

Future horizons

Mission-critical water
solutions for Merchant



The crucial role of fluid handling on board

When using the oceans as traffic and commercial routes, the reliability of the ship's infrastructure is paramount. Effective fluid handling is a cornerstone for safe and successful operations, crucial in mitigating downtimes and ensuring goods are transported safely and timely to their destinations. As the industry strives for greater efficiency and sustainability, ship designers and engineers face the challenge of enhancing ship capacities while minimizing environmental impact.

Fluid handling solutions lie at the heart of maritime operations, facilitating essential functions throughout a ship's voyage. These systems are integral to safe, efficient, and reliable operations, from providing water for crew use to managing ballast water and regulating indoor climates. The harsh conditions on board, like vibrations, movements, seawater, and salty air speed up corrosion and wear and tear of materials, resulting in leakages and costly maintenance and repair work. By implementing corrosion-resistant thermoplastic piping solutions for fluid handling, the ship's operators not only mitigate the risk of leakages but also extend the system's

service life, reducing maintenance costs and environmental impact.

GF Piping Systems is committed to enabling the safe and sustainable handling of water, gas, and chemicals at sea that are compliant with the latest regulations. Selecting long-lasting, corrosion-free, lightweight piping materials and automated flow solutions helps ship owners, engineers, designers, and operators improve the environmental impact by reducing the overall ship weight and its fuel consumption over the whole service life.



Future horizons

GF Piping Systems enables shipyards, ship owners, operators, engineers, and installers to switch from traditional piping materials to lightweight, corrosion-free thermoplastics. We help you to efficiently plan, design, install, and operate plastic flow solutions in new build and retrofit projects with a wide range of materials and tools, innovative automation solutions, and services.



Weight and space-saving design

The lightweight design of plastic piping systems contributes to weight reduction of the ship, which helps to improve fuel efficiency and increased passenger capacity. Additionally, plastic piping systems can be designed with smaller dimensions and prefabricated, allowing for space optimization and flexibility in installation.



Cost-effective installation

Due to their lightweight nature, flexibility, easy jointing technologies, and prefabrication options, plastic piping systems offer ease of installation. Faster installation and simplified maintenance can improve project timelines and overall efficiency for shipyards, reducing labor hours and straightforward integration with other systems.

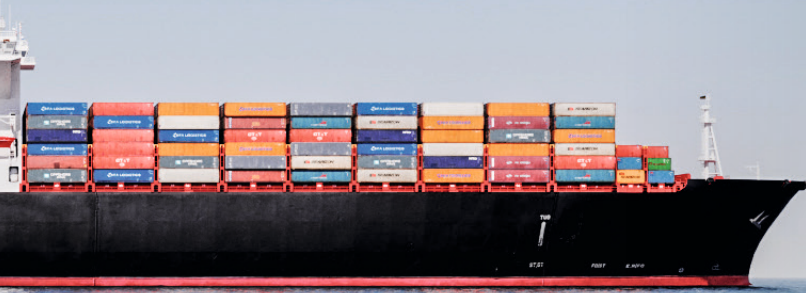


Improved operational performance

Plastic piping systems' resistance to corrosion and long-term durability can contribute to higher construction quality and reliability. The improved operational performance can reduce rework, warranty claims, and post-delivery issues, leading to higher customer satisfaction and the reputation of shipyards.



Scan to view all approved marine solutions:
www.gfps.com/marineapprovals



Enhanced reliability and hygiene

Plastic piping systems require minimal maintenance and offer long-term durability. They do not require regular painting or coating to prevent corrosion, reducing maintenance costs and downtime. The smooth inner surface of plastic pipes also minimizes the risk of fouling and scaling, further facilitating maintenance procedures.



One-stop shop

Shipyards can leverage the expertise and comprehensive support provided by GF Piping Systems. By offering a wide range of lightweight materials, automation solutions, jointing and tools, and services, the collaboration can help you overcome technical challenges, ensure compliance, and streamline the procurement and logistics processes.



Reduced carbon footprint

Thanks to their lightweight characteristics and the use of renewable and recyclable raw materials (i.e. bio-attributed PVC), GF Piping System's solutions have a reduced environmental impact than metal solutions. By providing Environmental Product Declarations (EPD) we enable transparent planning and help ship owners and operators to reduce GHG emissions during operation.

