



Energy-Saving, Efficient Water Treatment Programs for Boiler & Cooling Tower Applications

Water Treatment Divisional Products and Services



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Programs

Delval offers a full complement of water treatment programs for all utilities as well as process water. In all cases, our programs are aimed at providing more value than the cost of the treatment program. We pride ourselves in improving performance of your operation and conserving energy and water thus improving the carbon footprint of your facility with out of the box comprehensive approaches.

Boiler Treatment Programs (Liquid & Solid)

Our boiler treatment programs provide your boiler system from make-up through blowdown and condensate return with several layers of protection. The programs are not off the shelf programs but are tailor made for your site based on your needs, goals, and operation.

Our Water Treatment team takes a comprehensive approach to prescribing a program thus encompassing several important factors. Delval considers the water quality being supplied to the boiler system. For example, an incoming water that contains a high level of silica would require a polymer that sequesters the silica. We have implemented successful programs for well water, city water and river water.

We incorporate the pre-treatment equipment such as softeners, dealkalizers, reverse osmosis units, deaerators and feed water tanks already in place into our thought process with respect to prescribing a program.

Delval explores all alternative programs to ensure that we apply a treatment program that takes every advantage with respect to reducing operating costs from salt for the softener or dealkalizers through fuel for the boiler to blowdown or regeneration volume discharge. For example, if you are required to pre-treat your blowdown prior to discharge to a body of water, we consider how to reduce blowdown to mitigate the cost of pre-treatment.

Cooling Tower Treatment Programs (Liquid & Solid)

The cooling tower treatment programs provide your tower systems protection against deposition, corrosion and microbiological fouling. Impact factors of the cooling tower water are closely monitored such as pH, temperature (encountered by the tower water in heat exchangers), total alkalinity concentration, calcium concentration, and total dissolved solids. These factors are used to determine the water's tendency to retain or precipitate calcium. We then select the dispersants that would best prevent deposition which robs your system of energy efficiency.

Programs

Cooling Tower Treatment Programs (Liquid & Solid) - continued

While the water's tendency to retain calcium indicates that the water can be corrosive, Delval takes a more comprehensive approach to preventing corrosion with our plethora of high stress corrosion inhibitors. We invariably will conduct an on-going corrosion study or provide equipment for real time live on-line corrosion monitoring reflecting the metallurgy in your cooling system. Delval's inhibitors will maintain the corrosion rates well below the industry maximum standards thus providing you with proof positive that the system is protected from corrosion. In addition, we will be routinely checking the concentration of your system's metallurgy in the tower water with target minimum

Uncontrolled microbiological activity in a cooling tower system will lead microbiological fouling which results in a biofilm developing on the interior surfaces of your cooling tower system. Your system will lose energy efficiency in that biofilm is an excellent insulator. Secondly, corrosion will be enhanced with the layer of biofilm. Finally, biofilm is an excellent harbor for Legionella. A cooling tower system with biofilm present is vulnerable to a Legionella outbreak.

We have many options for non-oxidizing biocides, oxidizing biocides, and bio-dispersants to combat microbiological fouling in your cooling tower system thus mitigate the presence of biofilm. We recommend using all three (3) biocidal treatments but not on a continuous basis for several reasons. Bacteria can develop an immunity to a biocide form especially if only a single biocide is used. By using both non-oxidizing and oxidizing biocides on a continuous but alternating basis, the bacteria's ability to develop immunities is minimized thus broadening the kill spectrum.

Non-oxidizing or oxidizing biocides will only attack the surface of any biofilm that has developed in the system leaving the biofilm essentially intact. Bio-dispersants will penetrate the biofilm lifting it off the surface thus making it prey to the continuous applications of oxidizing and non-oxidizing biocides. Our thorough approach to microbiological control puts your system firmly in compliance with the best practices as defined by ASHRAE Standard 188, CDC, OSHA and the Federal Department of Health & Human Services CMS.

Closed Loop Programs (Liquid & Solid)

Delval's closed loop programs protect your closed hot or cold-water system from corrosion and deposition. While we prescribe using molybdate based treatment programs, we can supply a nitrite program as well. Nitrite programs tend to provide a nutrient for anaerobic bacteria that can infect a closed loop. In fact, there are times when a closed loop is microbiologically contaminated. Should the need arise, we offer a line of disinfectants that can be used to disinfect a contaminated closed loop water system.

Programs

Closed Loop Programs (Liquid & Solid) – continued

Our closed loop programs typically use a by-pass feeder as the point of application however we can be successful with other methods of injection. For a large, closed loop, Delval has concentrated closed loop programs that are aimed at lowering use cost.

Process Water Programs

Delval has been involved in treatment programs for a number of process water systems including water re-use when zero or reduced discharge is mandated. However, the programs are focused entirely on the given site and issue. Consequently, if you have a process stream that is an issue, contact Delval for a sampling & audit site visit or go to the “[Service](#)” section for more detail and then [contact Delval](#).

Products

Boiler System Chemistry (Liquids / Solids / Powders)

Oxygen Scavengers – Delval has both liquid, powder and solid oxygen scavengers that can be used in a boiler treatment program. The majority of our oxygen scavengers are sulfite based although we do have non-sulfite-based oxygen scavengers as well to be used where the need arises. Our oxygen scavengers are typically injected in the feed water tank or deaerator thus protecting the interior walls of the feed water tank or deaerator from oxygen attack. Our oxygen scavengers move through the feed water tank or deaerator to the boiler thus imparting a level of protection against oxygen attack to the tubes as well. Delval can provide FDA/USDA approval for use in boilers.

Alkalinity Builders – We offer both liquid and solid alkalinity builders. Alkalinity builders are typically injected in the boiler with the feed water however we have injected into the feed water tank or deaerator. The alkalinity builder serves two (2) major functions. First, alkalinity builder maintains the magnetite layer which is the iron's natural layer of protection on the tube surface. Secondly, alkalinity builder drives the reactions of the other boiler treatment products. Alkalinity builder demand is based on the level of alkalinity in the make-up water prior to pre-treatment. The alkalinity builders are both FDA/USDA approved for use in boilers.

Sludge Conditioners – Delval has a wide selection of sludge conditioners in both liquid and solid form tailored to your needs based on the constituents of your make-up water. While we can provide chelates, our normal treatment uses sludge conditioners that are polymers. Sludge conditioners function by wrapping a common charge around the colloidal solids that want to agglomerate into a heavy enough bulk to precipitate onto the tubes as scale. Scale robs your boiler of energy efficiency. In fact, an egg-shell thick scale will use 5% more fuel to produce the same amount of steam. This is why scale is such an anathema to a boiler system.

The constituents of your make-up water will determine the sludge conditioner required from our product line. However, the majority of make-up waters require a sludge conditioner that has a combination of calcium, silica and iron sequestering agents. Once the contaminants are sequestered with a wrapping of a common charge, the contaminants remain in the boiler water and are available for principally surface and secondarily bottom blowdown. Our typically used sludge conditioner is FDA/USDA approved for use in a boiler system.

On the other hand, if your make-up silica level is high, a Delval sludge conditioner with a polymer that would sequester silica would be successful at mitigating the formation of silica scale which is basically glass. Glass is an excellent insulator and cannot be removed easily once formed on boiler tubes. The control limits on our polymer sludge conditioners is dependent on the tracer in the sludge conditioner. Our sludge conditioners focus on providing you with sequestering agents that ensure success.

Products

Condensate Return System Protector – Delval is intent on protecting your return system from carbonic acid corrosion. When the boiler produces steam, it also produces carbon dioxide from the carbonate and bicarbonate alkalinity inherent in the make-up water. The condensate in the return system combines with the carbonic acid to form carbonic acid which can corrode the return system and damage steam traps. A condensate return system that is subject to corrosion is at risk. Corrosion will compromise the integrity of the piping leading to leaks. Leaks are not only a labor-intensive repair project but allow intrusion of unwanted going back to the boiler system.

