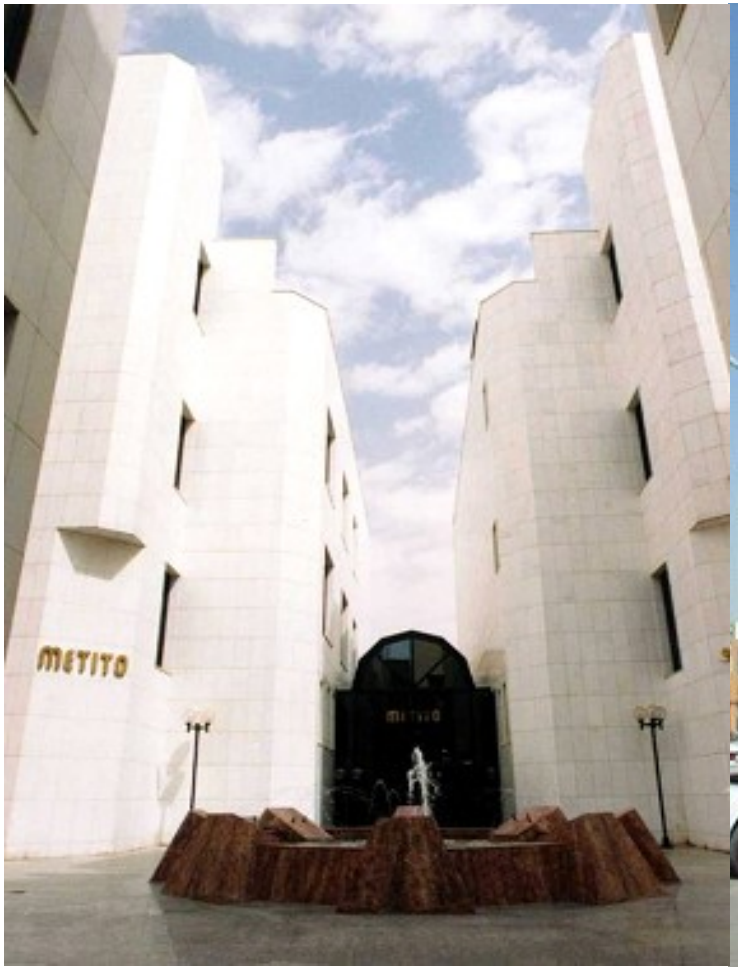
Sewage Treatment Plants

METITO

VEOLIA Water

Sewage Treatment Plants



OPERATIONS IN SAUDI ARABIA

Sewage Treatment Plants

Waste Water Treatment

- Major Pollutants
- Objectives
- Quality Parameters
- Treatment System
- Process Control Parameters

Sewage Treatment Plants

➢ Major Pollutants

✧Suspended Solids (Contaminant)

Leads to development of sludge deposits and anearobic conditions when untreated wastewater discharged to the environment.

✧Biodegradable Organics (Contaminant)

Composed of proteins, carbohydrates, and fats. They are measured in terms of BOD and COD. If discharged to environment their biological stabilization leads to depletion of oxygen, development of septic conditions (odors), growth of pathogens.

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✧Pathogens (Contaminant)

Wastewater carries full spectrum of microorganisms : Bacteria, Viruses, Protozoa, Heliminthis. These groups include pathogenic species which cause diseases.

✧Nutrients (Contaminant)

Nitrogen and phosphorus. When discharged to aquatic environment (lakes, rivers), they cause growth of undesirable aquatic life (Algae). If discharged on land, they may lead to ground water pollution.

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✧Refractory Organics (Contaminant)

Examples : Phenols, agricultural pesticides. They are resistant to conventional biological treatment.

•Heavy Metals (Contaminant)

Added to domestic wastewater by industries. They cause Toxicity at certain concentrations if wastewater to be reused.

✧Dissolved inorganic solids (Contaminant)

Such as calcium, sodium sulphate are added to wastewater as a result of water use.

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Wastewater Strength

- Wastewater is classified in terms of strength into three groups :
- Strong, Medium, Weak.

Contaminant	Concentration mg/l		
	Strong	***Medium***	***Weak***
Total suspended solids TSS	350	220	100
Biochemical Oxygen Demand (BOD-5)	400	220	110
Chemcial Oxygen Demand COD	1000	500	250
Total Nitrogen-N	85	40	20
Total Phosphonate	15	8	4

Note: It can be concluded that wastewater in Saudi Arabia is in the *Medium* range of strength.

