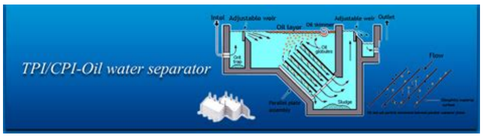
Cpi Oil Separator Manual



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Book Descriptions:

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As the process flows downward through the pack, separated oil begins to agglomerate on the underside of each plate allowing for oil particle growth and their rise to a collection area at the oil water interface. A thick layer of oil forms this interface and is allowed to collect until it overflows an adjustable oil weir 5 into an oil bucket for removal. The process water exits the bottom of the plate pack, rises upward and spills over a fixed water weir 7. On the backside of the water bucket there is a secondary oil compartment 8 which collects oil that may pass through the plate pack due to surges or upsets. Removal of this collected oil is a manual operation, opening a normally closed isolation valve. The gasketed cover 9 allows for a positive gas blanket pressure. A vent is provided for overpressure 10. ETS is your full service process water treatment solution.Powered by MPRESSED Media. An oil manual or controlled skimmer collects the oil and fats from of water surface and conveys them in a storage volume from which subsequently is relaunched or removed for subsequent treatments. The oil in oilwater mixture rises along the convex parts against the flow of water and the sludge descends along the concave parts to the bottom of separating tank. The oil wich raised to the surface is removed by regulatable drum oil skimmer of pipe oil skimmer. However, vendor literature normally does not address important characteristics such as highly variable flow rates and variations in suspended solids and oil concentrations. Rather, performance is advertised according to ideal conditions of consistent flow and oil concentrations, and no other contaminants present. There are no industry standards that manufacturers must meet. This has resulted in a large number of prefabricated separators hitting the market. Many of these manufacturers are making unsubstantiated claims about their products performance capabilities.http://huynhgiabaohotel.com/uploads/FCK/esa-service-manual.xml

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Often times, performance tests are performed under unreasonable conditions. The installation wrote a contract for the purchase of 60 prefabricated separators with coalescing plate packs for treating vehicle wash water. The specifications of the contract stated that the separators should be designed to treat a waste stream of 100 gpm. The separators were purchased and installed. However, they only performed at the rated capacity for approximately 1 minute, after which the separator could not treat the 100 gpm flow rate and became overloaded. Oil began passing through the separator, creating a continual discharge to the environment that violated the installations NPDES permit. The installation currently continues to use the separators with regulator approval, and cleaning up the discharged oil. This is an interim measure until the installations Central Vehicle Wash Facility CVWF is complete. Once finished, 54 of the washracks PWTB No. 200105 5 December 1997 A12 will be closed and the separators will be removed. The six that remain will be replaced with new separators that the installation designed. These will discharge to the CVWF. The purchasing agent wrote a contract for the purchase of several prefabricated separators with coalescing plate packs to be installed at various Army Reserve centers. This company was the lowest bidder and was awarded the contract. However, another company, who had also bid on the contract, obtained copies of the specifications through the Freedom of Information Act, and contested the awarding of the contract. Upon closer examination of the drawings, it was noted that the spacing between the plates was less than 0.65 in., certainly less than the minimum requirement of 0.75 inch. The agent contacted the company, who offered to adjust the plate spacing to bring the separator within spacing specifications. They kept the contract. The STS test does not produce such data.http://www.flying-vikings.net/UserFiles/erchonia-pl-5000-manual.xml

Manufacturers literature will often depict data concerning oil droplet size distribution based on percentages of droplets greater than specific micron sizes. However, there is no known or recognized analytical procedure that will provide this information. This means understanding as much as possible about the content of the process stream see para. 2d and the capabilities of various separator types. Unfortunately, very little definitive guidance is available that describes various separator configurations and what level of performance to expect from that configuration. To ensure that the separator being installed will meet performance expectations, enter as much information as possible into the contract specifications, including influent characteristics to the extent known and PWTB No. 200105 5 December 1997 A13 specific effluent requirements. Also include some type of testing requirements or quality assurance measures for after the separator is installed. This testing should represent worst case operation of the separator, not just ideal operating conditions. However, several factors that could potentially affect safety, efficiency, and proper management must be given careful consideration prior to the installation or modification of any oil water separator or separation system The slower the flow, the better the results. If too much oil accumulates in the receiving and middle chambers, it may flow into the wastewater outlet chamber and end up being discharged to the environment. Proper oil water separator design will allow for the removal and storage of accumulated oil and sludge from the separator to ensure that the accumulated products do not effect the operation of the separator. When these soapy wastewaters enter an oil water separator, it takes significantly longer for the oil to separate, if it can, from the water.

