

An offshore oil rig is shown at sunset, with the sun low on the horizon over the ocean. The rig's complex steel structure, including pipes and walkways, is silhouetted against the bright sky. In the background, several tall, cylindrical structures are visible. The overall scene is bathed in the warm, golden light of the setting sun.

Water and Wastewater Treatment Technologies Made Easy

At De Nora Water Technologies we make water treatment easy. That's why we offer a range of innovative treatment technologies used the world over to help protect and preserve the world's most precious resource.

About Us

De Nora, a private multinational company with global headquarters in Italy, provides its customers with safe, innovative and sustainable energy saving technologies on worldwide basis.

De Nora's products, systems and technologies, boosted by continuous investments in R&D, are used across multiple industries and applications including municipal water and wastewater, oil and gas, power generation and marine sectors.

The De Nora Water Technologies division has more than 50 years' experience in the development and supply of water and wastewater treatment filtration and disinfection solutions for municipal, energy and marine applications.

Our brands are recognised worldwide and include Capital Controls®, TETRA®, ClorTec®, OMNIPURE™, SANILEC®, SEACLOR®, MicroChem®, UAT™ and ADVANCE™.



Our Experience

Water Purification Capability

We have the experience of more than 50 years across every continent, and the satisfaction of tens of thousands of utility, industrial, commercial and government customers. Our localized field and factory service personnel are well trained to support De Nora Water Technologies' disinfection, instrumentation, and filtration products.

Disinfection

- Installed more than 3,000 electrochlorination systems producing over 3.0 million lb/day (56 thousand kg/hr) of sodium hypochlorite.
- De Nora is the market leader in the design, manufacture and supply of electrolyzers, electrodes, coatings and technologies to serve electrochemical processes in diversified markets
- The leading supplier of gas disinfection systems in the world with more than 40 years experience.
- More than 1,200 ozone and AOP (Advanced Oxidation Process) over 45 years
- Supplies more than 65 percent of the worldwide installed base of on-site generated hypochlorite (brine electrochlorination).

