

Piping Systems and Equipment

for Marine and Ship Building Applications



**ABS, PVC-U, PVC-C, PE-100, PP-H, PP-R,
INSTAFLEX[®], PRIMOFIT[®] and Pipe Tools**

GEORG FISCHER +GF+
Piping Systems



System Solutions for Piping Systems

What makes Georg Fischer a leading provider of piping systems are not only the high-quality products, but also the specific system solutions for specific applications and purposes. Our com-

ponents for the conveyance, control and measurement of liquids and gases are always an integral part of complete solutions. In other words: the right piping system for the right application.

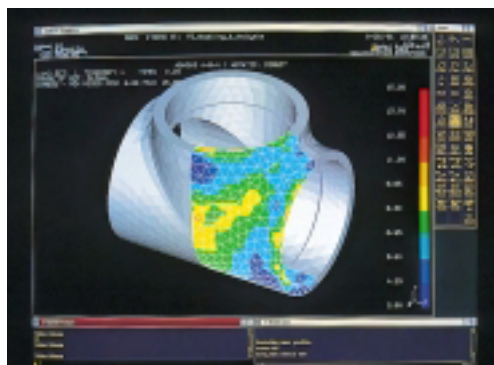
At Georg Fischer, we take consulting seriously. For example, we support our customers with know-how, as well as comprehensive documentation.



Tradition



Quality Management



Research and Development



Reliable, long life-Span, High Quality

Your Benefit: Expertise-Performance-Availability-Cost Effective

Low Weight

Plastic pipes weigh approximately 5 times less than metal. This can lead to weight savings of several tonnes per ship. Allowing more cargo and lower running costs.

No Corrosion

Problems with external corrosion or internal encrustation are eliminated by using plastic piping system.

Speedy Installation

Save time during the installation process, plastics lend themselves to pre-fabrication which can reduce installation times on board drastically. The speedy jointing techniques employed by plastics also allow jointing with limited tooling and no power source in very constrained spaces.

Efficient Maintenance

On board alterations or repairs can be conducted efficiently on plastics. No major specialised personnel or tooling are required to enable reliable jointing and installation of plastics on the ship itself.

Availability / Reliability

World-Wide Distribution

Approved tried and tested Materials

Georg Fischer products are available worldwide via an integrated multi-channel distribution network allowing purchase via distributors or internet. All Georg Fischer products have all major approvals for the marine industry and have a long history of reliable installations behind them.

Weight Comparison: Plastic to Metal (per 100 metres of piping)

	Pipe Diameter			
	d25	d50	d110	d160
Plastic, kg	16	53	248	550
Carbon Steel, kg	-	310	927	1710
Stainless Steel, kg	81	193	1041	1542
Copper, kg	59	291	-	-
Savings, kg Plastic to Steel	65	257	679	1160

The Advancement of Technology – Plastic Pipes for Ships.



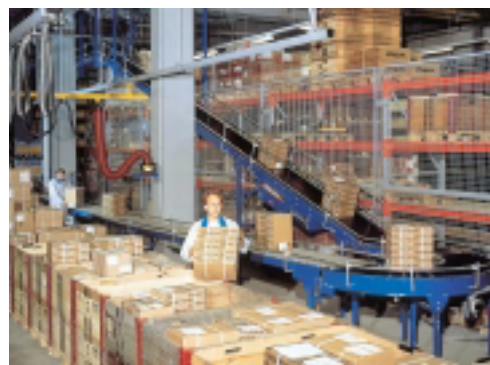
Training



Test Laboratory



Manufacturing

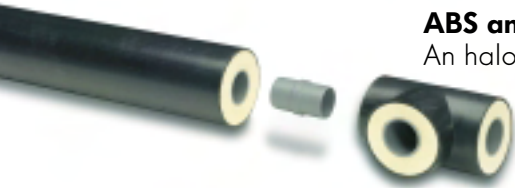


World-Wide Logistics

Systems and Components offering Real Customer

ABS and COOL-FIT

An halogen free, solvent cemented complete plastic piping system, similar to PVC but more robust, better low temperature resistance complying to the toxicity test according to IMO A.753(18) and SOLAS. Ideal for fresh and sea water cooling, air conditioning, drinking water, indirect refrigeration and brine systems. Available also pre-insulated 100% water and vapour tight, no condensation build-up.



