

Regeneration plants for sulfuric acid pickling

GEA Messo PT has developed and constructed plants for regenerating exhausted pickling solutions from sulfuric acid pickling baths for more than 30 years. In these plants, the ferrous sulphate accumulated in the acid is crystallized by cooling and separated as ferrous sulphate heptahydrate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$). The free sulfuric acid still present in the solution is returned to the pickling process. Special continuously operating processes have been established, in which the solution is cooled and concentrated by decompression evaporation under vacuum. This exceeds the solubility limit of ferrous sulphate and therefore causes it to crystallize.

This matured technology has been further developed and improved by GEA Messo PT in Duisburg, so that the attractive concept and its advantages can be introduced here to operators of pickling baths.

Regeneration Plants Sulfuric Acid

Pickling bath



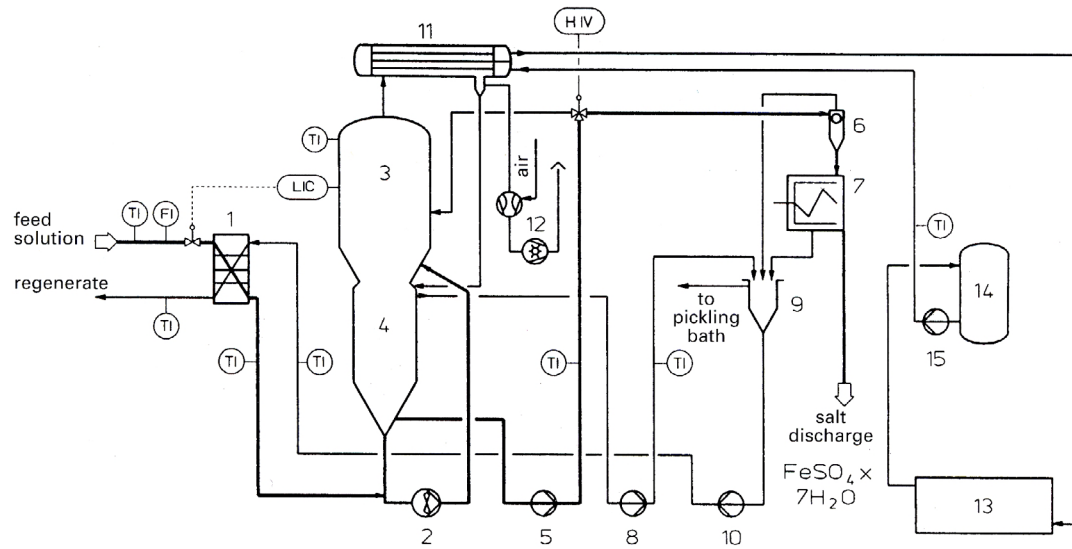
Process Engineering

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Process Description

The discharged pickling acid is firstly pre-cooled in a heat exchanger (1) using the regenerated acid from the regeneration collecting tank (9) before returning the regenerated acid to the pickling plant.

The pre-cooled pickling acid comes into the circulating system and, via the circulating pump (2), into the crystallizer (3), which is a stationary device with forced recirculation. Ferrous sulphate incrustation leading to plant shutdown is avoided by controlled limiting of supersaturation.

Possibly commencing incrustation is removed from the crystallizer walls at predetermined time intervals by an integrated rinsing system. Idle periods of the crystallizer are normally no longer necessary.

The pickling acid is cooled by evaporation under vacuum. Supersaturation as the driving force for crystallization is achieved by decompression cooling without cooling surfaces and by the concentration increase of the solution resulting from water evaporation.

The vapours from the crystallizer (3) are condensed by cold water in a surface condenser (11). The advantage of this condensation system is that no external cooling water is required. It operates with a closed circuit cooling system so that contamination by acid carried over with the vapours is ruled out.

It was possible to reduce the space required for a plant with stationary crystallizer for regenerating systems with a capacity of up to approx. 700 kg/h of ferrous sulphate heptahydrate to such an extent that the plant can be completely preassembled in a steel frame and transported by road or rail. Only the connection tasks have to be carried out at the operating site.

This concept has already been implemented successfully several times. For plants with higher capacity, the equipment can be sectioned into several of the preassembled modules described above. The capacity of the largest plant conceived and implemented so far is 6,500 kg of ferrous sulphate heptahydrate per hour. Existing regenerating plants have also already been successfully converted so that they conform to the latest requirements with regard to environmental protection, operational safety and economic efficiency.

FC crystallizer for $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$; pump position



FC crystallizer for $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$



...and preassembled in a steel frame



For more information regarding this technology and your specific configuration requirements, please contact us at: info.geamesso.de@geagroup.com or phone +49 2065 903-0.