



# Solutions for shipyards

Cruise Ships, Ferries, Mega Yachts, Merchant Fleets, Military Ships,  
Fishing Vessels, Offshore Platforms









# Passenger, commercial and military vessels and offshore platforms



**CRUISE SHIPS,  
FERRIES,  
MEGA-YACHTS**

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**MERCHANT FLEETS  
AND FISHING VESSELS**

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**MILITARY VESSELS**

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# Our identity

In a rapidly changing world, with a growing population and a changing climate, **water** is one of our planet's most precious resources, one that we must use with greater awareness and sustainability.

As a global leader in the industry that connects people with water and energy, Aliaxis is ready to take on this challenge and to help in shaping a better tomorrow.

We offer water and energy management systems all over the world, and it is the specific knowledge and experience of our people that enables us to support projects also in the naval sector, where our solutions and technologies enable superior performance and reduced operating costs without compromising on safety and durability.

**Our brands have been providing innovative solutions for over 60 years and represent our history and know-how in the field of Construction, Infrastructure and Industry.**

Aliaxis Italia develops personalised solutions and supports customers, from ideation to project execution, working together to define the ideal solution that can meet their needs and objectives.

A dense network of distributors, structured to guarantee not only the availability of products but also direct support and advice, is one of the many advantages that Aliaxis Italia delivers to its customers.



[www.fipnet.com](http://www.fipnet.com)









# From Proposal to Construction

Aliaxis is a leader in the management and conveyance of fluids.

**Aliaxis Italy** has a specialist team that caters to Shipowners, Shipyards and OEMs in the industry to offer:

- Consulting
- Solutions
- Technology

## CONSULTING

We listen to the needs of **Shipowners, Shipyards** and **OEMs** to find the most suitable solution. We work closely our partners from proposal to construction, providing the design, technical and regulatory support to achieve the desired result.

**If you have an ongoing project and would like advice, please contact:**

[ability@aliaxis.com](mailto:ability@aliaxis.com)

## ADVANTAGES

Aliaxis technology means:

- Being able to choose a complete system
- Assistance at the design stage
- Compliance with regulations
- High-performance materials
- Easy and fast installation
- Saving in installation times

Our team of technicians works closely with designers and companies from the **Proposal** to the **Construction phase**.

We build our service around our partner's needs.

**Treatment** and management of **water** on **seagoing vessels**:

- Water recycling.
- **Acoustic** comfort.
- **Air** quality.
- **Energy** saving.

We adapt our products and services to the needs of professionals and general contractors.

## GLOBAL DISTRIBUTION NETWORK

**Aliaxis** can guarantee rapid on-site service and availability of the same product at local level thanks to its global presence. Through this network it can support its partners on all continents through a presence in over 45 countries.







**For product lines relating to essential systems, water treatment, ballast water management, cooling systems, compressed air, and scrubbers, please contact:**

● **Industry Sales Technical Support technical.**  
fip@alioxaxis.com

**For product lines relating to sanitary water supply and drainage, please contact:**

● **Building Sales Technical Support**  
infotecnico.redi@alioxaxis.com

## Focus on

### IMO Resolution A.753

In 1993 the **International Maritime Organisation (IMO)** recognised a growing interest within the maritime sector in using materials other than steel for piping and the consequent need to **draw up specific requirements**, not yet included in the existing regulations, **for the use of rigid plastic pipes**.

The guidelines set out in **IMO Resolution A. 753**, adopted in November 1993, set out **acceptability criteria for plastics** to help Maritime Administrations make rational and uniform decisions regarding the permitted applications for such materials.

These guidelines provide the appropriate **design and installation requirements** for each specific application, as well as the fire behaviour criteria needed to ensure an **adequate level of safety** in accordance with the provisions of the International Convention for the Safety of Life at Sea (SOLAS) and MSC Circulars.

The continuous **development of plastics** for use on ships necessitated an update to A.753, with the adoption in 2010 of **resolution MSC.313 (88)**.

This revision also extended applicability to the use of flexible plastic hoses, synthetic rubbers, and materials with similar thermo-mechanical properties. In addition, it updated the specifications for **hydraulic sealing performance** and **fire resistance**.

In 2015 a further amendment was adopted by **MSC.399 (95)**, which revises and specifies the methods and criteria used for **testing on flame spread**, smoke generation and the toxicity of plastic pipes.

According to this resolution, pipe materials must **meet the requirements of the FTP (Fire Test Procedure) code**.











