be installed next to the electric motors to be used in the system.
2. Motors must be equipped with 2 sets of PTC type thermal protection coils, and one set must be adjusted for alarm and the other must be adjusted for the suitable temperature value for error. Motor isolation must be H class and the motor temperature increase must be B class. PTCs must be set to temperatures suitable for these insulation classes.
3. Motor terminal box and body must have separate grounding bolts. Motor plates must be stainless steel. Motor protection class must be minimum IP55 class. Shaft dimensions of the motor bodies must at standard structures and measurements specified in IEC.
4. All motors must be dimensions for continuous overload of 25%. Excluding special motors, all motors will be with squirrel cage, completely enclosed structure and must have fan cooling and must be suitable for startup with frequency converter. Motors must have protection against short-circuit currents and overloads.
5. Motors will be painted with two coats of epoxy paint.

Frequency convertors

1. All frequency converters will be heavy duty type.
2. They must have a menu in Turkish.
3. Frequency converters will be equipped to receive all electrical values related with the motor (current, voltage, power, etc.).
4. Drives must have a drive flux vector control, direct torque control or similar technologies.
5. Frequency converters must have both speed (rpm) control and torque (moment) control feature.
6. Drives must be capable of providing 100% continuous output current at specific conditions.
7. Without extra safety measures being necessary, the motor output shall be 100% short-circuit protected and the power and control shall have solid galvanic insulation.
8. In converters to be used, the times for motor start and stop shall be adjustable.
9. At some faults selected by fault management, it should be possible to perform an automatic reset whose number and periods can be set in advance.
10. Efficiency of the drivers will be 97% under full load.
11. Drives shall have protections against overcurrent, short-circuiting, input voltage loss, motor overload and underload, overvoltage/undervoltage, overspeed, over-temperature etc. faults.

12. Reference values such as the speed, torque, current, voltage, frequency, rpm, etc. relating to motors shall be monitored and controlled on the control system SCADA screen.
13. A circuit breaker (compact switch or fast blow blade fuse) will be provided at the front of each frequency converter for maintenance and repairs in the event faults (excluding blockset drawer)

Panels

1. Panels will be fixed vertical type of minimum IP54 with adequate ventilation.
2. The sheet metal used for the doors, covers, roofs and main frames of panels shall be 2 mm and that used for forming parts shall be 1.5 mm.
3. The cables inside the panel will be installed in an orderly manner and plastic cable ducts will be used where necessary.
4. Panels will be painted with RAL 7035 electrostatic powder paint.

Cabling and Trays

1. N2Xh power cables will be used in the 0.4 kV power distribution. Cables will be grouped to form a delta at the duct or the cable tray and will be fastened at each 1.5 meters with cable ties. Single core cables forming a delta will be installed in a duct or in a way that the cable tray contacts it. Connection of cables to the motors or equipment will be made with rigid and flexible pipes. Cables will not be visible after installation to the motors or equipment.
2. No splicing will be used in the cabling. In addition, extra 2 meters of cable shall be provided for equipment and panel sides each, taking into consideration any failures likely to occur on the cables installed.
3. Cable entries will be from under the panel in all cabling works and insulation will be provided.
4. The cable trays to be used must be heavy duty type, with minimum 2 mm wall thickness, hot dip galvanizing and cover.

4.5.2 Automation Works

1. Polish filters will be with PLC control and will be operated fully-automatically as specified in the process description.
2. All parameters required for operation of filters (pressure, temperature, level, etc.) must be controllable from the respective PLCs and display and control must be possible from the respective site Operator Panels.
3. Operator panel will be minimum 17" and will be Industrial Touch Panel PC of IP-65 protection class. Operator panel will be stored at IP-67 protection class. Viewing, adjusting and control of the program sequence and timings must be possible from the site Operator panel.
4. Separate HMI pages will be designed on the operator panel for the start sequence and stop sequence of the filter on the operator panel.
5. Password protection will be provided on the operator panel to prevent unauthorized access.

