

# Piping Systems

From design to your turnkey partner



# About Plasticon Composites

Plasticon Composites is a full-service turnkey solution provider in the field of corrosion resistant glassfibre reinforced plastic (GRP) tanks, piping and apparatus. Founded in 1950 Plasticon Composites is well positioned to meet your needs.

Plasticon Composites is the world's largest manufacturer of specially engineered, corrosion resistant, fibreglass reinforced plastics and dual laminate products providing integrated solutions for the handling, storage and processing of critical fluids and gases for the chemical, water & wastewater, power generation and other process industries. Dual laminate constructions consist either of thermoplastic or fluoropolymer liners reinforced with GRP.

Plasticon Composites is an international specialist in design, manufacturing, installation and service solutions for the processing, storage and transport of highly critical corrosive fluids and gasses. The products are constructed from high quality composite materials. Plasticon Composites has a consolidated geographical presence, with a multi-lingual staff and an active research and development programme. Our technical support team of specialists assists customers in the early planning and design stages of projects. Plasticon Composites aims to reach an optimum end-result with solutions that reduce operational costs for its customers. Composite structures by Plasticon Composites come in a wide variety of materials, sizes, shapes and forms, depending on process specifications. The versatility of working with today's composites, combined with the Plasticon Composites expertise, results in an extensive range of integrated solutions.

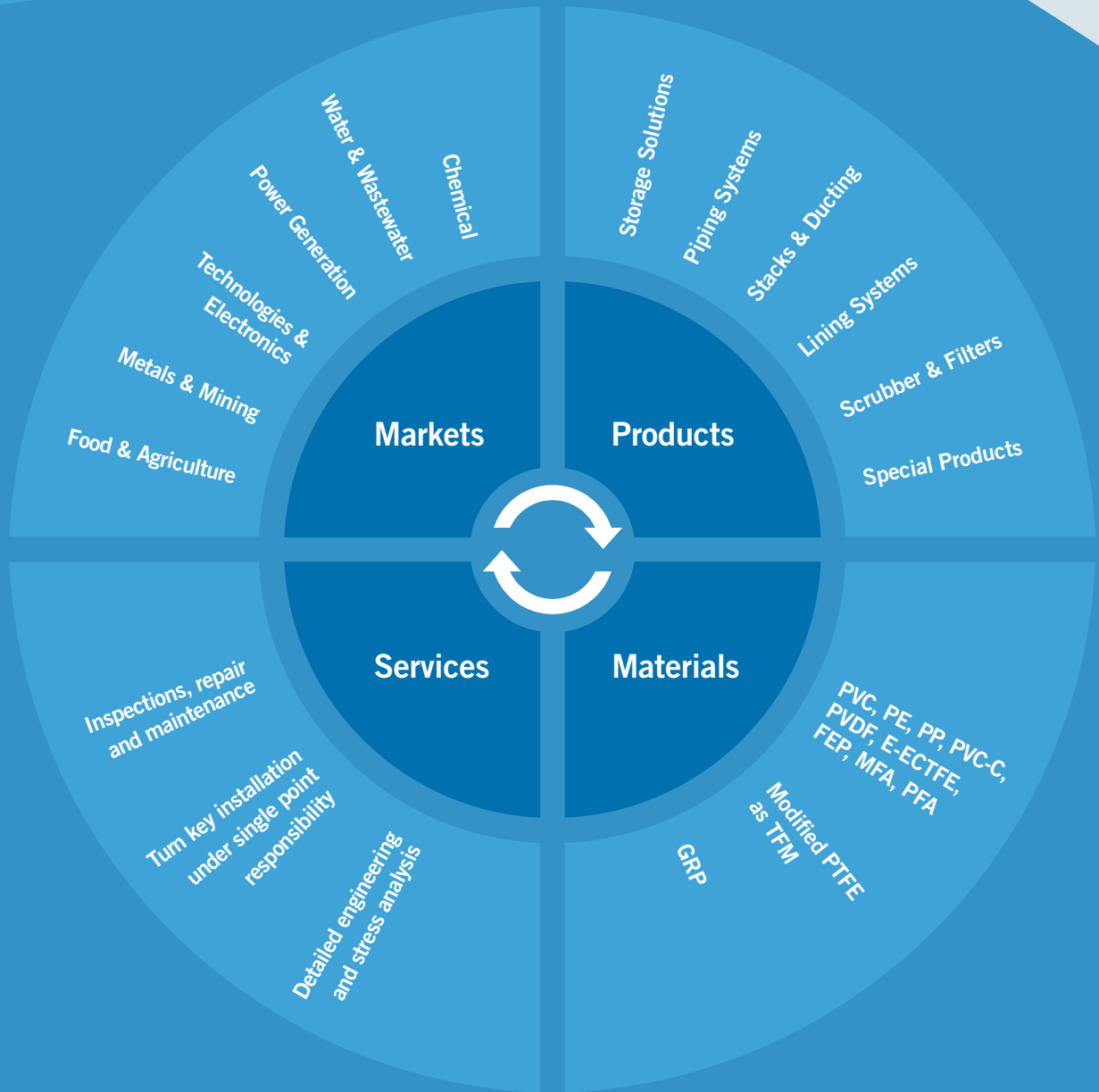
Plasticon Composites, leader in anti-corrosion applications and composite solutions