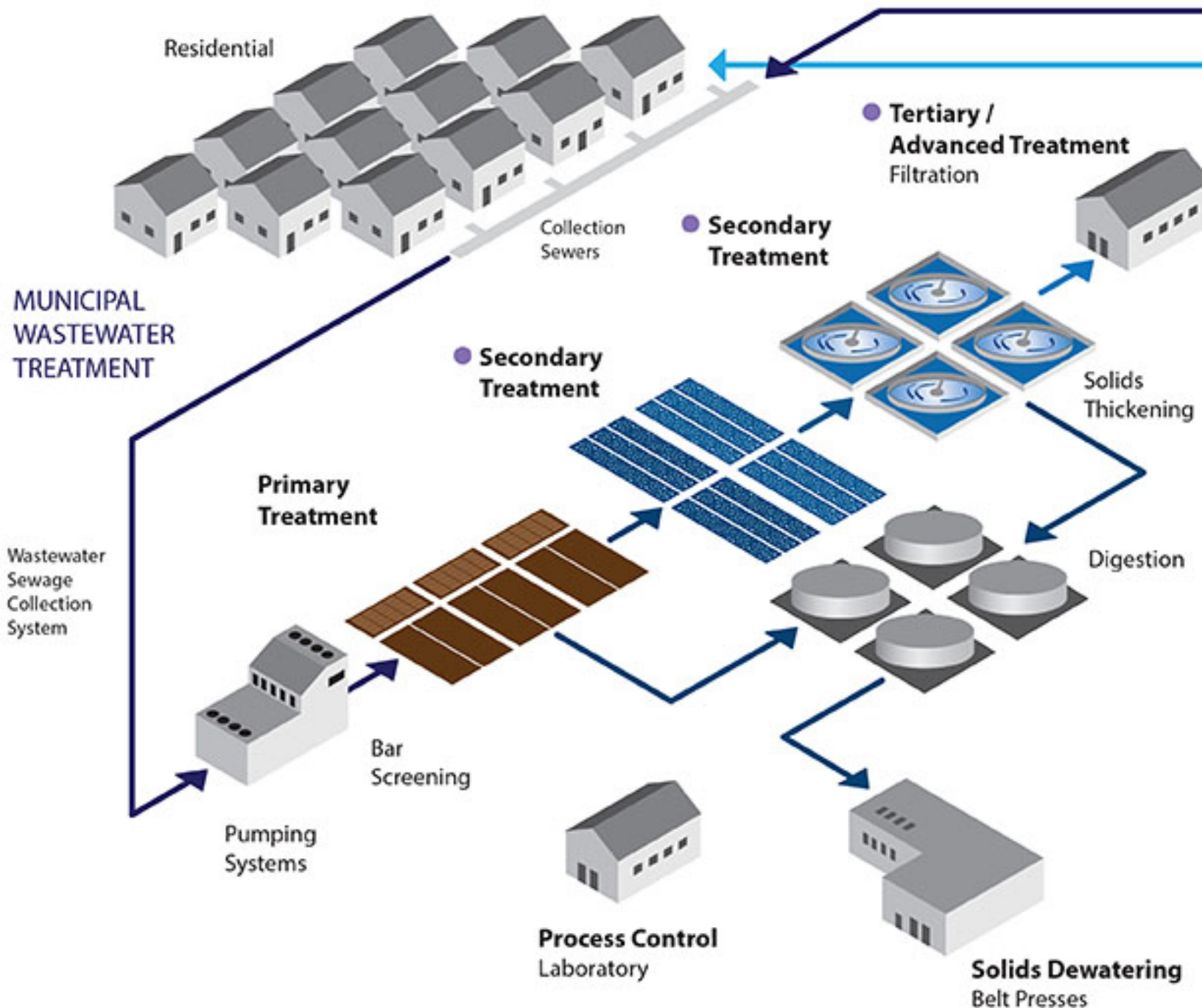
Filtration

- More than 35 percent of all Florida reuse water goes through TETRA® filters.
- Bayoxide® E33 arsenic removal media is permitted and operating in more than 40 US states.
- TETRA® DeepBed™ tertiary filters now treat over 1,000,000 m³/d in Europe.
- The TETRA® Denite® denitrification process is the single biggest contributor in the restoration of Tampa Bay. An average of 52 mgd (197 mg/L) have nitrogen removed using De Nora Water Technologies' process.
- More than 70 percent of US steel manufacturers requiring filtration employ TETRA® DeepBed™ Pressure Filters.
- Manufacturing desalination systems for high salinity applications for more than 20 years.
- Installing filtration systems for pre-treatment at desalination plants in Europe and the Middle East including some of the largest works in the world.

