

Gavnø Gods
Gavnø 2
4700 Næstved

Team Vand og Natur

Center for Teknik og Miljø
Rådmandshaven 20
4700 Næstved

Telefon +4555886168

naestved@naestved.dk

Tilladelse til videregående vandbehandling på Gavnø 15, 4700 Næstved ved opsætning af filteranlæg med granulat til reducere af arsen i drikkevandet.

Dato
10. februar 2026

Sagsnr.
25-032473

Sagsbehandler
Pia Diana Skov Petersen
pdspe@naestved.dk

Næstved Kommune, har den 26.01.2026 modtaget ansøgning fra Gavnø Gods om tilladelse til opsætning af filteranlæg med granulat til reducere af arsen i drikkevandet fra ejendommen Gavnø 15, 4700 Næstved. Ansøgningen er foranlediget af, at der i vandprøve udtaget den 28.10.2025 fra ejendommen er påvist forhøjet indhold af arsen i drikkevandet på 11 µg/l. fra ejendommen Gavnø 15, 4700 Næstved.

Vand til husholdningsbrug indvindes fra boring med DGU nr. 221.771. Boringen er etableret i 1967 og er 44 meter dyb. Boringen er beliggende på Gavnø 15, 4700 Næstved, matr.nr. 1s, Gavnø Hgd, Vejlø.

Afgørelse

Næstved Kommune giver hermed tilladelse til opsætning af filteranlæg til reducere af arsen i drikkevandet på ejendommen Gavnø 15, 4700 Næstved. Afgørelsen er meddeler, jf. §21 i Lov om vandforsyning m.v.

Tilladelsen gives på følgende vilkår.

1. Vandet til husholdningsbrug indvindes fra boring med DGU nr. 221.771. Boringen er beliggende på Gavnø 15, 4700 Næstved, matr.nr. 1s, Gavnø Hgd, Vejlø.
2. Der skal senest en måned efter anlægget er taget i brug, udtages en vandprøve fra taphane i ejendommen Gavnø 15, 4700 Næstved.

Prøven skal analyseres for en "Forenklet kontrol".



Ved en "Forenklet kontrol" kontrolleres vandet for udseende og lugt, pH, ledningsevne, arsen, nitrat, coliforme bakterier, Escherichia coli (E. coli) og kimaltal ved 22 °C.

3. Prøven skal udtages og analyseres af et akkrediteret laboratorium. jf. § 11 i drikkevandsbekendtgørelsen.
Kopi af analyserapporten skal sendes til Næstved Kommune på mail grundvand@naestved.dk.
4. Kontrolhyppigheden kan øges, hvis analyseresultaterne viser, at vandkvalitetskravet for arsen ikke kan overholdes.
Herefter skal der udtages en "Forenklet kontrol" en gang hvert 5 år.
5. Anlægget skal være udformet i overensstemmelse med ansøgning og beskrivelse fra Silhorko.
Der skal foretages et årligt serviceeftersyn med kontrol af vandbehandlingsprocessen, herunder forebyggende vedligehold, så vandkvalitetskravet for arsen på 5 µg/l. til enhver tid kan overholdes.
Det skal være muligt at påfylde granulat efter behov.
Ved udskiftning af dele/filtermateriale skal de bortskaffes på miljømæssig forsvarlig vis.

Baggrund for ansøgning

Ejendommen Gavnø 15, 4700 Næstved er en ejendom med egen vandforsyning – Husholdning 1-2 husstande. Ejendommen anvendes til kommercielt formål og er eget af Gavnø Gods.

Vandkvalitet

Næstved Kommune har modtaget kopi af analyse udtaget fra ejendommen Gavnø 15, 4700 Næstved som er analyseret for en "Forenklet kontrol" Prøven er udtaget den 07.04.2025.

Af analyserapporten fremgår det, at der er påvist et indhold af arsen på 11 µg/l. Grænseværdien for arsen er 5 µg/l. Der er ikke tidligere foretaget analyser for arsen i drikkevandet.

Arsen er et grundstof, som findes naturligt i grundvandet. Indtag af for meget arsen gennem længere tid kan have en sundhedsskadelig effekt. Forbrugerne er orienteret om det forhøjede indhold af arsen i vandet. Indholdet af arsen kan tilbageholdes ved avanceret vandbehandling f.eks. ved tilsætning af jern til fældning.



Gavnø Gods har indhentet tilbud fra Erik Hashøj om opsætning af et anlæg til fældning af arsen. Filteret indsættes i forlængelse af eksisterende vandbehandling. Filteret er et Silhorko filteranlæg type NS 40 til max 2,5 m³/t. Filteret skylles en gang pr måned og har behandlingsmål på arsen til < 3µg/L.

Fyldningen består af bærelag i bunden af filterbeholder og 140 kg GEH 102 GRANU FER HYD til optagelse af arsen. Produktblade for filtermaterialet er vedlagt som bilag.

Partshøring

Forslag til godkendelsen om videregående vandbehandling har været sendt til kommentering/høring hos ansøger og Styrelsen for Patientsikkerhed.

Gavnø Gods,

Ingen bemærkninger til forslag til tilladelsen.

Styrelsen for Patientsikkerhed har sendt følgende bemærkninger:

Næstved Kommune har i dag bedt Styrelsen for Patientsikkerhed om en udtalelse vedr. arsen i drikkevand på Gavnø Gods og opsætning af et filteranlæg med granulat til reducere af arsen i drikkevand.

Arsen i drikkevand er klassificeret som kræftfremkaldende af WHO (IARC-gruppe 1). Styrelsen for Patientsikkerhed, vurderer på det foreliggende grundlag, at indtag af drikkevand indeholdende arsen i den koncentration, der er fundet i aktuelle vandforsyning kan udgøre en sundhedsmæssig risiko. Styrelsen for Patientsikkerhed vil derfor fraråde at vandet fra vandforsyningen på adressen indtages eller bruges til madlavning.

Tilladelse til videregående vandbehandling:

Generelt vurderer Styrelsen for Patientsikkerhed, at den vigtigste forudsætning for en tilladelse til videregående vandbehandling er, at virkningen af anlægget dokumenteres, at anlægget nøje kontrolleres og vedligeholdes efter producentens forskrifter. Ved manglende kontrol og vedligeholdelse, vil anlægget i sig selv kunne udgøre en sundhedsfare (både på baggrund af risiko for bakterier i vandet og/eller ændret kemisk sammensætning i vandet). STPS tager ikke i den sundhedsfaglige vurdering stilling til, om det enkelte vandværk kan efterleve dette. Denne vurdering overlades til kommunen, som har detailkendskab vedrørende det berørte vandværk."



I relation til vilkårene som opstillet i udkastet til tilladelsen, har STPS ikke sundhedsfaglige bemærkninger.

Klagevejledning

Denne afgørelse kan påklages til Miljø- og Fødevareklagenævnet, indtil 4 uger efter at afgørelsen er offentliggjort, hvilket vil sige senest den 10.03.2026 jf. vandforsyningsloven § 77.

Afgørelsen kan påklages af afgørelsens adressat samt enhver, der har en individuel, væsentlig interesse i sagens udfald jf. vandforsyningslovens § 80.