# Marine applications

*"If you want to build a boat, don't gather men to chop wood, divide up the tasks and give orders, but teach them to feel nostalgia for the vast and infinite sea."*

**(Antoine de Saint-Exupéry)**

In recent years, the need to move people and goods ever more rapidly and smoothly has led to a substantial development of the marine sector. Cruise ships these days are fully-fledged floating cities where guests can expect to find an endless array of new activities and superior comfort. In order not to fail to meet these expectations, vessels must be safe, comfortable, but also ready within a reasonable time and without excessive costs.

Compared to traditional metal solutions, plastic fluid conveyance solutions are the ideal option for

shipbuilding because they are corrosion-resistant and much lighter, as well as being quick and easy to install.

Aliaxis offers robust, high quality plastic systems specifically designed to reduce weight and noise on board civil and military vessels, as well as solutions for fire prevention and for minimising the risk of spreading the legionella bacteria.

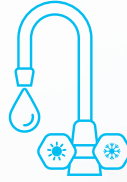
Our products ensure consistent performance throughout their lifetime, and a local technical support service is always available for any type of advice.



# Passenger, commercial and military vessels and offshore platforms



Essential systems



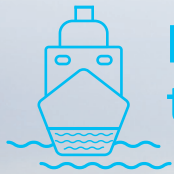
Hot and cold water



Water treatment



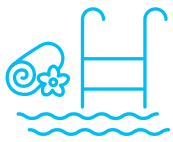
Black and grey water



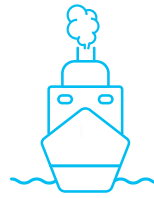
Ballast water treatment







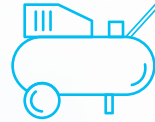
Swimming pools  
and spas



Exhaust gas  
scrubbers



HVACR  
installations



Compressed air



Ice production  
installations







## Cruise ships



Cruise ships must be increasingly comfortable and safe, with the constant introduction of original activities for passengers.

These ships are like floating cities, usually built within a very short time frame, and guarantee high quality and comfort with a cost-effective approach. Correct water management to prevent corrosion and ensure maximum safety on board are the main objectives in order to maximise the efficiency of life on board. Increasing the use of plastic systems and universal couplings, reducing ship weight and adding values such as noise reduction or fire prevention to improve the comfort and safety of passengers and crew.



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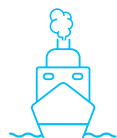
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# Ferries



Quick and easy maintenance to manage short stopovers in port is essential. Taking a ship out of service for unplanned stoppages would be an expensive option, and reliability is paramount.



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## Mega Yachts



Comfort and luxury are fundamental requirements for any mega yacht experience.

This is only possible if the essential functional requirements are facilitated by the use of reliable, high-quality materials.



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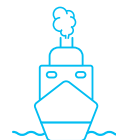
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# Merchant fleets



Today's supply chain and logistical needs require goods to be delivered without costly delays.

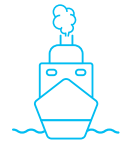
Stricter environmental regulations impose greater responsibility for the control of exhaust gases and ballast discharges, which require efficient and reliable solutions.



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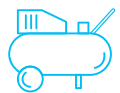
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## Trawlers and fishing vessels



With ships at sea for several months, long-distance fishing and its associated high value require total reliability of the water cooling and ice formation function.



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# Military vessels



The strategic and operational demands of effective defence vessels require absolute reliability, and all products must offer the highest quality and durability.



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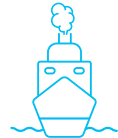
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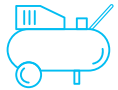
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## Offshore platforms



Due to their the distance from land, safety and reliability are paramount.

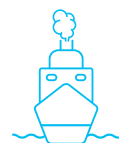
Durable solutions are essential to provide reliable supporting structures to operational activities.



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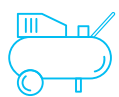
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# Our Brands







# Essential systems

The **SRtP** (Safe Return to Port) regulations, issued under the SOLAS Convention, were introduced by the IMO with the aim of setting minimum requirements for **"essential systems"** to ensure that ships are able to return to the nearest port in the event of damage due to fire, leakage or breakdown, or to **provide safe areas** to evacuate a ship within an appropriate time frame in the event of serious damage to one or more main vertical zones.