6. Filter Control System will be integrated to the DCS control system over the Modbus TCP communication protocol and viewing and control from the DCS will be possible.
7. Moreover, fiberoptic cable will be used in the communication between the PLC and DCS and which will be installed with redundancy.
8. Modbus TCP communication card (ABB CI867) must be added to the existing ABB brand DCS at the Boric Acid Factory II for TCP communication.
9. DCS integration will be realized only by personnel who have ABB partnership or who have received DCS training with ABB certification.
10. All inputs and outputs related with the filter (solution, water etc.) will be measured, recorded and reported in real-time.
11. Minimum 10% redundancy must be provided for each of the DI, DO, AI and AO numbers used in the system.
12. The control system must be selected to support expandable structure and must use the regular and hierarchical programming method.
13. All details displayed in the P&I diagrams shall be written in Turkish in the "explanations" sections.
14. Main supply input UPS output and 24 VDC power source outputs shall be protected with high voltage conductors.
15. All digital inputs from the site to the MCC panels and the output signals shall be connected to the control system over a relay and the analog input and output signals shall be connected over glass fuses with LED. PT100 inputs shall be connected to the system with isolation converters.
16. All analog input-output signals of the control system will be 4-20mA.
17. Site instruments and control system will be supplied with independent 24 VDC supply sources with redundancy. These supply sources will be used in the supply of gates, valves, sensors, alarm warning lamps, horns etc. receivers at the site and the control system will be fully isolated from the supply resources.
18. Panel name will be written on the metal plate on the front surface of the panel. Each material inside the panel will be labeled in conformity with the design and this label will be of PVC materials.
19. Panel will be placed at the location considered acceptable by the PLANT MANAGEMENT.
20. All panels to be used must have their own cooling system
21. Single line, connection diagrams and electricity-automation designs shall be placed inside a suitable pocket to be provided inside the panel covers. Details related with the motors (project name, power, startup type etc.) will be placed on the front side of the panel in a plastic casing. Network diagram of PLC system will be prepared and colored and easily comprehensible printout including IO modules Profibus and any IP (Ethernet) addresses devices together with their addresses will be provided inside plastic casing to be placed inside the control panel.
22. Permanent labeling (metal) of all devices at the site, the panel and the cables connected to the DCS and MCC panels will be completed and the site-panel and designs will be compatible with one another and labeling of the cables coming from the site at

- the DCS panels and numbering of the cables and connectors at the site panels will be realized.
23. Fittings in conformity with the cable cross-sections shall be used at the inputs of the dustproof panel located at the site. This panel shall be suitable for secure installation of the fittings and easily installation of the cable inputs and connections. The cable inputs shall always be from below. Tightness shall be ensured after the cable connections are made.
 24. Identification information forms for all equipment and devices in the system will be provided. Identification information sheets shall include all information related with physical structure, technical structure, location, pos. no. and calibration of all related systems, equipment and devices in the system.
 25. Terminals where the analog signals enter will be smart and illuminated glass fuse.
 26. In order to protect the instruments before the air connected to the instruments, air filter, lubricant, automatic discharge etc. equipment will be used.
 27. Instrument devices must be suitable for performance of the testing and calibration processes while the process is in progress.
 28. All transmitter and signal processes must have high voltage protection on the power and signal side.
 29. Minimum IP66 cable entry fittings of suitable dimensions will be provided at cable terminal entries of site instrument and electric equipment.
 30. All instrument devices and valves will be HART compatible and Smarty Type.
 31. All instrument devices and valves must be HART compatible and with pneumatic actuator. Moreover, the on-off information of all on-off valves must be carried to the control system with on-off positioners and the on-off position of the proportional valves will be carried with IP (hart) positioners used.
 32. All electrical equipment, control panels, site local control boxes, connection boxes, site devices, instruments, cables entering the equipment shall be marked with metal or plastic labels, depending on their respective locations, on which the codes and numbers are engraved.
 33. ONLINE UPS with minimum 30 minutes supply capacity to feed the related panel will be installed at the automation panel of the filter in the event of power failure. In the event of power failure, the operator screens shall not be switched off and the monitoring of the process shall be possible.
 34. Reports of the filter operation conditions (failure, flow, temperature, operation hours etc.) must be obtainable instantaneously and for selected time intervals from the operator panel. Changing of the reporting system will be possible in line with the request of the Entity.
 35. All analog signals from and to the site will be sent through rail type glass fuse with LED and the digital signals will be sent through relay for connection to the control system.
 36. Adhesive labels will strictly not be used in instrument labeling.

4.5.2.1. Control System Characteristics

1. **Memory Map** of the control programs of the filter and the Network Configuration of the control system will be provided to the Entity.
2. Control system of the filter will be programmed in a way to provide for both displaying and programming over the factory main control system (DCS). All hardware and software must be compatible with this.
3. The programming language to be used will be suitable for programming and in conformity with IEC -61131 standards.
4. The system controller must be equipped with diagnostic characteristics and diagnostic monitoring of the controller (operation status – operation/failure etc.) must be possible automatically.
5. System must be capable of continuous testing and automatic monitoring of the communication modules.
6. Control panel and Emergency-Stop buttons shall be placed at the site as close as possible for emergencies. Emergency-Stop button will stop the filter immediately and startup of the system will not be possible without resetting.
7. Pressure difference will be monitored with a diaphragm type electrical pressure transmitter over two points (filter duct and output pipe) on the filter body. Pressure transmitter will communicate with the PLC over up to date communication protocols and will generate suitable analog signals.
8. Flow control will control the filter feeder pump by processing of the signal from the flowmeter to be installed at the filter feeder line into the PID cycle of the PLC, changing of the frequency value of the frequency converter driving the pump and automatic control of the proportional valve.
9. Control system of the filter will have data exchange with the factory main control system (DCS).
10. Flowmeter will be installed at a point on a vertical line, if any, or at a straight section where there is no turbulence on the input line of the filter solution and the output line.
11. Smart site devices will communicate with PLC over 4-20 signal and they will all be with HART certification.