The condensate return system protector is a combination of amines that volatilize in the boiler and go out with the steam. The amines combine with the condensate at different points in the condensate return system. Morpholine drops out to neutralize the carbonic acid at points in the return system close to the boiler. Diethyl-aminoethanol (DEAE) condenses with the condensate in the return system mid-range from the boiler system. Cyclohexylamine drops out with the condensate in the far reaches of the return system. Typically, Delval uses a condensate return system protector with all three (3) ingredients thus ensuring protection through-out the entire return system. However, we can provide any combination of amines.

Our condensate return system protectors are FDA/USDA approved for use in a boiler system where the steam is used for humidification and or direct injected. However, dosage is limited to 25ppm total concentration and/or 10ppm of any individual amine. Consequently, we monitor those applications closely.

Should a facility restrict the use of amines to protect the condensate return system, there are mechanical options that can be pursued to offer a level of protection to the condensate return system.

All-in-One Chemistry – Delval has a full complement of all-in-one products. The all-in-one products provide the convenience of having the required components (oxygen scavengers, alkalinity builders, sludge conditioners and condensate return system protectors) in one liquid drum or solid jug. A select group of Delval's all-in-one products are FDA/USDA approved for use in a boiler system.

Products

Boiler System Chemistry (Liquids / Solids / Powders) - (continued)

Supplemental / Cleaning / Start-up & Lay-up Chemistry – Delval maintains a leading-edge stable of supplemental boiler treatment products and boiler cleaning products. There are times when the boiler treatment program needs a boost to get over an obstacle. Provided the chemical feed and control system is properly engineered, We can supplement their treatment programs with chemicals laser focused on a specific issue.

Our cleaning chemistry has worked successfully to remove scale and provide a bare metal tube to our customers. The cleaning chemistry selectively attacks the scale leaving the metal intact. In all cases, we have been able to send the spent cleaning solution down the drain. However, the selection process for a Delval cleaner requires an analysis of the scale to be removed.

Upon start-up of a new or re-tubed boiler, the boiler should be boiled out to remove any oils and slag but more importantly to begin the conversion of the tube's surface iron to magnetite which is the natural layer of protection for the tubes. Delval has a standing inventory of start-up boiler product that can accomplish this task as an authorized Cleaver-Brooks Representative.

Many of the boiler systems are seasonal and laid-up for the summer months. When doing so, the boiler should be laid-up properly to prevent oxygen attack and maintain the magnetite layer on the tubes. Delval can prescribe either a wet lay-up that will maintain oxygen scavenger and alkalinity levels that will protect the boiler while in lay-up. We utilize a very convenient sock that contains desiccant for dry lay-ups. The desiccant sock is inserted in the boiler and the boiler is secured. Upon start-up, the sock dissolves and provides the boiler with a modicum of protection until the treatment program starts-up.

Cooling Tower Chemistry (Liquids & Solids)

Corrosion Inhibitors/Dispersants – Delval has a wide array of cooling tower products that will protect your cooling tower system from corrosion and deposition. In all cases, Delval couples the corrosion inhibitor and dispersant in the same product for ease of application.

Our corrosion inhibitors incorporate several ingredients that lay a protective barrier on the interior surfaces of the piping, thus arresting corrosion from one end of the galvanic series of metal to the other, especially focused on copper and its alloys. Corrosion inhibitors will suppress corrosion rates below industry maximum standards.

Products

Cooling Tower Chemistry (Liquids & Solids)- continued

Corrosion Inhibitors/Dispersants (continued) - Delval's dispersants are resolute in holding the colloidal particles in the bulk water thus preventing them from depositing on the interior surfaces of the cooling system. The result is maximum heat transfer efficiency through-out the cooling tower system especially in the condenser.

Our line of high stress products that can handle cooling tower water exposure to skin temperatures as high as 180°F. All of our corrosion inhibitor/dispersants are available in GRAS (or Green) form that is generally regarded as safe for the environment.

Biocides – Delval maintains a broad line of biocides including, oxidizing and non-oxidizing products - both available in liquid and solid form.

The oxidizing biocides include all forms of halogens from chlorine-to-chlorine dioxide. The liquid chlorine is for customer specific purposes only. We refrain from using liquid chlorine due to its restrictive pH limits related to its efficacy and corrosive tendencies. The liquid bromine is used more frequently due to its wider window with respect to pH and less corrosive tendencies. The solid form of our halogen is halogenated hydantoin and has performed beyond expectations in the field. Chlorine dioxide can serve as both an oxidizing biocide and bio-dispersant. We have used chlorine dioxide when disinfecting a system. The chlorine dioxide is injected first to penetrate, dislodge and kill the biofilm. We chase the chlorine dioxide with liquid bromine to ensure total eradication of the biofilm and bacteria.

The non-oxidizing biocides include glutaraldehydes, isothiazolone and DBNPA in various concentrations. The glutaraldehydes and isothiazolone come in liquid forms. The DBNPA comes in both solid and liquid forms. The non-oxidizing biocide that is categorized as GRAS or generally regarded as safe for the environment.

Our recommendation typically couples an oxidizing and non-oxidizing biocide in the treatment programs to broaden the kill spectrum. However, all products can be used as stand-alone products for controlling microbiological fouling.

Bio-dispersants & Cleaning Agents – Delval maintains an extensive line of both bio-dispersants and cleaning agents for cooling tower systems depending on the contaminant involved.

Delval has a wide variety of bio-dispersants that can penetrate and remove biofilm from the interior surfaces of the cooling tower system depending on the constituents of the biofilm. Should a biofilm develop, removal is mandated to maintain control over microbiological activity.

Products

Cooling Tower Chemistry (Liquids & Solids)

Bio-dispersants & Cleaning Agents (continued) – If the biofilm comes away from the surface unchecked, there could be a Legionella outbreak in that the biofilm has proven to be an excellent harbor for Legionella. Biocides only attack the surface of the biofilm thus leaving the body intact.

Delval's line of bio-dispersants includes chlorine dioxide which will not only penetrate and remove the biofilm but also eradicate the bacteria once it has been placed in the bulk water. A bio-dispersant that targets algal mats is available through Delval. We carry a peroxide-based bio-dispersant and a peracetic acid biodispersant.

The cooling tower system is a depository for all forms of scale, silt and airborne solids. A cooling tower system is an air scrubber as well. Consequently, the sump sometimes accumulates organic deposits that need to be removed. The make-up water to the cooling tower system can and does contribute silt to the system. During times when calcium scale develops in a cooling tower system for a variety of reasons. The line of cleaning agents can attack and remove the deposition. We will prescribe a cleaning agent that will target the deposition depending on its constituents.

Start-up & Layup Products – We maintain a complete line of start-up and lay-up products including for starting up a galvanized system. Proper start-up and layup not only will extend the life of the system but is also prescribed in ASHRAE Standard 188, CDC and OSHA regarding the prevention and transmission of Legionella.

Closed Loop Chemistry

Corrosion Inhibitors - Delval's closed loop products protect your closed hot or cold water system from corrosion and deposition. Our typical program has a molybdate based corrosion inhibitor however we also have nitrite-based products. For a large closed loop, we have concentrated closed loop programs that are aimed at lowering use cost. Should the need arise, Our line of disinfectants can be used to disinfect a contaminated closed loop water system.

Services

Overview

Delval has the technical and mechanical expertise to provide a plethora of services aimed at improving your system operation; conserving water and fuel thus reducing your carbon footprint; and reducing your operating costs. We can provide service on something as simple as a chemical metering pump to conduct a risk assessment of your building water systems. Delval has 50+ years' experience at servicing all peripheral equipment associated with boiler systems from pre-treatment of make-up such as softeners, dealkalizers and reverse osmosis units to blowdown controllers providing parts and labor.

