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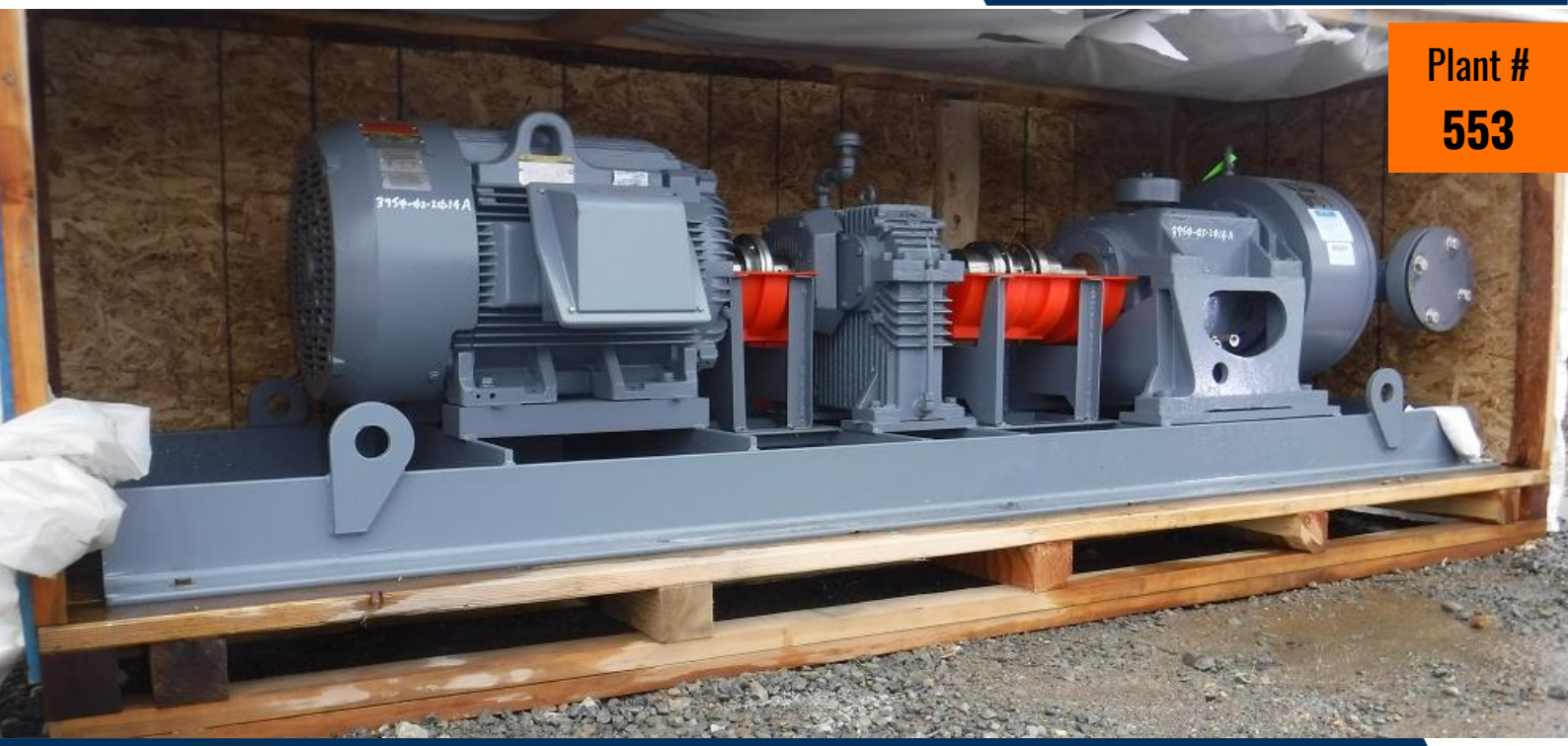

Plant # 553

# Jet Loop Reactor System – 5200 Gallon

**Capacity:** 5200 Gallon
**Process Information:** The loop reactor process is made up of essentially three parts: Catalyst activation, reaction, spent catalyst removal.

