water and process solutions for the sugar and ethanol industries
sugar and ethanol: a growing industry

The growing demand for ethanol is a worldwide trend. Increasing productivity and ensuring a quality product are some of the biggest challenges for sugar and ethanol plants to meet in domestic and export markets. For this reason, the constant maintenance of equipment and the search for highly effective solutions are critical to increasing the competitive advantages of the Brazilian industry.

The growing demand for renewable fuels has stimulated investments in various regions, including Brazil, Colombia, South America, Southeast Asia, and the United States. With expansion projects already underway in the sugar and ethanol sector, investments in new power plants should continue in the coming years and are expected to increase the trade of ethanol as an alternative source to fossil fuels.

With this favorable scenario, the industry must be prepared to meet the expected growth. Contributing to the success of the sugar and ethanol industry, SUEZ develops and offers products and services—present from the beginning to the end of the process—that are highly efficient and of excellent quality.

imagine products that enhance the productivity of their processes

SUEZ offers a complete product line and a dedicated team that sees beyond the foam and contaminants in their production. The control and understanding of the production process variables, combined with quality SUEZ products, increases measurable benefits to its plant.
SUEZ solutions for the sugar and ethanol industries

Preparation of Sulfitation Reagents

Evaporation

Flotation

Decantation

Sugarcane Receiving and Cane Wash

Milling

Water Treatment Plant

Cooling Towers

Distillation

Sludge Treatment

Ethanol Storage

Vinasse Tank

Packaging

Cooking

Fermentation

Silo

Biocides for Milling

Pre-Flocculent

Flocculants

Deposit Control

Chemical Cleaning

Decolorizing Agents/Pre-Flocculation/Flotation for Flocculant

Viscosity Reducer

Coagulant and Flocculant for Filters and Rotary Press

Antibiotics and Antiseptics for Fermentation

Antifoaming and Dispersing

Column Fouling Control

Ethanol Neutralizer

Coagulant and Flocculant to Vinasse Treatment
participating in the production of sugar

SUEZ has solutions for many operations in sugar production, including the control of microbiological contamination for juice during the clarification process in evaporation, as well as chemical cleaning for the evaporators. For example, during evaporation the DDF FoodPro* product line allows for more operation time before cleaning is necessary. FoodPro DLC*, based on either acidic or alkaline composition, reduce the need for manual cleaning. Additionally, SUEZ offers a wide range of products to clarify sugar, with products that have received FDA U.S. food contact approval to seek optimum performance and safety from the plant food to customers.

production of ethanol

SUEZ has several products related to the process of fermentation and distillation that lead to ethanol production. These are the Biomate* and FoodPro FBC product lines, which are microbiological control agents and antibiotics. During fermentation, it is necessary to control foam consisting of high performing dispersants and defoamers. During distillation, ScaleTrol*, the scale inhibitors product line, often results in an operation with fewer interruptions, resulting in an improved use of its assets. Finally, EndCor*, the corrosion inhibitors product line, ensures that ethanol can be transported and stored, causing less wear to the plant.

the U.S. Food and Drug Administration (FDA)

What is it? Why is it important?
The U.S. Food and Drug Administration (FDA) is the Federal Agency within the Department of Health and Human Services responsible for ensuring and promoting public safety to drugs, cosmetics, food and chemicals intended for food contact. All of SUEZ’s products designated for food applications are manufactured in accordance with our own strict internal quality policy, which ensures the integrity of these products. This policy was based on several purity and manufacturing quality regulations and covers product manufacturing, raw material and product specifications, warehousing, product segregation, cleaning, delivery, security, tampering evidence, recalls and customer complaints. In addition to having an internal quality policy, SUEZ’s facilities are ISO 9001 Registered globally to ensure correct implementation of all standards and procedures.