Softeners

When troubleshooting a softener, our first move is to test the make-up water for hardness and determine the bed size. With this information, we can calculate the regeneration maximum volume or needed regeneration frequency depending on if the softener is regenerated by volume or time. Once we have established either the volume allowed or frequency required for regeneration, we will run an elution study to ensure that the regeneration settings are appropriate i.e. backwash, brining, rinse. Further, we will check to make sure the brine solution volume is being replenished properly. We will then make recommendations on what needs to be done if anything to re-establish the performance of the softener to desired levels of performance which in a boiler system are 0-1ppm of hardness.

System Contamination

While operating both boilers and cooling tower systems can be contaminated with an unwanted contaminant. Delval takes a two (2) step approach to investigating and resolving an issue with a contaminated system in that there are two (2) possible sources of contamination for boiler and cooling tower systems:

Change in make-up

- Pre-treatment equipment is failing
- Quality of make-up from source has changed
- Intrusion
- Boilers systems are subject to leaks from the condensate return system
- Cooling tower systems are subject to leaks from the process heat exchangers as well as airborne contaminants

In any contamination investigation, we sample and analyze the make-up going into the given system for any changes. Should changes be evident, Delval looks to failing pre-treatment equipment first in that this equipment is under the site's control. Then explores any possible changes in the make-up water quality coming from the source whether it be well or city.

Services

System Contamination (continued)

Once all questions on the make-up have been satisfied, we move to identifying and eliminating the source of the intrusion and here is where we separate our boiler versus cooling tower approaches. Boiler system intrusions come into the system from the condensate return system regardless of the contaminant. In many cases, the contaminant results in a disruption of the surface tension of the boiler water in the boiler a phenomenon known as “bouncing boiler water” and is manifested in the sight glass. A point source analysis is done on all the streams providing condensate return to the boiler. The contaminant can be traced back to a single or multiple streams coming from process equipment that uses steam to heat a process either in an exchanger, external or internal coils. The contaminated condensate is diverted to drain and not returned to the boiler system until the leak can be secured.

Cooling tower system intrusion can come from the outside air or heat exchangers that use the cooling tower to remove heat from a system be it air conditioning or process. Cooling tower systems act as air scrubbers. Consequently, if there is an airborne contaminant in the vicinity of a cooling tower, it will be scrubbed out as the air moves through the tower to remove the heat and precipitates in the sump. In all cases, Delval will execute a cleaning and disinfection (if mandated by test results). Should the site expect the airborne contamination to continue after the cleaning and disinfection, then Delval will recommend the installation of a side stream filtration unit.

In the case of airborne contamination, the initial two (2) steps in eliminating contamination will be executed in tandem.

1. Delval will sample and comprehensively test the cooling tower water for microbiological activity.
2. Delval will chemically clean and flush the cooling tower to remove all inorganic and organic suspended solids and deposits.

If no microbiological activity is detected, the tower is filled and brought back on-line. If microbiological activity is detected, Delval will work to disinfect the cooling tower system. Depending on the nature and concentration of the microbiologically activity detected, and apply a bio-dispersant to remove any biofilm from the interior surfaces of the tower resulting from the airborne contamination. We will use a bio-dispersant that has biocidal capabilities or follow the bio-dispersant with a biocide to annihilate the bacteria that has been harbored in the biofilm. Lastly, the tower will be flushed, filled, and brought back on-line.

In the case of contamination coming from heat exchangers, a point source analysis is done on all the streams providing returning water to the cooling tower. The contaminant can be traced back to single or multiple streams coming from process equipment that uses cooling tower to remove heat from a system be it air conditioning or process. In most cases, the cooling tower system cannot withstand diverting the return water coming from a heat exchanger. Instead, the treatment program of the cooling tower is adjusted to handle the intruding contaminant. The leak is mechanically addressed and secured as soon as possible.

Services

Water Re-Use (Zero Discharge)

In more and more cases due to environmental restrictions, a site is mandated to eliminate, reduce, or modify the characteristics of the water discharged from their industrial processes and utilities. There are three (3) viable routes to consider when a site is facing this environmental mandate –

- Pre-treat on site the water prior to disposal
- Outsource disposal of the water
- Re-use the water in process or utilities

Treating the wasted water in house not only requires a capital outlay for a pre-treatment plant but also represents an increase in operating costs. In some cases, there is no way around the need for a pre-treatment plant especially if sanitary waste is involved. Outsourcing the disposal or having it hauled away for proper disposal is viable but usually a more expensive method and incurs operating costs that will consistently rise over time and which the site has no control over.

With an emphasis on the environmental mandate and a focus on return on investment, Delval can analyze and provide a feasibility study and plan for a given site to reduce or eliminate the discharged industrial process and utility wasted water by reusing the discharged water in the plant process or utilities. Provided the plan meets the needs of the site and the environment, we will engineer the system, design the process, and specify the equipment thus defining the capital required as well as the operating costs. In many cases, there is a savings that results from re-using the discharged water which will create a return on investment even if the site has a pre-treatment plan in operation.

Legionellosis: Risk Assessment Building Water Systems (ASHRAE Standard 188)

Delval can provide a Risk Assessment Water Management Plan for domestic potable and non-potable building water systems. Realize, 70% of the more recent Legionella outbreaks have come from domestic potable water systems. Realize, many municipalities and state governments have begun random audits for a Legionella Risk Study at buildings within their boundaries that have water systems. In fact, some municipalities and state governments have enacted and passed ordinances requiring all buildings with water systems to have and implement a Risk Assessment Water Management Plan.

We have conducted several Risk Assessments generating Water Management Plans that we are now in the process of implementing. The objective of the plan would be to put building water systems in compliance with best practices as defined by ASHRAE Standard 188 and supported by the CDC, OSHA, and Federal Department of Health & Human Services. The standard and supporting regulations deal directly with control measures required that minimize the present and transmission of Legionella in your building water systems.

Services

Legionellosis: Risk Assessment Building Water Systems (ASHRAE Standard 188)

To provide an extremely thorough and professional Risk Assessment, we were driven to find an automated tool to support our efforts. We have partnered with a third-party independent consultant who developed a proprietary software application for conducting a Risk Assessment of a site's building water systems. We believe the software's processes and programs are of the highest quality and credibility. The software web-based application is used by companies across our industry and by some of the top water experts in the world thus reinforcing credibility and defensibility to your Risk Assessment Water Management Plan.

Further, we have partnered with an accredited world-renowned microbiological laboratory that we use for validation purposes. They can analyze for Legionella as well as other opportunistic pathogens as defined by the Federal Department of Health and Human Services in their directive aimed at Health Facilities. More recently, our laboratory partner can arrange to test for the presence of COVID-19 on surfaces. As we all know, many new terms have been introduced with the pandemic such as "deep cleaning". All public facilities are undergoing a "deep cleaning" which means disinfecting every surface exposed to the public. To validate that your deep cleaning was successful at removing any COVID-19 will require testing the surface for the presence of COVID-19.

Corrosion Studies

Delval can provide the equipment and laboratory support to conduct on-going corrosion studies at your site for any process or utility water system with or without our water treatment program. There are two (2) alternatives when conducting a corrosion study. The time-honored method is to insert a sacrificial coupon(s) in a by-pass loop that has the bulk water of the system consistently flowing through. The metal composition of the sacrificial coupons mirror image the metallurgy in the system. Every 90 to 120 days, the coupons are removed and sent back to Delval's lab for analysis. A coupon analysis report is generated by our lab with the corrosion rates of the coupons. The second method is to install probes that reflect the metallurgy of the metal in the system in a by-pass loop that has system bulk water flowing through. Probes are replaced at a pre-determined frequency. An electronic monitor receives real time corrosion rates from the probes 24/7. In either case, for a meaningful result, it is best to have a 3-6 gpm flow rate through the by-pass loops.

Services

Sampling & Field Testing

As part of our treatment program, Delval on a pre-determined frequency, tests all systems to ensure that the products and application thereof is performing to protect the boiler, cooling tower and closed loop systems from attack. An attack on the system impedes heat transfer which causes efficiency to suffer or shortens the life of the system. Secondly, send samples back to our laboratory for tests on a periodic or as needed basis. Routinely sending samples to the laboratory provides validation that both our field tests and program are in sync with our desired results for all waters in the systems and that no change has occurred in the source make-up for the system.