Excessive use of detergents can render an oil water separator inefficient by completely emulsifying oils into the wastewater stream and allowing them to pass through the system. Lowemulsifying soaps are available that allow oil separation to occur more quickly after the soapy water enters the oil water separator. Frequent inspections should be made of the system and all associated piping, valves, etc.To reduce the accumulation of sludge, floors should be dryswept before washing.No further discharge STOP No Further Action Required Can the existing separator handle the increased flow. Is moving the process, diverting the flow economically feasible Characterize raw wastewater prior to any treatment if appropriate. Characterize treated wastewater if existing treatment equipment is in place. Proceed to Oil Water Separator Design Flow Diagram Decide what type of separator or separation system to use. Emulsion breaking or dissolved air flotation systems may be required for processes with chemically or mechanically stable emulsions. HydroFloAPI separators are designed to evolve with your growing, expanding process requirements. These robust separators can be retrofit with a variety of DynaPac media and plate packs increasing the efficiency of the separator as your process or discharge requirements change. Surface drag skimmers, sludge augers, vapor tight lids and even full dissolved air flotation DAF system conversions are simple bolt on modifications. For example look at the following spreadsheets. That is a 70% change in the total size of the separator. Both examples will remove the target oil with a specific gravity of.90 and less. The real world difference between the two is that the first example will be far more efficient than the second. If you size a separator without knowing the target removal efficiency, you will end up greatly over sizing the separator, because you will need to err on the safe side, and size the separator for maximum efficiency.

http://dev.pb-adcon.de/node/16731

Solving for and designing a separator capable of removing dispersed oil is a bit more complicated. But, just because it is calculable does not mean that it will perform that way in the real world. We had a number of conversations in regard to this topic and the above statement. It is interesting to note that, according to Mike, they never tested or proved this statement. No tests of any kind were ever conducted in any way, shape or form. They relied solely on basic Stokes Law calculations. In fact, I believe that the separators developed by Mike and myself with AFL and Great Lakes Environmental are still being manufactured today. In exactly the same manner. Using exactly the same criteria. 2 GPM per cubic foot period. We published a little DOS based program and distributed literally thousands of copies worldwide. The droplets bounce off each other like so many marbles, unable to coalesce with other oil droplets or onto the surface of any coalescing media. Any trace of surfactant or emulsifying agent makes the process even more difficult. They will respond with supporting calculations, but no one will respond with any quantifiable study supporting the claims. Many can supply influent and effluent test results showing the total change across the separator, but no one will be able to supply information on the particle distribution and actual removal efficiencies. Everyone bases the efficiency of their separator on their separators projected surface area. But, other design variables are all over the map. The angles and configurations of the plates are vastly different from manufacturer to manufacturer. Overall separator volume from the largest to the smallest designs can fluctuate as much as 150% or more. This ratio should give you the separator cost per cubic foot of media. This is important because the physical size of the separation chamber is the greatest factor in the cost of manufacturing any separator.

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Many separator manufacturers use the smallest media plate spacing possible in their separators. This allows them to post the largest projected surface area numbers possible, giving the customer the impression that they are purchasing the most efficient separator available. Unfortunately, this is not the answer. Other considerations come into play. Many other issues come into play, such as excessively high cross sectional velocities and Reynolds numbers, plate pack distribution and short circuiting issues, as well as oil and sludge reentrainment. All are common. It is an interesting study and worth a read. They were very thorough in their study and only made one error, albeit rather significant. Critical differences are the configuration of the influent distribution chamber, the overall separation chamber height to width to length ratios, the separators effluent configurations, etc. ALL these items need to be configured to match the media. This is demonstration text. Click edit above to create your own content. This document, API Publication 421, went about laying out several calculations that would assist end users in determining how much surface area was needed to achieve an acceptable removal rate at a given flow. The manufacturing process went through an even more drastic cost reduction when these sinusoidal shaped plates began to be fabricated out of different types of plastic. The reason for the corrugation was basically cost reductions, as manufactures all went to battle against each other claiming higher removal rates at bargain pricing. The trade off for producing the required surface areas to keep up with higher removal mandates was a design that fouled very quickly. This allowed capture of smaller micron sized oil droplets from the separator in the same sized tank usually a concrete pit. The surface area of these thick ” steel plates would catch smaller oil droplets at the top of each plate and allow them to collide or coalesce into bigger droplets.