Marine Disinfection

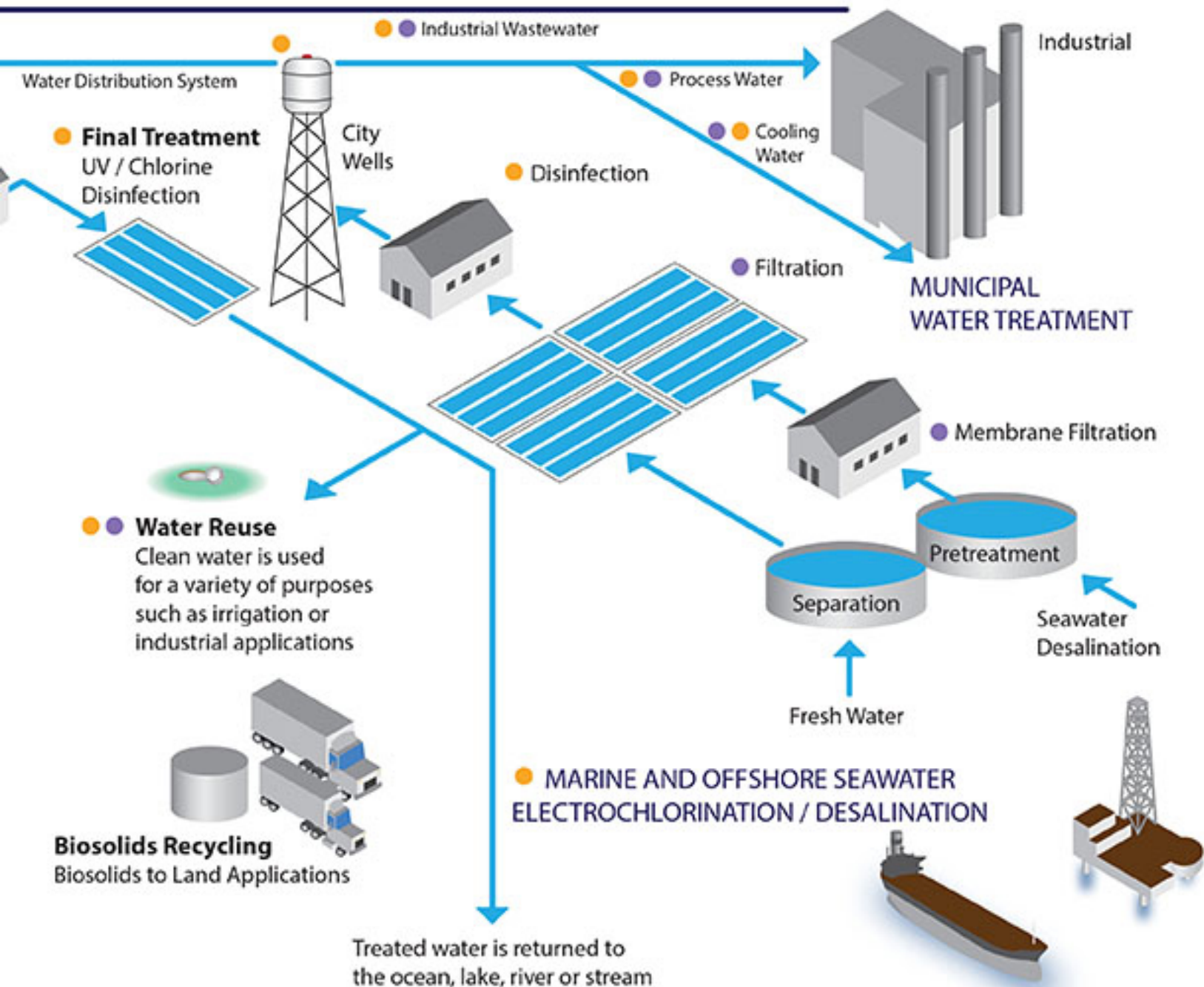
- More than 1,500 electrochlorination systems installed worldwide in marine, offshore, power and desalination applications.
- Offers the only marine sewage treatment systems that oxidize sewage in the electrochemical cell.
- OMNIPURE™ 55/64 is one of a limited number of systems to be certified to meet MEPC.227 (64)
- BALPURE® ballast water treatment system is patented and Type-Approved, providing an effective and economical solution to the threat of aquatic invasive species.

At De Nora Water Technologies we make water and wastewater treatment easy. We provide innovative filtration and disinfection solutions to meet your specific needs. We build long-term relationships by understanding our customers' needs, delivering value and behaving with integrity in everything we do.



Key:

- Disinfection Solutions
- Filtration Solutions



Drinking Water Filtration and Desalination Pre-treatment Made Easy



TETRA LP Block™ Dual Parallel Lateral Underdrain Filters

De Nora Water Technologies has more than 50 years of experience providing filtration treatment solutions to municipal, industrial and commercial markets.

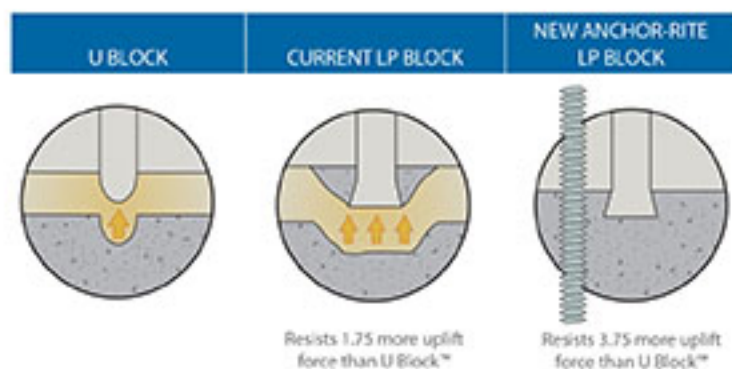
Drinking Water Underdrains

In gravity filters, the underdrain is one of the most important components contributing to overall system performance and operation — whether a new filter design or retrofitting of an existing filter. De Nora Water Technologies offers **TETRA® LP Blocks™** and **TETRA® U Blocks™** dual parallel lateral underdrains for drinking water and desalination pre-treatment applications.

