

GRP Storage solutions



About Polem

Polem, specialist from design to installation of GRP silos and tanks.



Polem, decades of experience



Polem has been a market leader in the production of GRP silos and storage tanks since the seventies. Over the decades Polem's growth has kept pace with the market. This is reflected in its optimal production capacity, efficiency and ongoing product development in line with customer demand. Polem's production facilities consequently incorporate the latest technologies and are equipped with modern equipment and machines. Today, Polem is capable of producing tanks and silos in its production halls with a diameter up to 9 metres. This is supplemented by 40 years of experience which is reflected in the experienced employees and true experts of Polem. They can provide you with advice starting in the design phase

up to and including the provision of a comprehensive maintenance programme. Polem relieves you from any concern related to the design, engineering, project management, transport, installation and maintenance.

Polem serves various industrial markets with its silos and tanks on the basis of its ability to meet customer-specific requirements. Complex or challenging projects that go beyond the norm are those that Polem would be pleased to look after on your behalf.

Polem is part of the Plasticon Composites Group, a world leader in corrosive resistant solutions for industries worldwide.



Production location, Lemmer



Polem location Lemmer, from the air

Polem offers cost-effective solutions to your storage needs at relatively low cost, a long lifespan and low maintenance.

Material Properties

In comparison to metal or rubber-lined steel products, Glassfibre reinforced plastic products (GRP) have many advantages. GRP is very light-weight, very strong and can be produced in a wide range of diametres, which has a direct impact in terms of extending the installation's lifespan and cost savings.

In addition, GRP is a durable choice of materials compared to traditional materials, which means that GRP delivers significant benefits in terms of resistance to abrasion, chemical corrosion, rust, as well as to extremely low and extremely high temperatures. This makes it a long-lasting solution with low maintenance costs for clients.



5 x 170 m³ process tanks, foodgrade



115 m³ silo, D=3000mm



Design & Engineering



Engineering at Polem

During the design and engineering phase, we take the next items in consideration: wall-friction, the internal friction of the material, flow properties, the risk of dust explosion and ATEX. It also applies to (chemical) liquids that often cause corrosion, abrasion or extreme temperatures. For the design of a solution for the storage of your specific materials you are best served by a true GRP specialist.

The above-referenced elements are all taken into consideration by Polem's specialists. They will select the right resin or resin combinations, fibreglass or other synthetic material types. If necessary, the design will also include the design of the chemical barrier layer for liquids.

Engineers at Polem individually analyse each new project and review the system performance specifications in order to select the right materials and construction methods.



Production of GRP silo

Production Process

GRP materials consist of a combination of polyester resin and fibreglass. The resin hardens the product and makes the product resistant to chemicals, the weather and marine conditions. The fibreglass creates mechanical strength. Polem uses a range of different resins including:

- Orthophtalic
- Isophtalic
- Vinylester

The selection of a specific resin depends on the particular application (material and temperature). Where necessary, E-CR glass fibre is used in addition to E-glass fibre in order to create higher chemical resistance.

Polem silos and tanks are finished using a coloured or semi-transparent top coat. This top coat is double-stabilised against UV light and provides optimum protection against any kind of weather.