What is the guarantee for your plant?
Use of SUEZ's product, which has been identified as compliant with FDA requirements, certifies that all the components of the product are appropriate for the use or uses noted in the specific FDA regulation matching the product’s end use application. (Note: it is the individual components of the product that are reviewed for FDA compliance, not the formulated product). Other industry regulatory requirements that SUEZ often meets are:

- INAL
- NSF International Standards for potable water
- NSF International (Non-Food Program) for products used in or around food processing areas

process solutions

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<th>Products</th>
<th>Operation</th>
<th>Goal</th>
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<td>Biocides</td>
<td>Mills</td>
<td>Microbiological reduction, with consequent sugar losses reduction</td>
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<tr>
<td>Coagulants</td>
<td>Molasses, Fermentation</td>
<td>Increases clarification rate and reduces the juice’s ICUMSA color and NTU turbidity (reducing sugar insoluble residue and increasing filtrability)</td>
</tr>
<tr>
<td>Pre-Flocculants</td>
<td>Decantation and Flotation</td>
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<tr>
<td>Flocculants</td>
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<td>Increases campaign and reduces necessity of off-line cleanings</td>
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<tr>
<td>Anti-Scaling Agents</td>
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cooling water services

Cooling towers are prone to microbiological contamination from the high airborne contaminant levels drawn in by induction fans. Process-related contamination can also occur, which then allows for rapid bacterial growth and associated fouling in the cooling tower’s nutrient-rich environment. When bacteria growth is not controlled, biofilms interfere with equipment performance. Biofouling reduces, or in some cases blocks, water flow, reducing heat transfer and increasing microbiologically induced corrosion (MIC) rates. Some biofilm organisms attack wood, which weakens structural components of wooden cooling towers. Dirty cooling systems also increase the risk of contracting airborne disease from inhalation of microorganisms that are present in cooling tower drift.

deposit control

The gradual accumulation of deposits in cooling water systems directly affects production. Process heat exchangers are usually the prime sites for deposition, since most scaling species have retrograde solubility characteristics. Simply put, scale forms at the hottest locations in the system—the heat exchange surfaces—including the shell/tube and plate/frame variety. Deposition problems can lead to reduced tower efficiency and decreased heat transfer rates, and can reduce the carrying capacity of pipelines. If unchecked, deposition can result in production loss, excessive energy usage, shortened equipment life and increased costs due to frequent cleaning or added pumping requirements.

corrosion

Corrosion most often occurs in both the process heat exchangers and system transfer piping. It is the result of an electrochemical reaction that is accelerated in the presence of higher temperatures, low flow or stagnant water conditions and in cases where the cooling water possesses a high concentration of dissolved solids. Causing heat exchangers to leak and rust to form, corrosion shows up as thinning of the tubes or pitting of the base metal. Failure of a critical heat exchanger can mean unscheduled downtime, loss of productivity and increased operational costs. The objective of an effective corrosion control program is to reduce metal corrosion to an acceptable level. Success depends on effective mechanical design, acceptable exchanger metallurgies, and selection and application of an effective chemical treatment program based on existing system, operational and water conditions.

GenGard® technology: for open recirculating cooling systems

GenGard is an advanced and cost-effective water treatment technology for the control of corrosion and deposition in open recirculating cooling systems. GenGard reduces production issues and helps costly capital equipment serve its intended useful life. GenGard programs can be applied across a pH spectrum from neutral to alkaline and improves results even under stressful conditions. The patented GenGard technology includes a new Stress Tolerant Polymer (STP), Alkaline Enhanced Chemistry (AEC) and Halogen Resistant Azole (HRA) in combination with phosphate based steel corrosion inhibitors.
boiler solutions
To ensure the best condition of energy and steam generation, the process of scaling, corrosion, and carryover should be avoided in steam generation systems. In addition, it is very important that the products used in boilers have FDA approval. SUEZ’s goals are to help customers maximize steam and energy production with quality, ensure that the customers’ assets remain in reliable operating condition, comply with existing regulations, as well as offer the lowest cost per performance.