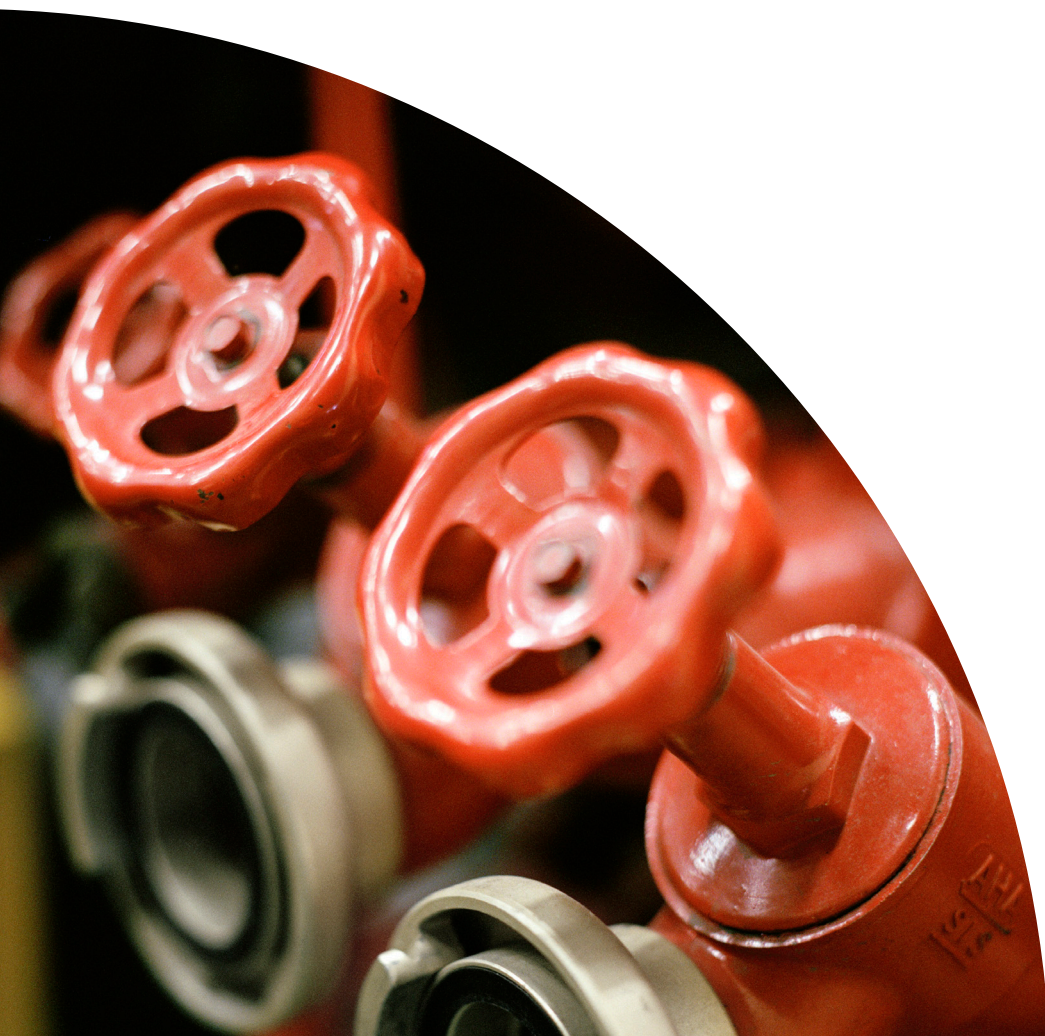
The regulations are mandatory for passenger ships built on or after 1 July 2010 with a length of 120 metres or more or with three or more main vertical zones.

The Safe Return to Port regulations imply a change in the design process for designers, shipbuilders, classification companies and for the administration of flag states.

Systems defined as essential include those related to the transport of fluids such as the main fire fighting system, bilge and ballast water management, systems to support safe areas and fuel transfer facilities.

In addition to increased safety for passengers and crew, a ship design that complies with safe harbour return regulations will provide additional benefits to operators.

Not only will the operation of the ship be more efficient and flexible through additional system capacities but the downtimes of systems during normal operation will also be reduced, ensuring the smooth running of the ship.





## STRAUB-FIRE-FENCE\*



### Technical data

- Size range:
  - Metal Grip FF 30.0 - 457.2
  - Grip FF 25.0 - 406.4
  - Open Flex 4 FF 323.9 - 508.0
- Temperature range: -30 °C to +100 °C
- Special lip seals: EPDM, NBR, FKM
- Straub Metal-Grip FF:
  - Body: AISI 316L or similar
  - Bolts: A4 - 80
  - Tie rods: AISI 316L or similar
  - Ribbon insert (optional): AISI 316L or similar/PVDF
- Straub Grip FF:
  - Body: AISI 316L or similar
  - Bolts: A4 - 80
  - Tie rods: AISI 316L or similar
  - Ribbon insert (optional): AISI 316L or similar/PVDF/HDPE
- Straub Open Flex FF:
  - Body: S32101
  - Bolts: AISI 316L
  - Tie rods: AISI 316L or similar
  - Ribbon insert (optional): HDPE

