FACILITY REVIEW REPORT

PET PLANT

Site Overview

Plant Site: ~195 acres
Uncer Roof: 680,000 sq. ft.

Prepared for:

International Process Plants

Summary

The Pet Plant facility was built for the production of Polyester Fibers and Polyester Resins. The Fibers capacity was not stated. The Resin capacity was 470M lbs annualized. The Fiber production has been shut down since 2000 and the Resin production was shutdown in December 2008.

The site consists of 680,000 sq. ft. under roof and sits on 195 acres. The site has rail and truck access. Sea access is also available at a nearby pier. Supplied utilities to the site include electricity, Public water, natural gas, and steam from a utilities owned Co-generation plant located next to the site. There is an on-site waste treatment facility that is an activated sludge plant with a capacity of 4,500 m^3/day.

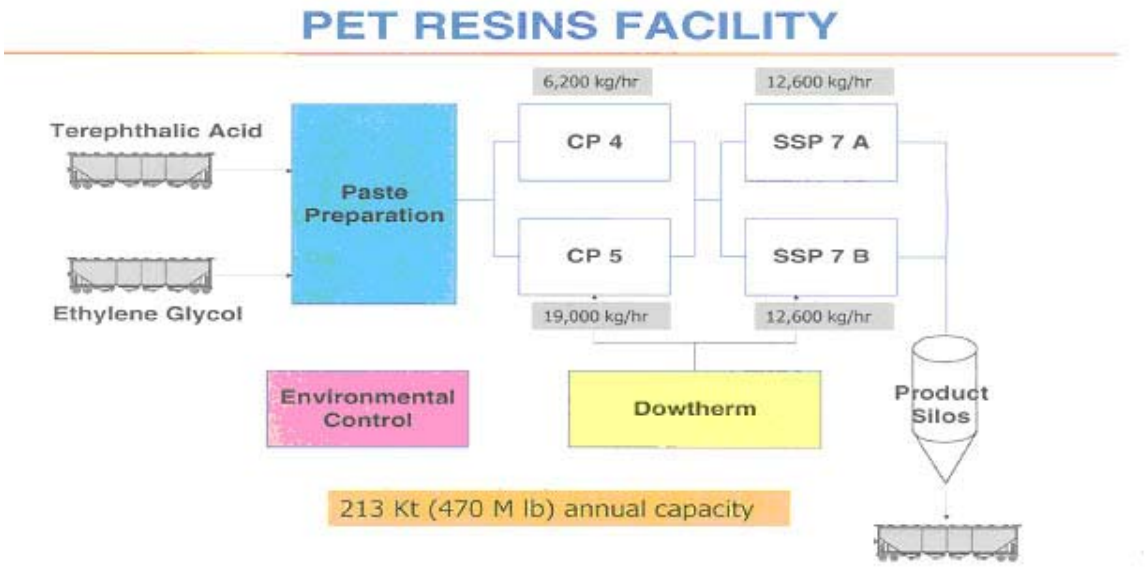
The initial site was constructed as a polyester filament plant. The plant was revamped to include Nylon filament, a polyester staple and HDI, followed by (2) additional polyester staple lines, finally the polyester resin lines were added. The esterification and melt polymerization technologies are all ICI based or a derivative of the ICI designs. The solid state polymerization technology on the resin lines is Bepex.

The resin lines are of a reasonable capacity and size. They are located in new building structures at the rear of the original buildings and could be split out from the rest of the site. The esterification and polymerization processes are based on ICI designs. The solid state polymerization technology is Bepex. It is a proven design with many installations around the world.

General

The resin plant has a stated annual capacity of 213,000 tons (470M lbs). The plant consists of (2) continuous polymerization (CP) lines based on ICI technology. (1) line has an instantaneous capacity of 6.2 tons/hr, with the second line instantaneous capacity at 19 tons/hr. Both lines feed (2) Bepex solid sate polymerization lines rated at 12.6 tons/hr each.

