



Wastewater Treatment Systems



Industrial
Design
Award
2010

*You have a right to a **clean environment***





Wastewater Treatment Systems

Miranda is an engineering, consultancy, manufacturing and R&D company focused in the treatment of water, wastewater and reuse of treated water. We are established to offer solutions to the growing water management needs of our country and the world struggling with the management of depleting water resources caused by global warming.

Miranda is focused to address the needs within its area of activity accurately and expediently with its experienced technical staff who are ready to serve with the principle of total customer satisfaction.

Miranda, Latin meaning of which means "worthy of admiration", was chosen deliberately by the founders of the company to address the neglect exhibited by society with respect to the environment and the desire of the founders of the company to reverse the effects of this negligence by producing exceptionally well designed equipment which would best address this requirement.

Additionally, "Miranda Rights" as defined in legal terms addresses every individual's most basic civil rights to live in a society which, in our opinion, should also include our right to live in a clean environment in harmony with nature.

It is for this reason Miranda and its employees take pride in being part of an organization that services this most fundamental need of human beings.

*You have a right to
a clean environment*



MIRACELL®

The system most preferred by customers who clearly understand the economic value in purchasing a well-built and well-designed system

Miranda has developed a wastewater treatment system named Miracell® which utilizes leading technologies in the wastewater treatment and reuse sector. Our customers, by using Miracell®, reclaim their domestic wastewater in obtaining odorless and clear treated water which is used for many purposes such as irrigating green areas, washing roads and utilization in various construction site services. The wastewater which would have been discharged is not only put to use by our customers as a valuable conserved resource but also is a proof of their individual contributions to the cleanliness of the environment. Those customers who are active in industrial fields are able to source their treated water for various applications such as process cooling water, concrete mixing and curing.

If one asks why Miranda is preferred over many other firms who appear to provide similar mentioned benefits, the response is hidden in Miracell®'s advanced technology. Aesthetic appearance is highly important and manufacturers should observe this significant factor in their designs in an effort to be environmentally sensitive, but many of our competitors do not address this key point. In addition, Miracell® due to the corrosion free and easily formed composite materials used in its manufacturing is offered in many desired colors, textures and forms.



Process Description

Before the wastewater is supplied to the Miracell[®], it will need to be treated mechanically and physically. To be able to prevent coarse materials to pass on through to the biological treatment unit, wastewater is first passed through a rough screen. Wastewater that is cleared of the coarse material is then channeled directly into the pre-sedimentation basin before the equalization basin which serves the purpose of equalizing the fluctuations in the daily flow of wastewater.

Wastewater that is equalized then is pumped from the equalization basin to Miracell[®] system by the help of a sewage pump with macerator (including spare sewage pump system) having level control. Sewage pump and its spare will be located at a proper depth in the equalization basin. If the wastewater plant is situated such that gravity flow serves the purpose of supplying the wastewater to the plant then the vortex pump will not be utilized.

Once the wastewater is cleared also of fine sediments then its passed on to the Miracell[®] Reactor Sections which remove nearly all of the BOD and COD in the water as well as the

remainder of the extra fine sediments in the system.

Once wastewater is supplied to the plant the flow is directed over a group of Lamella Separators which serve as a final settlement tank to remove fine sediments. pH is also neutralized by the biological treatment process and the water discharged from the system meets and exceeds the parameters for discharge of effluents into streams imposed by the Turkish and European Union Standards for Discharge. In order to provide irrigation and reuse water, Miracell[®] can be equipped with a sand filter and ultrafiltration system, thus providing a 99% hygienic water that can be used for various purposes.

The sludge that is periodically removed can also be utilized as a stabilized fertilizer. For areas of high sensitivity, mild chlorination may be utilized by use of an automatic chlorination unit attached to the system as an option, although by usage of Microbe-Lift bacteria, most of the reasons for chlorination such as Hydrogen Sulfide odors, Coli Bacillus and Mosquitoes are removed over 90% from the system naturally without harming the environment.

Features & Benefits

The Miracell[®] wastewater treatment system has a modular design, with units that can be configured to service small to mid-sized communities between 50 and 20,000 people or businesses with water treatment needs of 10 - 4,000 m³/day (2,600 - 1,058,200 GPD). It is one of the most flexible and expandable systems on the market today, where modules can be easily added or moved to accommodate changes in demand. The system is certified to meet or exceed strict EU environmental discharge and irrigation standards.