Sustainable processes

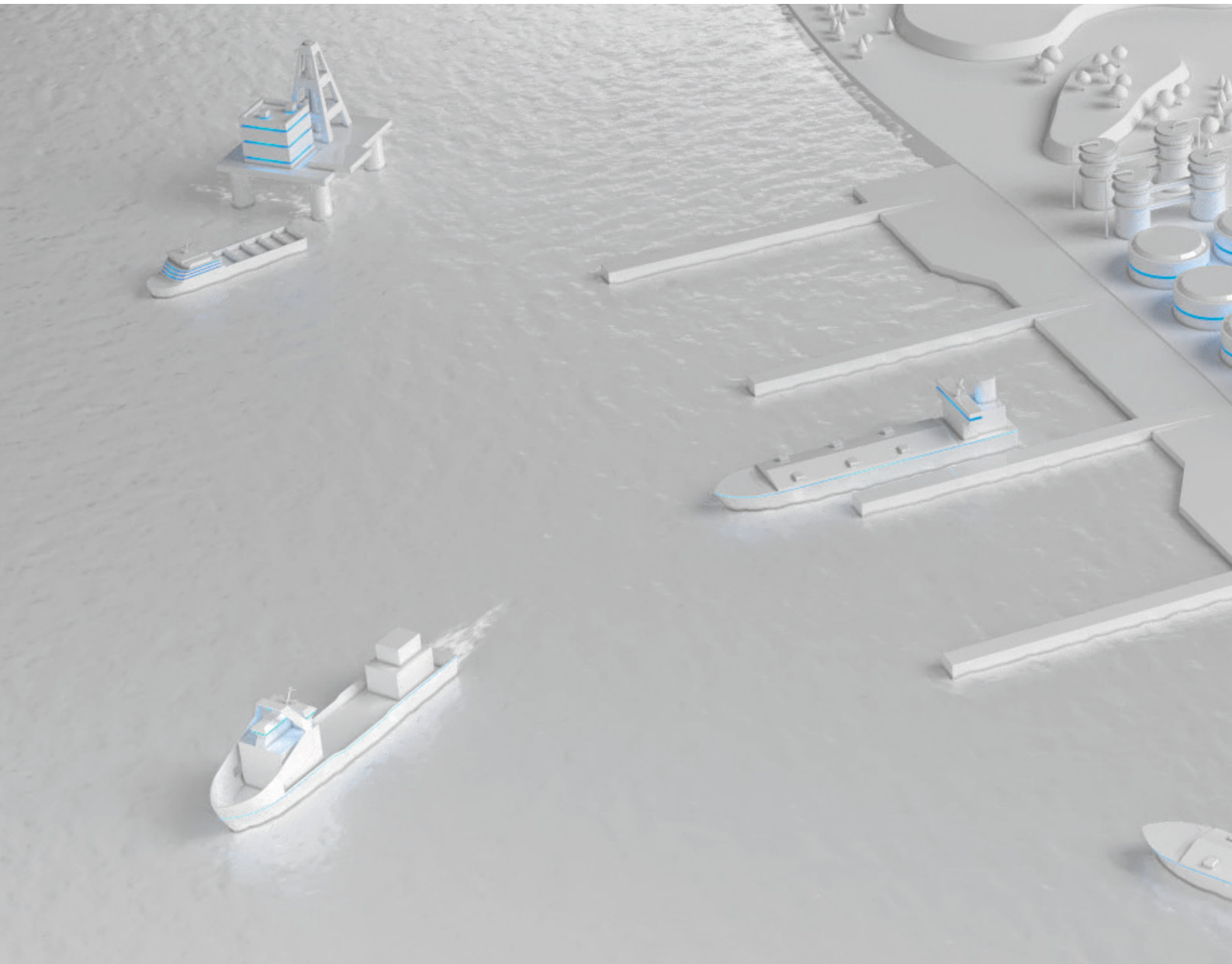
GF Piping Systems marine approved portfolio supports a wide range of applications in essential and non-essential areas of your inbound and deep sea vessel. From tug boats to special operations vessels, dredgers and the world's largest freight ships, we offer customized solutions for the mission-critical transport of water on board all types of merchant ships.

Fishing ships and trawlers

Fishing ships and trawlers require piping systems with resistance to seawater and chemicals, reducing maintenance and improving durability. Plastic piping systems can be utilized in Bilge/Ballast Systems and Sea Cooling Water Systems such as RWS (Refrigerated Cooling water) for Fish Cooling / Freezing, optimizing operational efficiency.

Special operations vessels

Lightweight components of special operations vessels can impact the maneuvering speed of the vessel. Plastic piping systems offer versatility and resistance to harsh environments, solving challenges in various specialized operations. They can be used according to the IMO regulations L3 requirements, for seawater and freshwater cooling, bilge/ballast systems and for waste water management, ensuring optimal performance in critical situations.



Freighter ships

Container ships and bulk carriers can benefit of the corrosion-resistance and lightweight properties of thermoplastic piping systems, addressing challenges of fuel efficiency and reducing maintenance costs. Applications include cooling systems, bilge/ballast systems, and engine cooling systems.

Tug boats

Tug boats benefit from the resistance and durability of plastic piping systems in marine environments. These systems find applications in bilge/ballast systems and fresh water supply, enhancing efficiency and longevity.

