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together

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news edition

TEMAK[®]
TOTAL WATER SOLUTIONS

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**Award for a “Life project”
at Municipality of Argos - Mycenae**

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Green Building**

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Can we see the current situation as an opportunity to change priorities?



Irodis Mitsopoulos
President & CEO
of TEMAK Company

Man, in its evolutionary process from the time of living in caves until today, has faced many natural disasters, floods, famines, pandemics and was in daily struggle with many adversities.

Each time, after each survival struggle, he became stronger and invented tools, methods and systems of prevention and protection and over the years he accumulated experience and the know-how, so that today, in modern times, he can protect and prevent a number of threats to his life and his health.

The COVID 19 pandemic, which is also a new challenge which humanity faces, is a **new opportunity** to review and improve our lives.

New systems will be created, new technologies will come to the light, the priorities of societies and leaderships may change, but in any case Man will become wiser and the humanity better.

Health will regain its dominant place in our interests and we will recall the essence of the proverb "My health, my wealth"!

It is well known that human health depends on WATER and that million people get sick every day from inadequate water or die from lack of it and we realize that **SUITABLE WATER** is a supreme good for man.

The house, the business, the Municipality, the City, must be supplied with **clean, healthy, drinking water** and every person must have access to it.

TEMAK takes care for water quality every day, for over 40 years, has specialized scientists, technicians, the know-how and appropriate machines, to offer to anyone interested the appropriate solution, so **that the water is suitable for the use he wants.**

It is an opportunity, redefining our priorities, to pay attention to water equal to the value it has for our Health and Life!

To the health of all!



Life project, the water desalination plant of TEMAK that finally solves the issue of water supply of the Municipality of Argos – Mycenae

The technologically integrated water treatment plant, which operates with a desalination unit with a capacity of 200 m³/h, was implemented by TEMAK through a tender process, providing residents and visitors of the Municipality of Argos - Mycenae with healthy drinking water of excellent quality. The start of its operation took place in June 2020, with the presence of Mr. Kamposos Dimitris, Mayor of Argos - Mycenae, who characterized the project: "Water Factory - Life Project that produces excellent drinking water". The main purpose of the desalination unit installation was on the one hand the improvement of the water quality of the springs of Anavalos and therefore the improvement of the existing water supply of the Municipality and on the other hand the full assurance and autonomy of water supply of the Municipality in periods of water shortage. The design and construction of the system were carried out according to the specifications of Municipal Enterprise for Water Supply and Sewerage of ARGOS through tender processing, so that the unit can operate in the future up to 23.5 hours/day, 365 days a year, with an efficiency of 200 m³/h, with a total annual water production of 1,715,500 m³ (23.5 h x 200 m³/h x 365 days).

The Municipality of Argos - Mycenae is supplied mainly by the existing water supply sources of Lerni and Amymoni. In recent years, the quantity of water tends to decrease, making it necessary to use water from the springs of Anavalos, which discharge into the sea, resulting in the loss of millions of cubic meters of water per year. The water of Anavalos is generally considered to be of good quality (except for the increased chlorides 320 mg/L) which are above the drinking water limits and make the water non-potable (maximum chloride concentration in drinking water is 250 mg/l). The solution was the water treatment so as to remove chlorides, but also to reduce the remaining ions, in order to turn it into drinking water and to improve all its additional elements. The treatment of the brackish water of the Anavalos springs is performed through the process of reverse osmosis. The produced water is blended with the clean water of the springs of Lerni to reach the water supply network of the Municipality. The production of the required amount of water is done by four portable units. Each unit has a capacity of 50 m³/h and is installed in a container measuring 12 m x 2.4 m x 2.8.



WATER QUALITY TO BE TREATED:

Brackish water of Anavalos springs

Required quantities of water to be treated:

1. Usable water flow: 400 m³/h.

Origin: Springs of Anavalos which flow into the sea.

