EPD

Environmetnal declaration according to SIRII

Company	Kreal Ltd
Product	Tubular Aerators

IVL Version: 20050209

COMPANY

The company KREAL Ltd, situated in S:t Petersburg, was founded in 1993 and employed 30 persons in 2003. It produces equipment for biological and physical wastewater treatment, such as:

- Porous tubular aerators for intensification of biological treatment in aeration tanks.
- Modular plants for biological wastewater treatment with a capacity from 10 to 150 m^3/day.
- Block-module plants on the base of modular plants with a capacity up to 3 000 m^3/day.
- Settler-filter created by reconstruction of existing settlers.
- Blocks of plane bed material to be placed in aeration tanks for intensified treatment of wastewaters containing slowly degradable organic and nitrogen compounds.
- Technology for denitrification and biological dephosphorization of wastewaters.
- Modular water-treatment plants for recycling of water with capacities up to 5 m^3/hour.

Information about the company may be found at its website www.kreal.spb.ru.

Contact person for the environmental declaration is:
Natalia Zhilnikova, telephone and fax: 007812 - 117 81 30, 117 07 13
e-mail: kreal@online.ru

PRODUCT

The aerator AL described in this declaration is a tubular aerator intended for use in activated sludge basins. The aerator tube is constructed of glass tissue impregnated with a mixture of epoxy resin and phenol-formaldehyde resin. It is plugged at both ends with plugs of LD-polyethylene. The aerators are mounted in pairs on polyamide tees, which in their turn are mounted on pipes of LD-polyethylene at the bottom of the aeration basin.

AERATOR TUBE MODEL	AL
Length, mm	520
Diameter, internal/ external, mm	40 /44
Pore size, µm	60 - 100
Weight, kg	0,2
Weight of end-plugs, kg	0,03 each
Standard oxygen transfer efficiency at 1 m depth, diffuser density 3 - 19 %, air flow 4 m^3/h, laboratory tank, %	4,6-6

USE AT S:t PETERSBURG CENTRAL WASTEWATER TREATMENT PLANT	
Depth of immersion of the aerators, m	5,5
Diffuser density, %	2,2
Air flow per aerator, m^3/h	3,3
Electricity consumption, kWh / kg oxygen supplied by the blowers	0,108
Electricity consumption, kWh / kg oxygen used [1)]	0,574
Oxygen utilisation, % [1)]	18,8

[1)] Based on data from aeration tank and laboratory tests.

LIST OF MATERIAL AND CHEMICAL SUBSTANCES

The weight of one aerator tube AL with end-plugs is 0,25 kg. It consists of the following materials:

MATERIAL CONTENT	
Glass tissue	56 %
Impregnating agent	
• Epoxy resin	10 %
• Phenol-formaldehyde resin	10 %
• Additive	0,04 %
Plastics, LD polyethylene	
• End-plugs	24 %

Of the materials listed above epoxy resin and formaldehyde are on the observation list of the Swedish National Chemicals Inspectorate as being sensitising. No chemicals listed in Annex 1 (August 21, 2001) to the EU Council Directive 67/548/EEC (June 27, 1967, classification, packaging and labelling of dangerous substances) are used in the manufacturing process. The residual concentrations in the aerators of solvents used in the manufacturing process are not known.

In the upstream production of polyamide the chemicals benzene, cyclohexane and cyclohexanone are used.

At the installation at the central wastewater treatment plant in S:t Petersburg one polyethylene pipe weighing 10,72 kg holds 110 aerators. These are connected pairwise by 55 polyamide tees weighing 0,04 kg each. One such aerator unit thus weighs 40,42 kg.

MATERIAL CONTENT OF AN INSTALLED AERATOR UNIT	
Aerators	68 %
Polyamide tees	5,4 %
Polyethylene pipe	27 %

The service life of an aerator unit is 8 – 10 years. The treatment plant receives as an average 1 090 000 m^3 of wastewater / day. The aerated volume is 226 650 m^3. A total of 331 aerator units as described above is used.

PRESENTATION OF THE ENVIRONMENTAL PERFORMANCE

The environmental performance is based on the results of a life cycle assessment, which comprises the manufacturing of the aerators and their use at the central wastewater treatment plant in S:t Petersburg.

The life cycle of the aerators is divided into two phases:

The manufacturing phase

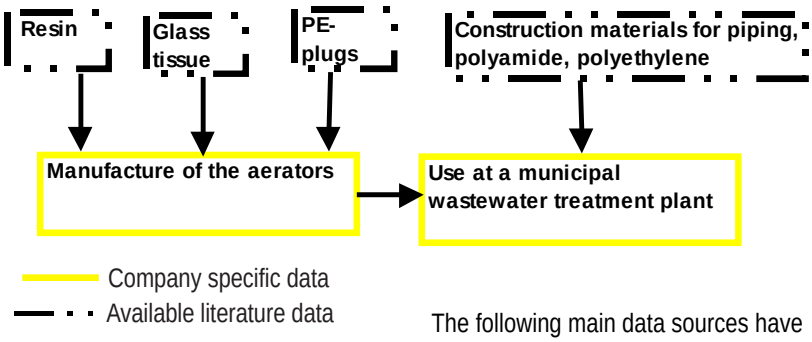
- Extraction of the necessary natural resources
- Production of the starting materials
- Transport of the starting materials to the factory of Kreal.
- Manufacture of the aerators and packing for delivery

The use phase

- Transport of the aerators from the factory to the wastewater treatment plant
- Extraction of the natural resources for tees and the piping necessary to install the aerators, and production of the tees and the piping.
- Transport of the tees and the piping to the treatment plant
- Use of the aerators in the activated sludge basin at the treatment plant.