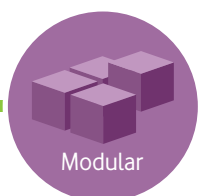
Odorless



Aesthetic



Economical



Modular



Silent

High Efficiency

- Consumes much less power
- Occupies much less space
- Requires much less maintenance
- The Start-up period is much shorter

Modular & Compact Design

- Can be easily transported
- Its capacity can be easily increased
- Can also be operated at less than maximum capacity

Quiet & Odorless

- It operates silently
- Less sludge will have to be discharged
- Odor and mosquito problems will be negligible

Areas of Application

Domestic Wastewater

Camps, Touristic Resorts, Municipalities, Mass Housing, Villas, Hotels, Restaurants, Construction Sites, Factories, Schools, Universities, Military Sites and Marinas.



Miracell® Product Series

○ Standard Equipment ○ Optional Equipment

Miracell® White

Miracell Module + Sedimentation Tank

- Low energy consumption
- Low maintenance cost
- Modular
- Composite (GRP)
- Low cost
- Standard water quality

BOD : 45 COD : 120 TSS : 45

Discharge purposes in emerging countries



Miracell® Green

Miracell White + Sand Filter

- Low energy consumption
- Low maintenance cost
- Modular
- Composite (GRP)
- High water quality

BOD : 25 COD : 110 TSS : 35

Discharge purposes in developed countries & irrigation purposes for emerging countries



Miracell® Blue

Miracell Green + Ultrafiltration

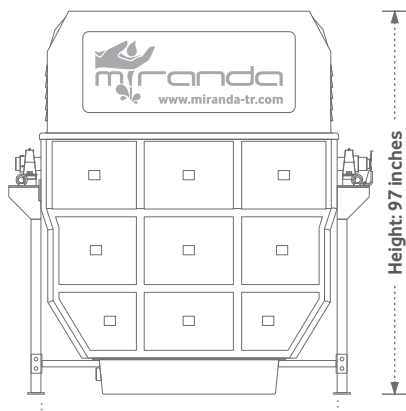
- Low energy consumption
- Low maintenance cost
- Modular
- Composite (GRP)
- Superior water quality

BOD ≤ 20 COD ≤ 90 / 50 TSS ≤ 10

Irrigation of landscape & vegetation, car washing, cooling towers & concrete mixing purposes in developed countries



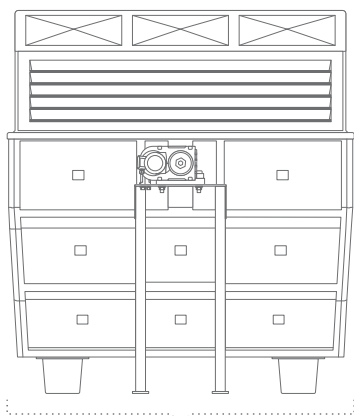
Technical Specifications



Width: 75 inches

MIRACELL®	50	100	150	200	300
Equivalent Population (person)	250	500	750	1000	1500
Treatment Capacity (gal/day)	13,200	26,400	39,600	52,800	79,300
Energy Consumption	0.25 kW	0.50 kW	0.75 kW	1.00 kW	1.50 kW
Width (inch)	75	75	75	75	75
Length (inch)	85	171	256	342	513
Height (inch)	97	97	97	97	97
Weight (pound)	1,900	3,800	5,600	7,500	11,200

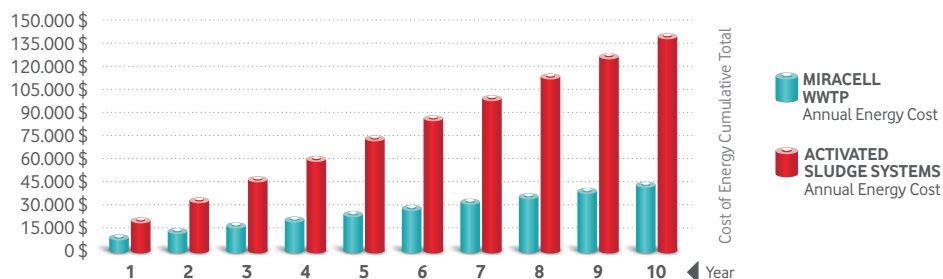
Pump excluded in energy consumption



Length: 85 inches

MIRACELL® WASTEWATER TREATMENT PLANT vs. ACTIVATED SLUDGE SYSTEM

Energy Comparison Table - 1000 People Capacity / 10 Year Energy Consumption



Note: Energy cost totals are provided for comparison purposes only. Increases in energy costs and energy consumption variations due to operation - maintenance activity has been disregarded. Our firm can not be held responsible for energy consumption calculations due to energy unit price escalations or other changes.



