

FINNCHAIN

Sludge Scraper System for Circular Tank

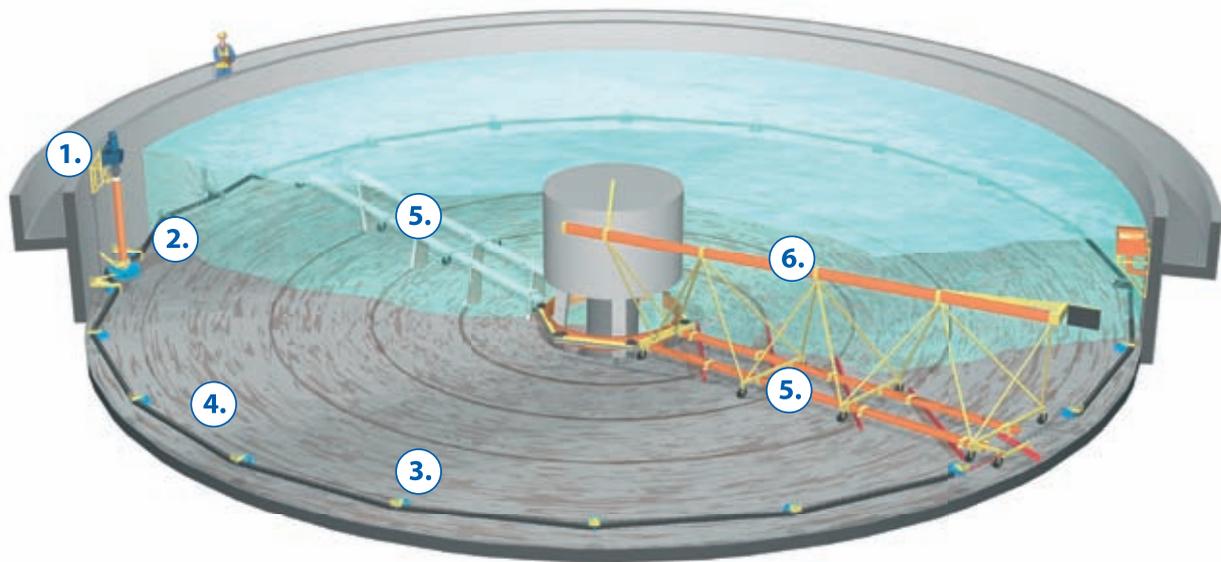
Keeping up your process



Company

Finnchain Oy represents strong know-how in the field of chains, specializing in environmental technology applications. The company develops, manufactures, markets, installs and services first-class sludge scraper systems for water and sewage treatment. We want to supply to our customers the latest technologies and comprehensive systems which are as service-free and reliable as possible.

The numerous international patents granted to our company indicate how important product development is to us. We fulfill the wishes and needs of our customers professionally, reliably and with a long-term view. As we are concentrating only on scraper systems, we are able to operate quickly and flexibly. Reliability is the keyword with respect to both our systems and their delivery.



The Finnchain system

Finnchain's rake-type sludge scraper system is a new type of solution for water and sewage treatment tanks. We have developed a new chain scraper system for circular tanks, providing an alternative to the traditional bridge scraper model.



1. Drive

A motor located at the edge of the tank rotates a gear, from which a drive shaft transmits the rotation to the drive wheel. Depending on the size of the tank, the speed at periphery is 1,2 to 3 m/min, and the motor power is 0,18 kW up to 0,55 kW.



2. Drive Wheel

A stainless steel drive wheel drives the conveyor chain. Traction is gained from several teeth through the use of guiding wheels.



3. Idler Wheel

The chain travels over idler wheels made from polyacetal, installed on the wall of the tank. Idler wheels are installed at approx. four-meter intervals.



4. Collector Chain

A tow bar is attached to the polyacetal chain, moving the bottom scraper and scum skimmer.



5. Bottom Scraper

Each tank has at least two bottom scrapers manufactured from fiberglass profile. If there is a lot of sludge or the tank has a large diameter, it is easy to install additional bottom scrapers.