### Advantages

- Complete fire protection
- Approved for main manifold and fire-fighting systems
- Approved for transporting flammable liquids with ignition temperatures both below and above 60 °C

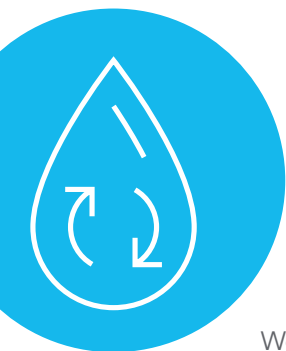
### Plus

- STRAUB-FIRE-FENCE couplings comply with the highest international standards for fire and temperature behaviour in accordance with ISO19921 and ISO19922
- STRAUB FIRE-FENCE is the optimal solution for many systems where fire protection is required

Intumescent plastic is firmly attached to the outside of the casing, which, in the event of fire, inflates and protectively encloses the coupling while maintaining full functional capability, offering users a simple, space-saving and safe pipe connection.







# Water treatment

## WASTE WATER TREATMENT

Waste water produced on board ships must be treated before being discharged into the sea to prevent any pollution of the marine environment.

Wastewater takes the form of grey and black water, and treatment systems separate and break down the load of organic contaminants to comply with International Maritime Organisation (IMO) legislation.

One of the most effective and widely used treatments involves the combination of a membrane bioreactor (MBR) with a reverse osmosis plant.

Once the osmosis treatment is complete, the resulting clean water can be safely pumped out without any threat to the environment, while the sludge resulting from the black water treatment is stored in a tank for further processing on board or pumped ashore when the ship reaches port.

## FRESH WATER GENERATION

Freshwater generation systems transform seawater into process water used for cooling systems, for example, or into service water for non-drinking uses or for drinking water.

The installations also filter and disinfect the water, regulate its hardness and mineralise the fresh water produced and stored.