Ønsker du/I at klage over afgørelsen, skal det ske via Nævnenes Hus, som er en digital selvbetjeningsløsning, link: <https://naevneneshus.dk>. En klage er indgivet, når den er tilgængelig for myndigheden i klageportalen. Ved klage skal der betales et klagegebyr, hvis størrelse er oplyst i klageportalen. Gebyret betales med betalingskort i Klageportalen. Vejledning om klageregler og klagegebyr kan findes på Nævnenes Hus hjemmeside link <https://naevneneshus.dk/> "vælg Miljø- og Fødevareklagenævnet, klik på "gå til nævnet" og klik på "gå til klagevejledning og start din klage".

Klagen sendes gennem Klageportalen til Næstved Kommune. Næstved Kommune videresender herefter klagen til Miljø- og Fødevareklagenævnet, ledsaget af sagens akter. Miljø- og Fødevareklagenævnet skal som udgangspunkt afvise en klage, der kommer uden om Klageportalen, hvis ikke der er særlige grunde til det.

Ønskes en fritagelse, skal en begrundet anmodning herom sendes til Næstved Kommune. Vi videresender herefter anmodningen til Miljø- og Fødevareklagenævnet, som træffer afgørelse om, hvorvidt anmodningen kan imødekommes. Evt. klage har ikke opsættende virkning, medmindre klagemyndigheden bestemmer andet.

Ønskes sagen afgjort ved domstol, skal retssagen være anlagt inden 6 måneder efter afgørelsen er offentliggjort, eller efter endelig klageafgørelse.

Hvis Næstved Kommune modtager klager over afgørelsen, vil du blive orienteret herom.

**Civil søgsmål**

Afgørelse efter Vandforsyningsloven kan indbringes for domstolene.
Fristen for søgsmål er 6 måneder, fra meddelelse af afgørelse.

Offentliggørelse

Godkendelsen annonceres på Næstved Kommunes hjemmeside i uge 7 med høringsfrist på 4 uger. Du vil blive underrettet hvis der har været indsigelser.

Med venlig hilsen

Pia Diana Skov Petersen
Miljøtekniker

Bilag: produktblade på arsen filteret.

Kopi:

Styrelsen for Patientsikkerhed, trost@stps.dk

Miljøstyrelsen mst@mst.dk.



Granular Ferric Hydroxide for Drinking Water Treatment

- ✓ Producing drinking water from ground water
- ✓ Water treatment for the food industry

■ Product Description

We developed GEH® 102 specifically for the drinking water treatment.

Based on granular ferric hydroxide, it removes hazardous substances from water selectively, but sustains the natural content of minerals and trace elements. This is ensured by the patented production and purity of our adsorbent. GEH® for drinking water treatment meets all requirements of DIN EN 15029 and is certified according to international standard NSF/ANSI 61.

Meet drinking water limits safely – with GEH® 102.

■ Target Substances

Contaminants, which are removed by GEH® 102 from water:

- | | |
|-------------------|--|
| › Arsenic (As) | › Vanadium (V) |
| › Copper (Cu) | › Zinc (Zn) |
| › Molybdenum (Mo) | › Hydrogen Peroxide (H ₂ O ₂) |
| › Lead (Pb) | › Hydrogen Sulfide (H ₂ S) |
| › Antimony (Sb) | › Phosphate (PO ₄) |
| › Uranium (U) | › Silicate (SiO ₄) |

Granular Ferric Hydroxide for Drinking Water Treatment



■ Properties

Chemical composition	β -FeOOH and $\text{Fe}(\text{OH})_3$
Dry solid content	58 % (± 10 %)
Iron content, relative to dry solids	600 g/kg (± 10 %)
Particle size range	0.2 – 2.0 mm
Undersize fraction	< 10 %
Total oversize and undersize fraction	< 20 %
Bulk density, backwashed	1150 kg/m ³ (± 10 %)
Specific surface area (BET-method)	approx. 300 m ² /g

■ Point-of-Use-Systems

GEH® 102 is commonly used in adsorption filters, but can also be applied in cartridge systems for the end-user (point-of-Use systems). The adsorption capacity depends on the water parameters and operating conditions. In principle, the same operating recommendations apply to point-of-use systems as to adsorption filters in centralized water treatment.

■ Transport and Storage

The packaging takes place in big bags or plastic drums, whereby the filling quantities are directed to the individual customers' needs.

The product is stable and can be stored for at least one year. To prevent the material from drying out, the big bags should be closed and, if possible, not stored outdoors. Outdoor storage is possible in plastic bags or protected from direct sunlight and at moderate temperatures (0 - 25° C). The big bags must not be stacked.

■ Individual Application Advice

Every application in water treatment has its own special requirements. A meaningful dimensioning of the plant and definition of the operating conditions can only be made after examining the individual case. The recommendations contained in this data sheet are therefore legally not binding. We will gladly advise you in detail on your application.

In addition, the General Terms and Conditions of GEH Wasserchemie GmbH & Co. KG apply.



Quality management system certified
in accordance with ISO 9001:2015



GEH Wasserchemie GmbH & Co. KG

49090 Osnabrück

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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

GEH® 101, GEH® 102, GEH® 103, GEH® 104, GEH® 105, GEH®-FK
µ-GEH®

1.2 Relevant identified uses of the substance or mixture and uses advised against

1.2.1 Relevant uses

Chemical raw material / Water treatment

1.2.2 Uses advised against

None known.

1.3 Details of the supplier of the safety data sheet

Company

GEH Wasserchemie GmbH & Co. KG
Adolf-Köhne-Straße 4
49090 Osnabrück / GERMANY
Phone +49 (0) 541-122009
Fax +49 (0) 541-1811990
Homepage www.geh-wasserchemie.de
E-mail info@geh-wasserchemie.de

Address enquiries to

Technical information

info@geh-wasserchemie.de

Safety Data Sheet

sdb@chemiebuero.de (No dispatch of safety data sheets)

Safety data sheets are available from the supplier.

1.4 Emergency telephone number

Company

+49 (0) 541-122009 Mo-Fr 9:00 - 17:00

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture [REGULATION (EC) No 1272/2008]

No classification.

2.2 Label elements

Hazard pictograms

none

Signal word

none

Hazard statements

none

Precautionary statements

none

2.3 Other hazards

Human health dangers

Contains no ingredients with endocrine-disrupting properties.

Environmental hazards

Does not contain any PBT or vPvB substances.

Other hazards

none

SECTION 3: Composition / Information on ingredients

3.1 Substances

not applicable

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3.2 Mixtures

The product is a mixture.

Range [%]	Substance
50 - 60	Iron hydroxide oxide yellow
CAS: 51274-00-1, EINECS/ELINCS: 257-098-5, Reg-No.: 01-2119457554-33-XXXX	

Comment on component parts

No dangerous components.

SECTION 4: First aid measures

4.1 Description of first aid measures

General information

Take off contaminated clothing and wash before reuse.

Inhalation

Ensure supply of fresh air.
In the event of symptoms seek medical treatment.

Skin contact

When in contact with the skin, clean with soap and water.

Eye contact

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.