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OBJECTIVES

What is biological treatment of waste water?

It is the conversion of organic matter into stable end products by the action of micro-organism (mainly bacteria), by accelerating the forces of nature under controlled conditions in treatment facilities.

-Primary treatment objectives:

1 – Removal of suspended solids, floatable material and nutrients.

2 – Conversion of biodegradable organics.

3 – Removal of pathogens (disease causing organisms).

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QUALITY PARAMETERS

The usual quality parameters used for raw and treated waste water are:

- Total suspended solids, TSS
- Biochemical oxygen demand BOD
- Chemical oxygen demand COD
- Ammonia NH^{+}_{4}

These parameters help in:

- Judging the treatment efficiency.
- Controlling treatment plant operation.
- Discovering operational problems.

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QUALITY PARAMETERS

TSS : Mass of Dry solids deposited on filter paper per unit volume of waste water (mg/L). (by sample filtration on filter paper).

BOD : Measurement of oxygen used by micro-organisms to biodegrade organic matter.

This means that it is basically

An indirect measure of organic matter concentration in waste water.

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QUALITY PARAMETERS

COD : It is a measure of oxygen equivalent to organic matter that can be oxidized by chemical reactions.

⇒ BOD ⟶ For Biodegradable organics.

⇒ COD ⟶ For all types of organics.

Therefore COD > BOD most of the time and COD is never < BOD.

Ammonia : It requires oxygen during treatment to convert to harmless NO_3.

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DESIGN CRITERIA

- Based on proven extended aeration process.
- The biological process is designed to remove predetermined quantity of suspended solids and dissolved matter and convert into a well stabilised sludge.
- Aeration zone volume based on 24-hr retention period.
- Suitable to operate at 70% of designed flow rate.
- Involves continuous active bacteria sludge re-circulation into aeration zone to best maintain the biological process.
- Feeds pressurized air to provide necessary dissolved oxygen for bacterial growth.

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TREATMENT STAGES

1. Incoming flow screening.

The incoming sewage flow first arrives at a manually or automatically raked bar screen that removes over sized solids from the raw sewage.

This bar screen is fabricated from 3 mm by 25 mm flat bars spaced 25 mm apart and inclined to facilitate cleaning of accumalted debris to a drying deck.

