



**DRYDEN
AQUA**
DISTRIBUTION | SUSTAINABLE
WATER
QUALITY

**10
HIGH-LEVEL
TRAINING
SESSIONS**






**DRYDEN
POOL ACADEMY**
KNOWLEDGE IS POWER!

Dryden Pool Academy SESSION 6

DAISY® Dryden Aqua Integrated System



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AGENDA 9:30 – 10:30 am

zoom



**DRYDEN
POOL ACADEMY**
KNOWLEDGE IS POWER!


9:30 What is DAISY® ? The biological approach

 APF® : The only multi-spectrum flocculant & coagulant on the pool market

 ACO® : The best stabilizer for all outdoor swimming pools

 NoPhos : The biological solution to prevent algae

10:20 Q&A : Questions / Answers





SESSION 6



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Questions & Answers

Prepare and send us your questions during the meeting using the chat!

Chat
Raise Hand

Q&A

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Dryden Pool Academy presentations and replays






www.drydenaqua.com

Replay available for 7 days after each session (EN, DE, FR, US)

PDF Presentation available for download 24 hr before each session (every Thursday)

Program




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DRYDEN AQUA INTEGRATED SYSTEM

A BIOLOGICAL APPROACH TO POOL WATER TREATMENT

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DAISY® : Dryden Aqua Integrated System

▶ DAISY® : A biological approach to pool water treatment

PREVENT rather than KILL!

1

AFM®

SESSION 5

Improves filtration and eliminates all breeding ground on which bacteria can grow and multiply

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DAISY® : Dryden Aqua Integrated System



▶ DAISY®: A biological approach to pool water treatment



2
APF®



Removes dissolved pollutants and all vital nutrients for bacteria to stop their growth

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DAISY® : Dryden Aqua Integrated System



▶ DAISY®: A biological approach to pool water treatment



3
ACO®




Protects chlorine and amplifies the natural disinfection power of the sun

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DAISY® : Dryden Aqua Integrated System



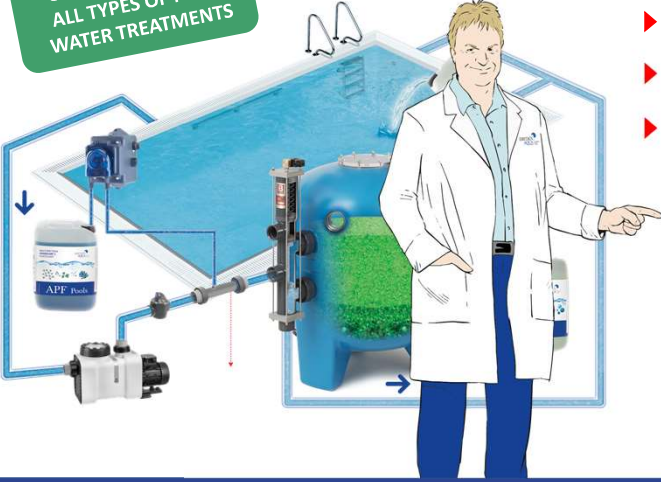
DAISY® RESULTS:

- ▶ Best filtration down to 0.1 micron
- ▶ Oxidation demand reduced by up to 80%
- ▶ Less disinfectants = less toxic DBP's

WHAT WE STAND FOR:

- ▶ The safest & clearest water
- ▶ The best air quality
- ▶ The lowest chemical consumption and operating costs

CAN BE USED WITH ALL TYPES OF POOL WATER TREATMENTS




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DRYDEN AQUA | SUSTAINABLE WATER QUALITY DISTRIBUTION

STEP 1
FILTRATION WITH AFM® ng

UNIQUE 100% BIO-RESISTANT FILTER MEDIA



DRYDEN POOL ACADEMY
KNOWLEDGE IS POWER!

