mineralit GmbH®

product information

At least 50 % energy saving!

The innovation in the field of aquaculture technology

mineralit® Zander breeding basin with implemented damper registers

mineralit® low-energy fish breeding basins

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1. Why Aquaculture?

Aquaculture itself gives the chance to produce specific economical exploitable animal and plant species for the human consumption. The production in Aquaculture increased between 1990 and 1999 from 13 to almost 33 mio tons. Often Aquaculture is connected with extensive troubles within the fish farming as well as unacceptable consequences for the environment due to not fully developed technologies.

For the goal of an environmental friendly procedure in the Aquaculture praxis two main ways emerged:

1. **A compact circular flow system:** In a closed circular flow the cultivated organisms are within a closed water basin. The water runs through diverse compartments, in which the charging and purification of water balance each other. Closed systems are usually realized on land in basins or in lakes.
2. **An open system with closed balance of materials:** In an open system surroun ding water streams through the basins. They are typically at sea as net cage or leashes system. The neutral environmental balance bases on a polyculture of diverse organisms which fill the different ecological compartments. The key is the balance in the whole system.

2. Circular flow systems - a focal point

The biggest part in Aquaculture is occupied by high intensive fish breeding systems which are independent from location. So-called circular flow systems consist of different stations for water filtration. Here fish can be generated in salt-water as well as in fresh-water without being fed by a natural water resource. This procedure gained importance since the costs of natural water increased and the markets need fish never mind which season.

Almost all analyses show that these circular flow systems need to be technically and technologically optimized. Especially for locations like Mid-Europe it is interesting to breed fish at such prices that this is capable for competing.

Therefore the following technical and technological requirements are needed:

low-energy fish breeding basins

1. Robust, low-maintenance and durable basin constructions
2. Rational warming and cooling of water (low-energy solutions)
3. Water preparation, supplying of fresh water, eduction of used water, control ling of different water quality
4. Maintenance, purification and operator convenience

2.1. mineralit® as universal construction material in fish farming basin technology

2.1.1. The basin material mineralit®

Since many years the firm mineralit® is specialized on developing, producing and merchandising slabs out of MMA- bounded mineral cast (MMA = Metamethyl-acrylat, among experts also called Polymer Concrete). Since 1998 more than 900.000 m² slabs were sold in the field of balcony and curtain-wall facing. Here we are talking about appliances which are approved by the building authorities. Therefore the firm has long-time experience with the manufacture and applian-ce, especially with the long consistency and the structural safety.

mineralit® is a high-performance- composite material, which consists to 94% of natural sili-ceous sand (see the picture above) that is bounded with quality reaction resin. Out of this material are casted molds that have very low erosion.

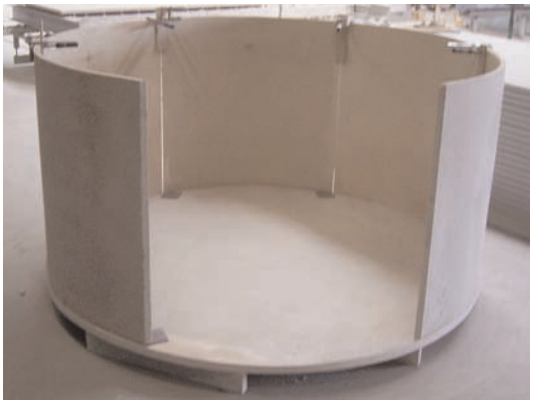
low-energy fish breeding basin

Recently mineralit® is also used for biogas-fermenter. Especially for this usage the material can show its mechanical and chemical qualities. Out of this the demand for low-energy fish farming basins for the Aquaculture developed. When using mineralit® for fish breeding basins you can assume that it will be firm still in 30 years without maintenance. The following **material characteristics** predestine this material for such an appliance:

1. Absolute gas-and waterproof of the material
2. High capacity also against aggressive chemicals and therefore appropriate usage for salt water
3. Confirmation of the physiological harmlessness
4. High physical variables (up to 6 times higher than concrete). That enables to make slight constructions in every wished geometrical form
5. It is possible to produce gas-and water-resistant basins in almost every size and form without any problems to a low price.
6. The surface can be designed with a high-quality PMMA- sealing.

2.1.2. The constructive body of mineralit® basin design

Basically all basins are constructed out of several slabs which are pre-dimensioned according to the size of the basin. The slabs are durable connected through cold welding.



A round basin is pre-assembled. The assembly can be made in the factory or directly on the spot.

Through this method it is possible to design basins in almost every size and geometric form. Basically it is possible to purchase complete units from factory. Concerning the minimization of transport-costs it is possible to set up basins from

the standard program on spot. The mineralit®-basin-assortment contains the standard-basin-assortment and special solutions. Here it is also possible to set them up in factory or on spot.

