CHEMETICS®

The converter

Sulphuric acid technology

The converter is the focal point of the sulphuric acid process. It is this vessel which contains the series of catalyst beds which are required to convert the sulphur dioxide gas to sulphur trioxide.

Most modern double absorption processes require four catalyst beds. The gas flows in series down through the beds with intermediate cooling between each bed being required.

Until 1980, when Chemetics introduced the first stainless steel converter, this vessel was traditionally manufactured from bricklined carbon steel and cast iron. Although many hundreds of these conventional units are installed around the world and are still in use today, most have caused the owners significant operating and maintenance problems.

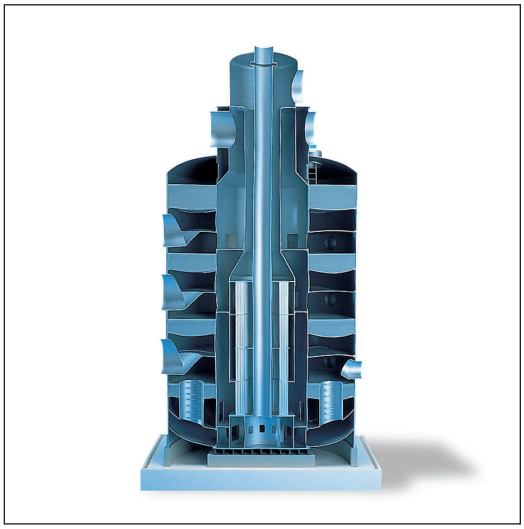
These problems include shell distortion and cracking, catalyst grid collapse, gas nozzle cracking as well as inefficient conversion of SO_2 to SO_3 due to catalyst bed by-passing and poor gas distribution. Fabrication from carbon steel, with its limited high temperature strength, has also restricted the design of traditional converters by limiting the first bed to being at the top of the converter.

Features of Chemetics' design

- The patented converter is fabricated throughout from stainless steel and consists of an all welded construction.
- The catalyst beds and inter-bed divider plates are "dished" to provide superior mechanical strength and flexibility such that the need for supplemental pipe or beam supports is eliminated.
- The converter has a central core in which can be located the hot gas heat exchanger and/or superheater to cool the gases leaving the first bed.
- The gas enters the chamber above each bed via inlet ports arranged symmetrically around either the outside periphery or the central core of the converter.
- All gas nozzles to and from the beds are circular in section.
- The first catalyst bed can be located at the bottom of the converter for easy access.
- The converter beds can be arranged to minimize plant gas ducting.
- The converter can be easily modified to provide a unit with 1 to 6 beds if required.
- The design can incorporate inter-bed quench air systems if required.

Converter replacement project (USA). ►

Four-bed converter with internal exchanger. ► ►



Benefits of Chemetics' design

- Stainless steel is substantially stronger than carbon steel at the operating temperatures of the converter, resulting in a long maintenance free life.
- Replacement of the traditional cast iron grids with welded stainless steel plates significantly reduces the weight of the converter and enables it to be lifted by crane. This is an extremely useful feature when replacing an existing unit.

Large converter in service for over 20 years.
►

- The inherent high temperature resistance of stainless steel to oxidation eliminates the need for metallizing or brick lining.
- The installation of gas heat exchangers and/or superheaters inside the converter eliminates the associated interconnecting ducting, as well as vessel foundations and insulation.
- The use of circular section gas ducts eliminates cracking and resulting gas leakage problems associated with oval, rectangular or "mouth organ" shaped gas duct connections.
- Gas entry to the catalyst beds via core slots provides good gas distribution across the catalyst bed ensuring maximum catalyst efficiency.
- The all welded construction of the converter prevents gas bypassing between the catalyst beds or the division plates, thus improving the long term conversion efficiency of the converter.
- The elimination of catalyst bed support posts or beams gives excellent access for inspection above and below each bed as well as for catalyst screening.
- The elimination of the brickwork and the cast iron grids reduces the heat capacity of the converter. This means that converter heat up time is considerably reduced.
- The all welded construction facilitates maximization of shop fabrication, thereby ensuring high quality manufacture.

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