2. Type - size of unit:

Production of a total capacity of 200 m³/h of drinking water through a desalination plant by the method of reverse osmosis.

PRODUCTION PROCESS:

Pretreatment stage:

- Water supply tank for treatment
- Chlorination unit
- Pumping of water to be treated
- Filtration with automatic turbidity filters
- Dechlorination with sodium metasilphite dosing
- Dosing system and addition of antiscalant
- Final fine-filtration with cartridge filters

Main water treatment stage:

- Main treatment/desalination of raw water by the method of reverse osmosis
- Cleaning in Place and flushing of membranes unit

Post-treatment stage:

- Final treatment and mixing with filtered water, in order to produce drinking water
- Post-chlorination system
- Drinking water storage.

The precious treated water through the desalination unit flows in the tap of every citizen and visitor, being a "source of life" and contributing to the overall development of the Municipality.

Environmental Awards 2020



The "Life Project for the Municipality of Argos - Mycenae" was awarded the Silver Award (category: Resource Sustainability - Water Stewardship /Water Management and Conservation - "Smart" water technologies & equipment - October 15, 2020).



The water desalination plant in the Municipality of Argos - Mycenae is an important investment as it has improved the adequacy and quality of the water supply of the Municipality.

The Municipality and the Municipal Enterprise for Water Supply and Sewerage of ARGOS ensured to the Citizens and visitors the autonomy of drinking water in periods of water shortage with the low production cost at 0.12€/m³, compared to the high purchase cost of bottled water, achieving the reduction of recycling of plastic bottles from bottled water and at the same time significantly reducing the environmental footprint.





Municipality: Sea water desalination plant using reverse osmosis process, with a total capacity of 650 m³/day in Koufonisia

PROJECT IMPLEMENTATION DATE

July 2020

PROJECT IMPLEMENTATION TIME

3 months

INTRODUCTION

The new portable desalination plant of Koufonisia, which was included in the Operational program "South Aegean", was funded by the European Union (ERDF) and from national resources through the public investments program. The installation took place at Parianos on the island of Koufonissia, where the existing desalination plant is located. Due to limited space at the installation site of the existing unit, the new desalination plant of TEMAK with a capacity of 700 m³/day was placed on top of the existing containers of desalination with certified stacking load of 192 tn. For the safe access to the second level, a special metal construction with ladder and platform was constructed with care and expenses of our company, which was connected to a reinforced base of reinforced concrete, according to a static study we carried out.

THE CHALLENGES

The continuation of cooperation with the Municipality of Naxos and the Small Cyclades with the upgrade of the already installed unit of 700 m³/day to 1,350 m³/day, given that the new unit had to be placed above the already installed containers of the existing desalination plant.

THE SOLUTION

The new unit operates by the method of Reverse Osmosis (RO) for sea water and has all those elements that make it autonomous and safe in terms of operation for both staff and the environment. The equipment of the portable desalination unit (pre-treatment, post-treatment, filters, membranes, high pressure pumps, etc.), is ergonomically installed in two containers of standard dimension and length of 40 ft each. The ergonomic layout of all the individual systems favors their easy operation and maintenance. The desalination plant has a pressure exchanger type energy recovery device, designed and manufactured with the aim of maximum electricity savings of 50%. For maximum ergonomics and location, the sea water supply and product water transfer pumps for the final product water were installed in the existing pretreatment - post-treatment container. The whole system has all the necessary configuration and automation, so that the treatment cycle is carried out autonomously [such as raw water supply pumps, high pressure pump, desalination membranes (reverse osmosis), dosing pumps, CIP system etc.].

THE RESULT

The outcome of the new installation is the covering of all the requirements of the island in drinking water all year round and in periods of increased demand.



Municipality: Second desalination plant to Municipality of Antiparos with total capacity of 300 m³/day

CLIENT

Municipality of Antiparos

LOCATION

Antiparos island

PROJECT IMPLEMENTATION DATE

August 2020

PROJECT DESCRIPTION

The project includes the design, construction, supply and installation of a portable sea water desalination unit with a capacity of 300 m³/day of drinking water.