Completed circular basin

Angled basin

Double-walled basin

Stainless steel run-out

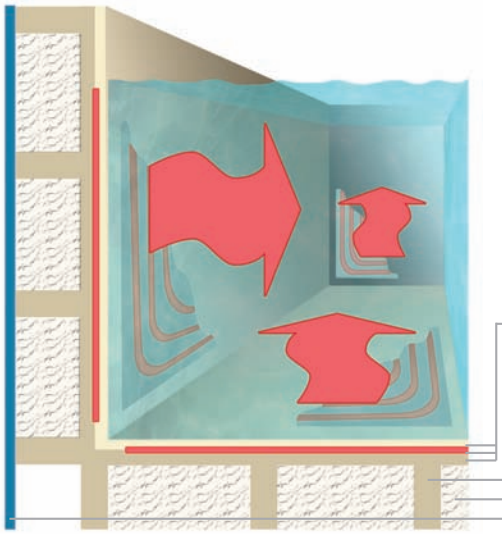
After the assembly the basins are ready for the high-quality acrylic resin sealing (a confirmation for innocuousness does exist). In this regard the colour-settings are carried out.

Another advantage of mineralit® basin constructions is that any pipe connection can be pre-assembled in factory. Nevertheless it is also possible to install them afterwards. Important to mention here is the gas- and water- resistance also with later installed pipe connections.

low-energy fish breeding basins

2.1.3. The energy saving effect of mineralit® basin design

Thermal collectors (as tube-system or aluminium collector elements) will be sealed if stable temperatures are needed or water needs to be heated up or cooled down. As the material is only 5 to 8 mm strong the warmth can easily be increased or decreased.



Constructive design of mineralit®- basin walls

mineralit®- slab with fused damper register

Ribbed construction to assure the bending strength

Upgraded insulation damping

Outer coverage out of wear-resistant polyethylene slabs

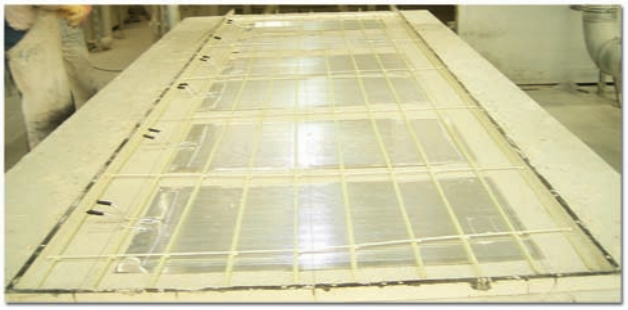
Experiences from heating systems in walls and on the ground show that with such slab elements only small flow temperatures are needed to get stable temperatures in big rooms.

Several elements are assembled to one basin. Through cold welding connections and edges are gas- and water-resistant. The ribbed constructions are also installed with cold welding. The complete basin will be provided with upgraded insulation that no warmth can get lost.
To avoid unnecessary energy wasting the basin needs a strong coverage. Recommended are acrylic double skin sheets. They have low weight and a considerable overall coefficient of heat-transfer. Also they are translucent and robust against other mechanical interferences.

Example for energy necessity:

mineralit®- basins with thermal collectors, upgraded insulation and coverage have an energy necessity of 1-2 kWh/m³ to reach stable 28 °C water temperature. The average heat loss is 1-2 °C/h. In contrast to normal systems **the energy saving is at least 50%**.

Practical example of manufacturing individual basin constructions (special solution)



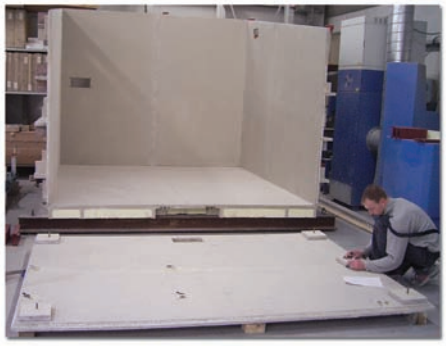
Model with damper register and armor

The second coat is casted

Alternative to aluminium damper register synthetic tubes can be casted in the slabs