4.5.2.2. Instrument Characteristics

a. Glass Fuse (For analog signals)

1. Must be rail type.
2. Must be with LED. Fault condition will be shown with illumination.
3. A release lever will be provided for each fuse.

b Relay characteristics (for Digital Signals)

1. In conformity with VDE 0160 (DIN EN 50 178) safety insulation and CE norms.
2. Must be rack mountable, universal type with 6 mm thickness.
3. To be equipped with a status led on top, which shall be lit upon powering.
4. To be equipped with a sliding switch and removal of the relay from the slot shall be possible automatically when said switch is retracted.

5. Response period shall not be greater than 5 ms.
6. Release time shall not be greater than 8 ms.
7. Maximum switching voltage: 250AC/DC
8. Continuous contract current: 6A
9. Test voltage: 4kv, 50Hz,1 minute

c. PLC Characteristics:

1. Supply voltage: 24VDC (Tolerance: $\pm 20\%$)
2. Operation temperature: 0 °C + 55 °C
3. Speed: 1.5 ms
4. Program Capacity: PLC memory will have adequate capacity to perform all processes. No additional memory unit will be used.
5. Communication speed between the control system and the operator server will be min. 100 Mbit/sec and communication must be over industrial ethernet.
6. Addition of communication modules such as Profibus, Modbus TCP, Ethernet and Profinet etc. shall be possible for information exchange with the control system.
7. Programming, program uploading and downloading processes will be over industrial ethernet.

d. Characteristics of the Signal Modules:

1. The number of channels in the modules should be limited in order to ensure affecting of minimum points in the event of a failure in the module. For this reason, the Analogous input and output modules must be with minimum 2, maximum 8 channels and the digital input and output modules must be with maximum 16 channels.
2. Analogous input and output modules shall be over 4-20 mA and digital input and outputs shall be over dry contacts.
3. Diagnostic alarm on channel basis must be possible.
4. Protection class must be min. IP 20.

e. Operator Panel:

1. Type: Industrial Touch Panel PC
2. Bus Support: Modbus/TCP
3. Loading Monitoring: ETH
4. Protection Class: IP-65
5. Must have Windows 10 operating system.
6. Must have original operating system
7. Must have minimum 17'' TFT LCD.
8. Must provide minimum 1027*768 resolution.
9. CPU must be minimum i5, 2 GHz.
10. HDD must be minimum 64 GB.
11. RAM must be minimum 16 GB.
12. 2 x RJ45, 4 x USB, 1 line-out connection must be provided at the back panel.
13. Operation temperature will be 0-60°C.
14. Audio warning must be possible.

15. Installation of the operator panel must be possible near the pressure filter (remote location from the PLC panel) as per the request of the Entity.

f. Electromagnetic Flowmeter Characteristics

Measurement Component Characteristics

1. Type : Magnetic
2. Process connection : flanged at DIN EN1092-1 standards
3. Tube material : Carbon steel
4. Device body : Aluminum alloy
5. Interior coating material: : Hard Rubber-PP-PTFE or PFA
6. Electrode material : 316 stainless steel or Hasteloy C-4
7. Damping : 1-100 seconds
8. Protection class : IP-67
9. Cable terminal cover : Manually opening with threading (telescopic)
10. Sensitivity : $\pm 0.2\%$ or lower.
11. Tag plate : Stainless steel

Transmitter Characteristics

1. Type : Electronic smart with LCD display, showing calibrated, instantaneous and total flow.
2. Measurement unit : m^3/h
3. Output signal : 4-20 mA +HART
4. Supply voltage : 24 V DC
5. Protection class : IP-67
6. Memory : Memory or memory card storing the calibration and parameter information must be provided on the transmitter section
7. Body material : Aluminum alloy suitable for challenging process conditions.
8. Additional characteristics: Must be Remote type, carriage to minimum 10 meters away from the sensor must be possible.

Certificates

Flowmeters must be presented along with a 5-point test certificate from a laboratory accredited by TÜRKAK and calibration certificates issued by an accredited laboratory of ISO17025 or international validity.

g. Full Bore Valve with ON / OFF Pneumatic Actuator

General Characteristics

Actuator:

1. Pneumatic,
2. With single acting spring return,
3. Hard anodized,
4. Corrosion resistant aluminum body
5. Suitable for manual opening - closing,
6. 4 bars minimum supply pressure,

7. 6 bars rated operation pressure,
8. Adjustable stroke setting (with stroke adjustment system in both directions)

Gearbox with Release Lever / Reducer / Manual Opening Component:

1. To be used on all valves.
2. Selections will be made according to the torque values of valves.

Switchbox:

1. IP 65 protection class
2. Capable of providing open-closed information

Solenoid valve

1. 5/2, 5 way, with 2 modes,
2. 24 VDC,
3. IP 65 protection class

*** All valves will be with pneumatic actuator and suitable for manual intervention (gearbox with release lever) and will be control from the Scada.

h. Proportional Control Valves with Pneumatic Actuator

General:

- | | | |
|----|-----------------|---|
| 1. | Type | : With pneumatic actuator |
| 2. | Pressure class | : PN16 |
| 3. | Dimensions | : DIN |
| 4. | Connection Type | : Flanged DIN Norm |
| 5. | Temperature | : - 10 / +150°C |
| 6. | Kv Value | : Selected in conformity with system data |

