



Linde's SOLVOCARB product line has been developed as a reliable and safe solution to meet neutralisation and remineralisation needs across a broad application spectrum from wastewater to drinking water.

Discover our full portfolio at www.linde-gas.com/watertreatment.

Getting ahead through innovation.

With its innovative concepts, Linde is playing a pioneering role in the global market. As a technology leader, it is our task to constantly raise the bar. Traditionally driven by entrepreneurship, we are working steadily on new high-quality products and innovative processes.

Linde offers more. We create added value, clearly discernible competitive advantages, and greater profitability. Each concept is tailored specifically to meet our customers' requirements – offering standardised as well as customised solutions. This applies to all industries and all companies regardless of their size.

If you want to keep pace with tomorrow's competition, you need a partner by your side for whom top quality, process optimisation, and enhanced productivity are part of daily business. However, we define partnership not merely as being there for you but being with you. After all, joint activities form the core of commercial success.

Linde – ideas become solutions.

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→ Success story

THE LINDE GROUP

Linde

SOLVOCARB® venturi.

Overcoming pH control challenges
in textile wastewater.



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Customer.

Established in 1951, Bossa is one of the largest textile corporations in Turkey, specialising in denim fabrics. At its facilities in Adana, around

300 m³/h of alkali wastewater needs to be regulated for pH control before it can be discharged into the local municipal treatment facility.

Overcoming pH control challenges in textile wastewater.

Challenge.

Textile wastewater is characterised by high pH values, which need to be brought down to acceptable levels before the water can be discharged into the municipal wastewater treatment (WWT) plant. In the past, Bossa used a sulfuric acid dosing system to do this, which would sometimes overshoot the final effluent pH setpoint and reduce the pH to around 4.0. Given that the consent limit set by the municipal WWT plant was between 10.0 and 6.0, the occasional instance of non-compliance was creating difficulties with local authorities. In addition, non-compliance can prove costly as it pushes up the tariffs that operators have to pay. This is a familiar issue for plant managers using mineral acids as the turbulence in their effluent system is often insufficient to completely mix and disperse the higher density acid solution. In addition, the use of mineral acids was causing significant corrosion issues in the area around the dosing point and raising safety concerns.

Another challenge that Bossa faced was insufficient WWT plant capacity. An expanding

business meant that Bossa needed to handle a higher volume of wastewater but the treatment plant in place was struggling to achieve the necessary throughput, due in part to the short retention time and insufficient mixing at the location where the acid was being dosed. Bossa was thus looking to expand its existing WWT facility and optimise the design to enable more accurate pH control and extend retention time, while also boosting capacity to support their growing operations.

Solution.

Linde's global and local water treatment experts teamed up and worked closely with Bossa's technical team to design a new pH control system capable of addressing the customer's pH control, corrosion, safety and capacity challenges.

This joint team came to the conclusion that the best way to meet these challenges was to replace the mineral acids in use with carbon dioxide (CO₂) as the neutralisation agent.

To distribute the CO₂ homogeneously, SOLVOCARB[®] venturi, Linde's in-line gas-liquid contacting system for CO₂, emerged as the best fit. The patented design ensures excellent bubble distribution and prevents localised pH variations, which was one of the issues that Bossa faced with their previous sulfuric acid (H₂SO₄) dosing system.

After several titrations of the site wastewater with CO₂, Linde demonstrated that the wastewater could be successfully neutralised to the desired pH level and accurately controlled with no risk of the pH falling below pH 6.0, even in the event of significant overdosing. This is due to the self-buffering properties of carbon dioxide. Safety was no longer a major concern as, compared with mineral acids, CO₂ is less corrosive to infrastructure and has no handling issues.

Due to its capacity to handle a wide variation in pH values (from 10.0 to 12.5) and flow rates (from 250 to 300 m³/h), SOLVOCARB venturi was a key element in the new plant design, developed by Linde and validated by Bossa experts. The final solution involved jointly designing and building a new gravity-fed treatment plant extension, with an increased retention time of over 5 hours. The existing treatment plant became an effective balance tank, helping to reduce some of the pH variations going forward to the new plant extension. A series of SOLVOCARB tubular hose mats were installed along with two SOLVOCARB venturi 250 units, complete with gas dosing equipment and a programme logic control (PLC) system. The whole system is cascade-controlled, using the pH signal from the outlet of the plant.



Darren Gurney, Senior Process & Business Development Manager (left), and Omer Saray, Applications Engineer (right), go over the details of the CO₂ dosing system.

SOLVOCARB[®] venturi. Efficient and safe neutralisation.

“Our plant extension using SOLVOCARB[®] venturi gives us the flexibility we need to handle future increases in loading with much greater control over the pH value of the water we release to the local treatment plant. This helps to reduce our tariffs and gives us a wider pH handling envelope. What’s more, the replacement of mineral acids with environmentally friendly carbon dioxide as the neutralisation agent improves safety and helps prevent corrosion in our infrastructure.”

Mustafa Deniz, Manager of Engineering Department, Bossa

Technology.

Linde's SOLVOCARB product line has been developed as a reliable and safe solution to meet neutralisation and remineralisation needs across a broad application spectrum from wastewater to drinking water. The SOLVOCARB venturi is a low pressure drop gas-liquid venturi contactor that provides excellent bubble distribution for effective gas dissolution. The spacing of the injection holes in the venturi nozzle has been specifically engineered to reduce the occurrence of localised pH variations. Available in a range of sizes to fit different pipe diameters, it is made from a chemically inert thermoplastic, with good resistance to solvents, alkali solutions and permeate waters.

Benefits at a glance.

- Accurate pH control
- Even bubble distribution for the avoidance of localised pH variations
- Non-corrosive, with positive impact on safety and infrastructure
- Handling of variances in inlet pH and flow
- Minimal maintenance required
- Good chemical resistance to solvents, alkali solutions and demineralised water
- Can be retrofitted to existing plants for capacity increases