YASA ET

Zero Liquid Discharge

www.yasa.ltd

Company mission statement

"Waste Is Another Resource"

By offering high quality wastewater treatment equipment worldwide, our company is committed to reducing waste and pollutants, while at the same time creating value from industrial wastewater for our clients.

Content

About Us

Headquartered in Shanghai, Yasa Environmental Technology (YASA ET) design and manufacture water and wastewater treatment systems, and deliver Zero Liquid Discharge solutions for a wide range of industries.

"Waste Is Another Resource" is our vision.

"Waste Is Another Resource" is our vision. By offering high quality wastewater treatment equipment worldwide, our company is committed to reducing waste and pollutants, while at the same time creating value from industrial wastewater for our clients.

Our Solutions

- Zero Liquid Discharge systems for complex wastewater
- Evaporators & Crystallizers
- Electrocoagulation & Electrocoagulation
- Electrodialysis & Bipolar Electrodialysis

Our Advantages

- International Team
- Comprehensive Treatment Solutions
- Flexible Configuration
- Manufacturing Facilities

Line Of Services

Zero Liquid Discharge Systems

Discover our intelligent vacuum evaporators and crystallizers for Zero Liquid Discharge applications.

Water & Wastewater Treatment Equipment

We design and manufacture equipment tailored for your water and wastewater treatment requirements.

Sewage Treatment Solutions

Our team can help you find the best water & wastewater treatment solutions for your projects thanks to our experience in this field.

Electrocoagulation & Electrooxidation Test Equipment

Discover our test equipment for Electrocoagulation and Electrooxidation.

Electrodialysis & Bipolar Electrodialysis Test Equipment

Test equipment tailored for your water and wastewater treatment applicayion.

Certifications

At our company, we take pride in our commitment to excellence and safety. As a certified high-tech company, we adhere to the highest industry standards, ensuring that all our products meet or exceed stringent electrical and safety regulations.

Our rigorous testing and quality assurance processes are designed to guarantee the safety and efficiency of every product we offer. Each item undergoes thorough inspection to ensure it complies with international standards. We are proud to have earned TÜV certification and CE marking for our solutions, demonstrating our adherence to recognized safety and quality standards.

Additionally, our status as a high-tech company has been recognized by the government, reinforcing our position as a leader in innovation.

We are proud to hold several patents, highlighting our inventive approach to product development. These patents represent our commitment to not only meeting industry standards but also pushing the boundaries of technology and design. Our patented products are the result of extensive research and development, demonstrating our focus on creating unique solutions that offer enhanced safety, efficiency, and performance.

We believe in transparency and accountability, which is why we maintain our certifications through continuous training and audits. This commitment to ongoing improvement helps us to incorporate the latest safety protocols and technological advancements into our products. When you choose our company, you can be confident that you are investing in quality, safety, and innovation.

Our Clients & Partners

ABB

MINERALS TECHNOLOGIES

ABNCN

MOLYMET

AO Smith

SCHAEFFLER

Coanda
A TETRA TECH COMPANY

SHANGHAI JIAO TONG UNIVERSITY

CSIC

Stony Brook University

EAST CHINA UNIVERSITY OF SCIENCE AND TECHNOLOGY

TII Technology Innovation Institute

ECOIMPIANTISUD
water treatment solutions

TREVI SYSTEMS

FlotLife

UNIVERSITÉ DE SHERBROOKE

Hydroleap

WAGENINGEN
UNIVERSITY & RESEARCH

JUNGHEINRICH

ZF

KEFA

מכון ויצמן למדע

MiNTH

جامعة قطر
QATAR UNIVERSITY

Our Technology

Our Zero Liquid Discharge (ZLD) solutions are designed to provide comprehensive and efficient wastewater treatment for a variety of industrial applications. We offer a range of cutting-edge technologies that work together to minimize waste and maximize resource recovery. Our portfolio of ZLD solutions includes:

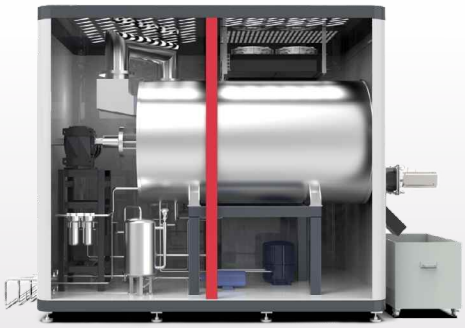
PREDEST Electrocoagulation and Electrooxidation Equipment

This technology combines electrocoagulation and electrooxidation to treat wastewater by removing contaminants through a process that involves electrically induced chemical reactions. It is highly effective in breaking down complex pollutants and separating them from the water.

EVADEST Evaporators

Our MVR and Heat Pump evaporators are designed to concentrate and separate water from dissolved solids, allowing for effective volume reduction in wastewater streams. EVADEST units use energy-efficient technology and design to achieve high evaporation rates.

With these innovative solutions, we are able to offer comprehensive Zero Liquid Discharge systems that meet the needs of industries seeking sustainable wastewater treatment and resource recovery. Each component of our ZLD suite is designed to work in harmony, delivering reliable and efficient results while minimizing costs for end users.



SOLIDEST Vacuum Crystallizer

This vacuum crystallizer is a key component in our ZLD process, facilitating the recovery of valuable solids from concentrated brine solutions. By operating under reduced pressure, SOLIDEST can crystallize salts and other solids from the wastewater, enabling their recovery and reuse.

DESALT Electrodialysis

Electrodialysis is a method of separating salts and other ions from water using an electric field. Our DESALT system is designed to provide effective desalination and ion separation, contributing to the overall efficiency of the ZLD process.

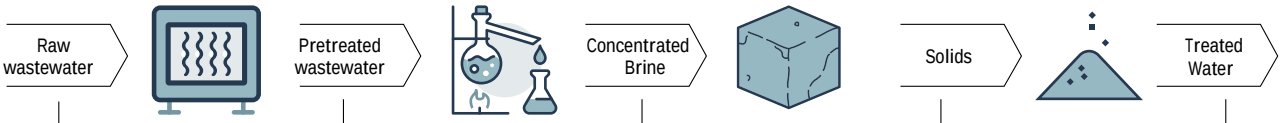
With these innovative solutions, we are able to offer comprehensive Zero Liquid Discharge systems that meet the needs of industries seeking sustainable wastewater treatment and resource recovery. Each component of our ZLD suite is designed to work in harmony, delivering reliable and efficient results while minimizing costs for end users.

Zero Liquid Discharge

Zero Liquid Discharge (ZLD) refers to a treatment process or system in which factories or treatment plants discharge no liquid effluent into surface waters, in effect completely eliminating the environmental pollution associated with water-intensive production processes.

ZLD is achieved by treating wastewater through water recycling and then recovery and reuse for industrial purpose.

How to achieve ZLD



Pretreatment

with PREDEST Electrocoagulation and Electrooxidation

The initial stage involves pretreatment to remove large contaminants and break down complex chemical structures. PREDEST uses electrocoagulation to destabilize suspended particles, leading to floc formation. These flocs are easier to remove through settling or filtration. Electrooxidation further oxidizes organic pollutants, breaking them down into simpler, less harmful substances. This pretreatment step is crucial for reducing the load on subsequent stages and improving overall efficiency.

Concentration

with EVADEST Evaporators

Once the wastewater has undergone pretreatment, it moves to the EVADEST evaporators. This stage aims to concentrate the wastewater by removing water through evaporation. The evaporators use energy-efficient techniques to increase temperature and create steam, which separates from the remaining liquid. This concentrated brine contains a higher proportion of dissolved solids and impurities, setting the stage for further treatment.

Solidification

with SOLIDEST Vacuum Crystallizer

After evaporation, the concentrated brine is transferred to the SOLIDEST vacuum crystallizer. This equipment operates under reduced pressure, allowing for lower temperature crystallization of dissolved solids. The process results in the formation of solid salts or other crystalline substances, which can be separated from the liquid. These solids can be reused, recycled, or safely disposed of, depending on the specific industrial application.

Desalination

with DESALT Electrodialysis

Sometimes the ZLD process involves electrodialysis to further concentrate the brine, recover chemicals by bipolar electrodialysis, or further polishing the treated water. DESALT uses an electric field to drive ions through selective membranes. This stage ensures that the remaining brine is further concentrated or that the distillate is free from salts, making it suitable for reuse or safe discharge.

How Do We achieve Zero Liquid Discharge?

Achieving Zero Liquid Discharge (ZLD) involves a combination of advanced technologies and strategic management practices aimed at completely eliminating liquid discharge from industrial processes. At YASA ET we can support and implement every step of the treatment process.

