

NEXT REVOLUTION
DynaLite-Filter

PREMIUM QUALITY
MADE IN GERMANY

WATCH[®]
ER
WATCH WATER
a Water Company

We make a difference.

DynaLite-Filter

Continuous filters - proven technology with the latest innovations

INTRODUCTION

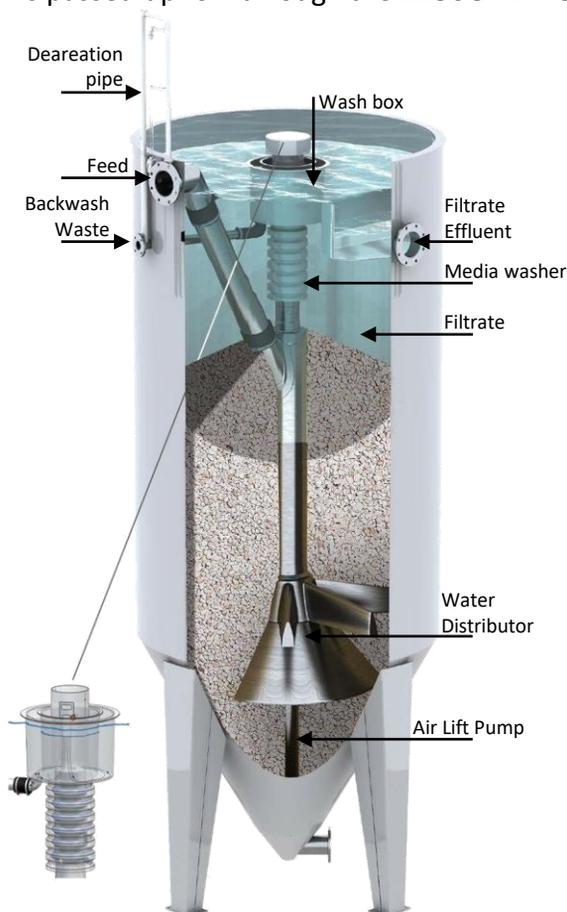
DynaLite-Filter is **dynamic, powerful, energetic** and a **continuous** filtration process method used to manufacture clean and fresh water without any interruption or backwash and rinse. The word continuous means **operating 24 hours a day, 7 days a week** and can operate for more than one or two years without a shut down. Shutting down and backwashing, rinsing, processes results in high amount of waste water and unwanted chemical demand. **DynaLite-Filter** is a process which is based on Fluidization. In this process water is passed upflow through the **ZEOSORB** media.

**HIGH FLOW
&
NO BACKWASH**

CHEMISTRY, WATER CHALLENGES
AND
SOLUTIONS

DynaLite-Filter

*"A ZEOSORB-PROCESS DISCOVERED BY
WATCH-WATER TO CLEAN WATER AND
REMOVE SUSPENDED SOLIDS /
TURBIDITY FROM WATER MORE
EFFICIENTLY"*



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PROVEN PROCESS

The **DynaLite-Filter** is an up-flow, moving bed filter that is constructed with highly advanced media depths for different applications and configurations. Raw water enters near the top and is led to the bottom of the tank by means of a water distributor. Suspended Solids are filtered out as the raw water flows up through the media bed. As the water reaches the top of the filter, it passes over the effluent weir as filtrate and is discharged. A small portion of the filtrate is diverted through the media washer and used for cleaning and transferring the waste solids.



The **DynaLite-Filter** filter employs a backwash rinse that is performed continually while the tank is processing water. An air lift pump, located at the Centre of the module draws the media from the bottom of the filter up into the wash box. As the media is released into the wash box, it falls into the media washer where the filtered solids are separated from the **ZEOSORB**. From there, the filtrate carries the solids out as waste (backwash).

The washed **ZEOSORB** falls down onto the media bed for continued use. Each air lift pump is adjusted and regulated by the pneumatic cabinet supplied with the installation.



Wash water and energy reduction

The amount of wash water used can be significantly reduced by running the **ZEOSORB** pump intermittently. This is achieved by the use of an optional wash water valve, and a solenoid in the pneumatic cabinet. This is especially valuable in ground water treatment, but has proven equally effective also in other applications such as in waste water applications, e.g. tertiary treatment. When running the **ZEOSORB** pump in cycles the energy cost is also reduced due to the decrease of the air consumption, and letting the **ZEOSORB** bed rest intermittently can result in a higher quality filtrate.