Ingestion

Rinse out mouth and give plenty of water to drink.
In the event of symptoms seek medical treatment.

4.2 Most important symptoms and effects, both acute and delayed

None known.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media

Product itself is non-combustible. Fire extinguishing method of surrounding areas must be considered.

Extinguishing media that must not be used

Full water jet

5.2 Special hazards arising from the substance or mixture

none

5.3 Advice for firefighters

Use self-contained breathing apparatus.

Fire residues and contaminated firefighting water must be disposed of in accordance within the local regulations.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

No special measures necessary.

6.2 Environmental precautions

Do not discharge into the drains/surface waters/groundwater.

6.3 Methods and material for containment and cleaning up

Take up mechanically. Avoid production of dust.
Dispose of absorbed material in accordance within the regulations.

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6.4 Reference to other sections

See SECTION 8+13

SECTION 7: Handling and storage

7.1 Precautions for safe handling

The normal safety precautions for handling chemicals must be observed.

Wash hands before breaks and after work.

Use barrier skin cream.

Do not eat, drink, smoke or take drugs at work.

7.2 Conditions for safe storage, including any incompatibilities

Keep only in original container.

Prevent penetration into the ground.

Do not store together with oxidizing agents.

Do not store together with acids.

Do not store together with food and animal food/diet.

Recommended storage temperature: room temperature.

7.3 Specific end use(s)

See product use, SECTION 1.2

SECTION 8: Exposure controls / personal protection

8.1 Control parameters

Ingredients with occupational exposure limits to be monitored EU (2004/37/EG)

not relevant

DNEL

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

There are no DNEL values established for the substance.

PNEC

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

There are no PNEC values established for the substance.

8.2 Exposure controls

Additional advice on system design

Ensure adequate ventilation on workstation.

Pay attention to dust limit value (ACGIH-2011: 10 mg/m³ particle inhalable; 1,25 mg/m³ particle respirable).

Measurement methods for taking workplace measurements must meet the performance requirements of DIN EN 482. For example, recommendations are given in the IFA's list of hazardous substances.

Eye protection

Safety glasses. (EN 166:2001)

Hand protection

Leather (EN 388).

The details concerned are recommendations. Please contact the glove supplier for further information.

Skin protection

Protective clothing (EN 340)

Other

Avoid contact with eyes and skin.

Respiratory protection

Not required under normal conditions.

Thermal hazards

none

Delimitation and monitoring of the environmental exposition

Protect the environment by applying appropriate control measures to prevent or limit emissions.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	solid
Form	granules
Color	black
Odor	odourless
Odour threshold	not applicable
pH-value	not applicable
pH-value [1%]	5,5 - 7,5
Boiling point or initial boiling point and boiling range [°C]	not applicable
Flash point [°C]	not applicable
Flammability	not applicable
Lower explosion limit	not applicable
Upper explosion limit	not applicable
Oxidising properties	no
Vapour pressure/gas pressure [kPa]	not applicable
Density [g/cm³]	1,15
Relative density	not determined
Bulk density [kg/m³]	1115
Solubility in water	insoluble < 0,1 g/l
Solubility other solvents	not required
Partition coefficient n-octanol/water (log value)	not applicable
Kinematic viscosity	not applicable
Relative vapour density	not applicable
Melting point [°C]	> 1000
Auto-ignition temperature [°C]	not applicable
Decomposition temperature [°C]	not applicable
Particle characteristics	not relevant

9.2 Other information

none

SECTION 10: Stability and reactivity

10.1 Reactivity

No dangerous reactions known if used as directed.

10.2 Chemical stability

The product is stable under standard conditions.

10.3 Possibility of hazardous reactions

Reactions with acids.

Reactions with strong oxidizing agents.

10.4 Conditions to avoid

See SECTION 7.2.

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10.5 Incompatible materials

Strong oxidizing agent.

Acids

10.6 Hazardous decomposition products

No hazardous decomposition products known.

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SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute oral toxicity

Product

ATE-mix, oral, > 5000 mg/kg

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

LD50, oral, Rat, > 10000 mg/kg

Acute dermal toxicity

Product

ATE-mix, dermal, > 5000 mg/kg

Acute inhalational toxicity

Product

ATE-mix, inhalativ (dust), > 5 mg/l 4h

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

LC50, inhalativ (dust), Rat, > 5,05 mg/L 4h

Serious eye damage/irritation

Does not contain a relevant substance that meets the classification criteria.
Based on the available information, the classification criteria are not fulfilled.
Toxicological data of complete product are not available.

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

Eye, non-irritating

Skin corrosion/irritation

Does not contain a relevant substance that meets the classification criteria.
Based on the available information, the classification criteria are not fulfilled.
Toxicological data of complete product are not available.

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

dermal, non-irritating

Respiratory or skin sensitisation

Does not contain a relevant substance that meets the classification criteria.
Based on the available information, the classification criteria are not fulfilled.
Toxicological data of complete product are not available.

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

dermal, non-sensitizing

Specific target organ toxicity — single exposure

Does not contain a relevant substance that meets the classification criteria.
Based on the available information, the classification criteria are not fulfilled.
Toxicological data of complete product are not available.

Specific target organ toxicity — repeated exposure

Does not contain a relevant substance that meets the classification criteria.
Based on the available information, the classification criteria are not fulfilled.
Toxicological data of complete product are not available.

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

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NOAEC, inhalative, Rat, 4,7 mg/m³ (subchronic), The effects observed are not sufficient for classification.

Mutagenicity

Does not contain a relevant substance that meets the classification criteria.
Based on the available information, the classification criteria are not fulfilled.
Toxicological data of complete product are not available.

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

in vitro, negativ

Reproduction toxicity

Does not contain a relevant substance that meets the classification criteria.
Based on the available information, the classification criteria are not fulfilled.
Toxicological data of complete product are not available.

- Fertility

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

oral, no adverse effect observed

- Development

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

oral, Rat, no adverse effect observed

Carcinogenicity

Does not contain a relevant substance that meets the classification criteria.
Based on the available information, the classification criteria are not fulfilled.
Toxicological data of complete product are not available.

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

no adverse effect observed

Aspiration hazard

Does not contain a relevant substance that meets the classification criteria.
Based on the available information, the classification criteria are not fulfilled.

General remarks

none

11.2 Information on other hazards

11.2.1 Endocrine disrupting properties

Contains no ingredients with endocrine-disrupting properties.

11.2.2 Other information

SECTION 12: Ecological information

12.1 Toxicity

Substance

Iron hydroxide oxide yellow, CAS: 51274-00-1

LC50, (4d), fish, 100 g/L

EC50, (48h), Daphnia magna, >100 mg/l (Lit.)

LC0, (96h), fish, >100 000 mg/l (Lit.)

LC0, (4d), fish, 10 - 100 g/L

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12.2 Persistence and degradability

Behaviour in environment compartments	not determined
Behaviour in sewage plant	Iron hydroxide oxide to adsorb nutrient, specially phosphate.
Biological degradability	not applicable

12.3 Bioaccumulative potential

not applicable

12.4 Mobility in soil

No information available.

12.5 Results of PBT and vPvB assessment

not applicable

12.6 Endocrine disrupting properties

Contains no ingredients with endocrine-disrupting properties.