Here's how it's typically achieved:

1. Source Reduction: Minimize the generation of wastewater at the source by implementing water conservation measures, optimizing processes to reduce water usage, and implementing closed-loop systems where water is continuously recycled within the industrial operation.
2. Wastewater Pretreatment: in our ZLD solutions, wastewater undergoes pretreatment to remove large solids, oils, and other contaminants that could interfere with downstream treatment processes, typically by PREDEST Electrocoagulation & Electrooxidation, and Dissolved Air Flotation. This step ensures the efficient operation of subsequent treatment units.
3. Advanced Treatment Processes: we employ advanced treatment technologies such as evaporation by EVADEST MVR or Heat Pump Evaporator, crystallization by SOLIDEST Heat Pump Crystallizer.
4. Brine Management: Manage the concentrated brine or solids generated from the treatment process effectively. This may involve further concentration through and brine concentration or recovery by DESALT Electrodialysis or Bipolar Electrodialysis equipment, coupled with evaporation or crystallization, solid-liquid separation, and appropriate disposal or beneficial reuse of the residual brine or solids.
5. Water Recycling and Reuse: Recycle and reuse the treated water within the industrial facility wherever possible. Treated water can be used for various non-potable purposes such as cooling, boiler feed, process water, or irrigation, reducing the demand for fresh water.
6. Resource Recovery: Extract valuable resources such as salts, metals, and other chemicals from the concentrated brine or solids stream for reuse or resale, enhancing the economic viability of the ZLD system and reducing environmental impact.
7. Energy Optimization: Optimize energy consumption within the ZLD system by integrating energy-efficient technologies, utilizing waste heat from industrial processes for evaporation or other treatment steps.
8. Regulatory Compliance: We ensure compliance with local environmental regulations and discharge limits throughout the ZLD process. Regular monitoring, reporting, and documentation are essential to demonstrate compliance and prevent any potential environmental liabilities.

PREDEST

Introduction

The fully automated equipment for reclaimed wastewater PREDEST® was developed by YASA ET following the principles of Electro-coagulation, Electro-oxidation, and Dissolved Air Flotation.

These technologies can greatly improve the treatment processes in water and wastewater treatment plants by pre-treating the feed solutions and improving the treatment results of hard-to-treat sewage.

Main Features

High Efficiency in COD and BOD Removal

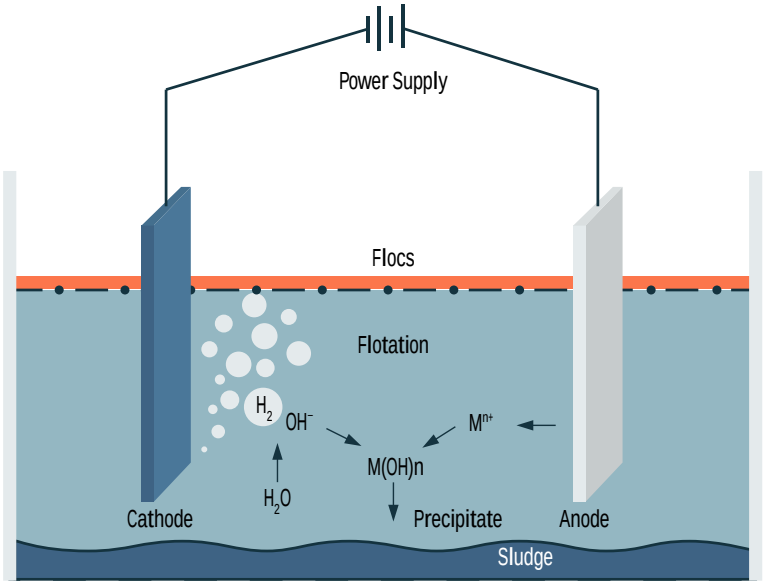
Reduced Chemicals Consumption

Hardness Reduction

Modular Configuration

Low Operating Costs

PREDEST



Working Principle

The electrical current provides the electromotive force causing the chemical reactions. Sacrificial electrodes supply either aluminium or iron cations that assist in a formation of more stable compounds – the contaminants form precipitating hydrophobic entities.

The patented technology of YASA-PREDEST® with rods electrodes structure integrates three processes for treating wastewater:

1. Electrolytic catalytic oxidation
2. Electro flocculation
3. Electro flotation

Thanks to its design the equipment has a high removal efficiency of most of the substances contained in wastewater, including heavy metals, calcium and magnesium ions, fluoride ions, COD, BOD, ammonia nitrogen, and oils.

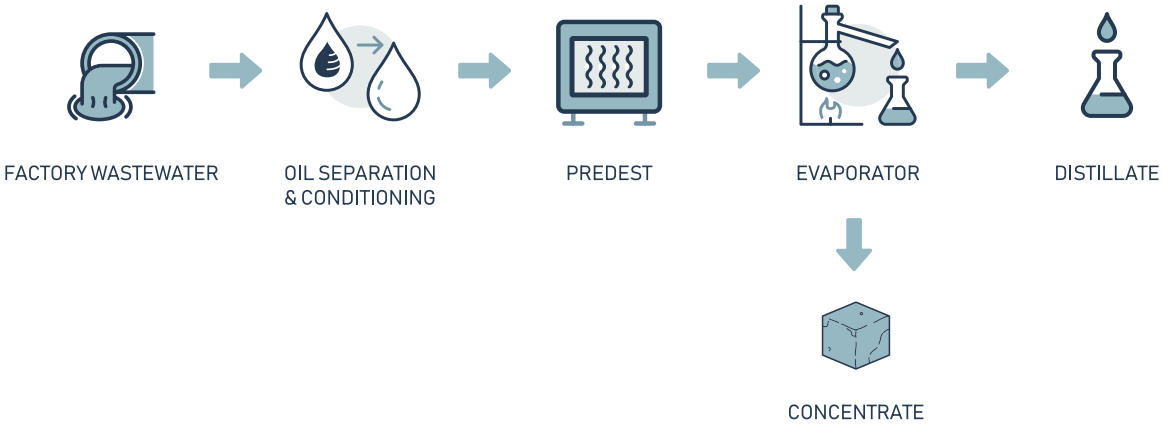
YASA ET PREDEST® wastewater treatment allows several distinct electrochemical processes to occur during the electro-coagulation process. These observed reactions might be explained as:

- Seeding - anode reduction of metals ions that become new centres for larger, stable, insoluble complexes, precipitating as complex metal oxides;
- Emulsion breaking - forming water soluble complexes and that way separating oil, drillers mud, dyes, inks, from the wastewater;
- Halogen complexing - as the metal ions bind themselves to chlorine and form chlorinated hydrocarbon molecules – resulting in the formation of large insoluble complexes and isolating pesticides, herbicides, chlorinated PCBs, etc.;
- Oxidation and reduction reactions - electro-coagulation can speed up the naturally occurring processes.

Applications

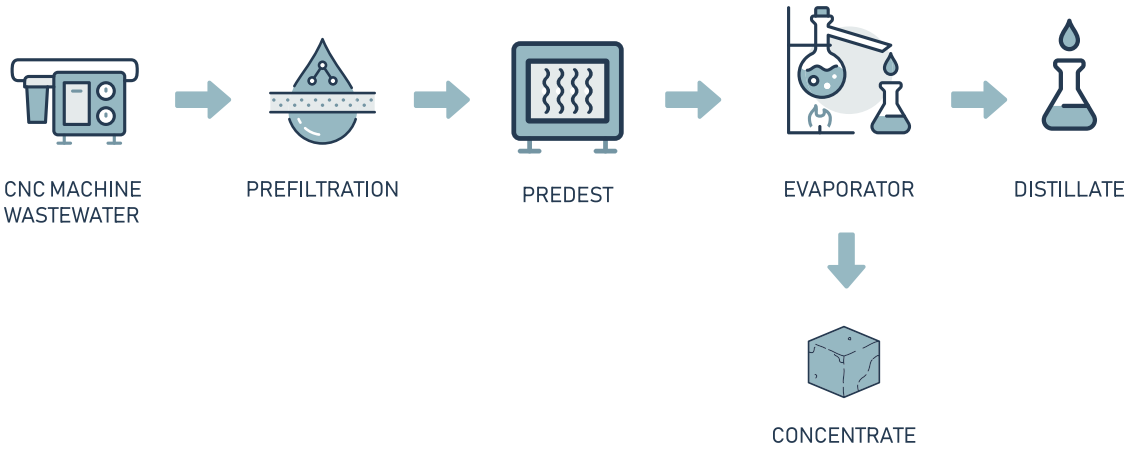
1. Oily Wastewater

Parameter	Feed	PREDEST	Distillate	Unit
COD	13.115	3.279	328	mg/L
Turbidity	1.220	281	3	NTU
BOD	3.150	945	28	mg/L
TOC	880	440	13	mg/L
TDS	990	693	7	mg/L



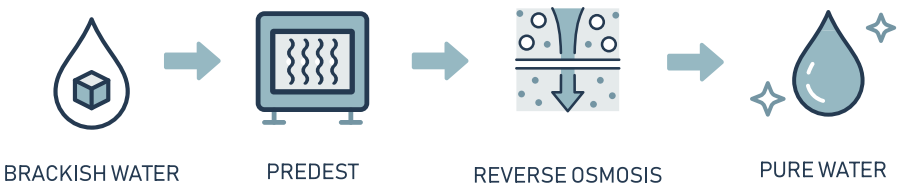
2. Cutting fluids and CNC Machining Wastewater

Parameter	Feed	PREDEST	Distillate	Unit
COD	42.900	12.870	257	mg/L
Turbidity	9.220	2.766	28	NTU
TOC	2.884	1.153,6	11,5	mg/L
TDS	1.090	763	15	mg/L
TDS	990	693	7	mg/L



3. Silica Removal from Well and Brackish Water

Parameter	Feed	PREDEST	Unit
SiO2	122,0	24,4	mg/L
Mg	99,0	29,7	mg/L
Ca	200,0	60,0	mg/L
Na	133,0	119,7	mg/L
Cl	192,0	172,8	mg/L



4. Electro-oxidation of Petrochemical Wastewater

Parameter	Feed	PREDEST	Unit
COD	44.650	8.930	mg/L
TDS	5.540	3.878	mg/L

Product Data Sheet

PREDEST		100	200	500	1000	2000	5000	Unit
Parameters	Capacity	100	200	500	1000	2000	5000	L/H
	Electrodes	30 - 60	30 - 60	30 - 60	30 - 60	30 - 60	30 - 60	n.
	Power	3,5	4	4,5	5	5,9	7,8	Kwh
	Length	2600	2600	2800	3000	3200	3600	mm
	Width	1600	1800	1800	1800	2000	2200	mm
	Height	1600	1600	1800	2200	2600	2600	mm

Case Study

Project Introduction

The client is one of the largest auto parts manufacturers in the world. The project goals were to reduce the environmental footprint of one of their factories by cutting down the factory wastewater discharge.

