

alegi:

All biologic and industrial processes in life are depending on water

Cost-efficient and robust disinfection-equipment UV-equipments for disinfecting drinking-, process- and waste-water are being used for some years now. The equipments on the market are used for water-amounts in the m³-range. Problems result of contaminations of the lamps in the water. An equipment was developed for small water-amounts which is insensitive to contaminations through improvements in systems engineering. Water-disinfection with UV-radiance is an inexpensive and nonpolluting method because the use of chemicals is not required.

The idea was the development of a water-disinfecting equipment for small water amounts. We developed an equipment in corporation with GTZ (German Gesellschaft für Technische Zusammenarbeit) and ESWE Versorgungs-AG in Wiesbaden/Germany. Unlike most of the aquatic equipments, the radiation source of his equipment is arranged externally to a quartz glass tube surrounded by water. Therefore an extensive cleaning of the lamps is not required. Additionally, an ideal operating temperature is guaranteed due to the air cooling. Further technical details..

Result: The multiple patented equipment is currently being used for degermination of hot water tanks, fountain water purification and disinfection of airwashers. The equipment is also ideal for drinking water disinfection in Third World Countries: the equipments' electric overall performance is very low. It can be operated with a photovoltaics-equipment and a battery.



the "alegi 1.200", with one 16 W Lamp

specification sheet (alegi 1.200)

Dimensions (Ø x length):	100 mm x 560 mm
Disinfecting performance for e.coli, legionella, etc:	1200 l / h
Disinfectable water level (at 20 °C) legionella, etc:	to 60.000 L (water circulation etc.)
Quartz glass tube:	20 mm x 380 mm
Water pressure:	6 bar
Sealing (UV-resistant):	O - Ring
Water connection:	1,5"
Number of lamps:	1
Electr. power input lamps:	1 x 16 W
Power supply:	120 - 260 VAC or 12 / 24 VDC
Lifetime of the lamps:	9.000 h
Control unit:	ELB

The multiple patented equipment is currently being used for degermination of hot water tanks, fountain water purification and disinfection of airwashers. The equipment is also ideal for drinking water disinfection with help by the sun: the equipments' electric overall performance is very low. It can be operated with a photovoltaics-equipment and a battery.

Reliable advantages of the alegi-system:

Innovative reflection-construction enables low power consumption with simultaneous high efficiency.

Minor loss of power of the emitters at heightened water-temperatures.

For the first time a disinfection is possible at temperatures over 60° C. Conventional systems permit a maximum of 30° C.

No cleaning necessary. Even complicated rinsing with acid as well as storing dangerous chemicals is not necessary.

The explicit regulations according to the German VDI 6022 are complied with.



Functional characteristics: Water is pumped through a quartzglass-tube which is located inside an aluminum tube. Low pressure UVC-emitters are arranged around the quartzglass-tube which emit a wavelength of 253,7 nm. The radiance destroys the germs' DNA and prevents its cell division. Special O³ - Emitters establish a radiance with wavelength lower than 200 nm, which produce free Ozone-radicals out of induced atmospheric oxygen. Ozone is one of the strongest oxidants. It reduces environmental toxicants, prevents biofilms and includes a temporary repository effect before it decomposes into oxygen again. Another advantage of Ozone is that it even destroys germs and is much more effective than Chlorine. Contact with dangerous chemicals is not

applicable. Regarding airwashers, an optimized conductometry with self-acting desalination can be carried out.

Range of application: Homes with cisterns and water with bad quality. The use of alegi-equipments improves the quality of life in regard to (water-hygiene and – flavour) our valuable water which is constantly decreasing. **alegi** equipments eliminate contamination through nitrate, algae and germs and diffusion through particulate materials. Residue is not an issue anymore. The impact of lime is reduced by 70% with **alegi** equipments. The taste and smell of water is enhanced. Chemicals are not added anymore. **alegi** equipments are reliable and have already been used in homes/cisterns for a long time.