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REMINDER

SESSION 5





100% BIO-RESISTANT
SAFE BARRIER AGAINST PATHOGENS
50% - 80% LESS TRICHLORAMINES
UP TO 50% LESS BACKWASH WATER
OUTLASTS ALL OTHER FILTER MEDIA

CERTIFIED 1 MICRON FILTRATION
CLEAN, CRYSTAL CLEAR WATER
REDUCED CHEMICAL CONSUMPTION

NEW HYDROPHOBIC SURFACE
50% LESS ORGANICS IN THE WATER
UP TO 50% LESS CHLOROFORM (THMs)













INCREASED HYDROPHOBIC SURFACE

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STEP 2

COAGULATION & FLOCCULATION WITH APF[®] (and ZPM)






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STEP 2 : Best coagulation & flocculation with APF® and ZPM

AFM is very good => filtration down to 1 micron
DAISY is much better!!!

The diagram illustrates the pool filtration process. On the left, a pool is connected to a filtration system. A red box highlights the addition of APF (Active Flocculant) and ACO (Automatic Chlorine Oxidation) products. The water then flows into a large blue tank where the products are mixed. On the right, a close-up of a filter shows a large blue arrow pointing upwards, indicating the flow of water through a filter with a 0.1 micron rating. The filter is labeled 'pools'.

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APF® is not a simple flocculant

Phase 1: Coagulation is the process of dragging dissolved substances out of solution. Reaction within seconds. This phase should take place in a turbulent environment

Phase 2: Flocculation is the process of bringing "coagulated" particles together to form larger particles (also called "flocs"). The reaction takes several minutes. The environment should be as gentle as possible

The diagram shows a pool filtration system with red arrows indicating the flow of water. The water enters the system, passes through a filter, and then returns to the pool. The chemical diagram below shows the reaction of 5 active components into coagulants and flocculants. The diagram is labeled 'The only multi-spectrum coagulant & flocculant on the pool market'. The chemical diagram shows 'Dissolved substances' (represented by green circles with minus signs) and 'Small particles in suspension' (represented by blue circles with plus signs) reacting to form 'Floc' (represented by a large cluster of green and blue circles). The reaction is labeled '5 ACTIVE COMPONENTS' and 'COAGULANTS + FLOCCULANTS'.

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Flocculation process – the slower the better



- APF polyelectrolyte molecules acts like a fishing net to trap small colloids & particles from the water
- The flocculated particles slowly grow over a few minutes in to larger floc.
- The water flow from the ZPM must be gentle.. It also takes time, so use DIN spec filters.



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APF® : Multi-spectrum coagulant & flocculant



5 ACTIVE COMPONENTS



COAGULANTS + FLOCCULANTS



UNLIKE MOST FLOCCULANTS, APF® CAN REMOVE ALSO DISSOLVED ORGANIC SUBSTANCES AND POLLUTANTS

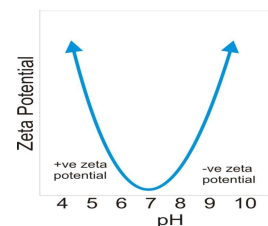
Dissolved substances : **80%** of the oxidation demand.

Suspended solids : around **20%**.

FOR A GOOD COAGULATION / FLOCCULATION

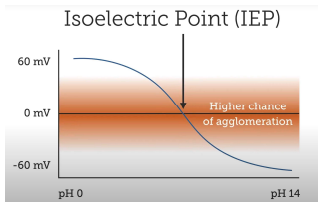
→ pH must be around neutral (6.8 – 7.6)

→ Alkalinity (TAC) must be > 40 ppm



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pH and Zeta potential



pH range:

ACIDIC

NEUTRAL

ALKALINE
(BASIC)

When the number of hydrogen ions (H⁺) equals the number of hydroxide ions (OH⁻), a solution is said to be neutral



H ⁺ -Ionen-Konzentration (mol/l)	OH ⁻ -Ionen-Konzentration (mol/l)	pH
1	0.000000000000001	0
0.1	0.00000000000001	1
0.01	0.0000000000001	2
0.001	0.0000000000001	3
0.0001	0.00000000001	4
0.00001	0.0000000001	5
0.000001	0.000000001	6
0.0000001	0.0000001	7
0.00000001	0.0000001	8
0.000000001	0.000001	9
0.0000000001	0.0001	10
0.00000000001	0.001	11
0.000000000001	0.01	12
0.0000000000001	0.1	13
0.00000000000001	1	14

10⁻⁷ H⁺ & 10⁻⁷ OH⁻

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What can't we filter out mechanically ?





