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TECHNICAL PROPOSAL FOR

EFFLUENT TREATMENT PLANT

LAMTHAO SUPER PHOSPHATE & CHEMICAL JSC

(DESIGNED CAPACITY – 200 M³/DAY)

Prepared By:

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TABLE OF CONTENTS

ANNEXURE – I

EXECUTIVE SUMMARY

1.0 EXECUTIVE SUMMARY

M/s LAM THAO SUPER PHOSPHATE & CHEMICAL JSC at Phu Tho Province, Vietnam intends to install an EFFLUENT TREATMENT PLANT of 200 M3/Day capacity to treat the effluent from production unit & meet the Vietnam QCVN A Level Discharge standards.

The scope of work includes complete design and engineering of the treatment systems including the supply of several equipment, testing, erection and commissioning of the complete treatment package (Tanks, mechanicals, plant units, piping, electrical, and instrumentation) as described in the process specifications.

With the installation of the proposed system, the client will be able to consistently treat its effluent as per desired standards and objectives.

ANNEXURE – II

DESIGN BASIS

2.0 DESIGN BASIS

2.1 FEED WATER CHARACTERISTICS:

WOG Technologies designed the offered system based on the following Incoming Waste water analysis provided to us as specified in an enquiry document:-

S. No.	Parameter	Unit	Values
1	Flow rate Feed	M3/Day	200
2	pH	mg/l	0.057
3	COD	mg/l	378
4	BOD5	mg/l	-
5	EC	µS/cm	192.4
6	TDS	mg/l	96.2
7	TSS	mg/l	27,310
8	CN-	mg/l	-
9	T-Hardness	mg/l	-
10	T-P	mg/l	1.73
11	T-N	mg/l	-
12	N-NO3	mg/l	-
13	Cl-	mg/l	230
14	SO42-	mg/l	73,000
15	F-	mg/l	28,600
16	SiO2	mg/l	37,000
17	Ca2+	mg/l	-
18	As	mg/l	0.002

19	Al3+	mg/l	12,978
20	Total-Fe	mg/l	56.9
21	Pb	mg/l	0.04
22	Manganese	mg/l	3.4
23	Cu2+	mg/l	-
24	Zn2+	mg/l	–

NOTE:-

1, In case the actual characteristics of the waste water to be treated indicates concentrations exceeding/below the above figures, or elements other than what is shown on the above as average values, we reserve the right to check our design and to modify our proposal accordingly.

2.2 PROCESS TREATMENT STEPS

Treatment Process

Collection tank

Coagulation, Flocculation and Clarification through HRSCC

Lime Precipitation @ pH 3.0

Lime Precipitation @ pH 8.5

Sludge thickening by Plate & frame filter press

Coagulation dosing system

Acid dosing system for pH Correction

Automatic Self Cleaning filter

Design Flow : 200 M^3 /Day

Operating Hours : 24 hours

2.3 TREATED WATER CHARACTERISTICS

AT THE OUTLET OF SELF CLEANING FILTER –
MEETING VIETNAM DISCHARGE STANDARDS (QCVN LEVEL A)

S. No.	PARAMETERS	UNIT	VALUES
1.	Flow	M3/Day	< 200 (Less Sludge)
2.	COD	Mg/l	< 50
3.	BOD	Mg/l	< 30
4.	Total Suspended Solids	Mg/l	< 50
5.	Total Nitrogen	Mg/l	< 20
6.	NH4-N	Mg/l	< 5
7.	Total Phosphorous	Mg/l	< 4

NOTE: - The above quality of treated water is achieved subject to the following:

- The feed water quality as considered is presented in Sr. # 2.1 of this proposal. In case of any change in the quality of feed water, there may be certain impacts on operating parameters or on end results of the system.
- The operation of Plant is strictly carried out as per WOG's Operation Manual and Instructions.
- Pure chemicals, original spares and consumables specified by us are used in WWTP Plant.