Ribbed construction to manufacture bigger, more bending-resistant basin elements

Floor slab with integrated upgraded- insulation-damping



To the left: basin assembly

To the right: basin ready for transport

low-energy fish breeding basins

2.2. mineralit®- basins within a circular flow system

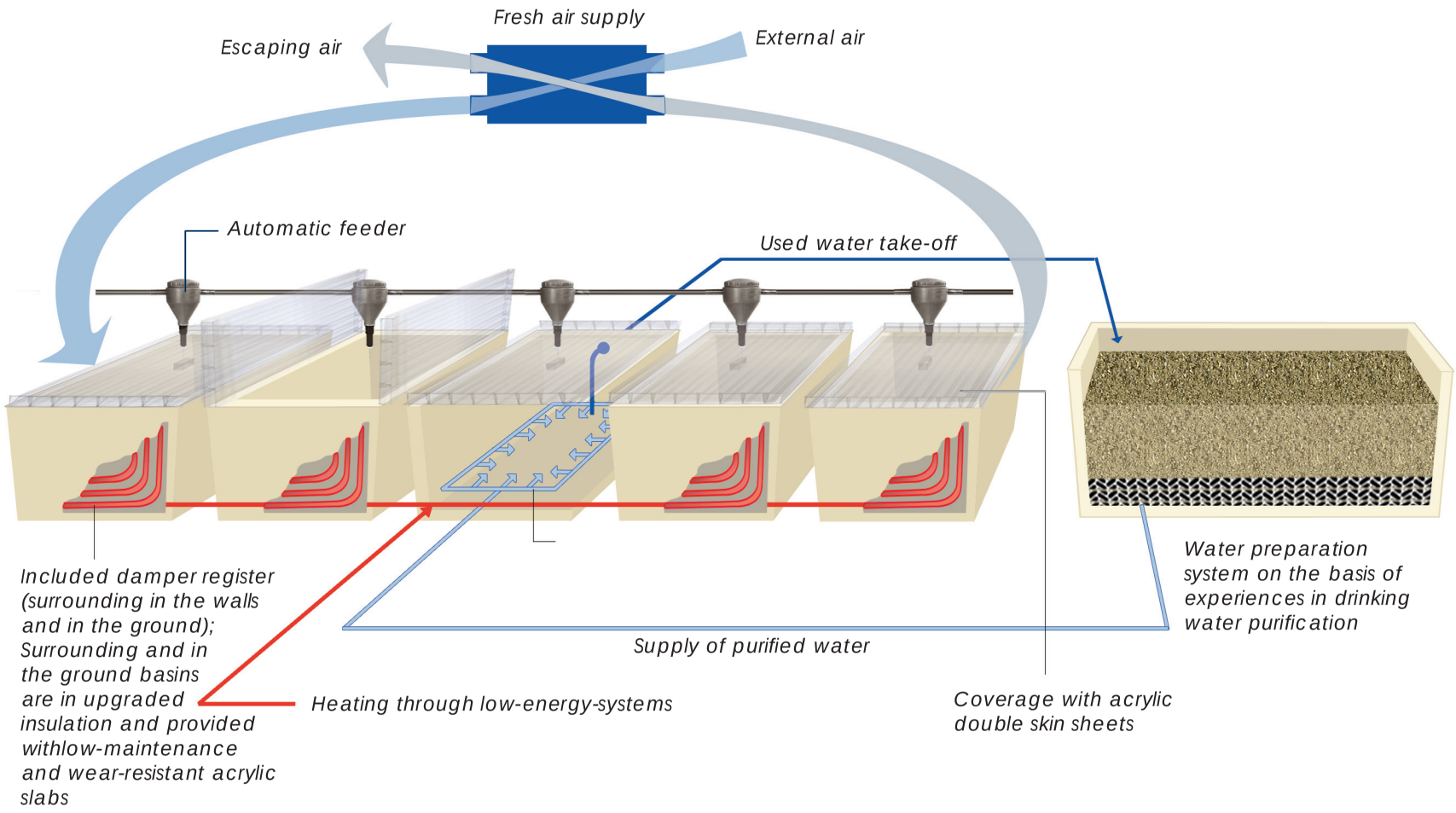
mineralit®- basin systems offer new possibilities of planning, building and operating circular flow systems in Aquaculture. **Characteristics of unique position** follow:

1. Production of robust, durable and low-maintenance basin systems in almost every size and form
2. The specific constructive solution of energy input (included thermal collectors) makes it possible to produce so- called energy saving systems, which increases the competitiveness
3. The characteristic values of high chemical consistency of the material mineralit® gives the possibility to breed without problems in fresh and salt water with the mineralit®-basin system
4. The absolute physiological harmlessness of mineralit® as basin construction or the sealing of the surface
5. Temperature steered basins with upgraded insulation do not need any extra buildings. (insulated). For the protection against direct climatic influence a roo fing like a tent is adequate (see scheme page 12)
   In the scheme on page 11 is shown an example of the constructive design for a circular flow system with mineralit®- basins

Brief description of the circular flow system

Recommended for a circular flow system is the basin construction as one big basin with small once included (size according to the construction of the circular flow system). The basin will be pre-assembled in factory and assembled on spot. The walls on the outside and the ground slab include thermal collectors and have an upgraded insulation. The outside slabs are sealed with a low-maintenance and wear-resistant surface (PE-slabs). The several basins are separated with bridge walls. These are waterproof and connected with the outside walls. To mention here is that these bridge walls can be removed for bigger sizes without any problems.
For assuring the stable water temperature and especially to avoid heat losses through the water surface acrylic double skin sheets are used for coverage. They can be folded and they have a special opening for feeding.
To secure the supply of fresh air a special fresh air pump is installed. When changing the air 95 % of the returned warmth is used, which leads to a minimum heat loss.