Material:

- | | | |
|----|------------------------|---|
| 1. | Body Material | : 1.4408 / A351 CF8M SS or AISI316 |
| 2. | Body type | : Monoblock (without joints) |
| 3. | Globe material | : 316 L Hardened or AISI 316 / Hard chrome coated |
| 4. | Globe type | : V Port, (Segmentball) |
| 5. | Process Connection | : Flanged Type |
| 6. | Operation temperature: | -10 - 150°C |
| 7. | Sealing | : With AISI316 Stainless Steel Seal or Soft seated
PTFE Class VI |

Actuator:

1. PNEUMATIC
2. With single acting spring return,
3. Hard anodized,
4. Corrossion Resistant Aluminum body
5. Suitable for manual opening - closing,
6. 4 bars minimum supply pressure,
7. 6 bars rated operation pressure,

8. Adjustable stroke setting (with stroke adjustment system in both directions)

Positioner:

1. Type: SMART, HART, advanced level diagnostic, with 2 manometers”
2. Input signal : 4 – 20 mA
3. Output signal : 4 – 20 mA / HART
4. Air pressure : Min 4 bar, max 6 bar
5. Connection : With the option of use with 2 or 4 wires.

i. Pressure Sensor

1. Electronic pressure sensor
2. Analog output :4-20 mA
3. Measuring range : In conformity with system data
4. Application : Liquids (Boric acid solution)
5. Pressure rating [bars] : In conformity with system data
6. Bursting pressure [bars] : In conformity with system data
7. Environment temperature [°C]: between 5-50°C

i. Difference pressure transmitter

1. Connection diameter : In compliance with the design
2. Type : With Electronic Smart LCD display, calibration must be possible on it with Hart 275/375.
3. Process Connection : Must be diaphragm type and must be in such a way that seal water is not used. Measurement must be possible without any external product for measurement other than power.
4. Output signal : 4-20 mA
5. Supply voltage : 24V DC
6. Seal material : 316 stainless steel or special alloys suitable for boric acid solution.
7. Sensitivity : +/- 0.1%
8. Protection Class : IP-67

j. Temperature Sensors

Head Section Characteristics

1. Material :with aluminum alloy
2. Head cover :Threaded
3. Well side connection : with 1/2 “ NPT male fitting
4. Protection class :IP-67

Well Characteristics

1. Structure : Straight shank
2. Process connection : with 1” NPT male fitting
3. Inner threading :1/2” NPT threading
4. Material : 316 stainless steel

Sensor Component Characteristics

1. Type : with RTD-PT100 head converter
2. Output signal :4-20 mA

k. Pressure Transmitter Characteristics

1. Electronic pressure sensor
2. Analog output :4-20 mA
3. Measuring range : In conformity with system data
4. Application : Liquids
5. Pressure rating [bars] : 30
6. Bursting pressure [bars]: 50
7. Environment temperature [°C] : -25-90°C

l. Lowe and High Pressure Switch Characteristics (Differential Pressure Transmitter)

1. Electronic pressure sensor
2. Digital output
3. Measuring range : In conformity with system protection values
4. Application : Liquids
5. Pressure rating [bars] : 30
6. Bursting pressure [bars] : 50
7. Environment temperature [°C]: -25-90°C

Overview

- Plant Management reserves the right to make changes in the scenario and reporting requests.
- Alarms will be defined for all instruments. Fault information will be registered the instrument name along with the number of the I/O card it is used with and the channel number.
- Pumps will not be operated if the necessary line opening cannot be achieved.
- Instantaneous and total values of all flowmeters in the system will be included in the Scada. Resetting of total values can be possible from the SCADA if required.
- Display of input, output pressure values of the system will be possible at the SCADA.
- All cabling, installation etc. process related with the instruments used will be realized by the Contractor.
- Screened signal cable which is 50 pcs of 1 mm cross-section, multicore, screened, bearing the cable number on each core will be installed from the DCS panel room to the existing polish filter floors to be (10x1)x5 in both factories. For cables to be installed;
 - ✓ At BAF-1 DCS panel room,
 - ✓ At BAF-1 Polish filter floor,
 - ✓ At BAF-2 DCS panel room,
 - ✓ At BAF-2 Polish filter floor 4 plastic panels with IP67 protection class will be placed. Terminal block will be provided inside each panel in conformity with the cable quantity and cable numbers will be ordered according to cable numbers. To be used
- All disassembly works required during the works will be under the Contractor's responsibility.