Dredgers

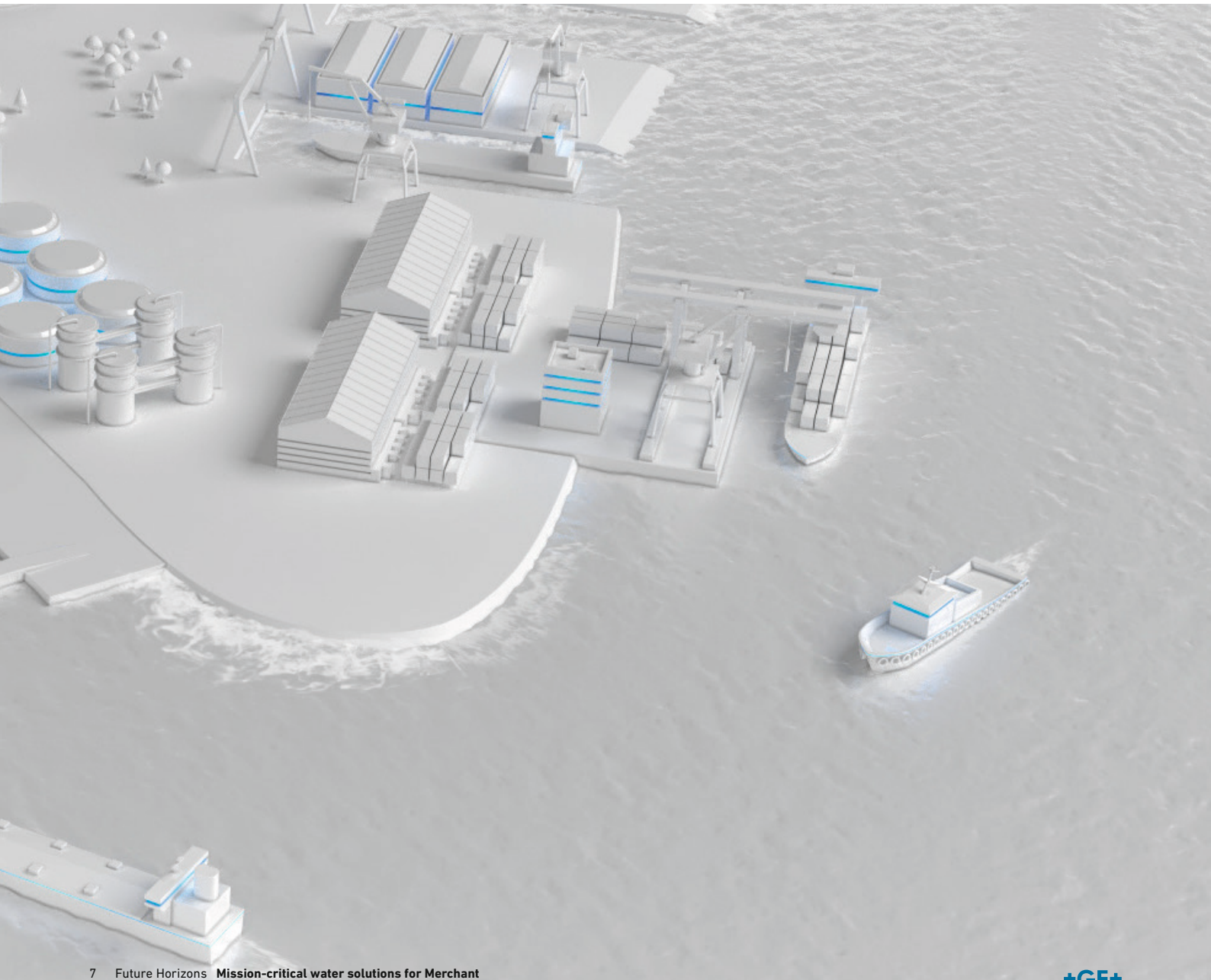
Plastic piping systems provide durability and resistance to abrasive materials, solving challenges related to corrosion and wear. They can be used for suction and discharge lines, dredge pumps, and slurry transport systems on board dredgers.

Chemical and gas carriers

For the transport of chemicals and gas, reliable and safe materials are paramount. Plastic piping systems offer excellent chemical resistance and prevent contamination. They can be utilized for cargo handling, bilge/ballast systems, and chemical transfer lines, ensuring safety and reliability.

Offshore support vessels

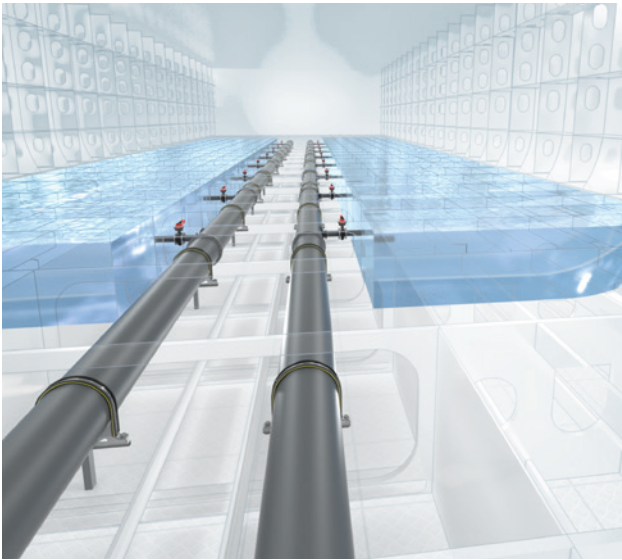
Plastic piping systems offer corrosion resistance and lightweight characteristics, addressing challenges of offshore operations. Applications include sea and freshwater cooling systems, bilge/ballast systems, and fire suppression systems, ensuring safety and operational reliability.



Essential applications

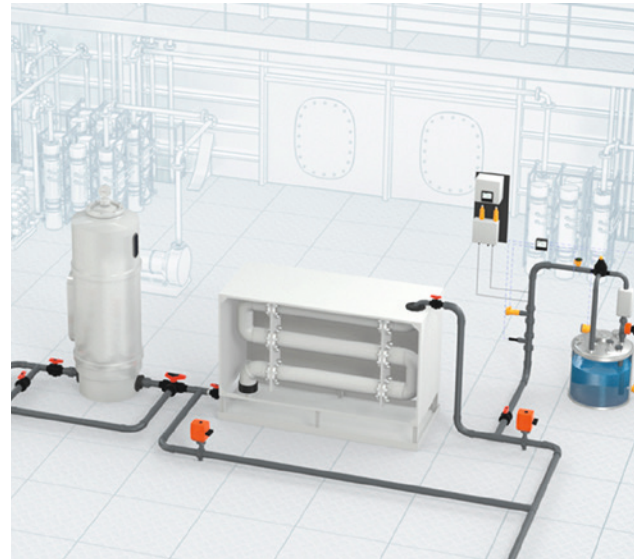
Improving operational safety

GF Piping Systems strives to help customers worldwide to improve operational safety and overcome environmental challenges through innovation. By developing highly engineered products, pioneering jointing technologies, and industry-leading training capabilities, we create solutions for smart fluid transportation on board that enhance operational safety and enable our customers to avoid accidents, leakages, and reputation loss.