12.7 Other adverse effects

None known.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Waste material must be disposed of in accordance with the Directive on waste 2008/98/EC as well as other national and local regulations. It is not possible to determine a waste code for this product in accordance with the European Waste Catalogue (EWC) since it is only possible to classify it according to how it is used by the customer. The waste code is to be determined within the EU in liaison with the waste-disposal operator.

Product

For recycling, consult manufacturer.

Waste no. (recommended)

190206
190205*

Contaminated packaging

Uncontaminated packaging may be taken for recycling.

Waste no. (recommended)

150102
150110* packaging containing residues of or contaminated by hazardous substances

SECTION 14: Transport information

14.1 UN number or ID number

Transport by land according to ADR/RID not applicable

Inland navigation (ADN) not applicable

Marine transport in accordance with IMDG not applicable

Air transport in accordance with IATA not applicable

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14.2 UN proper shipping name

Transport by land according to ADR/RID NO DANGEROUS GOODS

Inland navigation (ADN) NO DANGEROUS GOODS

Marine transport in accordance with IMDG NOT CLASSIFIED AS "DANGEROUS GOODS"

Air transport in accordance with IATA NOT CLASSIFIED AS "DANGEROUS GOODS"

14.3 Transport hazard class(es)

Transport by land according to ADR/RID not applicable

Inland navigation (ADN) not applicable

Marine transport in accordance with IMDG not applicable

Air transport in accordance with IATA not applicable

14.4 Packing group

Transport by land according to ADR/RID not applicable

Inland navigation (ADN) not applicable

Marine transport in accordance with IMDG not applicable

Air transport in accordance with IATA not applicable

14.5 Environmental hazards

Transport by land according to ADR/RID no

Inland navigation (ADN) no

Marine transport in accordance with IMDG no

Air transport in accordance with IATA no

14.6 Special precautions for user

Relevant information under SECTION 6 to 8.

14.7 Maritime transport in bulk according to IMO instruments

not applicable

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SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

EEC-REGULATIONS

2008/98/EC 2000/532/EC; 2010/75/EU; 2004/42/EC; (EC) 648/2004; (EC) 1907/2006 (REACH); (EU) 1272/2008; 75/324/EEC ((EC) 2016/2037); (EU) 2020/878; (EU) 2016/131; (EU) 517/2014; (EU) 2019/1148

- Comment on component parts

Substances of Very High Concern - SVHC: substances are not contained or are below 0.1%.

- Annex I (REACH)

The product is not subject to Annex I restrictions.

- Annex XIV (REACH)

According to Annex XIV of Regulation (EC) 1907/2006 (REACH) the product does not contain any substances $\geq 0.1\%$ that are subject to authorisation.

- Annex XVII (REACH)

According to Annex XVII of Regulation (EC) 1907/2006 (REACH) the product does not contain any substances $\geq 0.1\%$ that are restricted.

According to Annex XVII of Regulation (EC) 1907/2006 (REACH) the product is not subject to any restrictions.

TRANSPORT-REGULATIONS

ADR (2023); IMDG-Code (2023, 41. Amdt.); IATA-DGR (2024)

NATIONAL REGULATIONS (EU):

- Observe employment restrictions for people

none

- VOC (2010/75/CE)

0%

15.2 Chemical safety assessment

not applicable

GEH Wasserchemie GmbH & Co. KG

49090 Osnabrück

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SECTION 16: Other information

16.1 Abbreviations and acronyms:

ADR = Accord européen relatif au transport international des marchandises Dangereuses par Route
RID = Règlement concernant le transport international ferroviaire de marchandises dangereuses
ADN = Accord européen relatif au transport international des marchandises dangereuses par voie de navigation intérieure
ATE = acute toxicity estimate
CAS = Chemical Abstracts Service
CLP = Classification, Labelling and Packaging
DMEL = Derived Minimum Effect Level
DNEL = Derived No Effect Level
EC50 = Median effective concentration
ECB = European Chemicals Bureau
EEC = European Economic Community
EINECS = European Inventory of Existing Commercial Chemical Substances
EL50 = Median effective loading
ELINCS = European List of Notified Chemical Substances
EmS = Emergency Schedules
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC-Code = International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk
IC50 = Inhibition concentration, 50%
IMDG = International Maritime Code for Dangerous Goods
IUCLID = International Uniform Chemical Information Database
IVIS = In vitro irritation score
LC50 = Lethal concentration, 50%
LD50 = Median lethal dose
LC0 = lethal concentration, 0%
LOAEL = lowest-observed-adverse-effect level
LL50 = Median lethal loading
LQ = Limited Quantities
MARPOL = International Convention for the Prevention of Marine Pollution from Ships
NOAEL = No Observed Adverse Effect Level
NOEC = No Observed Effect Concentration
PBT = Persistent, Bioaccumulative and Toxic substance
PNEC = Predicted No-Effect Concentration
REACH = Registration, Evaluation, Authorisation and Restriction of Chemicals
STP = Sewage Treatment Plant
TLV®/TWA = Threshold limit value – time-weighted average
TLV®STEL = Threshold limit value – short-time exposure limit
VOC = Volatile Organic Compounds
vPvB = very Persistent and very Bioaccumulative

16.2 Other information

This document does not comply with Regulation (EC) No 1907/2006, article 31 (5) and may be used for internal purposes only.

Customs Tariff 28 21 10 00

Classification procedure

Modified position 7.1, 15.1

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GEH theory

GEH102 filter material

GEH102 is an inorganic synthetic iron oxyhydroxide compound (FeOOH) which is used for the removal of arsenic invented by Wasserchemie in Germany. GEH101, GEH102 and GEH104 are 1:1 the same product. The reason for the existence of the various types is purely marketing. GEH103 is the only product that differs. This is used in the mineral water industry and is used to prevent the pH from decreasing when the filter is installed. GEH103 is more purified to prevent this and is therefore at a higher cost. GEH105-M, which is a mix-bed of FeOOH and CaCO_3 is available for copper removal.

There are two types of FeOOH available based on their crystal lattice structure – α - FeOOH (*Goethite*) supplied by LanXess and β - FeOOH (*Akaganeite*) supplied by Wasserchemie.

The crystal lattice structure originates from the method of production. When datasheets state which polymorph is dominant it is purely for marketing purposes. There is no difference in the removal kinetics between the two types.

A key difference between GEH102 from Wasserchemie and Bayoxide E33 from LanXess is the specific surface area (BET) of the material. GEH102 has up to twice the surface area compared to Bayoxide E33 – $300 \text{ m}^2/\text{g}$ vs $120\text{-}200 \text{ m}^2/\text{g}$ respectively. Since the removal of Arsenic is an adsorption process a larger surface area is more beneficial since it provides a larger area and therefore more active sites for removal process.

Production

The production method is a precipitation and neutralization reaction between ferric chloride and sodium hydroxide. See Figure 1 Production method of GEH102 for a general overview of the process.