Transport of big diameter GRP cylinders to Germany in 1963



Transport of horizontal PVC/GRP tanks for a chemical plant in the Netherlands in 1959



Storage solution (20 – 150 m<sup>3</sup>) at a fertilizer plant



Stack liners (D = 10 meter) ready for installation

# Full Service Provider

Plasticon Composites' pipe systems comply with all major quality assurance and certification standards, including DIN, ASTM, SFS, UIC, AWWA, BS and ISO. Your guarantee of high quality, low maintenance and total solutions.



Stress design according to Autopipe or Ceasar II

## Design & Quality

Plasticon Composites' dual-laminate pipe systems are designed and produced in accordance with DIN 16965 and DIN 16966 Part 2 Type B. Our welders are certified by DVS. We apply DIN or ASME pressure.

## Approvals

Plasticon Composites is certified by several key testing authorities and conforms to a long list of design codes and industry standards & norms. The production companies, their products and employees are approved according to ISO, DVS, KIWA, DET Norske Veritas and GOST. Your guarantee of high quality, low maintenance and total solutions.



Plasticon Composites pipe engineers design according to the international codes like DIN and ASME



### One stop responsibility

Plasticon Composites is able to execute the entire project process for customers' piping solutions: from design and engineering, through to production, project management, installation and after-sales service.

Plasticon Composites provides the following services:

- Advice on the best liner option for each specific application
- Detailed engineering including isometric and spool drawings
- Stress calculations
- Supply of pipe fittings and flanges
- Assembly or spool construction in one of our factories or on site
- Project and site management
- Turnkey installation and erection of pipe systems
- Inspection and maintenance

Our international and multilingual installation crew and cooperation with certified partner companies make Plasticon Composites the ideal installation and maintenance partner. Plasticon Composites has successfully completed turnkey projects in Europe, the USA and the Far East.



Quality inspection by our well experienced quality staff



Plasticon Composites acquired certificates according to the rules of ISO, DVS, TÜV, KIWA, Veritas and IFBT



Hydrostatic test of a vessel with PED approval

# Product Range

Diameter range:	25 – 4000 mm ID (larger diameters available on request)
Design pressure:	16 bar (higher pressures available on request)
External design pressure:	1 bar / full vacuum
Design temperature:	Maximum 130°C for liquids and 170°C for gases
Design standards:	include DIN, ASTM, SFS, UIC, AWWA, BS, ISO and many others



A full range of thermoplastic products ready for further lamination



Fully robotized production of a GRP elbow (D < 1200 mm)

Standard fittings are available up to 400 mm ID in bell & spigot adhesive Plastilon® brand and up to 1,200 mm for butt & strap laminated joints. Special mouldings and pipe spools are available on request.