Ballast system

GF Piping Systems' solutions help efficiently load, distribute, and unload ballast water from 0°C to 40°C. Thanks to their material properties, plastic piping systems are corrosion-resistant, and constant contact with seawater and chemicals does not affect. The systems are designed for a long, maintenance-free service life of up to 25 years and thus help reduce failures, maintenance work, and costs.



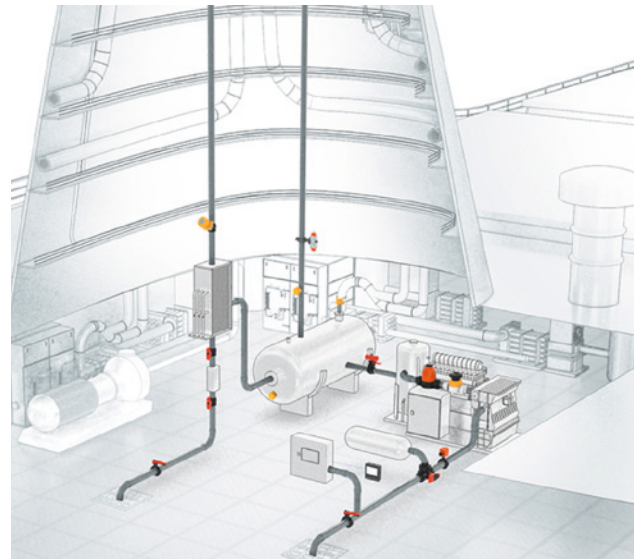
Ballast water treatment (BWT)

The spread of invasive species via ballast water can be prevented with the proper treatment of ballast water. Seawater and chemicals often push piping systems of corrosive materials to their limits, resulting in maintenance work, leakage, and downtime. GF Piping Systems provides corrosion-resistant solutions for reliable BWT, and pre-fabrication capabilities can help OEMs build BWT skids for fast integration on or offshore in no time.



Freshwater and seawater cooling

Corrosion- and erosion-free plastic piping systems help ensure hassle-free operations of freshwater and seawater cooling in essential applications. Thanks to the fire retardant pipe jacket system HEAT-FIT, cooling in crucial service areas such as machinery spaces, pump rooms, and control spaces according to the fire endurance matrix is now possible.



Exhaust gas scrubber

A very low pH is achieved during the exhaust gas scrubbing process, and piping systems of the effluent lines are exposed to highly aggressive fluids. Therefore, the ultimate resistance of the piping system is of utmost importance to ensure a long system life without any downtimes. Thermoplastic pipes, fittings, and valves have proven excellent chemical resistance and are lightweight, easy-to-install materials for scrubber applications.

Non-essential applications

Water quality and HVAC

At GF Piping Systems, we offer deep application knowledge of the entire water treatment process on board. We offer a wide range of materials for pipes, fittings, and valves, including PVC-U, PVC-C, PP-H, PE, and ABS. Also, we provide automation and measurement and control devices for pH value, pressure, and conductivity measurement. Our solutions guarantee high water quality and system availability.



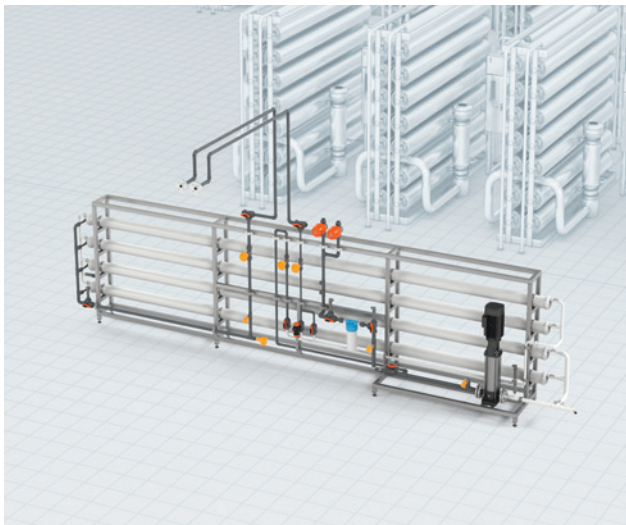
Fresh cold and hot water

Effective water supply thanks to a simple installation technology. Our systems are ideally suited for water distribution on all types of ships. Cabins, kitchens, restaurants, and bars are efficiently supplied with fresh water. The high flexibility of the material and the easy installation technology cut time and costs to a minimum. The installers can install individual or continuous lines, ring mains, T-piece branches, and continuous lines with circulation possible at every deck and in the risers of the vessel.



