Microelectronics
Semiconductor - Photovoltaic -
TFT/HB-LED - Storage Media
From the application to the product
The Right Product for the Application

Products from GF Piping Systems meet the highest standards for piping systems

Semiconductor
High-tech sector of industry producing microelectronic devices and assemblies.

Photovoltaic
Renewable energy generation by converting solar radiation into electrical power.

TFT/HB-LED and Storage Media
Microelectronic integrated circuits for consumer/computer technology or memory devices.

Class 10,000 cleanroom welding in Tustin, CA, facility
Microelectronics Industry
Providing advanced key technologies to create solutions of tomorrow

In the highly specialized sub-area of electronics, dealing with the design and manufacturing of integrated circuits is considered to be the nucleus of today’s and future high technology fields. With unique developments in the consolidation and miniaturization of electronic components, the microelectronics industry changed what was regarded for years as the technology standard. In special manufacturing processes under clean room conditions, high quality devices are produced for industries such as consumer electronics, communication, computer technologies, and automotive, to name a few. GF Piping Systems keeps up with this fast-growing sector by offering reliable and safe piping solutions optimally aligned to the demanding production processes for maximum safety, quality, and productivity. Our piping systems has been a long-time staple in the microelectronics industry by offering our customers the highest quality and outstanding service.

High-quality systems for high-tech microelectronics factories.

A technology requiring outstanding solutions.

High Purity Piping Systems
Absolute reliability and definitive assurance that high purity requirements are met throughout the entire production process characterize the high standards of quality set in the microelectronics industry.

GF Piping Systems offers the experience, the material, and technology expertise, as well as comprehensive system solutions for optimally covering those needs. With the integration of SYGEF Plus systems out of high purity PVDF and the corresponding joining technologies and innovative plastic piping systems, offers longevity as well as highest process and cost efficiency. Furthermore, our customers benefit from individual value added services completing the product portfolio. With this complete system approach in focus, GF Piping Systems is able to provide the most qualified solutions for high-end water applications in microelectronics.

Exceeding the standards
GF Piping Systems exceeds standards with outstanding solutions for completely controlled high purity manufacturing processes in the microelectronics industry. Besides the edge in quality, the portfolio, covering proven technology, state-of-the-art solutions for high-end water applications are provided ensuring safety, reliability and purity at the highest level.
Semiconductor

Intelligent plastic solutions for successfully managing the complexity of highly specialized processes

As one of the fastest-growing industries, the relatively young semiconductor sector showed high growth rates over the last decades and is still increasing its market share globally. With the rising demand for semiconductors, representing a key input for the electronic industry, manufacturing processes had to be geared to fast production while ensuring highest levels of safety and quality at the same time. Highly specialized facilities handle the complexity and sensiveness of the processes and products by operating in strictly-controlled clean room production areas in compliance with the requirements of quality assurance. With advanced solutions out of high purity plastics, GF Piping Systems offers an extensive portfolio for the safe and reliable conveyance of critical processing fluids in the production of electric circuits.

Safety without compromise

The capital-intensive production in the semiconductor environment is characterized by a sequence of multiple photolithographic and chemical processing steps, where highly toxic and aggressive media is used. Therefore reliable, leak-free piping systems for media conveyance are indispensable to avoid chemical contamination caused by leakage.

Top performance at every moment of operation

Ultrapure and Hot Ultrapure Water are the lifeblood of semiconductor wet processing. With SYGEF Plus systems out of PVDF high purity material and the corresponding IR-Plus fusion technology, GF Piping Systems offers the industrial benchmark solution, representing a key success factor in every process phase.

Added value for our customers

GF Piping Systems complies with the specific requirements of the semiconductor industry, providing reliable systems of highest purity performance. Thus customers profit sustainably from:

- Reliable, safe and pure operation
- Corrosion-resistant and contamination-free systems
- Reduced maintenance and operational costs
- Completely quality-controlled and assured processes
- 100% repeatability and traceability

Providing the most suitable piping systems, including the appropriate joining technology, is of particular importance in this demanding sector. GF Piping Systems is well aware of this responsibility, not only fulfilling it by an outstanding system offering, but also with global project support and certification training programs.
Applications in Semiconductor
High-purity piping systems in clean room applications