Plasticon designs PE, PP, PVC-U and C-PVC elbows, flanges, T-pieces and reducers out of one piece up to ID 400. The components are extruded from first class thermoplastic granulates in accordance with DIN and ASME standards.

**This production procedure avoids a weld in the component which means NO STRESS.**

Equipped to meet your project needs  
The production process on Plasticon Composites production sites employs the latest technology, by using robots and fully automated, computerized winding machines. Plasticon Composites offers customers flexible and continuous service for turnkey projects or maintenance by managing the stock of piping components at a central warehouse located in Europe and Asia.









Inspection of cooling water pipes  
(D = 2000 mm) at a power plant



# Application Areas

Plasticon Composites piping systems can be used perfectly in a number of environments because of their excellent properties.

## Underground Piping Systems

High corrosive applications demand high quality materials. Plasticon Composites offers all kinds of underground piping systems designed according to ISO 14692 and AWWA 45.

Plasticon Composites' pipes, with a standard length of 12,000 mm, withstood a 1,000 hours test, described in ISO 14692 and verified by TÜV Germany.

## Insulated Piping Systems

Plasticon Composites can also supply insulated pipes for cooled water conduits used in tropical and subtropical regions or in cold environments. These include heat tracing to prevent the medium from freezing. The use of polyurethane insulation finished with an GRP laminate, ensures 100% vapour-tight insulation. For product identification, Plasticon Composites is able to comply with your wishes in this respect.



Insulation (50 mm rockwool) and supporting of a pipeline in a chlorine plant



The installation of an underground cooling water pipe (D = 1600 mm) at a coal fired power plant

# GRP Piping Solutions

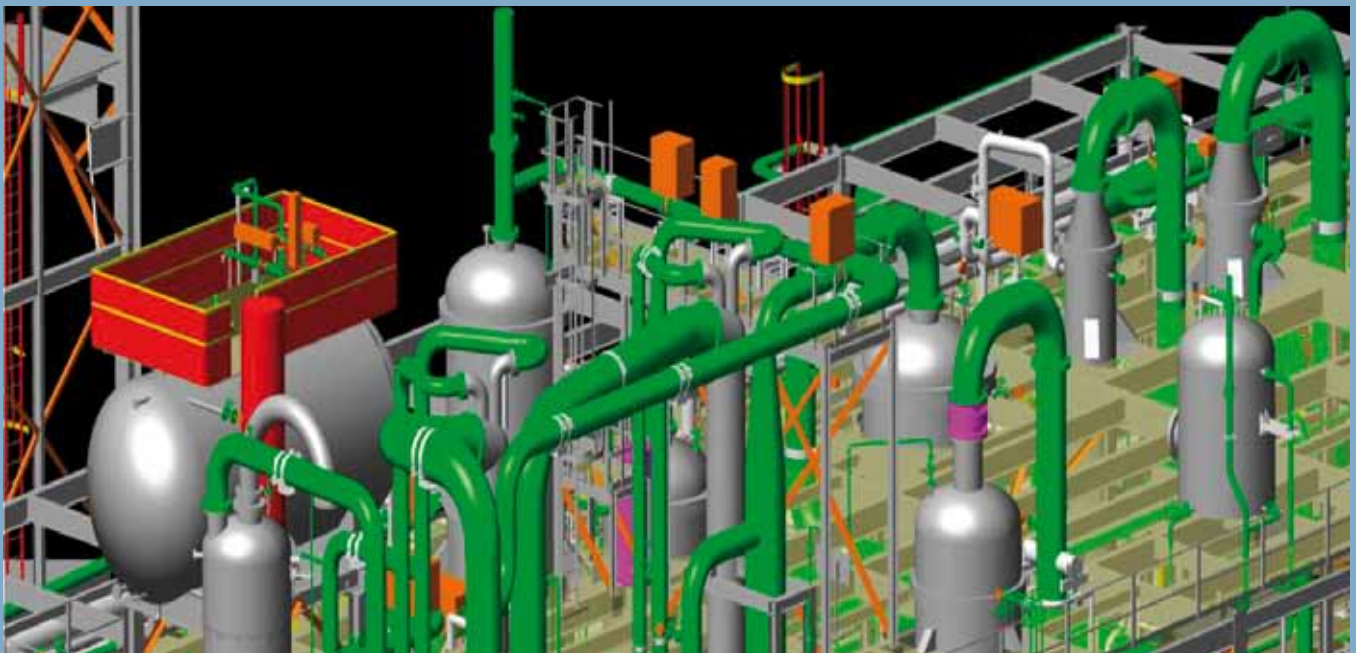
Plasticon Composites GRP piping solutions previously operated under the Kialite® brand name. Today we serve a much wider range of applications, with standard size pipes now ranging from 15 to 4000 mm. In other words, Plasticon Composites offers the GRP solution to fit any application.