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So instead of only being able to remove oil droplets of 150 micron size, the oil and water separator was now able to hit the 100 micron removal range. Seeing how these parallel plate pack inserts were achieving higher removal capabilities, the design no longer required a large tank to achieve the desired removal. The first packs started with very wide plate gaps, and companies began to tighten up these gaps in the attempt to obtain claim higher removal capabilities. The presence of solids, and the accumulation of them on these parallel plates, led to very short process runs before shut down and cleaning was necessary. The higher the flow rate, the longer these plates needed to be to theoretically guarantee the desired removal rate. The costs began to climb signifigantly as manufactures began tightening the plate gaps in these horizontal parallel packs. These problem areas eventually led to manufactures introducing corrugations into their designs to save on material costs, while still maintaining the structural integrity of the packs.The introduction of corrugations into the design of coalescers did nothing to go to the root cause of industrys frustration, which was the fouling and clogging created by solids mixing with oils creating sludge. Overwhelmingly, the problem has been with fouling coalescers that eat up maintenance dollars and compromise allowable effluent levels. A design method is provided in the API Manual on Disposal of Refinery Wastes, Chapters 5 and 6 OilWater Separator Process Design and Construction Details API publication 1630, 1979. Based on that design criterion, most of the suspended solids will settle to the bottom of the separator as a sediment layer, the oil will rise to top of the separator, and the wastewater will be the middle layer between the oil on top and the solids on the bottom. Most are built of concrete and with the high cost of labor and the need to reinforce these tanks with steel, new construction costs rise quickly.

Plus API units have an excessively large footprint and are far too much of a real estate burden to consider this as a viable option. Some units have a chain and scrapper mechanism. This helps move the solids to one side to be pumped out, but the automation piece for these are usually as much as the construction of the pit itself—and require significant maintenance as well. A design method is provided in the API Manual on Disposal of Refinery Wastes, Chapters 5 and 6 OilWater Separator Process Design and Construction Details API publication 1630, 1979.

Based on that design criterion, most of the suspended solids will settle to the bottom of the separator as a sediment layer, the oil will rise to top of the separator, and the wastewater will be the middle layer between the oil on top and the solids on the bottom. Most are built of concrete and with the high cost of labor and the need to reinforce these tanks with steel, new construction costs rise quickly. The design of the separator is based on the specific gravity difference between the oil and the wastewater because that difference is much smaller than the specific gravity difference between the suspended solids and water. This includes allowances for water flow entrance and exit turbulence losses as well as other factors.This removed oily layer may be reprocessing to recover valuable products, or disposed of. The heavier bottom sediment layer is removed by a chain and flight scraper or similar device and a sludge pump.Further water treatment is designed to remove oil droplets smaller than 150 micron, dissolved materials and hydrocarbons, heavier oils or other contaminants not removed by the API. Secondary treatment technologies include dissolved air flotation DAF, Anaerobic and Aerobic biological treatment, Parallel Plate Separators, Hydrocyclone, Walnut Shell Filters and Media filters.In operation it is intended that sediment will slide down the topside of each parallel plate, however in many practical situations the sediment can adhere to the plates requiring periodic removal and cleaning. Such separators still depend upon the specific gravity between the suspended oil and the water. However, the parallel plates can enhance the degree of oilwater separation for oil droplets above 50 micron in size. Alternatively parallel plate separators are added to the design of API Separators and require less space than a conventional API separator to achieve a similar degree of separation.