Wastewater Parameters

The factory wastewater has a high oil content and COD, which is more difficult to treat due to the presence of surfactants.

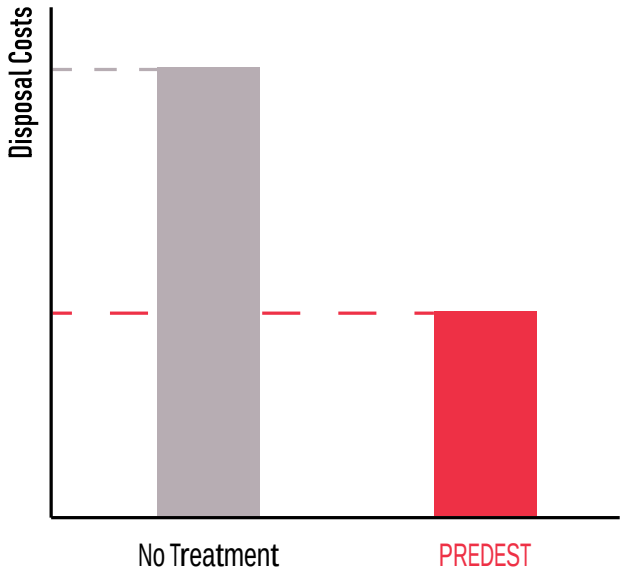
Solution

PREDEST Electrocoagulation Equipment was installed in the factory to treat and reduce the industrial effluents. The electrocoagulation process effectively promotes the removal, reduction and oxidative decomposition of pollutants and separates them from the water body. The sludge settles at the bottom of the electrocoagulation reactor, while the flocs float at the top. Thanks to a small filter press the sludge is dewatered and the treated water can be collected.

Treatment Results

- +79% Water recovered from the industrial effluent and discharged in the city sewers system
- -86% Contaminants and pollutants reduced from the feed wastewater as COD
- -59% Wastewater disposal costs were significantly reduced, as well as the factory footprint on the environment

Electro-coagulation Benefits



DISPOSAL COSTS -59%

CHEMICALS NONE

POLLUTANTS REMOVED -86%

EVADEST

Introduction

EVADEST technology uses mechanical energy to compress vapor generated during evaporation. The compressed vapor, at a higher temperature and pressure, is then reused as a heat source for further evaporation, resulting in energy savings compared to traditional evaporators.

Main Features

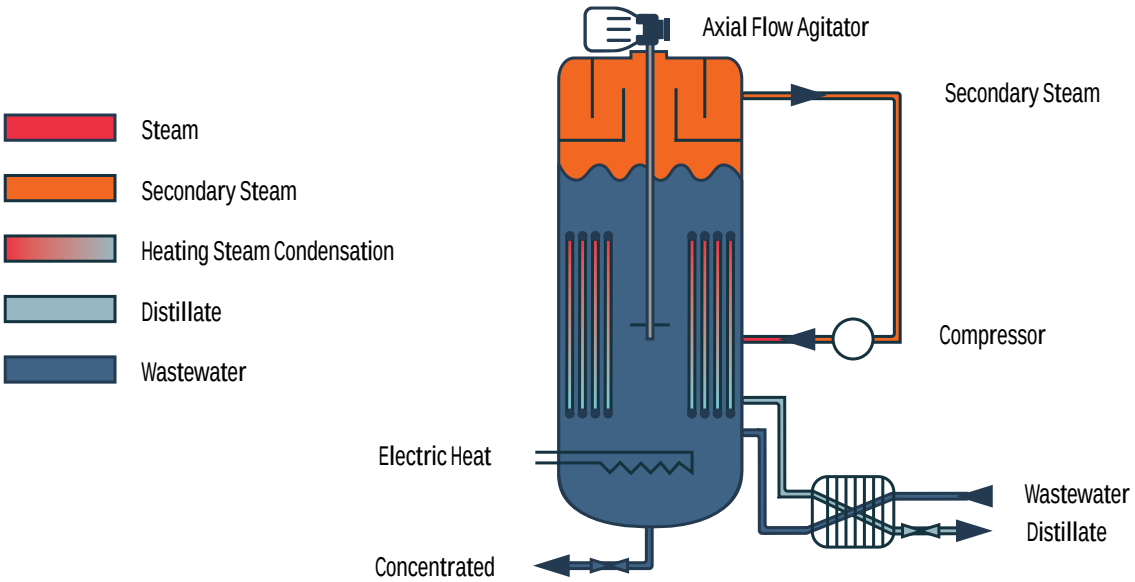
Minimal Power Consumption

No External Steam Required

Distillate High Quality and Purity

Versatile Solution

Low Scaling Configuration



Working Principle

EVADEST wastewater evaporators are the best technology for implementing a Zero Liquid Discharge system. The wastewater is transformed into two streams, one containing solid waste and the second one with high quality distillate, which can be reused in the factory production lines.

The thermodynamic wastewater evaporation of EVADEST involves heating the wastewater sufficiently to turn water into a vapor, thus removing it from pollutants.

EVADEST wastewater evaporator consists of four sections. The wastewater is fed into the evaporator and passes across a heat exchanger. The parallel tubes design is proven optimal in heating distribution and efficiency for heat exchange.

In the main boiler, the wastewater is evaporated by the recompressed steam. The applied heat converts the water in the solution into vapor. The vapor is removed from the rest of the solution and is condensed while the now-concentrated solution is discharged.

EVADEST wastewater evaporation has become an effective method for removing contaminants and concentrating liquid waste. It can remove salts, heavy metals, and hazardous materials, reducing COD, BOD and SS very effectively.

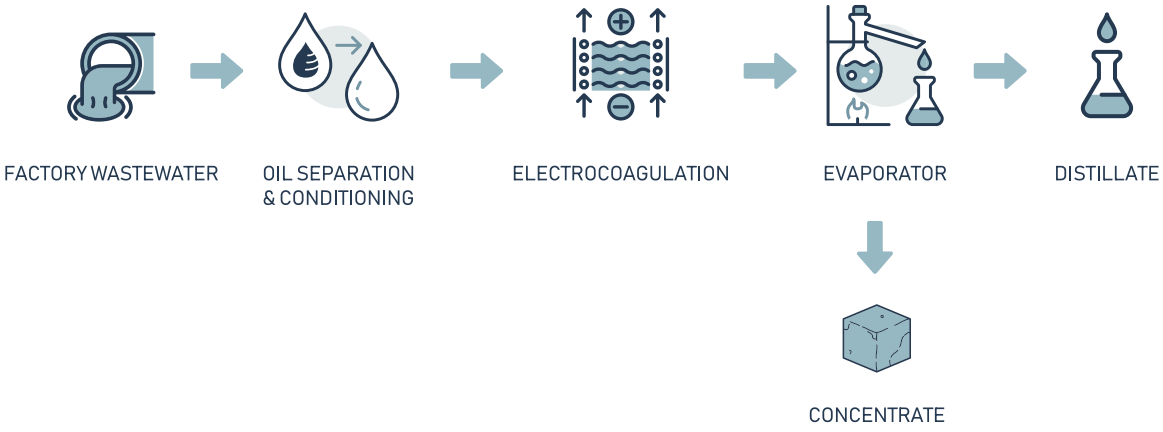
YASA ET's EVADEST evaporators allow our clients to:

- Reduce wastewater output by up to 97%, making it possible to reuse the water in the production line;
- Minimize the final sludge and concentrate;
- Minimize disposal costs and ROI in less than 1 year.