DROPBOX[®]

The system most preferred by customers who clearly understand the economic value in purchasing a well-built and well-designed system

The operating principle of Miranda Environmental and Wastewater Treatment Technologies Inc.'s Dropbox[®] Wastewater Treatment Unit is based on the Rotating Biological Contactor (RBC) technology. By employing RBC technology, specific quantity of disks are centered and connected around a horizontal shaft. The quantity of the disks is a function of the bacterial growth needed to treat the waste within the wastewater and other pertinent parameters. The shaft where the disks are connected is driven by an electric motor and reduction gear. The media made up in this manner is slowly rotated [3-5 rpm] by the mechanical drive.

In this system, 40% of the media surface is in the wastewater at any given time during the rotation. The organisms in the wastewater attach and multiply on the rotating media until they form a thin layer of biomass (fixed film over the disk media). The growth of fixed film presents significant active and large population of bacteria for biological organic pollutant degradation. The media carries wastewater film and the biomass into the air in which oxygen is absorbed naturally. The organic materials and the dissolved oxygen in the wastewater diffuse in biomass and metabolized.

The media passages allow wastewater and air to enter the passages on the surface of the disks without any restriction, which enables the growth of the biomass. Dropbox[®] units are fabricated from sheet steel with special epoxy coatings inside and out which eliminates deterioration from corrosive effects of the wastewater which is alkali within the system and the wear-down effect of harsh environmental conditions. An important advantage of Miranda's Dropbox[®] is its ability to be installed and buried in the ground or above ground. Ease of installation by literally locating in place and hooking up the pipe and power connections is another significant benefit for the user.

Discs in the system are made of corrosion-proof polyethylene.



Process Description

Rough Screen: Before the wastewater is supplied to the Dropbox® system, it needs to be treated mechanically and physically. In this regard, wastewater is first passed through a rough screen.

Equalization Basin and Pre-settlement: Wastewater which is cleared of the coarse materials is then channeled directly into the equalization basin, which serves the purpose of equalizing the fluctuations in the daily flow of wastewater but also as a pre-sedimentation area where fine sediments are settled and removed from the water.

RBC Reactor: The elevation of the water occurs without the use of pumps by utilizing several buckets connected to the shaft and rotating with the RBC drum. While the buckets move to their highest position they will pass over the catchment and empty their load of water over the area of discharge draining into the second chamber where polyethylene discs are located. The wastewater is then cleared of fine sediments and equalized before moved on to the Rotating Disc where nearly all of the BOD and COD will be removed along with the remainder of the extra fine sediments.

Final Settlement: Following the RBC process, treated water is moved onto the third section by utilizing a second set of buckets mounted on the rotating drum. In the third section

which serves as the final settlement, water is directed over a group of Lamella Separators to remove fine sediments. pH is also neutralized by the biological treatment process and the discharged water from the system exceeds the parameters of discharge imposed by the European Union. In addition, for areas of high sensitivity, mild chlorination may be utilized by the use of an optional automatic chlorination unit. By utilizing a laboratory generated specialized bacteria culture, odors caused by Hydrogen Sulphide, Coli Bacillus and Mosquito larva are removed over 90% from the system naturally without harming the environment.

Sand and Ultrafiltration Option: If further treatment is required for any specific purpose, Sand Filter (0.1 micrometer) and an Ultrafiltration (0.01 micrometer) can be used. Sand filter collects the suspended solids remained after sedimentation and sends effluent to Ultrafiltration.

Ultrafiltration is a membrane filtration method that prevents bacteria and viruses and creates 100% hygienic effluent for irrigation.