Sewage, black and grey water

Wastewater from sinks and showers, as well as from toilets and medical facilities, creates grey and black water that has to be conveyed safely to the wastewater treatment system on board. With the solutions from GF Piping Systems, safe transport is guaranteed. Our modern electrofusion, adhesive, or mechanical jointing technology is conducive to fast installation, and the highly diversified product mix provides installers with the flexibility they require. All our plastic systems do not corrode and deliver a long service life.



Water Treatment

GF Piping Systems offers comprehensive solutions for all applications throughout the water cycle, from chemical dosing systems and media filtration applications to ion exchangers. For customers seeking to automatize their processes on board, GF Piping Systems follows this wish with a comprehensive system of offering pipes, fittings, valves, the ideal jointing technology, and an optimally adapted selection of components for automation technology.



Air Conditioning (HVAC)

Air conditioning plays a vital role in onboard accommodation as it helps to have a healthy and pleasant atmosphere concerning temperature and humidity. GF Piping Systems provides energy efficient flow solutions that help owners and operators to lower the overall energy efficiency of cooling applications. Thanks to pre-insulated systems, the planning and installation time of the HVAC system can be reduced up to 50% compared to conventional systems that have to be post-insulated.

Application overview

Plastic piping system onboard merchant vessels

	Material	Marine Grade		Seacor	ABS	COOL-FIT		ecoFIT
		PVC-U	PVC-C			2.0	4.0	PE-100
System of measurement	Met./Sched.	Met./Sched.	Schedule	Metric	Metric		Metric	
Joining	Cementing	Cementing	Cementing	Cementing	Welding	Welding	Welding	
Applications in Accomodation, Engine Room, Technical Spaces								
Freshwater System Hot		X*	X					
Freshwater System Cold	X	X*	X					X
Greywater System & Treatment	X	X	X		X			X
Blackwater / Sewage System & Treatment	X	X	X		X			X
Technicalwater / Deckwash Treatment	X	X	X					X
HVAC System / Chilled Water System					X	X	X	X
Food Processing / Waste Water Service	X	X	X					X
Kitchen Drains / Grease Trap System	X	X	X					X
Swimming Pool / Jacuzzi	X	X	X		X			X
Brine Water System / Cool-Freeze / Sec.System							X	X
Central Heating								
Drainage / Scuppers	X	X	X					X
Cable Protection Piping								X
Working Air / Compressed Air								X
Starting Air/ Engine								
FiFi / Fire Main System								X**
Engine Cooling Water System								X**
Ballastwater / Heeling System								X**
Bilgewater System								X**
Scrubber Treatment System								X**
Scrubber Effluent Lines								X**
Cargo Lines								X
Purging Lines Air / Water								X
Jetting Leg Backup System / Spud Pillars								X
Jet-Water System								X
RSW System (Refrigerated Sea Water)					X	X	X	X
Fish Production / Processing Street	X				X			X
Ballast Bubble System / De-Icing System								X
Tank Venting								X
Sounding Pipes								X
Desalination Units / RO Units	X	X	X					
Ballast Water Management System (BWMS)	X	X	X					X**
Cooling Hydrogen / H2-Container / Methanol								X
Electrical Cabinet / Panel Cooling								

*Only schedule system is applicable.

** If L3 is required, ecoFIT is only applicable in combination with HEAT-FIT Jacket System.

PROGEF PP-H	AQUASYSTEM PP-R	INSTAFLEX PB	i-FIT Multilayer Composite	Hycleen Automation System	JRG Sanipex MT Multilayer Composite	Seadrain White PPFR	HEAT-FIT Insulation Jacket	UNI-Coupling	Butterfly valve 565
Metric	Metric	Metric	Metric		Metric	Welding	Metric	Metric	Metric
Welding	Welding	Welding	Mechanical		Mechanical	Mechanical	Mechanical	Mechanical	Mechanical
	X	X	X	X	X			X	X
X	X	X	X	X	X			X	X
					X	X		X	X
					X	X		X	X
X	X	X	X		X			X	X
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X		X	X		X			X	X

Integration partner for new build and retrofit projects

GF Piping Systems has been the trusted supplier of lightweight, corrosion-free plastic piping systems for the marine industry for over 30 years. We are proud to have supported customers with the execution from smaller inland water boats to deep-sea freighters.



Trailing Suction Hopper Dredger (TSHD)

An efficient ship conversion with prefabricated HDPE solutions

Van Ouwkerk transformed the cargo vessel MS Bente into the Trailing Suction Hopper Dredger (TSHD) MS Zeeburg, involving extensive modifications, accommodation enlargement, and installation of dredging equipment. Van Koeveringe Kunststoffen utilized HDPE ecoFIT pipes by GF Piping Systems for the jet lines, installing 750 meters of pipes and fittings ranging from d63 to d355. Having equipped over twenty ships, Van Koeveringe Kunststoffen benefited from quick prefabrication and ecoFIT's corrosion resistance.

The HDPE pipes offer durability, lightweight construction, and cost-effectiveness, enabling MS Zeeburg to efficiently mine sand and seashells. Throughout the project, GF Piping provided technical support on bracket spacing and certification requirements.

Read the full story: gfps.com/marine



Special Operations Vessel

Operational safety for a specialized high-performance vessel

A leading shipyard for specialized, high-performance vessels, has addressed a condensation issue in the HVAC piping system in one of their latest projects for a German customer. With the innovative pre-insulated plastic piping system COOL-FIT, Fassmer solved the condensation problem and brought several other benefits and efficiencies to the operations.

