Wastewater Treatment Process in Food & Drink Industry





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Untreated wastewater from the food and drink industry can have a massively harmful impact on the environment.

To reduce any negative impacts on the environment food and drinks manufacturers must take appropriate measures to reduce the level of contaminants in wastewater to acceptable, environmentally-protective standards.

Wastewater from these industries is both difficult and time-consuming to effectively manage.

This is partly due to the large quantities of harmful materials present. Materials such as high levels of nutrients, organics, and inorganics, suspended and dissolved solids not to mention BOD and COD levels can create a devastating impact on the environment and aquatic organisms if left unchecked.

Effectively disposing of wastewater is not a unique problem to the food and drink industry, however, it is important to consider in order to meet environmental standards. If you operate within the food and drink industry you will also require consent to discharge all trade effluent.

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Who is required to have Consent to Discharge?

All manufacturers within food and drink industries are required to obtain consent to discharge any trade effluent that may contain harmful contaminants.

These contaminants include the presence of organic and inorganic materials, heavy metals, BOD and COD levels, and harmful levels of nutrients.

It should be noted that rainwater, water from drain pipes, or water used in staff washroom facilities does not fall under the definition of trade effluent.

Manufacturers should be aware that authorities may refuse any wastewater which can be deemed to cause environmental damage or otherwise have an impact on public health and safety.

Agencies dealing with wastewater treatment issues in the UK include:

- The Environment Agency (England)
- Scottish Environment Protection Agency (SEPA)
- Northern Ireland Environment Agency (NIEA)
- Natural Sources (Wales)

A Trade Effluent consent can be acquired by contacting the Sewerage Undertaker. For more information regarding this and other environmental obligations of your business visit Ofwat.gov.uk.



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Variables in Wastewater

Several factors will determine the most effective method of wastewater treatment for your business. These include volume of wastewater, contaminant levels, site location, energy consumption, cost, average, and peak flow times. Trade effluent from the food and drink industry, in particular, needs to be carefully monitored for BOD, COD, suspended solids, pH levels, and bacteria.

Wastewater from different industries creates unique challenges. Meat and poultry products, dairy products, grain products, fruits, bakery's, beverages, and brewing all create different trade effluent from one another. Biochemical oxygen demand (BOD) and chemical oxygen demand (COD) values alone can vary drastically. There are seasonal complexities to be accounted for, too. These will affect the available treatment options.

At Enduramaxx, we can provide your company with a bespoke wastewater treatment that's suited to your industry. We are happy to provide advice on all aspects of wastewater treatment and we stock a range of tanks, mixers, and other resources which provide environmentally-safe methods of treating trade effluent.



Stages of Wastewater Treatment

In general, the wastewater treatment process falls into three main stages:

- Primary
- Secondary
- Tertiary

PRIMARY TREATMENT involves getting rid of any materials that float or can be removed via settling. At this stage, screening, grit removal, comminution, and processes like sedimentation are in place. Once these thicker materials including suspended solids are removed the BOD levels in the wastewater significantly drop.

SECONDARY TREATMENTS continue the removal of leftover suspended solids and other organic material that survived the primary treatment. Additionally, at this stage, biological processes involving microorganisms continue to lower BOD levels. This protects the dissolved oxygen levels for aquatic life when the water is eventually released into the environment.

TERTIARY TREATMENTS involve disinfecting the treated wastewater of any remaining contaminants. These treatments include effluent polishing for the removal of suspended solids and reducing BOD levels. These processes can vary depending on the type of trade effluent being treated.

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In this article, processes within the primary and secondary treatment stages will be the focus.

Screening

Screening is the first step in any successful wastewater treatment process.

Screening is a key stage that removes any objects or materials that may cause damage to the system or clog the piping and mechanisms further along.

Wastewater often contains high levels of solids and grit that can cause undue strain or mechanical wear on machines and wastewater treatment plants.

It's estimated that around 90% of all solids found are organic. Their composition varies between industries but includes organic and inorganic waste, grit, paper, faecal matter, and much else.



Types of Screens

Various kinds of screens can be used to remove solids (organic and inorganic) at an early stage in the wastewater treatment process:

- Coarse Screens
- Fine Screens

COMPLIANCE EXPERTISE

Comminutors & Grinders

COARSE SCREENS

Coarse screens have the widest openings, usually with holes of 6mm or more in some cases. These are generally used to remove large solid waste, debris, and other objects.

FINE SCREENS

Generally, fine screens have holes ranging from 1.5mm to 6mm. Screens containing even smaller holes (0.2mm to 1.5mm) can sometimes be deployed between fine screens and coarse screen stages are even more efficient at removing suspended solids.

Despite the obvious benefits of screening, they have some advantages. For one thing, manually-cleaned screens require very little maintenance

COMMINUTORS & GRINDERS

Comminutors and grinders work in combination to break down any waste materials which are 6mm to 19mm in size. Comminutors feature a rotating slotted cylinder that allows wastewater to pass through. The blades then break down the solids. Grinders on the other hand are used to reduce solids to a much finer degree. The grinders typically trap and grind the materials below 6mm.



