Manufactured in Germany

WATCHER® WATCH WATER a Water Company

FILTERSORB
FILTRATION
ADSORPTION
INSTANT PRODUCTS
OXY TREATMENT
SYSTEMS

FERROLOX

IRON HYDROXIDE BASED GRANULES

FERROLOX® (IRON HYDROXIDE) BASED GRANULES is one of the best Adsorber to load major worst contaminants in drinking water treatment with high capacity and also because of its chemical activity, ferric (III) hydroxide is quite appropriate to bind arsenate, phosphate or sulfide ions in aqueous media.

Watch Water® using a patented process now produces ferric hydroxide in a granular form with various bead diameters by combination of advanced crushing and sieving procedures. This gives access to a great variety of new applications of ferric (III) hydroxide.

FERROLOX® filter media, containing iron hydroxide **$Fe(OH)_3$** has an amorphous structure. The ferric ions content in the filter media is about 40% by weight. It is optimally shaped and highly porous, thus ensuring maximum loading capacity at low costs.

UNPARALLED HEAVY METAL REMOVAL

REMOVAL OF

- Arsenic
- Phosphates
- Copper
- Chromium
- Hydrogen Sulfide
- Selenium (IV & VI)

APPLICATIONS

- Drinking Water
- Well Water
- Sea Water
- Surface Water
- Waste Water
- Reverse Osmosis
- Aquariums
- Concentrate
- Industrial Water

NSF/ ANSI / CAN 61

MEMBER Water Quality Association

PREMIUM QUALITY
MADE IN GERMANY

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OPERATION PRINCIPLES

Arsenic and Phosphate removal

In the first step, arsenate or phosphate ions in aqueous solutions were bounded to the surface of FERROLOX® by adsorption. Second step, is a chemical conversion to stable ferric arsenate or ferric phosphate to the surface of FERROLOX®

$$Fe(OH)_3 + H_3AsO_4 \rightarrow FeAsO_4 + 3H_2O$$

$$Fe(OH)_3 + H_3PO_4 \rightarrow FePO_4 + 3H_2O$$

Hydrogen Sulfide Removal

Sulfide ions formed from hydrogen sulfide in water are removed in a similar way under precipitation of hardly soluble ferric sulfide.

$$2\,Fe(OH)_3 + 3H_2S \rightarrow Fe_2S_3 + 6H_2O$$

WATER TREATMENT

FERROLOX® media is applicable in a wide range of water treatment processes, from large-scale municipal systems to small-scale residential treatment units. Regardless of the system size, there are operational design parameters that must be considered to ensure effective, trouble free performance of the FERROLOX® media.

Groundwater or surface water is simply pumped in up flow mode through a single or multiple up-flow pressure vessels containing the FERROLOX® media, but it can be also successfully used in down flow filtration. In down flow filtration it is recommended to use oxygen dosing for better oxidation. It is also being used in systems to remove Chromium, Copper and Selenium.

The multiple pressure vessel design is either assembled in "**Parallel Flow**" or "**Series flow**". Flow to each vessel is measured and totalized to record the volume of water treated. Pressure differential through each vessel is also monitored. Periodic backwashing is typically performed at start-up and after each pressure drop of 0.5-1.0 Bar thereafter depending on usage and water quality

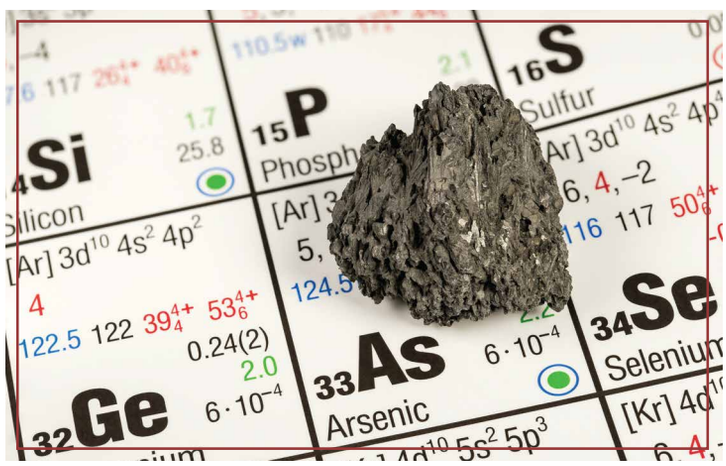
Arsenic in drinking-water and food has a major impact on long term health effects and can cause cancer and skin lesions. It has also been associated with cardiovascular disease and diabetes.

Chromium: (Hexavalent Chromium - "it's a slow poison") A recently-released report by the **Environmental Working Group** has found that the water supplies of almost all major cities and small communities are contaminated with hexavalent chromium, an industrial chemical toxin that does not get filtered out by ordinary consumer filter except from Granulated Ferric hydroxide FERROLOX® . According to the **National Toxicology Program**, hexavalent chromium is linked with gastrointestinal tumors and other forms of cancer. International governing bodies have stated that it is toxic when inhaled.

Copper: Long term exposure to copper can cause irritation of the nose, mouth and eyes and it causes headaches, stomach-aches, dizziness, vomiting and diarrhea. There are scientific articles that indicate a link between long term exposure to high concentrations of copper and a decline in intelligence with young adolescents.

Hydrogen Sulfide: Brief exposure to high concentration of hydrogen sulfide **(>500 ppm)** can cause loss of consciousness and possibly death. In most cases, the person appears to regain consciousness without any other effects. However, in any individuals, there may be permanent or long term effects such as headaches, poor attention span, poor memory and poor motor function. Exposure to low concentration may cause irritation to the eyes, nose or threat and fatigue. It may also cause difficulty in breathing for some asthmatics.