6. Surface Scum Skimmer

The scum skimmer, manufactured from fiberglass profile, is attached to the bottom scraper through a stainless steel pipe structure. The scum collector at the end of the scum skimmer transfers the scum to the sludge channel at the edge of the tank.



Innovation and Experience

Novel and innovative solutions for chain scraper systems since 1984.



Reliability

Reliability in both operation and delivery is one of the keywords of our operations.



Ecology

Durable products with a long service life signify environmental friendliness at its best.



Total Economy

Low total investment cost and operating costs make the investment profitable.



Partnership

A functioning and successful partnership is formed on the basis of trust and commitment to common goals.

The Superior Features of the Finnchain System

LOW COSTS AND EASY MAINTENANCE

Corrosion free parts

The system comprises of only corrosion free parts. Materials used are plastic, fibre glass and stainless steel making finishing treatment of components unnecessary.

Works perfectly without lubricants

Water lubricates the system, making the use of traditional lubricants redundant. Freezing conditions do not cause problems, as all components are submerged.

Low energy consumption

Thanks to the system's light structure, its energy consumption is low. Depending on the size of the tank, the motor power is only between 0,25 – 0,55 kW.

Durable and easily replaceable parts

System's movable parts are durable as the load placed upon them is minimal in water. Light weight component also enable easy and quick maintenance of the system.

COST SAVINGS FROM TANK STRUCTURES

Light structure requires no massive structures

The system does not require massive concrete walls. Largest load on the walls is max. 300 kg. Scrapers are attached to a central bearing at the bottom of the tank so the middle of the tank requires no supportive structures either.

Easy to cover

Tank is easy to cover for odor control as all parts, except for the motor, are submerged.

LIGHT AND EASY TO INSTALL

Electricity effortlessly

Electrical cabling is only needed for drive unit and chain watch on the tank wall, making electrical installations quick and easy to do.

Light components

All components are light to handle and easy to install. The heaviest part is the gear motor, weighting approx. 100 kg.

Mussalo Waster Water Treatment Plant

In 2003, the first Finnchain scraper system was installed to replace a bridge scraper in Mussalo WWTP in Kotka, Finland. Good experiences gained from the first system, resulted in choosing Finnchain systems for extension and rebuilding project. After the extension the plant is using the following Finnchain systems:

Tank type	Information	Number
Primary sedimentation	diameter 26 m	3 tanks
Secondary sedimentation	diameter 36 m	2 tanks
Secondary sedimentation	diameter 39,5 m	2 tanks
Sludge thickener	diameter 13 m	3 tanks
Grit Scraper	rectangular 20 m	3 tanks





Is a Light, Plastic Structure Enough?

Plastic Chains Replacing Steel Chains in Rectangular Tanks

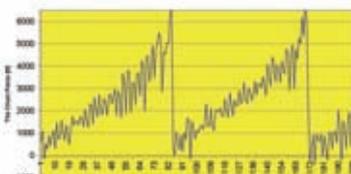
Plastic is an excellent material for waste water treatment. Plastic chains have already replaced steel chains in rectangular tanks. Finnchain has been manufacturing plastic chains scrapers for rectangular tanks since 1984, with over 2000 installed systems until 2009.

Light Sludge Loads Do Not Require Massive Structures and Machinery

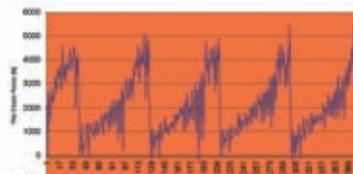
To prove our claim, we studied the sludge loads in three different tanks during real life conditions. The largest loads were observed during the start-up phase. Measures were taken every 30 seconds over 11 days with two sensors that were placed on chain links for the duration of the test.

Test Results for a Tank with a Diameter of 37 Meters

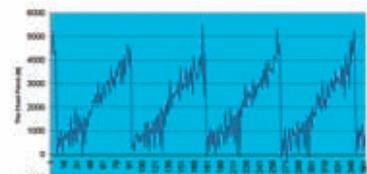
Start-up phase
19. October 2006, at 8:46



After a week
26. October 2006, at 6:55



After 11 days of operation
30. October 2006, at 6:26 a.m.



