“CERA-PURE”

CHEMICAL FREE WASTEWATER RECYCLING AND WASTEWATER TREATMENT

TECHNICAL DESCRIPTION

TEA’s wastewater heat recovery systems are completely factory assembled, service proven and engineered for maximum wastewater heat recovery. Our exclusive plate & frame heat exchangers offer thermal efficiencies 300–500% greater than continuous shell & tube heat exchangers.

DC Heater

TEA’s SuperHeater provides near 100% energy efficiency for the most economical water heating available. Fully assembled water manifolds, exclusive inlet fresh water distributor, combustion zone cooling, and Smart Touch controls make the TEA SuperHeater the Ultimate in Direct Contact Water Heating.

Tanks

TEA makes stainless steel tanks ranging from 15 gallons up to 30,000 gallons. Our unmatched quality tanks have welded seams, hydraulically formed fittings and rolled flanges on both top and bottom heads to eliminate weld distortion.

Shaker Screen

TEA’s Shaker Screen has been proven to be the most effective method of filtering wastewater. Our stainless steel construction, including the base, makes it ideally suited for wastewater filtering application. With sizes ranging from 24” to 60” and mesh sizes down to 38 micron, TEA Shaker Screens can handle most any wastewater filtering application.

Pumping Packages

TEA offers efficient, space saving pumping packages precisely engineered for your application. Single, dual, triplex and quad pumping packages are available to meet your plant’s specifications. Stainless steel piping with anti-slam check valves and isolation valves, UL Control Panels, compact design, and pre-assembled packages are all standard features.

DIMENSIONS

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Springer Pumps, LLC

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WASTE WATER TREATMENT SYSTEM

Plants with sewer discharge compliance issues can use the ultra-filtration capabilities of the Cera-Pure System for chemical free treatment of the wastewater. The resultant filtered water can be used as recycled water in the plant. Recovery rates for recycled water can be as high as 90% of the water processed through the Cera-Pure system, with the remaining being sludge for disposal.

To use the Cera-Pure System most effectively, wastewaters should be segregated into black water and dischargeable gray water. In laundries, split trenches work best. The black water is processed through a Shaker Screen to the finest micron level possible, generally about 150 microns. This filtered black water is discharged into a cone bottom equalization tank. Wastewater is pumped, from an intermediate level in the equalization tank, to the Cera-Pure System, where pre-filters remove entrained solids down to the 5-10 micron level.

This filtered water is then pressure fed into the circulating loop of the ceramic filter module for final separation. Both high pressure and high velocities are used to separate the wastewater into filtrate water, and unfiltered concentrate water. Continuous reverse flow shock waves dislodge accumulated material from membrane pores maintaining filtrate flows. The filtrate can now be recycled for use in the plant. The filtrate water is usually within a few degrees of the incoming unfiltered water temperature. Concentrate water is returned to the equalization tank for mixing with incoming black waters and re-processing.

At the end of the processing day, the equalization tank is allowed to settle out. Most suspended solids will settle out over night. Any free oils will float to the top. Before start up in the morning, the settled sludge is pumped out to a sludge storage tank along with floating oils. At this time, the system is ready to begin processing plant wastewater again.

WASTE WATER RECYCLING SYSTEM

In areas that lack sufficient supplies of water, or water and sewer costs are excessive, the “Cera-Pure” water recycling process is ideal. Wastewater can be processed into recycled water and a concentrated waste stream that contains all of the removed contaminants. Plants that do not have sewer discharge compliance issues can effectively recover 50%, or more, of the total discharge volumes.

The wastewater is first processed through a Shaker Screen to the finest micron level possible. This filtered wastewater is discharged into a tank that acts as buffer storage before feeding into the Cera-Pure System.

The pre-filtered wastewater is then pumped to the “Cera-Pure” system where self-cleaning finer filters removes entrained solids down to the 5-10 micron level. This filtered water is then pressure fed into the circulating loop of the ceramic filter module for final separation. Both high pressure and high velocities are used to separate the wastewater into filtrate water, and unfiltered concentrate water. The filtrate can now be recycled for use in the plant. The filtrate water is usually within a few degrees of the incoming unfiltered water temperature. The concentrate water is discharged to the sewer.

Continuous reverse flow shock waves dislodge accumulated material from membrane pores maintaining filtrate flows. The automatic periodic chemical cleaning of the elements can be scheduled during plant down time, and will maintain the elements in pristine condition.
The heart of the Cera-Pure system is the ceramic elements. They are round rods with multiple internal channels. The channels are coated with a porous membrane, which are engineered to pass liquids below 0.2 microns and reject all media above. The coatings are fused into the elements to make a robust filter, unaffected by heat or chemicals, and capable of pressures over 1000 PSI and years of service.