- Spare parts guarantee must be given for all products to be used for minimum 10 (ten) years and selections will be made accordingly.
- All programs used in the project will be delivered together with their licenses, installed on the industrial PC.
- PLC and Industrial PC software used in the project will be free of passwords and will be handed over to the Plant Management completely unlocked form.
- Training will be provided to necessary personnel after the startup processes.
- Training will be provided to the operators in 3 shifts separately during their respective shift.
- Training will be provided to the maintenance units for the trouble-shooter teams in 3 shifts separately during their respective shift.
- Engineering training will be provided to 3 persons at the office of the manufacturer firm for minimum 3 days for explanation of the PLC and Industrial PC software and instruments used and all expenses (accommodation etc.) will be to the Contractor's account.
- The operation logic of the system will be designed as fully automatic with an agreement reached between the Contractor and the Entity.
- All instruments to be used in the project will be presented to the approval of the ENTITY.
- Electrical diagrams (panel designs) of the project will be presented to approval prior to the site processes and site works will commence after approval of the diagrams.
- Electrical diagrams will be presented in 3 copies in 3 separate files together with the petition for provisional acceptance.
- All data, programs and software will be presented in a memory unit of minimum 1 TB within the provisional acceptance period.

5. WORK COMMENCEMENT DATE, DELIVERY TERM, DELIVERY PLACE AND CONDITIONS

Work commencement date: Work will be started following signing of the contract.

Delivery period: 240 calendar days following date of signing of the contract. Following delivery of the materials, periods lapsing during installation, testing and startup, and the performance tests are included into the delivery term. In the event of reinforcement being necessary on the platform where the polish filters will be installed, the reinforcement process will be realized by the Plant Management. The term of the work will be suspended upon application to the Plant Management in the event of the contractor requesting to start the installation process, on the condition that the Contractor delivers the polish filters to the site prior to completion of the reinforcement process. The term of the work will recommence with the letter from the Plant Management to the Contractor to commence installation following completion of the reinforcement process.

Delivery Place and Conditions: Delivery of the polish filter and equipment, of which the manufacture and supply is completed by the Contractor will be as follows:

Inland: After completion of the production and supply of the polish filter and equipment, the Contractor will deliver these to the storehouse/site of Emet Boron Works Plant Management. All kinds of insurance processes required for manufacture and installation of the filter and equipment (shipping, installation all risk insurances etc.) will be provided by the Contractor in a timely manner and the insurance costs will be borne by the Contractor. Moreover, the policies will be presented to the Entity. All costs related with transportation and insurance will be borne by the Contractor.

Abroad: Subsequent to completion of manufacture and supply of the polish filter and equipment, the Contractor will deliver these storehouse/site of the Plant Management on the basis of DAP delivery to Emet Boron Works Plant Management. All kinds of insurance processes required for manufacture and installation of the filter and equipment (shipping, installation, all risk insurances etc.) will be provided by the Contractor in a timely manner and the insurance costs will be borne by the Contractor. Moreover, the policies will be presented to the Entity. All costs related with transportation and insurance will be borne by the Contractor.

5.1. Battery Limit:

All mechanical, electrical and automation works required in the scope of the work described in Article 3.1 are included into the work scope.

5.2. Entity's Responsibility:

If appropriate and subject to approval of the Plant Management, the forklift, overhead crane and electricity, water, steam, compressed air etc. services will be provided by the Plant Management free of charge. Accommodation and food will be provided by the Contractor. Transportation of all equipment related with the polish filter, unloading and delivery to the installation place is under the Contractor's responsibility.

5.3. Contractor's Responsibility:

- All mechanical-construction-electrical and automation designs in the work scope will be prepared by the Contractor and presented to the Plant Management for approval. Order and production processes will be started following approval of the Entity.
- All production and installation works will be carried out in conformity with the applicable laws, regulations, scientific principles and technique.
- Although the works to be carried out are explained in general, the Contractor will be responsible for realizing the works, supplying materials and doing the installations related with the work and handing over the system in functioning condition.
- All designing, supply, installation, testing and startup works in the scope of the work will be realized in conformity with Occupational Health and Safety rules.

- In the event of the existing system being damaged during execution of the work, the Contractor will restore the system to its original state, free of charge. In the event of failure in restoring, related damage will be repaired by the Plant Management and the cost will be collected from the Contractor.

6. REQUIRED DOCUMENTS, INFORMATION AND SAMPLE

Analyses required for the performance of the polish filters will be conducted at the Plant's Laboratory. In the event of objection of the Contractor, the analyses may be conducted at an accredited laboratory with related costs to the account of the Contractor.

6.1. Documents required in the bid scope

- Bidder will be required to document whether it is authorized to offer the subject goods of purchase. In this context, documents evidencing manufacturer status will be presented in the event of manufacturer or documents evidencing authorized representative status will be presented in the event of representative.
- If the bidder is the manufacturer, documents evidencing manufacture of equipment (belt filter, polish filter, pusher type centrifuge, decanter centrifuge, crystallizer, evaporator and fluid bed drier) requiring technology for chemical processes of industrial scale will be presented with the bid.
- Bidder must have an ISO 9001:2008 Quality Management System certificate. The bidder will add this certificate to the bid.
- Purchase of 2 Polish Filters is included into the Incitement scope and the firm will give the manufacture and installation costs separately in annex of the bid.
- Bidder must add the capacity, weight, dimensions, material, brand and origin information and Priced List for the devices of the machines-equipment, instrument and control system offered.
- **Work Experience Certificate:** The Bidders shall be required to present technological product experience certificates evidencing experience related with goods procurement works that are undertaken with a priced contract with a value not less 30% of the offered price, for the public or private sector either inland or abroad regarding the subject works of the tender or similar works, and of which the final acceptance is realized in the last five years prior to the first announcement date of the tender. Other issues will be as specified in the Regulations on Implementation of Goods Procurement of the Public Procurement Law No. 4734. Bidders that do not have the production capacity of the plant (50.000 Tons/year) on the work experience documents will present documents certifying this issue in addition in the bid envelope. Works that are acceptable as similar works will be Works, in which minimum one of the belt filter, polish filter, pusher type centrifuge, decanter centrifuge, crystallizer, evaporator and fluid bed drier equipment is manufactured and installed for a plant with a production capacity of minimum 50.000 tons/year.