Applications

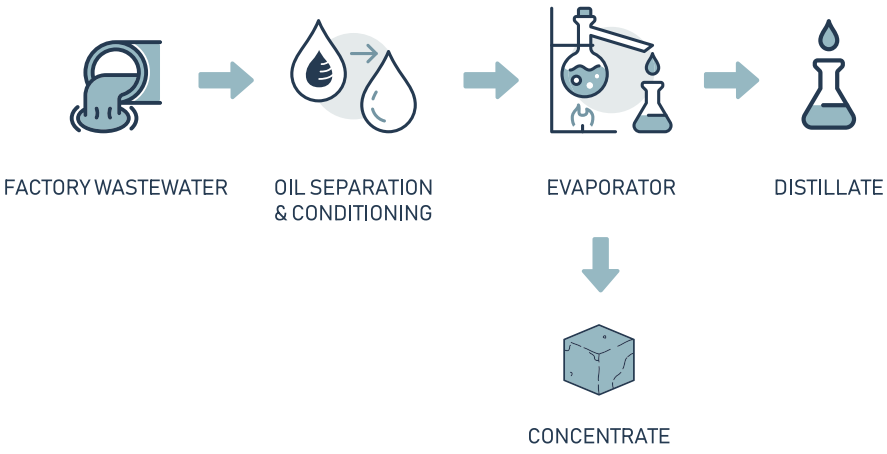
1. Oily Wastewater

Parameter	Feed	Pre-treatment	Distillate	Unit
COD	44.300	28.795	288	mg/L
Turbidity	3.998	920	9	NTU
BOD	4.940	2.470	74	mg/L
TOC	1.360	680	20	mg/L
TDS	3.760	2.632	26	mg/L



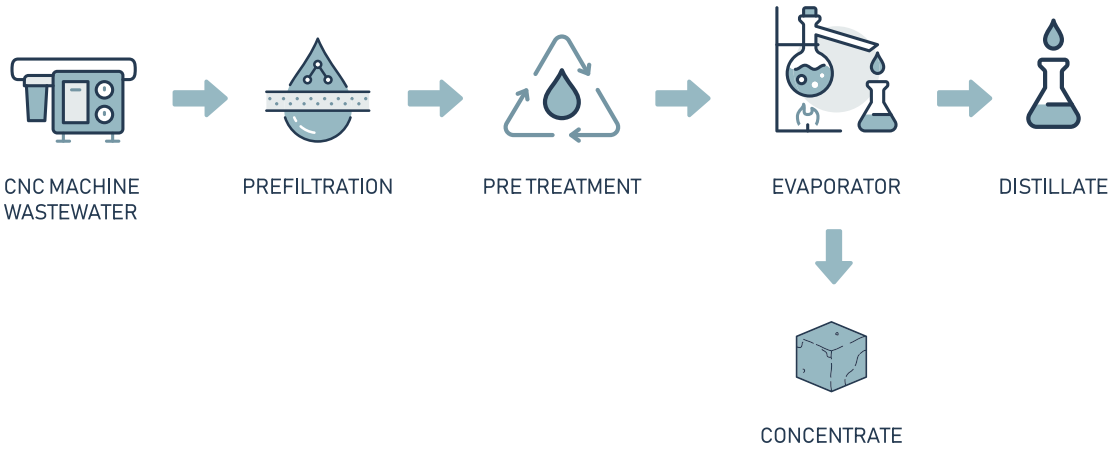
2. Electroplating Rinse Bath Wastewater

Parameter	Feed	Distillate	Unit
Cr	122,0	1,2	mg/L
Ni	11,0	0,1	mg/L
Al	10,0	0,1	mg/L
Fe	3,0	0,0	mg/L
Cu	2,1	0,0	mg/L
Nitrate	8,9	0,1	mg/L
TDS	4.398,0	44,0	mg/L



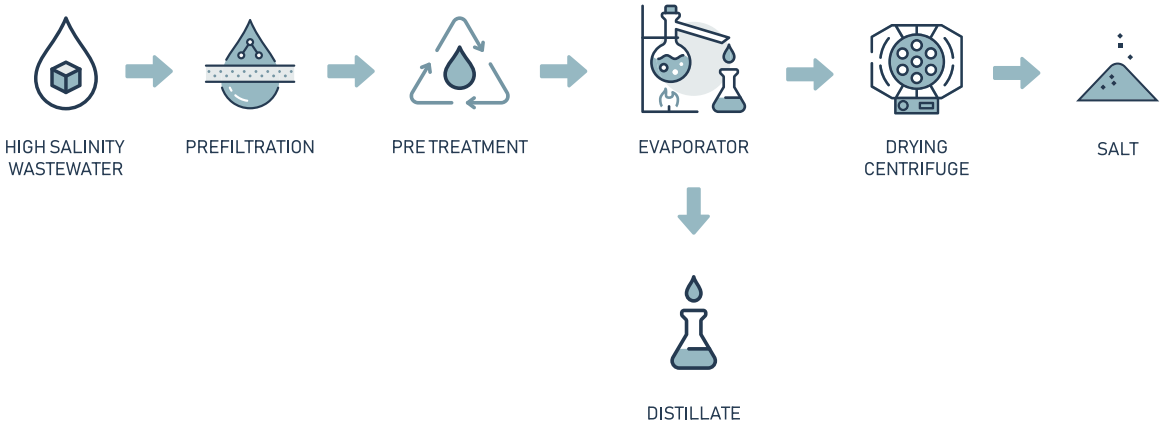
3. Cutting Fluids & CNC Machining Wastewater

Parameter	Feed	Pre-treatment	Distillate	Unit
COD	133.000	79.800	1.596	mg/L
Turbidity	24.220	6.055	61	NTU
TOC	3.155	315,5	3,2	mg/L
TDS	1.144	686	14	mg/L



4. High Salinity Wastewater From Chemical Industry

Parameter	Feed	Pre-treatment	Distillate	Unit
COD	22.578	9.031	903	mg/L
BOD	29.450	8.835	884	mg/L
TDS	67.100	46.970	470	mg/L



Product Data Sheet

EVADEST-M		100	200	500	1000	2000	3000	5000	Unit
	Capacity	100	200	500	1000	2000	3000	5000	L/H
	Power	90	90	85	85	80	70	45	Kwh/ m³
Parameters	Length	2200	2800	3200	3600	4500	5500	6500	mm
	Width	1600	1800	2200	2200	2500	2800	3300	mm
	Height	2600	2900	3200	3600	4000	4500	5500	mm

EVADEST-E		50	100	200	300	500	Unit
	Capacity	100	200	500	1000	2000	L/H
	Power	160	160	160	160	160	Kwh/ m³
Parameters	Length	2600	2500	3400	3600	5000	mm
	Width	1400	1600	2000	2200	2400	mm
	Height	2200	2400	3000	3300	3600	mm

Case Study

Project Introduction

Our client is a global leader in the production of rolling bearings and linear motion products, and required a solution to treat and dispose of the entire factory wastewater. The wastewater is mainly originating from metal cutting processes and CNC machining, which make the wastewater particularly hard to treat and dispose of.

Solution

Wastewater treatment system including EVADEST Vacuum Evaporator as main treatment. The evaporation technology ensures that the wastewater is highly concentrated, while at the same time the equipment produces high quality distillate that can be discharged into the sewerage system. The equipment has excellent COD removal efficiency, thus high-quality distilled water can be obtained from difficult to treat wastewaters. The power consumption of the equipment is minimal thanks to the vacuum effect that reduces the boiling point to below 40∞C.

Wastewater Parameters

The factory wastewater has a high COD content, originating from cutting fluid and emulsion wastewater discarded by CNC. A secondary stream comes from metal heat treatment processes and pickling.

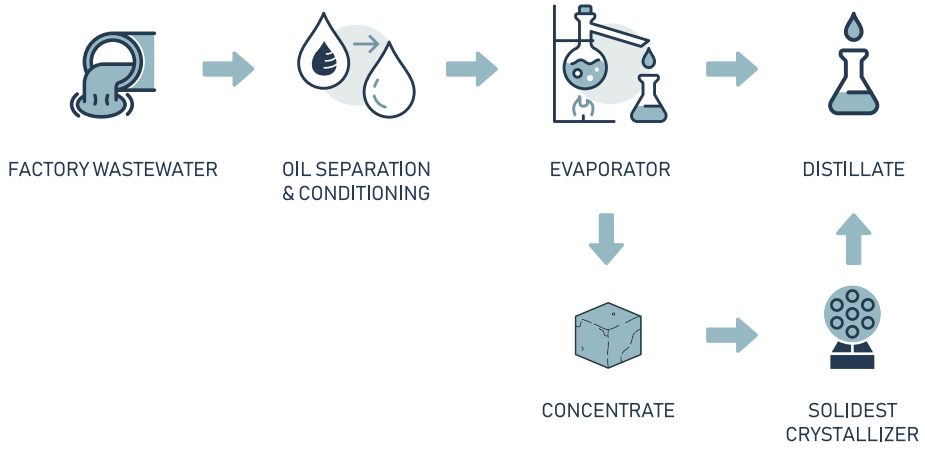
Treatment Results

- +72% Water recovered from the production processes and recycled for manufacturing purposes
- -99% Contaminants and pollutants reduced from the feed wastewater as COD
- -84% Wastewater disposal costs were significantly reduced and the fully automatic system lowered the operation costs

Applications

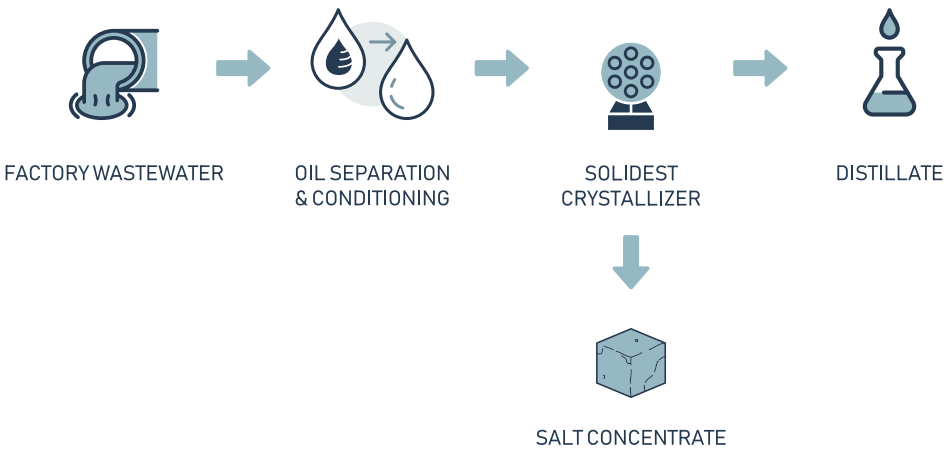
1. Oily Wastewater

Parameter	Feed	Distillate	Unit
COD	94.050	2.822	mg/L
Turbidity	3.998	40	NTU
BOD	4.940	49	mg/L
TOC	1.360	14	mg/L
TDS	2.133	21	mg/L