In operation, liquids to be processed are pumped at high pressure and velocities through the channels. The porous membrane allows clear water to pass through, while rejecting all oversized particles. The high velocity of the flowing liquid sweeps the solids off the membrane and keeps it in the circulating stream. Near sized particles, which may be lodged in the pores, are flushed out during the air pulse backwash. The filtered water, called filtrate, is discharged into the filtrate header for use as recycled water. The recycled water is perfectly suited for use as process water in most operations, will not contain any chemical additions, or effect any plant equipment.

All plants that use water in their processing have concerns regarding water: whether it be ever increasing water and sewer costs, scarcity of water, or discharge compliance issues. Cities do not want the waste products in your sewer water and assess fines & surcharges directly related to what your wastewater contains. Traditionally wastewater treatment systems using chemicals have proven to be a double edge sword. Wastewater can be discharged under the limits, but the systems and their chemical/labor costs have risen to unacceptable levels.

Ceramic filtering systems have changed the game! For plants with discharge compliance issues, the Cera-Pure system can be used for chemical free wastewater treatment and clean up the wastewater for discharge. Plants facing limited water supplies or exorbitant water & sewer costs can use the Cera-Pure system to recycle and reuse a significant portion of their water, thereby reducing water & sewer costs. Plants using hot water will enjoy additional savings in water heating costs because the heat in the recycled water is recovered as well.

Is Cera-Pure right for your plant? An engineering study can evaluate how much of your wastewater can be recycled or treated. Whether you are looking to reduce your sewer fees, recycle a portion of your waste water, or both, a Cera-Pure system may be the perfect solution for you.

TEA's staff is available to assist you in making this evaluation. Contact us for further information.
Fresh water is becoming increasingly expensive to use, and after being used for processing, is expensive to discharge to the sewer. It is now possible to economically process wastewaters into recycled water and remove contaminants before discharging to the sewer.

TEA’s “Cera-Pure” Ceramic Element Filtration System can filter most wastewaters to the sub-micron level, separating the stream into recycled water and disposable wastes. Oils & greases, total suspended solids, COD/BOD, and a host of other undesirable elements are separated for disposal. The resultant clarified water stream is fully capable of being re-used in your processing.

Ceramic element filtration is the only recycling system that can operate without expensive chemicals and constant operator monitoring. The fully automatic operation reduces operator supervision from startup in the morning to shutdown at the end of the day.

Plants that do not have sewer discharge compliance issues can effectively recycle 50%, or more, of the total discharge volume. The ceramic elements will separate the water into recycled water and a concentrated waste stream. The waste stream will contain all of the removed contaminants for discharge to sewer.

If sewer discharge compliance issues are a problem, a waste water treatment approach can be implemented that will recover up to 90% of the water processed for re-use, and concentrate the waste products as sludge for separate disposal. These systems are more complex but the financial returns can be most attractive.

Ceramic element filtration of wastewater is a quick and continuous process and will recover most of the heat contained in the water for additional energy savings.
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At the heart of the Cera-Pure System are the aluminum oxide ceramic elements, which can remove particles down to 0.1 microns. This means all but the smallest organic molecules or soluble ions are removed.

Ceramic Element Filtration is ideally suited for treatment for discharge or recycling from a wide range of industries, including laundry and textile finishing plants, concrete processing facilities, metal finishing plants, car washes, automotive processing industries, poultry and egg processing plants, and other food processing.

Servicing of the elements is automatically performed periodically depending on the quality of the wastewater. Pneumatic reverse flow shock waves are used to dislodge accumulated material from the surface of the filtering membrane. The automatic periodic chemical cleaning of the elements can be scheduled during plant down time, and will maintain the elements in pristine condition.

In the basic system, liquid is pumped from a pit or tank, through a Shaker Screen (about 150 micron screening), and into a feed tank. A pump then supplies this pre-screened liquid to the Cera-Pure system. Another finer filter is used to refine the liquid for the final ceramic filtering step. The liquid is then fed into the main re-circulation loop where it is circulated at high pressure and velocity through the “Cera-Pure” module. In the module, the liquid is filtered through the elements and filtrate is discharged into the filtrate header. The liquid in the loop is continuously circulated through the module. As impurities build up in the re-circulation loop, a portion of the liquid in the loop is bled off as a reject/concentrate stream to the sewer.

The fully automatic operation reduces operator oversight from startup in the morning to shutdown at the end of the day.
TEQUILA PROCESSING PLANT
During the Tequila making process the agave plant is boiled to make a mash and extract the agave liquor. This liquor was then cooled so it could be filtered to remove agave fibers. The liquor was then re-heated to start the fermentation process. This was a time consuming and energy intensive process.
A Cera-Pure System was installed to filter the agave fibers from the liquor while still hot. Because they are impervious to heat the ceramic element filtration system eliminated two unit operations and saves time. Eliminating the cool down and re-heating process has reduced energy costs by 40%.