6.2. Documents required in the delivery scope

The Contractor will provide the following documents separately for each polish filter in the delivery scope.

- Flow Diagram, P&I Diagram

- Construction and Workshop Drawings of all Machinery and Equipment.
- Documentation for the Process Control System
- Power and Control Designs (Electrical - electronic - pneumatic)
- Specifications of Equipment and Instrument Devices
- General Layout Drawings with Dimensions
- Foundation and Load Drawings
- As-built Drawings will be presented in Autocad format (Construction, Mechanical, Electrical, Automation) (1 printout + 3 sets on CD), as continuation of above,
- Installation, Operation and Maintenance Instructions and all other documents will be delivered in 3 sets in Turkish.
- Identification cards for the equipment lists and all equipment
- Catalogs and detailed information regarding each device, equipment used
- Equipment pos. no. and part codes for ordering
- Panel Construction Drawings, Single Line Diagrams, Connection and Control Diagrams, Test Reports,

All documentation and projects specified in this article will be delivered to the Plant Management in full by the Contractor and the Entity will be entitled to use said information, documents and projects produced in the scope of this Work in its future manufacturing and project works.

7. BID AND PAYMENT CONDITIONS:

The filter group and the related equipment must be delivered to the Plant Management site in order for the payment to be made after delivery. However, in the event of any delays in the delivery of materials supplied from abroad to the site due to the manufacturing period or customs processes, the remaining amount after deduction of the amount corresponding to such equipment can be paid if this issue is proven by the Contractor.

Advance Payment: Advance payment will be paid at a rate of 25% against the letter of guarantee for advance payment.

7.1.1. Inland: Bids will be presented in TL or USD/EURO currency. Following delivery of all filter and equipment to the Plant Management site, a payment at the rate of 50% of the contract price will be paid against the Performance Bond.

Following approval of the acceptance, payment will be made against invoice at a rate of 25% of the contract price.

7.1.2. Abroad: Bids will be presented in USD/EURO. Letter of credit will be opened for 75% of the contract price and 50% of the price of the goods will be paid after the goods arrive to customs against shipping documents for 100% and the balance 25% will be paid following approval of acceptance.

7.2. Partial Bid Bids will be presented for the complete work.

7.3. Inland: Letters of guarantee for advance payment and interim payments will be released upon approval of the acceptance.

Abroad: Letter of guarantee for advance payment will be released within a period of 1 month

following delivery of the materials to the Plant.

7.4. Performance Guarantee: No performance guarantee will be taken.

7.5. Elements other than Price: Elements other than price will not be taken into consideration in the bids.

8. INSTALLATION, TEST, STARTUP AND PERFORMANCE TESTS

Contractor will be responsible for assembling the material/machines-equipment at the site and carrying out the startup and performance testing. Installation will be realized at Kütahya province, Emet subprovince and climate information related with the place of installation will be under the responsibility of the firm.

8.1. Installation:

Installation of the polish filter system will be realized to ensure perfect operation.

8.2. Testing and Startup Works:

Following completion of all installation works, the testing and startup works will be started by the Contractor (under the supervision of the Plant Management).

Completion of the startup works and readiness of the system for performance tests will be notified by the Contractor to the Plant Management in writing. Plant Management will carry out the necessary examination within 10 (ten) calendar days and issue a decision for commencement of the performance tests if the system is ready.

8.3. Performance Tests:

- No additional charges will be claimed for the performance tests.
- Performance tests will be carried out separately for each polish filter.
- In essence, the performance tests are to be carried out together by the Plant Management and the Contractor, and the Plant Management may start the tests on its own if the Contractor is not ready on the commencement date of the tests.
- Performance tests will be realized under the responsibility of the Contractor and supervision of the personnel of the Plant Management.
- Performance tests will be carried out between 08.00-24:00 hours throughout 2 days (2 days x 16 hours) continuously with washing of the filter in 7-hour intervals. Washing period will be maximum 1 hour. Interruptions **up to 1 hour** will not be taken into consideration during these works and interruptions **up to 4 hours** will be added to the end of the test. Said interruptions will occur maximum 2 times during the whole performance test. Performance tests will be repeated in the event of interruptions being more than 2 (two) times.
- Performance tests will be repeated maximum 5 (five) times.
- In the event of interruption of the performance test due to reasons attributable to the Plant, the performance test will be continued from where it is left when the problem is remedied.

