

RAS2020™ – Land-based Farming for the Future

KRÜGER  VEOLIA

RAS2020™ – the key solution for large-scale sustainable fish production



Facts of RAS2020™

Annual production capacity	1,200 tons
Total footprint of building	3,340 m ²
Efficient tank volume	6,400 m ³
Maximum daily feeding	4,200 kg feed /day
Maximum standing stock	450 tons
Water consumption	175-350 l/kg feed/day
Discharge water quality	Tailored to client

PATENTED

WATER TECHNOLOGIES



Selected references of land-based RAS2020™ fish farms

- Salmon – Swiss Alpine Fish, Switzerland
- Kingfish – Sashimi Royal, Denmark
- Salmon – Fredrikstad Seafoods, Norway

Sustainable Water Solutions for Aquaculture

Krüger and Veolia offer a **unique grow-out solution**:

RAS2020™ is a flexible, module-based recirculating aquaculture system with optimised production logistic, low operating costs and reduced footprint.

The fish are farmed in a controlled environment based on the state-of-the-art recirculation technology ensuring stability of the water parameters to optimise growth, reduce feed conversion ratio (FCR) and improve survival. RAS2020™ has brought in optimal flexibility in RAS systems resulting in minimum handling and moving of the fish using fish pumps reducing stress.

RAS2020™ is based on well tested Veolia components such as drumfilters, moving bed bio-reactor (MBBR), degasser and controlsystem.

The adjustable water velocity in the two round circular tanks secures optimal fish conditions in the entire water column. It is generated by flowmakers which secures an exchange of water in each tank section in less than a minute. The velocity of water is adjusted to size and species, which gives optimal fish welfare and subsequently high quality of meat.

Guaranteed performance

The specific RAS technology used in the RAS2020™ was developed in cooperation between Krüger and Krüger Kaldnes®, Veolia – a recognised worldwide supplier of RAS solutions with a long track record of references.

Reduced footprint – reduced costs

The production module is extremely compact with a total foot print of only 3,340 m². The compact RAS2020™ design allows for production of the same volume of fish requiring only half the foot print compared to that of other conventional RAS designs on the market.

Due to the existing expertise in Veolia, the discharge from the RAS2020™ modules can be cleaned to comply with any environmental standards.

The wastewater treatment system can be designed to reduce the discharge of nitrogen, phosphate, suspended solids, COD and BOD to meet any environmental restriction. In areas with limited water resources the volume of intake water can be reduced by reuse of discharge water after denitrification.

The RAS2020™ is delivered with a performance guarantee of specified threshold levels of key water parameters to secure optimal fish welfare at maximum production.

A local and competent partner

Wastewater and water treatment is the key competence of Krüger and Veolia, and with our global representation we can be your local partner in 61 countries.

Cost-Efficient Design

The RAS2020™ has a number of advantages compared to conventional RAS solutions – both during the construction phase and during operation.

Advantages during construction:

- No underground piping – less associated risks
- Reduced foot print – up to 40-50 pct.
- Prefabricated standard concrete modules for quick and cost effective construction

Advantages during operation:

- Adjustable tank sizes to secure optimal density at all time by moveable screens separating tanks
- Uniform adjustable flow velocity in the entire water column – similar water parameters in the entire tank volume
- Up to 99,5 pct recirculation of water
- Reduced operating costs for manpower
- Reduced energy consumption
- Vacuum CO₂ stripper – enhanced N₂ and CO₂ stripping
- High turnover – up to two tank volume though RAS per hour
- Excellent conditions for management overview
- Sorting and grading equipment may be placed on the central platform reducing distances during the fish handling process
- Separation of fish in two purge tanks each with individual RAS-system
- Easy transfer of fish to purge tank and to processing using moveable grids to reduce stress
- Optional protein skimmer with ozone injection in RAS loop

Accommodates Various Fish Species

The RAS2020™ is well suited for species such as salmon, trout, kingfish, sea bass, pike perch among others.