As needed sampling and testing is available for both sites that are on a Delval water treatment program or sites that are not. A site not on our program could be seeking a second opinion on the performance of their current water treatment program especially if deposition has occurred in either the boiler, cooling tower, or close loop system. Both water and deposits can be analyzed for both organics and inorganics. A stream that is suspected of contaminating a system needs to be tested to identify the source of the contamination. Make-up water needs to be analyzed for a softener, dealkalizer or reverse osmosis unit application or issue. Legionella testing is required to validate a risk assessment water management plan by both our current sites and others. Legionella testing is completed by an accredited world renown laboratory.

Here are two examples of Delval's Water Treatment Sales Engineers sampling and monitoring a system.



Closed Loop Volume

We can determine the volume contained in a closed loop system with or without a Delval water treatment program. Many times the volume contained is valuable information for both treatment, start-up, shutdown, cleaning, and disinfection.

Services

Evaporation Credits

Delval can assist in applying for evaporation credits which will reduce a site's sewer costs by the amount of water being evaporated in a cooling tower system or consumed in any other process. Municipalities calculate a site's sewer charge by the amount of water taken in by a given site. This does not take into account the significant amount of water that is evaporating from a cooling tower to remove heat from the building or process. We have successfully negotiated 40% reduction in sewer charges for our customers with the municipalities involved.

New Water & Energy Conservation Technologies

Delval is continuously seeking new technologies that will result in a reduction of water or energy consumption by industry and commercial buildings.

Equipment

Overview

Delval can provide all equipment needed for pre-treating make-up water (softeners, dealkalizers, reverse osmosis units) as well as chemical feed and control systems aimed at improving the efficiency and lowering the operating costs of your utility systems. Configuration, start-up, and training is included in all equipment provided. All equipment provided is warranted for one (1) year and some equipment is warranted for two (2) years which includes all parts and labor. Installation can be included and is always optional through Delval's mechanical team for all equipment.

Softeners

Delval can engineer, size, specify and provide water softeners for any, and all boiler or cooling tower systems. We can provide a unit as small and simple as a single bed that regenerates on a timer to a complex progressive system with multiple tanks. In most cases, we recommend a duplex system to ensure soft water supply at all times. We recommend using the latest leading-edge resin that minimizes the amount of salt required for regeneration.



Once installed, Delval will start-up the softener and configure the softener for operation. Settings for regeneration will depend on either time or volume. Delval will factor in the hardness concentration of the incoming water and the resin bed volume. Training will be provided for the operators on the softener; its workings; and troubleshooting. Operating manuals will be provided and left on site for future reference.

Delval can service the softener units whether new or in operation in conjunction with or separate from our treatment programs as needed or on a preventive maintenance plan at an agreed upon frequency. All of the boiler systems and some of the cooling tower systems we service have softeners in place and operating. We have 100+ years of experience in servicing and troubleshooting softener systems.

Softeners remove the calcium and magnesium contaminants from the make-up water for either boiler or cooling tower systems. A softener is used to pretreat the cooling tower or boiler make-up water to reduce the operating costs of the system. Softened water allows either system to increase the cycles of concentration which leads to a number of benefits related to operating costs. With increased cycles of concentration, blowdown is reduced which means the demand for make-up is reduced thus conserving water and reducing chemical treatment costs. Further, eliminating the hardness (calcium & magnesium) significantly reduces the risk for scale formation in a boiler system and deposition in a tower system. Consequently, heat transfer operates at optimal efficiency clearly providing enough return on investment (ROI) to justify.

Equipment

Dealkalizers

Delval can engineer, size, specify and provide dealkalizers for any, and all boiler systems. We can provide a unit that are small and simple regenerating on time or larger units with multiple tanks and controlled regeneration like seen in the figure to the right.



Once installed, Delval will start-up the softener and configure the softener for operation. Settings for regeneration will depend on either time or volume. We factor in the hardness concentration of the incoming water and the resin bed volume. Training will be provided for the operators on the softener; its workings; and troubleshooting. Operating manuals will be provided and left on site for future reference.

Delval can service the dealkalizers units whether new or in operation in conjunction with or separate from our treatment programs as needed or on a preventive maintenance plan at an agreed upon frequency. Not all of the boiler systems we service require dealkalizers. Nonetheless, we have 100+ years of experience in servicing and troubleshooting the dealkalizers that we do service and maintain.

The make-up water is comprised of natural alkalinity which consists of carbonate, bi-carbonate and hydroxyl ions. A dealkalizer removes 75-90% of the alkalinity in the make-up water. When determining the allowable cycles of concentration that a chemical treatment program can handle in a boiler system, there are three (3) limiting factors to consider: alkalinity, conductivity, and silica. If alkalinity is the determining factor, then a dealkalizer should be considered for two (2) reasons. First, removing the alkalinity will allow the boiler system to operate at higher cycles of concentration thus saving fuel, water, and chemicals.

Secondly, the chemical ingredient that will be reduced is the condensate return system protector which is the most expensive chemical in any given treatment program. To better understand the savings, we need to work backwards from the return system to the make-up. The condensate return system protector neutralizes the carbonic acid formed in the condensate return system when the condensate couples with the carbon dioxide in the return system. The carbon dioxide is generated in the boiler with the steam from the carbonates and bicarbonates in make-up water and goes out into the system. Removing the carbonates and bicarbonates in the make-up water reduces the carbon dioxide generated with the steam which in turn reduces the amount of condensate return system protector to neutralize the carbonic acid formed from the combination of carbon dioxide and condensate in the return system. Consequently, a return on investment can be attained in some cases using a dealkalizer.

Equipment

Reverse Osmosis Units

Delval can engineer, size, specify and provide reverse osmosis units as well as accompanying filtration for the make-up and storage tanks with level controls for the permeate for any, and all boiler systems. To properly engineer the reverse osmosis unit for filtration and/or microbiological control, Delval will sample and perform a comprehensive analysis on the make-up for particle count distribution, Silt Density Index and microbiological activity. Delval will factor in the temperature of the incoming water and possible halogen level, accordingly. We can provide units off the shelf with standard controls or have a unit custom built for your facility with a control system that suits your needs.

Once installed, Delval will start-up the reverse osmosis unit. Delval plans for and has successfully overcome mechanical, microbiological, and chemical issues with start-ups. Delval configure the reverse osmosis for operation. Settings for feed pressure, permeate, concentrate and concentrate recycle flow will be set based on the membranes being used. Training will be provided for the operators on the reverse osmosis unit including parameters to monitor with corresponding log sheets, membrane changes, and troubleshooting. Operating manuals will be provided and left on site for future reference.

Delval can service reverse osmosis units whether new or in operation in conjunction with or separate from our treatment programs as needed or on a preventive maintenance plan at an agreed upon frequency. We have successfully brought several reverse osmosis units on-line for boiler system applications. Consequently, we are very confident in our capabilities to start-up, service and troubleshoot units.

Reverse osmosis units can –

- Significantly improve quality of city or well water boiler system make-up
- Eliminate softeners and/or dealkalizers
- Yield a significant return on investment

provided either one of two (2) qualifications are valid when explored and validated

First, allowable cycles of concentration that a chemical treatment program can handle in a boiler system is dependent on three (3) limiting factors: alkalinity, conductivity, and silica. If anyone of these factors limit the cycles of concentration to less than seven (7) cycles of concentration, a reverse osmosis unit is definitely justified. The reverse osmosis unit will provide significant savings on fuel, water (both consumed & discharged) and chemicals.

