



AFM[®]

**Activated filter media
made from green glass**



What is AFM[®]?

AFM[®] stands for **A**ctivated **F**ilter **M**aterial, a revolutionary filter media made from green glass developed and manufactured by Dryden Aqua.

AFM[®] exceeds the performance of quartz and glass sand by filtering about 30 % more organics.

AFM[®] is bio-resistant and self-sterilising which means no biofilm is formed in the filter bed. This important feature makes the pool system healthier, ecological and more economical.

AFM[®] has successfully been used in over 100'000 public and private swimming pools worldwide.

AFM[®] is manufactured under ISO 9001-2008 standards and is a filter material certified under European standards for swimming pools and drinking water, NSF50 and NSF61.

AFM[®] is a registered trademark and is exclusively made by Dryden Aqua.



AFM® exceeds the performance of quartz and glass sand by far

1. Crystal clear water:

AFM® filters much finer than quartz or glass sand. At 20 m/hr filtration speed a nominal filtration of 5 microns is achieved without flocculation – AFM® filters at least 30 % more organic substances than fresh quartz or glass sand. With optimised coagulation and flocculation with APF and ZPM, a nominal filtration of less than 0.1 microns can be achieved.

2. Lower chlorine consumption means less secondary chlorine reaction products:

chlorine is an excellent disinfectant. But in reaction with organic and inorganic substances it also produces undesirable, harmful reaction by-products such as trichloramine and THM's. The more chlorine is consumed the more secondary reaction by-products are produced. With AFM® we can remove far more substances than with sand or glass sand. This applies particularly in connection with coagulation and flocculation. Everything that can be filtered out and removed in backwash process doesn't have to be oxidised. The better the filtration the lower the chlorine consumption and less disinfection by-products are produced.

3. Bioresistant – no home for bacteria, viruses and other pathogens:

sand is a good mechanical filter but it's also an ideal breeding ground for bacteria. Within just a few days every grain of sand is colonised by bacteria. They immediately form mucus to protect themselves against the disinfectant. In this so-called «biofilm» live entire communities of bacteria and other pathogens – including Legionella. If you have no organic film in your filter there are also no Legionella.

4. No trichloramine and no chlorine smell:

the bacteria in the biofilm convert urea into ammonia which then reacts with chlorine to inorganic chloramine (mono, di- and trichloramine). Trichloramine causes the unpleasant chlorine smell and is also a severe health hazard. If however, no heterotrophic bacteria are present, urea remains in the water. It reacts with chlorine to the harmless chlorine urea. No biofilm – no trichloramine - no chlorine smells.

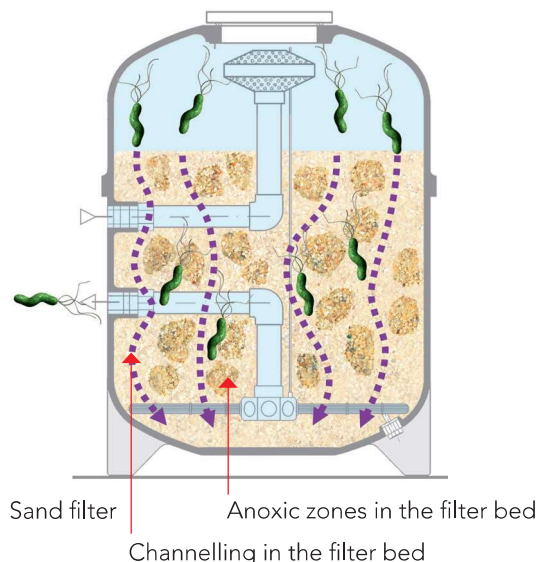
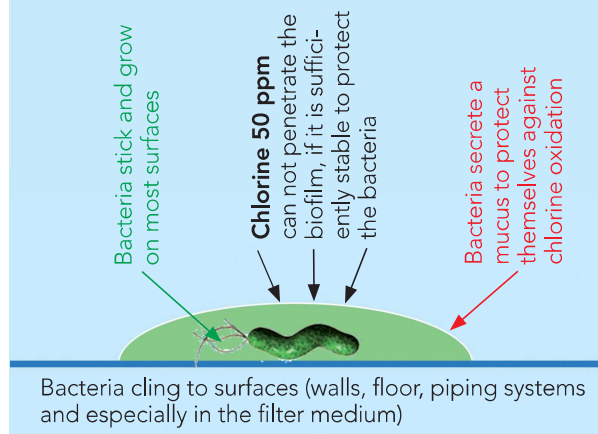
5. Filter function remains good with AFM® for many years:

No biofilm in the AFM® filter also means no channel formation to disrupt the filter function. Due to filter contamination the performance of a sand filter worsens dramatically after 6 - 12 months despite frequent backwashing. The performance of AFM® remains consistently high for many years.