By seamlessly integrating the system with the existing copper design using engineered components and electrofusion technology, Fassmer eliminated the need for insulation steps. The marine-approved COOL-FIT system ensures energy efficiency, lightweight construction, and maintenance-free operation throughout the vessel's service life, benefiting both owner and operators.

Read the full story: gfps.com/marine



Renowned for innovation and high standards, the German shipyard Fassmer sought an improved solution for the piping systems of a specialized vessel series. With the innovative pre-insulated plastic piping system COOL-FIT, Fassmer addressed and solved a condensation issue in the HVAC piping system in one of their latest projects for a German customer. Opting for GF Piping Systems' fully pre-insulated COOL-FIT system, Fassmer overcame condensation issues and gained added benefits. The COOL-FIT system, comprising PE100 pipes and fittings with high-energy insulation foam and HDPE pipe jackets, offers enhanced insulation, corrosion protection, and vapor-tight sealing.

Sustainable solutions for the marine industry

Environmental benefits

GF Piping Systems is committed to enabling the safe and sustainable transport of fluids and is a reliable partner for achieving the ambitious IMO goals of GHG reductions.

We continuously analyze and improve our solutions to the latest (environmental) standards.

SUSTAIN

The environmental benefits of thermoplastic at a glance:



30% lower environmental impact

On average, GF's plastic piping systems have a potential environmental impact of around 30% lower than the competing systems made of stainless steel, copper, or glass-reinforced plastic.



Long service life

GF's thermoplastic solutions are extremely durable under harsh marine conditions and their service life can exceed 25 years. Compared to competitive products which might require replacement after 10 to 15 years, the long service life has a high, positive environmental impact across all categories.

GF Piping Systems' solutions comply with the Green Passport (Ship Recycling Plan or Inventory of Hazardous Materials). We help you identify environmentally preferable piping system options by providing (comparative) Life Cycle Assessments of our products and solutions. Additionally, our Environmental Product Declarations provide transparent information about the environmental performance of recycling practices, facilitating informed decision-making and encouraging responsible actions among stakeholders.

Learn more about our sustainability efforts:

www.gfps.com/sustainability



LIABILITY



250'300 kg less CO₂

Regarding the global warming impact, one plastic system saves on average between 1'900 kg (PVC-U) to 250'300 kg (PB) of CO₂-equivalents. This corresponds to the volume of CO₂ released by a midsize vehicle on a journey of 11'900 to 1'564'000 kilometers, respectively.



Renewable and recyclable

The environmental impacts during the raw and manufacturing phases are significantly higher for most competitive materials like stainless steel or copper. Additionally, GF Piping Systems uses renewable raw materials, such as tall oil, to produce systems like PVC-U.

Together as one

Process automation

We offer a true partnership with a unified vision toward active water conservation. Our solutions for automated flow processes ease the way toward autonomous vessels.



GF Piping Systems offer deep application knowledge of the entire process within the water treatment onboard. Depending on the application area, there are different water treatment process challenges, ranging from guaranteeing high water qualities and providing reliable measurements to assuring stringent regulations. Plastic piping solutions from GF Piping Systems provide higher efficiency around the water cycle with increased productivity and lower operational and overall costs.



One user experience across the whole control loop

GF Piping Systems is your experienced partner with a full portfolio of measurement, control, and actuation components, which are easy to install and use and have local support through all project phases. We offer the full package with our products and solutions, providing top-quality installation, a highly skilled team of experts standing by our customers' side every step of the way worldwide, and digitalized services ensuring a project is at the forefront of the market.



Design (Planning phase)

Easy planning thanks to application-specific solutions making an effortless combination around the complete control loop.



Select (Ordering phase)

Easy to select and order via configurators and matching components throughout the whole portfolio.



Install (Building phase)

Easy planning thanks to application-specific solutions making an effortless combination around the complete control loop.