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DAF (dissolved air floatation)

DAF has been used in wastewater treatment processes since the 1960s throughout Europe. This is an ideal process for treating raw containing light particles, algae, and other organics often at low temperatures. Algae, in particular, can be particularly difficult to remove from the bottom. Industry professionals recognize DAF as a valid form of sludge thickening capable of easily removing oil and grease.

How DAF works

By using micro air bubbles released into the water using nozzles, these attach to and float suspended solids and flocculated particles to the surface. At the surface level, these particles can be easily removed. The entire process stands in contrast to sedimentation which removes settled particles from the bottom.

What are the advantages of DAF?

There are several wonderful advantages to DAF over sedimentation. For one thing, it creates a much more efficient removal process, particularly algae. It also requires a much shorter start-up time (roughly 30 minutes) than settling. DAF also creates significantly lower turbidity in the wastewater. It's not as sensitive to temperature as sedimentation.

Another benefit of DAF is the lighter floc which requires reduced levels of coagulants and less time for flocculation. DAF also allows for a higher surface loading rate (SLR) in the overall process.

There are only a few drawbacks to DAF but they are worth considering. For one thing, DAF uses a lot more energy than sedimentation. It also needs to be protected from adverse weather conditions such as extremely low temperatures and rain. In freezing conditions, there is the risk that the floating solids will begin to harden and settle.





Flocculation

Flocculation and sedimentation simply can't occur without the aid of coagulants. These coagulants destabilise particles and suspended solids in the wastewater. These materials clump together to create flocs. As these flocs grow heavier they settle on the bottom of the tanks.



Enduramaxx stock Flocculation tanks that can be used as an effective pretreatment to rid the wastewater of unwanted solids and other contaminants.

Biological treatment

Untreated wastewater contains a veritable smorgasbord of contaminants including pathogens, heavy metals, garbage, and a lot of harmful toxins. Biological treatments are used at the secondary treatment stage to eradicate these pollutants. This complicated process involves the use of bacteria, nematodes, and other natural organisms to assist in the decomposition of organic substances.



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Biogas

A by-product creation of this process is the creation of methane or biogas and this has some immediate benefits. Biogas can be used as a renewable source of energy for heat and electricity, reducing off-setting the costs of production. In turn, it reduces the volume of waste and the facility's carbon footprint.

Sludge Management

Sludge is a natural by-product of wastewater treatment and contains solid and semi-solid materials. This material needs to be completely removed from wastewater before it can be moved safely reused or filtered back into the environment. In general, there are two main types of sludge – Primary and Secondary. Primary is a result of sedimentation while secondary sludge is created through biological treatments.

There are several treatment goals for successful sludge treatment.

First of all, this includes a reduction in the overall volume of the sludge which in turn reduces the cost of storage and pumping.

Secondly, it's necessary to stabilize the organic materials within the sludge so the material is less hazardous for the environment.



At Enduramaxx you'll find a range of **wastewater sludge settlement tanks** which can be used for storage of raw effluent, treated sludge, or sewage. Upright or conical tanks can also be used for assisting in the decanting stage. These tanks can be customized depending on the needs of your business.

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Sludge Treatment Process

There are three main stages to sludge treatment:

Thickening, Digestion, and Dewatering.

At Enduramaxx we stock the necessary tanks for effective sludge management at every stage of the process.

As discussed thickening can be achieved through DAF (dissolved air floatation). However, sedimentation or settling is a straightforward and effective manner of removing suspended solids from wastewater.

Digestion of sludge involves decomposing the removed sludge into a stabilized substance. This process achieves a couple of key things before it can be properly disposed of. Firstly, it can reduce the volume of the sludge by up to 50%. It also removes the noxious smell and eliminates harmful pathogens in the sludge.



Enduramaxx's **Conical Cone Tanks** make it removal of sludge from wastewater quick and easy. The sludge can be dried out and disposed of separately.

Despite having the harmful elements removed from it during digestion, sludge still needs to be dewatered. Dewatered sludge can often contain a lot of water, nearly 70% in some cases, yet it can still be handled as a solid material. Using a sludge drying bed is the quickest and simplest way of dewatering sludge.

At this point in the process it is safe to dispose of dewatered sludge. This can be done either by spreading it across agricultural land, or burying it in a landfill. A third party may need to be contacted in order to effectively dispose of the dewatered sludge.

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Enduramaxx can help your wastewater treatment process

Enduramaxx stocks everything needed for an effective wastewater treatment system, including storage tanks, mixing and reaction vessels, and much else. Our staff have years of experience in all areas of wastewater treatment and can answer any queries regarding setup and practice.

Check out the full range of Enduramaxx products by visiting our home page today.







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