The largest loads were measured during the implementation phase, before the tank had been filled with waste water. The highest force the chain was subjected to was 6.1 kN. As the chain's breaking load is 35 kN, the safety factor was more than sufficient. The testing was performed by Arotekno Oy.

A Functional Whole is the Sum of its Parts – Finnchain’s Unique Components

Finnchain’s excellent product development and innovation are also evident in our numerous groundbreaking solutions, and the international patents granted for them.

1. Collector Chain and ConicPin Chain – Strength and Reliability

The collector chain is the most important component in chain scrapers for circular tanks, because it travels in an abnormal position with respect to the structure of standard chains. For this reason, we have developed a special chain for circular tanks, the ConicPin™ chain with conical pins. Due to the conical pins, 50 % less tension is required to keep the chain straight compared to traditional chains with straight pins.

2. Drive Wheel with Adjustable Pitch – Easy installation and long lifetime

The undisputable benefits of Finnchain’s drive wheels with adjustable pitch and chain watch, long used in rectangular tanks, can also be fully utilized in circular tanks.

As the chain wears and elongates over time, the pulling pins of the drive wheel can be easily adjusted to increase the pitch circle of the drive wheel. This allows the aligning of the pitches of the wheel and the chain, extending the lifetime of both components.

3. Fiberglass Scraper Flights – Durability and Quality

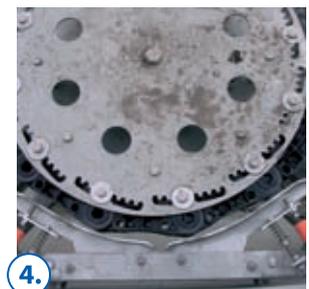
Based on many years of research, Finnchain has chosen to use high-quality fiberglass frames in its scraper flights, containing a high glass content (60 to 70 %). The extremely high rigidity of these hollow profile flights makes this “superflight” the strongest and most reliable scraper flight for even the largest tanks.

The profile height of the bottom scraper is 300 mm, but in the middle of the tank where the sludge load is greatest, the flight’s height is 500 mm.

4. Double-acting Chain Watch – Security and Protection

In Finnchain systems, a unique, patented chain watch both secures the operation and acts as overload protection.

In overload situations, the chain tries to jump over the tooth or the stud on the drive wheel. For this reason, the chain watch installed on the drive wheel, preventing the chain from jumping, is the most reliable solution.



Technical data

1. Chain

Type	Pitch mm	Breaking load kN	Working load kN	Bearing surface joint mm ²	Bearing surface tooth notch mm ²	Width mm	Height mm	Weight kg/m	Material
HA178	178	35	20	1700	1840	84	92	4,3	PA/POM

2. Drive Wheel

Type	No of drive pins Z=	Pitch diameter mm	Innerwidth mm	Diameter of drive pin mm	Weight kg/kpl	Material
Z=12/HA178	12	620	108	20	24	AISI 304/PEUR

3. Idler Wheel

Type	Rim diameter mm	Hub bore mm	Bearing area for hub mm ²	Weight kg	Material
FC-300	300	60	7200	3	PA

4. Scraper Flight

Type	Dimensions mm	Height mm	Weight kg/m	Cross sectional area mm ²	Moment of inertia		Polar moment of inertia I _v mm ⁴	Material	Profile
					I ₁ mm ⁴	I ₂ mm ⁴			
FC-220	220x120x3	220	4,1	2 315	10 881 245	5 083 635	7 012 345	GRP	Hollow
FC-300	300x100x2,5	300	3,2	1702	11 183 000	1 664 100	2 521 000	GRP	Hollow, triangle

5. Bottom Wheel

Type	Rim diameter mm	Width mm	Hub length mm	Weight kg	Material
FC-280	280	75	80	2,4	PA6

Manufacturer: Finnchain Oy

Rekitie 1, FI-26510 Rauma, Finland

Tel. +358 (0)2 8387 3800

Fax +358 (0)2 8387 3830

www.finnchain.fi