Colloidal Particles




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ZPM: Strongly amplifies coagulation and flocculation










- ▶ **Creates a strong cavitation:** Perfect mixing / turbulent environment ideal for coagulation reactions
- ▶ **ZPM neutralizes the electrical charge (Zeta Potential) of small particles in suspension to initiate flocculation process.**
- ▶ **Small investment** – no moving parts, needs no power and has no operating and maintenance costs.


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APF® injection



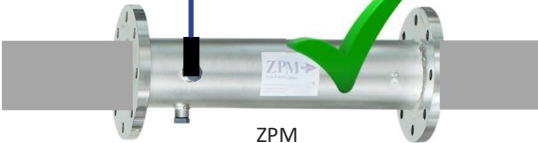


STENNER
3,2 a 160 ml/h




Ex: 120m3 swimming pool :
Turnover rate : 30m3/h.

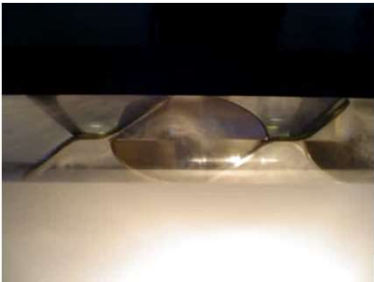
APF dosing : 9 to 30 ml/h
Potentiometer set on : 5% to 18%



ZPM



APF



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Alternative to ZPM




Pressure loss DN 40 - DN 65



If the use of a ZPM is not possible, the best injection point is into the pump or less than 1 meter before the pump"






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Dolphinarium Madrid: 2000m3 9 Dolphins







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Dolphinarium Madrid: problems




PAC dosed at 700ml/h but only during the night, low alkalinity, no coagulation, no mixing....

- ⇒ Dosage should be around **200 ml/h but 24/7**
- ⇒ **Coagulation and a proper alkalinity >100ppm** are key to lower turbidity (NTU)






⇒ **Right dosing point**
(pre-filter => turbulent environment)



⇒ **Proper dosage**
(slow, continuous dosage)

⇒ **Good pH & Alkalinity**



⇒ **Proper product**
(coagulation + flocculation)

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Dolphinarium Madrid






- Turbidity (NTU) was improved dramatically
- Combined chlorine dropped by a factor of 2 - 3
- THM's have been significantly reduced

Small changes can improve the situation dramatically without big investments !!

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Why using APF®? Reason number **1**




0.1 MICRON

THE BEST FILTRATION



- ▶ AFM + APF/ZPM : Removal of particles down to 0.1 micron
- ▶ Everything that can be filtered out does not need to be oxidized

Chlorine demand is therefore reduced to the lowest possible level!

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Why using APF®? Reason number **2**




OPTIMAL SAFETY

REMOVAL OF DISSOLVED POLLUTANTS AND CHLORINE RESISTANT PATHOGENS (e.g CRYPTO)





CRYPTO

GIARDIA

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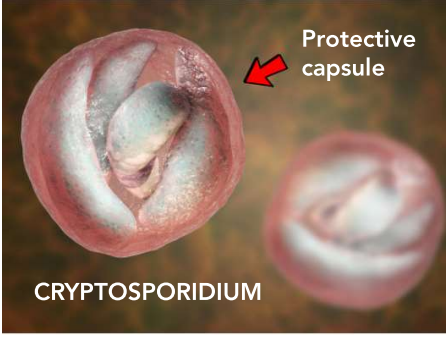
Cryptosporidium



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Cryptos are pathogens (of fecal origin) that are ingested orally and cause severe diarrhea => cryptosporidiosis is a serious intestinal disease

The only way to remove them
=> FILTRATION



Protective capsule

CRYPTOSPORIDIUM

Cryptos can survive at 5 ppm chlorine for 5000 hours. **They are resistant to chlorine.**

Cryptos are 3 to 6 microns in size and can be filtered with very good filtration

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Why using APF®? Reason number 3



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POOL ACADEMY
KNOWLEDGE IS POWER!