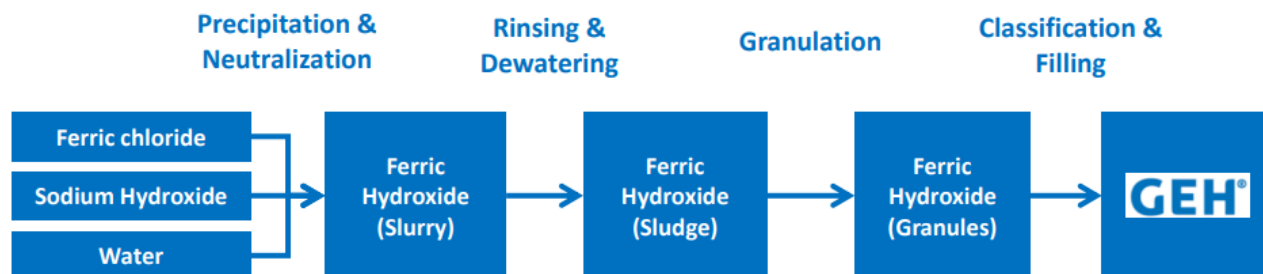


Figure 1 Production method of GEH102

GEH102 is delivered wet due to the production process. This can be an advantage since there will be no dust accumulation at the waterworks when loaded in the filter.

The production of the filter material must adhere to EN 15029. The only filter materials that can adhere to this standard are GEH102 and Bayoxide E33. Other production methods using recycled materials, coated materials and materials with additives are not allowed according to this standard and it is not recommended to use these products. GEH102 is certified for drinking water applications according to the American NSF/ANSI Standard 61 and German TrinkwV: §11 Liste der Aufbereitungsstoffe.

Processes

GEH exhibits a varying surface charge which is dependent on pH. The surface charge can be manipulated by adjusting the pH of the water. When pH is below 7.8 the surface charge will be slightly positive and above 7.8 it will be slightly negative. See Figure 2. This adjustment of surface charge is important when considering which ions are required to be removed.

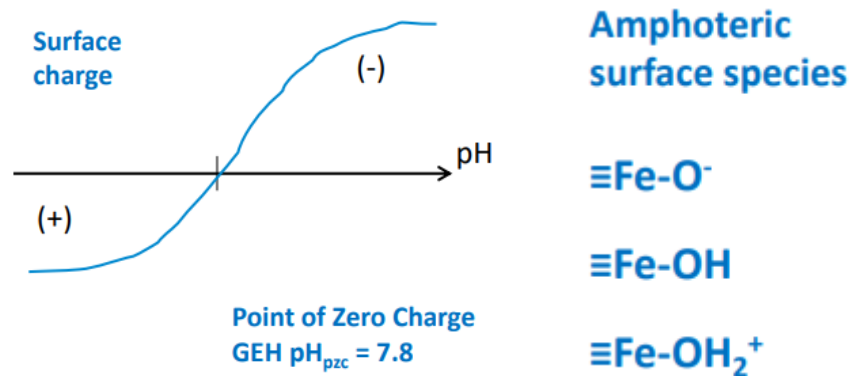


Figure 2 Surface charge of GEH102 depending on pH

All oxyanions such as $HAsO_4^{2-}$, HPO_4^{2-} and HVO_4^{2-} require a positive surface charge while cations such as Cu^{2+} and Zn^{2+} require a negative charge to bind to the surface of GEH102. When using GEH102 to remove heavy metal cations such as Cu^{2+} , Zn^{2+} and Pb^{2+} the pH should be above 7.8 but not high enough for $CaCO_3$ precipitation since this will foul the filter material. The pH value of 7.8 is a theoretical value but ranges from 7.5 to 8.1.

Arsenic is a natural occurring element and can be found in ground water in various places in the form of either Arsenite – H_3AsO_3 or Arsenate - $HAsO_4^-$. Arsenite is difficult to remove since it has a neutral charge at neutral to relatively high pH, while the surface charge of the filter media is negative as well. Arsenite needs therefore to be oxidized into Arsenate to facilitate removal.

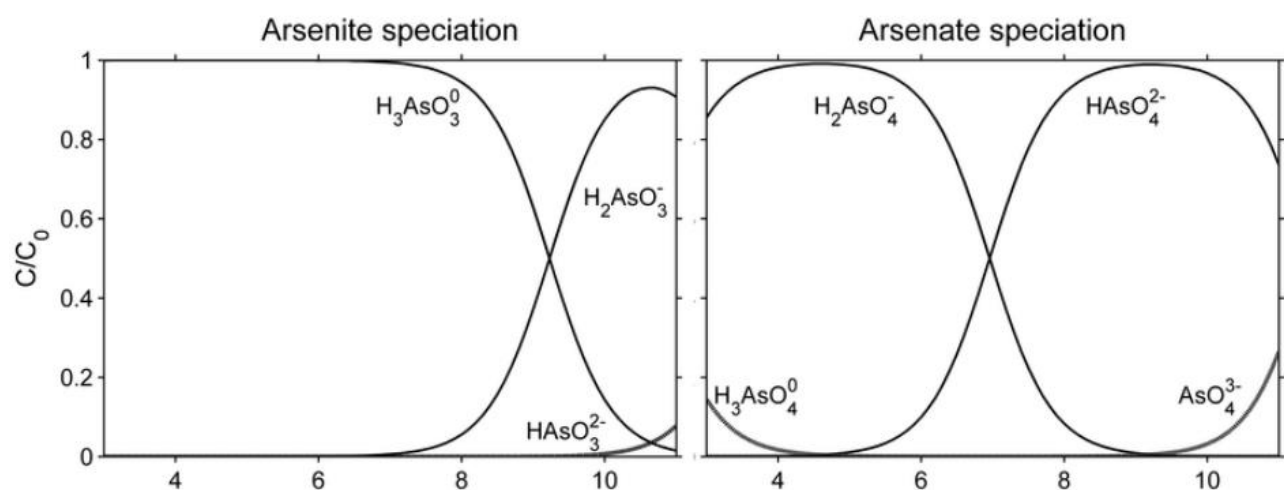


Figure 3 Arsenite vs Arsenate species at various pH levels

As shown by the graph in Figure 3 Arsenate is negatively charged at low pH levels and can therefore be removed by the positive surface charge at these pH levels. Acids such as CO_2 or H_2SO_4 can be used to lower the pH to a desirable level. If aggressive CO_2 is present in the inlet water, it is more beneficial to have the GEH102 filter as a

primary/prefilter since the aggressive CO_2 would ensure that the pH is low and therefore beneficial regarding the surface charge of the filter material.

Various other factors determine the efficiency of FeOOH in its capacity to remove selected ions. Due to this complexity, it is therefore difficult to assess the filter material's performance. See Figure 4.