- Effective removal of solids
- Equal distribution of backwash air/water
- Low headloss
- Exceptional installation strength, integrity and maintenance-free life with no moving or wearing parts
- Reduced volume of dirty backwash water produced and lower operating costs
- GroutGrip™ and Anchor-Rite® designs resist uplift from the filter floor and eliminate uncertainty from grout installation
- Wide, low-profile design reduces installation cost
- Our desalination systems are suitable for high salinity water applications
- Easy assembly



Desalination Plant During Construction



TETRA® LP Block™ dual parallel lateral underdrain

Membrane Filtration Made Easy



De Nora Water Technologies offers membrane filtration systems to meet any tap, brackish or seawater application need. Using high quality components, the systems are engineered to effectively produce treated water, free of particulate matter or contaminants.

Membrane Filtration Systems

De Nora Water Technologies offers the **UAT™ Reverse Osmosis (RO)**, **Ultrafiltration (UF)**, **Nanofiltration** and **Electrodeionization (EDI)** systems for a variety of municipal, commercial and industrial applications.

- UAT™ RO membrane filtration systems range in standard output capacities up to 10 mgd
- UAT™ UF systems range up to 10 mgd
- UAT™ EDI systems are available with a maximum permeate flow rate of 2.2 m³/h- 104 m³/h (10 gpm- 460 gpm)



UAT™ Reverse Osmosis System



UAT™ Reverse Osmosis System



UAT™ Electrodeionization System



UAT™ Ultrafiltration and Reverse Osmosis Systems



UAT™ Ultrafiltration and Reverse Osmosis Systems

Contaminant Removal Made Easy



SORB[®] Inorganic Removal

Contaminants in drinking water affect public health. As a result, they should be treated, limited or removed from drinking water supplies. De Nora Water Technologies has a variety of proven treatment solutions.

Arsenic Removal Systems

The **SORB 33**[®] arsenic removal process is proven to effectively and economically reduce arsenic below 4 ppb. The system works in conjunction with a robust and proprietary ferric oxide media, **Bayoxide**[®] E33.

- Simple installation and operation
- Pre-engineered systems range from 1.1–2.1 m (3.5–7 ft) diameter to treat 17–204 m³/hr (75–900 gpm)
- Cost-effective treatment solution for arsenic removal

Arsenic Removal Media

Bayoxide granular ferric oxide media has been successfully removing arsenic from drinking water treatment systems since 1999.

- Removes As (III) and As (V) to <4 ppb
- High capacity for arsenic
- Long media life under continuous operation
- Very low residual (backwash) effluents: <0.1% of water treated
- No chemicals for regeneration
- Small footprint
- Dry media, NSF Standard 61 approved

Fluoride Removal

De Nora Water Technologies offers the **SORB 09**[™] fluoride removal system, a fixed-bed adsorption process for the removal of fluoride onto solid activated alumina.

Iron & Manganese Removal

The **Omni-SORB**[™] filter system is designed for iron and manganese removal applications and for combined arsenic/iron/manganese removal where iron levels are high enough to affect arsenic removal. Lower water losses — <50% than greensand systems

- Reduces operational and maintenance expenses
- Ensures removal of contaminants
- No need to use permanganate for oxidation
- Pre-engineered systems range from 1.1–2.1 m (3.5–7 ft) diameter to treat 19–240 m³/hr (85–1,050 gpm)

Nitrate Removal

The **SORB 07**[™] nitrate removal system is an ideal solution to treat nitrate contamination in ground water supplies.

- Capacity ranges from 100 to 3000 gpm
- Small footprint
- Regenerative process extends resin life

Ion Exchange Systems

TETRA[®] **Higgin's Loop**[™] ion exchange system is a continuous countercurrent ion exchange contactor for liquid phase separations of ionic components using solid exchange resins. The **TETRA**[®] **Higgin's Loop** ion exchange system is a great enhancement for ion exchange applications when compared with fixed bed and fluid bed systems. The Higgin's Loop system efficiently utilizes the resin capacity, uses less regenerant and less fresh water, generates consistent product quality and minimizes wastewater volumes.

pH Adjustment

The **TETRApHix**[™] advanced CO₂ pH adjustment system is ideal for use in drinking water applications requiring CO₂ addition for lime softening or recarbonization or the control of pH.

- Increases gas efficiency
- Low maintenance and reduced operational costs
- Smaller footprint compared to conventional carbon dioxide pH adjustment systems

Other contaminants

De Nora Water Technologies also offers solutions for Nitrite oxidation and leachate treatment.