Features & Benefits

The Dropbox® wastewater treatment system has a plug & play design, with units that can be configured to service small to mid-sized communities between 50 and 20,000 people or businesses with water treatment needs of 10 - 4,000 m³/day (2,600 - 1,058,200 GPD). It is one of the most flexible and expandable systems on the market today, where modules can be easily added or moved to accommodate changes in demand. They can also be buried in the ground. The system is certified to meet or exceed strict EU environmental discharge and irrigation standards.



High Efficiency

- Consumes much less power
- Occupies much less space
- Requires much less maintenance
- The Start-up period is much shorter

Plug'n Play & Compact Design

- Can be easily transported & installed
- Its capacity can be easily increased
- Plug & Play Design
- Can be buried in the ground

Quiet & Odorless

- It operates silently
- Less sludge will have to be discharged
- Odor and mosquito problems will be negligible

Areas of Application

Domestic Wastewater

Camps, Touristic Resorts, Municipalities, Mass Housing, Villas, Hotels, Restaurants, Construction Sites, Factories, Schools, Universities, Military Sites and Marinas.



Zemi Beach Resort & Spa, Anguilla, DB150



Dropbox can also be insulated and heated as shown above which can be of benefit in extremely cold areas.



Dropbox® Product Series

○ Standard Equipment ○ Optional Equipment

Dropbox® White

Dropbox Module + Sedimentation Tank

- Low energy consumption
- Low maintenance cost
- Plug & Play
- Low cost
- Standard water quality

BOD : 45 COD : 120 TSS : 45

Discharge purposes in emerging countries



Dropbox® Green

Dropbox White + Sand Filter

- Low energy consumption
- Low maintenance cost
- Plug & Play
- High water quality

BOD : 25 COD : 110 TSS : 35

Discharge purposes in developed countries & irrigation purposes for emerging countries



Dropbox® Blue

Dropbox Green + Ultrafiltration

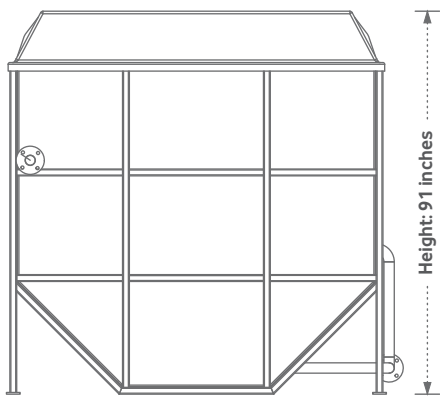
- Low energy consumption
- Low maintenance cost
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- Superior water quality

BOD ≤ 20 COD ≤ 90 / 50 TSS ≤ 10

Irrigation of landscape & vegetation, car washing, cooling towers & concrete mixing purposes in developed countries



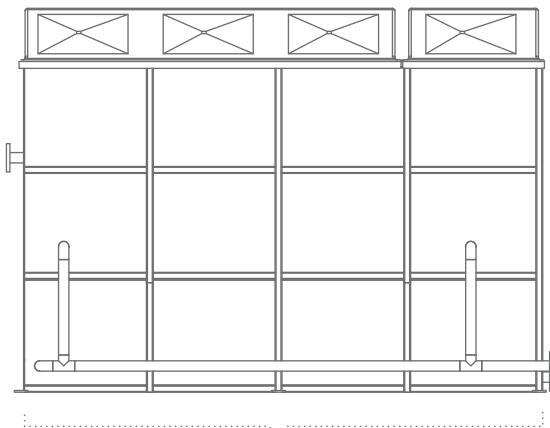
Technical Specifications



Width: 86 inches

DROPBOX®	10	20	30	50	100	150	200
Equivalent Population (person)	50	100	150	250	500	750	1000
Treatment Capacity (gal/day)	2,600	5,300	7,900	13,200	26,400	39,600	52,800
Energy Consumption	0.18 kW	0.25 kW	0.37 kW	0.55 kW	1.10kW	1.5 kW	2.2 kW
Width (inch)	86	86	86	86	86	86	86
Length (inch)	152	170	180	245	382	458	472
Height (inch)	91	91	91	91	91	91	91