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process design and applications

DynaLite is used to solve purification problems in drinking water treatment, industrial water supply, recovery and reuse of water and treatment of wastewater before discharge. Customers are public utilities, pulp and paper industry, iron and steel industry, chemical process industry, pharmaceutical industry, mining and mineral industry, food industry, power plants, incineration plants, metal finishing and electroplating industry and others who use and process water.

Continuous Contact Filtration is used to produce process water and drinking water from river or lake water and for certain wastewater applications. The flocculation chemicals are mixed into the feed stream of the **DynaLite-Filter(s)**. The first part of the filter bed provides excellent conditions for fast floc formation and serves as flocculation reactor. No flocculation tanks are required. Presetting can be eliminated because of **DynaLite's** ability to handle high concentrations of solids.

Process Water Recycling reduces water consumption and permits full control of the water quality. After screening or primary settling, spent process water is pumped to the **DynaLite-Filter**. The filtered water is recycled. Wash water is flocculated and thickened. The overflow from the thickener goes back to the filters.

Tertiary Filtration is used for final treatment of wastewater before discharge. **Contact filtration with aluminum or iron salts as flocculation agents may be employed, as required, to precipitate phosphorous and enhance suspended solids removal.** The end product meets the highest environmental standards applicable to municipal wastewaters and industrial effluents. The final filtration process can be combined with biological denitrification. Nitrates are converted to nitrogen gas by a thin film of active bacteria on the filter granules.

Treatment of Metal-Bearing Industrial Effluents includes precipitation of the metallic ions, followed by flocculation, sedimentation, and final filtration in a **DynaLite-Filter**. The process produces low residual metal contents and meets strict environmental standards.

In most applications the filter media is by Watch Water manufactured highly advanced ZEOSORB .

Normally the **ZEOSORB** in the filter does not need replacing, but a small amount of refill may be needed on a yearly basis (abt. 0.3% of the volume). Particular material is used in bio activated filters. **DynaLite-Filter** Carbon is a special version with catalytic carbon as media.



PROCESS APPLICATIONS

The requirements for water treatment are being increasingly regulated by new laws and regulations. This means that more powerful and efficient equipment is needed. The **DynaLite-Filter** by **Watch Water** provide an economic and energy saving method.

The **DynaLite** continuous contact filter can be applied in both municipal wastewater and industrial water treatment processes. Whether you need reuse of quality water, nutrient removal, industrial water treatment, or raw water treatment, **DynaLite** by **Watch Water** opens up for new process solutions and delivers unparalleled effluent quality, meeting the highest of environmental standards:

- **Suspended solids reduction**
- Two stage Continuous Contact Filtration
- Nitrogen removal (denitrification and nitrification)
- Phosphorous removal
- BOD/CO D removal
- Activated Carbon treatment
- Treatment of metal-bearing effluents
- Pretreatment to other processes



ZEOSORB[®] is an Absolute Replacement of Sand



Advantages - DynaLite

... improves the process

- **No first filtrate – always clean effluent of a high quality**
- **High suspended solids without need for pre-treatment**
- No shock loads on the wash water treatment system
- Low head loss
- Low energy consumption
- Low supervision and maintenance costs
- No interruption of the operation for backwashing
- Small footprint

... simplifies the system

- **No need for backwash pumps**
- No wash water storage tanks
- No wash water collecting tanks
- No need for backwash automation
- No air scour blower
- No clogging filter bottom nozzles
- Single media filter bed
- The system is easy to construct and easy to maintain
- Easy retrofitting for biological treatment

... examples of Industrial Applications

- **Metal finishing**
- Backwash water recovery
- Process water
- Cooling tower blowdown/side stream filtration
- Steel mill scale
- Chemical processing
- Ideal for pretreatment in lieu of gravity filters

ZEOSORB specifications

Introduction

ZEOSORB[®] has been introduced to the process purification of drinking water and wastewater due to its large specific surface area and the selective adsorption of substances, such as ammonia, dissolved organic matter and many other cations. Moreover, **ZEOSORB**[®] has advantageous hydraulic properties, that is – the filtration capacity of large quantities of water. Compared with other adsorbents, **ZEOSORB**[®] is more stable, has better filter features, accessible and relatively cheaper.