Example of a circular flow system on the basis of mineralit basins



Example of a circular- flow- system with temperature- regulation and upgraded insulation

low-energy fish breeding basins

2.3. Water preparation, Supplying fresh water, Eduction of used water, Control

A scheme about the concept of the water preparation is on page 12.
Concerning the usage of mineralit® basin systems for fish farming in circular flow systems any water preparation system can be used.

2.3.1. Procedure description of the water preparation system

The offered technique follows the needs of water preparation for several waters, which are used in fish farming. The basics about water preparation are clear since the drinking water purification is known. This type of water preparation is mainly used for drinking water purification as open filter system. This experience should be taken into account for the concept of circular flow systems.

The filter technique in its basic structure stayed the same and was adapted to the needs in fish farming. Nevertheless the output of the system is new concerning the optimal energy input. Every preparation is unique and needs a certain initial running. This is especially reasonable through the form of the basins. Therefore the possibility to interfere is needed. With mineralit® basin systems it is easy to change the system technique if needed.

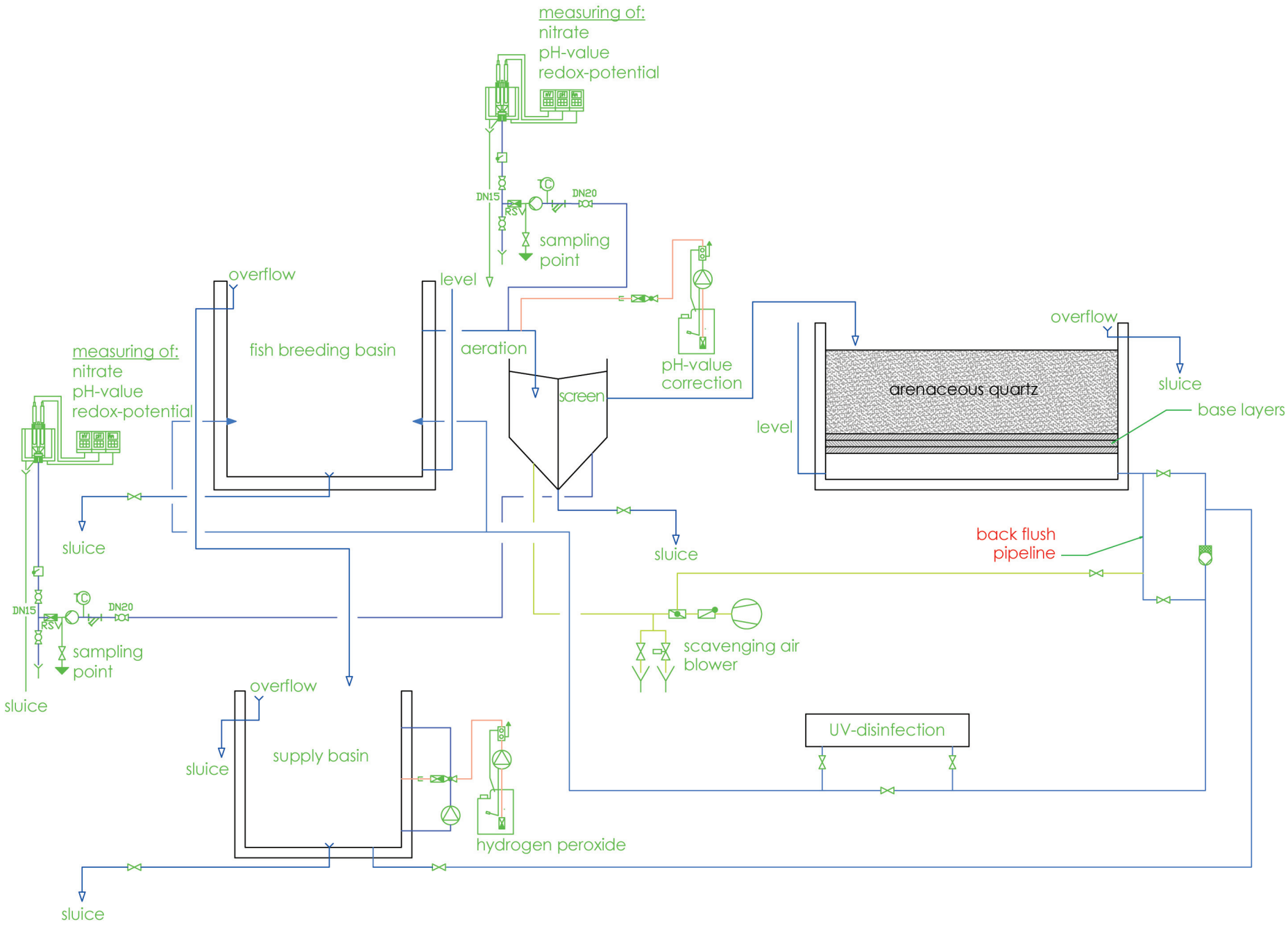
The water drain of the several fish breeding basins will be carried into a discharge basin with integrated aeration and fine screen. From here on the vented water which is free of rough impurities is brought to an open filter through a pump and a gutter. The filtered water is taken from the basin with clear water with a frequency transformer. The clean water is carried to the fish breeding basins as needed.