With its years of experience, GF Piping Systems stands prepared to provide systems that guarantee highly productive and efficient manufacturing non-stop, 24/7. For liquids and vacuum used in the demanding semiconductor field, GF Piping Systems offers safe and dependable piping solutions for different applications. Our systems safely convey ultrapure water, the lifeblood of the fab used in cleaning wafers as well as process cooling water, necessary for cooling heat intensive equipment. With waste systems to carry away spent chemicals, industrial and scrubber water, the factory is kept comfortable and in compliance with environmental regulations. House vacuum for hands-free transport of wafers and Chemical Mechanical Planarization, just to name a few, are other common applications, where customers rely on our systems.
Photovoltaic

The “Total Plastic Solution” piping systems are strengthening a dynamic industry in shaping the future of energy

Generating energy by means of photovoltaic technology is a highly promising market of the future. The industry is still expected to remain one of the most dynamic sectors globally. Today’s solar cell industry already plays a pivotal role in developing and rolling out renewable energy solutions and therefore in preventing global climate change. Similar to the requirements of the semiconductor industry, the high demands regarding purity, safety, and quality characterize the processes in the production of photovoltaic systems. Reliable conveyance of media under clean production conditions has to be assured and appropriately controlled. Whether it is process technology or the production flow, the portfolio of superior products and systems of GF Piping Systems covers all high-end water applications in the photovoltaic industry, meeting the specified requirements and hence making a contribution to shape the energy market of the future.

Innovative piping systems for the solar cell future
Complex wet processes are necessary in the conventional photovoltaic production to deeply clean the silicon wafers and etch their surfaces. Sawed out of a polycrystalline silicon ingot, the wafers are treated by adding diverse acids, as well as oxidizing chemicals, alkalis and inorganic salts to reach the requested quality. Water with diverse attributes such as distilled, deionized, demineralized or ultrapure water is used as well. Due to the highly corrosive nature of many of these media and compounds, plastic piping offers not only the highest resistance and longevity compared to metal piping, but also a more economical and easier way to process.

A total plastic solution considering individual differences
The decision for the plastic system to use must be made on an individual basis, considering all process and application characteristics. GF Piping Systems offers the right solution, depending on the type of chemicals and their concentration and the pressure or temperature application conditions. Thereby the total system approach focuses not only on the most suitable pipes, but also on joining elements, seals, valves and the automation range.

Added value for our customers
With innovative application-oriented solutions, GF Piping Systems meets the high requirements of the photovoltaic industry, giving its customers a cutting edge.

- Highest chemical resistance
- Widest range of material-specific solutions including components
- Process safety
- Individual and economical high purity system solutions
- Twin-pipe system CONTAIN-IT Plus for safe media conveyance
- Excellent life-span expectations, even at elevated temperatures
- Best leach-out characteristics
- Low conductivity
- Competent project support
Applications in Photovoltaic

GF Piping Systems supplies tailored high-quality piping solutions precisely serving the needs

As a global player, GF Piping Systems is well aware of its responsibility to the environment and therefore actively supports eco-friendly energy generation. The reliable all-plastic solutions, specifically tailored to the needs of the photovoltaic industry, comply with the strict requirements for manufacturing large-scale, integrated solar cells. Due to beneficial properties such as non-corrosiveness and highest chemical resistance, plastic piping systems successfully cope with the variety of aggressive media—from acids to oxidizing chemicals to alkalis and inorganic salts—used in the complex, water-based etching and cleaning processes in conventional photovoltaic production. Whatever the particular water application is, with its complete and proven plastic product portfolio, GF Piping Systems actively supports the photovoltaic industry in designing reliable and efficient systems for deionized, specified or cooling water processes, to name a few.
TFT/HB-LED and Storage Media

Advanced plastic piping systems for exceeding required standards in high-technology manufacturing

Besides being an essential part of the microelectronics industry, TFT/HB-LED and storage media technologies have in common that they are driven by growing market expectations regarding performance and ecological sensibility. Not only more sophisticated energy-efficient products are demanded in the context of ecological challenges, but also the manufacturing processes have to be more environmentally-oriented with a focus on operational and cost efficiency at the same time. Existing specification limits will be consequently pushed forward. By offering future-oriented solutions, GF Piping Systems continues to demonstrate credibility in the markets and keeping its position as a supplier of high-end systems for high-technology products.