8.4. Performance Guarantee and Acceptance under Fine

Tests and analyses related with performance values will be realized at the Plant's laboratory at a certain time interval to be determined by the Plant Management, and the analyses may be realized at accredited laboratories with the costs to be borne by the Contractor in the event of Contractor's objection. Contractor may be present at the laboratory during these analyses, if so requests.

If the Contractor cannot solve the problem related with the filter and equipment and achieve the guaranteed performance values within the period under fine specified in Article 11.1, acceptance under fine on the basis of the total contract price or rejection process will be applied. **Filter system will not be accepted in the event of rejection of any criteria.**

8.4.1. Polish Filter Capacity:

Capacity fine will be calculated as specified below, which shall be separate for each polish filter.

Maximum fine rate foreseen for capacity is 10% of the contract price. As a result of the performance tests, in the event of filter capacity being achieved between 160 m³/h and 200 m³/h, the fine will be applied according to the following formula. Performance test will be considered failed in the event of a plant capacity under 160 m³/h.

Kg : Mean capacity measured as a result of the performance tests (m³/h)

SB : Contract Price

C_{EK}: Fine amount to be applied to the Contractor for the capacity shortfall

$$C_{EK} = SB \times \frac{(200 - Kg)}{200} \times 0,25 \quad (\text{if } 160 \leq m^3 < 200)$$

8.4.2. Suspended Solid Amounts in the Filtrate (Polish output):

Suspended solid substance fine will be calculated as specified below, which shall be separate for each polish filter.

Maximum fine rate foreseen for suspended solid substance is 2% of the contract price. As a result of the performance tests, in the event of suspended solid substance amount being 0.015% and 0.025%, the fine will be applied according to the following formula. Performance test will be considered failed in the event of a measured suspended solid substance of more than 0.025%.

AKMg : Mean suspended solid material measured as a result of the performance tests (%)

SB : Contract Price

C_{AKM}: Fine amount to be applied to the Contractor for the suspended solid substance

$$C_{AKM} = SB \times \frac{(AKMg - 0,015) \times 0,03 \times 0,5}{0,015} \quad (\text{if } 0,015 < AKMg \leq 0,025)$$

Analysis will be realized with samples taken every two hours after the polish filter is started up. Suspended solid substance amount will be determined by calculation of the mean value of the analysis results of the samples taken (analysis to be realized with minimum 3 samples taken in each shift).

8.4.3. CaO Amount in the Filtrate (Polish output):

CaO amount fine will be calculated as specified below, which shall be separate for each polish filter.

Maximum fine rate foreseen for CaO amount is 3% of the contract price. As a result of the performance tests, in the event of CaO amount being between 620 ppm and 750 ppm, the fine will be applied according to the following formula. Performance test will be considered failed in the event of the CaO amount being over 750 ppm.

CaOMg : CaO amount measured as a result of the performance tests (ppm)

SB : Contract Price

C_{CaO}: CaO Fine amount to be applied to the Contractor

$$C_{CaO} = SB \times \frac{(CaOMg - 620) \times 0,143 \times 0,5}{620} \quad (\text{if } 620 < CaOMg \leq 750)$$

Analysis will be realized with samples taken every two hours after the polish filter is started up. CaO amount will be determined by calculation of the mean value of the analysis results of the samples taken (analysis to be realized with minimum 3 samples taken in each shift).

In the event of successful completion of the performance tests, the Contractor and the Plant Management will prepare a performance test protocol.

9. ACCEPTANCE PROCESSES

2 polish filter systems delivered by the Contractor will be accepted after control and inspection in the scope of the following conditions.

9.1. Following manufacture of the 2 polish filter systems and delivery to the Plant Management and after completion of all installation works, the testing and startup works will be carried out by the Contractor under the supervision of the Plant Management. Performance tests will be started upon completion of the testing and startup works. Performance tests will be carried out throughout 2 days (2 days x 16 hours) without interruption with washing of the

filter in 7-hour intervals. Washing period will be maximum 1 hour. Interruptions **up to 1 hour** will not be taken into consideration during these works and interruptions **up to 4 hours** will be added to the end of the test. At the end of this period acceptance of the work will be realized with consideration of the performance values specified in Article 8 of the Technical Specifications.

9.2. Partial Acceptance and Payment will be possible for each polish filter in the scope of this work. Partial Acceptance and Payment will be realized with the price of each polish filter being considered half the contract price upon positive conclusion of the performance tests along with the installation and startup of the related polish filter.

10. WARRANTY

Warranty term will start after acceptance.