**Major Equipment:**
1 - Loop Reactor Feed Tank Pumps (P – 2 / P-2014A & P – 3 / P-2014B / Location: USA)
2 - Fresh Catalyst Tank Jet Mixer (MZ – 2 / MZ-3036 / Location: USA)
3 - Fresh Catalyst Batch Tank (V – 4 / V3035 / Location: China)
4 - Fresh Catalyst Tank Pump - (Not Available)
5 - Fresh Catalyst Heat Exchanger - (Not Available)
6 - Catalyst Pressure Tank - (V – 3 / V-3031 / Location: China)
7 - Loop Reactor - (R – 1 / R-3001 / Location: China)
8 - Jet Mixer (MZ – 1 / MZ-3002 / Location: USA)
9 - Cross Flow Filter (F – 1 / F-3033 / Location: USA)
10 - Loop Reactor Heat Exchanger (EX – 1 / EX-3006 / Location: USA)
11 - Loop Reactor Pump (P – 1 / P-3004 / Location: USA)
12 - Air Cooled Heat Exchanger (Not Available)
13 - Loop Reactor Cross Flow Filter Back Pulse Tank (V – 1 / V-3013 / Location: China)
14 - Batch Filtration Tank (V – 6 / V-4031 / Location: China)
15 - Filtration Vessel Pump (Not Available)
16 - Batch Product Filter (F – 2 / F-4035 / Location: USA)
17 - Product Stripper Feed Tank (V – 7 / V-5005 / Location: China)
18 - Stripper Feed Pumps (Not Available)
19 - Solvent Recovery Tank Reflux Condenser (EX – 3 /EX-3021 /) & Solvent Condenser (EX – 2 / EX-3019) / Location: USA
20 - Loop Reactor Solvent Recovery Tank (V – 2 / V-3020 / Location: China)
21 - Loop Reactor Continuous Guard Filters (F – 3 / F-4036A & F – 4 / F-4036B / Location: USA)
22 - Relief Vent Collection Tank (V – 5 / V-3091 / Location: China)

## Brief Plant Description

Unused jet loop reactor system. 5200 gallon SA516 carbon steel loop reactor, internal MAWP 150 psi @579F max temperature. The process consists of three main parts.
1.Catalyst Activation - This step is necessary where the catalyst must be activated prior to being injected into the reaction loop. The system was set up to expose the catalyst, in a solvent slurry, to hydrogen.
2. Reaction - The reaction is started in batch mode by filling the reactor with the primary reactant/solvent solution (Feed) and the proper amount of activated catalyst in the solvent slurry. The reactor is circulated through the loop and is brought to reaction temperature. The secondary reactant is then introduced through the jet mixer slowly until the batch reaction is complete and the reactor pressure has raised to the designate level. The Feed is then introduced, and an equilibrium established for feed rate of Feed/secondary reactant and the reacted product discharge. The reaction is cooled via the loop heat exchanger and the reacted product solution is removed via the cross flow filter. The pore size in the filter keeps the catalyst in the loop while the velocity of the fluid in the loop keeps the pores from plugging. Occasionally a back flush is required using material from the back-pulse tank. The finished product solution flows to the product stripper feed tank. The solvent is removed vis a desolventization step (not included in NCC's equipment). There are two guard filters (active and spare) in the line to the desolventizer to capture any catalyst that passes out of the loop.
3. Spent Catalyst Removal - Periodically spent catalyst needs to be removed from the loop. This is accomplished via a batch removal process. A calculated portion of the slurry in the loop is removed to the batch filtration tank. It is then processed through the batch catalyst filter to separate the finished product solution from the catalyst. The spent catalyst is discharged to a container and the finished product is sent to the product stripper feed tank. Fresh catalyst make-up is injected into the loop through the catalyst activation system. The system was never installed, and the components are available for relocation. Some components are in China located at OEM's site, rest of the equipment are in the US. The system can be used for Amination, Alkylation, Carbonylation, Ethoxylation, Hydrogenation, Nitrolation, Oxidation and Phosgenation.

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