Parameters affecting the performance:

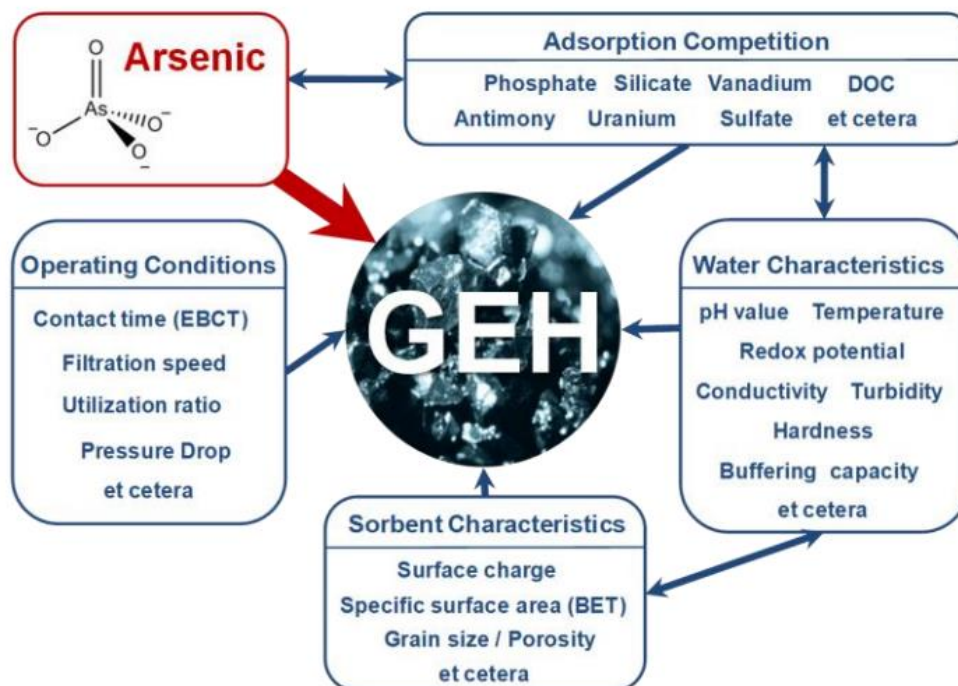


Figure 4 Performance parameters of GEH102

Regeneration of the filter media is not possible due to that it would require a heavily caustic environment (pH=14) which would degrade the filter material.

Competing ions

The FeOOH filter material has the same adsorption specificity for some ions other than Arsenate. These ions will compete with Arsenate to be adsorbed on the surface and subsequently exhaust the filter material quicker if present. Vanadate and phosphate will compete with Arsenate 1:1 for the adsorption sites while silica will precipitate on the surface and thereby reducing the capacity. About 1 mg/l silica equals 1% less capacity.

Other contaminants

Uranium removal can be achieved but it is a very complex process. Oxyanions such as Molybdenum and Wolfram can also be removed.

Zn^{2+} and Cu^{2+} will precipitate as hydroxides when pH rises, and the surface charge will be more beneficial for the removal of cations. It is unclear what reactions occur in the filter, but it is most likely both adsorption and precipitation.

SiO_2 is a difficult contaminant to remove and is regarded more of a nuisance species. If present in large amounts and pH is favorable it can polymerize and coat the filter material.

H_2O_2 when used as a disinfectant will not exhaust the capacity of the filter material since it is a catalytic reaction occurring on the filter material surface.

Set-up

Lead lag configurations can be very beneficial if project scope allows for it. Parallel filters with time-staggered filling are a way to reduce cost since fillings need to be changed less often. Can be used when complete removal of arsenic is not required but just kept below limit.

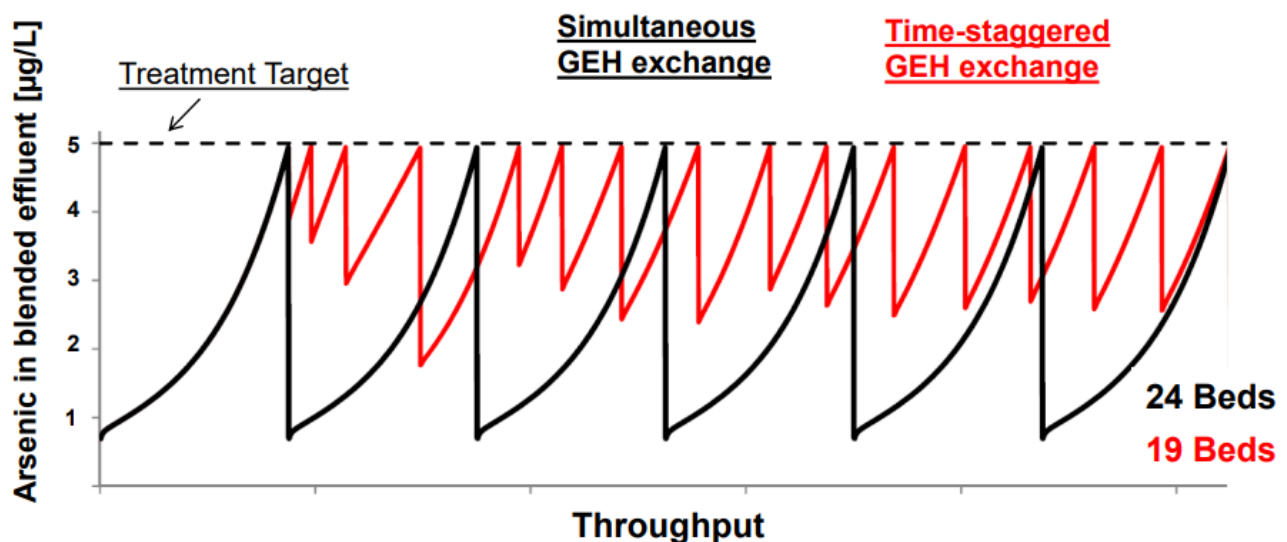


Figure 5 Model for time-staggered refilling of parallel sorption beds.

Bypass can be favorable when only one GEH102 filter is in operation. The graph in Figure 6 shows how the bypass flow is reduced in connection with the arsenic concentration in the outlet. The graph is a model and would be more of a step curve. The downside of bypass can be frequent sampling for calculating the bypass ratio to ensure the outlet concentration is below the criteria. The bypass together with a lead-lag configuration would require less frequent sampling.

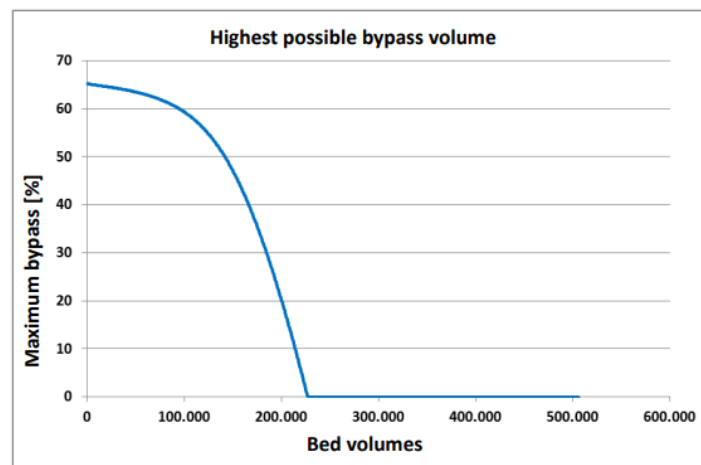


Figure 6 Model for bypass percentage over time

Due to kinetics the breakthrough curve cannot be fully determined by stoichiometry and is therefore a gradual increase in concentration which will occur before the stoichiometric breakthrough as shown in Figure 7.

