

CASE HISTORY

BATEMANS BREWERY MEMTREAT® SYSTEM

End User George Bateman & Sons Brewery
Process MEMTREAT®
Application Brewery Waste Water Treatment

Introduction

Like most well established breweries, the Batemans Brewery has had a gradual increase in production over the years with the introduction of new seasonal and all year round ales tailored to suit its customer's requirements. With this expansion of production free space is now at a premium.

The brewery's waste production has also increased and although the wastewater and wash down waters collection network and interconnecting drains have not needed modification, the onsite waste water treatment plant required upgrading to ensure effluent outside the trade effluent discharge consent would not be discharged to the local sewer.



MEMTREAT® Unit and Aeration Grid

Although other technologies would be capable of treating the effluent for discharge to sewer, Batemans brewery opted for ACWA's MEMTREAT® (Membrane Bio Reactor) technology which has a small footprint whilst producing small quantities of sludge and high quality permeate grey water suitable for reuse.

Design Information

Like all breweries, the waste flow and loads vary depending upon the current brewing and cleaning regime for a particular day or week. Data was collated over a period of time and the figures were rationalised and used as a design basis for design of the treatment plant. The following table indicates this design basis along with the required and expected grey water quality.

Estimated Raw Waste Water Flows and loads					
Description	Units	Average Value		Maximum Value	
Flow	m ³ /day	83		100	
COD	mg/l	5,141		6,520	
COD	kg/day	426		652	
BOD	mg/l	2,368		3,400	
BOD	kg/day	196		340	
Suspended Solids	mg/l	1,017		3,220	
pH (Typical)	-	4.0 – 6.0		7.0	
Expected Grey Water Quality					
Description	Units	Average Value		Maximum Value	
		Required	Actual	Required	Actual
Flow	m ³ /day	83	83	100	100
COD	mg/l	1500	<120	2000	<120
BOD	mg/l	-	<60	-	<60
Suspended Solids	mg/l	-	<10	-	<10
pH (Typical)	-	6-10	6-9	6-10	6-9

Description

The first stage of treatment is the removal of large items of material from the influent e.g. fibrous debris, floating matter, grit and other solids (e.g. rags, corks, bottle tops etc) in order to prevent damage to mechanical equipment and blockages in the downstream treatment process and to the flat sheet membrane unit. The influent is screened to <3mm with a fine rundown screen before being transferred to the balancing Tank.

The balancing tank evens out periodic peak surges in flow and concentration from the wash cycles, waste and out of specification discharges from the brewery. The balancing tank is fitted with a coarse aeration system to prevent settlement. A balance tank is particularly useful for situations when there is no production such as weekends as effluent can be stored during the week and processed at the weekend to ensure the biology of the system is kept stable. The balanced flow is then pumped to the MBR tank for treatment.

Within the MEMTREAT[®] Tank the biological components of the wastewater are degraded and the solid / biomass components are retained and removed from the treated wastewater as sludge. In essence the MEMTREAT[®] process unit consists of a bioreactor and membrane microfiltration process combining the biological treatment and solids removal stages in a single process unit.

Within the aeration zone, activated sludge biomass utilises oxygen delivered as fine bubble diffused air from duty / standby blowers to degrade the biological components of the wastewater. An MBR system biomass operates at a higher mixed liquor suspended solids (MLSS) concentration than conventional suspended biomass processes. Typically a conventional system would operate at 3-5000mg/l MLSS whilst the MEMTREAT[®] system operates at 15-18,000mg/l MLSS. This allows for a smaller process volume and therefore smaller overall footprint and less volume of sludge production.

The membrane effectively operates as the liquid - solid separation zone. The membrane units separate the treated wastewater from the suspended biomass. The treated wastewater passes through the membranes and out of the MEMTREAT[®] unit utilising the available hydrostatic head leaving behind the solids suspended in the biomass.

The majority of the biomass is retained within the aeration and membrane zones. Surplus biomass more commonly known as surplus activated sludge (SAS) is discharged to a sludge sump for offsite disposal. Based upon average flow conditions, the system is expected to produce approximately 12m³/day of SAS.

The membrane system consists of a membrane panel held on a support frame. A number of these panels are mounted together in a membrane cassette. These flat sheet membranes have a pore size of 0.4µm, however the effective size is much smaller than this due to a build up of biomass film on the membrane plates.

The membrane plates are based on the principle of cross-flow filtration ensuring that all solids, including micro-organisms and viruses, are retained within the activated sludge. The system is a simple system to operate, as it is a gravity system. No suction pumps are required to remove the treated wastewater from the membrane units.

Coarse bubble diffused air continuously operates underneath the membrane units. This has the dual function of providing oxygen for continual degradation of incoming organic matter and also providing a scouring action against the surface of the membrane to prevent the membrane pores becoming blocked with biomass.

The MEMTREAT[®] system can typically produce treated effluent with a quality equal to or better than <10mg/l BOD, <10 mg/l SS, <2 mg/l NH₃, <2.2cl/100ml coliforms. The reclaimed treated effluent is similar in quality to potable water and suitable for reuse.

pH correction, if required, is usually undertaken at the balancing stage. However, correction can also take place prior to the MEMTREAT[®] tank. Sodium hydroxide is also used for supplemental alkalinity. Alkalinity is required for the nitrification process; deficiency in influent alkalinity will reduce the degree of nitrification that can take place.

The MEMTREAT[®] system requires a periodic chemical clean in place (CIP) of the membrane elements, this is a relatively simple process takes place approximately every 6 months, there is no need to drain the tank, remove the biomass or membranes or shut down the process. A typical CIP will take approximately 3 hours.