THE PROBLEM/CHALLENGE

The purpose of the project is to increase the capacity of the existing desalination plants of TEMAK, to meet the growing water needs on the island, both due to reconstruction in recent years and the growth of tourism during the summer months. It is noteworthy that the unit was built and put into operation in just sixty days from the signing of the contract with the Municipality to meet the increased needs for water in the peak month, in August.

THE RESULT

This unit was installed in the area where the two existing desalination units of our company have been operating since 2014, with a capacity of 700 m³/day, thus increasing the total daily production capacity to 1000 m³/day of drinking water, solving this way definitively the chronic problem of self-sufficiency and autonomy that the island was facing.





Municipality: Iron and manganese removal system with a processing capacity of 700 m³/day

CLIENT

Municipality of Ikaria

LOCATION

Agios Polikarpos, Ikaria

PROJECT IMPLEMENTATION DATE

August 2020

PROJECT DESCRIPTION

The project includes the design, construction and installation of an iron and manganese removal system by refining treated water through two multimedia filters in series with a special retention material. The processing capacity of the system is 700 m³/day.

THE PROBLEM/CHALLENGE

The aim of the project is to reduce the high concentrations of ferrous metals (2.61 ppm) and manganese (0.20 ppm) contained in the borewell water of the "Haraka", in order to avoid any negative impact on human health.

THE RESULT

The internal water supply network of the settlements of Agios Polykarpos, Lombardas and Gialiskari of the Local Community of Agios Polykarpos of the Municipality of Ikaria is supplied with clean and healthy drinking water, which is now accessible to residents and visitors of these areas.





Shipyard: Sea water desalination unit with energy recovery device with a total capacity of 340 m³/day of drinking water

CLIENT

Shipyard

LOCATION

Greece

PROJECT IMPLEMENTATION DATE

June 2020

PROJECT DESCRIPTION

- Seawater pumping
- Multimedia automatic turbidity filter
- Antiscalant injection to protect membranes from scale deposits
- Add caustic soda (pH increase)
- Main reverse osmosis unit for water desalination
- Energy recovery device
- CIP unit -membrane flushing
- Desalination water storage tank (after hardness has been added, pH adjusted and water chlorinated).

INTRODUCTION

The restart of this shipyard and at the same time the shipbuilding industry marks major changes and the development of industry throughout the country. The shipyard has been reborn and competes heavily with overseas shipyards, serving a large number of ships from around the world, combining quality service with the speed required by the Shipping industry. At the same time, the development of infrastructure, new jobs and increased mobility has turned the shipyard and the island where it is based into a reference point.

THE CHALLENGE

The rapid development of the shipyard and the great mobility created the need to use more and more quantities of water, on the one hand to carry out the necessary repair work of the yard, and on the other hand to meet the needs for its operation. For these reasons, TEMAK was invited to build a desalination plant which will ensure continuous adequacy in drinking water achieving significant savings for the yard.

THE SOLUTION

The desalination system consists of a sea water reverse osmosis unit with energy recovery device with a capacity of 340 m³/day of drinking water. The system is portable and fully installed in a 40 ft. container. With the energy recovery system of the unit, the high pressure of the reject water of the reverse osmosis is exchanged, with the result that the high pressure pump is dimensioned with almost half of the electricity that would be needed if there was no energy device and to achieve a lower energy consumption by 50%. In the post-treatment stage, the pH is improved and the hardness is enriched through a rehardening filter, so that the produced water is drinkable according to the current legislation.

THE RESULT

Ensuring the necessary quantity and quality of water for the operational uses of the shipyard and for the needs of the staff gives increased added value to the services provided to the customers of the shipyard.



