

PRETREATMENT WASTEWATER PLANT FOR FOOD PROCESSING PLANTS DESIGNED TO DISCHARGE WASTEWATER INTO MUNICIPAL SEWAGE NETWORK.
 (fruit and vegetables plants, meat, poultry and fish plants, slaughterhouses, abattoirs, etc.)

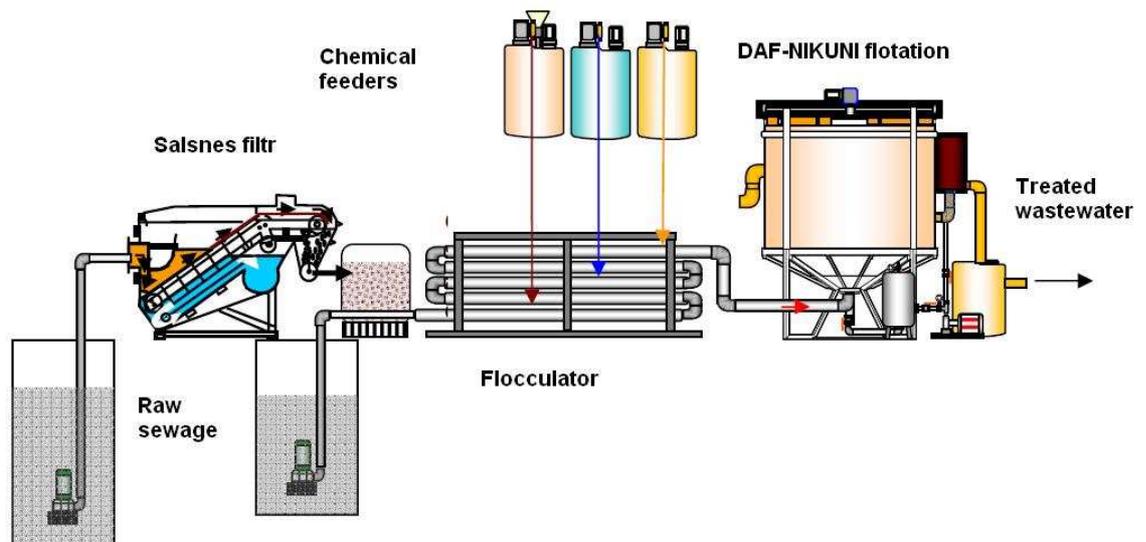
MECHANICAL – CHEMICAL PRETREATMENT PLANT.

Restrictive EU regulations concerning the quality of discharged wastewater into municipal sewers and rising charges from wastewater operators, cause that pretreatment wastewater plant becomes part of manufacturing.

Sometimes manufacturing plant may result a rejection to admit wastewater non pretreated by municipal facility because that kind of sewage threaten accurately operation of biological treatment and considerably increase the unit cost of treated wastewater in municipal facility.

Polish company INWATEC offers modern pretreatment plants to enable fulfill requirement by two stages of pretreatment plant: mechanical and chemical based on the latest Norwegian and Japanese solutions.

System design for industrial wastewater pretreatment



MECHANICAL TREATMENT

Salsnes filter is currently considered as the world's most efficient and cheapest to operate device for removing suspended solids from wastewater.

Salsnes Filter - Non- pressurized mechanical filter to remove solids and simultaneous sludge dewatering.

Reduction: BOD 35 – 50%, COD 45 – 60%
 Suspended 65 – 95%, fat 40 – 70%

The removal process of solids involves to drain sludge during the transport on the filter mesh, from which the sludge is discharges by compressed air into screw thickener. Dehydrated sludge has a low moisture content (often less than 70%) which facilitates its to further utilization.



Salsnes filter does not require to use of additional chemicals, such as coagulants and flocculants. Power consumption for treatment wastewater and sludge dewatering is at the level $0,06 \text{ kWh/m}^3$. To clean filter mesh is used compressed air from the blower, which is the part of the filter, and in the case of plants with a high fat content, the mesh is washed by hot water several time a day (about 20 liters per wash).

Cleaning mesh by compressed air does not generate additional wastewater as it in belt presses. Salsnes Filter removes all impurities from wastewater greater than $50 \mu\text{m}$.

Applications of Salsnes filter, before flotation, reduces chemical consumption several times compare to drum sieve.

CHEMICAL TREATMENT

Step 1. After Salsnes Filter wastewater is directed to flocculation unit where chemicals are added (coagulants, flocculants) to bond micro-suspension and colloids, and so produce larger agglomerates. So-called flocs.

Pipe flocculator unit is used for chemical precipitation pollutants from wastewater using coagulants and flocculants, pH adjustment and creation of larger easy to separation agglomerates, so-called flocs. Pipe flocculator provides to produce larger particles suspension, which flowing into flotation or settling tank. Construction of the flotation unit ensures sufficient time for wastewater mixing and provides optimal conditions for the creation of large flocs without mechanical mixing.