Pool 3 m deep, zero turbidity, 25 m visibility range

How bacteria survive in a swimming pool?



What makes AFM® that effective?

1. Clean Green glass:

The raw material used for AFM® has to have a very specific glass quality. AFM® is only made from pure green glass which is the only glass that has the necessary metal oxides to make AFM® self-sterilising.

2. Ideal hydraulic properties:

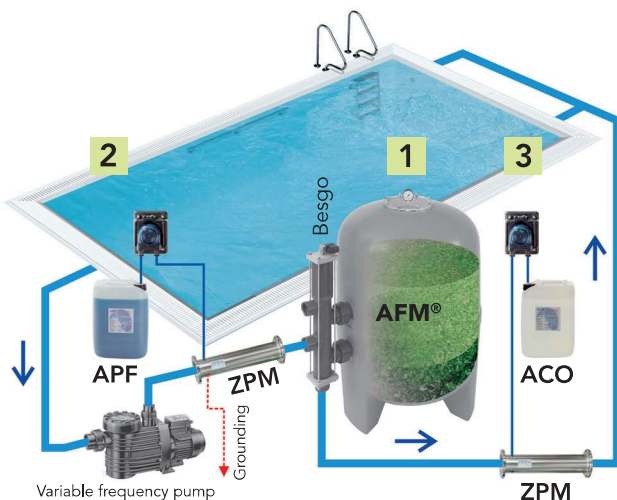
The raw material is broken into the optimal grain size and grain shape. The correct shape is crucial for the outstanding hydraulic characteristics of AFM®. Balls (glass beads or pearls) as well as plates are not suitable for clean water applications. For security reasons, no dangerous glass splinters are allowed to be present in the filter material. Our ISO certified manufacturing process ensures that this is not the case.

3. Activation process:

The AFM® activation process creates a mesoporous structure with a huge catalytic surface area. Typically crushed glass or sand has a surface area of 3'000 m² per m³ but activated AFM® has a surface area of over 1'000'000 m² per m³ which is over 300 times greater surface area for adsorption and catalytic reactions. Hydroxyl groups on the surface give AFM® a strong negative charge known as the zeta potential that attracts heavy metals and organic molecules. In the presence of oxygen or oxidising agents the catalytic surface generates free radicals that make AFM® self-sterilising and protect AFM® from bacteria.

Dryden Aqua Integrated System (DAISY)

was developed with the aim to eliminate hazardous by-products of the disinfection.



- 1 Filtration with **AFM®**
- 2 Coagulation and flocculation with **APF** and **ZPM**
- 3 Catalytic oxidation with **ACO** and **ZPM**

Your advantages at a glance

Crystal clear water – AFM® filters much finer than quartz or glass sand.

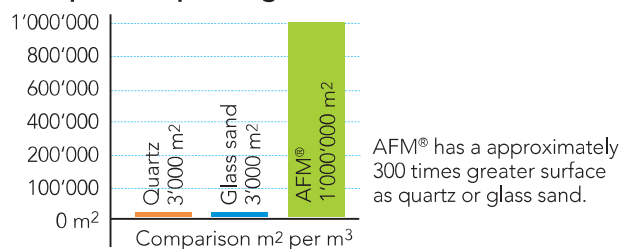
Lower chlorine consumption – Everything that is filtered out doesn't have to be oxidised.

No smell of chlorine – No heterotrophic bacteria means no trichloramine and thus no disturbing and harmful chlorine smell.

No Legionella – Legionella and many other pathogens grow in the protection of the biofilm. No biofilm means no Legionella.

Ecological and economical – AFM® and the integrated Dryden Aqua system save resources such as water, chlorine and energy.