Furthermore, the range of products under the Plastilon® label have been optimized and extended over recent years. Plastilon® piping products are specially designed for the chemical processing industry, the main advantage is immediate availability and quick installation by bonding the components together.

The experienced engineers at Plasticon Composites select the best resin option for each application, from polyester, vinyl ester and epoxy resins.



GRP piping, part of the chemical processing at a steel plant



Design of the piping at a chemical plant

The wall construction of a GRP pipe system consists of three layers:

1. Liner

Liner selection determines the optimal chemical resistance to the most aggressive liquids and gases. The liners consist of a layer of pure resin followed by high-quality gel coat, glass veils and chopped strand glass mats. All are fully impregnated with resin. The thickness of the liner varies from 0.5 to 6.3 mm, depending upon the application.

2. Structural layer – reinforced laminate

The reinforced laminate provides high mechanical strength and resistance to axial and circumferential loads. The construction of this laminate, consisting of combinations of glass rovings, woven glass rovings and/ or chopped strand glass mats, all fully impregnated with resin, depends on the type of application and pressure class.

3. Top coat

The top layer, consisting of a surface veil impregnated with resin, protects the GRP pipe system from all kinds of weather, chemical penetration and UV radiation. This top layer also gives the product a smooth surface and can be supplied in any colour.

Product advantages

GRP piping systems have the following major industrial benefits compared with traditional materials such as steel or concrete:

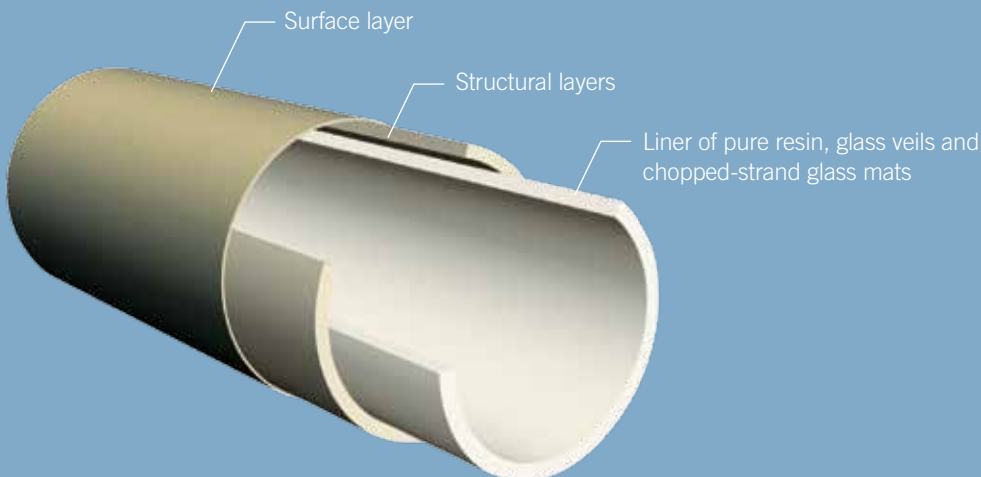
- High mechanical strength with excellent fatigue resistance and high impact strength
- High temperature resistance
- Thermal insulation is 200 times better than steel
- The smooth internal surface (low coefficient of friction) results in low pumping costs
- GRP piping systems can be easily upgraded with abrasion resistant, electrically conductive and fire retardant additives
- Light weight for easy handling, fast installation and less complex support structures
- Cost effective solution compared to steel materials and non-reinforced thermoplastics, due to reduced installation and maintenance costs together with longer service life