## PVC-U SYSTEM



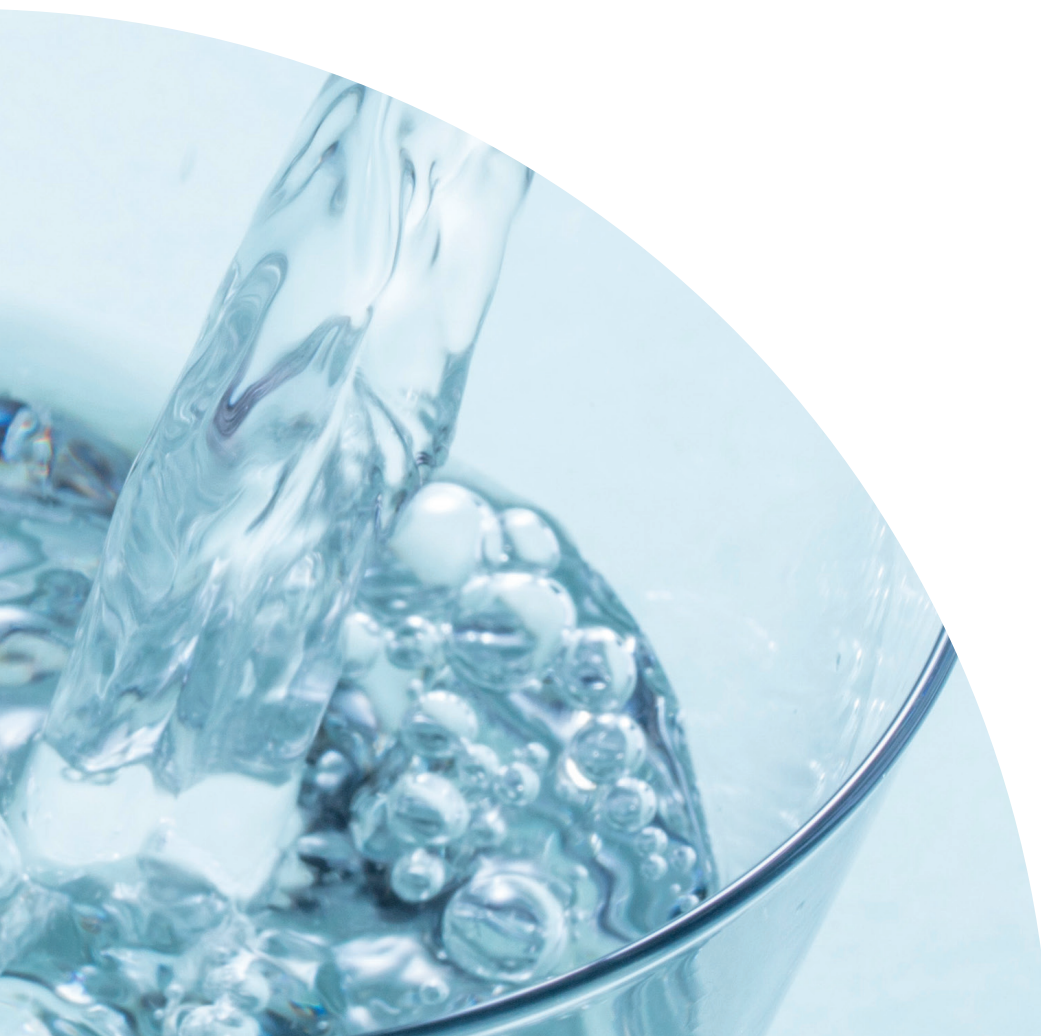
## PVC-U PIPES AND CONNECTIONS SYSTEM

### Technical data

- Standard for pipes: UNI EN ISO 15493, UNI EN ISO 1452
- Size range: d12mm – 315mm
- Joint: Cold welding
- Temperature range: 0°C ÷ +60°C
- Nominal pressure PN16 – PN10 with water at 20 °C
- Seal material: EPDM, FKM
- Wide range of ball valves, butterfly valves and diaphragm valves, manually operated and with electric or pneumatic actuator

### Advantages

- Simple, fast and secure jointing
- Inert to galvanic corrosion
- Abrasion resistance
- High chemical resistance:
- Good fire behaviour (compliance with low flame spread test in accordance with ASTM D 635, FTP code)





## TemperFIP100®



### PVC-C PIPES AND CONNECTION SYSTEM

#### Technical data

- Standard for pipes: UNI EN ISO 15493
- Size range: d16mm – 225mm
- Joint: Cold welding
- Temperature range: 0°C ÷ +100°C
- Nominal pressure PN16 – PN10 with water at 20 °C
- Seal material: EPDM, FKM
- Wide range of ball valves, butterfly valves and diaphragm valves, manually operated and with electric or pneumatic actuator

#### Advantages

- Simple, fast and secure jointing
- High thermal resistance
- Linear thermal expansion coefficients
- Low surface roughness
- Excellent fire behaviour (compliance with low flame spread test in accordance with ASTM D 635, FTP code)

## FLS INSTRUMENTATION



The FLS instrumentation range offers a wide selection of sensors and transmitters that can be combined with indicator monitors to allow remote control of the monitoring status through analogue and digital outputs.

#### Conductivity measurement

The generation of fresh water from seawater involves a significant reduction in salt concentration.

Starting from a seawater conductivity value of over 53 mS/cm, the various desalination processes – combined in some cases with mineralisation processes – must produce water with a conductivity suitable for each specific use:

- Process water 50÷500 µS/cm a 20 °C
- Service water 1000÷2500 µS/cm a 20 °C
- Drinking water 500÷1000 µS/cm a 20 °C

The application of conductivity measurement systems is therefore instrumental in defining the exact values for each application, optimising the effectiveness of the processes and identifying malfunctions or inefficiencies. The FLS instrumentation range enables the measurement of conductivity from 2 S/cm to 0.055 µS/cm.

## VKD DUAL BLOCK®



### BALL VALVE WITH PATENTED ANTI-VIBRATION SYSTEM

#### Technical data

- Standards: UNI EN ISO 1452, UNI EN ISO 15493, UNI EN ISO 15494
- Size range: d16mm – 110mm
- Joint: Cold welding, Flanging ISO-DIN / ANSI
- Nominal pressure PN 16 with water at 20 °C (PP-H: PN10)
- Body Material: PVC-U, PVC-C, ABS, PP-H
- Seal material: EPDM, FKM
- Wide range of manually operated versions and with electric or pneumatic actuator

#### Advantages

- Minimised pressure losses thanks to the full-bore ball valve
- Safety against accidental operation thanks to 0° – 90° handle lock
- Good fire behaviour (compliance with low flame spread test in accordance with ASTM D 635)

#### Plus

- The patented Dual Block® system ensures the tightness of the ring nuts even in the event of vibration or thermal expansion
- Patented Seat Stop® ball carrier system that lets you micro-adjust ball seats and minimise the axial force effect
- With the same features as the Dual Block® series, three-way versions (TKD series) and adjustment versions (VKR series) are also available





# Ballast water treatment

Over the years, the loading and unloading of ballast water in different geographical areas has resulted in significant imbalances to local marine ecosystems caused by the introduction of invasive species. The most effective way to limit the spread of non-native species transported in ballast water is to prevent their introduction.

In 2004, therefore, the International Maritime Organisation (IMO) introduced the Ballast Water Code (BWC) to regulate the control and management of water and sediment in ballast water for all ships over 400 GT.