The RAS2020™ can be supplied with the following:

- Tailored wastewater treatment can be designed for any environmental standards - including reuse of the water discharged
- Quarantine/ nursery unit
- Complete trout or salmon smolt hatchery
- Complete intake water systems
- Heat recovery and temperature regulation system
- Protein skimmer with ozone injection
- Emergency power plant, oxygen generators
- Assistance with applications and support to obtain environmental permissions
- Assistance to obtain export credits and co-financing
- As an equipment and design supply with supervisors during installation
- As a turnkey supply
- Management support after start up

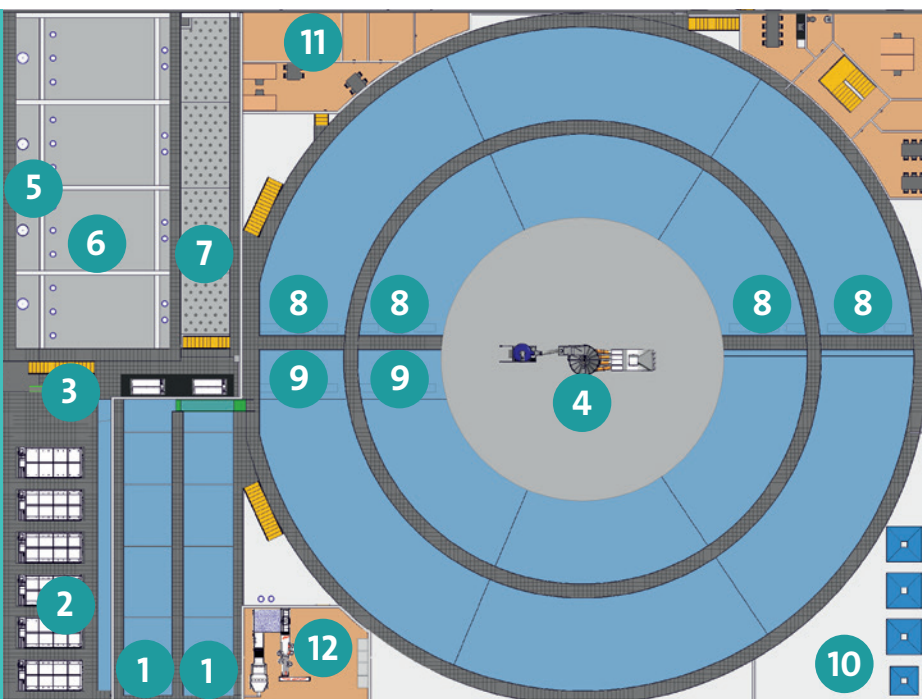
Feed Load Specifications

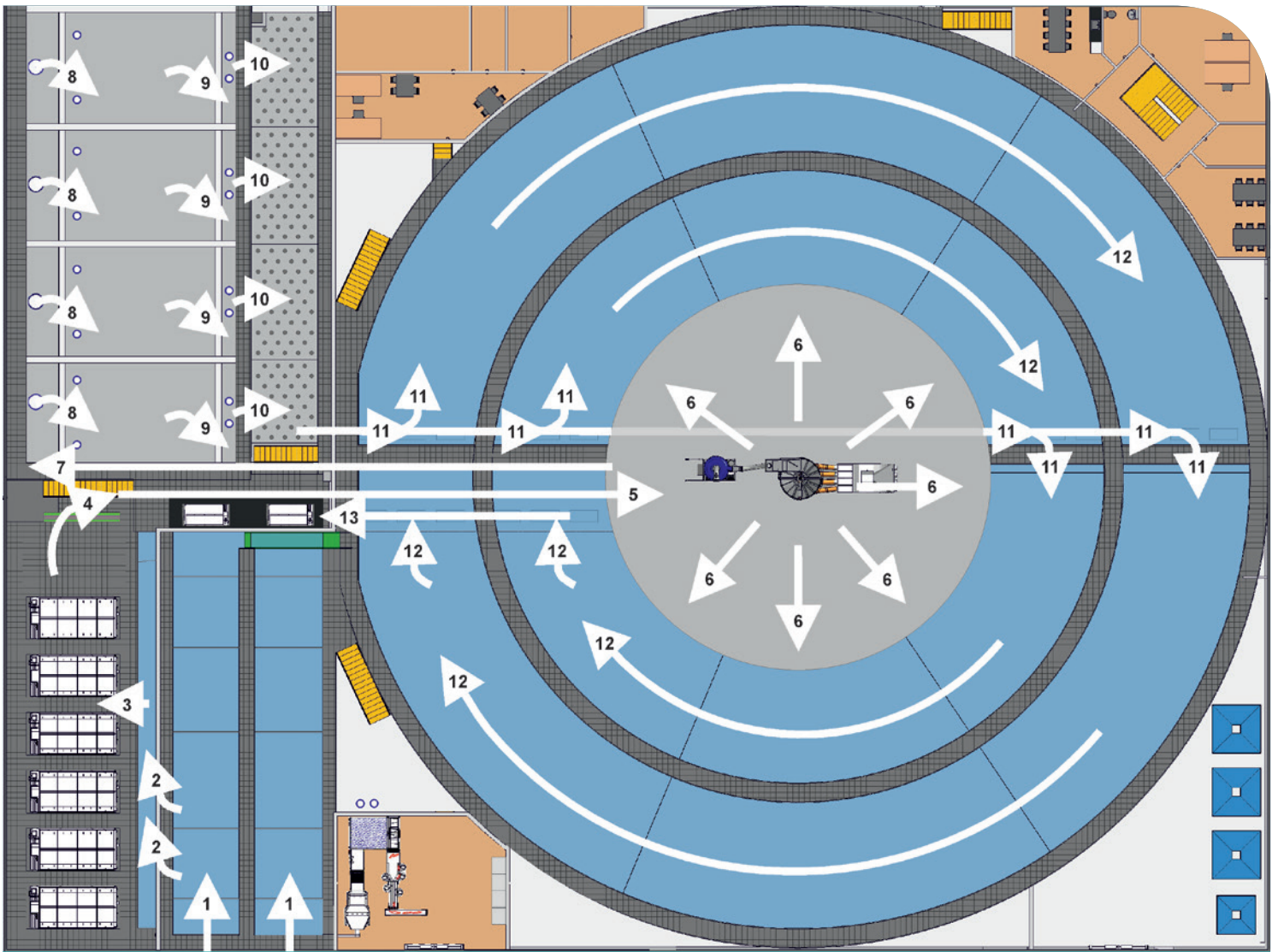
RAS2020™ is designed for a daily feed load of maximum 4,200 kg feed per day and an annual production capacity of 1,200 ton fish depending of species and production logistic.

Illustration of the Water Treatment Process

1. Purge Tanks
2. Drum Filters (V)
3. UV Filter
4. Biofilter MBBR (V)
Fish pump, grader and counter
5. Propeller Pumps
6. CO₂ Degasser (V)
7. Medium Head Oxygenation units
8. Outlet from water treatment to fish tank
9. Inlet from fish tank to RAS
Flow makers
10. Feeding system
11. Control room (V)
12. Processing

Veolia technology (V)





RAS2020™ flow pattern

For further information please contact
Michael Bech

Project Developer (Ph.D)
 Mobile: +45 27 60 03 75
 E-mail: mcb@kruger.dk
 SKYPE ID: michael.bech

Resourcing the world

Krüger A/S • Veolia Water Technologies, Denmark

Gladsaxevej 363
 DK-2860 Søborg
 Tel: +45 39 69 02 22

Haslegårdsvænget 18
 DK-8210 Aarhus V
 Tel: +45 87 46 33 00

Indkildevej 6 C
 DK-9210 Aalborg SØ
 Tel: +45 98 18 93 00

Fabriksparken 35
 DK-2600 Glostrup
 Tel: +45 39 69 02 22

email: aquaculture@kruger.dk • www.kruger.dk/aquaculture