The hazard of germinated water increases:

The hazard of germinated water increases. New cholera stock, toxic e.coli bacteria, legionella, protozoa, etc. are responsible for the increase of numbers of water-diseases even in countries with plenty of clean drinking-water.

Experts assume that one third of the gastro-intestinal diseases are caused by inadequately filtered water. The Drinking Water Ordinance dictates that water has to be free of pathogenic germs which can cause infections or contagious diseases.

Escherichia coli (e.coli), Enterococcus and coliform bacteria are numbered among these and are credited as indicator organisms. When e.coli is detected then it is considered as an evidence for fecal contamination. Such contaminations are basically hazards of infectious diseases and have to be taken seriously.

Bacterial und viral contaminations of drinking water can cause severe diarrheal illnesses that are life-threatening especially to infants and toddlers but also adults and children with weak immune defense. If wounds are cleaned with polluted water it can lead to severe wound-infections.

From the point of view of the German Robert Koch Institute, not only drinking water or water used to prepare food have to be drinking water quality in terms of the Drinking Water Ordinance. Even water for body hygiene, washing and cleaning should meet the requirements of the Drinking Water Ordinance.

Water-degerminating-equipments are available on the market. However, they have a lot of major technical disadvantages, especially those that are used in developing countries:

Laminar waterflow

Hazard to skin and eyes

Heavy decrease of efficiency through hightened surface temperature of the radiator

Bad reflectance of the used material

Difficult cleaning

Low transmission-rate

Organic compounds can only be oxidated through secondary treatment

Very expensive UV-sensors

Solutions for the particular issues:

Laminar waterflow

Solution: There is a round swirlplate with holes, where the water flows through, in front of the water inlet inside the reactor. This plate is installed diagonally. Whereby the water gets swirled and this causes a consistent irradiation. Furthermore, a higher retention period is achieved.

Hazard to skin (erythema) and eyes (conjunctivitis) Erythema is the redness of skin caused through ultraviolet radiance. An actinic reaction causes a swelling of the cells inside the skin, redness and later on flaking of dead layers of the skin. Already a small dosis of UV-C rays in the range of 253,7 nm that reach the eyes cause painful infection of the conjunctive tissue – conjunctivitis, because the eyes are not protected through cornea like other body parts.

Solution: The swirlplate, as mentioned under point 1, prevents that UV-rays get through outwards even if the equipment is not unplugged. This is especially important when used in developing countries. It is prevented because the swirlplate is located at a distance in front of the water inlet. There are no holes on the swirlplate above the inlet. Therefore the inlet is covered for the eyes. The holes are located outside the inlet where the water flows through. This is very important because radiation can cause serious illnesses in a split second.

Heavy decrease of efficiency through heightened surface temperature of the radiator Concerning UV-C rays, as all discharge lamps, temperature is in relation to the UV-yield. The Hg-low pressure resonance line is generated the strongest when the right steam pressure is created in the discharge tube. The ideal pressure is set in an ambient temperature of 20 degrees Celsius. The flask temperature is 40 degrees Celsius in an open system. In most of the UV-degerminating-equipments on the market, the radiator is located in a protective tube made out of quartz glass which is surrounded by flowing water. The radiators' heat output in the protective tube can lead to heat accumulation and therefore enormously reducing the UV-efficiency.

Solution: The construction of the equipments were changed to an effect that water is lead through a quartz glass tube and one or more radiators are located in the open air space between the glass tube and the outer shell. In most cases an ideal temperature of the radiators' tube-barrier is accomplished due to the large surface of the outer metalcoat and better heat conduction. In extreme cases the temperature is measured with ordinary electronic circuits and if necessary, filtered air is blown along a small diaphragm pump through the equipment. Radiator-capacity, of ten to twenty times higher, is required if warm water flows through the equipment, where the radiators are located in the quartzglass tube. The temperature does not matter with WaterVitt equipments. The low radiator-capacity can be maintained. Therefore new application areas can be introduced in industrial countries, for example legionella prevention in hot-water systems. A UV-equipment is built in the circulation circuit. Thereby the boiler and the major part of the tubing up to the tap can be degerminated.