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ANNEXURE – III

PROCESS DESCRIPTION

3.0 PROCESS DESCRIPTION

- Waste water shall be collected in a Collection tank.
- Submersible mixer shall be provided in Collection tank.
- Waste water shall be fed to the flash mixer and flocculation tank
- Coagulation - flocculation processes facilitate the removal of suspended solids, turbidity and colloids.
- High Rate Solid Contact Clarifier is being given for removal of total suspended solids, turbidity and Colloidal.
- Overflow of HRSCC tank shall be routed to Reaction tank -1.
- pH of the waste water shall be increased from pH 0.05 to 3.0 for precipitating. The
- following reactions are believed to take place:

$$H2SiF6 + 3CaCo3 \rightarrow 3CaF2 + SiO2 + 3CO2 + H2O$$

$$2H3PO4 + CaCO3 \rightarrow Ca(H2PO4)2 + H2O + CO2$$

- In the above reactions, almost all the fluorides are precipitated as calcium fluoride. Silica is also precipitated out. However, most of the phosphates remain in solution as monocalcium phosphate. During the second stage treatment, the product of the first stage is further treated with lime at a pH of about 8.5.
- In the second stage the under mentioned reaction takes place:

$$H2SiF6 + 3Ca(OH)2 \rightarrow 3CaF2 + SiO2 + 4H2O$$

$$3Ca(H2PO4)2 + 7Ca(OH)2 \rightarrow 2Ca5OH(PO4)3 + 12H2O$$

- In the second stage, residual fluorides and phosphates from the first stage are converted into insoluble calcium fluoride and calcium hydroxyl at pH around 8.5 and precipitated out.
- Settled sludge in the reaction tank-1 & reaction tank – 2 shall be fed to Plate & Frame Filter Press for sludge thickening.
- Dewatering polymer dosing system shall be provided for Sludge thickening.
- Sludge thickening through hydraulic plate & frame filter press.

- Centrate shall be collected in Centrate sump.
- Centrate shall be fed to Automatic self cleaning filter.
- Coagulant (Provision) & HCL shall be fed in discharge line for final polishing of centrate prior to discharge.
- Filtration through Automatic self cleaning filter.
- Filter backwash water shall be routed back to collection tank.
- Filter water shall be discharged to Hong river meeting the discharge standards.

Submersible Mixer

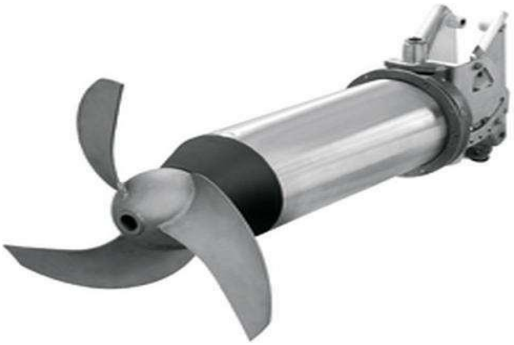
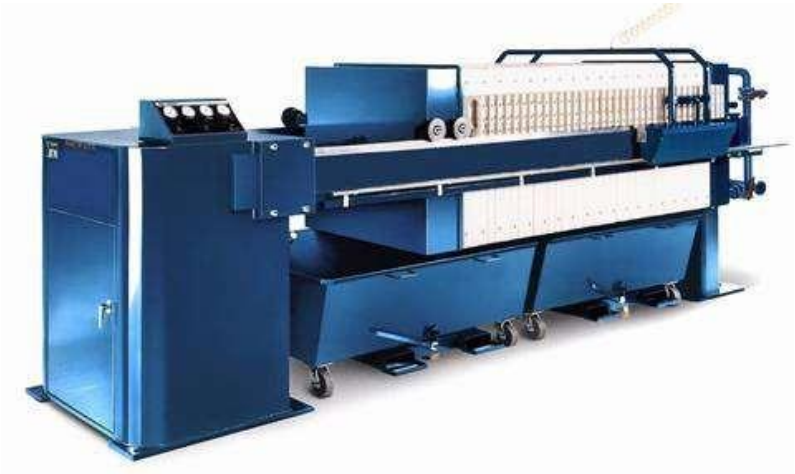