Covering the entire process chain

Similar to the high demanding semiconductor production, the manufacturing of TFT/LED and storage media technologies is structured in wafer cleaning and metallization, patterning and etching. Incoming water supply, process cooling, neutralization, chemical distribution, and liquid waste handling, have to be managed. With plastic piping solutions from GF Piping Systems, customers benefit from the wide range of materials to be selected according to the diverse process requirements, temperature conditions and chemical concentrations demanded.

Following the developments of a changing market

Increasing global environmental awareness and a fast technological progress make these pioneering markets continuously renew themselves.

GF Piping Systems offers innovative systems following the developments of those similar acting industries and their changing requirements and provides outstanding added value. Among others, the product and service offer includes:

- High quality and purity solutions
- Highest chemical resistance
- Maximum of safety and efficiency
- In-depth market know-how
Applications in TFT/HB-LED and Storage Media

State-of-the-art systems for guaranteeing consistent water qualities in demanding application areas

Increasing storage memory capacity per footprint, the trend towards flash memory and other market relevant technological developments more and more affect the manufacturing environment in high-technology sectors. All microelectronics applications in these constantly growing high-technology industries are characterized by highest demands regarding system quality and performance. Pure and high pure materials and systems are a must if one wants to ensure the customer expected conditions of production and applications. Based on its wide experience in microelectronics, GF Piping Systems has developed comprehensive system solutions out of plastics that meet those high requirements. Combined with specified automation and joining technology, these piping systems allow installations to be optimized regarding efficiency and safety in site construction at the same time.
Ultrapure Water / Hot Ultrapure Water

GF Piping Systems offers high purity solutions for <11 nm devices up to 450mm wafers and beyond.

Main Benefits:

- **Purity**
  - Completely controlled high-purity manufacturing processes

- **Safety**
  - Comprehensive quality assurance and quality control systems

- **Efficiency**
  - 100% process repeatability

- **Performance**
  - Unique complete system offering along with global support and training

Diagram:

```
 a) SYGEF Plus PVDF System up to d 450 mm
 b) Diaphragm valve type 519
 c) Variable area flow meter type 801
 d) High Purity Union
 e) Clamp-on flow meter Ultraflo U3000 / U4000 / U1000
 f) Butterfly valve type 365
 g) IR-Plus (Infrared) fusion technology
 h) Ball valve type 546
 i) DIASTAR Sixteen
 j) SYGEF Plus HP gasket
 k) Pressure sensor type 2250
 l) Temperature sensor type 2350
```
Solutions - Ultrapure Water / Hot Ultrapure Water
An overview of the key systems and products

Considering the diversity of individual end-user high-quality water demands, ultrapure water sets the highest standards and requirements in regard to particle control, system purity and quality assurance. Detection, reliable control, and filtration of bacteria, particles, organic, and inorganic sources of contamination are absolute necessary for microelectronics industries to gain ultrapure water quality. Depending on the process-oriented defined UPW quality, different methods of chemical or physical treatment form an aligned series of purification steps including, for example, gross, carbon, or ultrafiltration, water softening, reverse osmosis and distillation. Thanks to the pure material character of plastic solutions from GF Piping Systems and due to completely controlled cleanroom manufacturing sites, highest quality and purity standards can be assured, supporting the industry in designing efficient and secure water processing applications.

SYGEF Plus PVDF System
Polyvinylidene fluoride piping solution for demanding water applications. Completely controlled processes, regarding particle control and impurities, to ensure customer expected performance of overall ultrapure water system integrity. Matched with state-of-the-art welding technologies, system reliability, purity and safety are assured.

IR-Plus (Infrared) fusion
Wherever highest purity and quality needs to be guaranteed, this non-contact heating joining technology is predestined. Highest demands on weld strength, full traceability and entirely reproducibility are fulfilled, along with easiest operation and short welding time. Absolute process precision allows minimized, well-defined weld beads.

Pneumatic diaphragm valve DIASTAR Sixteen
The optimized geometry of the valve body provides linear flow characteristics and a doubled flow rate at constant energy expenditure. Together with high closing forces and an innovative plastic housing without metal bolts, it is ideally suited for control applications, guaranteeing both increased efficiency and process stability up to line pressure of 16 bar *.

SYGEF Plus PVDF System, d 450 mm
With upscaling the unsurpassed SYGEF Plus product line to the dimensions d 355–d 450 mm, increased demands regarding UPW flow capacity can be met. A wide selection of pipes, fittings and accessories is covered by this pioneering, SEMI F57 compliant, range extension, offering excellent surface characteristics and low-weight design.