TETRA[®] Higgin's Loop Ion Exchange



Bayoxide[®] E33 Media

Biological Wastewater Treatment Made Easy



TETRA® Submerged Aerated Filter

For biological treatment and tertiary wastewater treatment, De Nora Water Technologies has it covered. The proven TETRA® design is used for applications that require treatment including removal of BOD, ammonia, suspended solids, phosphorus and nitrate-nitrogen.

Biological Wastewater Treatment Systems

De Nora Water Technologies offers TETRA® biological aerated filter systems for the removal of contaminants from municipal and industrial wastewater

TETRA® Submerged Aerated Filters (SAF)

A simple process for the biological oxidation of ammonia-nitrogen ($\text{NH}_3\text{-N}$) and BOD for both municipal and industrial wastewaters.

- Effluent qualities of 5 BOD and 1 $\text{NH}_3\text{-N}$ (mg/L)
- Effluent $\text{NH}_3\text{-N}$ of less than 0.5 mg/L
- Exceptional performance and flexibility
- Low operating and maintenance costs
- Small footprint
- Can be used for either secondary treatment (SAF/cSAF) or as a tertiary (nitrification) stage (NSAF)

TETRA® CoIOX™

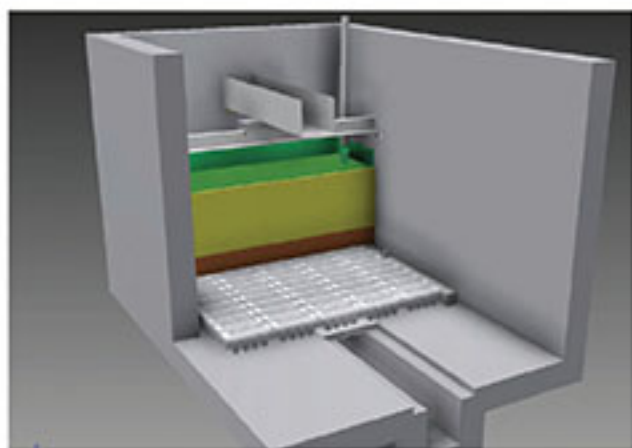
TETRA® CoIOX™ is an advanced aerobic biological treatment system which combines a solids removal and biological treatment process with innovative design features to achieve superior performance.

- Nitrifies ammonia nitrogen
- Achieves superior BOD removal
- Removes suspended solids
- Offers greater efficiency and operational reliability than other aerobic biological treatment processes

TETRA® Amphidrome™

The TETRA® Amphidrome™ process is a biological fixed film sequencing batch filter that provides simultaneous removal of BOD, ammonia, suspended solids, phosphorus, and nitrate-nitrogen. The performance of the deep bed Amphidrome is guaranteed to produce an effluent which meets or surpasses regulatory standards.

- Nitrifies ammonia nitrogen
- Achieves superior BOD removal
- Removes suspended solids
- Offers greater efficiency and operational reliability than other aerobic biological treatment processes



TETRA® Wastewater Filter Construction



TETRA® CoIOX™ at East Greenwich

Tertiary Wastewater Treatment Made Easy



TETRA® SDF at Jishan, China

De Nora Water Technologies' Tertiary and Advanced Wastewater Treatment technologies produce cost effective wastewater effluent that is safe for direct discharge or reuse.

Tertiary and Wastewater Treatment Systems

De Nora Water Technologies' **TETRA**[®] filters produce high quality advanced wastewater treatment plant effluent. The complete product line includes application-specific engineered gravity, pressure and modular filters and pre-assembled gravity deep bed filters.

TETRA[®] SNAP T[®] Block

The TETRA[®] SNAP T[®] Block underdrain is a proven design of filter underdrain.

- Offers superior distribution of both backwash air and water, concurrently
- High loading capacity
- Ensures improved backwashing distribution
- Used in >10% of the world's water reuse capacity

TETRA[®] DeepBed™

The TETRA[®] DeepBed™ tertiary gravity filtration system is an economical solution for the removal of total suspended solids (TSS).

- Superior total phosphorus (TP) removal to below 0.2 mg/L
- No moving parts to clog or wear
- <4% backwater water return (2% typical)
- Easily converted into denitrification mode



TETRA[®] SNAP T[®] Blocks



TETRA[®] Denite[®]

Industrial Pressure Filters

TETRA DeepBed pressure filters combine a nozzleless filter bottom and spherical monomedia for industrial markets. Systems offer automatic filtration and backwashing cycles, with the filter as a standalone operation. These systems are fully automated and provide excellent removal of TSS, oil and grease.