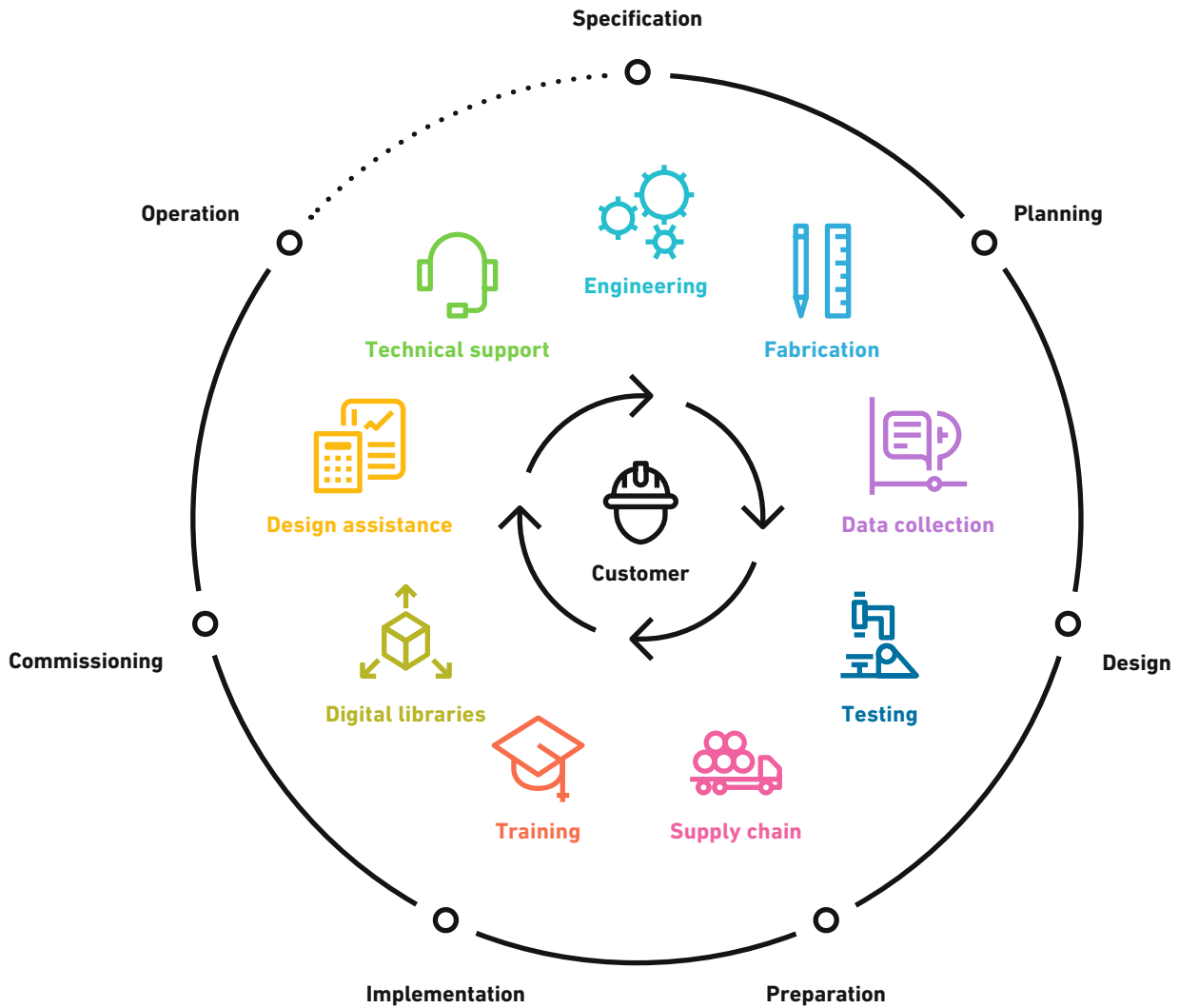


Own (Operation phase)

Easy monitoring once installed, including spare part availability. Long lifetime and low maintenance make for low downtimes.

Specification to operation

With Specialized Solutions, the global leader GF Piping Systems provides project support every step of the way to achieve construction excellence. Allowing owners and planners to concentrate on their daily business without interruption.





Engineering

Increase the efficiency of your project with the tailor made analysis packages from GF Piping Systems and decide which offer is right for you according to your needs. You have the choice between Project Analysis and Advanced Engineering, thus always receiving the appropriate support in every phase of your project.



Digital libraries

GF Piping Systems is continuously developing digital libraries with all of our product design drawings. Our files are fully compatible with Autodesk Revit, AVEVA, Intergraph, Autodesk AutoCAD Plant 3D and Trimble SketchUp with 3Skeng to provide proper engineering design tools used by planners, architects, owners and operators for BIM and Plant Design.



Custom product design and prefabrication

Having your individual needs and application in focus, our customizing teams forge the solution that fits you best, developing custom-made parts to complete systems or special solutions produced in small series, individual consulting and off-site prefabrication. Through our global network of flexible locations, we offer a wide range of comprehensive solutions.



Training

GF Piping Systems instructional courses to help you teach your customers and their installers essential knowledge for the welding of pipes and piping components, as well as an in-depth understanding of butt and electrofusion connections. Trainings are available virtually, in-house or on site. Trusted training, empowering you.



Ultrasonic Non-Destructive Testing (NDT)

When installing a system, the most critical parts are going to be the weldings – often seen as the weakest point of a system and highly critical to a safe and reliable operation. With Ultrasonic NDT, you can proceed with assurance thanks to scientific proof that the welds are secure.