Corrosion control in steam generation systems
Corrosion issues may arise in various parts of the steam generating system, such as the pre-boiler, steam and condensate systems as well as the boiler itself. This type of corrosion damages deaerators, feedwater lines, feedwater heaters and economizers. There are also corrosion events that occur continuously after the boiler, affecting pipes, evaporators or condensers. These events are generated by low pH due to the presence of high concentrations of carbonic gas (CO2) in the feedwater, or because of oxygen in the system. The extensive CORTROL® line of oxygen scavengers eliminates the deleterious effect of oxygen and passivates the metallic surfaces, helping solve corrosion issues in the section previous to the boilers. In the same way, various blends of neutralizing amines, as well as film forming products, are effective in the combat of corrosion in the sections after the boilers, and are available in the STEAMATE® line.

deposition and scaling control in steam generation systems
It is very important from a technical and economical point of view to maximize heat transfer in steam generating equipment, as well as in all systems involved, to reduce costs and preserve the integrity and reliability of the steam generating system assets. Maintaining clean heat transfer surfaces in a boiler make for highly cost effective energy transfer from fuel to amount of steam produced. Since fuel is the major cost of operating a steam plant, maximizing this energy to steam ratio at the highest possible level is important. Scale forming contaminants in boiler feedwater such as hardness or iron can rapidly lower this ratio leading to higher fuel use and more costly operation. The scale that forms also causes additional thermal stresses on boiler tubes leading to overheated failures that can bring down the boilers and limit or completely eliminate process operations. Superheating tubes in the points of high heat exchange flow leads to non-scheduled halts in the process, resulting in a loss of production as well. The use of high quality feeding water at operation conditions, along with utilizing internal treatment with SUEZ products, solves scaling and deposition issues within boilers. The OPTISPERSE® line includes a large group of polymers, dispersants, phosphates, phosphonates and other actives in the correct proportion to be used for each specific situation. All products used for this application have FDA clearance. SUEZ has made FDA approved patented technology available for high pressure boilers, with better action for iron dispersion and enhanced operation at higher temperatures and pressures.

wastewater treatment benefits
By separating liquids from solids, more insoluble matter can be removed. Anaerobic and aerobic biological systems are able to provide high removal rates for soluble contaminants, increased gas production for steam or electricity and low levels of scaling.

biological control
Proper biological control is critical to the prevention of waterborne disease and proper operation of equipment, such as cooling towers, heat exchangers, water scrubbing systems and reverse osmosis units. Encouraging microbial growth in wastewater treatment systems may sometimes be appropriate, however, to help ensure the health of beneficial microorganisms that remove specific types of organic matter. As such, SUEZ offers products and treatments to either reduce or augment microorganism growth in water systems.

clarification
Using exclusive blends of custom-designed polymer formulations, SUEZ’s treatment programs can remove organic color, calcium and magnesium hardness, iron and suspended solids from influent water. These polymers help reduce the need for pH adjustment, decrease load on dematerializers, increase filter throughput and reduce sludge volume. SUEZ also offers technologically advanced and comprehensive resources for wastewater treatment, making effluent waters acceptable for reuse or discharge.

metals removal
The removal of heavy metals from waste streams is a critical component of industrial wastewater treatment, as these metals do not naturally degrade and can be toxic to aquatic life, even at low concentrations. SUEZ makes it possible for industrial facility operators to reduce heavy metals—including soluble and/or particulate heavy metals, such as lead, copper, chromium, iron and manganese—from waste streams to help ensure regulatory compliance.

odor control
Whether you process water for public consumption, treat wastewater or run industrial processes in which water purity is essential, control of objectionable odors is a challenge. SUEZ provides a range of advanced products and treatment options for cost-effective odor control in water processing and wastewater treatment.

boiler treatment
carryover control
The purity of steam is essential for the efficient and safe operation of the post-boiler system. In the same way the deposition and scaling control in boilers is important, the control of steam purity and actions on the water carryover to steam lines is crucial to ensure the integrity of superheaters, steam headers, and turbines. Therefore, the chemical, mechanical, constructive and operational reasons that lead to the carryover process must be understood and minimized. Although there are no specific products to eliminate these issues, SUEZ’s analytical program and technical assistance reduces these events and minimizes their impact.

water and wastewater treatment
MemChem* chemical solutions are designed to reduce operating costs and decrease energy and water demand while simultaneously improving our customers’ environmental safety. MemChem solutions include a variety of products, including dechlorination, antiscalants, bio control, cleaners and filtration aids that are formulated to enhance the performance of pure water equipment such as cartridge filters, multimedia filters (MMF), carbon, microfiltration, ultrafiltration, nanofiltration and reverse osmosis (RO). Making it possible for your team to focus on core activities, SUEZ provides on- and off-site services to identify and implement a MemChem service program customized to meet your needs.