PP-H and PE-100

Fusion jointed systems offering good flexibility, the fusion jointing techniques are simple and quick, offering excellent reliability. PP-H is ideal for yachts or smaller vessels where flexibility and weight are primary concerns. PE-100 (electro-fusion ELGEF Plus) is ideal for larger dimensioned systems such as bilge, ballast and air vent lines.



PVC-U/PVC-C

The plastic systems with the longest tradition, Georg Fischer first produced PVC in 1957. Since then due to PVC's excellent value for money it has grown to be the most commonly used material in industrial systems world-wide. Primarily used for drinking water treatment and swimming pools on ships, technical water, cold potable water and general fresh water services are also good applications for PVC.



Light Metal Alloy Butterfly Valves

Georg Fischer's aluminium alloy valves save weight whilst offering the same performance as standard steel valves.

Reduce maintenance and down time with non corroding long life-span plastics.

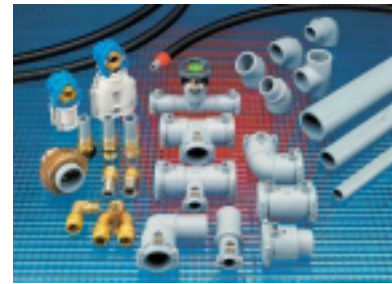


Benefit



INSTAFLEX

The ideal potable hot and cold water service for the marine industry. The high flexibility of INSTAFLEX allows simple pre-fabrication drastically reducing installation times on board. Allowable maximum working temperature 95 °C.



AQUASYSTEM in the raw material PP-R or as a multi-layer ALU system offers another solution for hot and cold water services.



Couplings

A stainless steel two-bolt coupler widely used in shipbuilding, mining, wastewater treatment and other industries. For fast, simple and reliable connecting or repair of all kinds of pipes, metallic or plastic. Flexible, repair and restraint couplings, for pressures up to 64 bar and temperatures from -30 °C to +125 °C.



PRIMOFIT and malleable iron fittings

Threaded malleable iron fittings from Georg Fischer have a tradition of 200 years behind them. For ship building they are ideally suited for sprinkler systems and general mechanical services on board ships. PRIMOFIT is a compression fitting for end load or flexible connections, for metal to metal connections saving time and space.



Pipe Tools

Efficient, high quality installations with state-of-the-art tube/pipe fusion, cutting, beveling and bending tools for all pipe dimensions and all materials (metal and plastics). Rental pools, service, demonstrations and sales worldwide.

Speedy installation of the optimum components improving your boats efficiency.

Fishing Trawlers with plastics to increase load bearing capacity.



High-speed ferries and yachts with plastics for fresh and sea water services, improve weight performance ratio.



Georg Fischer Plastic Systems and Components are approved by all the major Classification Societies.

Application Areas for Plastic Pipes on Ships

The «International Maritime Organisation» IMO has published a guideline for use of plastic pipes on ships, namely IMO Resolution A.753 (18), originally released in 1993. This document outlines the tests required before the system can be considered for approval from the various classification societies.

The tests outlined cover primarily the following categories; flame endurance, flame spread, smoke generation, toxicity, fire protection coatings and general installation or worthiness tests eg. external load, connections etc.

The resolution contains a matrix defining which tests are required for a particular pipe line in which location area of the ship.

The allowable application areas for plastics on ships are fundamentally non-essential systems, primarily fresh and sea water lines but also air/gas venting systems, compressed and service air as well as non essential oil lines.