Equipment

Reverse Osmosis Units (continued)

Secondly, brine discharge is forbidden in many if not all states per the individual departments of environmental protection. Softeners and dealkalizers require brine discharge to function. Consequently, if a facility discharge goes to a protected body of water per the individual departments of environmental protection, the facility is mandated to dispose of the brine solution without discharge. Treating the brine solution on site for disposal will require a significant capital investment for an evaporator which carries a heavy operating cost burden. Or the facility can outsource the disposal which again carries a heavy cost and subject to increase as environmental laws constrict. The reverse osmosis unit will eliminate the need for the softener thus eliminate the source of the disposal cost and generate a significant return without presenting a discharge problem.

By-Pass / Shot / Pot Feeders

Closed loop chemistry whether it is a cold or hot closed loop is typically applied through a feeder in a loop that sends water from the high pressure side of closed loop to the feeder returning to the low pressure side of the closed loop. There are many names in the industry for this feeder: by-pass, shot, pot feeder. Delval can engineer and provide these feeders in all sizes and orientations (horizontal or vertical). Delval can engineer the feeder to include bag filtration or not.

Filtration Units

Boiler Cooling Tower & Closed Loop Systems (Non-Potable Water)

Delval can engineer, size, specify and provide filtration units for many different applications to remove both suspended and dissolved solids. To do so, Delval will analyze a sample to be filtered for solids and particle count distribution. For dissolved solids, We will supplement the filtration media with a coagulant that will pull the dissolved solids out of the water causing them to be captured in the filtration unit. Filtration units can be as simple as a single bag filter unit to a side stream filtration unit for a cooling tower with a mixed media bed and a separator.

Once installed, Delval will start-up the filtration unit and configure the filtration unit for operation. Media replacement for bag or cartridge filters will be determined for the site. We can provide the bags or cartridges or the site can purchase the media independent of Delval. For a mixed bed filtration unit, regeneration will depend on either pressure differential, time, volume or a combination of all three (3). Training will be provided for the operators on the reverse osmosis unit including parameters to monitor with corresponding log sheets, media changes for bag or cartridge units, and troubleshooting. Operating manuals will be provided and left on site for future reference.

Equipment

Filtration Units–Boiler, Cooling Tower, Closed Loop Systems (Non-Potable Water)

Delval can service the filtration units whether new or in operation in conjunction with or separate from our treatment programs as needed or on a preventive maintenance plan at an agreed upon frequency.

We provide filters for various streams in a boiler system from make-up to condensate return. Delval has provided filtration for the make-up when the boiler system was pulling make-up water from a river. Delval has provided carbon and solids filtration in advance of reverse osmosis units to protect the membranes from chlorine and unwanted solids.

Our filtration units are typically used on either cooling towers or closed cold loop systems. Side stream filtration units on cooling towers are used to remove solids that could impeded heat transfer or contribute to formation of a biofilm on the systems' interior surfaces. A biofilm provides a harbor for bacteria that cannot be removed without treatment beyond the use of a single oxidizing or non-oxidizing biocide in that the biocides will only kill the bacteria on the surface of the biofilm. With the establishment of ASHRAE Standard 188 which is supported by the CDC, OSHA and CMS, cooling tower systems are installing a side stream filtration unit as due diligence for the prevention of Legionella and transmission from the cooling tower. A side stream filtration unit is sized to handle 10% of the flow recirculating through the cooling tower system. So, in some cases, the side stream filtration unit is referred to as a slip stream filtration unit.

Closed loops are sometimes compromised and have suspended and dissolved solids circulating with the bulk water. While the precipitating solids alone can present a problem with strainers and pumps, the solids also can provide nutrients for anaerobic bacteria that can contaminate a closed loop system. Consequently, some sites have chosen to eliminate the solids prior to contamination using filtration. A typical filtration unit for closed loops is comprised of a separator for the larger suspended solids and either a bag or cartridge filter for the smaller and dissolved solids. Delval can provide via purchase or lease a filtration unit for a closed loop. Should the site need to clean more than one closed loop, we can design a portable filtration unit that can be moved from one loop to another throughout the site's campus.

Equipment

Filtration Units – Domestic Water (Potable Water)

Delval can engineer, size, specify and provide high efficiency filtration for any, and all point of use applications whether or not we have provided the Risk Assessment Water Management Plan (for more detail on these plans go to “Services” icon. Delval filtration units can capture down to 0.002 microns which will include Legionella (0.5 microns required) and other opportunistic pathogens such as viruses (0.002 micron required). The filtration units are FDA approved for a six (6) month term prior to removal and replacement. We will train the on-site personnel on installing the filters; removal & replacement; and troubleshooting. Operating manuals will be provided and left on site for future reference.

ASHRAE Standard 188 – Legionellosis: Risk Management for Building Water Systems has established best practices that should be adhered to for building water systems including domestic potable water. The CDC, OSHA and Federal Department of Health & Human Services – Centers for Medicare & Medicaid Services have supported the ASHRAE Standard thus are enforcing the best practices as defined by the ASHRAE Standard. Further, several municipal and state governments have initiated programs or passed legislation that enforce the best practices as defined by the ASHRAE Standard. Finally, the majority of the most recent Legionella outbreaks have been fueled by domestic water.

Consequently, many domestic potable build water systems have a Risk Assessment Water Management Plan in place and are monitoring, verifying, and validating the plan on a pre-determined frequency for each of the plan’s control measure. Inherent in all Risk Assessment plans is the potential for filtration at potable water points of use (faucets, eye wash stations, showers) that can capture Legionella and other opportunistic pathogens such as viruses.

Deionize Exchange Units

Delval can provide a properly sized deionized unit on a lease exchange basis should one be required. There are times when a site requires improved quality water on a temporary basis. In these cases, we can provide the deionized unit on exchange whereby we deliver the initial units; connect the inlets and outlets to the appropriate lines provided and defined by site; and, remove & replace the exhausted tanks when notified that regeneration is needed.

Cooling Tower Chemical Feed & Control Systems

Overview

Delval can design, engineer, specify and provide a complete chemical feed and control system for a cooling tower system including automated blowdown, metering pumps, feed control, and monitoring for a liquid or solid water treatment program.

With over 100 liquid and solid chemical feed and control systems of varying shapes and sizes in place and operating successfully on small & large cooling systems. We can provide the system fully integrated with information being fed to the building management system, segregated with only local remote control or any combination thereof.

Additionally, provide a control system that will monitor and maintain chemical residuals that protect the cooling tower system from corrosion and microbiological fouling as well as monitor control measures for both cooling tower performance and compliance with ASHRAE Standard 188 which is supported by the CDC & OSHA. Delval's control system can adjust to a change in the quality of make-up real time changing blowdown and chemical feed automatically. The control system can be restricted to local display or integrated with the building management system. Control measures that can be included in our control system include the following:

- Chemical residuals
- Make-up volume demand
- Blowdown
- Conductivity of both make-up and tower waters
- Cycles of concentration
- Temperature
- Indicator of the tower water tendency to either precipitate solids or retain (LSI)
- Real time corrosion monitoring

Configuration, start-up, and training is included in all equipment provided. The majority of the equipment is warrantied for two (2) years which includes all parts and labor. Maintenance of the chemical feed and control equipment is included in Delval's water treatment programs but can be purchased separately as well. Installation can be included and is always optional through our mechanical team for all equipment.

Solid Feed

Demand for Delval's solid feed programs is exploding for several well-founded reasons. Instead of handling drums weighing up to 400#'s, the chemicals come in jugs weighing at most 11#'s. Not only is drum handling eliminated but drum disposal which requires triple rinsing and costly disposal is eliminated as well. Secondly, the containers of product are shipped UPS eliminating all headaches associated with drum deliveries from weather hold-ups to uncontrolled freight costs.

Cooling Tower Chemical Feed & Control Systems

Solid Feed (continued)

Product storage becomes a dream instead of a nightmare. The products can be stored on a shelf in an office and have a two (2) year shelf life. Also, there is no spill concern or hazmat procedures to have in place in the event of a spill. Consequently, Delval has over 15 solid feed systems on-line and the list is growing.

Typically, Delval has installed pre-piped and wired wall mounted solid feed systems for cooling towers shown in Figure 1. However, the components can be shipped separately and field mounted.



