

Sweet Atlac Solution: Aspartame reactor

Holland Sweetener Company

The new Aspartame production extension of Holland Sweetener Company, a joint venture between DSM and the Japanese company Tosoh, was built in Geleen, the Netherlands in 1994. Atlac 590 epoxy novolac vinyl ester resin is used in the structural parts as well as the lining of one of the separator vessels in the Aspartame production plant.

SWEET SOLUTION IN ATLAC 590

Aspartame is the artificial sweetener produced and marketed by HSC. During the manufacturing of this sweetener, the aspartame intermediates have to be separated from solvents used in the production process. The process stream entering the separation vessel has a pH value of 2. The combination of solvents in a highly acidic process stream place high demands on the chemical resistance of the construction materials used for the separator vessel.

Initially alternative materials such as stainless steel and ECTFE lined vessels were considered. In the original production unit an ECTFE lined vessel was used. At this stage it had already been determined that the adhesion between the ECTFE and vinyl ester resin lining remained very good despite some migration of solvents through the ECTFE. However, changes in the production process led to elevations in the concentration of organic solvents as well as increases in the design temperature to 80°C. Both placed even



SUMMARY

> Aspartame reactor of 5.67 m high and a diameter of 2.8 m.

OPERATING CONDITIONS

> 30% Aromatic organic ester, 5% Sodium chloride, <1% Ketones, <0.1% Toluene and <0.1% Hydrochloric acid. Design temperature of 80°C.

ATLAC SOLUTION

> Atlac 590 novolac based vinylester, providing excellent thermal and chemical resistance against solvents, acids and oxidizing media like chlorine.

IN SERVICE

> 01-01-1992

BENEFITS

> Corrosion free
Ease of installation in terms of weight and assembly.
Chemical resistant

REMARKS

> Presented at Coatings and Linings conference Antwerpen - 1997, and at Tüv conference in München.

higher demands on the chemical resistance of the materials used.

THE MATERIAL OF CHOICE

Mechanical Plant Services (MPS), a subsidiary of DSM, was approached by HSC to evaluate and recommend better alternatives in terms of construction materials and design options for the new plant extension. It was decided to build a GRP separator vessel entirely from Atlac 590. Extensive testing of the resin in typical process environments was performed in close cooperation with DSM Resins Zwolle. A glass flake lining based on Atlac 590 proved to give the best results as a chemical resistant lining for the inside of the vessel. The structural part of the vessel was built from filament wound sections again using Atlac 590.

A significant factor influencing the choice of a GRP vessel was the ease of installation in terms of weight and assembly. The vessel was built into an existing production plant where both space and access were limited. It was built in three sections, which were subsequently assembled on-site. Such an operation would have been very costly in, for example, high nickel alloy because of the extra weight and the need for expert

welding. Another advantage of the GRP vessel is that future changes in the process streams necessitating additional pipes or flanges, can be also installed quickly, easily and on-site. On-site inspection of the liner integrity during installation and service was an important aspect that had to be ensured. Mechanical Plant Services advised the use of a carbon veil between the liner and the structural laminate. By using a spark-type detector connected to the carbon veil, the glass flake lining could be inspected for integrity after installation. An unpigment resin was used for the structural laminate to enable detection and repair of any discontinuities or transport damage to the laminate liner.

The separator vessel was designed and built in three sections by plasticon in Oldenzaal the Netherlands. Plasticon also undertook the on-site assembly of the reactor vessel. The glass flake coating was applied prior to the on-site delivery by Corrocoat, specialist in anti-corrosion linings. MPS performed the on-site inspections related to the installation of the vessel and continue to monitor the vessel during the service as part of the maintenance programme.

About DSM

DSM Composite Resins is the largest producer of unsaturated polyester resins in Europe. With production facilities in many different European countries, DSM Composite Resins offers a wide range of resins, matching every conceivable processing and end-use requirement, in the most diverse applications. Local Sales offices and Technical Service laboratories enable close cooperation and partnerships between customers and DSM Composite Resins. Central Research & Development is fully equipped to develop and test new resins and to tune systems for optimal results in specific processing techniques. The development, service and manufacture of composite resins are certified according to ISO 9001.

About Atlac

For several decades Atlac resins have proven themselves highly suitable in applications where chemical and thermal resistance in combination with high mechanical properties are required. Atlac resins have outstanding corrosion resistance to a wide range of organic and inorganic acids, alkalines, solvents and bleaches. They are widely used for fibre-reinforced applications such as storage tanks, vessels, pipes and ducts. The Atlac resins can be processed by means of a wide range of fabrication techniques, including filament winding, hand layup, spray-up, and polymer concrete.

Contact

Jeroen van Bussel
DSM Composite Resins
P.O. Box 615
8000 AP Zwolle The Netherlands
+31 38 4569569
+31 38 4569230
jeroen.bussel-van@dsm.com

Technical details

Application	Aspartame reactor of 28 m3
Medium	Organic Solvents and Inorganic acids.
Conditions	Working temperature of 60°C Design temperature of 80°C
Construction details	Structural Laminate and Glass flake coating are both based on Atlac 590.
Resin	Atlac 590 epoxy novolac based vinylester
Commissioning	01-01-1992
Inspected	01-01-1996
Manufacturer	Plasticon, Oldenzaal
End user	Holland Sweetener Company
Location	Geleen, The Netherlands
Remarks	Volume: 28m ³ , Height: 5.67m, Diameter 2.80m and Weight: 2700 kg Plasticon Oldenzaal also undertook on-site assembly of the reactor vessel. The glass flake coating was applied by Corrocoat, specialist in anti-corrosion linings.