NO ALGAE

REMOVAL OF DISSOLVED PHOSPHATES (PO4)

PHOSPHATE IS A VITAL NUTRIENT FOR ALGAE AND BACTERIA



NoPhos



APF Pools



NoPhos has a 3+ charge Phosphate has a 3- charge To precipitate phosphate out of solution

APF 20L contains 1.5L of NoPhos => Natural phosphate remover

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NoPhos

THE BIOLOGICAL SOLUTION TO PREVENT ALGAE







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A word about phosphates in swimming pools...

Where do they come from?

Agricultural run-off from fertilizers

- Huge seasonal variation

From tap water

- From reservoirs
- Phosphates added by water authorities for lead control

From Bathers

- Skin cells
- Bacteria

From birds leaves, pollen etc., (outdoor pools).






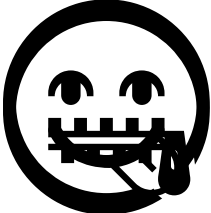





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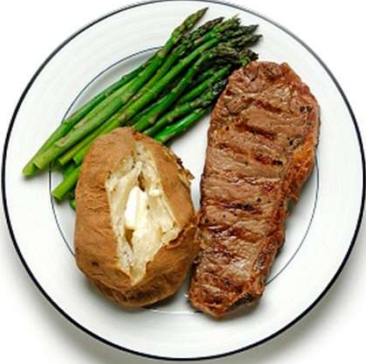
Phosphate is like Vitamin C for algae







In the absence of phosphates.....

there may be plenty of food but, it can't be metabolised!






Phosphates catalyse the mechanism for nutrient transport across cell membranes.



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Phosphates in swimming pool water exist principally in 2 forms



2 forms of phosphates


Orthophosphates (free phosphates) that are in solution.

Organic phosphates that are bound up in any organic pollutants (algae & bacteria)




This pool doesn't have any free phosphates, all the phosphates are in the algae!

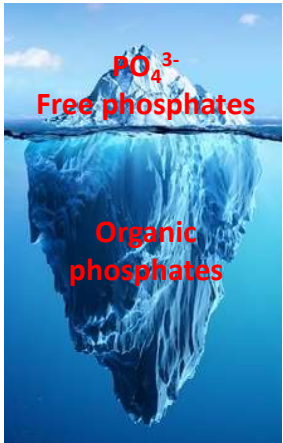
0 ppm ?



A standard photometer analysis will only detect free phosphates.



Free phosphates are only the tip of the iceberg!



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NoPhos : The biological solution to prevent algae!

It is not the job of chlorine to control algae !




**REMOVES PHOSPHATES FROM POOL WATER
PREVENTS ALGAE GROWTH IN A SUSTAINABLE WAY**

**IS A COAGULANT - IMPROVES FILTRATION
PROVIDES CLEARER, SAFER WATER**

**NATURAL PRODUCT – COMPATIBLE WITH ALL TREATMENTS
PRESERVES YOUR HEALTH & THE ENVIRONMENT**

Preventive treatment
Apply 100ml of NoPhos per 50 m³ of water into the skimmer or into the balance tank every week.

Intensive treatment
Use a phosphate test kit to measure phosphate concentration. Apply 10ml of NoPhos to your skimmer to remove 1g of phosphate.

Highly concentrated liquid product

**Pool volume m³ x Phosphate concentration (ppm)
= phosphate to remove (g) x 10 = Amount of NoPhos needed (ml)**

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DRYDEN AQUA SUSTAINABLE WATER QUALITY DISTRIBUTION

STEP 3

USE THE NATURAL POWER OF THE SUN WITH ACO®!





DRYDEN POOL ACADEMY KNOWLEDGE IS POWER!

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STEP 3 : Use the natural power of the sun with ACO®

**For all outdoor pool!
=> 2 main features**

STEP 3

The diagram shows a pool with a filtration system. A red box highlights the ACO product being added to the pool. Another red box highlights the ACO product being added to the filter. To the right is a large white container of ACO with a blue label that reads 'ACTIVE CATALYTIC OXIDATION' and 'ACO®'.

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1 ACO® PROTECTS CHLORINE FROM PHOTO-REDUCTION

PERFECT PRODUCT FOR ALL SALTWATER POOLS!