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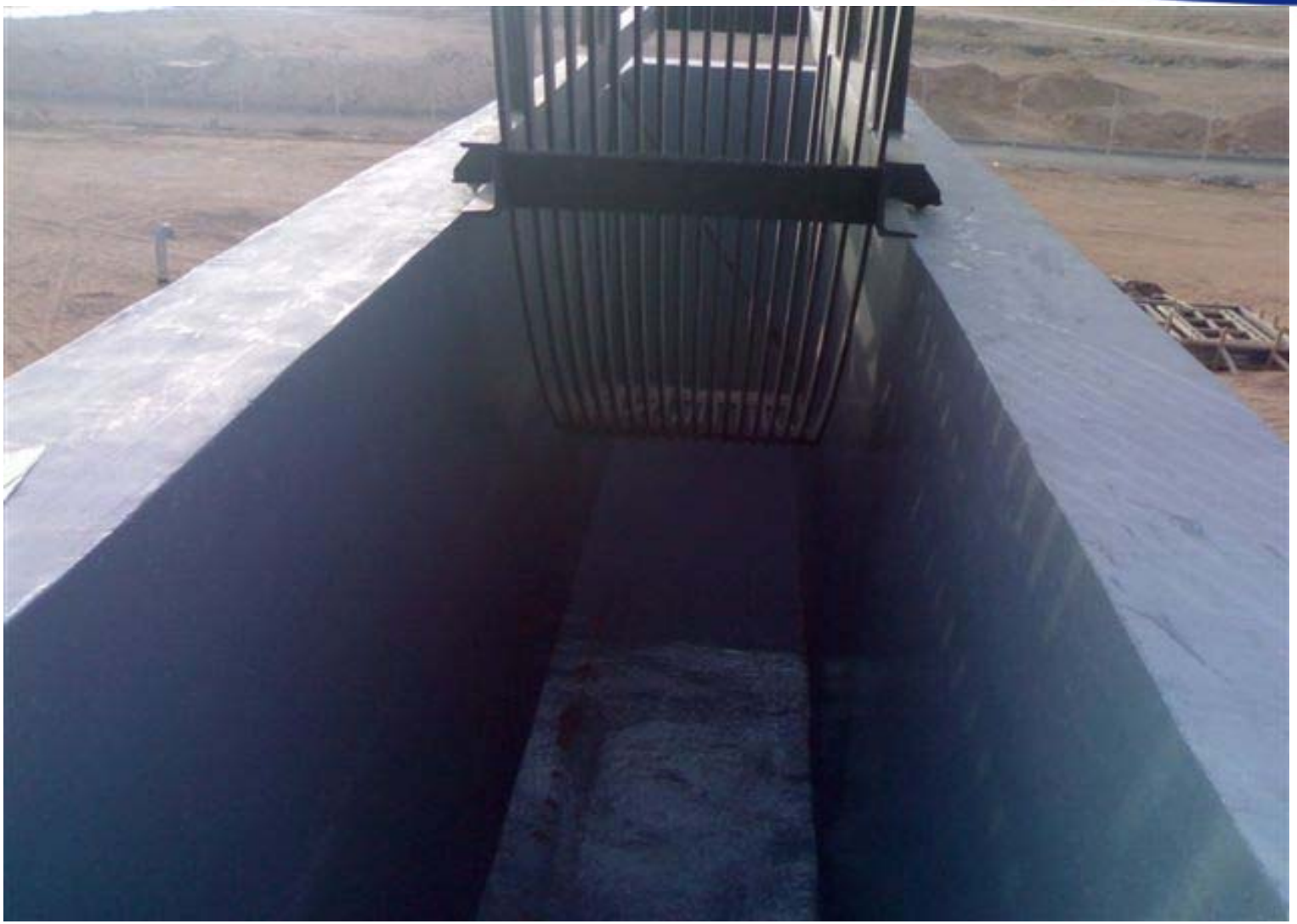

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2. Aeration.

The screened sewage flow then enters the rectangular shaped aeration zone with vertical sides and smooth surfaces to prevent scum and froth accumulation.

To ensure maximum retention and eliminate short circuiting by the raw sewage particles, the aeration compartment is fitted with air diffusers placed along one side of the chamber so as to facilitate the spiral rotation of the fluid content.

The aeration compartment tank is fabricated in steel plate adequately braced and stiffened to prevent deflection and is designed for placement on a flat concrete foundation.

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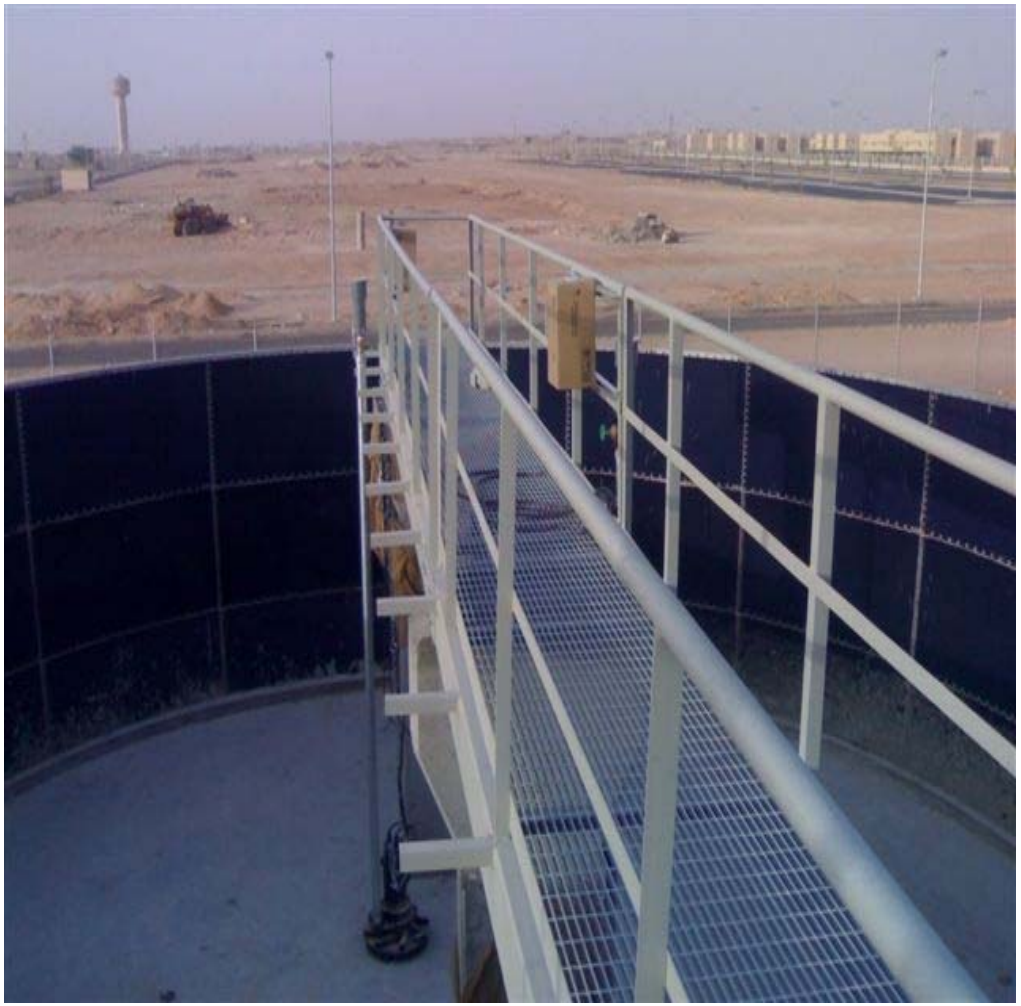