A typical parallel plate separator The majority of those refineries installed the API separators using the original design based on the specific gravity difference between oil and water.For exampleThe transformers found in substations use a large amount of oil for cooling purposes. Moats are constructed surrounding unenclosed substations to catch any leaked oil, but these will also catch rainwater.OWS descriptions and drawings By using this site, you agree to the Terms of Use and Privacy Policy. You should consider upgrading your browser to improve your experience. They also ensure your operation meets water authority standards. Or we can design and build one thats perfectly suited to your site. Our systems pay themselves off through savings on mains water use and wastewater removal. Theyre flexible enough to meet any sites requirements and are ideal for domestic, commercial, industrial and mining settings. They are durable, compact, easily maintained and will help ensure wash water adheres to water authority standards. We offer a wide range of skimmers that facilitate the reliable removal of floating oil and debris from water. Theyre suitable for industrial and commercial wastewater and will ensure you adhere to all water authority regulations. Different technologies of oil water separation are more suited to some industries than others. Operating costs and amount of maintenance intervention also differ widely. The most efficient separators reduce oil content to less than 5 ppm, while others are only capable of lowering the oil content to 50 ppm. How do you ensure compliance with environmental regulations for your industry, while optimising your capital expense and operating costs. How do you avoid investing in the wrong technology and exposing yourself to an expensive retrofit. Different types of oil water separators Coalescing Plate Separators have plates made from material that attracts oil, and separate it from the water.

Many plates are stacked on top of each other to increase the oil removal capacity. Vertical Gravity Separators VGS have internal cones made of material that attracts oil. Small oil droplets form on the cones and then enlarge as more and more oil is collected, before eventually floating to the surface. Hydrocyclone Separators use cyclones to create a spiral flow through the separator. The centrifugal force causes heavier water molecules to separate from lighter oil particles. Cost breakdown for oil water separators Each type of oil water separator is suited for different applications and industries. Experts in the field are able to provide professional advice about which oil water separator may be most suited to your needs. Technology Flow rate Applicable industries Price starting from Checklist for choosing the best oil water separator for your application It is important to enlist professional input when choosing an oil water separator for your specific application. Many factors must be taken into account to determine which technology will work best and it is important to note that some oil water separators may not work at all in particular industries. If a mistake is made, it is typically very expensive to retrofit a different technology oil water separator. Some of the factors to take into account are Influent water quality Cheap oil water separators are mainly used in applications where the water flow is small or intermittent. The major purpose of the separator is to ensure regulatory compliance rather than handle significant separation requirements. The intermittent nature of operation is less conducive to automated systems and can require regular human intervention. What are the advantages of more expensive separators. More expensive oil water separators are able to treat more complex influent water properties. They can handle higher flow rates and a wider variety of oil types present in the water including some emulsions.

This equipment tends to have more sophisticated control systems, with automation of main functions. Operator alarms and alerts ensure corrective action can be taken before an incident occurs e.g. An oil spike in the effluent or a breakdown in operation. They are also more reliable and require less maintenance interventions than cheaper oil water separators. Contact Cleanawater for more information about oil water separators We can combine our solutions to suit your specific business, compliance and investment requirements. Call our expert team on 1800 353 788 today to arrange a consultation for your oil water separator needs and to make sure you keep compliant with regulations. Get started here. Read more Find out more.. Read more In areas of the world where water appears to. For car wash operators, this is a particularly important issue as your business is reliant on water. We are one of “the founding fathers” of the separators in use today and a leading specialist in this field. Presently we mainly use CFI and IPI separators in our designs, combining cost effectiveness with the best technical solution for each specific project. Please refer for more detailed information to the next paragraphs. Therefore API separators have to be relatively large basins.Due to hydraulic factors such as short circuit currents and turbulence in the separator basin, the API performance is limited to intercepting oil droplets with a minimum size of 150 micron only. Settled sludge is removed through a well, located at the exit side or by manual periodic draining and cleaning. API separators require frequent maintenance. In addition to this they also have the following disadvantages Still, it is impossible to avoid short circuit currents and turbulence. Thus very small particles cannot be completely separated. 2. Wind and rain can disrupt the liquid surface, which induces turbulence and interferes with oil skimming.