*water applications only
DI Water/Specified Water

Advanced solutions for clean water processing that guarantee defined and specified water qualities

Main Benefits:

- **Purity** = Specified system performance
- **Safety** = Defined quality guidelines guaranteeing safe and reliable systems
- **Efficiency** = Reproducible and fast joining technology for economic installation
- **Performance** = Minimum TOC ensures high water quality in clean water systems

Please see below a typical selection of products which stand exemplarily for this application:

- **a)** Butterfly valve, manual, type 365
- **b)** Pressure reducing valve V182 / 82
- **c)** PROGEF Standard PP System
- **d)** Clamp-on flow meter Ultraflo U3000 / U4000 / U1000
- **e)** Multiparameter controller type 8900
- **f)** Electromagnetic flow sensor type 2551
- **g)** Flange type PP-V, DN32
- **h)** Ball valve, manual type 546
- **i)** Flow sensor type 2536
- **j)** Diaphragm valve type 514
- **k)** Temperature sensor type 2350 including type 8050
- **l)** DryLoc ph/ORP sensor electrode type 2750 including preamplifier type 2757
- **m)** Conductivity electrode type 2842 including type 8050
- **n)** Pressure sensor type 2450 including type 8050
- **o)** Ball valve, manual, type 543
- **p)** Variable area flow meter type 350
- **q)** Diaphragm valve, pneumatic, type DIASTAR Ten
Solutions - DI Water/Specified Water

An overview of the key systems and products

Completely controlled processes in industrial or laboratory applications with highest purity and quality standards in manufacturing require process water of specified qualities at different levels such as deionized water or less-demanding UPW water. For initial industrial water treatment and for guaranteeing a consistently specified water quality throughout the entire process chain, physical water properties, parameters, and concentrations have to be precisely controlled and reliably maintained. Deionization systems use a two-stage process of ion exchanging to affect the removal of all mineral ionic materials such as cations from sodium, calcium, iron and anions. GF Piping Systems provides high-quality systems for these demanding binding and filter processes, meeting all relevant industry standards. In several applications, solutions from GF Piping Systems assure the processing of water in a way that it maintains the given specifications.

PROGEF Standard PP piping system
- Great surface finish and leach out characteristics
- Capped and bagged
- Outstanding weldability

LXT piping system
- Fast, reliable installation by the solvent-cementing process.
- Unique blue translucency enables visual inspection of joint integrity

Joints for clean services
The low-weight and corrosion-resistant plastic unions guarantee a safe and reliable system, especially when high purity applications need to be ensured. The mechanical joints are delivered bagged to ensure cleanliness and to prevent contamination prior to installation. Depending on the area of application, unions are available in several materials.

Diaphragm valve type 514
The optimal flow geometry provides twice the flow with the same amount of energy. Installation dimensions identical to previous models allow easy backward compatibility. Innovative body design with no metal fasteners.

Type 530 AquaTap™ Recirculating Faucet
The Type 530 AquaTap™ Faucet is made from high purity PVDF, and the IFD is available in SYGEF PVDF, PROGEF Natural PP, and PROGEF Standard PP in either weld or sanitary clamp connections. Simple heat flaring tools make leaf-proof, minimum crevice connections between components.
Process Cooling Water
Non-corroding piping systems reliably supplying high-tech manufacturing processes with temperature-controlled water

Main Benefits:

- **Purity**
  - Avoidance of metallic contamination in clean manufacturing areas

- **Safety**
  - Flexibility of plastic pipes minimizes the risk of water hammer

- **Efficiency**
  - No corrosion and no incrustations limit maintenance to a minimum

- **Performance**
  - Low heat conductivity of the system results in minimum heat loss

- **a)** Ball valve, electric, type 130
- **b)** Temperature sensor type 2350 including type 8052
- **c)** Multiparameter controller type 8900
- **d)** Flange PP-V, DN50
- **e)** Butterfly valve, manual, type 567
- **f)** Ball valve, manual, type 546 with tee valve, type 546 true union ball valve
- **g)** 3-way ball valve, type 546 with electric actuator
- **h)** ecoFIT PE System
- **i)** ELGEF Plus Saddles
- **j)** Ball valve, pneumatic, type 037/039
- **k)** Electromagnetic flow sensor type 2551/2552
- **l)** Big dimension pipes
- **m)** IR-Plus (Infrared) fusion technology
- **n)** ELGEF Plus Elbows
Solutions - Process Cooling Water
An overview of the key systems and products