Pump excluded in energy consumption



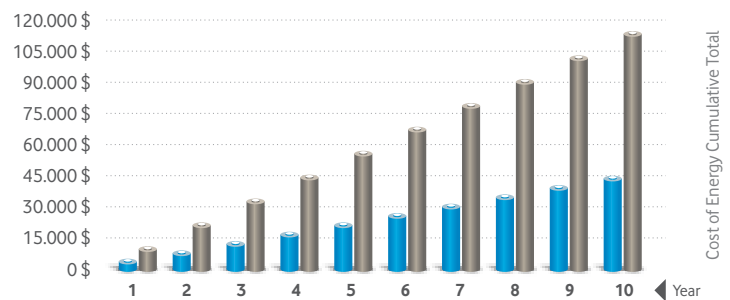
Max. Length: 472 inches

DROPBOX® WASTEWATER TREATMENT PLANT vs. MBR SYSTEM

Energy Consumption Comparison Table

1000 People Capacity / 10 Year Energy Consumption

DROPBOX WWTP Annual Energy Cost
 MBR SYSTEMS Annual Energy Cost



Apple Springs, South Dakota, Insulated/Heated Plant operating in -18°F ambient temperatures.



Trinidad Tobago, DB 30

R/OCELL[®]

It allows the customer to obtain clean drinking water by desalinating sea water and brackish water most economically

R/OCELL[®] Reverse Osmosis Systems

Miranda provides drinking and utility water solutions for all needs and capacities through its R/OCELL line of Reverse Osmosis Systems which apply leading edge technologies.

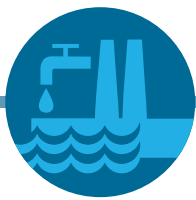
Miranda is your solution partner in reverse osmosis systems for applications in sea water (desalination), brackish and well water filtration by offering custom design, manufacturing and customer satisfaction guarantees.

Miranda can also provide containerized and climatized solutions for site camps or where mobility / reapplication at a different site is required.



Areas of Application

- Drinking Water Supply Facilities,
- Fruit Juice and Soft Drink Industry,
- Milk and Dairy Products Industry,
- Health Industry,
- Glass Industry,
- Textile Industry,
- Cosmetics Industry,
- Electronics and Appliance Industry,
- Cooling and Humidifier Systems,
- Medium to High Pressure Steam Vessels,
- Fisheries,
- Yachts and Ships,
- Pure Water and Ice Production,
- Well and Sea Water Filtration.



Process, Drinking and Utility Water



Turnkey



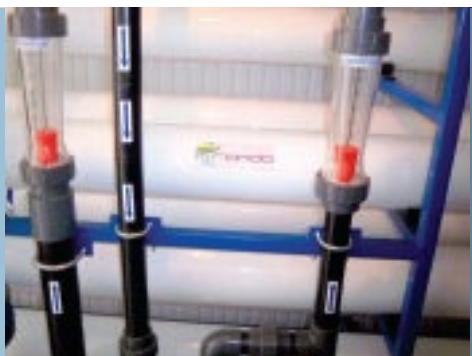
Economical



Low Energy Consumption



EU Compatible



MBR

Membrane Bioreactor Systems

MBR Systems are considered as advanced active sludge treatment systems. They utilize micro pores within the membranes to separate liquid and solid particles in the water by pressure. As a result of this process, secondary treatment is not needed. Besides treatment of wastewater, MBR systems also offer attractive solutions in regaining greywater. By providing filtration at a 0.01 micron level,



Biochemical Oxygen Demand (BOD₅)
 < 2 mg/l

Total Suspended Solids (TSS)
 < 2 mg/l

Ammonia Nitrogen (NH₃-N)
 < 1 mg/l (MBRs with nitrification)