Typical Applications for Plastic Pipe Systems on Ships:

- water treatment for drinking and swimming pool water
- cold and hot potable water
- fresh water cooling for example air conditioning
- sea water cooling (non essential)
- bilge lines
- fresh water service and cooling
- general brine lines, also for refrigeration systems

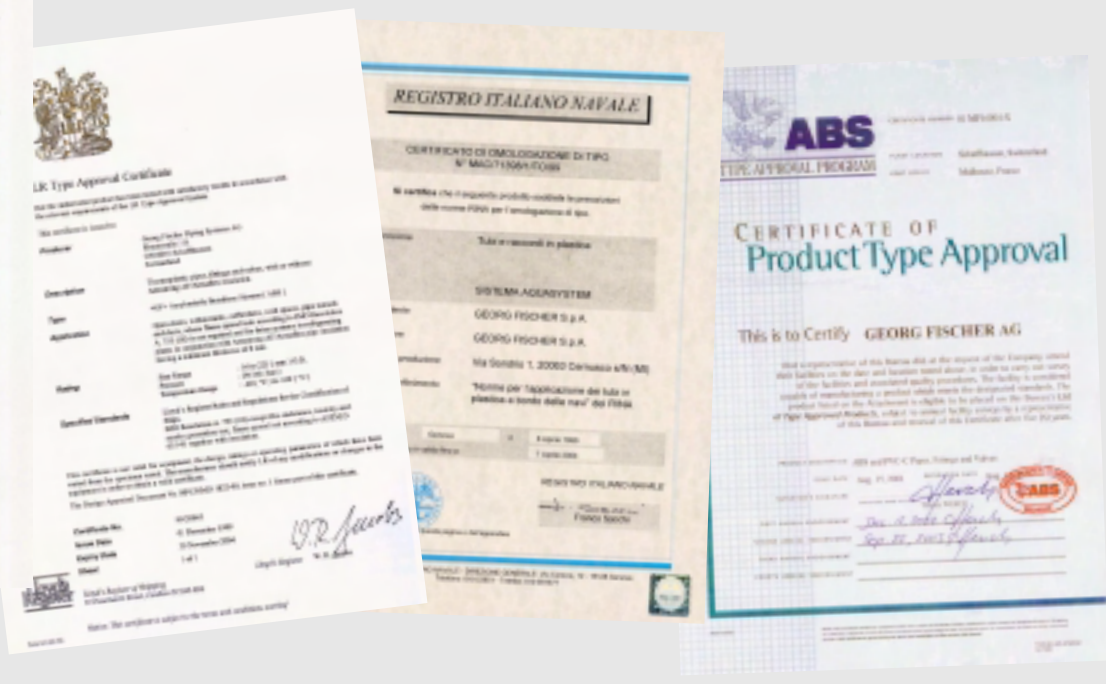
- air and gas venting
- compressed and general service air (non essential)

Flame Spread Characteristics

This test is done in accordance with ASTM D.635-91. «Rate of Burning and Time of Burning of Self-Supported Plastics in a Horizontal Position». Samples corresponding to the relevant wall thickness of the pipes are exposed to an open flame for 30 seconds. The time and extent of burning are measured. Please note: if the sample does not burn 100 mm in 30 seconds the time and extent of burning are written into the test certificate, if the sample burns more than 100 mm then the rate of burning is measured and reported in the certificate. The only plastic which can achieve *no flame spread* is PVC-C. Other materials such as ABS achieve no flame spread when using a fire protection in the case of ABS a flame retardant insulation from Armstrong, namely Armaflex A/F. All standard plastics, other than the PVC's, are classified as either normal or easy burning. PVC-U is self-extinguishing (i.e. after removal of the flame the PVC will extinguish itself), PVC-C is flame retardant to most international test procedures (i.e. B1 to DIN 4102, or M1 to NF rance).

Toxicity and Smoke Generation

These requirements apply only to passenger bearing ships in accommodation, service and control spaces. The PVC's will not pass the toxicity test due to their



References

Georg Fischer has a wide range of experience of installing plastic and metal pipe systems on ships. Here is a sample of some projects undergone using Georg Fischer products:

halogen, or chlorine content, all other approved Georg Fischer plastics are halogen free. For smoke generation test results (ref. SOLAS II-2/34.7) please consult Georg Fischer.

Fishing Trawlers for:

Indirect Cooling: RSW (Refrigerated Sea Water): Ice Generation
 Use of ABS and PE on fishing trawlers is becoming more and more widespread due to the weight savings incurred from using a plastic system. Georg Fischer has various references in this field from Iceland, Sweden, Scotland and Australasia. Please consult Georg Fischer for further details.