Resin Lines

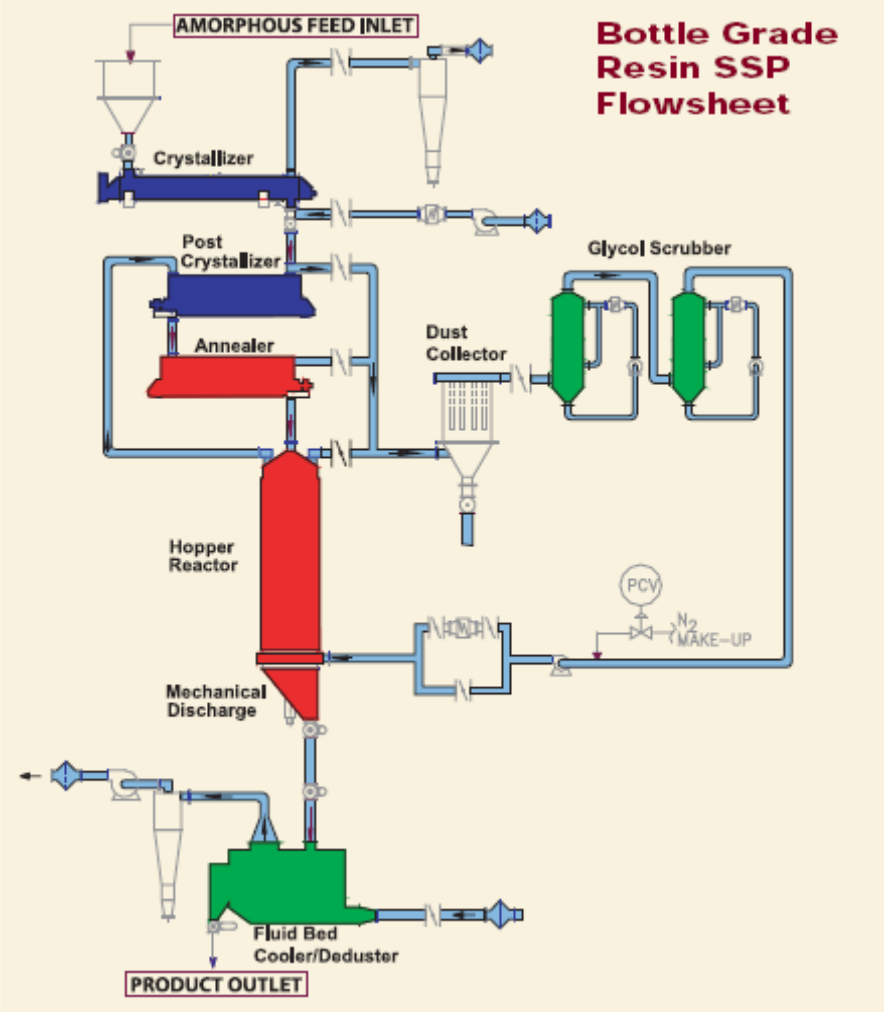


The CP line process starts with (2) main raw materials, PTA and EG being metered and mixed into a paste in an agitated tank. The paste is pumped into a stainless vertical primary esterifier vessel. This vessel is agitated and is heated by internal coils by DowthermA vapor to a pressure of 280 kpa at a temperature of 280°C. The vapor from the vessel goes to a tray column with the EG being returned to the process and the remaining water with VOCs being sent to a Thermal Oxidizer for destruction. The monomer from the primary esterifier is then fed into a 3-stage stainless horizontal secondary esterification vessel. Each stage is agitated and heated with internal coils using DowthermA vapor. This vessel operates at atmospheric pressure and at 280°C. The vapor from the vessel goes to a tray column with the EG being returned to the process and the remaining water with VOCs being sent to a Thermal Oxidizer for destruction.