Step 2 From the flocculator wastewater flows into the flotation tank where they are mixed with micro bubbles of air. Microbubbles attach to flocs and carry them to the liquid surface, forming easy to scrape sludge in form of scum. Clean wastewater is accumulate in the bottom of the flotation unit, where is directed outside of the unit. Determining parameter of the efficiency in flotation is the bubble size - the smaller bubbles the more micropollutants can be removed from the wastewater.

DAF-NIKUNI flotation unit – flotation unit of the most modern generation, which uses air bubbles in size 20-30 microns (traditional flotation – 300microns) to remove suspended solids. So small bubbles allow for more precise cleaning of wastewater in smaller unit. The “heart” of flotation DAF-NIKUNI unit is a Japanese pump NIKUNI which replaces complex, traditional systems flotation with compressor, additional pumps and pressure tanks and extended control system.

DAF-NIKUNI flotation unit, developed by INWATEC is lightweight and chemical resistant device. High volume of microbubbles (up to 10% of liquid volume) allows for much higher efficiency and removal of pollution. than in conventional flotation.



Advantages of DAF-NIKUNI flotation:

1. high purity of treated wastewater,
2. ability to remove micropollutants,
3. High reduction of BOD, COD, TSS, N and P,
4. good sludge dewatering (flotation),
5. lower consumption of chemicals,
6. chemical resistance - made from HDPE, PP,PVC and steel 304, 316,small size
7. quiet operation
8. low power consumption
9. maintenance-free operation

Comparison of traditional installation with the installation of DAF-NIKUNI

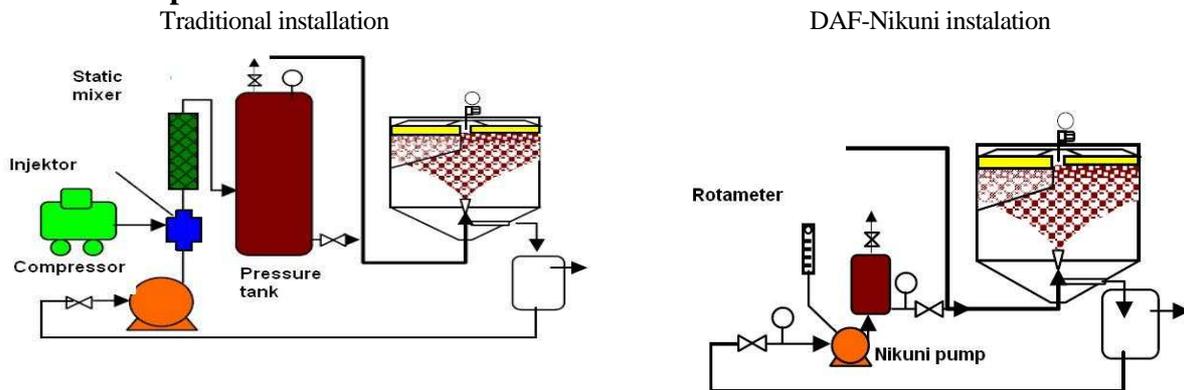


Table 1. Comparison of traditional installation with the installation of DAF-NIKUNI unit.

Parameter	Unit	Raw sewage	Traditional flotation		DAF-NIKUNI flotation	
			Value	Reduction	Value	Reduction
COD	mg/l	820	280	65,9%	180	78,0%
BOD	mg/l	520	160	69,2%	100	80,8%
Suspended solids	mg/l	1120	150	86,6%	21	98,1%
FOG	mg/l	35	27	22,9%	4	88,6%

Table 2. Comparison of operating parameters of the flotation unit equipped with a conventional air dispersion system with flotation unit equipped in the NIKUNI – DAF pump.

Parameter	Traditional flotation	DAF-NIKUNI pump
Efficiency	52 m ³ /h	89 m ³ /h
TSS (outlet)	170 mg/l	120 mg/l
Transparency of wastewater	68-72%	79-82%
Coagulant consumption		Less then 35%
Polymer consumption		Less then 40%
Energy demand	16,8kw	7,6 kW
Sludge concentration	1,8-2,4%	3,4-4,0 %
Energy consumption		Less then 50%

The main advantages of Inwatec DAF-NIKUNI flotation: micro- and nanobubbles pumps and flotation tanks made from special materials, cause:

- cheaper than previously used flotation units,
- smaller overall dimensions, with the same efficiency,
- devices with higher efficiency in wastewater treatment,
- less expensive to operate,
- devices characterized by low noise.

Wastewater pretreatment designed with filter Salsnes Filter, DAF-NIKUNI flotation and pipe flocculator due to small size can be directly connected to the existing wastewater buffering tanks.