10.1. Material/Machine-Equipment Warranty:

- Hardware and software related with all machinery-equipment and devices supplied by the Contractor will be under the Contractor's warranty for a period of **1 year (12 months) as of the acceptance date.**
- Contractor will carry out all manufacture and installation works related with all kinds of machines-equipment and devices and the filter supplied and will guarantee complete operation of the filter system after the testing and startup works. Non-functioning equipment definitely not be accepted.
- Contractor will remedy all defects caused by the design, material, workmanship of the Polish Filter or Contractor's own fault, free of charge.
- Contractor will arrive at the site and carry out necessary actions within 10 workdays for repair or replacement of all kinds of faulty, defected devices and parts that may be found during the warranty period.
- Period lapsing during repair, replacement or completion of the missing material will be added to the warranty period.
- Contractor will give part supply guarantee against charge for all machines, equipment and devices and all hardware and software related with these for a period of 10 years.
- In the event of the Contractor not accepting the problem related with the equipment or insisting on non-remedy of the failure following notification by the during the warranty period, the Plant Management will have the failure remedied in the name and to the account of the Contractor.
- In the event of failure in fulfilment of the required guarantees by the Contractor, the Contractor will take all measures to achieve the guaranteed values and will make necessary changes including replacement of equipment, with all costs to its account. If the Contractor fails to take necessary actions or achieve the guaranteed values within the period specified by the Entity, the Plant Management will make the necessary modifications and changes to the account of the Contractor.

11. FINES

11.1. If the guaranteed performance values cannot be achieved as a result of the performance tests, the Contractor will be required to make the necessary correction within 60 calendar days with the costs to its account. The fine provisions of the Administrative Specifications/Contract will not be applied during this period. In the event of failure in achievement of the performance values at the end of this period also, an additional period will be granted subject to fine at percentages specified in the Administrative Specification/contract on the basis of the price of each filter system for each calendar day of delay for solution of the problem in compliance with the specification and the Bid.

11.2. In the event of failure of the Contractor in presenting the detail and application projects to the Plant Management within 60 calendar days as of the contract signing date, a delay fine of 0.05% (five per ten thousand) of the price of each filter system will be applied for each calendar day of delay.

11.3. In the event of failure of the contractor in arriving at the site and carrying out necessary actions within 10 work days for repair or replacement of all kinds of faulty, defected devices and parts that may be found during the warranty period, the Plant Management will take all actions to remedy said defect and collect the related cost from the Contractor.

12. OTHER ISSUES

12.1. Supply and installation of pump outputs, inter-connections, piping between pump-filter, solution output and discharge pipes of the filter, hot/cold water pipes, instrument air lines, steam lines, connection of all pipes with the filter, required for the polish filter, all pipes and connectors required for operation of the solution and waste outputs, solution and waste collection etc. system, and all manual and automatic valves, cable trays, illumination, panels, frequency converters, various flanges, seals, brackets, collectors etc. materials will be in the scope of the Contractor's responsibility.

12.2. Detailed and classified brand, material, type, origin, installation related codes related with the equipment will be provided on the parts and said codes will be provided clearly in the designs.

12.3. The polish (pressure) filters will be installed on a platform and +14 meters elevation and all activities related with making the installation site suitable for installation of the filters in this scope (construction, mechanical, electrical-automation works) will be realized by the Contractor (excluding reinforcement works).

12.4. P&I diagram, piping, valve and instrument specifications and Annexes for the polish (pressure) filter and equipment are all in the Contractor's scope. Supply all materials that are required for sound operation of the system will also be in the work scope, even if they are not specified in the scope.

12.5. Confidentiality: Contractor will observe the principles of Confidentiality regarding information and documents related with the plant.

12.6. Occupational Health and Safety: Contractor will work in conformity with the provisions of Occupational Health and Safety Law No. 6331 and other legislation related with occupational health and safety.

All documentation and projects specified in this article will be delivered to the Plant Management in full by the Contractor and the Plant Management will be entitled to use said information, documents and designs produced in the scope of this Work in its future manufacturing and project works. All kinds of documents will be presented to the Plant Management in Turkish language.

Training:

- Operation and process (operator) training will be given to the operation group. Said training period will be a total of 18 hours consisting of 3 hours per day for minimum 2 days for three shifts.
- Maintenance-repair, calibration, programming and project training will be given to the Machine - Electricity -Automation groups. This training will be at the level of responding to the system when necessary and making additions or modifications. Said training period will be a total of 6 hours consisting of 3 hours per day for minimum 2 days.
- All training services will be included into the bid scope and no additional payments will be made for these.
- Contractor will register each personnel trained in each group with a Protocol.

CE Marking:

The machine and equipment to be supplied shall have the CE marking to evidence conformity to the (EU) standards.

Packaging:

Suitable packaging will be provided to prevent damaging of the equipment during handling, unloading and installation. All machines and processed open surfaces that may be exposed to atmospheric corrosion will be covered with suitable protection components that can be removed easily.

Production Control: Contractor must definitely obtain the approval of the Plant Management for brand and type selection of mechanical and electrical equipment and materials such as valves, pumps, instruments, etc.

Confidentiality: Contractor will observe the principles of Confidentiality regarding information and documents related with the plant.

13. ARTICLES OF THE TECHNICAL SPECIFICATIONS

This technical specification consists of 13 (thirteen) articles, including this article.

ENCLOSURES:

- ANNEX-1 BAF-1 Polish filter floor 1,
- ANNEX-2 BAF-1 Polish filter floor 2,
- ANNEX-3 BAF-2 Polish filter floor 1,
- ANNEX-4 BAF-2 Polish filter floor 2,

Technical Specification Prepared by: 11.10.2019

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