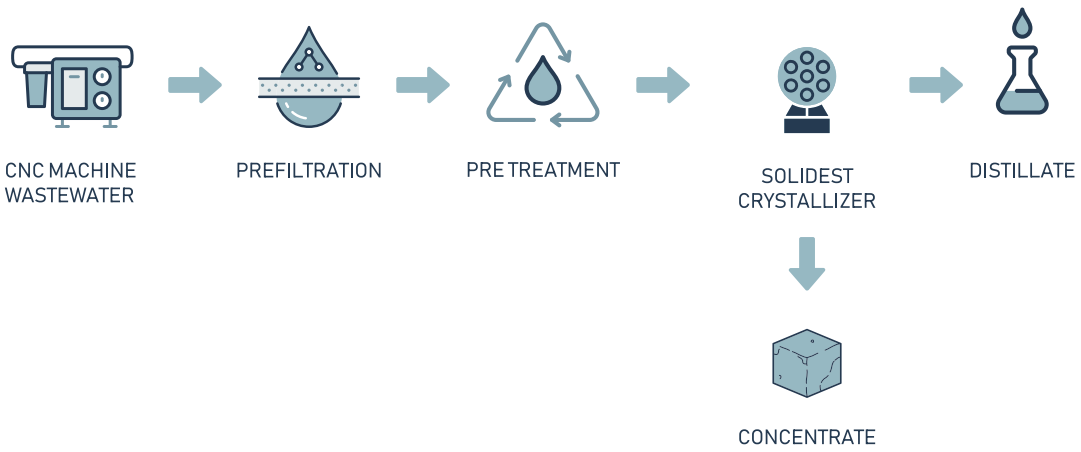
2. Electroplating Rinse Bath Wastewater

Parameter	Feed	Distillate	Unit
COD	260,0	2,6	mg/L
Ni	4.899,0	24,5	mg/L
Zn	58,0	0,3	mg/L
Cu	1.904,0	9,5	mg/L
Nitrate	8,9	0,0	mg/L



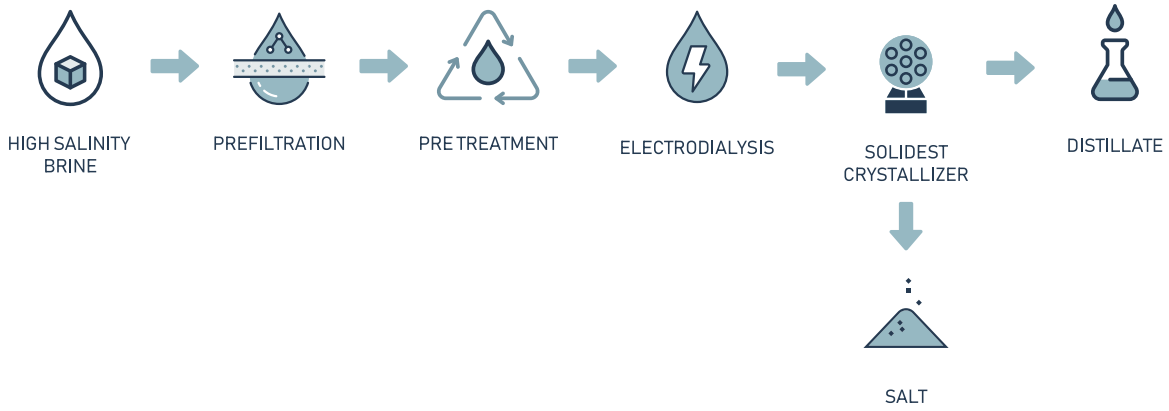
3. Cutting fluids and CNC Machining Wastewater

Parameter	Feed	Pre-treatment	Distillate	Unit
COD	33.890	20.334	407	mg/L
Turbidity	506	127	1	NTU
TSS	885	88,5	0,9	mg/L
TDS	17.503	10.502	210	mg/L



4. RO Reject Brine Concentration & Water Recovery

Parameter	Feed	Electrodialysis	SOLIDEST	Distillate	Unit
Na	11.240	78.680	314.720	157	mg/L
Ca	320	480	2.400	1	mg/L
Mg	669	803	4.014	2	mg/L
Cl	22.623	135.738	407.214	204	mg/L



SOLIDEST®

Heat Pump Crystallizer

Introduction

SOLIDEST Crystallizers are used to concentrate the feed wastewater into solid crystals and recover the distillate.

YASA ET SOLIDEST® Crystallizers are suitable for recovering salts from wastewater that can then be either used or sold, especially in the treatment of chemical wastewater. In this way, a crystallizer maximizes waste stream usage and helps plants meet zero liquid discharge (ZLD) requirements.

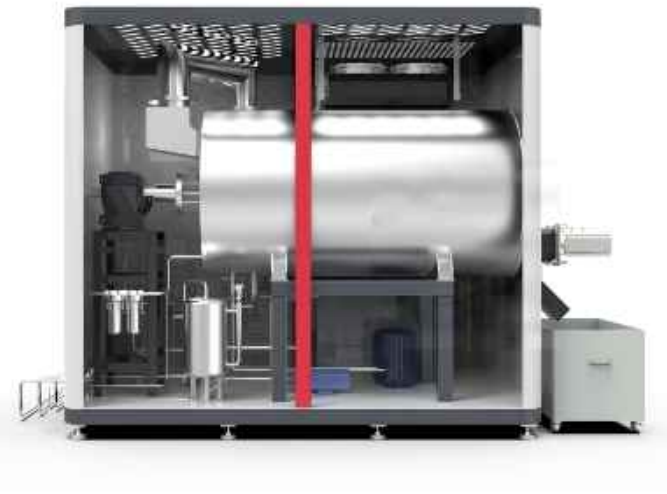
Main Features

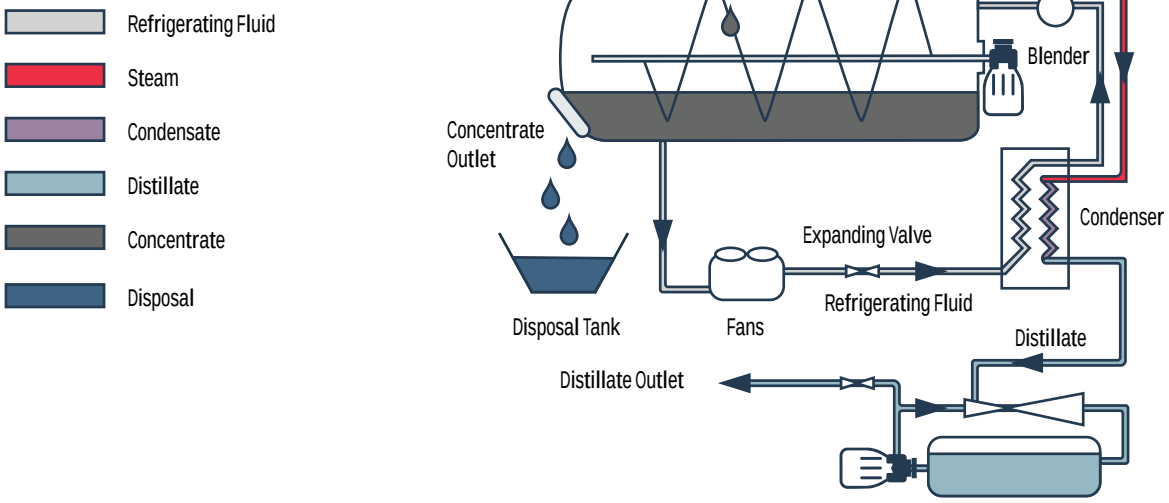
Self-Cleaning Technology

Wastewater Reduced to Solids & Crystals

Suitable For Highly Contaminated Wastewaters

Easy Maintenance





Working Principle

SOLIDEST Crystallizer for wastewater treatment can reduce wastewater streams to dry solids. In order to meet stringent zero liquid discharge (ZLD) requirements, factories are turning to advanced technologies that eliminate wastewater streams and leave behind clean water and solid salt crystals.