Hotel: Water treatment system for 5 star hotel in Elounta, Crete, producing 210 m³/day

PROJECT IMPLEMENTATION DATE

June 2020

PROJECT IMPLEMENTATION TIME

3 months

PROJECT DESCRIPTION

- Seawater collection
- Multimedia turbidity filter with a filtration rate of 15 m³/h
- Injection of antiscalant to protect membranes from scale deposits
- Multi-cartridge safety filter of 5 micron porosity
- Main water treatment with reverse osmosis unit achieving a specific energy consumption of 2.60 kWh/m³
- Storage of desalinated water in a drinking water tank after increasing the hardness, final pH adjustment and post-chlorination

INTRODUCTION

The investment and construction of the hotel unit was implemented by a company specialized in the construction of projects. The state-of-the-art hotel resort includes a villa complex with main and private pools in each villa, restaurants, bar, spa, conference room (for conferences, movie screenings and special events), beach house, cable car, fully equipped gym, amphitheater for special events with private kitchen, shops, high speed yachts and catamaran available for charter as well as parking. The system is installed in a specially designed basement of the hotel. Due to the high level of facilities of the hotel complex, it was deemed necessary to install

a desalination water treatment plant to meet the needs for drinking water. The system is installed in a specially designed basement of the hotel.

THE CHALLENGE

The amount of water from the local water supply network was minimal to insufficient to meet the increased needs of the 5 star hotel and the only solution was the treatment of sea water by the method of reverse osmosis, so that the produced water is drinkable according to the current Legislation.

THE SOLUTION

The system consists of a reverse osmosis unit with a high pressure pump assembly and a pressure exchanger type energy recovery device. The pump is made from super duplex stainless steel for maximum corrosion resistance. Sea water desalination is performed using semi-permeable membranes with a total rejection more than 99.8% of the elements present in sea water. Advantage of the system is the energy recovery device taking advantage of the high pressure of the reject water of the reverse osmosis unit which results in a lower energy consumption of about 50%. The desalination unit has an electronic panel with integrated PLC made by TEMAK, which completely controls the operating cycle of the water treatment system. Finally, the system has special equipment that allows remote monitoring and control of the unit via computer.

THE RESULT

Ensuring adequacy and quality of 210 m³/day of drinking water.



Hotel: Containerized water treatment system for 4 star hotel in Vasilikos, Zakynthos, producing 150 m³/day

PROJECT IMPLEMENTATION DATE

July 2020

PROJECT IMPLEMENTATION TIME

2,5 months

INTRODUCTION

The complex in Zakynthos is a beautiful two-storey hotel with gardens, built according to the local Ionian architecture at the top of a green hill. It has a total of 155 rooms of various types, including double, family rooms and maisonettes. The water to be treated comes from the sea and is led to the reverse osmosis system which is installed in a container of special specifications with thermal insulation, lighting, ventilation and air conditioning.

PROJECT DESCRIPTION

- Multimedia turbidity filter with a filtration rate not exceeding 16.0 m³/h
- Injection of antiscalant agent to protect membranes from scale deposits
- Main desalination unit with reverse osmosis membranes (includes CIP unit and membrane flushing unit)
- Product water storage tank after water post-treatment which aims to increase hardness, final pH adjustment and post-chlorination

THE CHALLENGE

The hotel is located in a place that is not supplied

with mains water. The only solution for its water supply before the installation of the first desalination unit of TEMAK was transporting low quality water through tanks, with very high purchase costs and with high annual maintenance costs of the hotel due to damages caused by poor water quality. The hotel's need to ensure water adequacy and meet all its drinking water needs was one way. For this reason, a second TEMAK desalination unit was installed.

THE SOLUTION

The new desalination unit consists of a reverse osmosis system. The unit was constructed, installed and transported in a container. The system has a pressure exchanger type energy recovery device. This system takes advantage of the high pressure of the reverse osmosis reject water, thus saving about 50% of electricity.