Bad reflectance of the used material

Solution: In the equipment, where the radiator is located inside the glass tube, the water comes in contact with the outer metal shell which has to be made out of stainless steel. But stainless steel has a very low reflection rate of 25 to 30%. The shell can be made or coated by other UV-proof materials so that no water can come in contact. for example out of

- untreated aluminium 40 – 60 %
- treated aluminium 60 – 89 %
- anodized aluminium 65 – 75 %
- magnesium oxide 75 - 88 %
- calcium carbonate 70 - 80 %

Difficult cleaning

Solution: It is required with equipments on the market that they are rinsed with acid approximately every two weeks to remove developed, germinated mucilage which can recontaminate water because a mechanical cleansing is not possible. With WaterVitt, infrequent cleansing is only necessary because there is no clogging on the smooth glass wall and algae is destroyed. An ordinary bottle brush will do if cleansing is still required. A self-acting cleansing can be provided for special applications which works without energy efficiency but only with distribution pressure.

Low transmission-rate

Solution: There is a strong reduction of the sterilization rate when water is contaminated through sediments, suspended solids, metal compounds, etc. This can have the result that certain areas are not degerminated and there is an increased germination when radiation is minimized. All producers have the same problem with direct radiation when water flows through the equipment without pretreatment. Water is very tarnished through washed up earth-masses, especially in flood plains. Therefore a simple procedure was developed. A second tube is placed inside the quartz glass tube which is closed at the ends. Depending on the contamination, a thin or broad film can be created through the glasstube diameter where the water has to flow through and an adequate transmission rate is achieved. A radiator can be placed inside the additional glass tube whereby the film is radiated from the inside and outside. The equipments' advantage is that degermination is available instantly and a complex filtration is not necessary. A cascade flow of water and its direct radiation is implicitly not advised due to risk of accidents.

Organic compounds can only be oxidated through secondary treatment

Solution: A radiator should be used which generates texture-destroying rays in the range of 254 nm and creates ozone out of atmospheric oxygen below 200 nm. Air is blown through the equipment and Ozone is created. This Ozone is added to the water. The oxidation product and the excess ozone escape through an aspirator which is disposed downstream to a charcoal absorber.

Very expensive UV-sensors

Solution: A glass top is laminated with four-type luminescent material. This converts the UV-rays, which aren't visible, into visible light and are processed through a simple photoelectric cell. Lenses should be installed for use in developing countries to verify the function of the rays.

In some countries without AC mains power a degermination with photo-voltaic equipments is the only possibility. A lot of money can be saved through the advancements as described because the rays, solar generator, adjuster and the battery can be dimensioned considerably smaller.

Please note that this is only a short outtake of improved possibilities. 35 patent claims were accepted. 24 additional claims are in the process of being tested. Therefore there are countless combination possibilities on site according to the requirements.

Result:

UV-Degermination is the most efficient, cheapest and harmless of all current degermination-methods.

Beyond dispute, the biggest advantage of this procedure is that dangerous substances will not be added to the water.

Therefore the waters' flavor nor chemical consistence will be altered. With thousands of installed equipments worldwide, UV-technology has proven that UV-radiance is highly effective against pathogenic agents, viruses and bacteria.

The use of nonpolluting **alegi** UV-light instead of potentially harmful chemicals will lead to a microbiological deactivation-rate of 99,99% and higher. Water is therefore safe, hygienic and low priced.

UV-equipments are technically easy to handle and effective. They are low maintenance and reliable. Handling with dangerous gases does not apply. There is no harm for the operator or the environment.

alegi-equipments are available from 900 liters/hour to 800.000 liters/hour.

We are looking for distributors.

alegi solutions - made in Germany

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