

SPECIALTY CHEMICAL MANUFACTURER IMPROVES PERFORMANCE OF HIGH TEMPERATURE VAPOR SYSTEM

A specialty chemical manufacturer operates a small (500 gal) high temperature reactor. Reactions are carried out at 650^oF to 720^oF and the reactor is heated by a dedicated electric vapor phase reboiler using Dowtherm A / Therminol VP-1 (BP/DPO). The system was installed in 1990 and has operated without major problems.

PROBLEM STATEMENT:

The system was plagued with minor operational problems associated with non-condensable formation, which resulted in cold spots at the top of the vessel and condensation of reactants in the vapor space. Frequent venting of the thermal vapor system helped the problem but caused a considerable loss of fluid (30% of the total fluid fill volume per year). As the biphenyl component of BP/DPO is a reportable substance, the losses reflected poorly on the plant's environmental standing.

Capital constraints, along with the jacket design of the reactor made conversion to a liquid heat transfer system unattractive. The high temperature of the process precluded changing the fluid to an alternate material.

CORRECTIVE ACTION

Modifications were made to the reactor to relocate the BP/DPO vapor supply nozzle and vent nozzle and an improved vent system was installed which captured non-condensable compounds away from the reactor. The vent system was instrumented to detect the amount of non-condensable material so that the system was vented ONLY when needed.

IMPROVEMENTS NOTED:

1. Temperature control of the vessel was improved and fewer instances of reactants condensing on the reactor head were noted.
2. Venting of the BP/DPO system was reduced and annual fluid losses were reduced to <10%.