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3. Clarification.

The clarifier forms an extension to aeration chamber where properly aerated sewage arrives at this tank where active sludge is settled at bottom where a portion is re-circulated to aeration tank while the excess is sent to the sludge holding tank prior to disposal.

The clarified effluent passes over to next step via a properly sized and installed outlet weir with a side trough.

The clarifier is fabricated in steel plate to form an inverted pyramidal hopper where the flat bottom of the hopper rests on the concrete base with sides steadied by rolled steel angle legs as necessary. All flat sides are stiffened and braced to avoid buckling

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4. Dis-infection

The effluent flows out into an adequately sized chamber for chlorine dis-infection to remove active and alive bacteria and micro-organisms as the last step of the biological process

This compartment could be added of similarly fabricated tank or at the customer choice of any other tank.

5. Filtration

The last step is to pass the treated and dis-infected water into filtration where suspended matters are removed and water at this stage complies with the originally designed parameters.

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description	Unit	CDA Series – MODEL			
		CDA 3	CDA 6	CDA 9	[redacted]
Average Flow Rate (DWF)	m^3/d	3	6	10	[redacted]
Peak Flow Rate	m^3/hr	0.12	0.25	0.41	[redacted]
Population Equivalence	No.	10	20	30	[redacted]
BOD_5 Loading	Kg/d	0.65	1.3	1.95	[redacted]
Aeration Volume (effective)	M^3	45	88	165	[redacted]
Settlement Tank Volume (effective)	M^3	Same chamber for both aeration & settlement			[redacted]
Air supply method		Air blower			[redacted]

Sewage Treatment plants

description	Unit	RDA Series – MODEL								
		RDA 20	RDA 30	RDA 40	RDA 50	RDA 60	RDA 70	RDA 80	RDA 90	RDA 100
Average Flow Rate (DWF)	m^3/d	20	30	40	50	60	70	80	90	100
Peak Flow Rate	m^3/hr	2.50	3.75	5.00	6.25	7.50	8.75	10.00	11.25	12.50
Population Equivalence	No.	85	130	170	215	260	300	340	390	430
BOD_5 Loading	Kg/d	5.2	7.8	10.4	13	15.6	18.2	20.8	23.4	26
Aeration Volume (effective)	M^3	20	30	40	50	60	70	80	90	100
Settlement Tank Volume (effective)	M^3	5.6	7.5	8.3	10.7	12.5	14	15.3	18	19.4
Residence at Peak Flow	Hr	2.2	2	1.7	1.7	1.7	1.6	1.6	1.6	1.6
Rise Rate at Pak Flow	M/hr	0.63	0.71	0.83	0.8.	0.9	0.97	1.0	1.0	1.0
Air requirements (at 20°C at sea level)	M^3/Hr	40	60	80	100	120	140	160	180	200