Based on numerous studies, it can be concluded that **ZEOSORB**[®] has great potential as effective adsorbent in numerous processes of purification of drinking water and wastewater, such as water softening, the removal of ammonia (from municipal wastewater, wastewater from livestock farms, the barn manure, water from ponds and swimming pools), the removal of nitrogen, the removal of dissolved organic matter and color, the removal of heavy metals (from natural water, acid mine water, industrial wastewater), the removal of radioactive substances from wastewater, desalination seawater and many others.

ZEOSORB[®] performs as polyfunctional sorbent in the waste water treatment process and it binds a number of harmful components. However, it does not possess the ability of anions adsorption due to negative charge of its aluminosilicate network. Superficial modification of **ZEOSORB**[®], by means of organic modifiers, allows partial neutralization of negative charge of external surface of **ZEOSORB**[®] media.



For more information please check our **ZEOSORB**[®] homepage and brochure.

www.watchwater.de

ZEOSORB FEATURES

Superior Purification of

- Drinking Water
- Ground Water
- Surface Water
- Waste Water
- Swimming pool Water
- Reverse osmosis pre-filtration

Greater Ammonia Adsorption

- Reduces Turbidity < 3 micron
- Controls Chloramines formation
- Greater Surface Area
- Long lasting media (> 10 years) not consumed in process

Saves Water

- Doubles time between backwashes
- Reduces backwash time by up to 50%
- Naturally Green Product
- High capacity filtration

Physical Properties

Filtration (nominal)	< 3 micron
Porosity	24 - 32 %
Particle Size	0.5-1.0 mm x 1.5-2.5 mm
Surface Area	30 m ² /gram
Mesh size	18 x 35 and 8 x 14
Color	Pale green/grey
Water Retention	Holds 50% of its weight
Surface Absorption	Hydrophilic

Structure and Properties

ZEOSORB[®] is a high purity natural Aluminosilicate microcrystalline mineral. It is available in particle size of 0.5 - 1.0 mm (18x35 Mesh) or 1.5 - 2.5 mm (8x14 Mesh). The bulk weight is about 820 kg/m³. **ZEOSORB[®]** made by Watch[®] Water has high porosity and high specific surface and it is resistant to abrasion. The **ZEOSORB[®]** medias classified as a GRAS (Generally Recognized As Safe) product. It is also listed under NSF standard 61 and German Trinkwasserverordnung (TVO) 2011.

Since the mid 2005, lab and field test data reports in the Europe have indicated that **ZEOSORB[®]** filtration media consistently outperformed sand, sand/antracite and multimedia in both pressure vessels and gravity filtration tests.

Based on more than 100 lab. and field tests (2/3 using pressure vessels and 1/3 using gravity beds) since the mid 2005, representing commercial, residential and industrial water filtration projects, it has been concluded that high purity **ZEOSORB[®]** media is superior to conventional granular media.

ZEOSORB[®] effectively removes fine particles in the range of 0.5 µm to 3 µm, that escape conventional media.

Similar results were observed for gravity beds. Some representative examples of high purity **ZEOSORB[®]** filter performance are provided below.

Summary of performance test data

Filter Media	Filter rating (nominal)	Solids loading capacity
ZEOSORB[®] (18 x 35 mesh)	< 3 µm	~ 2.6x
Sand (20 x 40 mesh and Anthracite)	20 µm	1x
Sand/Anthracite (20 x 40)	15 µm	~ 1.4x
Multimedia	12 µm	~ 1.6x

River water turbidity: **ZEOSORB[®]** versus multimedia media filtration tests were conducted for fine particle (turbidity) removal from river water. Pressure vessels (18" diameter) were operated with a service flow of 36.7 m/h of bed area for six consecutive days and turbidity (NTU) was measured in the feed and filtered water. The filtered water average NTU was approximately 1/3 of the multimedia filtrate, indicating superior fine particle removal by **ZEOSORB[®]**.

Bottled water plant: A bottled water plant pumped groundwater to four 48" diameter pressure vessels that feed two RO units. The multimedia reduced the well water SDI by an average 5% compared to 45% to 50% SDI reduction for the **ZEOSORB[®]** media.

Cooling tower makeup water: A major chemical plant facility in USA had turbidity problems with river make-up water being used for a cooling tower. The sand/garnet gravity filter inadequately removed turbid particles after rain events. The sand/garnet was replaced with an equal volume (15.45 m³) of 0.5 x 1 mm **ZEOSORB**[®]. When operated at the same flow rate 6.1 m/h, it removed greater than 98% of the turbidity against only 20% for the sand/garnet.