The necessary heating of the water happens through the ground of the basin and the walls through integrated heating collectors. The basin temperature is stable through regulators.

The several fish breeding basins get their water through hydraulic inlets. Inside the basins is a circular PE-pipe, which consists of hydraulic nozzles. The nozzles are distributes so that no zones without water change exist. Also the nozzles are in such an order that the waist can be leaded away without any problems.

The inducted water will be carried away through the outlet which has a decline of 1:100. Than it will be delivered into the basin which is split up in two part (the screen insert and the basin of pacification). From the basin of pacification the

System scheme of water preparation



water will be delivered to a filter for the preparation of the water. The two chamber basin and the storage tank are connected with a pipe. This is necessary for the backwashing of the filter through the pump. In case of average a fast filling can be done through the pipes.

Because of the deficit of water through out the process the necessary fresh water can be conducted through an automatic system.

The water from the backwashing will be extracted from the storage tank.

To avoid microbial contamination it is necessary to feed hydrogen peroxide.

Measuring and control systems proof water parameters like the pH-value, oxygen content and redox-potential.

The sample of water is taken 2 times. Samples of water are taken 2 times to get a correct pH-value.

The placement of the measuring instruments allows the supply of pH-value-correction agents.

Within the complex system are all necessary security and control elements included and applied in a control cabinet.

The water preparation system is hand controlled.

Only the measuring and control elements, the pH-value-dose pump, fresh water feeding, the steering of the pump and the steering of the level are included in the system and control cabinet.

The conception of the components of the system allows rapid changes. The technique of the system will be controlled before fishes are applied.

Several processes and the capability will be proven. An acceptance certificate will be prepared.

2.3.2. Advantages of the recommended water preparation technique compared to the conventional known systems in the field of fish farming and water preparation

1. The filtration of the water is known since the purification of water
2. The optimal construction of pipeline-dimensions through a very low flow velocity.
3. Good hydraulic design for feeding the fresh water
4. Distribution of fresh water through a surrounding pipeline with nozzles
5. Optimal energy effort through frequency-regulated pumps
6. Control of the systems through levels of the basins and the filtration system
7. Monitoring of water quality through latest measuring and control system technique with clear handling
8. Quick reactions on changes of water parameters
9. Low energy entry because of the isolation of the basins and the screen
10. Holding stable water temperatures because of the applied heating system
11. Ergonomic composition of pipelines, fittings and aggregates
12. Therefore secure handling through the operator
13. Control of the system technique through a control cabinet
14. Secure operation of the complete system technique through good and approved technique
15. Robust and stable system components
16. Low maintenance of the system technique
17. Low effort of maintenance
18. There are no areas with corrosion within the system

mineralit® GmbH

product information

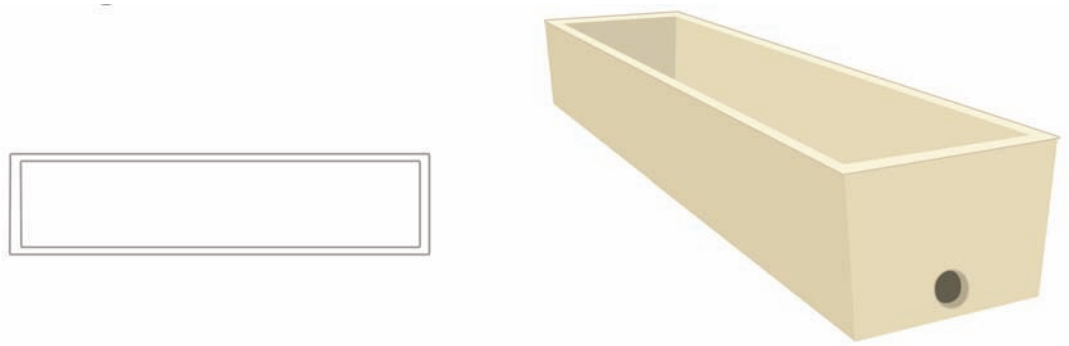
Standard range

low-energy fish breeding basins

Our standard range includes all popular basin forms, sizes and designs. If your desired size of the basin is not mentioned here, do not hesitate to contact us. It is no problem for us to produce basins in individual sizes. The basins can be transported in separate parts and assembled on spot. Therefore even a slab-measurement of 50 m can be realized easily.