The Ballast Water Management Convention (BWMC), which came into force on 8 September 2017, requires ships to treat the water contained in their tanks in order to remove invasive species such as Asian Undaria, Vibrio Cholerae, European Green Crab, and North Pacific Starfish, or to render them harmless before discharging at ports of arrival, issuing an international certificate and recording each movement on a special register.

FRIALEN®



## PE100 PIPES AND CONNECTIONS SYSTEM FOR ELECTROFUSION

### Technical Data

- Standard for pipes: UNI EN 12666
- Size range:
  - Pipes up to d1200mm
  - Connections:
    - Butt welding d16mm-800mm
    - Electrofusion d20mm-1200mm
- Jointing: butt welding, electrofusion
- Temperature range  $-20^{\circ}\text{C} \div +60^{\circ}\text{C}$
- Nominal pressure: PN 10-16 with water at  $20^{\circ}\text{C}$

### Advantages

- Lightweight, flexible and impact-resistant material, fully recyclable
- Suitable for longitudinally stressed pipes due to the inherent elasticity of the material
- Easy and safe installation using butt welding or electrofusion techniques





## FLS INSTRUMENTATION



By measuring the parameters in the various systems, performance can be optimised and effective action can be taken in both the routine and non-routine management of individual processes.

### REDOX AND CHLORINE MEASUREMENT

In order to comply with the BWMC guidelines, ballast water handling must be implemented with disinfection systems based on the use of chlorine chemicals, ozone or UV irradiation.

Although UV treatment has become increasingly popular, chlorination is still the technique that offers the best compromise between efficiency, environmental friendliness and operating costs. The chlorination process of ballast water can be carried out either by dosing with hypochlorite, produced by electrolysis from seawater, or by the in-situ production of chlorine dioxide.

The FLS instrumentation range enables these processes to be monitored with simple RedOx probes or with more specific sensors for measuring free chlorine or chlorine dioxide.

## STRAUB-METAL-GRIP



### MECHANICAL COUPLINGS FOR METAL AND PLASTIC PIPES

#### Technical Data

- Size range: 30.0 ÷ 609.6 mm
- Temperature range: -30°C to +100°C
- Seal bushing EPDM, NBR, FKM
- Components/Materials:
  - Body: AISI 316L or similar
  - Bolts: A4 - 80
  - Tie rods: AISI 316L or similar
  - Ribbon insert (optional): AISI 316L or similar/PVDF

#### Advantages

- Installation along close lines or in small spaces thanks to its compact design
- Minimal installation time and optimised downtimes
- Compensation of axial misalignments and angular deviations. Joint and compensation in a single element
- Weight 75% lower than flange connections, increased payload
- Reduction of mechanical stress on pipes from vibrations, oscillations and water hammering
- Can be applied to metal and plastic pipes (using reinforcement ring)

## FK HEAVY DUTY



### BUTTERFLY VALVE WITH HANDLE LOCK

#### Technical Data

- Standards: UNI EN ISO 1452, UNI EN ISO 15493, UNI EN ISO 15494
- Size range: DN40 - DN 400
- Joint: Flanging ISO 9624, ISO 7005-1, EN 1092-1, DIN 2501, ANSI B16.5 Cl.150
- Nominal pressure:
  - Wafer version: DN 40÷250: PN 10, DN 300: PN 8, DN 350: PN 7, DN 400: PN 6 with water at 20 °C
  - Lug version: DN 65÷200: PN 10, DN 250÷300: PN 6 with water at 20 °C
- Body material: PP-GR
- Disc materials: PVC-U, PVC-C, ABS, PP-H
- Stem: Stainless steel AISI 316
- Seal material: EPDM, FKM
- Wide range of manually operated versions and with electric or pneumatic actuator

#### Advantages

- High mechanical resistance thanks to glass-fibre reinforced polypropylene body (PP-GR)
- Lug version can also be installed as an end line valve, bottom discharge valve or tank dump valve
- Good fire behaviour (compliance with low flame spread test in accordance with ASTM D 635)

#### Plus

- Locking, unlocking, rapid operation and graduated adjustment in 10 intermediate positions thanks to ergonomic HIPVC handle
- High-level performance over time thanks to the stainless steel stem completely insulated from the fluid with a square cross-section in accordance with ISO 5211





# Hot and cold water

The need to ensure the hygienic safety of closed, confined and high occupancy environments, such as cruise ships, has become increasingly pressing.

Preventing the risk of contamination also means paying special attention to all sanitary water supply and drinking water distribution systems to avoid bacteriological proliferation.

Biofilm is a microbial community that adheres to the surface of pipelines.