Produced water filtration: A German oil company wanted to convert unusable oil production water into irrigation water. The production water was processed for oil/water separation: chemical flocculation; clarification; and ozone oxidation. It was then filtered using two pressure vessels (72" diameter) with high purity **ZEOSORB**[®] media operating at approx. 29 m/h. The filtrate was used directly as feed water for an RO unit and the product water was recycled as agricultural irrigation water.

Reverse Osmosis prefilter: An electric utility installed a 340 m³ water treatment facility with two multimedia filters and RO equipment to produce boiler make-up water. The RO units could not be operated due to filter vessel pressure loss problems and an elevated SDI in the filtrate. The two multimedia bed were replaced with equivalent bed volumes of 18x35 mesh high purity **ZEOSORB**[®] media and the strict design specifications for the RO feed water have been consistently met for over two years.

Prefilter for Granulated Activated Carbon: Municipal water supplied to restaurant contained elevated iron and other fine particles.

Cartridge (5 µm) filters rapidly loaded and caused reduced water flow to the Granulated beds and chiller. A backwashing **ZEOSORB**[®] filter (10" diameter vessel with a 24" bed depth) was installed and tested by an independent engineer and technical consultant.

The feed water had 0.1µm to 10µm particles (average SDI or slit density index = 4.3). The **ZEOSORB**[®] media bed effectively removed the iron particles. The product water particles were in the 0.1 µm to 2.3 µm range, with an average SDI = 0.

ZEOSORB[®] ***for Physical filtration barrier to pathogens such as bacteria and bacterial spores:***

Physical filtration barriers for accumulation or collection of microorganisms in water that endanger human health have been in focus during the last several years. **ZEOSORB**[®] will be an ideal collector of pathogens such as giardia, cryptosporidium, and other bacteria and their spores. Most of these organisms and their spores are in the size range of 0.5 - 10 micrometers (microns). In contrast, the water permeable pores in **ZEOSORB**[®] are mostly smaller than .05 microns; therefore the **ZEOSORB**[®] fragment or granule can "surface collect" a high percentage of these microorganisms while the water passes through the **ZEOSORB**[®] fragment.

All drinking water standards for microorganism pathogens, and turbidity can be most easily met using a natural, relatively low-cost material, such as **ZEOSORB**[®] rather than "sand" which is chiefly quartz grains.

For more information please check our **ZEOSORB**[®] homepage and brochure.

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BENEFITS

- **Better Filtrate Clarity:** Typical sand/anthracite filter beds have a 12 to 15 micron nominal filter rating. **ZEOSORB[®]** typically would have a nominal filter rating of less than 3 microns. This property greatly reduces the effluent turbidity, generally measured in national turbidity units (NTUs).
- **Increased flow rate in gravity System:** In a sand/anthracite filter media system the flow rates typically 3 to 5 m/h. In a **ZEOSORB[®]** filter media system, the flow rate is typically in the 10m/h range.
- **Increased flow rate in pressure vessel systems:** In a sand/anthracite pressure vessel filter system the flow rates are typically 15 to 17m/h. In a **ZEOSORB[®]** pressure vessel filter system the flow rates are typically in the 29 to 37 (and sometimes 48) m/h range.
- **Lower capital requirement to increase Filtration Capacity:** Generally, the capacity of a filter plant can be doubled with no increase in the plant by switching the filter media to **ZEOSORB[®]**.
- **Fewer Back wash cycles:** **ZEOSORB[®]** requires only one half of the backwash cycles that are required by sand/anthracite.
- **Less Back wash water:** The fewer backwash cycles generally cut the amount of backwash water by one third to one half. This means treating less backwash water and greater plant capacity.

- **Greater Loading due to greater surface area:** **ZEOSORB[®]** generally has 6 to 7 times the surface area as sand. This makes **ZEOSORB[®]** a much better filter media with greater holding capacity.
- **Long media bed life:** The anticipated filter bed life of **ZEOSORB[®]** is 10 yrs.
- **Land application of spent ZEOSORB media:** Under most conditions, **ZEOSORB[®]** filter bed can be applied to lawns and gardens as soil amendments.
- **Simpler Handling:** **ZEOSORB[®]**, monomedia beds simplify materials handling, shipments and bed loading.
- **Better Cleaning:** Active, dynamic, bed tumbling and mixing during backwash efficiently cleans bed granules.

Application

- Sand/anthracite and multimedia bed replacement
- Surface and ground water filtration
- Economical filter beds upstream to RO and Nano-membranes



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