**on-site services:**
- Testing of water chemistry, pH, conductivity, free chlorine, turbidity and SDI
- MB tests, microbiological count, BioScan*
- System audits, pretreatment and RO systems, system optimization
- CIP operation training, membrane storage and system troubleshooting and diagnostics
- Optimization of chemical dosages

**off-site services:**
- Membrane autopsy to identify causes for membrane performance degradation
- Complete water analysis
- Membrane restoration services

**MemChem solutions:**
- SoliSep* MPT Filtration Aid removes particulates that foul membranes, reduces CIP cleaning frequency and operation cost, extends filters and membrane life
- MPH NSF pH Adjustment maintains desired pH, reduces scaling potential, reduces iron and aluminum fouling
- DCL Dechlorination removes chlorine from water and protects membrane from damage
- Bio Control and Biomate MBC maintains clean pretreatment and RO system, maintains optimum membrane rejection percentage, reduces chemical usage and CIP cleaning frequency
- HyperSperse MDC and MSI Antiscalant optimizes RO operation at maximum recovery and extends membrane life, reducing capital cost and chemical costs by reducing CIP cleaning usage
- Kleen MCT Cleaner restores membrane performance, lengthens membrane life and helps reduce membrane replacements

**productivity tools:**
- Argo Analyzer* Software predicts critical fouling potential, offers guidance in selecting the best antiscalant, recommends dosages for best RO operating conditions and percent RO recovery and supports operational cost savings
- WinFlows* engineering design simulates RO system’s optimum configuration and operation and provides predictions of permeate quality throughout membrane lifespan
- RO Normalization Data Sheet engineering tool tracks and monitors RO performance by tracking key operational parameters, helps users troubleshoot and maintain RO and provides guidance in selecting membrane chemicals to provide optimum performance
SUEZ’s TrueSense is a solutions platform of measure, automation and process control, and knowledge management technologies that enable optimization of cooling water systems.

TrueSense integrates three new and unique functionalities into one platform: direct online monitoring of critical water chemistries; personal instrumentation that dramatically improves the productivity and accuracy of offline testing; and a powerful data management and communication capability that provides deep insight into system status and opportunities for lowering total cost.

TrueSense is a tangible result of SUEZ’s focus on developing solutions to address water management challenges, even in the toughest operating conditions.

Key elements of the TrueSense platform are TrueSense Online for Cooling and TrueSense View.

- TrueSense Online for Cooling is a single, unified in-line technology that can directly measure and monitor multiple core chemistries that are applied for effective cooling water treatment, such as orthophosphate for corrosion control; proprietary polymers for deposit control; and the management of halogens like chlorine for microbiological control. TrueSense Online provides a better understanding of cooling system status, enabling users to tighten control parameters to avoid or better respond to system variation and upsets, reduce water use and costs, and to lower total cost of operation.

- TrueSense View provides a web-based knowledge-management solution for system visualization, analysis, alarming and reporting. TrueSense View arms plant personnel with the right information in terms of content, frequency and form. In addition, wireless features enable deployment with minimal time and cost.

The TrueSense platform is designed to work in conjunction with SUEZ’s most advanced cooling chemistry, GenGard with Stress Tolerant Polymer. The synergy between these two platforms enables optimal performance of cooling water systems with forgiving chemistry that performs even in the toughest conditions.
case study: SUEZ treatment program defoaming and dispersing

In an ethanol production plant, the excessive foam generation in the discontinuous fermentation vats caused many problems during the filling phase that resulted in yield loss and high treatment costs. To identify possible technological solutions, SUEZ technicians made a diagnosis of the fermentation process, including the following steps:

1. Review of product and rates that were being used
2. Review the client’s fermentation process operation
3. Test the bench with Fermenteste, followed by testing the plant to determine the most suitable dispersant and defoamer
4. Change the product application points
5. Align products and the operation to increase the yield of the process
6. Monitor the process, in order to determine the results and calculate the gains for the client

Conclusion: After implementing the SUEZ defoamers and dispersants program, the client was able to reduce their process costs approximately US $260K. Productivity gains have meant an increase in production capacity by about 33,000 m³ of ethanol during the season.