Replaces the need for cyanuric acid or stabilizer and chlorine efficiency

The diagram illustrates the process of UV light interacting with ACO. On the left, a sun icon emits 'Short-wavelength UV light' towards a yellow circle labeled 'ACO'. This light passes through a blue barrier and emerges as 'Longer-wavelength UV light'. To the right, a clock icon indicates that 'The half-life of inorganic chlorine (40min) is increased by 300%'. Chemical symbols for Cl, Br₂, and H₂O₂ are shown.

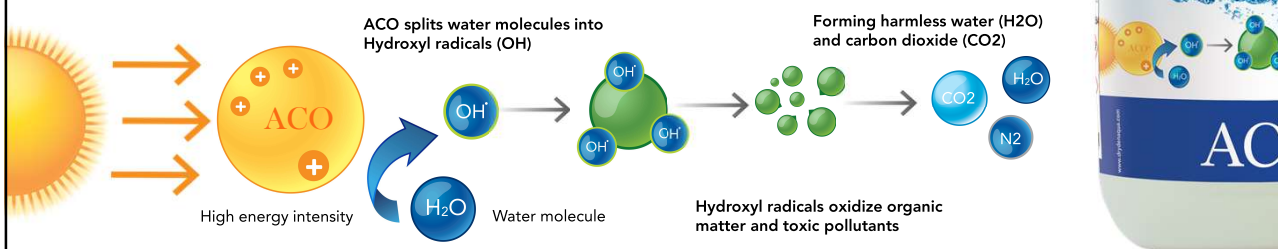
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2 ACO® INCREASES OXIDATION



Chloramine concentration and turbidity are reduced by up to 50%
 AMPLIFIES THE NATURAL DISINFECTION POWER OF THE SUN

PHOTOCATALYSIS: THE SCIENCE BEHIND ACO



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What is?



- A liquid UV filter that protects chlorine from the sun and replaces need for Cyanuric Acid (CYA) or stabilized chlorine.
- A photo catalyst that amplifies the natural UV light of the sun to form Hydroxyl Radicals (advanced oxidation) reducing the need for chlorine and extending the life of salt cells.
- NSF 50 certified



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How does ACO® work?



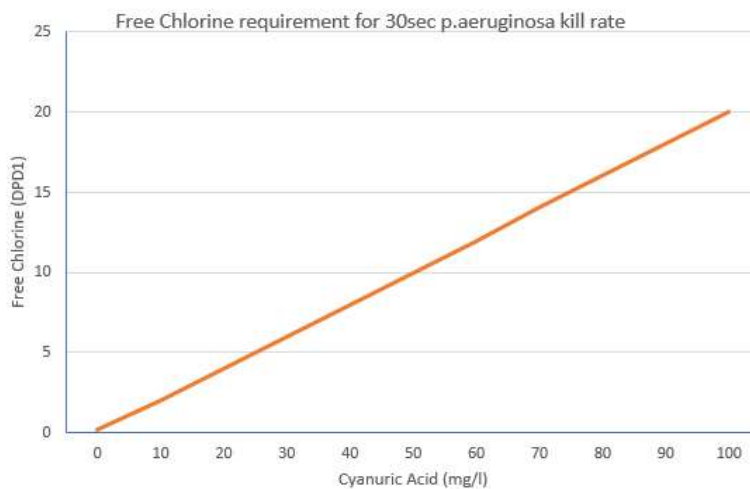
- Consists of a mixture of poly silicates and metal oxides
- Converts the short-wavelength, energy-intensive UV rays from the sun into longer wavelengths
- This protects chlorine from photolysis (decomposition by the sun) without reducing its effectiveness
- The released energy splits water molecules producing free radicals (hydroxyl radicals and oxygen radicals) providing Advanced Oxidation with no harmful DBP's.



Dose 4 liters per 100 m3 of pool water once per month
(=1 Gal per 30,000 Gal per month), manually or automatic

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Why is CYA problematic?