Plate & Frame Filter Press



Self Cleaning filter

Glass reinforced Plastic tanks:

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ANNEXURE – IV

LIST OF CIVIL STRUCTURES (CLIENT'S SCOPE)

4.0 LIST OF CIVIL STRUCTURES (CLIENT'S SCOPE)

The following are the detailed list of Civil & Structural units envisaged for the project:

No.	ITEMS		SPECIFICATIONS
1.	SHED FOR FILTER PRESS SYSTEM (ELEVATED STRUCTURE)		
	Quantity	:	1 No.
	Size	:	As per detail design drawing
2.	SHED FOR AIR BLOWERS		
	Quantity	:	1 No.
	Size	:	As per detail design drawing
3.	CHEMICAL BUILDING		
	Size	:	1 No., As per design drawing
4.	CONTROL BUILDING		
	Size	:	As per design drawing
5.	EQUIPMENT FOUNDATION FOR TANKS, AIR BLOWERS, PUMPS ETC.		
	Quantity	:	Lot
6.	ACCESS LADDER		
	Quantity	:	Lot
7.	WALKWAY, HANDRAILS		
	Quantity	:	Lot

NOTE: -

- All the above mentioned sizes are indicative and are subjected to change/modify as per the process requirement during detailed engineering. Design changes can be made with prior approval from the client.

ANNEXURE – V

SCOPE OF SUPPLY

5.0 SCOPE OF SUPPLY

The following are the detailed list of Mechanical Rotating Equipment envisaged for the project:

ELECTRO-MECHANICAL ITEMS

- Collection tank in Glass reinforced MOC (Volume: 40 M3)
- Flash Mixer tank of MSEP Construction (Volume: 1 m3)
- Coagulant Dosing system (1 No. HDPE Dosing tank with Agitator, 2 Nos. diaphragm metering pumps)
- Poly Dosing system (1 No. HDPE Dosing tank with Agitator, 2 Nos. diaphragm metering pumps)
- Flocculation Tank of MSEP Construction (Volume: 2 m3)
- High Rate Solid Contact Clarifier of MSEP Construction (Dia: 3 m X 3.5 m Ht)
- Sludge Holding Tank of MSEP Construction (Volume : 15 m3)
- Sludge Transfer Pumps (Screw Pump; MOC: CI); Qty: 2 Nos. (3 m3/hr @ 20 mwc)
- Reaction tank-I in Glass reinforced MOC (Volume: 10 M3)
- Reaction tank-II in Glass reinforced MOC (Volume: 10 M3)
- Centrate sump in Glass reinforced MOC (Volume: 24 M3)
- Submersible Mixer in SS-316 MOC for Collection tank
- Submersible Mixer in SS-316 MOC for Reaction tank -I
- Submersible Mixer in SS-316 MOC for Reaction tank -II
- Twin lobe Air Blowers for Reaction tank-I
- Twin lobe Air Blowers for Reaction tank-II
- Coarse bubble air diffusers (MOC:PP) for Reaction tank-I
- Coarse bubble air diffusers (MOC:PP) for Reaction tank-II
- Filter Press feed Pumps (MOC: Casing: CI, Internals: SS-316), Qty: 4 Nos.
- Hydraulic plate & frame filter press, Qty: 1 No., MOC: Body: CI, Plates: PP
- SCF feed Pumps (MOC: Casing: CI, Internals: SS-316), Qty: 2 Nos.
- Static mixer in uPVC MOC
- 400 micron Automatic Self Cleaning Filter in SS 316 MOC, Qty: 1 No
- Lime Preparation & Dosing system (4 Nos. HDPE Dosing tanks, 4 Nos. centrifugal pumps)

