Valve solutions for lithium production from brine resources

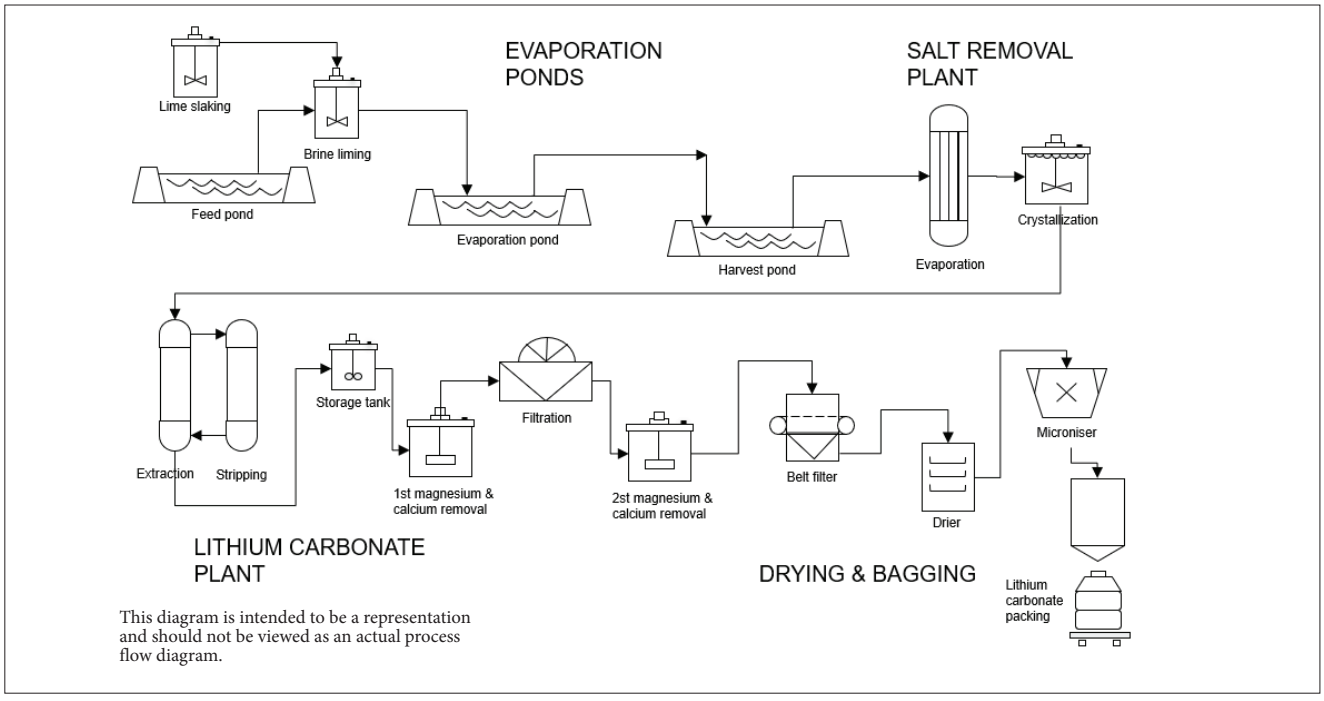


Fig. 1. Simplified flow diagram of lithium carbonate production from brine resources

