Acid towers & distributors

Sulphuric acid technology

In double absorption plants there are generally three acid towers: the drying tower, the intermediate absorbing tower and the final absorbing tower.

Each of these towers is usually made of carbon steel with an internal lining of acid resistant brick. This lining covers all the acid wetted surfaces. A membrane material is applied together with the brick to protect the carbon steel shell of the tower from corrosion. The tower also contains an acid resistant ceramic packing, supported by a brick dome.

The gas enters at the bottom of the tower and flows upward through the packing which is completely wetted by a downward flow of sulphuric acid. The gas leaving the top of the packing passes through a mist eliminator device before leaving the tower. In the drying tower, a mesh pad or candle type mist eliminator may be chosen to remove the entrained acid mist droplets. In the intermediate and final absorbing towers, where a high loading of fine mist particles is expected, a candle type mist eliminators are specified. The gas leaving the final tower is discharged to atmosphere.

The acid flow to the top of the tower is introduced via either a pipe or trough type distributor.

Conventional design characteristics

The problem areas which can be encountered with conventional acid towers are:

- Maldistribution of acid across the tower. This could be caused by trough distributors not being level or pipe distributors being blocked, or by excessive corrosion of either type of distributor with time.
- Corrosion of the cast iron distributors results in high levels of iron in product acid.
- Cracking of and partial collapse of ceramic packing support grids.
- Corrosion of the carbon steel shell or base. This will occur if the acid is able to seep through to the shell because of poor quality brick lining or inadequate membrane installation. The corrosion product formed has a volume many times greater than that of the carbon steel. This could cause bulging of the shell or brick heaving resulting in accelerated corrosion and failure of the tower.
Features and benefits of Chemetics’ design

- The acid flow evenly irrigates the top of the tower packing through special proprietary designed pipe or trough type distributors.
- Since their introduction in 1982, Chemetics pipe and trough distributors have been fabricated from SARAMET® austenitic stainless steel. This material has demonstrated superior corrosion and erosion resistant properties in strong sulphuric acid service.
- The tower packing is supported on a self-supporting brick dome whereby most of the packing weight is transferred to the tower shell and not to the tower base.
- The towers have a dished bottom which prevents brick heaving if sulphate forms between brick and shell.
- The towers are elevated to accommodate access to the tower bottom if maintenance should ever be required.
- Particular attention has been paid to the detailed mechanical design of the gas and acid inlet nozzles to minimize potential stresses imposed by inlet gas ducting and outlet acid piping.
- High quality acid resistant linings are supplied along with top quality installation supervision to ensure a maintenance-free life for the tower.
- For certain applications SARAMET® tower designs are offered which have the advantage of eliminating the requirement for brick linings.

Chemetics also specializes in the installation of replacement towers and distributors in existing plants.