INSTRUCTIONS FOR BED INLET TEMPERATURE OPTIMIZATION FOR MECS® CATALYST FOR SULFURIC ACID

GENERAL

The temperature rise across a catalyst bed is a measure of the degree of conversion and also indicates the gas strength. The concept of bed inlet temperature optimization is to adjust the bed inlet temperature to maximize the temperature rise, and thus the conversion, across the catalyst bed. This is generally a trial-and-error procedure.

1. Each converter pass should be operating at the lower end of its recommended bed inlet temperature range at the beginning of this optimization process. Make sure that the converter is operating at steady-state conditions (i.e. gas flow and inlet SO_2 strength).

2. Note the initial temperature rise across the first pass. Increase the first pass bed inlet temperature approximately 5 °C and allow the converter to stabilize at the new condition for approximately 4 hours. If the new inlet temperature results in a larger temperature rise across the first pass, then increase the bed inlet temperature further. However, if the higher bed inlet temperature has caused a smaller temperature rise across the catalyst bed, then return to the bed inlet temperature that provided the largest temperature rise. The inlet temperature should be changed until the optimum value has been identified within approximately 2 °C. If the same maximum temperature rise occurs with several inlet temperatures, the lowest temperature that produces a maximum rise should be used.

3. While maintaining the inlet temperature to the 1st pass at the optimum value as determined in step 2, optimize the bed inlet temperature for the 2nd pass following the same procedure.

4. Maintain the inlet temperatures to the 1st and 2nd passes at the optimum values while making adjustments to pass 3. Optimize the bed inlet temperature for the 3rd pass following the procedure in step 2 if there is a significant and measurable temperature rise in pass 3. If the temperature rise across the 3rd pass is small, the effect of changing the inlet temperature may not be noticeable. In this case, the stack SO_2 emission level can be used to determine the optimal 3rd pass inlet temperature. Increase the pass 3 bed inlet temperature in increments of approximately 5 °C, allowing the converter to stabilize approximately 4 hours between each change. The optimal bed inlet temperature results in the lowest SO_2 emissions level in the stack. The inlet temperature should be changed until the optimum value has been identified within approximately 2 °C.

5. While maintaining the inlet temperatures to the 1st, 2nd and 3rd passes at the optimum values, optimize the bed inlet temperature for the 4th pass. The temperature rise across the 4th pass is usually very small; thus, the effect of changing the inlet temperature may not be noticeable. Therefore, when optimizing the 4th pass inlet temperature, observe the stack SO_2 emission level. Increase the 4th pass bed inlet temperature in increments of approximately 5 °C, allowing the converter to stabilize approximately 4 hours between each change. The optimal bed inlet temperature results in the lowest SO_2 emissions level in the stack. The inlet temperature should be changed until the optimum value has been identified within approximately 2 °C.

6. While maintaining the inlet temperatures to the 1st, 2nd, 3rd and 4th passes at the optimum values, optimize the bed inlet temperature for the 5th pass, if applicable, following the procedure in step 5.

7. After all of the pass inlet temperatures have been optimized, conversion will be at a maximum and stack SO_2 emissions at a minimum. It is important to note that for each set of operating conditions (i.e gas flow and SO_2 strength), different pass inlet temperatures are typically required in order to optimize the overall conversion. Also, as the catalyst ages, the optimal bed inlet temperatures will change.

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