

REACTIVE CHEMICAL
CONCERNS

CONFIDENTIAL

DO 004303

SAFETY AND REACTIVE CHEMICAL CONCERNS
FROM DUAL REACTOR EQUIPMENT AND OPERATION

SAFETY Fire: The large quantities of flammable materials being handled makes fire prevention a primary concern. New piping beneath the reactor will be equipped with remote activated, fail-close, fire-safe EBVs. The integrity of new piping beneath the reactor will be checked. Deluges and gas detectors cover the reactor area and new solvent heat exchanger.

PROCESS Polymer Phase Out: Polymer phase out will first be indicated by a sharp drop in the lower reactor temperatures. Especially important in the primary reactor where high molecular weight polymer is made, unchecked polymer phase out can cause reactor and line plugging. Bottom reactor low temperature alarms will alert operators to increase hydrogen flow, increase reactor temperature, and increase reactor inlet temperature. The pilot plant is defining unstable operating regions and determining mixing effects on these regions.

PROCESS Ethylene Gas Out: Reactor ethylene gas out will result in loss of reactor temperature and pressure control (which would be indicated by numerous pressure and temperature alarms). Down time to liquid fill and re-start the reaction may be needed. The operating conditions which lead to gas out (such as low ethylene conversion from an inadequate solvent/ethylene ratio or high inlet temperature) can be monitored and alarmed.

SAFETY/
PROCESS Exchanger Leakage: Internal water leakage into the process, which might occur during periods of plant downtime, would cause poor catalyst efficiency or loss of reaction. Solvent leakage into the condensate, which might occur during plant operation, would be detected by a flammable gas detector at the condensate drum. Both situations require downtime to plug leaking tubes.

PROCESS Catalyst System: Mis-aligned and deadheaded pumps are a potential problem in a new catalyst piping arrangement. Double-block-and-bleeds, check valves, premix and ATE flow indicators/alarms, and reactor temperature indicators/alarms should help prevent mis-directed catalyst flow. The diaphragm pumps are equipped with internal hydraulic pressure relief to limit maximum discharge pressure.

SAFETY/
PROCESS Reactor Agitator: The agitators each have shutdown alarms. If not restarted quickly, loss of reactor agitation would require a train shutdown. The agitator seal systems are equipped with level, pressure, and differential pressure indicators/alarms.

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SAFETY Solvent Pump System: Additional solvent pump piping presents potential mis-alignment and deadhead problems. Check valves and flow indicators/alarms should help prevent problems. A solvent pump discharge pressure control loop and pressure relief valve will prevent over-pressuring.

PROCESS Loss of Primary Reactor Inlet Heating: If unchecked, the loss of primary reactor inlet heating would lead to polymer phase out. A low temperature alarm alerts operators to the problem.

PROCESS Loss of Secondary Reactor Inlet Cooling: The loss of cooling for the secondary reactor would result in a decrease in the proportion of low molecular weight polymer. The overall higher molecular weight polymer may then present processing difficulties, such as separator level control or die pressure.

SAFETY Water Hammer: A concern of dumping condensate into the low pressure steam drum is water hammer. A nitrogen tie-in will act as a pressure pulse dampener.

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