The water/material interface is an ideal place for the build-up and development of bacteria, such as *Legionella*, which develops in water circuits at temperature ranges of between 25°C and 45°C, or *Pseudomonas* bacteria, which develop in cold sanitary water networks. The presence of biofilms, corrosion and limescale deposits in pipes are factors that favour their proliferation.

To limit the development of bacteria in water conveyance circuits, three operations are therefore essential: combating the formation of limescale deposits and corrosion in pipes, keeping the water in systems at a high temperature or being able to increase the temperature according to sanitary treatment needs, and avoiding water stagnation by ensuring correct circulation.

To apply these measures, chemical/thermal shock or continuous treatments can be carried out.





## FLUXO



### FLEXIBLE MULTILAYER SYSTEM

#### Technical data

- Standard for pipes: UNI EN ISO 21003
- Size range: d16mm – d75mm
- Joint: Mechanical crimping
- Temperature range  $-45^{\circ} \div 100^{\circ}\text{C}$
- Nominal pressure: PN 10
- Material: 5-layer PEX-b – Al- PEX-b insulated pipe
- Wide range of pipes, connections and valves

#### Advantages

- Flexible hoses, easy to bend also by hand
- Minimised thermal expansion
- Limited pressure drops
- Classification of reaction to fire BL S1 D0

## WEFATHERM



### PP-R/PP-RCT PIPE AND CONNECTION SYSTEM FOR POLYFUSION AND ELECTROFUSION

#### Technical data

- Standard for pipes: UNI EN ISO 15874 PP-R SDR 6 – 7.4 – 11; PP-RCT SDR 7.4 – 9 – 11
- Size range: PP-R d20mm – d125 mm, PP-RCT d20mm – d315 mm
- Jointing: polyfusion and electrofusion
- Temperature range PP-R from  $5^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ ; PP-RCT from  $5^{\circ}\text{C}$  to  $95^{\circ}\text{C}$
- Nominal pressure: PP-R PN20, PN16, PN10; PP-RCT PN20, PN16, PN10
- Material: PP-R, PP-RCT
- Wide range of pipes, connections, plastic-brass transition connections and valves

#### Advantages

- PP-R:
  - low propensity to create deposits
  - high chemical resistance
  - excellent value for money
- PP-RCT:
  - minimised thermal expansion
  - high resistance to mechanical stress

## SYSTEM'O



### TWO-COLOUR PVC-C PIPES AND CONNECTIONS SYSTEM

#### Technical data

- Standard for pipes: UNI EN ISO 15877
- Size range: d16mm – d160 mm
- Jointing: cold welding
- Temperature range:  $5^{\circ}\text{C}$  to  $90^{\circ}\text{C}$
- Nominal pressure: HTA PN25 < d63mm, PN16 < d160mm; HTA-F PN16
- Material: PVC-C HTA, PVC-C HTA-F
- Wide range of pipes, connections, plastic-brass transition connections, valves and dedicated clamping system

#### Advantages

- Simple, fast and secure jointing
- Dedicated hot (HTA) and cold (HTA-F) water solutions easily identifiable within the system
- More than 98% recyclable
- Limited pressure drops

#### Plus

- Fire behaviour in accordance with MSC.399.
- PVC-C is one of the least biofilm-promoting materials due to the low roughness of its surface. It is also able to withstand chemical treatments (continuous chlorination and hyperchlorination) due to its excellent compatibility with products containing chlorine or derivatives, and thermal treatments (thermal shock or constant temperature maintenance between  $55^{\circ}\text{C}$  and  $60^{\circ}\text{C}$ ) due to its strong mechanical resistance properties.





# Black and grey water

Already in the 1970s, the issue of ship waste water management led more than 160 countries to sign an international convention.

Since 1973, black and grey water discharges have been regulated at international level by Annex IV of the International Convention for the Prevention of Pollution from Ships, known as MARPOL 73/78. The discharge of waste water or "black water" into the sea is prohibited except under the specific conditions laid down in the Annex.

The number of passengers on cruise ships has increased by 10% per year over the past decade, and the growing popularity of this type of tourism has multiplied the number of ships and their size, resulting in a significant increase in the volume of black and grey water produced.

To safeguard the well-being of the world's seas, the most attentive and responsible companies have already initiated processes to modernise all systems and equipment for the treatment and purification of waste water and the management of sludge.