The mineralit®- fish breeding basins are available in **standard** version or in **low-energy** version (with integrated heating and cooling registers and upgraded insulation-damping)

Long stream basin



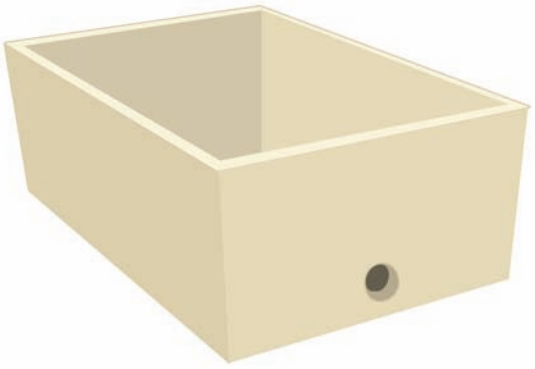
Standard-version: robust, firm construction out of mineralit®
Low-energy-version: mineralit® slabs that are able to cool and heat through heating or coiling registers and upgraded insulation. You can decide which walls of the basin should be cooled or heated (for instance all or only the ground).

Inside measurements in mm (LxWxH)	**Low-energy** item nr.	**Standard** item nr.
2.000 x 1.000 x 600	1 - NE 20 10 06	1 - 20 10 06
3.000 x 1.000 x 600	1 - NE 30 10 06	1 - 30 10 06
4.000 x 1.000 x 600	1 - NE 40 10 06	1 - 40 10 06
5.000 x 1.000 x 600	1 - NE 50 10 06	1 - 50 10 06
3.000 x 1.000 x 1.000	1 - NE 30 10 10	1 - 30 10 10
4.000 x 1.000 x 1.000	1 - NE 40 10 10	1 - 40 10 10
5.000 x 1.000 x 1.000	1 - NE 50 10 10	1 - 50 10 10
5.500 x 1.000 x 1.000	1 - NE 55 10 10	1 - 55 10 10
6.000 x 1.000 x 1.000	1 - NE 60 10 10	1 - 60 10 10
6.000 x 2.000 x 1.000	1 - NE 60 20 10	1 - 60 20 10

The basins (both versions) will be produced as ordered **with excrement dump or without it**. More options are **with the boreholes of the overflow** at the superior seam and the **free selectable position of the drain**.

low-energy fish breeding basins

Rectangle basin



Standard-version: robust, firm construction out of mineralit®
Low-energy-version: mineralit® slabs that are able to cool and heat through heating or coiling registers and upgraded insulation. You can decide which walls of the basin should be cooled or heated (for instance all or only the ground).

Inside measurements in mm (LxWxH)	**Low-energy** item nr.	**Standard** item nr.
2.000 x 1.000 x 1.000	2 - NE 20 10 10	2 - 20 10 10
2.500 x 1.000 x 1.000	2 - NE 25 10 10	2 - 25 10 10
3.000 x 1.000 x 1.000	2 - NE 30 10 10	2 - 30 10 10
3.500 x 1.000 x 1.000	2 - NE 35 10 10	2 - 35 10 10
4.000 x 1.000 x 1.000	2 - NE 40 10 10	2 - 40 10 10
2.000 x 1.500 x 1.000	2 - NE 20 15 10	2 - 20 15 10
3.000 x 1.500 x 1.000	2 - NE 30 15 10	2 - 30 15 10
3.500 x 1.500 x 1.000	2 - NE 35 15 10	2 - 35 15 10
4.000 x 1.500 x 1.000	2 - NE 40 15 10	2 - 40 15 10
2.000 x 2.000 x 1.000	2 - NE 20 20 10	2 - 20 20 10
3.000 x 2.000 x 1.000	2 - NE 30 20 10	2 - 30 20 10
3.500 x 2.000 x 1.000	2 - NE 35 20 10	2 - 35 20 10
4.000 x 2.000 x 1.200	2 - NE 40 20 12	2 - 40 20 12
4.000 x 3.000 x 1.200	2 - NE 40 30 12	2 - 40 30 12
5.000 x 3.000 x 1.200	2 - NE 50 30 12	2 - 50 30 12
6.000 x 3.000 x 1.200	2 - NE 60 30 12	2 - 60 30 12

The basins (both versions) will be produced as ordered **with excrement dump or without it**. More options are **with the boreholes of the overflow** at the superior seam and the **free selectable position of the drain**.

low-energy fish breeding basins

Circular basin

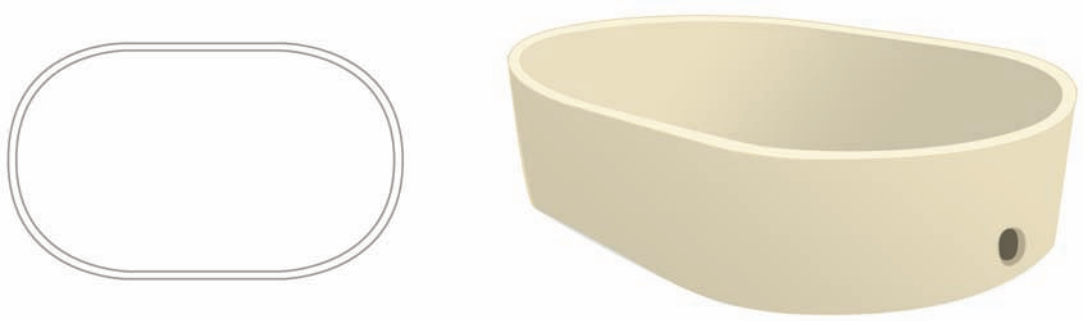
Standard-version: robust, firm construction out of mineralit®
Low-energy-version: mineralit® slabs that are able to cool and heat through heating or coiling registers and upgraded insulation. You can decide which walls of the basin should be cooled or heated (for instance all or only the ground).