Figure 1 – Single Biocide with Inhibitor Jug Feeder

The solid feed system comes mounted on ¾" plexiglass with struts that can be anchored to the floor for easy install not to mention the small footprint required. A city water supply line, inlet from the tower, outlet to the tower and blowdown line is all the plumbing that is needed. All piping is schedule 80 PVC.

There can be up to three (3) feed stations on the wall mount. One is for the corrosion inhibitor/dispersant which can come in jug or disk form. Jug is depicted in figure 1. Non-oxidizing biocide is provided via a second feed station like the one in figure 1. A solid feed system using a disk feeder for the inhibitor and dual biocides is depicted in Figure 2.

Cooling Tower Chemical Feed & Control Systems

Solid Feed (continued)



Figure 2 – Dual Biocide with Disk Feeder

Level sensors monitor the level of solution in the sumps at the base of the feed stations. When the inventory of solution reaches a pre-set low point, a solenoid opens and sprays to solid product in the container with water. The resulting solution drops and fills the sump to a pre-set inventory level at which point the solenoid secures itself.

The blowdown controller is pre-mounted on the wall mount. The controller will require power (110volt). The display can continuously read conductivity, pH, inhibitor/dispersant concentration, real time corrosion rates, ORP, etc. The controller is configured to activate all the chemical pumps via alternative feed modes. The controller activates blowdown via the motorized blowdown valve based on maximum allowable conductivity or cycles of concentration. The controller can be restricted to local display or remote display to a building management system via Modbus or BACNet.

Cooling Tower Chemical Feed & Control Systems

Solid Feed (continued)



Figure 3 – Configuring a controller

The corrosion inhibitor/dispersant pump can be fed activated based on time, make-up, blowdown or inhibitor/dispersant concentration in the tower. A probe can be included which reads inhibitor/dispersant concentration 24/7/365. The pump is set to activate when the inhibitor/dispersant concentration drops below the needed level to protect the cooling tower from corrosion/deposition and ceases pumping when the inhibitor/dispersant concentration has reached acceptable levels for protection. The non-oxidizing biocide is typically activated with a timer. The non-oxidizing and oxidizing biocides are typically activated with a timer however there are alternative methods of dosing the oxidizing biocide i.e. ORP, halogen concentration.

A coupon rack is included for an on-going standard typical corrosion study. Or the wall mount can have a real time corrosion monitor mounted and connected to probes instead of coupons in the coupon rack. The real time corrosion monitor reads and displays corrosion rates real time on both its and the controllers display.

Cooling Tower Chemical Feed & Control Systems

Solid Feed (continued)

Delval has developed, engineered, built, and installed a second generation proprietary control system for the wall mount unit whose only requirement is the controller. Our proprietary control system uses the information collected and monitored by the controller as well as harvesting additional information. The proprietary software then calculates and displays on a its touch screen or to the building management system the following:

- Chemical residuals
- Amount of individual chemicals used
- Make-up volume demand
- Blow down volume
- Conductivity of both make-up and tower waters
- Cycles of concentration
- Temperature
- Indicator of the tower water tendency to either precipitate solids or retain (LSI)
- Real time corrosion monitoring

The information provided by Delval's control system and proprietary software is meaningful from three (3) distinct perspectives.

1. The information provides real time data on the water treatment program's performance and cooling tower operating measures.
2. There is a portion of the data that can be used to comply with the due diligence required by ASHRAE Standard 188 and supported by CDC and OSHA.
3. The information can provide the DEP if the site's discharge water is governed by the DEP of the individual state for daily chemical use rates.

Liquid Feed

Delval has a tried and true liquid feed system for treating and protecting cooling towers systems is in place and operating successfully in over 50 cooling tower systems. The products come in pails and/or drums of different sizes.

Typically, the components for feed and control come separately and are mounted and plumbed in the field. On the other hand, the components can be plumbed and mounted on a ¾" plexiglass with struts that can be anchored to the floor for easy install depicted in figure 1 below.

Cooling tower Chemical Feed & Control Systems

Liquid Feed (continued)



Figure 1 – Wall mount for liquid feed system

The footprint required is approximately a four-foot square to accommodate the pails and drums on a containment tray. An inlet from the tower, outlet to the tower and blowdown line is all the plumbing that is needed. All piping is schedule 80 PVC.

The blowdown controller is pre-mounted on the wall mount. The controller will require power (110volt). The display can continuously read conductivity, pH, inhibitor/dispersant concentration, real time corrosion rates, ORP, etc. The controller is configured to activate all the chemical pumps via alternative feed modes. The controller activates blowdown via the motorized blowdown valve based on maximum allowable conductivity or cycles of concentration. The controller can be restricted to local display or remote display to a building management system via Modbus or BACNet.

There can be up to three (3) metering pumps' suction lines go into the chemical drums or pails that sit in front of the wall mount unit. The corrosion inhibitor/dispersant is typically delivered in drums and the biocides (oxidizing and non-oxidizing) in pails.

Cooling Tower Chemical Feed & Control Systems

Liquid Feed (continued)

The corrosion inhibitor/dispersant pump can be fed activated based on time, make-up, blowdown or inhibitor/dispersant concentration in the tower. A probe can be included which reads inhibitor/dispersant concentration 24/7/365. The pump is set to activate when the inhibitor/dispersant concentration drops below the needed level to protect the cooling tower from corrosion/deposition and ceases pumping when the inhibitor/dispersant concentration has reached acceptable levels for protection. The non-oxidizing biocide is typically activated with a timer. The non-oxidizing and oxidizing biocides are typically activated with a timer however there are alternative methods of dosing the oxidizing biocide i.e. ORP, halogen concentration.

A coupon rack is included for an on-going standard typical corrosion study. Or the wall mount can have a real time corrosion monitor mounted and connected to probes instead of coupons in the coupon rack. The real time corrosion monitor reads and displays corrosion rates real time on both its and the controllers display.

We have developed, engineered, built, and installed a second-generation proprietary control system for the wall mount unit whose only requirement is the controller. Our proprietary control system uses the information collected and monitored by the controller as well as harvesting additional information. The proprietary software calculates displays locally or to the building management system the following:

- Chemical residuals
- Amount of individual chemicals used
- Blow down volume
- Conductivity of both make-up and tower waters
- Cycles of concentration
- Temperature
- Indicator of the tower water tendency to either precipitate solids or retain (LSI)
- Real time corrosion monitoring

The information provided by Delval's control system and proprietary software is meaningful from three (3) distinct perspectives. First, the information provides real time data on the water treatment program's performance and cooling tower operating measures. Secondly, there is a portion of the data that can be used to comply with the due diligence required by ASHRAE Standard 188 and supported by CDC and OSHA. Finally, the information can provide the DEP if the site's discharge water is governed by the DEP of the individual state for daily chemical use rates.

Cooling Tower Chemical Feed & Control Systems

Start-up/Training/Service for both Solid or Liquid Feed Systems

Once installed, Delval will start-up and configure the liquid feed system. Settings will depend on the water treatment program chemical demands. Training will be provided for the operators on the feed station(s); its workings; and troubleshooting. Operating manuals will be provided and left on site for future reference.

Delval can service the both solid & liquid feed systems whether, new or in operation in conjunction with at no additional charge or separate from our treatment programs as needed or on a preventive maintenance plan at an agreed upon frequency. Delval has over 50 cooling tower feed systems in place and successfully operating so we have ample experience in servicing and trouble-shooting the feed stations.

Figure 1 depicts one of Delval's Water Treatment Sales Engineers starting up a solid feed system on a tower.



Figure 1 – Starting up a solid feed system on a tower

Boiler Chemical Feed and Control Systems

Overview

Delval can design, engineer, specify, and provide a complete chemical feed and control system for a boiler system including automated or manual surface blowdown, chemical tanks, agitators, metering pumps, feed control, and monitoring for a liquid or solid water treatment program

Delval has over 100 chemical feed and control systems of varying shapes and sizes in place and operating successfully. Delval can provide the system fully integrated with information being fed to the building management system, segregated with only local remote control or any combination thereof.