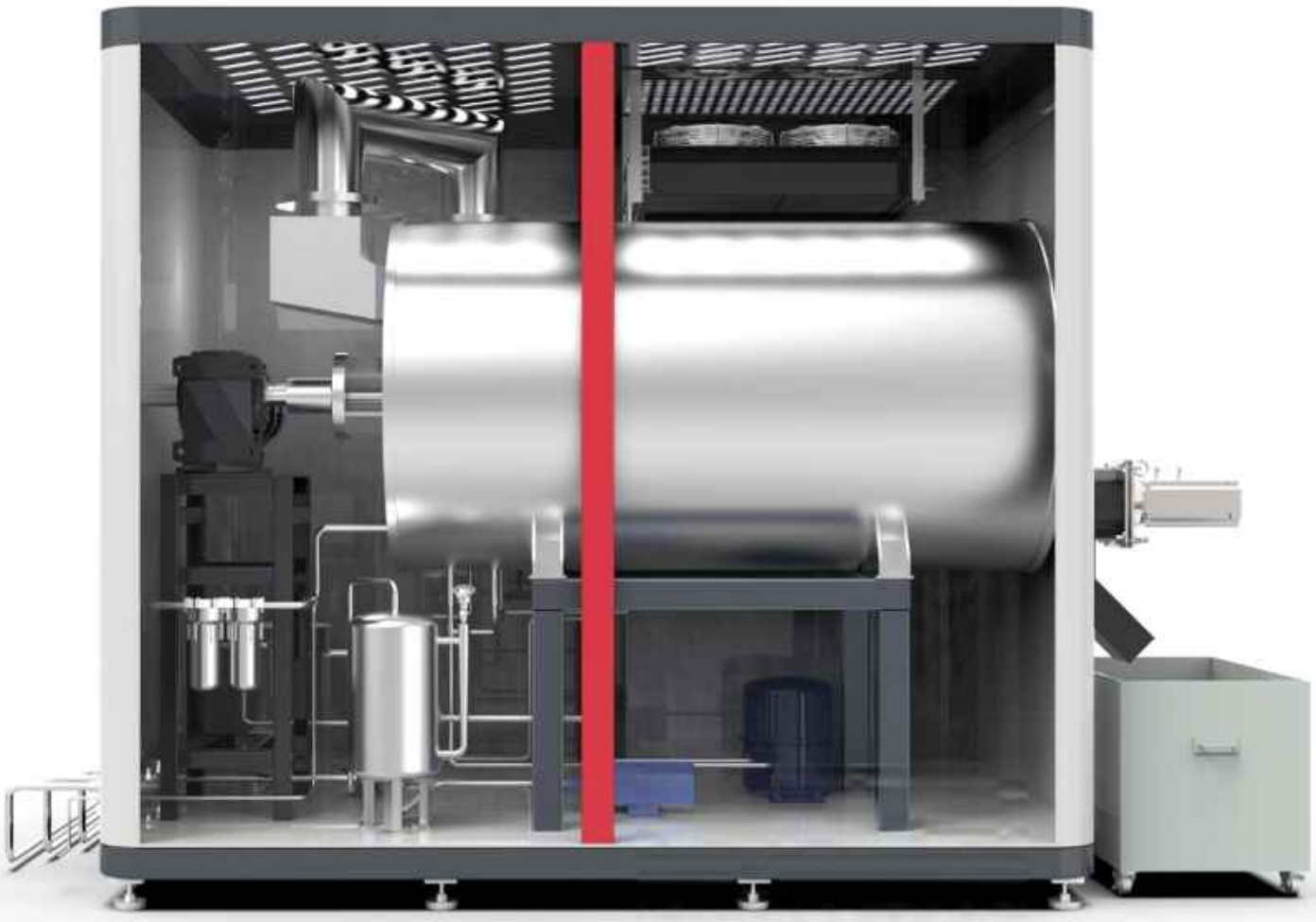
Yasa SOLIDEST crystallizer patented design features automatic operations and self-tank cleaning 24/7, without human supervision needed. The horizontal screw of SOLIDEST automatically empties the main tank from sludge and crystals.

The double jacketed boiler design allows for any wastewater to be treated, reducing pre-treatment and overall maintenance costs, while the heat pump minimizes power consumption costs.

The equipment crystallization process separates the polluting content from the wastewater and transforms them into crystals. At the end of the purification cycle up to 97% of the water can be recovered, thus reducing disposal costs for the final user.

Product Data Sheet

SOLIDEST		30	50	100	200	500	Unit
Parameters	Capacity	30	50	100	200	500	L/H
	Power	220	220	220	220	220	Kwh/ m³
	Length	2600	2800	3500	3600	4000	mm
	Width	1600	1800	1800	2200	2600	mm
	Height	1700	2000	2100	2200	2600	mm



Case Study

Project Introduction

The client is one of the largest intra-logistics equipment manufacturers in the world. The wastewater parameters make this effluent difficult to treat and the disposal costs of the factory considerably high. Another concern are the presence of organics and high COD, which can't be easily removed from the waste stream. The treatment system by chemicals installed in the factory was not efficient and very costly.

Solution

Wastewater treatment system including SOLIDEST Vacuum Crystallizer as main treatment. The crystallization technology ensures that the wastewater is highly concentrated, while at the same time the equipment produces high quality distillate that can be recycled in the factory production processes. At the same time, the fully automatic operation of the equipment let the operators to run SOLIDEST on a 24/7 schedule with minimal supervision. Furthermore, the equipment treats the wastewater on monthly bases schedule, thus reducing the power consumption and costs for the client.

Wastewater Parameters

Wastewater comes from the factory manufacturing processes, mostly from metal polishing and metal parts manufacturing.

Treatment Results

- +79% Water recovered from the production processes and recycled for manufacturing purposes
- -95% Chemicals consumption reduced compared to the previous system
- -70% Wastewater disposal costs were significantly reduced and the fully automatic system lowered the operation costs

DESALT®

Electro-dialysis & Bipolar Electro-dialysis

Introduction

DESALT Electrodialysis & Bipolar Electrodialysis Equipment is an advanced technology used for water and wastewater treatment, particularly in desalination processes and systems for chemical production.

Main Features

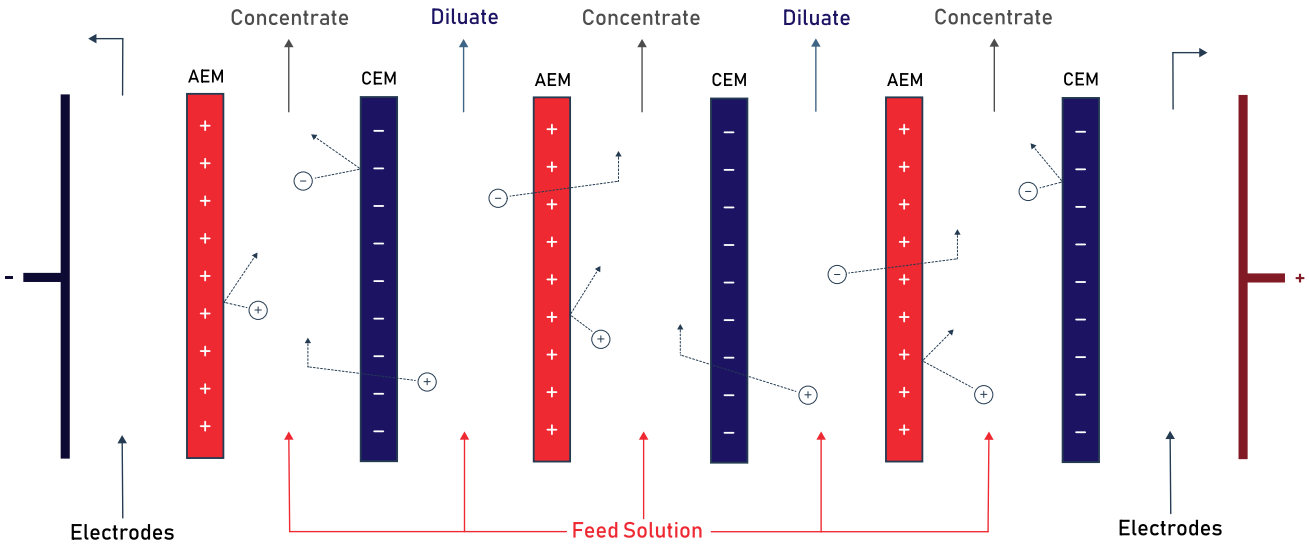
High Recovery Rate

Water Desalination Adjustable Parameters

Reversal Function Removes Scaling

Acids/Bases Concentration & Recovery

DESALT EDR



Working Principle

DESALT membrane stack consists of alternating cation exchange membranes (CEMs) and anion exchange membranes (AEMs) arranged between two electrodes. The membranes selectively allow either positively charged ions (cations) or negatively charged ions (anions) to pass through.

When an electric current is applied across the membrane stack, positively charged ions are attracted towards the negatively charged electrode (cathode), while negatively charged ions move towards the positively charged electrode (anode). This migration of ions through the ion-selective membranes is driven by the electric field.

DESALT ion exchange membranes selectively allow only ions of one charge type to pass through while blocking ions of the opposite charge. As the ions migrate through the membrane stack, they become concentrated in separate compartments between adjacent membranes based on their charge.

The compartments containing concentrated ions are referred to as concentrate or brine compartments, while those with depleted ions are referred to as dilute compartments. The desired ions are collected from the dilute compartments as the product, while the concentrated brine is removed from the concentrate compartments as waste.

Bipolar Electro-dialysis (BPED)

Introduction

Bipolar Electrodialysis (BPED) is a type of electrodialysis that uses bipolar membranes to produce, recover, or purify chemicals from certain solutions.

