

## Crystalactor Pilot Unit Testing



### Technology

Crystalactor®

### Applications

- softening
- phosphate recovery, incl. struvite
- (heavy) metals recovery
- fluoride recovery
- pre-treatment for de-ionisation
- pre-treatment for inland desalination
- water recovery from membrane concentrates

### Contact

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### Industrial water treatment

The Crystalactor® is a fluidised-bed type crystalliser for the selective removal and recovery of components from water and wastewater. In a cost-effective process, a reusable product in the form of hard water-free pellets is produced instead of chemical waste sludge. The technology is suitable for domestic and industrial applications, for water softening and removal or recovery of phosphates, fluoride or heavy metals.

### More than 3 decades of experience

As founding father of our global crystallization technology, Royal HaskoningDHV has decades of experience in executing pilots, validation and demonstration trial runs for Crystalactor applications and has used this experience to optimize the practical procedures and methods.



### Proven features

Moreover, this experience was used to standardize pilot units – and such unit is also recommended to be used in this project – that have following proven features:

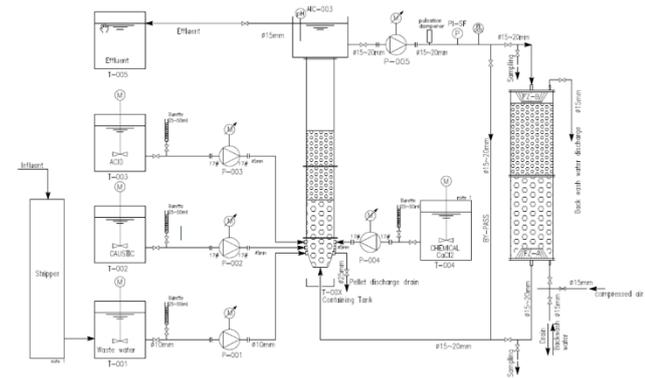
- **Compact.** The pilot units can easily be transported and easily be deployed on-site without major, costly or demanding site preparation and utility requirements.
- **Tailor-made.** The pilot unit could operate with various configurations and can be tuned to site specific needs
- **Process transparency.** Use of transparent reactor and filter columns enables to closely follow visually the processes within the crystallizer raising commitment of end-users. Well-thought sampling and analyses protocol will verify the reduction of the element(s) targeted.
- **Scale-up.** The results obtained with the pilot unit can be translated by our experienced designers to even world-largest application without scale-up risks. Furthermore, sufficient product pellets are produced to determine quality and composition and judge outlet/reuse options.
- **Process optimization.** The pilots can be used to determine most optimized basic design parameters for the sizing of the full-scale, chemical and seeding material consumption and optimize associated capital and operational expenditures.
- **HSE.** The pilot unit can easily be placed in safe surroundings like existing buildings, containers, tents, etc. Treatment volumes and reagent volumes are minimized to facilitate waste disposal and reduce chemical consumption and handling. We can state that we comply to the HSE safety rules. Our well-skilled staff is fully aware about the safety risks of piloting with chemicals and other hazards.

### Crystalactor pilot system

In general, we will provide a manually controlled Crystalactor® Pilot unit representative for full-scale conditions. It consists of the following “plug-and-play” equipment:

- One 3.5 m height ø 50 mm Crystalactor glass reactor.
- One Crystalactor feed pump (hose type) and one filter feed pump (hose type).
- Two chemical dosing pumps (both hose type) and two 100 - 200 litre chemical storage tanks with mixers.
- Sufficient volume of seed material for Crystalactor for 3 weeks of pilot testing.
- Sufficient volume of quartz sand and anthracite for filter.
- Backwash blower and backwash pump for dual media filter.
- The Crystalactor pilot is fully manually controlled (no control equipment required).
- The client has to deliver two Multi-boxes of 1000 litres for influent and effluent storage.

Note: for in-house lab tests at Royal HaskoningDHV office, we also have a ø 2 cm glass Crystalactor unit available.



### Standard Way-of-Working

The general approach for a Crystalactor pilot trail is that the operation will be done by an operator or process engineer from the Client. Based on our experience, most trails take about three to four weeks. If water composition is outside our scope of experience or additional information is needed, it is of course possible to extend the pilot test period.



The Pilot unit is transported to your location, which is arranged by Royal HaskoningDHV. Our process engineer is available on site during the first week for installation, start-up and commissioning and client operator training, after which, he will return to his office and will be available for remote feedback.



Note: an alternative way-of-working, different pilot set-up's or other specifications, are of course also possible and can be discussed upon request.

### Requirements

Requirements to be provided by the Client:

- Covered room in a non-Ex area (minimal 8.0 m<sup>2</sup>, minimal height approx. 5.0 m), with allowance for minor water spills.
- Near (<25 m) sewer or other discharge connection for treated water.
- Electricity: 230 V 50-60 Hz for all pumps and mixer: installed 3,000W, max consumption 2,000W.
- Chemicals / reagents required.
- Demineralized water for dilution of reagents.
- Daily representative “fresh” feed water to the Crystalactor.
- (Mobile) scaffold with ladder.
- Multi-Boxes for buffering and storage.
- Work desk (min. 3 m<sup>2</sup>), chair, temporarily access to printer and internet.
- Sample bottles (contents approx. 250 ml).
- Contra- and pellet analyse in close consultation with client.

### Jar tests

As alternative, Crystalactor jar tests could be carried out. These jar tests will take relatively little time (few days) and will indicate if the (waste) water is suitable for crystallization. Note that a jar-test answers a few initial questions, but consecutive pilot testing is required to confirm initial results.

### Intellectual Property Rights

A Non-Disclosure Agreement regarding Royal HaskoningDHV's Crystalactor technology and its application knowhow will be applicable for any pilot trail.

For more information, we refer to our website:

[www.crystalactor.com](http://www.crystalactor.com)