



Application Profile: Lime Slaker Heating

A number of industries use hydrated lime addition for their processes. Hydrated lime (or calcium hydroxide, or slaked lime) is usually a dry powder resulting from the controlled slaking of quicklime with water. The exothermic or released heat of reaction is captured and used to evaporate the excess slaking water. High calcium quicklime readily reacts with water to form hydrated lime. The reaction is highly exothermic and the process is known as "slaking". The reaction is usually carried out in a "slaker" (a specially designed mixer) which, through a process of rigorous mixing, makes certain that all of the quicklime has come into intimate contact with water and no unreacted quicklime remains. A number of slaker processes use the addition of heat via hot water to accelerate the reaction time. The reaction occurs in slaker vessel at high temperatures up to 180-215°F.

The slaker is often heated by heat exchangers or by sparging steam into the Slaker. The use of external steam control devices to control the steam flow by modulating the steam pressure can lead to excessive steam hammer & vibration. Steam hammer and vibration often result from poor mixing and condensing of the steam.

- Lime slaker applications rely on the chemical reaction to produce the necessary heat for the reaction. Adding hot water to the lime slaker can accelerate the cycle for improved processing times. Good temperature control is important to achieve high efficiency in the reaction. Improved reaction reduces lime costs.
- Proper temperatures optimize spraying through the spray nozzles.
- Sparging also has a tendency to create non-uniform temperature zones in the slaker, resulting in uneven reactions within the system.
- Spargers may also damage the slaker walls because of the violent condensation process, particularly when coupled with the stress corrosion issues mentioned previously.
- Seasonal temperature changes require turndown capabilities beyond sparger and traditional heating methods.

PSX Heater solution:

A PSX heater can be installed in-line upstream of the slaker. The tight temperature control possible within the PSX heater allows a more uniform reaction, thus reducing lime costs, and allowing for finer tuning of the slaker process. The fast and accurate temperature response of the heater allows the Utility to fine tune the chemistry in the slaker, reducing the chemical usage, and/or the reaction time. The PSX heater can also be supplied in appropriate metallurgy to address the any erosion or corrosion issues

Key Direct Steam Injection Benefits

- **Precise Temperature Control** (typically +/- 1 °F) improves performance
- **Reduced Energy Costs** over inefficient steam sparging
- **No Steam Cavitation or Vibration** as a result of improved steam condensation and no tank damage
- **Reduced Chemical costs** by better reaction and process control
- **Lower Maintenance** and no scale build-up due to the PSX Heater self cleaning design
- **High Turndown** capability by the PSX Heater allows for seasonal water temp changes

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