TETRA[®] Denite[®]

De Nora Water Technologies offers the TETRA[®] Denite[®] system that combines the denitrification and filtration process for the removal of nitrate-nitrogen ($\text{NO}_3\text{-N}$) and suspended solids in a single treatment step.

- Fixed-film biological denitrification process
- Integrates with other processes for superior total nitrogen (TN) and phosphorus removal
- Reduces $\text{NO}_3\text{-N}$ to low levels (<1.0 mg/L)
- Effluent total phosphorous concentrations <0.3 mg/L are consistently achieved
- Can easily meet <2 NTU or <5 mg/L TSS (<2 mg/L TSS typical)
- Capable of denitrifying to low $\text{NO}_3\text{-N}$ concentrations at low wastewater temperatures
- TETRAPace[®] automatic dosing control saves up to 30 percent in carbon consumption
- SpeedBump[®] operation removes accumulated gas without removing the reactor from service

Systems are available as bespoke designs or in TETRA[®] Modular DeepBed™ filter package plants.



TETRA[®] Denite[®] at Village Creek WWTW

Gas Feed Disinfection Made Easy



Capital Controls® Gas Feed Disinfection Systems

Gas Feed Systems

The **Capital Controls**[®] line of gas feed disinfection equipment includes chlorination, dechlorination/sulfonation, ammoniation and recarbonation equipment.

- Vacuum Gas Feeders (Manual/Automatic) up to 200 kg/h (10,000 lb/day)
- Pressure Gas Feeders (Manual/Automatic) up to 20 kg/h (1,000 lb/day)
- Automatic Gas Control Valves
- Vaporizers up to 200 kg/h (10,000 lb/day)
- Custom Engineered Systems
- Accessories and mixing systems

Scrubbers

EST[™] municipal and industrial scrubbing systems include both wet and dry scrubbers for emergency gas abatement, odor scrubbers and particulate scrubbers.

Vent Exhaust Gas Arrestor

The **Capital Controls**[®] **Type VEGA**[™] is a disposable chlorinator vacuum regulator vent gas arrestor designed to treat occasional chlorine gas vent releases that normally accompany chlorine container changeovers.



Capital Controls[®] Gas Feed Disinfection Systems



EST[™] Gas Scrubber System

Analyzers, Controllers and Gas Detectors Made Easy

Water Quality Analyzers

De Nora Water Technologies has been a leader in continuous analysis for over twenty years. Our offering of residual analyzers are designed to continuously monitor chlorine and other parameters in drinking water, wastewater, cooling water and other process water applications.

De Nora Water Technologies' analyzers include:

- MicroChem®2 analyzer and controller measures up to three of the following parameters: pH, ORP, Dissolved Oxygen, Chlorine, Chlorine Dioxide, Conductivity, 4-20mA and Temperature
- Capital Controls® Series 1870E and 1770 chlorine analyzers
- Capital Controls® CI500 and CI1000 residual chlorine analyzers
- Capital Controls® CI1000B and DVU bufferless chlorine analyzers

Water Quality Controllers

The Capital Controls® CAPTROL® Series 1450 and 1451 controllers can read a chlorine residual signal, a flow signal, or both to effect excellent, smooth and responsive control of chlorine dosing. Additionally, "before and after" chlorine analyzers can be used in conjunction with a flow input to provide very refined control of the chlorination process.



MicroChem*2 Controller/Analyzer/Transmitter

Gas Detectors

De Nora Water Technologies' gas and leak detectors provide continuous detection of chlorine gas and sulfur dioxide gas in a normally clean air environment in up to eight distinct locations, protecting personnel and property wherever chlorine is unloaded, stored or used. Highly sensitive, the detectors monitor gas levels below U.S. OSHA requirements.



Capital Controls* ADVANCE™ Series 1610 Single Point Gas detector



Capital Controls* CAPTROL® Series 1451 Controller

Ultraviolet and Ozone Disinfection Made Easy

De Nora Water Technologies offers ozone disinfection and UltraDynamics® ultraviolet disinfection systems for use in a complete spectrum of applications.