Approvals

Georg Fischer has a whole range of approvals from all the major classification societies, namely Lloyds Register, Det Norske Veritas, American Bureau of Shipping, Bureau Veritas, Rina etc. Other approvals, for example NKK, CNS, US Coast Guard etc. are either in work or can be applied for on demand.

Ship Building Approvals Overview

Classification Society	GL	LR	BV	RINA	ABS	DNV	CCS
Material System							
ABS	•	•	•	•	•	•	
PVC-C	•	•	•	•	•	•	•
PVC-U	•	•	•	•	•	•	•
PE 100	•	•	•	•	•	•	•
PP-H		•	•	•	•	•	•
PB Instaflex	•	•	•	•	•	•	•
PP-R	•	•		•			
Aquasystem				•			
1.11.03							

Australia		
Oceanfast	20 m to 70 m High-Speed Ferries General Water Services	WAGA
Austal ships	Passenger Ferries Fresh Cold and Cooling Water	WAGA
Brunei		
Personal Yacht Sultan of Brunei	General Water Services	INSTAFLEX and WAGA
Bulgaria		
Futura Intenational Container Ship	Hot and Cold Water Distribution	INSTAFLEX
China		
Zhong Hua Shipyard	Fresh Water Services, Grey/Black Water	PE and PP
Shan Hai Guan Shipyard, Hebei	Hot Water	INSTAFLEX
Mayflower Resolution	Cold Water	PE-80
Offshore Windfarm	Gray Water	PE-80
Installations Vessel		
Croatia		
3.MAJ	Gray/Black water	PVC-C
Container Ships	Cold and Hot Water Distribution	PVC-C
Brodosplit Shipyard	Gray / Black Water	PVC-C
Container Ships		
Finland		
Masayards, Turku	Water Treatment for Swimming Pools	PVC-U
Masa Yards Helsinki	Hot and Cold Water Distribution for the Cabin Area	INSTAFLEX
Cruise Liner	Fresh Water Treatment Plants Pipes, Fittings and Valves	PVC-C
France		
Chantiers de l'Atlantique	Grey Water Dreamward and Winward Kloster Cruisers	PVC-U
	Grey Water Sovereign of the Sea RCCL	PVC-U
Germany		
Meyer-Werft	Water Treatment Plants for Swimming Pools Fresh Water Service for Cabins, Hot and Cold Water Treatment for Drinking Water Cooling Water (fresh Water and Sea Water)	ABS/PVC-U INSTAFLEX PP ABS
Lürssen-Werft Bremen-Vegesack	Grey Water	PVC-C
Fassmer-Bootswerft Lemwerder	Grey Water	PVC-U
Peene-Werft Wolgast	Ballast/Bilge	PE-100
Holland		
Van de Giessen du Nord	Sanitary Hot and Cold Water	PVC-C
Italian		
Fincantieri Cruise Liner	Hot and Cold Water Distribution for the Cabin Area Brine Distribution Foodcooling	Aquasystem PP-R ABS
Slovenia		
Betaplast Mega yachts	Vacume Sewage System, Aircon Chilled Water Distribution Aircon Chilled Water Distribution Hot and Cold Water Distribution and Valves Valves	PVC-U ABS Aquasystem PP-R PP-H
U.A.E.		
Dubai Dry Docks Mega Yachts	Hot and Cold Water Distribution Aircon Chilled Water Distribution Heating Distribution	INSTAFLEX INSTAFLEX INSTAFLEX
Ajman Dry Docks Casino Liner	Cold Water Distribution Hot Water Distribution Aircon Chilled Water Distribution Heating	PVC-C INSTAFLEX ABS INSTAFLEX
UK		
Tenacious Jubilee Sailing Trust Tall Ship	Hot and Cold Water Services	INSTAFLEX

Worldwide for You.



The technical data is not binding and not an expressly warranted characteristic of the goods. It is subject to change. Please consult our General Conditions of Supply.

The more complex the products and systems, the more important it is to offer specialist services. We consider it our duty to support our customers every step of the way wherever they may be. At present, our own sales organisations can be found in 16 countries on four continents. We are also continuously expanding our partnerships with distributors representing Georg Fischer worldwide.

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Piping Systems

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