Delval can provide a control system that eliminates testing, makes batching hands free or fully automated and ensures the chemical treatment levels will protect the boiler system from the feed water tank or deaerator to the condensate return system. The control system monitors the boiler system at a pre-determined frequency recording the following control measures:

- Make-up volume
- Condensate return
- Conductivity in boiler(s)
- Cycles of concentration
- Feed water volume
- Amount of individual chemical used

With this information, the proprietary software calculates the chemical demands and activates the chemical metering pumps to meet the demand. The system can be built with the capability to send all information to a building management system.

Configuration, start-up, and training is included in all equipment provided. majority of the equipment is warrantied for two (2) years which includes all parts and labor. Maintenance of the chemical feed and control equipment is included in Delval's water treatment programs but can be purchased separately as well. Installation can be included and is always optional through Delval's mechanical team for all equipment.

Boiler Chemical Feed & Control Systems

Automated Surface Blowdown Control

Delval can provide plumbed fully integrated stand-alone automated surface blowdown station for up to four (4) boilers. Included is a surface blowdown controller (touch screen available), a motorized ball valve for normal surface blowdown; a by-pass with a control valve in the event continuous blowdown is needed; and, a sample port for testing. All of the equipment is wall mounted on a ¾" plexiglass which is on struts for anchoring to the floor. The wall mount unit allows easy installation in that the installer only needs to connect the inlet to a surface blowdown line coming off the boiler and the outlets go to drain. Also, the wall mount unit can be located on the floor away from the boiler for easy calibration, testing & maintenance.



Figure 1 – Automated Surface Blowdown Valve Stand

All readings and settings are local to the unit but can be sent to the building management system via Modbus or BACNet. All equipment can be purchased separately and plumbed in the field as well.

Boiler Chemical Feed & Control Systems

Automated Surface Blowdown Control (continued) - Once installed, Delval will start-up and configure the surface blowdown controller whether it is on a wall mount blowdown station or individually mounted for operation. Blowdown will be based on conductivity of the boiler water. Settings will depend on the quality of the make-up water and allowable cycles of concentration. Training will be provided for the operators on the automated surface blowdown controller and related valves; its workings; and troubleshooting. Operating manuals will be provided and left on site for future reference.

Delval can service the automated surface blowdown system whether new or in operation in conjunction with at no additional charge or separate from our treatment programs as needed or on a preventive maintenance plan at an agreed upon frequency. Most of the boiler systems we service have automated surface blowdown in place and operating successfully. We have 50+ years of experience in servicing and trouble-shooting automated surface blowdown systems.

Solid Feed

While the majority of our boiler water treatment programs apply liquid chemistry, solid chemistry is also available. Solid feed programs eliminate all the costs and handling related to liquid drums. The products come in 11 lb. jugs. The jugs are inserted in the solid feed station.

Figure 2 below is a four (4) station boiler solid feed system and Figure 3 is the feed station for the oxygen scavenger which also appears on the left side of Figure 2.



Figure 2 – Multi-product Boiler Solid Feed System

Boiler Chemical Feed & Control Systems

Solid Feed (continued) -



Figure 3 – Oxygen Scavenger Feed Station

The level of solution in the sump is monitored. When the level reaches a certain low point, a solenoid opens automatically and softened make-up sprays into the jug creating a solution that is re-accumulating in a sump at the bottom of the solid feed station creating a diluted liquid solution. The solenoid is secured once the desired inventory level is attained.

The metering pump on the pump shelf below the feed station is activated to send the liquid solution to either the feed water tank, deaerator, feed water line or boiler. The metering pump can be activated by –

- Valve opening to meet the demand for water by the feed water tank or deaerator
- Valve opening to meet the demands for feed water by the boiler.
- Feed water pump activation meeting the feed water demands of the boiler.
- Timer(s)
- Delval control system frequency that meets the demand for chemistry based on condensate return and make-up per boiler.

Feed stations can be bought as a prefabricated wall mount unit as shown in figure 2. Or they can be provided individually and mounted in the field.

Boiler Chemical Feed & Control Systems

Solid Feed (continued)

Once installed, Delval will start-up and configure the solid feed station(s) for operation. Pump settings will depend on the water treatment program chemical demands. Training will be provided for the operators on the feed station(s); its workings; and troubleshooting. Operating manuals will be provided and left on site for future reference.

We can service the feed station(s) whether new or in operation in conjunction with at no additional charge or separate from our treatment programs as needed or on a preventive maintenance plan at an agreed upon frequency. While this technology is somewhat new, we have over 15 solid feed systems in place and operating successfully. So, we have ample experience in servicing and trouble-shooting the feed stations.

Liquid Feed

Delval can design, engineer, specify and provide liquid feed stations for applying a liquid water treatment program to the boiler system. By far, liquid feed stations are the predominant method of applying the chemistry associated with a boiler water treatment program. Consequently, there are a plethora of chemical products in liquid form from oxygen scavengers to condensate return protectors.

The simplest form of liquid feed is to place a metering pump on the drum of the neat liquid products being fed thus the term “neat” feed for this approach. The number of metering pumps is directly proportional to the number of feed points i.e. feed water lines, boilers, feed water tanks, deaerators and the number of products being used.

For example, if a two (2) boiler system with a feed water tank is being treated with four (4) products, seven (7) metering pumps would be required. The oxygen scavenger would be injected in the feed water tank with one (1) pump. The alkalinity builder, sludge conditioner and condensate return protector would be injected individually into the feed water line or boiler of each boiler. If any supplemental products are required to address a need or issue, one (1) of the routine treatment products would have to be replaced with the supplemental product in that the injection points are limited.

Our preferred liquid feed system is to employ the use of mix tanks in which the liquid treatment products are mixed to homogeneous cocktails using an agitator. The preference for cocktails versus neat feed has its foundation in maintenance, chemical control, flexibility. Fewer metering pumps are required. Fewer moving parts lessens maintenance demands. Adjusting a liquid treatment program using a cocktail of the individual products provides better control which flattens both the peaks and valleys of chemical residuals which are critically maintained in given ranges to protect the boiler system. Neat product feed tends to heighten peaks and lower valleys in that they are concentrated products. Should a supplemental product be required to address a certain issue, the tanks allow addition of the supplemental product easily.

Boiler Chemical Feed & Control Systems

Liquid Feed (continued)

Delval would size and provide a minimum of two (2) mix tanks with agitators whereby batches would last a minimum of one (1) week. The oxygen scavenger is mixed in one tank. The homogeneous treatment oxygen scavenger cocktail is fed to the deaerator or feed water tank. The alkalinity builder, sludge conditioner and condensate return protector are mixed in the second tank. The homogeneous cocktail is then fed into the boiler feed water lines or directly into the boilers. Figure 1 is a typical dual mix tank boiler liquid system.



Figure 1 – Dual Mix Tank Boiler Liquid System

The frequency with which treatment cocktails are required depends on the chemical demands of the boiler system. The tanks are always sized by Delval so that the frequency is not less than one (1) week. Making and mixing the cocktails can be hands on, somewhat hands off (semi-automatic) or totally hands free (fully automatic). The six (6) step procedure for creating a cocktail is as follows:

1. Fill tank to submerge agitator impeller
2. Activate agitator
3. Add chemicals required
4. Fill tank to full level
5. Allow agitator to run for a given period of time to ensure homogeneous cocktail
6. Secure system

Boiler Chemical Feed & Control Systems

Liquid Feed (continued)

Delval has designed, engineered, and provided a fully automated hands-free system that allows the cocktail to be created when needed whereby the operator simply “flips a switch” to activate the process. Figure 2 shows three (3) double wall tanks with transfer pumps above that are sending neat product to the mix tank in Figure 3.