- Acid Dosing system (1 No. HDPE Dosing tanks, 2 Nos. diaphragm metering pumps)
- Coagulant Dosing system (1 No. HDPE Dosing tanks, 2 Nos. diaphragm metering pumps)
- DWPE Dosing system (2 Nos. HDPE Dosing tanks, 2 Nos. diaphragm metering pumps)
- Piping, Valves & fittings

ELECTRCIALS

- MCC Panel
- Power & control cables
- Earthing
- Elecrical accessories
- Cable trays
- Push button station

INSTRUMENTATION

- Flow meter (1 No., Type: Electromagnetic)
- Pressure gauges, 1 lot (Diaphragm type)
- Pressure gauges, 1 lot (Bourdon type)
- Level switches (Float & Board type) for dosing tanks
- Level transmitters (Ultrasonic type) for other tanks
- pH meter (4 Nos. total)
- PLC based control panel
- Instrument fittings & accessories
- Signal cables
- Junction box

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ANNEXURE – VI

TERMINATION POINTS

6.0 TERMINATION POINTS

The following are the termination points envisaged for the offered waste water treatment plant:

Feed Effluent	:	At the inlet of Collection tank
Treated water	:	At the outlet of self cleaning filter (5 m distance)
Electric power	:	Supply to our control panel
Sludge	:	At outlet of Filter press
Service Water	:	At one point within battery limit

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ANNEXURE – VII

LIST OF EXCLUSIONS

7.0 LIST OF EXCLUSIONS

Following are the exclusions from Scope of Work:

1. Area lighting, fire fighting system & illumination.
2. All Civil works including foundations, paths, sheds etc.
3. All Structural work including ladder & platforms.
4. Treated Wastewater to the point of final discharge.
5. Storage Shed for storage of our equipments, etc.
6. Lime Transfer, Lime silos & conveyor system.
7. Free electricity, Chemicals & water during construction/erection/installation stage.
8. Incoming power termination to Motor Control Center.
9. Any other work /activity and/or item not specifically covered or included in Proposal.

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ANNEXURE – VIII

LIST OF DRAWINGS

8.0 LIST OF DRAWINGS

The following are the additional drawings /documents attached with the technical Proposal:

S. No.	DRAWING NO.	DRAWING TITLE
1.	WOG/PROPOSAL/2016/LAMTHAO/ETP/101/R1	PROCESS FLOW DIAGRAM

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ANNEXURE – IX

STANDARD WARRANTY

9.0 STANDARD WARRANTY

The equipment is warranted against faulty workmanship and materials on an ex-works basis, for a period of 12 months from date of startup or 18 months from date of dispatch of the equipment, whichever is earlier. All implied warranties, including merchantability and fitness for a particular purpose, are limited to the terms and periods of warranty set forth below and to the extent permitted by law, any and implied warranties are excluded.

This limited warranty is extended in lieu of all other warranties, agreements or obligations, expressed or implied, concerning WOG Group components. This warranty does not cover damages incidental and/or consequential due to the failure of manufacturer's equipment. Manufacturer warrants that the proposed plant and equipment will perform according to specifications for a period of 12 months from the day of startup or up to 18 months from the shipment, whichever is earlier and provided there are no changes to the feed wastewater analysis given to WOG prior to the sale of this equipment.

Labor and freight costs are not covered under this warranty. WOG does not offer re-warranty on any replaced parts. WOG's warranty is only valid provided the equipment are properly installed and operated and maintained in accordance with the WOG's Operations & Maintenance manual.

Warranty is per WOG's standard terms and conditions. During the Performance Guarantee test period, in the event of equipment breakdown, repair- the root cause of the problems shall be analyzed based on client's request and the commercial impact shall be discussed and mutually agreed by both the parties.

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