Bell & spigot adhesive GRP pipe parts, the Plastilon® brand



The proper storage of GRP pipes





# Dual Laminate Piping Solutions

By combining various thermoplastic or fluoropolymer liners such as PVC, C-PVC, PP, PE, PVDF, E-CTFE, FEP, PFA and MFA with glassfibre reinforced polyester resins Plasticon Composites offers solutions for extremely hot and corrosive environments. Plasticon Composites manufactures and installs standard and non-standard lined GRP pipes for aggressive products such as chlorine gas, hydrochloric acid, sodium hypochlorite and caustic soda.

Dual-laminate solutions employ thermoplastic material as the chemical resistant liner, and thermoset GRP material as the reinforced structural wall. This GRP wall is mechanically or chemically bonded to the thermoplastic liner to overcome the effects of reduced pressures and differing thermal expansion coefficients. Combined with the strength of the GRP, the thermoplastic layers' excellent corrosion resistance properties create a finished product that tolerates higher combined temperatures and pressures. The development of very reliable and cost-effective welding and bonding techniques for dual-laminate pipe systems makes this method the preferred choice in many markets, particularly when compared to plastic-lined steel or regular GRP pipe systems.

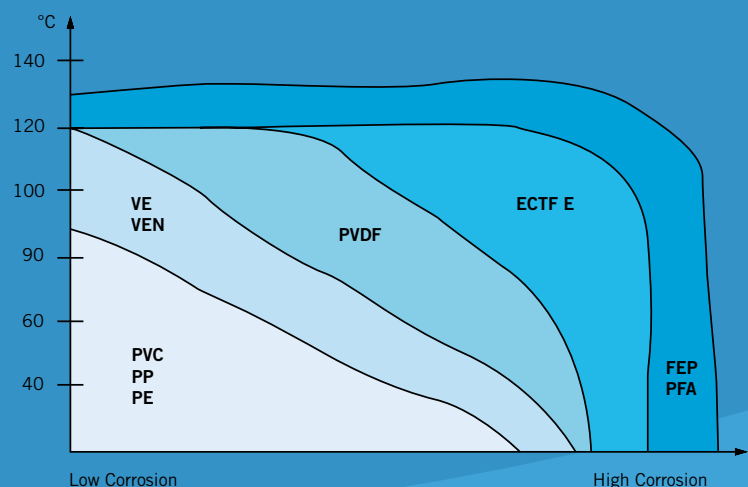
## Dual laminate advantages

Compared to plastic-lined steel and non-GRP reinforced thermoplastic pipe, dual laminate pipe systems:

- can be used in full vacuum and at higher temperatures than steel-lined piping;
- do not suffer external corrosion from exposure to industrial environments, unlike steel piping;
- weigh 75% less than lined steel;
- are less sensitive to impact cracking during handling and installation compared with thermoplastic pipe systems;
- have a far wider range of corrosion resistance and abrasion resistance than GRP pipe systems;
- prevent structural fibres coming into contact with the process fluid stream;
- have better pressure handling capabilities at higher temperatures compared with thermoplastic piping;
- are less sensitive or brittle at low temperatures compared with non-GRP reinforced thermoplastic piping;
- allow for wider support spacing than thermoplastic piping.