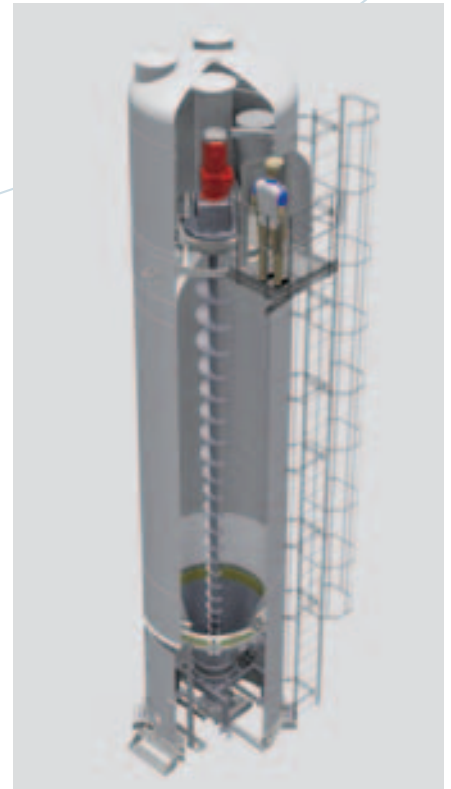
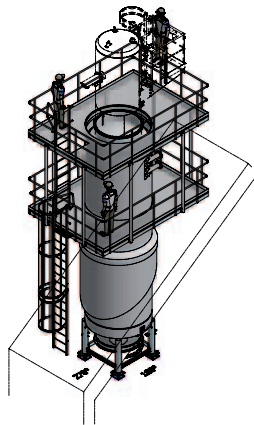
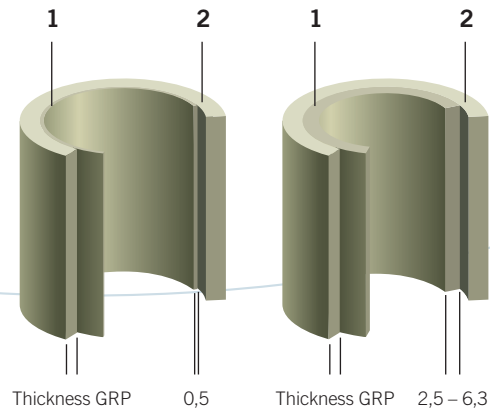
The inside of the silos and tanks are smooth and seamless, giving excellent flow characteristics and are easy to clean.

The silos and tanks can be supplied in one single piece with a diameter ranging from 800 - 9,000 mm, and with a volume ranging from 1 m³ - 1,500 m³. The production facilities are capable of producing seamless cylindrical components of up to 30 m in length.



GRP spray nozzle

- 1: Chemical Barrier Layer
- 2: Reinforcement Layer



Mixing silo

Insulation

Should insulation be required, it is a simple task to equip the silos and tanks with a 50 mm PU foam layer covered by a 5 mm GRP layer. This method of insulation produces a K value of 0.5 W/m²K. If needed the thickness can be adjusted, for example to 100 mm PU foam (0.3 W/m²K).

Benefits include:

- 100% resistant to any kind of weather
- Easy to apply at the factory; no additional on-site costs
- Cost-effective



Manhole

Sustainability and innovation

LCA* studies have shown that production with composite materials use less than twice energy when compared with metals alloys and concrete.

Production costs and maintenance prove to be considerably lower in comparison with standard materials.

*European Bridge Engineering Conference
Lightweight Bridge Decks, Rotterdam,
Marche 2003

R.A. Daniel: Environmental considerations
to structural material selection for a bridge.

Food

GRP silos and tanks are extremely well-suited for storing all kinds of foods, including liquids, such as water, soy sauce, starch slurry, brine, oils and fats. But also for storing solids, such as flour, salt, sugar, starch, corn, cocoa or gluten.

Polem uses specially selected resins for the construction of tanks and silos destined for use in the food industry. The resins are FDA-approved and are consequently suitable for use in this industry. To meet the FDA standards, the resins are subjected to a migration test in accordance with current standards for liquid as well as dry foods.

Furthermore, GRP has highly effective insulating properties (expressed by the formula $\lambda = 0.17 \text{ W/m}$) thus preventing the creation of cold bridges. In this case an air dryer is usually sufficient and insulation may not even be required. Should insulation nevertheless be necessary, it is easy to apply.



5 x 140 m³, D=2800mm, flour



Starch storage tanks, food grade

Provide excellent insulation
against condensation and
temperature fluctuations



12 x 110 m³, D=3000 mm, flour



Large Diameter
starch silos

Feed



46 silo's and tanks, D=1900, 2400 and 2800

Polem supplies a wide range of feed silos, fertiliser silos and liquid feedtanks. Quality, service and competitive prices are the basis for Polem's strong position in this market.



GRP silos (6 x 500 m³, D = 5000 mm)



4 x 420 m³ silo, D=5000

Polem supplies a wide range of silos and tanks for the animal feed industry. For example, for the storage of grains, cereals, soy products, wheat, molasses, oil, salt, minerals and more.

Based on its many years of experience serving this market, Polem is in a position to create quality and durable designs.

Quality, service and cost-effective price levels are the basis for a strong position in this market.



18 x tanks 40 m³, vegetable oil

Pulp & paper

Polem's storage tanks and silos are extremely well-suited for products such as starch, as well as chemicals such as chlorine due to the chemical barrier layer Polem installs on the inside of the product. Polem's storage tanks and silos have a seamless and smooth inner wall that makes them suited for these products.