FOOD PROCESSING PLANT
An egg processing plant produces 3000 gallons of wastewater per day with high levels of BOD, TSS, and TKN, resulting in sewer surcharges of $4000.00 per month.
A Cera-Pure System was installed to treat the wastewater to remove proteins and other organic matter that contribute to the high readings. The filtrate produced is of such quality that it falls below municipal discharge limits. BOD was reduced 99%, TSS was reduced > 99%, and TKN was reduced 98%. Because the process does not require any chemical pre-treatment, the concentrate is suitable for other rendering. The sewer surcharge was reduced from $4000.00 per month to less than $400.00.

COMMERCIAL LINEN PLANT
A large commercial laundry was unable to grow due to a limited water supply. Increasing the size of the water service would be cost prohibitive.
A Cera-Pure System was installed to filter and recycle the wastewater back into the laundering process.
The plant is reusing 50% of the wastewater without any adverse effect on product quality. This has allowed the plant to take on additional accounts and increase daily production using the same total volume of water. In addition to recycling the water, the heat in the water is also recycled thus reducing the energy required for water heating.
TEQUILA PROCESSING PLANT

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TEA's Cera-Pure system usually a few degrees warmer than the incoming water.

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A Cera-Pure System was installed to treat the wastewater to remove any products that could reduce the quality and quantity of recycled water that can be used.

Ceramic filters do not remove ions, so recycling ceramic-filtered water can result in an increase of TDS. Too high a TDS level will impact product quality. Based on operating experience, most plants can recycle at least 50 – 60% of their total wastewater. Testing of the final combined plant process water, in consultation with your chemical vendor, will determine how much recycle rates can be increased.

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The plant is reusing 50% of the wastewater without any surcharges of $4000.00 per month.

FOOD PROCESSING PLANT

An egg processing plant produces 3000 gallons of wastewater per week. Cleaning is done with an alkaline detergent with a final weak acid rinse. Cleaning is fully automatic. The only regular maintenance is required (greasing pump bearings for example). The only regular maintenance is required (greasing pump bearings for example).

The elements are made from a fired ceramic that is virtually impervious to chemical or biological attack. Unlike RO and NF membranes, which only last a couple of years, the ceramic elements will last virtually indefinitely when operated according to the Installation & Operation Manual.

The Cera-Pure ceramic elements do require periodic cleaning due to slow buildup of contaminants. Cleaning is done with an alkaline detergent with a final weak acid rinse. Cleaning is fully automatic. The only regular maintenance is required (greasing pump bearings for example).

How much operator interaction is required?

TEA's Cera-Pure system is fully automatic and performs all routine operations, from startup to shutdown, without any operator interaction. The system has controls that automatically react to the constantly changing demands of the plant to achieve optimum performance. The system features remote monitoring and data logging, allowing plant managers and engineers to see the system performance in real time. As with most equipment, some minor, infrequent, maintenance is required (greasing pump bearings for example). The only regular maintenance action requiring an operator is the weekly inspection or replacement of the bag filter membranes.

How much water can be recycled?

Ceramic filters do not remove ions, so recycling ceramic-filtered water can result in an increase of TDS. Too high a TDS level will impact product quality. Based on operating experience, most plants can recycle at least 50 – 60% of their total wastewater. Testing of the final combined plant process water, in consultation with your chemical vendor, will determine how much recycle rates can be increased.

What is the quality of the water produced by a ceramic filter system?

Ceramic filtration is a mechanical process that operates at ultrafiltration levels. The quality of the filtrate is high enough to reuse in industrial applications. However, initial testing will identify any products that could reduce the quality and quantity of recycled water that can be used.

What is the expected life of ceramic elements?

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Do the ceramic elements require cleaning?

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How much expansion is built into each system?

Modules are available in 100, 150 and 200 gallon per minute influent capacities. Some growth is usually available by changing the backwash cycle times and element cleaning cycle times, but growth is limited. Testing of equipment in actual use can evaluate if higher throughput rates are possible. Equipment should be sized when ordering so that possible additional capacity already exists.

What other benefits can be achieved?

It should also be noted that in addition to the water, sewer, and energy savings, there are savings in avoidance of impact fees or the cost of new construction that would otherwise accompany the same increase in water volume. Many municipalities and/or utility companies have grant monies or rebates available for conservation of water and energy.
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CERA-PURE Dimensions

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Other TEA Products

Top View | Side View | End View

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