Cooling of media, single components, or entire systems is an integral part of many industrial processes. Thanks to its high specific heat capacity, density and thermal conductivity, water is more and more used in today’s cooling systems. Thereby, heat transmission—from the production environment or component that has to be cooled—to water used as the coolant and the subsequent heat convection characterize the functional principle of process cooling systems. Intelligent piping solutions from GF Piping Systems represent the excellent cooling infrastructure behind the scenes, allowing fast, efficient and accurate process cooling in industrial manufacturing operations. Longevity, low heat loss, and lower energy consumption are the main benefits customers can profit from, when using products from GF Piping Systems in their cooling circuits.

ecoFIT PE piping system
Feeds cooling water directly to a working tool or process.

PROGEF Standard PP piping system
Suitable for cost-effective distribution of DI-water and RO-water, as well as for industrial applications in chemical product, plating and cooling.

PVC piping system
GF’s Harvel PVC pipe is ideal for applications involving corrosive fluid transfer.

Tee valve, type 546 true union ball valve
In applications where continuous flow system operation is critical, the innovatively-designed tee valve provides required safety and strength features as well as significant savings regarding installation time and labor expenses. By combining valve, tee, and plug into one assembled unit, the user benefits from a strong and equally convenient connection.

Multiparameter controller type 9900
The Signet multiparameter controller has perfected the concept of modularity. It is equipped with the combination of inputs, outputs and relays specified by the user. The unit accepts up to six input devices to measure flow rate, pH-value, conductivity, pressure, level and temperature.

Butterfly valve type 567/568
The double eccentric operating principle of the butterfly valve type 567/568 guarantees good friction behavior and therefore less wear and tear compared to conventional centric butterfly valves. A high level of security against water hammer is thus provided.
Specialty Waste
Cost-effective solutions from GF Piping Systems for safely conveying corrosive fluids even at elevated temperatures

Main Benefits:

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purity</td>
<td>Reduced environment impact due to avoided chemical contamination</td>
</tr>
<tr>
<td>Safety</td>
<td>Leak-tight systems for the safe handling of aggressive chemicals</td>
</tr>
<tr>
<td>Efficiency</td>
<td>No need for passivation and 50 % reduced welding times versus steel</td>
</tr>
<tr>
<td>Performance</td>
<td>Highest chemical/corrosion resistance results in zero maintenance</td>
</tr>
</tbody>
</table>

- a) Pneumatic diaphragm valve DIASTAR Ten
- b) Ball valve, manual, type 546
- c) Ball check valve type 561/562
- d) Paddlewheel flow sensor type 2536
- e) Double-See System
- f) Pressure sensor type 2250
- g) Butterfly valve, manual, type 567
- h) pH/ORP Wet-Tap unit type 3719
- i) Electromagnetic flow sensor type 2551
- j) pH-sensor type 2724
- k) Multiparameter controller type 8900
- l) Temperature sensor type 2350 including type 8052
- m) PVC-U System (other system solutions available)
Solutions - Specialty Waste
An overview of the key systems and products

Wherever hazardous or aggressive media is used in industrial manufacturing or treatment processes, reliable solutions for conveying the related specialty waste have to be considered to the same extent as the certain production process itself. Strict regulations control and monitor specialty waste systems, focusing on avoiding any form of chemical contamination and thereby reducing environmental impacts. GF Piping Systems offers complete plastic systems of highest chemical and corrosion resistance for intra-productional distribution, disposal, reclaim or recycling applications. Even at elevated temperatures, absolute safety and leak-tightness can be assured. Combined with appropriate measurement and control technologies and the right joining method, customers can trust in and benefit from a complete system solution.

**Chemical Resistance**
- **ecoFIT PE piping system**
  Robust behavior combined with acute resistance to fracture is a significant advantage over other common thermoplastic piping systems.
- **Fuseal PP piping system**
  Fuseal is resistant to the corrosive action of alkalis, alcohols, acids, and solvents.
- **PVC piping system**
  GF’s Harvel PVC pipe is ideal for applications involving corrosive fluid transfer.