1 x 150 m³, D=3500 industrial starch



1 x silo 250 m³, D=5000, lignosulfonate





Chemical Processing

Polem has developed an excellent project portfolio in the chemical industry, including the:

- Pharmaceutical industry;
- Chlorine industry;
- Fertiliser plants;
- Petrochemical industry.

Liquids

Polem offers solutions for the storage and treatment of chemical liquids, such as:

- Hydrochloric acid. Sulfuric acid, Fatty acids
- Sodium- and Calcium Hydroxide
- Sodium Chloride, Aluminium chloride, Ferric chloride, Sodium sulfate

The 2.5 to 5 mm thick inner chemical barrier layer makes the tanks resistant to chemicals, with or without a double wall.

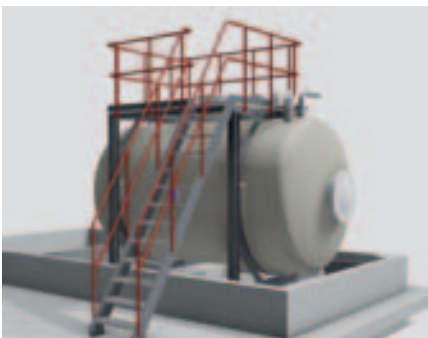
Solids

In addition, Polem specialises in silos for all kinds of dry chemical substances, such as sodium chloride and sodium bicarbonate (BICAR).

This industry involves complex processes in terms of the treatment of chemical liquids and solids. Polem recognises the complexity and special demands of this market and in addition to storage tanks and silos also supplies process equipment, such as gas scrubbers.



7 x 100 m³, hydrochloric acid 30%



25 m³, ferric chloride



Double wall tank and leakage detection 1 x 40 m³ sodium hydrochloride, 1 x 40 m³ hydrochloric acid

Construction

Materials, such as sand, cement and lime are increasingly stored in GRP silos. The silos are equipped with an abrasion-resistant outlet and can be produced in a wide range of diameters. Furthermore, steel substructures can be supplied for the elevated installation or truck drive through requirements.



50 m³ storage of flame retarder



The installation of cement silos



5 x 90 m³ storage of cement





Water, Waste Water Treatment & Renewable Energy



5 x 500 m³, 2 x 150 m³ storage tanks



H₂S scrubber, D=3000, H=22 metres

Polem storage tanks and gas scrubbers are used in the industrial waste water market. The fact that Polem's products can be widely deployed, custom-made and have an excellent price-quality ratio makes them especially attractive.

In addition, the products are used in biogas markets as digesters or as storage tanks for a wide range of liquids.

For safe storage of bio fuels and related products such as vegetable oils and glycerine GRP tanks have excellent qualities.



H₂S scrubber, D=2800, H=17 metres

Full service provider

Polem has the capability to design, manufacture, install and service GRP and dual laminate products for your specific needs. An experienced, multi-lingual staff consisting of our team of engineers and technical support specialists assist customers in the early planning and design stages. The end result is an engineered system that reduces life cycle cost.



Installation of silos on site

Liquids

Field Fabrication & Installation

Field fabrication and installation can be highly cost-effective and efficient. When several large components have to be assembled on site, field fabrication and installation often overcome size and difficult access problems.

On site Production

With the use of a field winding machine, Polem is able to manufacture tanks, vessels and piping up to 20 metres in diameter. On-site manufacturing can minimise transportation costs and can be effectively coordinated with other on-site contractors.

Maintenance services

Polem recommends periodic upgrades and maintenance for the optimum performance of composite systems in extreme environments. To minimize downtime and avoid unplanned interruptions, Polem offers the following maintenance services:

- Inspections
- Refurbishments
- Preventive Maintenance
- Facility Upgrades
- Repairs



Installation on site, our expertise

Continuous training

Polem realises that an investment in training is critical to the company's long-term leadership position in the field of engineered composite systems. Two areas of focus for the company include:

In-House Training

Polem acknowledges that many of the best ideas are generated by our employees. Product training sessions are a part of day-to-day business and best practices and are encouraged so that Polem can offer customers the very best service and product.

Polem's certified laminators exceed industry requirements for certified GRP laminators through its in-house training programme. This is in addition to the annual testing and inspections performed by well-known organisations such as KIWA and DVS.