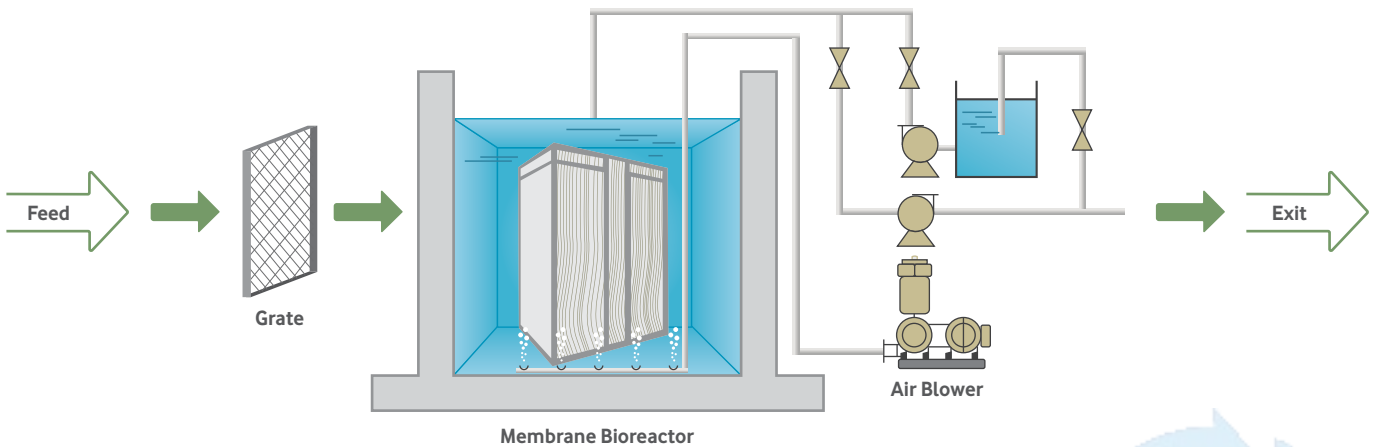
Total Phosphorus (TP)
 < 1 mg/l (with addition of an anaerobic tank)

Total Nitrogen (TN)
 < 3-10 mg/l (denitrification with anoxic tank)

Turbidity
 < 0,5 NTU

Membrane Bioreactors are;

- An advanced form of activated sludge treatment
- Separate solid and liquid particles
- Remove pathogens, bacteria and block viruses
- Provide highest quality treated water
- Require smaller spaces



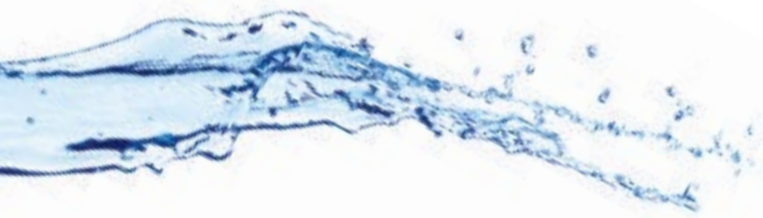
GREYWATER RECYCLING

Greywater is the wastewater collected from laundry, dishwashing, bathing type of domestic activities and does not contain wastewater from toilets. Greywater amounts to about 80% of all the water used domestically. By utilizing membrane bioreactors and ultrafiltration type of equipment greywater can be processed and recycled to save up to 97% of the utility water used.



••• Areas of Application

- Filling toilet reservoirs, laundry, irrigation
- Fountains / decorative pools, car washing
- Filling of fire extinguishers or tanks
- Cooling towers for industrial uses



UF

Ultrafiltration System

Ultrafiltration is a process, which separates particles by preventing them from passing at a molecular level (40 Angstrom) filtration by application of pressure. By Ultrafiltration, suspended solids, turbidity, color pigments up to 99,97% and most importantly all bacteria and viruses can be removed from the wastewater.

As a consequence, Ultrafiltration is a key process in treating spring water and potable water.

Areas of Application

- Precise and Advanced water treatments
- Pre-treatment before reverse osmosis
- Open-Closed water circuits
- Industrial solid-liquid separation distillation process
- Purifying pathologic microorganisms



SF & ACF

Sand Filter & Active Carbon Filter

Blurriness which is the most notable contamination parameter showing suspended solids, silica, residues etc. in the water. These factors are removed by sand filtration which helps protect the equipment in the process line after sand filter.

Active Carbon Filter is used to remove odors, taste, color and organic contaminants. The system operates automatically by control valves without requiring human intervention.

••• Areas of Application

- Treating of brackish water to be used in communities, municipal facilities or residences
- Treating pool water or potable water for Hotels and Resorts
- Producing processed water for Industrial facilities