PVC/GRP pipes for the transport of Hydrochloric acid (30%) at 60°C



Corrosion resistance of Plasticon composite materials relation to temperature



Preparation of dual laminate spools for a project in China

**Plasticon Composites dual-laminate pipe systems are available with a wide range of quality liners to meet your specific operating conditions. These include the following:**

**PVC & CPVC**

(Polyvinyl Chloride & Chlorinated Polyvinyl Chloride)

PVC and CPVC are used as chemically resistant liners for a very wide range of acids and alkalis. They are resistant to most inorganic compounds and to oxidants up to 80°C (PVC) and 100°C (CPVC). They are also resistant to most organic compounds, with the exception of chlorinated solvents and aromatics.

**PE & PP**

(Polyethylene & Polypropylene)

PE and PP are used in extreme chemical environments and hydrometallurgy. They are chemically resistant to virtually all inorganic chemicals, with the exception of strong oxidizing agents and free chlorine. They are also resistant to most organic compounds, other than strong or chlorinated solvents. Depending on the process fluid, they can be used up to a maximum temperature of 90°C.

**PVDF**

(Polyvinylidene Fluoride)

PVDF is a fluorinated polymer that is highly resistant to strong acids, inorganic & organic chemicals (including solvents), and reducing agents in aggressive environments. PVDF has a maximum service temperature of 120°C.

**ECTFE Halar**

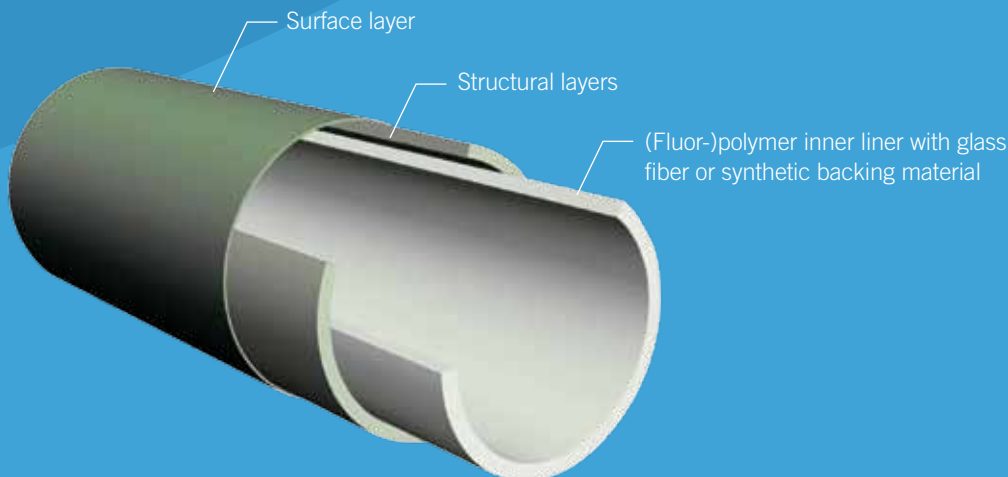
(Ethylene Chlorotrifluoroethylene)

ECTFE Halar is a fluorinated polymer that is highly resistant to a wide variety of chemicals, and is insensitive to changes in pH or moisture, or to strong oxidizers. ECTFE Halar has a maximum service temperature of 120°C.