The monomer is then fed into the polymerization process. The Low Polymerizer (LP) is a vertical agitated vessel that is jacketed with internal coils. This vessel is heated by DowthermA and operates under a slight vacuum generated by glycol vapor based ejectors. The final vessel in the polymerization train is a High Polymerizer (HP). This is a jacketed horizontal vessel with a wiped wall agitator the length of the vessel. This vessel operates at a higher vacuum generated by glycol vapor based ejectors. Both the LP and HP are assumed to be stainless vs. stainless clad carbon steel. This could not be confirmed. Polymer is pumped with Maag gear pumps through a Maag 100 micron candle filter assembly. (filter life is 4-6 months). After filtration the polymer is fed trough die heads to (3) Conair horizontal cutters (model 9024) with (2) spares, through Gala dryers to intermediate storage silos.

The Solid State Polymerization is a Bepex process. The process starts with the amorphous chip being fed into (2) 50,000 kg/day hoppers, which feed both lines. The chip is fed into a Bepex Solidaire crystallizer heated with a once through hot air system (~ 150°C) to raise crystallinity to ~ 40%. The exhaust air is fed through a ThermOx unit to destroy any VOCs. It is then fed into a Bepex Soildaire Torusdisk unit which has Dowtherm heated jackets, shafts and paddles. This step increase crystallinity and raises the temperature to ~ 209°C. The process vessel is purged with Nitrogen. The next vessel is a jacketed purge screw / annealer, which is also purged with nitrogen which feeds the vertical reactor vessel. The vertical reactor vessel is dowtherm heated with coils wrapped around the outside of the vessel. It is a plug flow design and purged with nitrogen. It holds the chip temperature at ~ 200°C for ~ 15 hrs to build IV to the final desired level of .80 to .84 iv. The chip is discharged into a water tank and mixed into slurry (Waeschle Conticon system) then pumped through a Gala Dryer, Rotex classifiers and then dense phase conveyed to stainless storage / shipping silos. The slurry system is used as it helps wash the chip and minimize dust for the customers. All process vessels are stainless. The nitrogen system is closed loop, with the N_2 gas stream being cleaned by glycol scrubbers.

General process flow for Bepex SSP



Utilities
Process DowthermA heating is supplied by (3) vertical gas fired process heaters. The heaters are rated at 22m btu / hr and are manufactured by Borne. The primary dowtherm system is a liquid system and contains about 50,000 gallons. A fourth vertical process heater is available and is located on the utility owned cogeneration plant site. The heat is transferred from the primary system to the vessel and piping vapor systems through reboilers located near the process.

Nitrogen for the process was supplied by Air Liquide

Steam was supplied by a Utilities owned cogeneration plant located next to the site.

Utility supplied 115kv power was fed to a site owned substation with (3) transformers that dropped the voltage to 13.3 kv. (2) of the transformers have been shutdown and the oil drained. Most motors on site were 575v, except for very large motors which were 2,400v or 4,160v.

Compressed air and chilled water was generated on site. No equipment details available.

Process water was supplied by (2) 10,000 gpm wells and (2) – 5,000 gpm wells.

Waste water treatment was handled by an on site, above ground extended aeration plant with aeration tanks and clarifiers. Discharge was permitted to the lake.

Material handling
Primary raw materials, PTA (purified terephtalic acid) and EG (ethylene glycol) were supplied by rail. PTA powder is unloaded by a Waeschle dense phase convey system in a dedicated building into storage silos. EG is pumped from railcars into a tank farm. Most tanks for EG were aluminum. (1) was stainless. Some tanks are out of service.

Chip shipments can be by rail hopper cars, hopper trucks, or super sacks. Rail and truck loading are by gravity from silos.

Environmental
The site does have a remediation effort that is managed for 1.4 dioxanne and ethylene glycol. There are some on-site landfills for GRUB (glycol recovery unit bottoms) which are capped. An asbestos survey for the site has been completed and is available.