**Safety**
- **Double-See PVC/CPVC piping system**
  Fast and easy to install, and available with a complete selection of pipe, fittings, leak detection and access tees, closure couplings and termination fittings.
- **Fuseal Squared PP piping system**
  Double contained Fuseal PP option, ideal for containing leaks.
- **Contain-It PVC piping system**
  Clear PVC secondary piping system. Fits over virtually any carrier system.

**Efficiency**
- **Pneumatic diaphragm valve DIASTAR Six**
  The cost-efficient solution with long service life for elastomer diaphragms up to 6 bar. It unites high quality with the basic functions of a pneumatic actuator. Optimal flow geometry provides twice the flow with the same amount of energy. Backward compatibility to previous models is also warranted.

**Performance**
- **Electromagnetic flow sensor type 2551**
  The patented magnetic flow sensor type 2551 (size range: DN15~900 mm) is an insertion sensor without moving parts. All versions are corrosion-resistant to ensure a long service life and minimal maintenance costs. The sensor is also available as a metal version, type 2552 (up to DN2550 mm/102”).
Process/House Vacuum

Complete system offering for usage in applications at different vacuum levels down to finest vacuum

Main Benefits:

- Purity: No metal contamination in clean installation areas
- Safety: Advanced joining technology guaranteeing leak-tight systems
- Efficiency: Compliance with TA Luft/ VDI 2440 leads to operating cost savings
- Performance: Minimum pressure loss owing to smooth surface character

a) Union joining
b) Gauge guard Z 700/701
c) Variable area flow meter type 335/350
d) Ball valve, manual, type 546 with tee valve, type 546 true union ball valve
e) Ball check valve type 561/562
f) Flange PP-V, DN50
Solutions - Process/House Vacuum
An overview of the key systems and products

Several applications in microelectronics such as drying, coating, distillation, vaporization, and handling need process or house vacuum systems for the generation of vacuum in levels from low, medium, and down to finest vacuum. Depending on the specific application, the production environment or the handling process, different types of vacuum systems, vacuum chambers, and pumps are used, fulfilling the particular demanding requirements. GF Piping Systems offers complete process and house vacuum piping solutions with maximum energy efficiency and high-speed operation, ensuring accuracy, safety, velocity, and very low pressure loss at the same time.

**Tee valve, type 546 true union ball valve**
In applications where continuous flow system operation is critical, the innovatively designed tee valve provides required safety and strength features as well as significant savings regarding installation time and labor expenses. By combining valve, tee and plug into one assembled unit, one benefits from a strong and equally convenient connection.

**Ball valve type 546**
Quality, design and innovative features make this ball valve unique. A modular system and compact design with many connection options ensure maintenance-free operation. Besides its cost-saving and long-lasting operative usage, the ball valve offers absolute leak-proofness and is fully compliant with legal requirements according to VDI 2440 (TA Luft).

**Variable area flow meter type 335 / 350**
The large range of these radially dismountable measurement devices opens the way for a wide array of uses with diverse media. For example, the type 350 is available in the installation length 350 mm. The great advantage of the variable area flow meter is the easy-to-read measured value without electrical connections.

**ecoFIT PE piping system**
Transfers large quantities of water from one process to a new process.

**PROGEF Standard PP piping system**
Suitable for cost-effective distribution of DI-water and RO-water, as well as for industrial applications in chemical product, plating and cooling.

**PVC piping system**
GF’s Harvel PVC pipe is ideal for different types of vacuum systems.
Value Added Services
From planning support to implementation – our specialists are always close by

As a leading provider of piping systems in plastic and metal, we offer our customers not only reliable products, but also a large package of services. Our support ranges from a comprehensive technical manual or the extensive CAD library to an international team of experts, who work closely together with local sales companies. And when it comes to implementing a project, our customers additionally benefit from a wide range of training courses, either on site or in our modern training centers worldwide.

Technical support
Technical support and material selection are key factors for a successful installation. GF Piping Systems offers technical support in the field along with our technical support staff located in Tustin, CA.

Chemical resistance
Our specialist teams have decades of experience in the area of chemical resistance. They can offer individual support and advice in selecting the right material for the corresponding system solution. On request, a team will examine and select the appropriate material for special applications.

Training courses
GF Piping Systems offers a wide range of training courses that allow participants to gain confidence in working with our products and proven joining technologies. The practical training is clearly defined, structured, and adapted to the various levels of participants' experience.