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case study: optimization of doses of the broth in decanting (plant estivas)

A sugar production plant conducted the process of settling only the addition of phosphoric acid, lime and polymer. The client felt that their costs with phosphoric acid, measured in the range of 180 ppm, were very high, but this dose level maintained that there was no compromise with the quality of the sugar end. The SUEZ solution to maintaining process performance and reducing costs was to implement the use of an FDA-approved decolorizing agent compound food grade, thereby avoiding risk to the customers. Initially, tests were performed on a bench using the Sucroteste equipment produced by Tecnal, and then, from the promising results obtained, tests were conducted in the plant using an economic feasibility study of proposed program changes.

Conclusion: The use of about 24 ppm of food grade decolorizing agent allowed dosages of phosphoric acid to reduce to about one-third of the original amount, consequently reducing the dosage of lime. This brought the client a gain of about $50,000 per harvest, only considering the cost of reagents decantation. Both the man-hours for cleaning x boxes evaporation (due to the smaller amount of incrustations of calcium), and increased productivity of the grinding were not included in this calculation. Another consequence of this change was revealed when the decantation system started to operate with less oscillation of pH, providing more reliable results.

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case study: SUEZ program to microbiological control in plants

In a sugar and ethanol plant, the lack of adequate microbiological control made it difficult to determine the performance of antibacterial agents in the mills, and prohibited the technical and economic evaluation of operational procedures in place. After the customer signed a partnership with SUEZ, a work plan was put in place that included the following actions:

1. Planning and determining the best operational practices and laboratory
2. Employee training by a specialized SUEZ team
3. Execution of the phases previously planned
4. Determination of benefits to the client

Conclusion: After implementation of new operational methods, experiments were performed with SUEZ bactericidal and bacteriostatic agents, following the results for several weeks. The gains, in terms of increasing the sugar and ethanol yield, were estimated at U.S. $55K in the first season, considering the cost of product dosing. Moreover, these best operating procedures allowed the plant to reassess their processes, significantly increasing the food safety of their sugar.
SUEZ commitment to the environment

Protecting the major existing asset—the world—is one of SUEZ’s highest priorities. SUEZ is committed to imagining, encouraging, developing and building innovative solutions to today’s environmental challenges while also driving economic growth.

SUEZ is committed to providing customers with innovative and responsible solutions to the hurdles they face now and in the future. The SUEZ Innovation, Development & Advanced Services Center (SUEZ IDEAS Center), applies a century of global experience to product and technical services research. SUEZ’s state-of-the-art laboratory is staffed by renowned research and development engineers and scientists who are equipped to analyze the composition of water and wastewater samples to develop the best technical, cost-effective solutions for SUEZ customers. Every day, we invest in developing new technologies to meet industry challenges, from reducing the total cost of producing water to reducing waterborne diseases and to providing environmentally friendly chemicals. We also continue to invest in our people so that they continue to provide the very best value to our customers.

SUEZ partners with world-leading institutions and industry leaders to expand our research and testing capabilities and to develop comprehensive, seamless solutions. SUEZ is at the forefront of wastewater reclamation, treatment, and reuse and we are focused on providing our customers with current solutions that help them save water and energy, and reduce operating costs. SUEZ offers a unique range of solutions and experience across industries such as oil and gas, refining, power, municipal, mining, steel, commercial and institutional, and food and beverage.

We understand how to help our customers tackle environmental regulations because we’ve established stringent environmental policies of our own that make us even more responsible in the way we conduct our operations. At SUEZ, we imagine new models, new technologies, new solutions, to secure a resourceful future for all.

We engage in the resource revolution to reinvent the way we manage resources in the new circular economy.

proof not promises award

SUEZ’s Proof Not Promises* Award (PNP) recognizes customers and sales representatives for significantly improving industrial operational performance.

As part of the award program, customers and sales representatives work to solve operational, production, environmental and health and safety issues to meet strategic business goals that result in proof—not promises. The PNP three-tier selection process examines the set goals as well as the achieved operational and financial benefits.
Find a contact near you by visiting www.suezwatertecnologies.com and clicking on “Contact Us.”

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