

# Wet Chlorine gas chilling/filtration tower

## Ineos Chlor (former ICI Plant) Runcorn

The chlorine/alkaline industry was one of the first to discover the benefits of Glassfiber Reinforced Plastics (GRP) as a construction material for chemical processing equipment. This chlorine chill and filtration tower at an INEOS production site is a good example how Atlac 382 overcomes steel corrosion problems.



### MANUFACTURING CHLORINE

Chlorine manufacturing is carried out in cells by electrolysis of brine (sodium chloride solution) in chlorine gas and sodium hydroxide solution. Both streams are purified before use in other processes. Equipment in contact with aqueous process environments in the chlorine/alkaline electrolysis can be manufactured in corrosion-resistant GRP.

In addition to chlorine manufacture, other important areas for GRP include brine treatment, sodium hypochlorite production, chlorine treatment and effluent treatment. In the ICI/Ineos chlorine production plant, a variety of plant items were made of GRP including vessels, piping, ducting, valves, pumps, fans, covers and vent stacks.

### CHILLING AND FILTRATION TOWER

The GRP tower, built in 1974, is based on a bisphenol A fumarate unsaturated polyester resin (Atlac 382). It has an overall height of 19.3 m, with a chill / cooler section of 1.68 m diameter and a top filter section with a diameter of 3.35 m.

In the bottom section of the tower, wet chlorine gas at 80°C and contaminated with sodium chloride particles is cooled down to 40°C with cold water. In the filter section on the top, the brine particles are removed.

### THE ATLAC SOLUTION

Atlac 382 is the mainstay of the Atlac product family with more than 35 years of proven performance in the field of chemical resistant applications. The cured resin combines excellent high-temperature behaviour with outstanding resistance against a broad range of aqueous acidic, salt and alkaline solutions. In particular, its resistance to inorganic acids and oxidising media is superior.

### BENEFITS

The ICI engineers were early pioneers in the use of Glassfiber Reinforced Plastic in their chlorine/alkaline plant equipment. They recognised that the service life of GRP is significantly longer than traditional rubber lined steel. And due to its non-conducting behaviour, GRP minimises stray currents to ground,

### SUMMARY

> Chlorine chilling / filtration tower

### OPERATING CONDITIONS

> 80% Chlorine (gas)  
Working temperature of 80°C with chlorine gas and 40°C with chlorine gas in the cooler.

### ATLAC SOLUTION

> Atlac 382

### IN SERVICE

> 01-01-1976

### BENEFITS

> minimised stray currents resulting in energy savings  
corrosion free  
strong resistance to inorganic acids and oxidising media.  
excellent high temperature behaviour.

### REMARKS

> still working today (2005)

resulting in large savings in electrical power costs. Furthermore, GRP is readily available, easy to maintain, very light and offers freedom in design.

Built in 1974, the Ineos chlorine chill and filtration tower was honoured with the award of 'most corrosion resistant material for construction' in 1981. The design of the tower was in competition with another design using an exotic alloy. The GRP design won on the strength of its overall cost-effectiveness. The savings on capital costs were marginal, but the savings on maintenance have proven to be outstanding. It is still battling today (2005) against the extremely corrosive environment of wet chlorine gas.

## 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.

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### Technical details

Application	cooling / filtration tower
Medium	80% Chlorine gas
Construction details	GRP tower height=19,3 m, with a chill/cooler section of dia 1.68 m and a topfilter section of 3,35 m. dia. Chemical barrier is 10-15 mm.
Conditions	working temperature of 80°C for chlorine gas and 40°C for chlorine gas in the cooler.
Resin	Atlac 382
Commissioning	01-01-1976
Inspected	2005
Manufacturer	Prodite Limited, UK
End user	Ineos Chlor, former ICI Plant
Location	Runcorn, UK
Remarks	The vessel is a typical example of the degree of sophistication which can be achieved with GRP materials. It has 35 branch outlets and is designed for 1.5 bar(g) hydraulic pressure at a design temperature of 80°C.