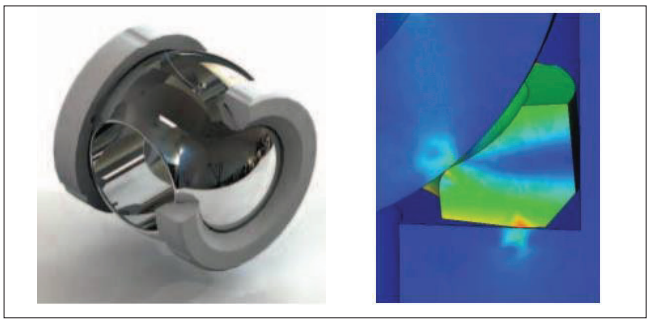
Process overview

Lithium is mainly produced from two major sources – underground mineral ore and brine deposits. Recovering lithium from brine deposits starts from pumping the brine to a series of evaporation ponds. The brine is kept in the evaporation ponds for a period of months to even over a year, until much of the water content has been removed through solar and wind evaporation. In addition to lithium, the concentrated brine typically contains other metals such as potassium and sodium. The processing plants normally operate several large evaporation ponds of various ages. By-product metals, such as potassium, may be extracted from younger ponds, while waiting for the lithium content to reach high enough concentration for further processing. After the brine in the evaporation pond has reached an optimal lithium concentration, it is pumped to a lithium processing plant for extraction. The plant flow sheet includes several steps and vary depending on the brine composition and desired end-product. The processing at the lithium carbonate plant usually starts with a pre-treatment step to remove unwanted components from the brine. The pretreatment typically includes filtration and/or ion exchange purification. Next, to isolate desirable products and byproducts, a series of solvents and reagents are applied through precipitation. The brine is then filtered to separate the precipitated solids. Finally, the brine is treated with a reagent, such as sodium carbonate to form a stable, yet readily convertible compound, usually lithium carbonate. Other types of saleable forms of lithium include lithium hydroxide, lithium chloride, lithium bromine and butyl lithium. A simplified flow diagram is shown in Figure 1.

Neles valve solutions

In lithium production, some of the main challenges for control equipment are corrosive and erosive media and a tendency for solids to accumulate to the valve cavities. The equipment of the lithium carbonate plant needs to be periodically cleaned with a solution of sulfuric acid (H_2SO_4) which is typically fed to the system for example at a concentration of 18 %. This process is carried out at intervals, and the neutralized solution obtained from cleaning is sent to a discard pond.

The presence of sulfuric acid must be considered when selecting valves for the process. Although, for example CF8M is suitable for weak sulfuric acid concentrations, if concentrations are higher, standard materials and hard chromium coatings may not be able to withstand the corrosive process conditions. Alloy 20 or Hastelloy C may be considered for some of the valve installations. Soft seated valves are typical in these applications and Jamesbury™ Xtreme™ seat will be a perfect choice.

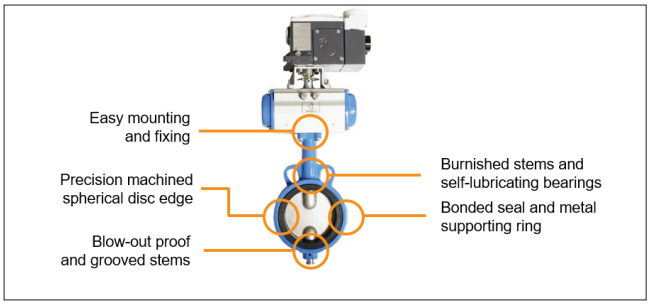


Neles ball valve with Xtreme seat and finite element analysis

Lithium carbonate plants also use a considerable amounts of sodium carbonate (soda ash). Sodium carbonate is prepared in a plant specifically designed for this purpose where it is transformed from solid state to concentrated solution, typically with recycled water. The temperature of the system is controlled by heating the recycled water. Potential ingress of solids is one key consideration when selecting the valves in the process. Neles valves have been designed with several features and options which reduce cavities and thus prevent solids build up. As an example, our Neldisc butterfly valves design leaves no cavities between the bearings and the gland packing, preventing product ingress and improving reliability.

Neles butterfly valves operate both in control and shutoff applications. Our butterfly valve portfolio covers a wide variety of trim materials and seat combinations, making it the perfect choice for many of the liquid flows at lithium production sites.

Neles rubberlined butterfly valve



Neles butterfly valve

In addition to metal seated, engineered butterfly valves, our product range also includes rubberlined valves. Long service life and low total cost of ownership are key characteristics of our rubberlined portfolio.

Crystallization equipment, on the other hand, are used in the upstream processing as separation machinery. These equipment incorporate various control valves for air, gas & liquid flows. Globe valves can provide an excellent solution for the process control.

When it comes to globe valves, we know your most important consideration is optimized performance and extreme reliability. The longer a valve performs as designed and without problems, the better. By focusing on the all-important areas of the design, material research and sealing technologies – we have engineered the next generation globe valve performance.

Neles globe valve

For our customers in lithium production, we are dedicated to matching the application requirements with the most economical products. To ensure the efficiency and reliability of the valves, correct valve selection is very important.

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