Comparison quartz, glass sand and AFM®



Bottom line:

The chemistry of the glass, the particle shape and especially the activation process give AFM® these important properties to clearly outperform sand and glass sand filters. The large surface has a strong negative charge to adsorb organics and small particles. The surface also has metal oxide catalysts which produce free radicals and thus a high redox potential. Therefore AFM® is self-disinfecting. AFM® prevents bacteria from settling to make it a unique, bio-resistant filter material.



Technical data of AFM®

What is the recommended layering of AFM®?

If you are currently using sand or glass sand simply replace this in your filter with AFM®. While sand has a specific weight of 1'450 kg/m³, the specific weight of AFM® is 1'250 kg / m³, and therefore it needs about 15 % less AFM® according to weight. For example: your filter has 150 kg of sand, only 125 kg of AFM® are needed.

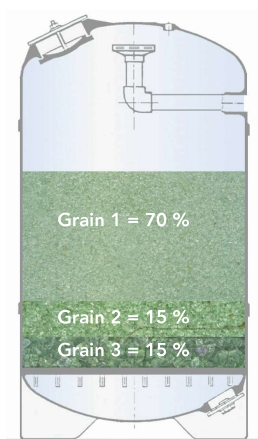
AFM® is supplied in four different grain sizes and should be used as follows:

AFM® grain 0 = 0.25 to 0.5 mm grain size

AFM® grain 1 = 0.4 to 1.0 mm grain size

AFM® grain 2 = 1.0 to 2.0 mm grain size

AFM® grain 3 = 2.0 to 4.0 mm grain size



Grain 2 can be used for filters less than 1000 mm in diameter instead of grain 3. Also for all DIN filters with nozzle plate, grain 3 can be substituted with grain 2.

Operating criteria:

Recommended filtration speed: 15 - 30 m/h
Air purge: 60 - 100 m/h
Flush: 40 - 50 m/h
Desired filter bed expansion: at least 15 %

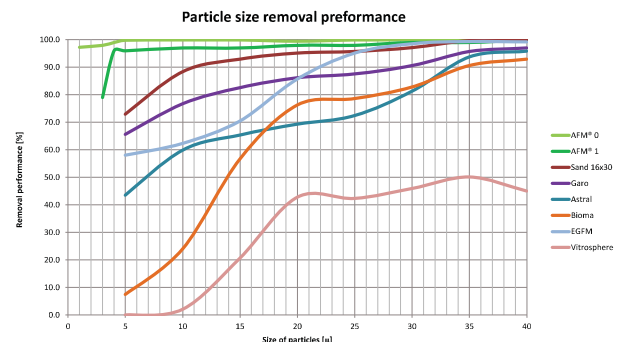
AFM® grain 1 specification:

Specific weight: 1'250 kg/m³
Effective size: 0,46 mm
Hardness: > 7 mohs
Spherizity: > 0.8
Roundness: > 0.6
Uniformity coefficient: < 1.5 to 1.7
Cross-sectional ratio: 2 to 2.4
Specific gravity: 2.4 kg/l
Purity: 99,95 %
Embodied energy: <65 kwh/t
Bulk bed density: 1.25 kg/l
Organic material: < 50 ppm

Chemical composition in %:

Silica	72	Calcium	11
Magnesium	2	Lanthanum	1
Sodium	13	Cobalt	0.016
Aluminium	1.5	Lead	<0.005
Antimony	<0.001	Mercury	<0.0005
Arsenic	<0.0001	Titanium	<0.1
Barium	0.02	Rubidium	<0.05
Cadmium	<0.0001	Iridium	<0.05
Chromium	0.15	Platinum	<0.0001

Comparison of the Filtration performance:



AFM® 1 will remove more than 95 % of all particles in the water down to 4 microns. The best a very high quality sand or other glassand can achieve is 20 microns at an efficiency of 95 %. AFM® 0 is able to remove particles down to 1 micron at an efficiency of more than 95 %. AFM® 0 has been developed for best filtration where flocculation cannot be used.



Who is Dryden Aqua?

We are a marine biological company specializing in water quality and innovative, sustainable treatment technologies. Our unique knowledge combination and detailed understanding of the biological as well as physio-chemical reactions has enabled us to develop a highly innovative range of products for aquaria and swimming pools. Therefore we became leader in water treatment for public and private swimming pools.

Our mission is: crystal clear and healthy water without any smell of chlorine. Today more than 100'000 pools worldwide using our system.