Ultraviolet Disinfection Systems

UltraDynamics® UV Disinfection Systems

UltraDynamics® ultraviolet disinfection systems are available in closed vessel horizontal configurations for drinking water applications.

- Drinking water systems are designed to treat up to 315 m³/hr or 2 mgd per system
- Wastewater systems designed to treat up to 4 mgd or 631 m³/hr per system



UltraDynamics® UV Disinfection

Ozone Applications and Systems

MCP-XTL, TPF-XTL, DTPF-XTL Ozone generators series

Through the acquisition of Ozono Elettronica Internazionale, De Nora Water Technologies offers a complete range of ozone solutions and Advance Oxidation Processes (AOP) systems, for water and wastewater applications developed in more than 45 years of experience and 1,200 installations.

Ozone is produced either from: ambient air, LOX and PSA VSA installation generating a powerful disinfection media.

Systems can be on skid or containerized and provided as stand alone plants therefore requires only power supply and eventually cooling water.

- Ozone production:

MCP-XTL up to 1.4 kg/h

TPF-XTL up to 37.5 kg/h

DTPF-XTL up to 75 kg/h

- Low power consumption
- Low maintenance costs
- Control and monitoring systems ensure safe operation
- Available as individual generators or complete systems



Ozone disinfection systems from De Nora Water Technologies

Chlorine Dioxide Generation Made Easy



Capital Controls® G4000 Chlorine Dioxide Generator — Dubai, UAE

De Nora Water Technologies' chlorine dioxide is a versatile disinfection treatment chemical that aids in the prevention of trihalomethane formation, a chlorinated organic by-product, by oxidizing the precursors that cause THMs.

Chlorine Dioxide Generation Systems

De Nora Water Technologies offers the Capital Controls® chlorine dioxide generators to produce the disinfectant chemical using reagents in either commercially available or diluted concentrations.

- Efficient gas production
- Precise solution feeding
- Low maintenance
- Dependable operation
- Ranges from up to 2 g/day to 10 kg/hr (up to 529 lb/day)
- Consistent product yield greater than 95%
- Largest installed base in Italy



Capital Controls® GS4000 Mini Chlorine Dioxide Generator

Water Storage Management System

De Nora Water Technologies developed the ClorTec® RMS™ water storage management system as an economical solution for varying municipal, commercial and industrial applications.



Capital Controls® Chlorine Dioxide Generators

Electrochlorination Systems Made Easy



ClorTec™ Brine Electrochlorination Systems

De Nora Water Technologies is a world leader in the supply of seawater and brine water electrochlorination with 3,000+ installations in more than 60 countries. Electrochlorination is a proven, cost-effective, reliable and safe method for generating sodium hypochlorite on-site.

CECHLO Brine Electrochlorination

The CECHLO electrochlorination systems for the on-site production of sodium hypochlorite is a safe and economical solution. developed 40 years ago by Chlorine Engineers, CECHLO is a well-established product line in Japan and is now owned by De Nora Water Technologies through CEC Water Technologies.

There are four types of CECHLO systems, depending on the concentration of sodium hypochlorite:

- CECHLO-MS (Membrane Technology): 5~12% as Cl_2
- CECHLO-IS (Membrane Technology): 5% as Cl_2
- CECHLO-NS: 0.8% as Cl_2
- CECHLO-M: 100~2,500ppm (0.01~0.25%) as Cl_2



CECHLO-MS System



CECHLO-NS System

ClorTec® Brine Electrochlorination

ClorTec® Brine Electrochlorination Systems

The latest generation of brine electrochlorination technology, the ClorTec® DN range, offers simple operation and maintenance as well as unrivalled performance and safety advantages.

Systems generate a 0.8% sodium hypochlorite using three common consumables: water, salt and power

- The **most efficient salt and power usage** at 3.0 lb (1.36 kg) of salt and 2.0 kWh DC power per lb (kg) equivalent of chlorine produced
- Individual hydrogen venting on each cell delivers **safety advantages over competing designs**
- Simplified piping, open access, **reducing maintenance and operational issues**
- Less complex system with fewer instruments and simplified controls which **means easy operation**
- Cell casings in PVC/FRP and acrylic.
- Multiple Frame Options: Powdered Coat, 304SS and FRP
- New remote "**Smart Monitoring**" system monitors the system performance via the internet. This tool allows system optimisation and remote maintenance and troubleshooting.