THE RESULT

Ensuring the quantity and the quality of drinking water, reducing the operating costs and damages of the hotel but also increasing the quality of the services provided by the hotel to its customers. The total production of both desalination plants is 400 m³/day.



Saudi Arabia: Brackish water treatment system in chemical industry with the method of reverse osmosis producing 170 m³/day

PROJECT IMPLEMENTATION DATE

June 2020

PROJECT IMPLEMENTATION TIME

2 months

INTRODUCTION

Industries require water of high quality for a range of applications, such as manufacturing, material processing, heating and cooling. Low conductivity/high purity water is of great importance for the manufacture of many products in the chemical industry, such as chemicals, detergents and cosmetics.

TREATMENT STAGES – PROJECT DESCRIPTION

The water available for treatment is stored in the raw water tank and with the appropriate dosing system the necessary chlorination and disinfection of the water is done. Two supply pumps, one in operation and one standby, transfers the water to the pre-treatment stage. The water first passes through a turbidity filter to remove turbidity and suspended solids. Sodium metasilicate is then dosed for dechlorination and antiscalant to protect the membranes of the reverse osmosis unit. A Redox instrument is also added to protect against water dechlorination. The water then passes through a cartridge filter for better particle retention, up to 5 micron.

The perfectly filtered water is promoted via the high pressure pump to reverse osmosis unit and feeds the membranes (low consumption and high rejection) for salt rejection and with the least energy consumption. The product water has total dissolved solids less than < 50 mg/L. From the total water flow of 12.47 m³/h that enters the reverse osmosis unit, the 5 m³/h is the product water and the 7.3 m³/h is the reject one, and a total recovery rate of 75% is achieved. The unit has a CIP/flushing system for rinsing the membranes after each stop of the system as well as for chemical cleaning of the membranes, when required. At each stop of the system, the cartridge filters, high pressure piping, high pressure pump, and membranes are rinsed with desalinated water which protects the high pressure membranes and piping from corrosion. When chemical cleaning is required, the water bypasses the high pressure pump and feeds the membranes directly. The product water is collected in the storage tank. The system has its own electrical panel to power all the electrical parts of the system.

THE RESULT

Through proper automation of TEMAK construction, the whole process is completely controlled, so that the product water meets the high requirements in applications such as the chemical industries.



Investments: Production of all water treatment systems of TEMAK using green energy

TEMAK, a leading company in the field of water treatment, implements internationally recognized management systems, which relate to the quality, environment, hygiene and safety of employees. Its certifications are:

- Quality management (ISO 9001: 2015 certification)
- Environmental management (ISO 14001: 2015 certification)
- Occupational Health and Safety (OHSAS 18001: 2007).

Our main concern is the respect for the ENVIRONMENT and the strengthening of the effort for CLEAN DRINKING WATER worldwide, upgrading the quality of life FOR EVERYONE through the Integrated Water Treatment Solutions that we have.

Focusing on the actions of corporate social responsibility, the environment and being environmentally aware, we proceeded with the project of installing a photovoltaic station using the Net Metering mechanism in our privately owned facilities in Acharnes, Attica.

The energy produced by the PV station exceeds 100,000 kWh/year with the result that all water treatment systems of TEMAK are produced with zero electricity consumption.

In the near future, the combination of water and green energy will mean profitable solutions for customers, contributing the most to avoid the impending energy impasse and the ominous future due to the lack of clean water sources.



Water suitable for Pharmaceutical Industries

The pharmaceutical industry aims to produce innovative medicines through strict production processes and continuous controls. The quality and safety of each medicinal product are inextricably linked to the water used to produce it, which of course is subject to equally demanding standards.

Pharmaceutical companies need water for both their production process and sterilization. Through the extremely strict regulations that apply throughout the world (Greek Pharmacopoeia, European, United States, etc.) water can belong to one of the following categories, depending on the quality: a) drinking water, b) deionized, c) ultra-pure or d) distilled (injectable), with specifications for conductivity, microbial load, endotoxins, nitrates and heavy metals.