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ACO® CASE STUDY : AQUA NATURA





Problems

- Combined chlorine too high (0.3 – 0.4 ppm)
- Very high turbidity (1,2 NTU)
- High chlorine demand (16l / m3 per year)

Project ID:

Company:	TERRA NATURA SA www.terrannatura.com
Location:	Spain, Benidorm
Year:	2014
Description:	Manual dosing of ACO in a big waterpark (6000 m ³)
Goals:	Reduction of chlorine demand, improvement of the water clarity, less combined chlorine





Actions


Manual dosing of ACO (1l per 100m³ every week)

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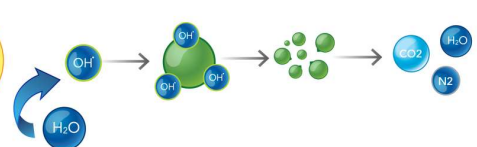
ACO® CASE STUDY : AQUA NATURA - Results

	Before	After
Combined chlorine (ppm)	0,3 - 0,4	0,12 - 0,2
Chlorine consumption per year	96'000l NaOCl	67'000l NaOCl
Turbidity (NTU)	1,2	0,7



- 30% less chlorine demand compared to the year before. **That's a saving of 29'000 ltr NaOCl per year.**
- Turbidity was reduced by 40%.
- 50% less combined chlorine.

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DAISY® BENEFITS



BENEFITS:

- ▶ Filtration down to 0.1 micron
- ▶ Oxidation demand reduced by up to 80%
- ▶ Clearer and safer water without pathogenic bacteria
- ▶ Healthier air – Trichloramines and THMs reduced by 50%
- ▶ Lower operating costs (water, chemical, energy savings)

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DAISY® competition pool Greece

50m visibility – If operated the right way – The perfect solution



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DRYDEN AQUA
SUSTAINABLE WATER QUALITY

DAISY® brochure

DRYDEN AQUA
SUSTAINABLE WATER QUALITY

DAISY® INTEGRATED SYSTEM

THE HEALTHIEST SWIMMING EXPERIENCE

DAISY® in 3 steps:

1. Filtration with ADFP® (Advanced Dissolved Filtration Process) - in which bacteria are gone.
2. Coagulation & flocculation with ADFP and ZPO® (Zero Point Oxidation) - removes dissolved pollutants and fine particles to ensure crystal clear water.
3. Disinfection solution with ADFP - stopping the cycle of production even in the sun and prevents chlorine from evaporating.

WHAT IS DAISY®?

DAISY® Dryden Aqua Integrated System is an ecological and sustainable water treatment solution which prevents bacterial growth in all private and public swimming pools. DAISY® can significantly lower the cost of water treatment, enhance water clarity, and provide the healthiest swimming experience.

DAISY® UNIQUE BENEFITS

- ▶ Filtration - 0.1 micron. Reduces oxidation demand by up to 50%.
- ▶ Prevents the formation of toxic disinfection byproducts (DBPs).
- ▶ Offers the best air quality - without chlorine smells.
- ▶ Provides clearer and cooler water - without softening bacteria.
- ▶ Lowers operating costs - water, chemicals and energy savings.
- ▶ Makes a positive environmental impact.

DAISY® | DRYDEN AQUA INTEGRATED SYSTEM | SWIMMING POOLS

WELCOME TO OUR NEW DOWNLOAD SECTION!

www.drydenaqua.com/downloads

12 pager

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DRYDEN AQUA SUSTAINABLE WATER QUALITY

DAISY® E-learning video

DRYDEN AQUA SUSTAINABLE WATER QUALITY

YouTube



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MARCH 5th 2021

zoom

DRYDEN POOL ACADEMY KNOWLEDGE IS POWER!

SESSION 7 : OXIDATION

- The different oxidants
- Free chlorine vs redox
- DA-GEN : The best disinfection with free radicals
- Problems with corrosion in swimming pools and the Langelier Index
- DAISY+ Case study



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DRYDEN AQUA SUSTAINABLE WATER QUALITY

QUESTIONS / ANSWERS

DRYDEN POOL ACADEMY
KNOWLEDGE IS POWER!

DAISY®

THE HIGHEST WATER QUALITY
BEST FILTRATION DOWN TO 0.1 MICRON

THE BEST AIR QUALITY
NO CHLORINE SMELL AND
UP TO 50% LESS THMS

LOWEST OPERATING COSTS
SUBSTANTIAL CHEMICAL,
WATER AND ENERGY SAVINGS

Q A

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DRYDEN POOL ACADEMY
KNOWLEDGE IS POWER!

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