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Sewage Treatment Plants

description	Unit	DA Series – MODEL								
		DA 50	DA 100	DA 200	DA 300	DA 400	DA 500	RDA 800	DA 900	DA 1000
Average Flow Rate (DWF)	m^3/d	50	100	200	300	400	500	800	900	1000
Peak Flow Rate	m^3/hr	6.2	12.5	25	37.5	50	62.5	84	94	104
Population Equivalence	No.	215	430	860	1,290	1,720	2,150	3,400	3,800	4200
BOD_5 Loading	Kg/d	13	26	52	78	94	120	146	172	198
Aeration Volume (effective)	M^3	45	88	165	230	340	400	585	640	710
Settlement Tank Volume (effective)	M^3	18	30	60	72	90	110	178	220	275
Residence at Peak Flow	Hr	2	2	2	2	2	2	2	2	2
Rise Rate at Peak Flow	M/hr	0.63	0.71	0.83	0.8.	0.9	0.97	1.0	1.0	1.0
Air requirements (at 20°C at sea level)	M^3/Hr	100	200	334	466	538	642	936	1,150	1,334

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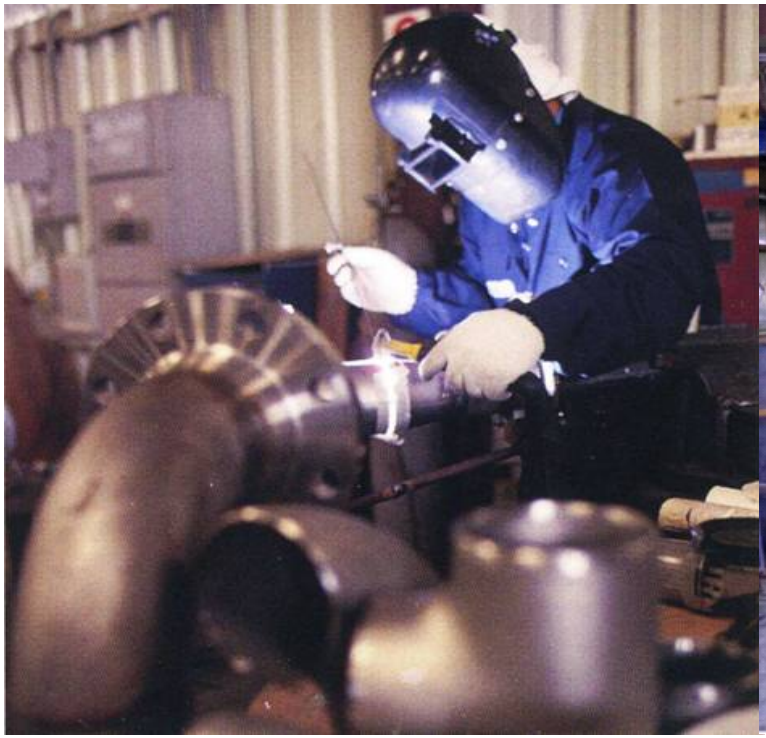
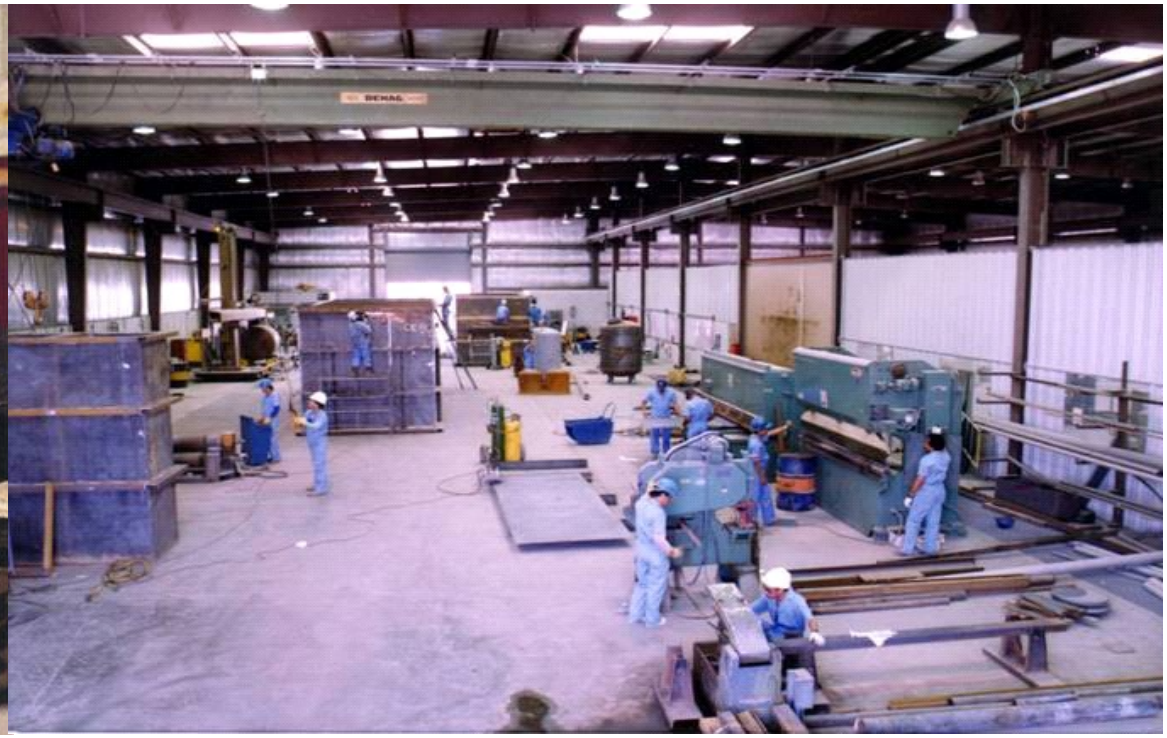
METITO MANUFACTURING FACILITY