**Fully fluorinated liners**

(MFA, PFA & FEP) (Perfluoroalkoxy, Tetrafluoroethylene- Perfluoro (methyl vinyl ether) & Fluorinated Ethylene Propylene)

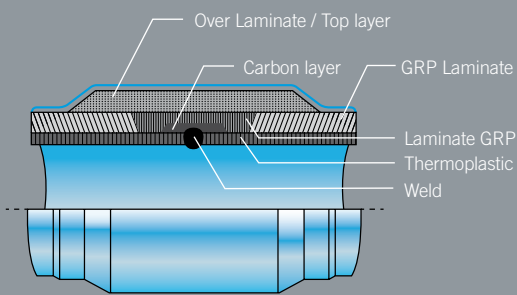
All three fluoropolymer liner options offer high thermal and chemical resistance to acids, alkalis, salt solutions, halogens, aliphatic and aromatic hydrocarbons, ketones, amines, alcohols, furans, esters and aldehydes. These high-quality lining materials can be used up to a maximum of 200°C, depending on the process fluid.



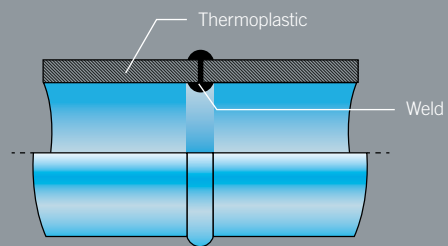
# Installation Methods

Plasticon Composites' full range of options include a comprehensive schedule of jointing and fitting solutions. This allows us to serve different markets and specific requirements. Whether your piping system is complex or standard, underground or above ground, at sea or in a confined space, Plasticon Composites can offer the right solution.

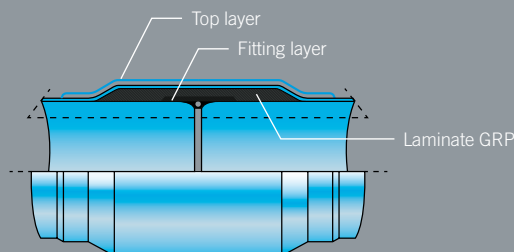
**Figure 1:** Hot gas weld



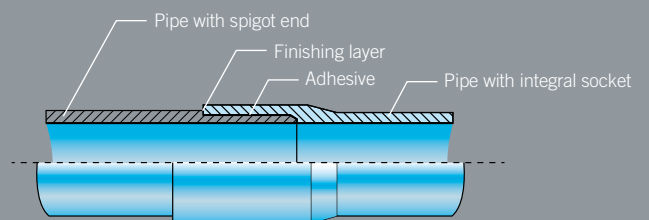
**Figure 2:** Butt fusion weld



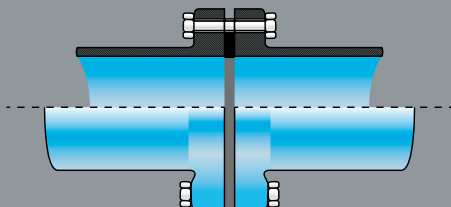
**Figure 3:** Butt & strap lamination joint



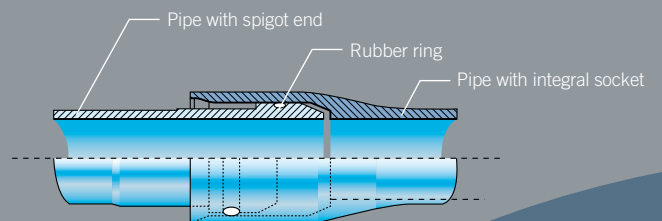
**Figure 4:** Bell & Spigot adhesive joint