Applications

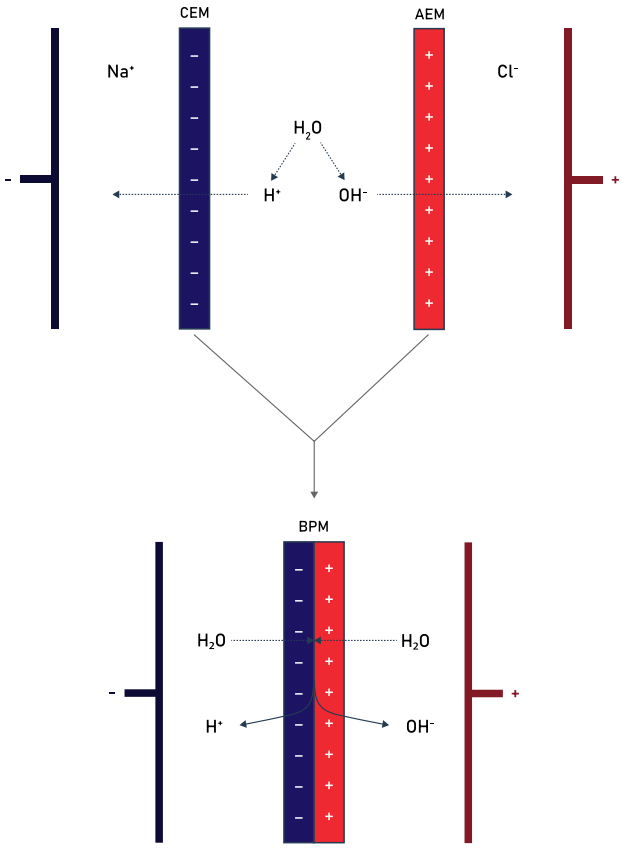
- Acid-base production and recovery
- RO brine recovery of NaOH and HCl
- Lithium purification and production
- CO2 capture from gases, atmosphere, and waters

Working Principle

Bipolar membranes (BPMs) are a special class of ion-exchange membranes constituted by a cation- and an anion-exchange layer, allowing the generation of protons and hydroxide ions via a water dissociation mechanism. Such unique feature makes bipolar membranes attractive for a variety of applications in many sectors, such as (bio)chemical industry, food processing, environmental protection, and energy conversion and storage, among others.

The main process based on bipolar membranes is bipolar membrane electrodialysis (BMED) where BPMs are alternately stacked with monopolar membranes (either CEMs, AEMs, or both) to produce acid and base, or for a variety of applications ranging from resource (re)generation and recycling, energy storage and conversion, and environmental protection.

Based on the project requirements, we can configure and setup the membrane for maximal efficiency and effectiveness.



DESALT-ED and DESALT-EDBM Test Equipment

Thanks to its custom-made design, DESALT Electrodialysis and Bipolar Electrodialysis test equipment can be used to test many different feed solutions and find the optimal configuration to scale up Electrodialysis and Bipolar Electrodialysis systems to full size projects.

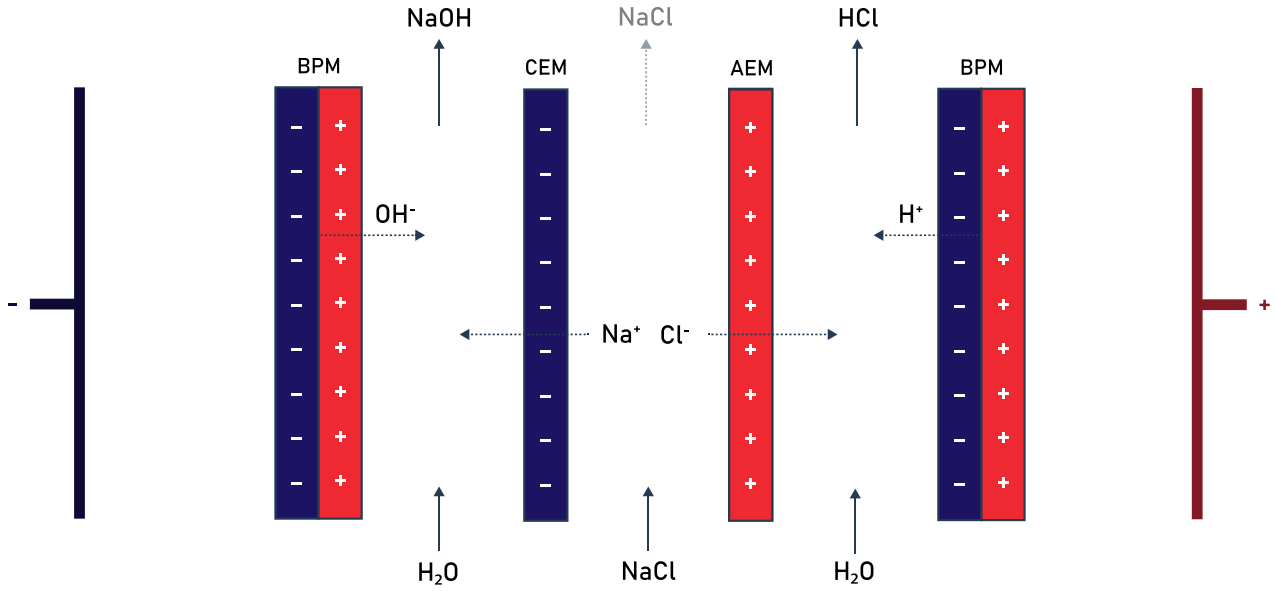
Thanks to the Electrodialysis and Bipolar Electrodialysis Test Equipment our clients can extensively test the water and wastewater treatment system and save money, time, and avoid any errors in the treatment process scale-up.

Features

- No installation, ready to use
- Simple and inexpensive solution
- Multiple applications in every field
- Membrane module customization

Applications

- Water and wastewater purification
- Sustainable water and wastewater treatment
- Chemicals concentration and production
- CO2 capturing



Product Data Sheet

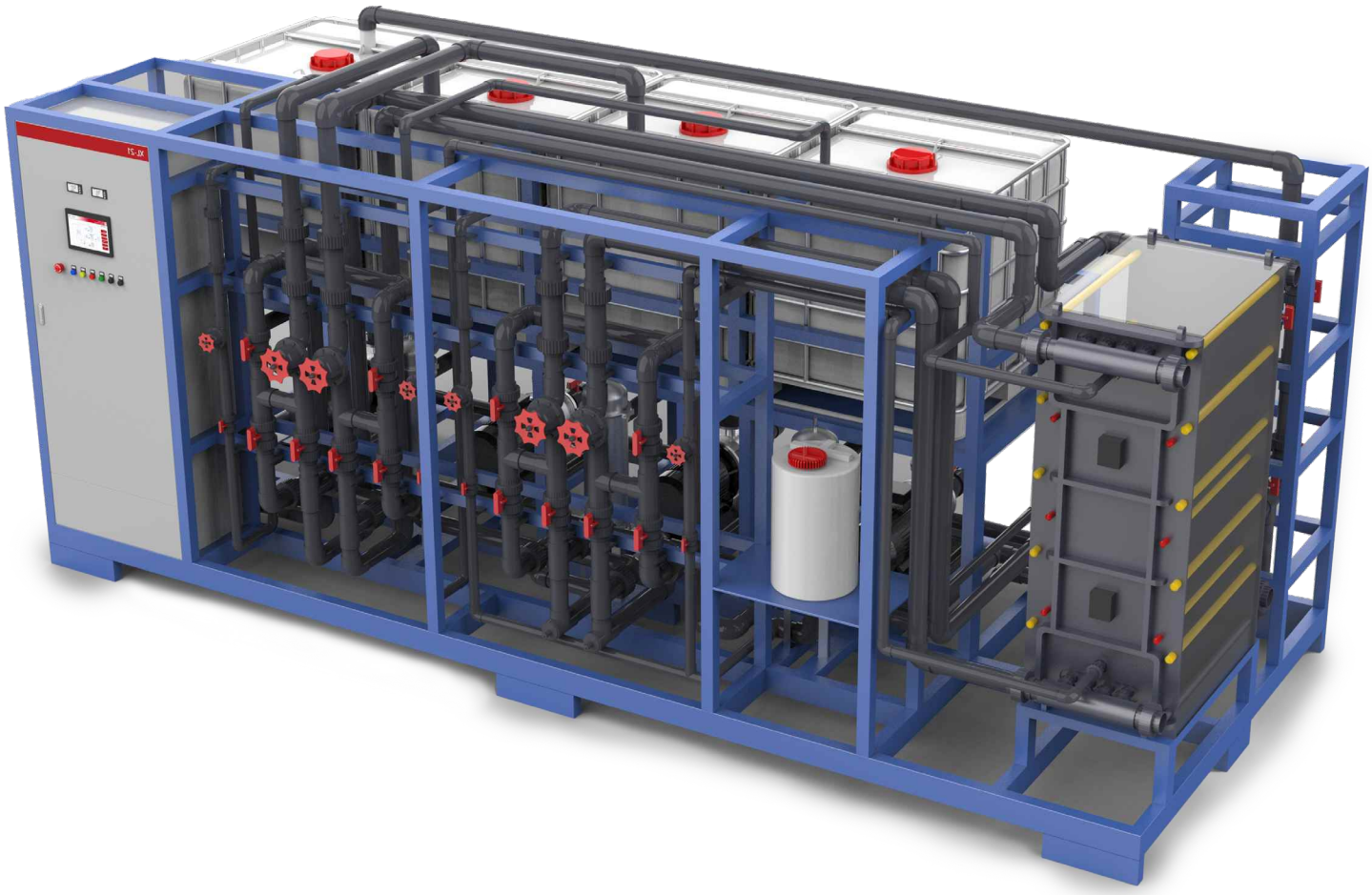
Type	Cationic			Anionic		
Model	CM-1	CM-2	CM-3	AM-1	AM-2	AM-3
Thickness (mm)	0.12-0.15	0.15-0.20	0.15-0.20	0.12-0.15	0.15-0.20	0.15-0.20
Exchange capacity mol/kg g	1.5-1.7	1.0-2.0	1.5-1.7	1.6-2.2	1.6-2.0	1.5-1.8
Resistance (Ω cm²)	1.5-4.5	2.0-4.0	1.5-4.0	2.0-3.5	3.0-4.5	4.5-5.5
Selective permeability%	≥95	≥95	≥95	≥95	≥95	≥95
Pressure (Mpa)	≥0.2	≥0.2	≥0.2	≥0.25	≥0.25	≥0.25