MANUFACTUTING IN SAUDI ARABIA

Sewage Treatment Plants

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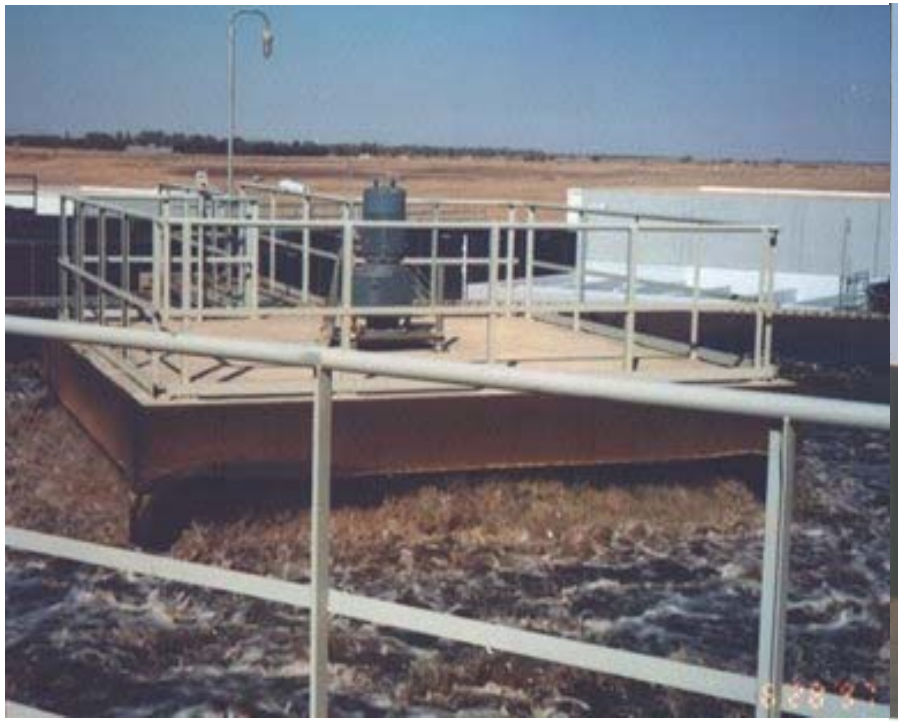

