Vacuum Crystallizer System

Immediately Available

This glass-lined and duplex stainless steel heating-type crystallizer system is designed by Sabic. The crystallizers were built by Pfaudler, an industry leader in glass-lined equipment. This unit will handle over 30 m³/hr of feed which is approximately 28,000 kg/hr. It removes about 10,000 kg/hr of solvent, forwarding about 18,000 kg/hr of slurry to the centrifuge section.

The system includes two lines with two crystallizers each, two heaters with in-line mixers, four condensers, vacuum jets and pumps, one feed pump, two slurry pumps, and a receiver tank. The previous service was for crystallization of a Bisphenol-A solution with toluene as the solvent.

![Crystallizer System Process Flow Diagram](image)

The receiver pump is rated for 9.2 m³/hr. The typical feed flow is 8.4 m³/hr which is approximately 9,000 kg/hr leaving the receiver (no solvent at this point). The product feed enters an in-line mixer where heated solvent is added. The product feed mixed with heated solvent then enters the bottom of the first two crystallizers. These glass-lined crystallizers are agitated and heated on the shell with hot water. The first crystallizers operate at 100°C and 0.6 bar absolute. The overheads from the first crystallizers go through vacuum condensers. Vacuum is provided by a combination of jets and vacuum pumps. The condensed solvent is sent to the solvent recovery section.
The product from the bottom of the two first crystallizers gravity flow into the side of the two second crystallizers. The second crystallizers are also glass-lined, agitated, and heated on the shell. The second crystallizers operate at 60°C and 0.2 bar absolute. The overheads from the second crystallizers also go through vacuum condensers where the solvent is condensed and sent to the solvent recovery section. The slurry product is pumped from the bottom of the second crystallizers with two centrifugal pumps capable of moving 34 m³/hr each. These pumps provide recycle to the second crystallizers as well as forwarding the slurry product to the centrifuge section. The forwarded slurry product flow is typically 20 m³/hr or about 18,500 kg/hr.

This crystallizer system includes the following major components:

- The receiver is 1.5 meters diameter by 1.8 meters straight side. It is rated for 1.1 bar + FV at 340°C and the jacket is rated for 12.8 bar at 195°C. The receiver is constructed of 304L stainless steel.

- The first two crystallizers are 2.4 meters diameter by 2.3 meters straight side. They are rated for 1.1 bar + FV at 200°C and the jackets are rated for 8.7 bar at 200°C. There are 15 kw agitators running at 20 – 120 rpm. The crystallizers are constructed of glass-lined steel by Pfaudler.

- The second two crystallizers are 2.4 meters diameter by 2.3 meters straight side. They are rated for 1.1 bar + FV at 200°C and the jackets are rated for 8.7 bar at 200°C. There are 15 kw agitators running at 20 – 120 rpm. The crystallizers are constructed of glass-lined steel by Pfaudler.

- The two solvent heaters are rated for 377,000 kcal/hr each and have 8 square meters of surface area with duplex stainless steel tubes and tube sheets. The carbon steel shell is 0.3 meters diameter by 2.6 meters long. The tube side is rated for 12.3 bar at 232°C and the shell side is rated for 12.8 bar at 232°C.

- The four crystallizer condensers are rated for 1,260,000 kcal/hr each and have 38 square meters of surface area with duplex stainless steel u-tubes and tube sheets. The duplex stainless steel shell is 0.5 meters diameter by 4.2 meters long. The tube side is rated for 8.7 bar at 180°C and the shell side is rated for 5.3 bar at 180°C.