**Figure 5:** Flange joint



**Figure 6:** Mechanical O-ring joint (available with locking key or unrestrained)

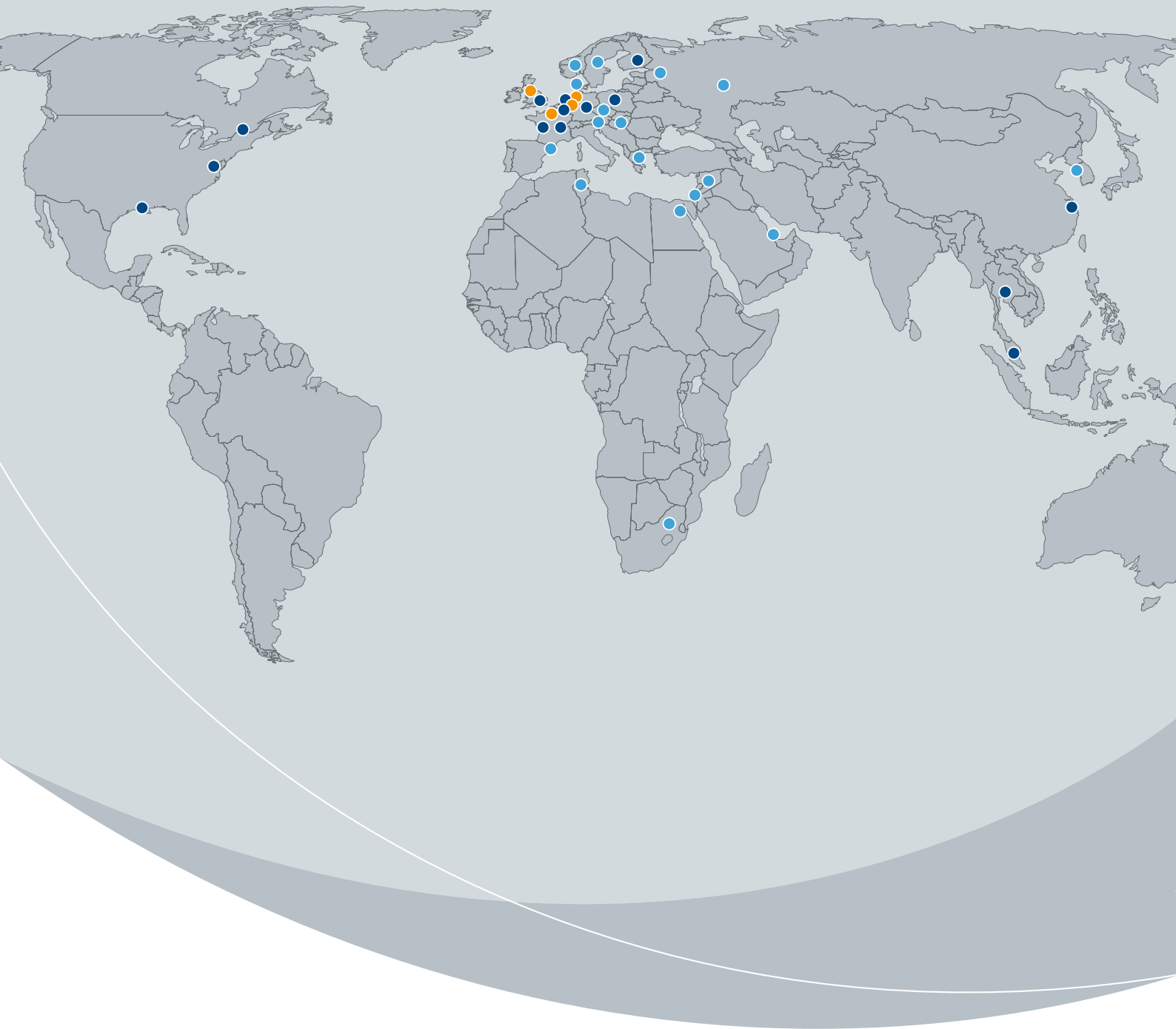




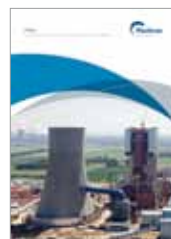


The lamination of a GRP pipe for chlorine gas by our well experienced installation personnel

- Operations & Sales
- Sales
- Polem, bulk storage



General



Power



Piping Systems



Chemical