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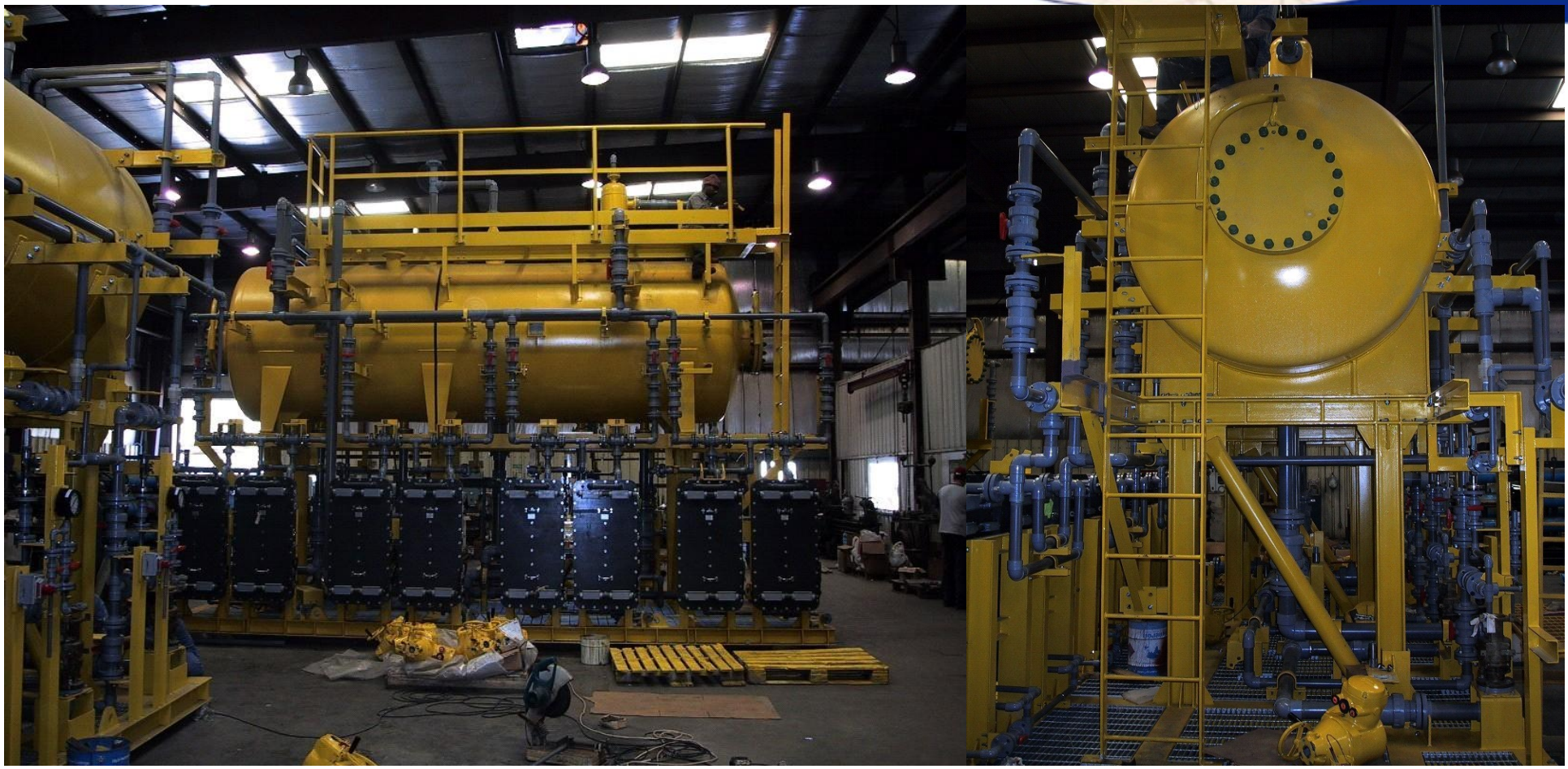

SPECIALLY DESIGNED OFFSHORE SEWAGE TREATMENT UNIT

Local manufacturing (selection)

- Supply and execution of all water and industrial waste water systems related to oil, gas & chemical industries varying from packaged equipment supply to execution of turnkey plants
- Supply of chemical injection skids upstream of oil and gas processing plants, and API, DAF, AWS, filtration and other separation processes on the downstream side
- International manufacturing specifications, standards and custom quality procedures are applied

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Local manufacturing (selection)

Wastewater Package Treatment Plants