Phosphates: Dosing Sodium Phosphate in drinking water has caused very serious problems and effecting public health. People get affected; have to be treated with dialysis. Some people develop kidney problem within a few days if city water is dosed with phosphate to protect pipes from scaling and corrosion.



The Watch Water® **UP FLOW Adsorption** system is an advanced design that uses best innovation and Watch Water® extensive **Adsorption** experience to deliver a very compact design. When compared to all conventional filter systems, this up-flow system provides the following advantages.

COMPACT DESIGN

The construction of Watch Water® **UP-FLOW Adsorbers** systems permit a very smooth flow rates up to 2000 litres per minute in a single pressure vessels (1200 m^3 /hr). The result?

Very few pressure vessels can accommodate your flow requirements. In fact, the Watch Water® **UP-FLOW Adsorbers** require 50% less number of tanks. Using less pressure vessels enables a reduction in the size of building required for conventional down flow systems. The result is lower capital investment costs

IMPORTANT

Concentration of Arsenic & other contaminants can be expressed as Micrograms per liter, abbreviated as µg/L, milligram per liter (mg/L), parts per billion (ppb) or parts per million (ppm).

1 microgram per liter (µg/L) = 1 parts per billion (ppb)

1 milligram per liter (mg/L) = 1 parts per million (ppm)

10 microgram per liter (µg/L or ppb) is same as 0.01 milligram per liter (mg/L or ppm)

EASE OF USE

The *Watch Water®* **UP-FLOW Adsorber** systems are designed with ease of use in mind. **NO valves, NO electricity, NO backwash, NO chemicals** it absolutely user friendly that makes Adsorber installation and removal to exchange Adsorber material easier without the use of special tools or labour. Open the tanks on top let the media flow out and fill it back with new media, it's so easy. **UP-Flow Adsorbers** minimizes labour, operator and maintenance costs. Reproduce NO effluent, while no backwash. **UP-FLOW** pressure vessels are **50% smaller** than down-flow system.

DISPOSAL OF SPENT MEDIA

The exhausted or spent FERROLOX® media is a non-toxic solid waste. Its disposal is not problematic at all. Under normal environmental conditions no leaching of **Arsenic** takes place out of the spent media. All other technologies like ion-exchange or Reverse osmosis, the regenerated effluents on concentrate are of big concern worldwide. After the expiration of capacity, FERROLOX® can be advantageously utilized as a very useful component for manufacturing bricks. So FERROLOX® is supposed to be the safest technology to remove arsenic, copper, chromium, phosphates and hydrogen sulfide from water and waste water. As the FERROLOX® technology is applied in **UPFLOW adsorption**, the adsorbent is utilized **100% of its capacity**. This technology is not only the most economical but also the most effective. It can be used in **POE** Residential applications in rural areas with hand tube-wells, as well as for large scale applications in towns with community water works. Several arsenic, chromium or phosphates elimination plants with FERROLOX® in **UP-FLOW systems** are operational in Argentina, Vietnam, Portugal, India, Bangladesh, Chile and are successfully inservice in other countries.

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LOADING INSTRUCTION OF FERROLOX® ADSORBER

1st: Watch Water® recommends to fill the pressure vessel with water up to 1/3 of its height to avoid any damage on **bottom distributor** and the media itself. Keep water level all the times minimum 15 cm above the media. The media should never become dry.

2nd: It's recommended to use **good quality quartz** sand for under bed. It should just cover the bottom distributor and should be 3cm over it.

3rd: FERROLOX® should be filled from top of the vessel leaving **30 cm of freeboard** that the media can expand and fluidized easily.

4th: Inert Resin on the Top of the media should be maximum **20 cm** in height, covering the top distributor to avoid clogging.

5th: Close the top of the tank with **distributer** and fill the water from bottom till top and leave it **soaked** for **at least 4 hours** before doing any backwash. Begin backwashing at very slow-rate for 15 minutes. Note the valve at the outlet is closed and the drain is open.

MATERIAL PROPERTIES

Chemical formula and composition:
Amorphous $Fe(OH)^3$

Mineralogical composition:
Ferric ions up to (40%) by weight

PHYSICAL PROPERTIES

Bulk weight	630 - 640 kg/m³
Porosity	min. 75%
Humidity	08%
$Fe(OH)_3$	min. 75%
Specific surface	290 m²/gram
Mesh size	0.5-2.0 mm x 2.0-4.0 mm
Color	Dark brown

OPERATION CONDITIONS AND EXCHANGE CAPACITY

Bed depth	420 - 1500 mm
Freeboard up flow	10 - 20%
Freeboard down flow	30 - 40%
Service flow rate	10 - 20 m/h
Back wash flow rate	25 - 30 m/h
Total adsorption capacity for P	16 g/kg
Total adsorption capacity for As^{5+}	13 g/kg
Total adsorption capacity for Zn	30 - 40 g/kg
Oxidation capacity for H_2S	Up to 22% of its dry weight
pH	5 – 9.5

Disclaimer : *The information in this publication is based on reliable data and is provided in good faith, without warranty or performance guarantee, as product use conditions are beyond our control. Watch Water GmbH, Germany, does not offer express or implied warranties, including merchantability or fitness for a specific purpose. Users should assess product suitability and performance with their equipment. Specifications may change without notice. Please note that the filter media in this brochure do not eliminate bacteria. Do not use our products with microbiologically unsafe or unknown-quality water without proper disinfection. Watch Water GmbH, Germany, is not liable for consequential or incidental damages, such as lost profits from product use.*

Standard Packaging

Packging	Weight of product	Quantity/ pallet	Gross Wt./ pallet	Certification
Bag (30 L)	19 kg	40	785 kg	NSF/ANSI/ CAN 61
Bulk Bag (1000L)	634 kg	1	660 kg	

★ *Other packaging can be considered on request*

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