On-site training
GF Piping Systems offers technical support during the planning phase, and on-site training and certification for joining and handling. The duration and structure of the training depends on the project and the system being installed.
Generating a genuinely individual added value for our customers is our ultimate goal when implementing our tailor-made solutions. With our application knowledge and product expertise, we support our customers during the planning process, the sustainable realization of the projects and the provision of services. Our expertise in developing and producing piping systems, combined with our profound industry and market knowledge based on long-standing experience, makes us a qualified and professional partner for our customers.

**CAD library**

The extensive CAD library is the most frequently used planning tool from GF Piping Systems. The database comprises over 30,000 drawings and technical data regarding pipes, fittings, measurement and control technology as well as manual and actuated valves. The big advantage of the CAD library is that the data can be integrated directly in CAD models.

**Online and mobile calculation tools**

Our numerous, multilingual online calculation tools are very useful for configuring and calculating. By means of pressure/temperature diagrams, the pressure of liquid media recommended for pipes and fittings at various temperatures can be easily defined. FlowCalc App, the mobile application of GF Piping Systems, is an on-site planning tool for pipe diameter and flow velocity calculation to select the right dimension of piping systems when no expert is nearby.

**Technical manual**

We have documented the extensive know-how of GF Piping Systems in planning and installing plastic piping systems in our technical manual for customers. This detailed documentation is available in both printed and digital versions. The established reference book is helpful in planning large and small projects.

**Custom fabrication**

Our custom fabrication group has the ability to fabricate finished goods ranging from all sizes and materials. All our custom fittings and spools are designed using 3D engineering software, then fabricated in accordance to our customers’ drawings and specifications. Custom fabrication in our shop takes the effort out of performing multiple welds in the field, resulting in reduced labor costs.
System Overview

Our products bring a system to the applications of our customers

Plastic piping systems are ideal for use in microelectronics. Plastics do not form galvanic elements and are not conductive. GF Piping Systems with its comprehensive product range offers its customers high product reliability in combination with joining technologies proven over time in practice. Customized solutions are also available on request.

**SYGEF Plus and Standard System**
Polyvinylidene fluoride, fusible (socket, butt, IR-Plus and BCF-Plus fusion), excellent chemical resistance.
Dimensions: 16–450 mm
Temperature: -20°C – +140°C

**PROGEF Standard PP Systems**
Polypropylene, socket, butt and BCF-/IR-Plus fusion.
Dimensions:
- PROGEF Standard 16–500 mm
- PROGEF Natural 20–63 mm
Temperature: -10°C – +80°C

**PVC System**
Solvent cementable plastic, universal use, good chemical resistance, easy to join with special adhesives.
Dimensions:
- 6–400 mm/¼ –16 inch*
Temperature:
-0°C – +60°C / 32°F – +140°F*

**ecoFIT PE System**
Fusible plastic (electro, socket, butt and IR-Plus fusion), UV and impact resistant.
Dimensions: 20 – 1,200 mm
Temperature: -50°C – +60°C

**CPVC System**
Solvent cementable plastic, universal use, good chemical resistance, easy to join with special adhesives.
Dimensions:
- 16–225 mm/¼ –12 inch*
Temperature:
-0°C – +80°C / 32°F – +210°F*

**Double Containment:**
**Double-See, Fuseal Squared, Contain-It Systems**
Double containment pipe systems for extra protection when hazardous media is conveyed.
Dimensions/Temperature: Varies depending on system

**Fuseal PP System**
Joined mechanically or electrofusion system. Fuseal is flame-retardant and can be used for double containment pipelines.
Dimension range: 1½–18 inch

* Sch80
Joining Technology

The material, application and medium are key criteria for selecting the right joining technology.

GF Piping Systems offers diverse methods of joining technology for joining together the same as well as different materials, pressure ratings and dimensions. The materials selection ultimately decides the method of joining. For example, piping systems made of PE, PROGEF PP, PB and SYGEF PVDF are fusion joined, while piping components made of PVC, CPVC and ABS are in principle only cemented.

Joining technology

- IR-Plus fusion – the clean connection
- BCF-Plus fusion – the smooth connection
- Butt fusion – the connection for larger dimensions
- Electrofusion – the easy connection
- Socket fusion – the strong connection
- Solvent cementing – the fast connection
- Mechanical joints – the quick connection

Joint cross-section

Macro-image
GF Piping Systems

Worldwide at home

Our sales companies and representatives ensure local customer support in over 100 countries.

www.gfps.com/us