Inside measurements in mm (ØxH)	**Low-energy** item nr.	**Standard** item nr.
1.000 x 600	3 - NE 10 00 06	3 - 10 00 06
1.000 x 1.000	3 - NE 10 00 10	3 - 10 00 10
2.000 x 600	3 - NE 20 00 06	3 - 20 00 06
2.000 x 1.000	3 - NE 20 00 10	3 - 20 00 10
2.500 x 600	3 - NE 25 00 06	3 - 25 00 06
2.500 x 1.000	3 - NE 25 00 10	3 - 25 00 10
3.000 x 1.000	3 - NE 30 00 10	3 - 30 00 10
3.500 x 1.000	3 - NE 35 00 10	3 - 35 00 10
4.000 x 1.000	3 - NE 40 00 10	3 - 40 00 10
4.500 x 1.000	3 - NE 45 00 10	3 - 45 00 10
5.000 x 1.000	3 - NE 50 00 10	3 - 50 00 10

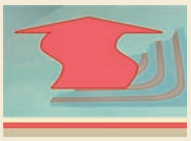
The basins (both versions) will be produced as ordered **with excrement dump or without it**. More options are **with the boreholes of the overflow** at the superior seam and the **free selectable position of the drain**.

low-energy fish breeding basins

Oval basin



Standard-version: robust, firm construction out of mineralit®
Low-energy-version: mineralit® slabs that are able to cool and heat through heating or coiling registers and upgraded insulation. You can decide which walls of the basin should be cooled or heated (for instance all or only the ground).



Inside measurements in mm (LxWxH)	**Low-energy** item nr.	**Standard** item nr.
3.000 x 1.500 x 1.000	4 - NE 030 15 10	4 - 030 15 10
4.000 x 1.500 x 1.000	4 - NE 040 15 10	4 - 040 15 10
5.000 x 1.500 x 1.000	4 - NE 050 15 10	4 - 050 15 10
5.000 x 2.000 x 1.200	4 - NE 050 20 12	4 - 050 20 12
6.000 x 1.500 x 1.000	4 - NE 060 15 10	4 - 060 15 10
6.000 x 2.000 x 1.200	4 - NE 060 20 12	4 - 060 20 12
7.000 x 2.000 x 1.000	4 - NE 070 20 10	4 - 070 20 10
8.000 x 2.000 x 1.200	4 - NE 080 20 12	4 - 080 20 12
9.000 x 3.000 x 1.200	4 - NE 090 30 12	4 - 090 30 12
10.000 x 3.000 x 1.200	4 - NE 100 30 12	4 - 100 30 12
12.000 x 4.000 x 1.200	4 - NE 120 40 12	4 - 120 40 12
14.000 x 5.000 x 1.200	4 - NE 140 50 12	4 - 140 50 12

The basins (both versions) will be produced as ordered **with excrement dump or without it**. More options are **with the boreholes of the overflow** at the superior seam and the **free selectable position of the drain**.

low-energy fish breeding basins

Circular stream basin

Standard-version: robust, firm construction out of mineralit®
Low-energy-version: mineralit® slabs that are able to cool and heat through heating or coiling registers and upgraded insulation. You can decide which walls of the basin should be cooled or heated (for instance all or only the ground).

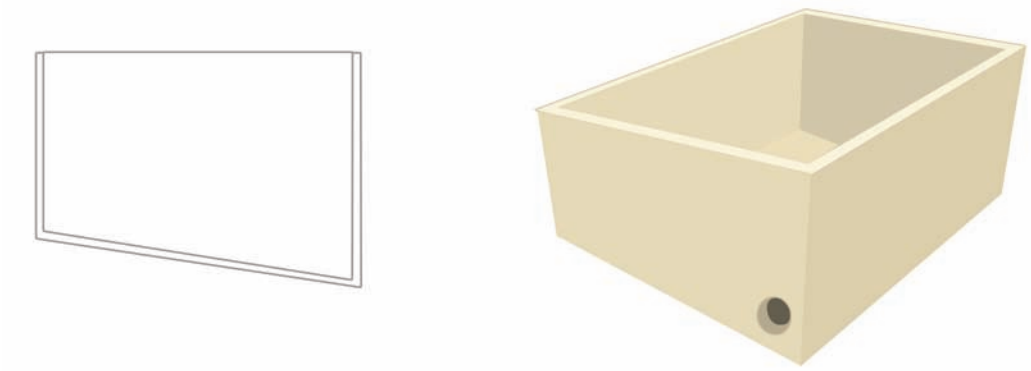
Inside measurements in mm (LxWxH)	**Low-energy** item nr.	**Standard** item nr.
3.000 x 1.500 x 600	5 - 30 15 06	5 - 30 15 06
4.000 x 1.500 x 600	5 - 40 15 06	5 - 40 15 06
5.000 x 1.500 x 600	5 - 50 15 06	5 - 50 15 06
6.000 x 1.500 x 600	5 - 60 15 06	5 - 60 15 06
3.000 x 1.500 x 800	5 - 30 15 08	5 - 30 15 08
4.000 x 1.500 x 800	5 - 40 15 08	5 - 40 15 08
5.000 x 1.500 x 800	5 - 50 15 08	5 - 50 15 08
6.000 x 2.000 x 800	5 - 60 20 08	5 - 60 20 08