Electrolytic Disinfection Made Easy



SEACLOR® Seawater Electrochlorination System installed in a power plant

Seawater Electrochlorination

SANILEC® Seawater Electrochlorination Systems

SANILEC® systems are the standard and preferred electrochlorination system for biofouling control in offshore and marine as well as power and coastal applications.

- Systems range in capacity from 2.8–47,620 lb/day (1.2–21,600 kg/day), per train
- Minimal operation and maintenance requirements
- Once-through flow design eliminating recycle requirements
- Use of corrosion-resistant materials of construction
- Customized layout and supply to meet site-specific requirements
- Low power consumption



SEACLOR® Seawater Electrochlorination Systems

SEACLOR® systems are used for biofouling control in power plants, cooling towers, liquefied natural gas (LNG) terminals and desalination facilities, as well as coastal installations using seawater for cooling or other process needs all over the world.

- Designed for continuous and unattended operation and require only periodic monitoring
- Eliminates storage, handling and purchase of hazardous chemicals
- Supplied pre-assembled or pre-fabricated to the maximum possible extent
- Systems range in capacity from 500–50,000 lb/day (10–900 kg/hr), per train



Marine Disinfection Made Easy



Ballast Water Treatment

The Type-Approved and patented **BALPURE®** ballast water treatment system is a simple, reliable and flexible electrolytic disinfection treatment solution to meet the most stringent ballast water discharge requirements. Using a slip stream approach, the BALPURE® system can be remotely mounted away from the ballast lines and split into small sub-assemblies to minimize other equipment relocation and additional engineering/ship re-designs.

- Two Stage Process: Filtration and Electrochlorination
- Suitable and IMO Type Approved for all water conditions (seawater, brackish and fresh water)
- Available for ballast water flow rates from 400 to 12,500m³/h with one unit
- Reliable and flexible solution for both retrofits and new builds
- Applied for USCG Type Approval



BALPURE® Installed Onboard Bulk Carrier



MARINER OMNIPURE® Series M55 Marine Sewage Treatment Systems

Marine Sewage Treatment

MARINER OMNIPURE® Series M55

The compact, MARINER OMNIPURE® sewage treatment system features a bulkhead mounted arrangement that maintains the use of your vessel's installed sewage and seawater pumps and in-place collection/holding tanks. The systems accommodate crew complements up to 25 persons (black and gray water).

- Accommodates varying crew complements
- BV Certification and USCG Certificate of Approval to IMO Resolution MEPC.159(55)
- Easy to install, start up, operate and service
- Eliminates storage, handling and purchase of hazardous chemicals
- No pre-treatment of raw inlet sewage stream
- Small footprint and weight

OMNIPURE™ Series 55/64

OMNIPURE™ Series 55/64 sewage treatment systems are the only marine sewage treatment system to oxidize sewage through an electrolytic process as well as generating sodium hypochlorite for the disinfection of the sewage streams. The systems accommodate treatment capacities up to 197 persons (black and gray water).

- BV Certification and USCG Certificate of Approval to IMO Resolution MEPC.227(64)
- Easy to install, operate and service
- Lightweight package
- Minimal maintenance
- No additional tanks or filtration equipment required
- Operates on-demand, instantaneous on-off operation
- Operator-safe solids handling system
- Small equipment footprint



OMNIPURE™ Marine Sewage Treatment Systems

Aftersales Solutions Made Easy

De Nora Water Technologies offers a range of aftermarket solutions to support our customers throughout the life of their products.

Aftersales solutions

At De Nora we are strongly committed to providing aftersales service and support for our entire product portfolio. We understand your De Nora Water Technologies equipment has different service needs depending on factors such as age, maintenance, application and duty cycle. This is why we are now offering a variety of aftermarket solutions to reduce maintenance requirements and extend the life of your De Nora Water Treatment technologies.

- Trained and knowledgeable staff understand how to maximize product life and efficiency spare parts availability across all De Nora lines
- Warranty and service plans available
- 24/7 technical support



Aftermarket solutions from De Nora Water Technologies

Global Locations

Abu Dhabi, United Arab Emirates

Barcelona, Spain

Colmar, Pennsylvania USA

Goa, India

Los Angeles, California USA

Milan, Italy

Pittsburgh, Pennsylvania USA

Shanghai, China

Singapore

Sao Paulo, Brazil

Sugar Land, Texas USA

Tampa, Florida USA

Tamworth, United Kingdom

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