This can be prevented by constructing a roof over the basin, but this is costly. 3. API separators generally emit a unpleasant odour. 4. The separated oil contains water and may require further separation. Although the API separator served its purpose, in due course environmental regulations became stricter. As new rules could not be met by using APIs, a better separator was needed. Following experiments and sophisticated hydraulic calculations, in 1962 the Parallel Plate Interceptor PPI was put into use. The plates were covered and completely enclosed by a curved steel plate, providing a semicircular space along the length of the plates, completely filled by separated oil. Sludge and heavy particles fell to the tank base and were slowly carried by the current to a separation well at the discharge end. The solution to these problems was found by a Shell engineering, by Mr. Jacob Struyten, who jointly invented and developed an entirely new separator the CPI. Another main difference was the use of corrugated plates. The separated oil droplets would collect in the tops of the corrugations, while solids would deposit in the troughs.Separated solids would slide down and separated oil drops would adhere to the invert side of the plates and gently move upwards due to its lesser density than water. The fact that Struyten was also a pioneer in the field of plastics in general and plastic welding in particular, did certainly influence this design decision. The use of corrugated plates also contributed to the rigidity of the plates. At the bottom and top the plate packs were fitted with chutes to guide the separated oil and sludge out of the pack. This new separator was thoroughly tested and proved to be a considerable improvement as compared with the PPI. The design became known as the Corrugated Plate Interceptor, CPI and it was patented by Shell. Appointed licensed manufacturers were Struyten of Holland, Japan Gasonline Corporation of Japan and Monarch of the USA.

Oily water enters the pack at the top and flows between the parallel plates in a downward direction. Separated oil droplets adhere to the plate surface, coalesce and move upward, counter to the downward moving main flow. The separated oil droplets leave the CPI plate pack at the top. Moreover CPI plate packs can also be used for the separation of heavier particles. With this application the water enters the plate pack at the bottom side and moves through the pack in an upward direction. Separated particles subsequently slide down along the surface of the plates and leave the plate pack at the bottom. Even the CPI however, had a disadvantage clogging of the plate packs, caused by sludge accumulation in the guide chutes.The chutes also formed an obstacle for cleaning the plate packs with water jets. The plate packs had to be lifted out of their basins before they could be cleaned. However due to the accumulated sludge, the weight of a plate pack increased significantly over time.He replaced the guide chutes by strips, solving the problem of clogged plate packs and at the same time increasing efficiency with 30%. The increase in efficiency can be explained because the chutes caused turbulence in the water flowing between the plates. The strips in the TPI facilitate a laminar flow between the plates, thereby enhancing the plate pack’s efficiency. Struyten patented this new design and successfully sold thousands of TPI plate packs worldwide. Many of these are still in use today. On rigs and platforms space is very limited and weight must be saved to the maximum possible extent.The traditional CPI and TPI separators have a relatively small plate surface per m3 of separator basin volume and per m2 of separator basin area. It was necessary to maximise the plate surface compared to the separator basin’s dimensions. This was achieved by developing the Cross Flow Separator or CFI.

Contrary to counter current separators with the entry at the top or bottom, the CFI has an entry at the side. The water flows in a laminar stream between the plates in a horizontal direction.The main advantage of the CFI is that heavy as well as light particles can be separated from the effluent simultaneously. For instance, oil is separated by floating upwards along the tops of the corrugated plates to the surface of the separator tank. Heavier particles at the same time settle along the bottom of the corrugated plates and slide down the plates to be collected in a sludge cone and discharged through a blowoff valve. Depending on the purpose of the CFI separator we determine the ideal plate design, which can be flat, corrugated or have a special profile.It is important to know when to use which plate design. A plate profile suitable for the separation of oil from a low viscosity liquid, such as water, is not necessarily suitable for separating oil from a high viscosity liquid. CFI applicationsCFI separators are the best solution for the following applications 1. To simultaneously separate light and heavy particles from liquids. 2. To enhance the efficiency of existing separator tanks. For instance three phase separators, free water knock out vessels and drain water separators especially when used on off shore facilities. 3. When space is limited and dimensions of the separator are dictated by the available space. 4. In pressurised separators. The original effective CPI pack surface was 130 m2, while the effective Cross Flow pack surface is 500 m2! The only disadvantage of the CFI is that the flow velocity between the plates is limited. The only disadvantage of the CFI is that the flow velocity between the plates is limited. We always strive to look further, to develop and to try new ideas. Often this results in a new product or application.

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