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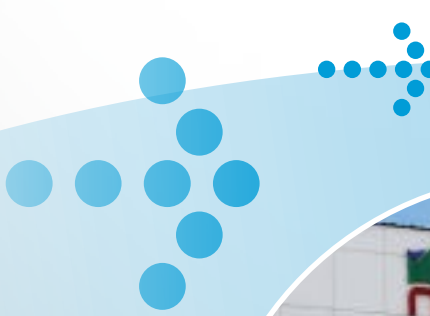
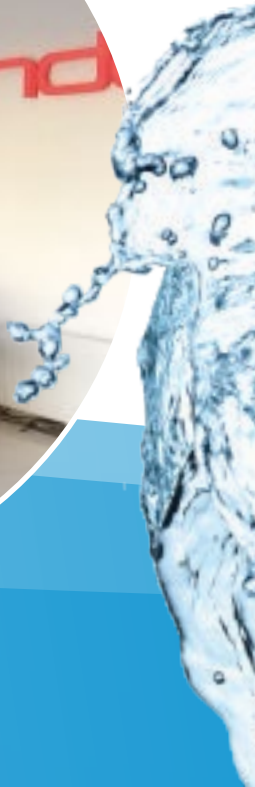
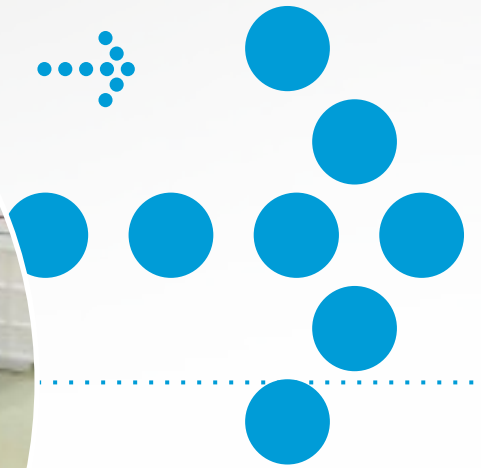


Design Turkey
Industrial Design Awards 2010 Winner

MIRACELL®



DIN EN ISO 9001:2000
Zertifikat: 01 100 252885





You have a right to
a *clean environment*



miranda

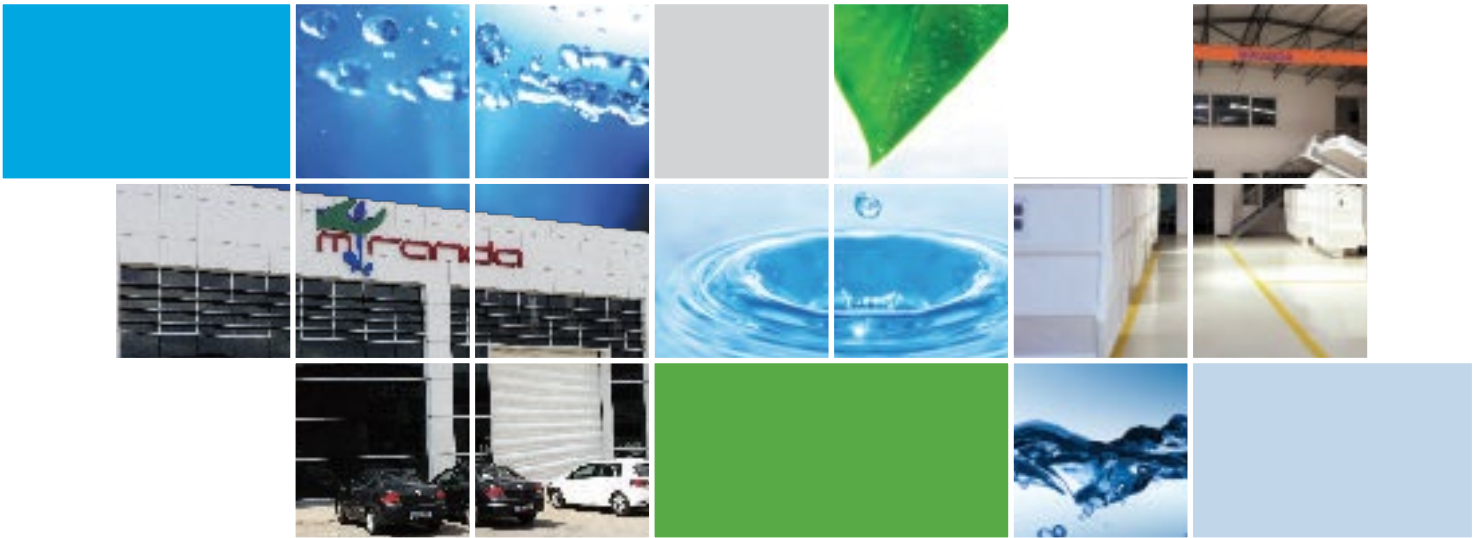
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