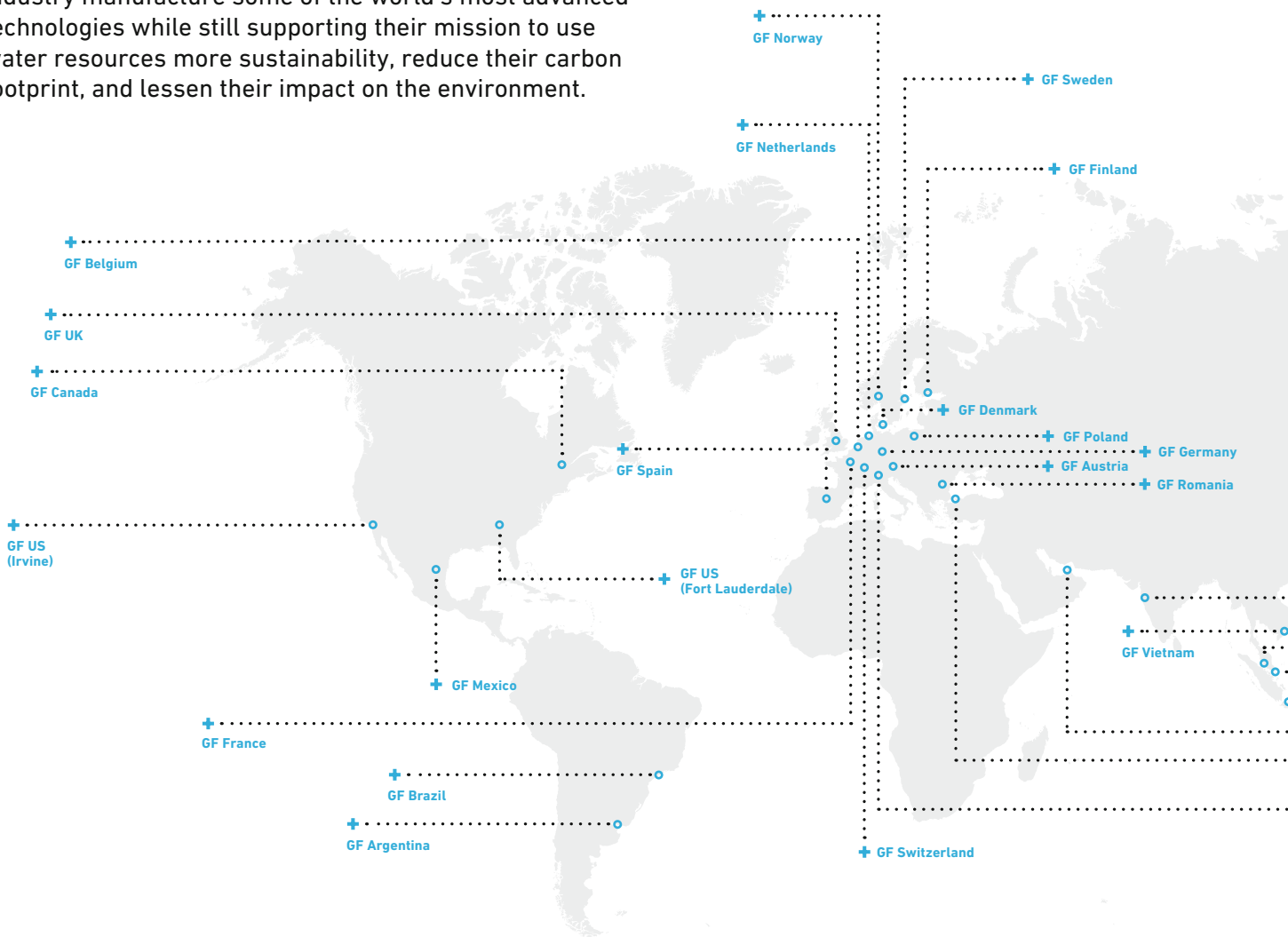
www.gfps.com/specialized-solutions



Speak to an expert

Support around the globe

GF Piping Systems has supported the marine industry's efforts to build efficient, safe, and hygienic piping systems onboard for more than 30 years. Our global teams help the industry manufacture some of the world's most advanced technologies while still supporting their mission to use water resources more sustainability, reduce their carbon footprint, and lessen their impact on the environment.

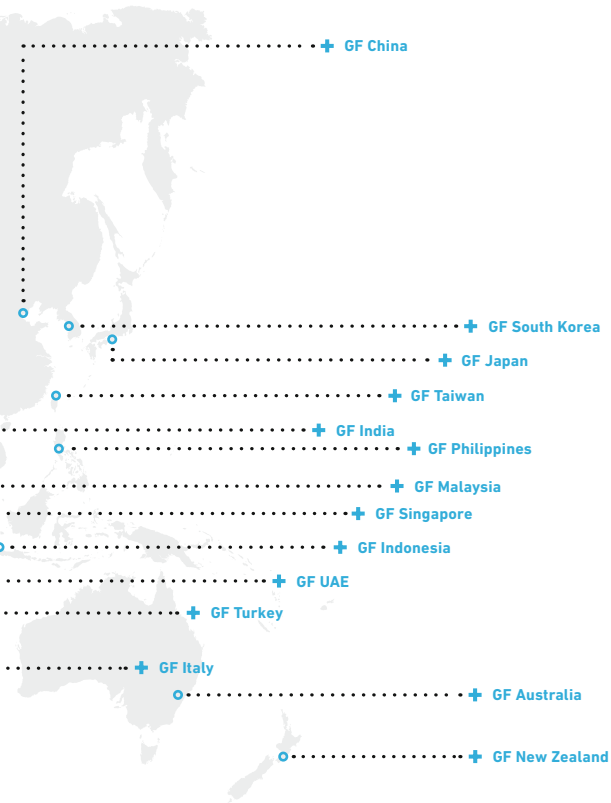


Locations

GF Piping Systems is represented in 31 countries with its own sales companies and 36 production sites. This means that we are always by our customer's side. Our production sites in the Americas, Europe, and Asia ensure sufficient availability and quick, reliable delivery.

Local Marine experts

Additionally, GF Piping Systems has a global network of more than 30 local experts specialized in the marine sector to provide you with the best service on site. With a deep application know how and strong background in regulations for the applications of thermoplastics on board, our team is available to our customers as partners throughout all project phases: from planning to implementation.



Next steps

Find your local contact on the back cover of this brochure or visit our GF Piping Systems website, where you will find specialized contact persons in your area. You will also find additional information on our products, including technical datasheets, operating instructions, and relevant certificates and approvals.

More about our smart solutions for merchant:
www.gfps.com/marine



Local support around the world

Visit our webpage to get in touch with your local specialist:

www.gfps.com/our-locations



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