The LCA was carried out in 2003 and has been based on production and operational data for Kreal and for the S:t Petersburg central wastewater treatment plant given for that year.

Data on electricity generation are basically based on data from Western Europe from the middle of the 1990´s, however data on the composition of the electricity from the average grid in the S:t Petersburg area, as well as data on some emissions from electricity generation there, were available for 2003 and have been used.



Data on the energy consumption for extraction and refining of fossil energy wares have been collected for the years 2000 – 2001, whereas data on emissions from heat generation from fossil fuels are West European data from the middle of the 1990´s.

The life cycle inventories of chemicals and polymers are generally from the middle of the 1990´s

The aerators are assumed to be produced and used in S:t Petersburg, and the starting materials are assumed to be produced in that area. Fossil fuels and feedstocks are assumed to come from Russian oil fields and refineries.

The functional unit for the manufacturing phase is one aerator with end-plugs, packaged for delivery at the factory.

The functional unit of the use phase is the use of the aerator during its service life in an activated sludge plant such as the central wastewater treatment plant in S:t Petersburg.

Sludge settling and sludge treatment are not included in the LCA, nor is the impact of the treated wastewater.

The manufacture of the additive representing 0,04 % of the weight of the aerator is not included in the inventory.

Energy allocation as described by Frischknecht et al (1996) is used in the inventories of oil extraction and refineries.

The following main data sources have been used:

PROCESS
Manufacture of aerators, tees and piping
Construction and efficiency of the activated sludge plant
Electricity generation
Extraction and use of fossil fuels
Acetone, epoxy resin, polymers
Phenol-formaldehyde resin
Glass tissue
Paper packaging
Transports

DATA SOURCES
Specific data from Kreal
Specific data from Kreal and the central wastewater treatment plant S:t Petersburg
Data from the power supplier in the S:t Petersburg province, supplemented with data from ETH (R. Frischknecht et al., “Ökoinventare für Energiesysteme”, 3rd ed., 1996)
Energy Statistics of the Non-OECD Countries, 2000 - 2001, IEA (2003), supplemented with data from ETH (R. Frischknecht et al., “Ökoinventare für Energiesysteme”, 3rd ed., 1996)
I. Boustead, “Eco-Profiles of Plastics and Related Intermediates”, APME, Brussels
SimaPro (Delft University of Technology 1996)
SimaPro (PRé Consultants; Amersfoort)
Finnish average data for unbleached recycled paper (KCL, Espoo, 1992)
Nätverket för Transport och Miljö (2003), Stockholm (Network for Transport and Environment)

ENVIRONMENTAL PERFORMANCE DECLARATION

	Manufacturing phase	Use phase	Total
Resource use			
Use of non-renewable energy resources (kWh)	6,5	28 000	28 000
Use of non-renewable material resources (kg)	0,18	$7,3 * 10^{-3}$	0,19
Use of renewable energy resources (kWh)	0,0025	17	17
Use of renewable material resources (kg)	$5,1 * 10^{-5}$	$4,3 * 10^{-7}$	$5,2 * 10^{-5}$
Emissions			
Global warming (kg CO_2-equivalents)	0,79	4 500	4 500
Acidification (mol H^+-equivalents)	0,12	560	560
Ozone depletion (kg CFC-11 equivalents)	$9,2 * 10^{-8}$	$2,3 * 10^{-4}$	$2,3 * 10^{-4}$
Photochemical oxidant formation (kg ethylene eq.)	0,0012	0,14	0,14
Eutrophication (kg oxygen equivalents)	0,015	47	47
Recyclable resources			
Materials (kg)	0,0011	0,20	0,20
Wastes			
Hazardous waste (kg) [1)]	0,0048	68	68
Regular wastes (kg) [1)]	0,023	200	200

DATA NOT INCLUDED IN THIS STEPWISE EPD

The environmental impacts of the following process are not included in the life cycle inventory:

Production of the additive.

Reycling declaration

The glass tissue of the worn-out aerators may be used in filters for water treatment.

Information from the verification body

This stepwise EPD was prepared at the SIRII institute IVL Swedish Environmental Research Institute Ltd and verified by Mr. Lars-Gunnar Lindfors, scientific director.
The EPD has been prepared according to the SIRII concept for stepwise EPD. The underlying LCA is in accordance with the ISO 14040

The drafting of and working methods for environmental declarations according to Sirii has been carried out within Sirri (Swedish Industrial Institute´s Initiative). Participating institutets have been FRAMKOM verskamhetsutveckling AB, IFP Swedish Institute for Fibre and Polymer Research, IVF Industriforskning och Utveckling AB, IVL Svenska Miljöinstitutet AB and TRÄTEK, Institutet för Träteknisk Forskning.

This environmental declaration was compiled on 10 February 2005 by Mats Almemark

ISSN