Table 1: Indicative upper limits of European Pharmacopoeia (Ph. Eur.)

Parameters (units)	Deionized water	Injectable water
TOC (ppm)	0,5	0,5
Conductivity ($\mu\text{S}/\text{cm}$)	4,3 @ 20°C	1,1 @ 20°C
Nitrates (ppm)	0,2	0,2
Heavy metals (ppm)	0,1	0,1
Aerobic bacteria (CFU / 100 mL)	100	10
Endotoxins (IU / mL)	0,25 (use for dissolution water)	0,25

After the revision of the regulation of Ph. Eur., Launched in April 2017, added new technologies for the production of ultra-pure and injectable water, such as the combined treatment with reverse os-

mosis (RO) and electro-deionization (EDI), a modern ion exchange application that leads to continuous removal of ions from water with extremely high recoveries. These technologies are equivalent to and/or superior to distillation, both in terms of equipment quality and durability.

TEMAK, with its many years of experience in the construction of water treatment systems, offers the ideal solution, as it specializes in the respective needs, in order to perfectly satisfy all the specifications of medicines production. Among the basic processing steps are: 1) pre-treatment [disinfection-by automatic chlorination, filtration, dechlorination and removal of organic charge or ultrafiltration (UF) and softening-to avoid chemicals protecting the membranes of reverse osmosis 2) deionization or reverse osmosis - single or double passage) and 3) the final finish with (electro) deionization and disinfection [with ultraviolet (UV) radiation or ozonation]. To ensure the smooth operation of the system, but also to combat the growth of microbial load, it offers systems and equipment for chemical cleaning or thermal disinfection (to avoid the use of chemical disinfectants).

By installing a complete TEMAK water treatment system, the pharmaceutical industry enjoys multiple benefits:

- It has water guaranteed to be suitable for any required use with a design based on its needs.
- Uses technologies that comply with the increasingly stringent quality standards of drug production.
- Has complete control over the efficient and safe operation of the system through modern monitoring systems.

- Uses materials of excellent quality and reliable operation.
- Has a stable partner who offers a complete solution for water treatment, from project design and study to after-sales support.
- It can provide portable units in containers.

The above is proven through the number of installed applications in pharmaceutical companies both in Greece and abroad.

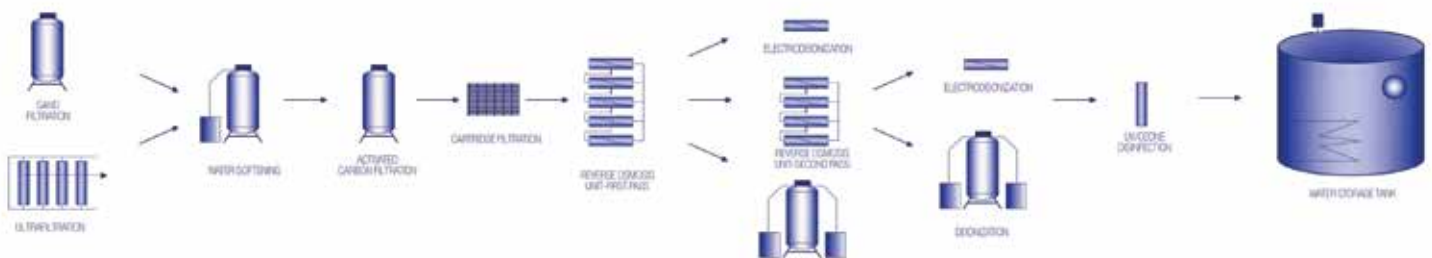


Figure 1: Typical diagram of deionized water production



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In March 2019, TEMAK successfully launched the largest and most modern brackish water desalination plant in Greece, producing 10.000 cubic meters potable water per day.



**WATER VALUE
AMBASSADOR**
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