Industry Technical Associations

Polem maintains active membership of many technical associations throughout the world in order to stay abreast of changing technologies and pending regulations.

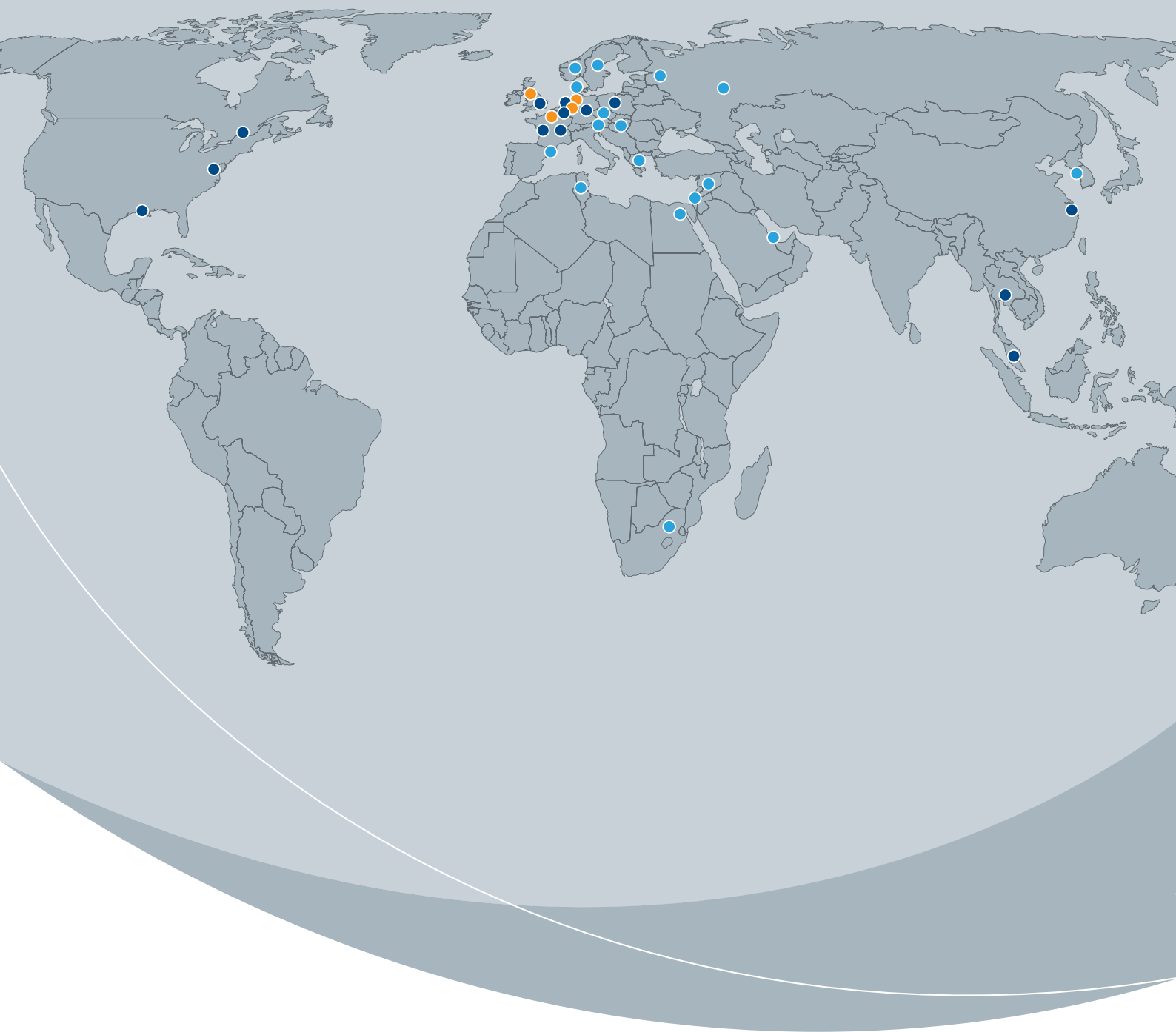


Polem executes your project with care

Design is provided with 3D CAD-systems for a swift and precise work.



Polem, your certified partner



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Polem is member of the Plasticon Composites Group,
world leader in chemical and corrosion resistant solutions.