Figure 2 – Neat Tanks with Transfer Pumps for Automated Mix Tank System



Figure 3 – Mix Tank for Automated Mix Tank System (note three (3) lines injecting neat chemical into larger mix which in turn treats three (3) boilers via the metering pumps

Boiler Chemical Feed & Control Systems

Liquid Feed (continued)

Delval can provide all tanks needed for a liquid boiler feed system. Size is site specific. Double walled tanks or tanks with containment are recommended to store neat products safely. We can provide transfer pumps to move the neat liquid from either a drum or double walled containment tanks to the mix tanks. Figure 4 is a set of neat product tanks with containment and transfer pumps.



Figure 4 – Neat product tanks with containment & transfer pumps

The number of metering pumps is still based on the number of feed points i.e. feed water tank, deaerator, feed water lines, boilers however the number of metering pumps are far less than in a neat feed system. Fewer moving parts translates into less maintenance. For example, if a two (2) boiler system with a feed water tank is being treated with four (4) products, three (3) metering pumps would be required. The oxygen scavenger solution would be injected in the feed water tank with one (1) pump. The alkalinity builder, sludge conditioner and condensate return protector homogeneous solution would be injected individually into the feed water line or boiler of each boiler.

The metering pumps are activated by one of the five (5) source signals below –

- Valve opening to meet demand for water by the feed water tank or deaerator for the oxygen scavenger metering pump.
- Valve opening to meet the demands for feed water by the boiler for the multi-product solution pumps. With deaerators, recommended because feed water pumps are constantly circulating water through the deaerator.
- Feed water pump activation meeting the feed water demands of the boiler. Recommended because feed water tanks feed water pumps are on/off..
- Timer
- Delval control system frequency that meets the demand for chemistry based on condensate return and make-up per boiler.

Boiler Chemical Feed & Control Systems

Liquid Feed (continued)

Delval has engineered, built, and installed an automated liquid chemical control feed system that eliminates daily testing and maintains chemical residuals that are necessary to protect the boiler. In addition, the Delval control system monitors and displays via a touch screen monitor the following boiler control measures:

- Conductivity of each boiler
- Condensate return
- Make-up water demands
- Feed water demands
- Cycles of concentration
- Individual amounts of chemical used

Figure 4 is a fully automated system that has eliminated testing at one of our customer facilities. It has been online for four (4) and the boilers have opened clean every year.



Figure 4 – Fully Automated Mix Tank Liquid Feed System

Boiler Chemical Feed & Control Systems

Liquid Feed (continued)

Once installed, Delval will start-up and configure the liquid feed system. Settings will depend on the water treatment program chemical demands. Training will be provided for the operators on the feed station(s); its workings; and troubleshooting. Operating manuals will be provided and left on site for future reference.

We can service the liquid feed system whether, new or in operation in conjunction with at no additional charge or separate from our treatment programs as needed or on a preventive maintenance plan at an agreed upon frequency. With over 50 liquid feed systems in place and successfully operating, we have ample experience in servicing and trouble-shooting the feed stations.

Figure 5 depicts a Delval Water Treatment Sales Engineer troubleshooting a liquid mix tank in a boiler system.



Figure 5 – Troubleshooting Mix Tank for a Liquid Feed Boiler System

References



January 27, 2021

Letter of Recommendation for Dave Baccari, Delval Equipment

To Whom It May Concern:

Dave has provided our plant with water treatment products and services since 2004. In 2004 we were motivated to change suppliers due to the fact that we suffered white rust damage to three brand new cooling towers. (The damage had occurred due to bad advice/no advice from the previous supplier.)

Since 2004, Dave and Delval's service has been excellent. The manufacturer of our cooling towers told me that, due to the fact that we bought towers with galvanized basins, we could anticipate a life expectancy of 11 years with proper water treatment on the galvanized basins. We have experienced 16 years of good service on these towers, which is a testament to the effectiveness of the water treatment program.

Dave does an outstanding job of monitoring our treatment installations on our four cooling tower systems. Due to recent turnover, we lost an experienced mechanic who paid close attention to our cooling towers. Dave was instrumental in coaching up this mechanic's replacement, which sometimes included delivering "constructive criticism", which isn't always the most fun or easy thing to do.

At Dave's suggestion, we have recently changed over one of our cooling tower systems to solid block chemical technology. Instead of buying 55 gallon barrels of concentrated treatment chemical, we now buy solid pucks and granules that are loaded into a feeder board equipped with controller and pumps. This has yielded multiple of benefits:

- Tighter Control: The scale and corrosion inhibitor control is now active feedback PID loop control. This has resulted in much tighter and consistent control of the level of inhibitor chemical in the system.
- Safety: Eliminates employee exposure to concentrated chemicals in liquid form.
- Ergonomics: Eliminates the handling of bulky 55 gallon barrels of chemical.
- Freight Savings: Replaces shipment of 55 gallon barrels with shipment of ordinary cardboard boxes.
- Chemical Savings: One year of experience on the new system on one of our towers has shown a significant reduction in chemical purchase cost.

Sincerely,
Gerald Lonergan

A handwritten signature in blue ink that reads "G. Lonergan".

Manager, Engineering & Tech Services
Mitsubishi Chemical Advanced Materials
201 Industrial Drive
Delmont, PA 15626

References



Delval Equipment
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Washington, PA 15301

Dear Sirs,

I am currently the Manager of Projects and Maintenance with Lanxess Corporation at our facility located on Neville Island. I came to this facility five years ago and have continued the Boiler Maintenance and Water Treatment service agreement that was in place with Delval.

During my time here, there has been a constant presence by your water treatment staff and they have been instrumental in maintaining a very high quality of water for our boiler and cooling tower system.

We perform an annual boiler inspection and the internal condition of the boiler is remarkable, especially considering that this boiler is almost 60 years old. This can be directly attributed to the individuals from your Company that perform the bi-weekly water analysis, make the necessary adjustments to the chemical additives that keep our equipment running smoothly.

This is followed by a detailed report identifying any issues that were identified, the adjustments that were made to bring the conditions in line and any recommended action for our staff to follow up with.

I would recommend your water treatment expertise to anyone who is currently looking for this type of service. We have been able to run our facility with little to no interruption of service from our steam system and anticipate the same results in the year ahead.

Best Regards,

Jeffrey M. Zeffiro, P.E.
Lanxess Corporation
Material Protection Products
Manager – Projects and Maintenance
3499 Grand Avenue
Pittsburgh, PA 15225

References



Dyno Nobel Inc.
1320 Galiffa Drive
Donora, PA 15033
Ph: 724.379.8100
dynonobel.com

February 4, 2021

Referral of Delval Equipment Water Treatment

Our facility has been pleased to work with Delval Equipment, specifically their Water Treatment division and technician Mr. Dave Baccari. The goods and services provided, such as testing, recommendations, adjustments, and chemical purchasing, have always been prompt, professional, and cost effective. This facility's boiler and its operation are critical components of our business. Mr. Baccari's communication and accessibility have provided great assurance that our system is operating with conformance and efficiency.

Regards,

A handwritten signature in blue ink, appearing to read "K. Corcoran".

Kevin Corcoran
Site Manager
Ph: 724.678.5879
E: kevin.corcoran@am.dynonobel.com

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Groundbreaking Performance®

References



1424 Mars-Evans City Road
Evans City, PA 16033
February 1, 2021

To whom It may concern

For over a year, the Ascensus Callery site has partnered with DelVal Equipment to complete a migration of our water treatment program for our boilers and cooling towers that was liquid based to one that is solid based. From the start of this process and including to date, DelVal, and in particular Dave Bacarri, have shown to be very knowledgeable and resourceful with any of the issues that arose during the migration. The migration of our program went very well on budget, and without any incident or injury. This can be attributed to the very professional and safe approach Dave Bacarri has towards completing this change. From this change, Ascensus has realized not only the savings anticipated from DelVal proposed but additional savings in our utility costs. In conclusion, we would recommend DelVal's approach to water treatment of boilers and cooling towers over their competitors.

Dennis Kimmel
Site Services and Utilities