The basins (both versions) will be produced as ordered **with excrement dump or without it**. More options are **with the boreholes of the overflow** at the superior seam and the **free selectable position of the drain**.

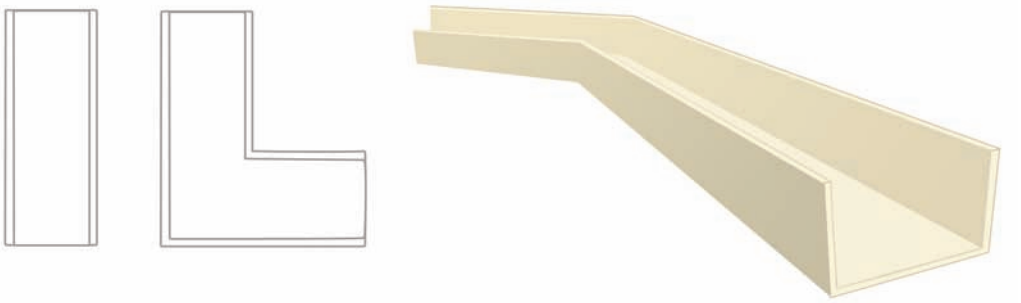
low-energy fish breeding basins

Sturgeon basin

An inclination of the ground for instance for the sturgeon breeding, can be realized if desired at a rectangular basin.



Connecting gutters



Different applications of the gutters out of mineralit® for instance as connection between 2 or more basins
The connecting gutters will be calibrated and produced according to your individual needs. Individual solutions for the corner are also possible.

low-energy fish breeding basins

Chemical resistance of mineralit

The chemical resistance was checked with test pieces which were stored for a long time with the biggest grain at 8mm.

Assessment: + resistant o partly resistant - not resistant

+ sullage (excrements	+ fatty acid	+ phenol
+ aluminium chloride	o hydraulic fluid	+ phosphoric acid (10%)
+ formic acid (10%)	+ isopropanol	+ phosphoric acid (20%)
+ amine	+ caustic potash (10%)	o azotic acid, conc.
+ ammonia (10%)	+ caustic potash (30%)	+ hydrochloric acid (10%)
+ ammonia (25%)	+ caustic potash (50%)	+ hydrochloric acid (30%)
+ ammonia, alcoholic	+ lime water	o hydrochloric acid, conc.
o arom. hydrocarbons	+ kerosene	+ corniness
- ethyl acetate	+ white spirit	+ sulphuric acid (10%)
+ ethyl alcohol	+ linseed oil	+ sulphuric acid (30%)
+ ethyl alcohol (10%)	+ seawater	+ sulphuric acid (50%)
+ benzene, normal	+ molasses	o sulphuric acid (80%)
+ benzene, supe	+ methanol	+ soap sud
- benzol	- chloromethane	+ silage
+ beer	+ milk	+ silicone dilution
+ blood	+ lactic acid (5%)	- carbon tetrachloride
+ boracic acid (3%)	+ lactic acid (10%)	o toluene
+ butanol	+ mineral oil	+ grape juice
o butyl aether	- chlorobenzene	- trichloroethylene
- chloroform	o propyl acetate	+ water, de-ionized
+ chlorine water	+ propan-1-ol	+ water, 90°C
+ chromic acid (10%)	+ sodium carbonate	+ hydrogen peroxide (3%)
+ chromic acid (20%)	+ sodium chloride (5%)	+ hydrogen peroxide (10%)
o chromic acid (40%)	+ sodium chloride, saturated	+ hydrogen peroxide (30%)
+ cyclohexane	+ sodium hydroxide (10%)	o hydrogen peroxide (80%)
o dibutyl phthalate	+ sodium hydroxide (30%)	+ wine
+ diesel oil	+ sodium hypochlorite (15%)	+ whisky
o dioctyl phthalate	o nitro propane	o xylene
+ acetic acid (10%)	+ olive oil	+ citric acid (10%)
+ acetic acid (20%)	+ oxalic acid (10%)	+ citric acid (30%)
+ acetic acid (30%)	- perchloroethylene	
+ acetic acid (80%)	+ petroleum	

Date: 09/2008

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