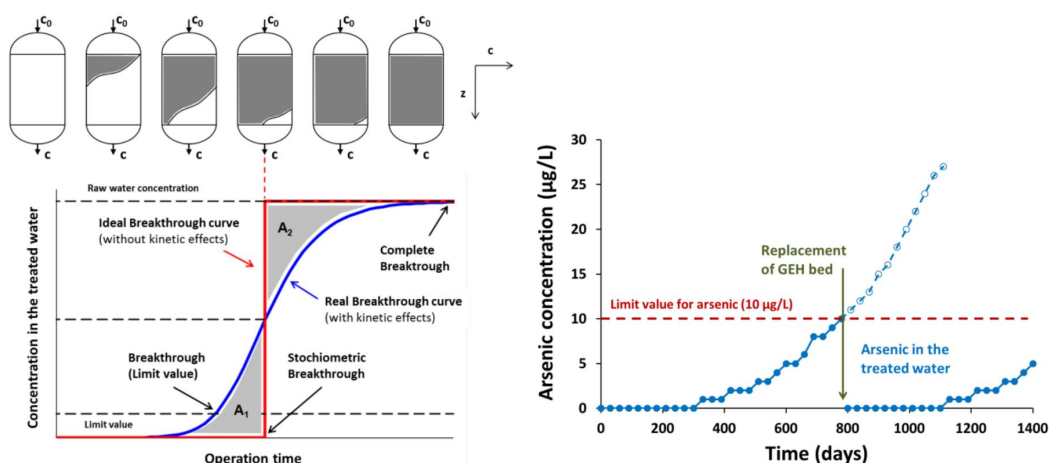


Figure 7 Kinetic effects on the breakthrough curve of GEH102

Lead lag configuration

When the adsorber is running, breakthrough will occur before the entire capacity of the adsorber bed is exhausted as seen in Figure 8. Instead of changing the entire adsorber at this point, a lead-lag configuration can be beneficial and reduce the frequency of filter bed exchange and thereby reducing cost over time. In a lead lag configuration two filters are placed in series, a primary and a secondary. When breakthrough occurs on the primary filter, the secondary filter will start the adsorption process while the remaining capacity of the first filter will be exhausted. When the capacity of the first filter is completely exhausted the filter media will be changed and the two filters 'switch places'. What was previously the secondary filter will now become the primary filter and the previous primary filter will now become the secondary filter with renewed filter material and the process repeats. GEH Wasserchemie will inform of the adsorption capacity when preparing dimensioning proposals.

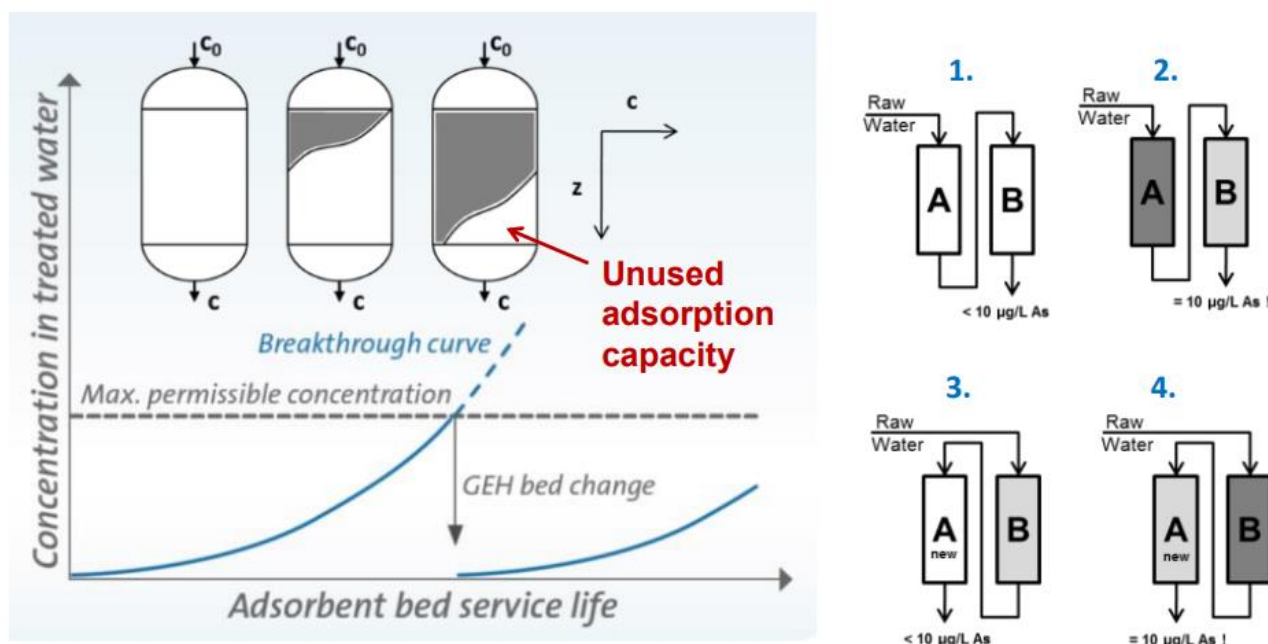


Figure 8 Lead lag configuration

Tank specifications

The GEH is generally promoting corrosion but is not considered as a strong corroding agent. Therefore, typically FRP-tanks, stainless steel or coated steel filters are used.

Uncoated vessels have experienced minor corrosion after some years in some projects, while in other projects there was no problem. The water chemistry might also play a role, but that effect is not investigated. Based on this information, it is therefore recommended that all filters containing the GEH filling are either coated inside or stainless steel. A star-formed nozzle system can be applied, but the standard SILHORKO nozzle plate system is recommended.

Pre-treatment

Some requirements are needed to be fulfilled before satisfactory adsorption can take place.

The pH should be low as mentioned in Processes section. Furthermore, there should be low turbidity and a Fe content < 0,2 mg/l together with Mn content < 0,02 mg/l.

Operation

The filter is always operated filled with water, with a Mankenberg pressure relief valve installed. No aeration occurs in the adsorption filter and must be done in the pretreatment filters.

A full instruction on how to load the filter material can be found in the GEH technical datasheet found in the Handbook. Further information can be found in informational video “How to operate a GEH adsorber” provided by Wasserchemie. <https://www.youtube.com/watch?v=4n7-qbpc8Ok>

When the filter is in operation a classification of the filter material will occur based on particle size, see Figure 9.

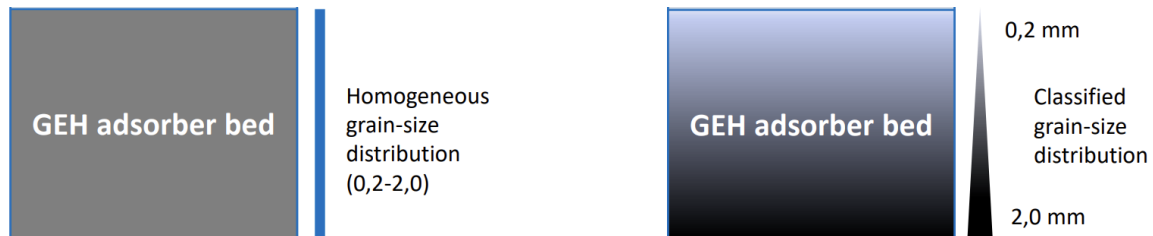


Figure 9 Classification before and after initial operation

Disinfection

An initial disinfecting routine should be performed before the filter material is used for drinking water purposes. The suppliers guide for disinfection can be found in the Handbook. Since GEH102 is an inorganic compound, it does not tend to be susceptible to biofouling, but microbiological growth can occur on the media if the raw water carries increased loads of organics and/or microorganisms. When starting up a filter a recommendation is to sanitize the outlet stream via either a UV, chemical dosing or a combination of both.