Model	Application
CM-1	Desalination of concentrated acid-base inorganic salts solution by BPED
CM-2	Desalination/concentration of ions in organic solution
CM-3	Solution desalination of low concentration feed
AM-1	Desalination of concentrated acid-base inorganic salts solution by BPED
AM-2	Desalination/concentration of ions in organic solution
AM-3	Solution desalination of low concentration feed

Product Data Sheet

Type	Bipolar	
Model	BP-1	BP-2
Thickness (mm)	0.20-0.22	0.26-0.28
Exchange capacity mol/kg g	1.7-1.9	1.7-1.9
Resistance (Ω cm²)	0.7-0.9	0.8-1.0
Selective permeability %	≥95	≥95
Pressure (Mpa)	≥0.2	≥0.3

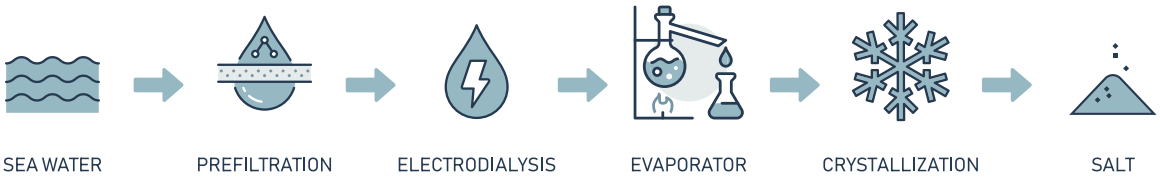
Model	Application
BP-1	Bipolar membrane electrodialysis for the production of acid and base, inorganic salts, organic salts
BP-2	Electrolysis process, electrochemical synthesis process



Applications

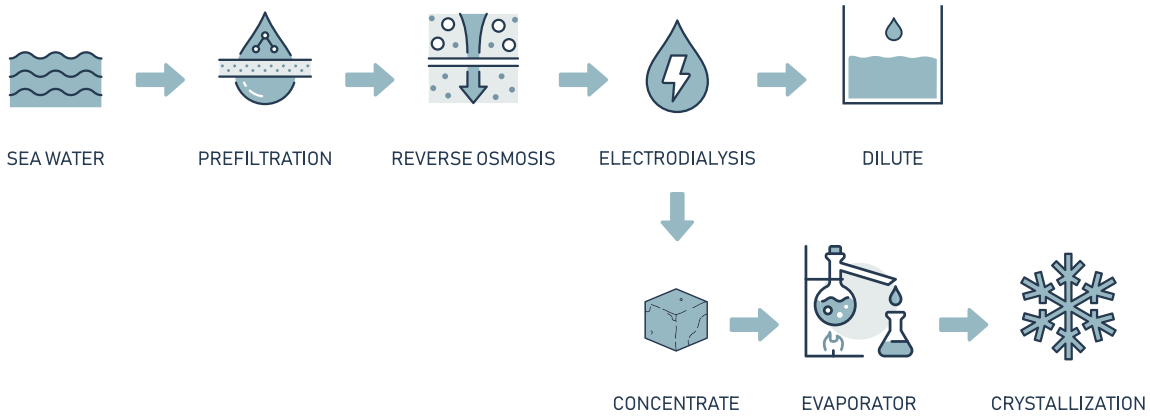
1. Salt Production from Seawater

Parameter	Feed	Product	Unit
Na	10.556	52.780	mg/L
K	280	390	mg/L
Ca	409	500	mg/L
Mg	1.270	1.340	mg/L
Cl	18.980	95.320	mg/L
TDS	31.495	150.330	mg/L



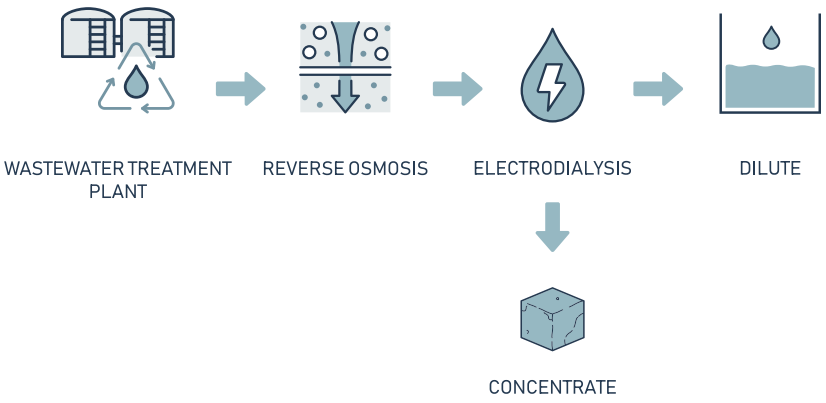
2. RO Brine Recovery and Concentration

Parameter	Feed	Dilute	Concentrate	Unit
Na	16.860	5.620	60.696	mg/L
K	606	390	390	mg/L
Ca	639	500	500	mg/L
Mg	2.013	1.340	1.340	mg/L
Cl	30.305	9.102	109.098	mg/L
SO4	4.230	1.410	2.961	mg/L
TDS	54.653	18.362	174.985	mg/L



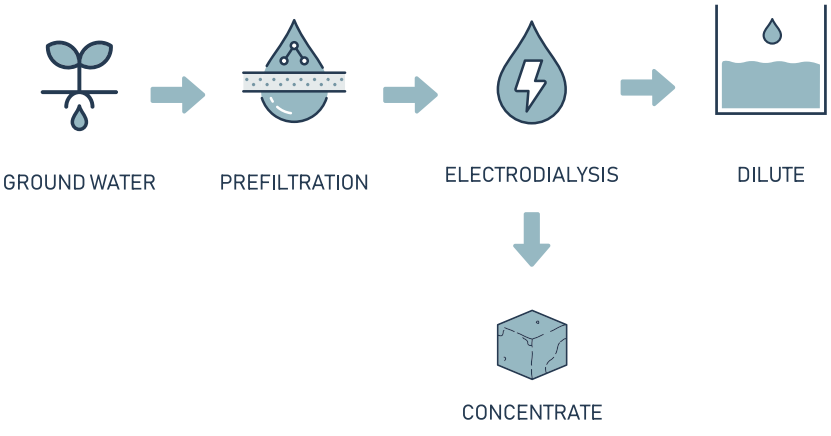
3. Industrial Wastewater Brine Recovery & Concentration

Parameter	Feed	Dilute	Concentrate	Unit
COD	900,00	900,00	900,00	mg/L
BOD	440,00	440,00	440,00	mg/L
TDS	23.180,00	2.897,50	81.130,00	mg/L



4. Groundwater Desalination

Parameter	Feed	Dilute	Concentrate	Unit
Na	301	60	1.204	mg/L
Ca	206	34	618	mg/L
Mg	96	16	288	mg/L
HCO3	390	65	1.170	mg/L
Cl	512	73	2.048	mg/L
SO4	188	27	132	mg/L
TDS	1.693	276	5.460	mg/L



Why Work With Us

As a leading provider of water and wastewater treatment solutions, YASA ET offers several compelling reasons why companies choose to partner with us for their projects:

Comprehensive Expertise in Water and Wastewater Treatment

We offer a broad range of advanced technologies, including electrocoagulation, evaporators, vacuum crystallizers, and electrodialysis. This extensive portfolio allows us to tackle even the most complex treatment challenges with customized solutions, ensuring that our clients receive efficient and effective treatment processes.

Innovative and Patented Technologies

Innovation drives our approach to product development. We hold several patents, a testament to our inventive spirit and our ability to push the boundaries of technology and design. Our patented technologies offer unique solutions that are both effective and efficient, setting us apart in the industry.

Zero Liquid Discharge (ZLD) Solutions

We specialize in Zero Liquid Discharge solutions, which is a significant advantage for companies seeking sustainable wastewater treatment options. Our comprehensive flow process, combining electrocoagulation, evaporation, vacuum crystallization, and electrodialysis, ensures that our treatment minimizes environmental impact while maximizing resource recovery.

Commitment to Safety and Compliance

Safety and quality are at the core of what we do. Our TÜV certification and CE marking on our products demonstrate our dedication to maintaining the highest standards. This commitment provides our clients with the confidence they need, knowing that they are working with a partner that values reliability and safety.

Recognition and Trust

Our status as a high-tech company underscores our reliability. This recognition, along with our commitment to ongoing training and audits, reflects our focus on continuous improvement and accountability. Clients trust us because we not only meet regulatory standards but also strive to exceed them.

Customization and Flexibility

We understand that every client is unique, which is why we offer a diverse portfolio of technologies and solutions. This flexibility allows us to customize projects to meet specific industry needs and operational goals, ensuring that our clients receive treatment solutions that align with their objectives.

Test Equipment for Universities and R&D Labs

In addition to our treatment solutions, we design and manufacture test equipment used worldwide by many renowned universities and R&D labs. This equipment is essential for academic and industrial research, and its widespread adoption by respected institutions is a testament to our quality and reliability.

By partnering with YASA ET, companies gain a trusted ally in their water and wastewater treatment projects. Our strong focus on safety, compliance, and sustainability, coupled with our innovative and flexible approach, makes us the ideal choice for companies looking to meet regulatory standards and reduce their environmental footprint.

THANK YOU FOR THE BUSINESS WITH US.

Contact us

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