EBCT

The minimum EBCT for GEH102 is 3 minutes but can vary depending on the water analysis and is hence project specific. It is therefore of the utmost importance that the design specifications provided by Wasserchemie is followed.

Backwash

When dimensioning the filter be aware of the requirements regarding expansion of the filter material. This information can be found in the technical datasheet in the Handbook. The object of the backwash during operation is to remove particles (from raw water) retained in GEH bed. These particles could form a blocking layer on the top, which causes an increase of differential pressure. Therefore, it is important to monitor differential pressure during operation, and to perform a backwash when pressure drop exceeds the maximum permissible value of 0.5 bar. If the raw water is turbidity-free and the pressure conditions are stable, periodic backwashing is not necessary since it is an adsorption process occurring in the filter. It is recommended that the backwash frequency is decided by the operator in conjunction with Silhorko-Eurowater.

In general, it is possible to also use less freeboard, but the backwash velocity needs to be adjusted. 20 m/h is the minimum, with only 35 % of freeboard, see Figure 10. If the filtration velocity is quite high, it is recommended not to use a backwash velocity at the lower end. Our recommendation is max. 26 m/h which requires 50% freeboard.

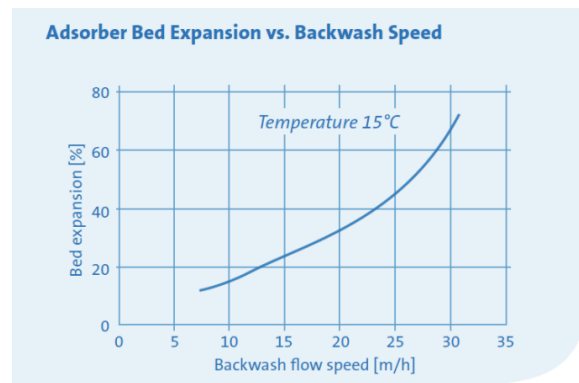


Figure 10 Bed expansion vs backwash speed

Backwash until the effluent is free of turbidity – Approximately 10 minutes.

Disposal

The filling should be disposed of in conjunction with local and national requirements regarding environmental hazardous materials. When the Arsenic is bound to the material it will not be washed out by rain and leech into the ground.

Case experiences

Tindbæk Waterworks

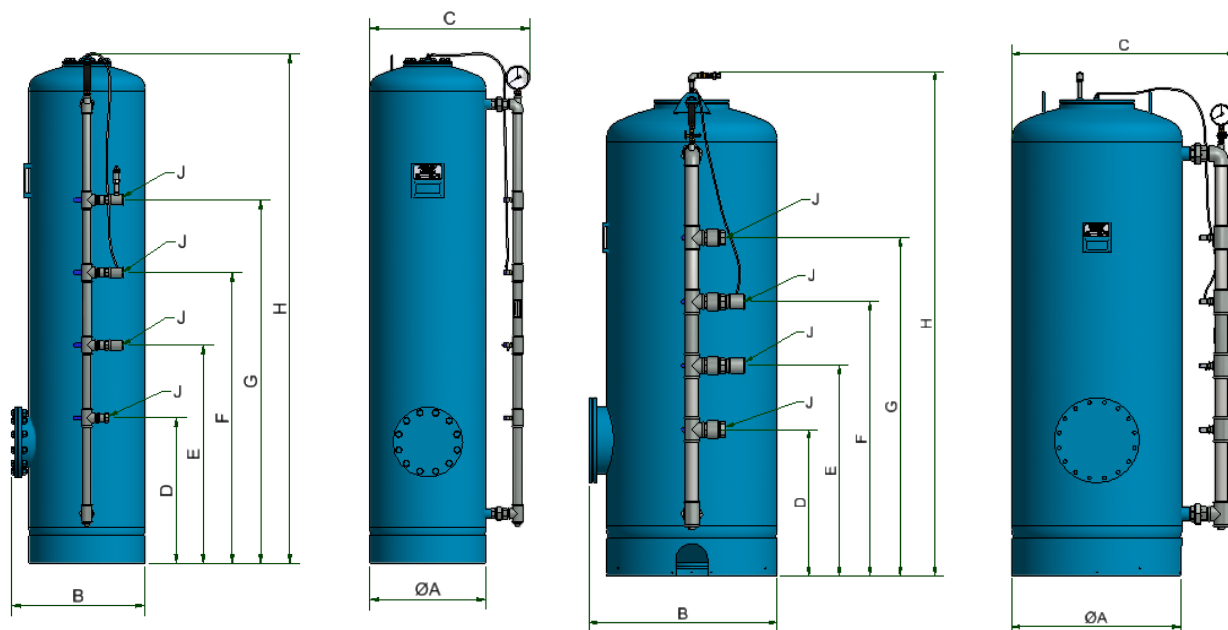
Will be updated

Ålestrup waterworks

Will be updated

Manuelt trykfilter type NS 20-200

Vandtemperatur maks. 50 °C | Rørsystem af galvaniseret stål | Beholder af stål | Udvendig overfladebehandling: Epoxymaling af høj kvalitet | Indvendig overfladebehandling: Ingen | Option: Indvendig og udvendig varmgalvanisering | Fremstillet og CE-mærket iht. trykbeholderdirektivet (PED)



Modul 20-40-60

Modul 80-130-170-200

Ydelse og vægt

Anlægsstørrelse	Ydelse [m³/h]	Transportvægt¹ ca. [kg]	Bruttovægt² ca. [kg]
20	1,2	100	215
40	2,4	140	410
60	3,6	200	710
80	4,8	320	1400
130	7,8	400	2100
170	10,2	520	3000
200	12	600	3500

1. Vægt ekskl. fyldning og vand, inkl. emballage

2. Vægt inkl. fyldning og vand

Målspecifikationer

Anlægsstørrelse	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H¹ [mm]	J Tilslutning
20	300	370	475	220	520	820	1120	1390	Rp ¾
40	400	470	575	370	670	970	1270	1680	Rp 1
60	480	550	655	600	900	1200	1500	2105	Rp 1
80	650	730	880	660	960	1260	1560	2310	Rp 1½
130	800	880	1030	690	990	1290	1590	2380	Rp 2
170	900	1010	1130	710	1010	1310	1610	2420	Rp 2
200	1000	1110	1230	730	1030	1330	1630	2450	Rp 2

1. Frihøjde over anlæg minimum 300 mm

De viste tegninger er vejledende og kan variere med ekstraudstyr og konfigurationer