FRIALEN



## PE100 PIPES AND CONNECTIONS SYSTEM FOR ELECTROFUSION

### Technical data

- Standard for pipes: UNI EN 12666
- Size range:
- Tubes up to d1200mm
  - Connections:
    - Butt welding d16mm-800mm
    - Electrofusion d20mm-1200mm
- Jointing: butt welding, electrofusion
- Temperature range  $-20^{\circ}\text{C} \div +60^{\circ}\text{C}$
- Nominal pressure: PN 10 - PN 16 with water at  $20^{\circ}\text{C}$

### Advantages

- Lightweight, flexible and impact-resistant material, fully recyclable
- Suitable for longitudinally stressed pipes due to the inherent elasticity of the material
- Easy and safe installation with and butt welding or electrofusion techniques





## PHONOBLOCK



### PUSH-FIT PVC-U PIPES AND CONNECTIONS SYSTEM

#### Technical data

- Standard for pipes: UNI EN 1329
- Size range: from Ø40 to Ø160
- Jointing: push-fit system
- Temperature range: 0 °C to 70 °C
- Material: PVC-U enriched with mineral fillers
- Wide range of pipes, connections and dedicated clamping system

#### Advantages

- Installation without the use of tools or solvents
- Reaction to fire classification Euroclass B-s1-d0
- High acoustic comfort certified by the Fraunhofer Institute at 13dB-2l/s
- Low weight

## STRAUB-FLEX



### MECHANICAL COUPLINGS FOR METAL AND PLASTIC PIPES

#### Technical data

- Size range: 48.3 ÷ 2032 mm
- Temperature range: -20°C to +180°C
- Special lip seal: EPDM, NBR, FKM
- Components/Materials:
  - Body: AISI 316L or similar
  - Bolts: A4 - 80
  - Tie rods: AISI 316L
  - Reinforcement ring (optional): AISI 316L

#### Advantages

- Installation along close lines or in small spaces thanks to its compact design
- Minimal installation time and optimised downtimes
- Compensation of axial misalignments and angular deviations
- Joint and compensation in a single element
- Weight 75% lower than flange connections, increased payload
- Reduction of mechanical stress on pipes from vibrations, oscillations and water hammering
- Can be applied to metal and plastic pipes (using reinforcement ring)

## HTA®-E

**MSC.399**



### PVC-C PIPES AND CONNECTION SYSTEM

#### Technical data

- Standard for pipes: UNI EN 1329
- Size range: from Ø40 to Ø200
- Jointing: cold welding
- Temperature range: 5 °C to 100 °C
- DP: 3 bar with water at 20°C, peak 70°C for 1/2 hour
- Material: PVC-C HTA-E
- Wide range of pipes, connections and dedicated clamping system

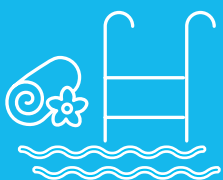
#### Advantages

- Simple, fast and secure jointing
- Easy installation thanks to lightweight components
- More than 98% recyclable

#### Plus

- Fire behaviour in accordance with MSC.399





# Swimming pools and Spas

Among the most popular leisure activities during cruises or long voyages are swimming pools and wellness centres; for this reason a great deal of attention is paid to their fitting and maintenance to guarantee high and constant water quality for the comfort and health of passengers, while aligning the maintenance schedules of these areas with those commonly used in revamping the rest of the vessel.

## PVC-U SYSTEM



## PVC-U PIPES AND CONNECTIONS SYSTEM

### Technical data

- Standard for pipes: UNI EN ISO 1452, UNI EN ISO 15493
- Size range: d12mm – 315mm
- Joint: Cold welding
- Temperature range 0°C ÷ +60°C
- Nominal pressure: PN16 – PN10 with water at 20 °C
- Seal material: EPDM, FKM
- Wide range of ball valves, butterfly valves and diaphragm valves, manually operated and with electric or pneumatic actuator

### Advantages

- Simple, fast and secure jointing
- Inert to galvanic corrosion
- Abrasion resistance
- High chemical resistance:
- Good fire behaviour (compliance with low flame spread test in accordance with ASTM D 635, FTP code)



## TemperFIP100®



### PVC-C PIPES AND CONNECTIONS SYSTEM

#### Technical data

- Standard for pipes: UNI EN ISO 15493
- Size range: d16mm - 225mm
- Joint: Cold welding
- Temperature range 0°C ÷ +100°C
- Nominal pressure: PN16 - PN10 with water at 20 °C
- Seal material: EPDM, FKM
- Wide range of ball valves, butterfly valves and diaphragm valves, manually operated and with electric or pneumatic actuator

#### Advantages

- Simple, fast and secure jointing
- High thermal resistance
- Linear thermal expansion coefficients
- Low surface roughness
- Excellent fire behaviour (compliance with low flame spread test in accordance with ASTM D 635, FTP code)

## FLS INSTRUMENTATION



When constructing leisure areas such as swimming pools or water parks installers prefer blind transmitters connected directly to a control PLC for managing the hydraulic systems.

This solution gives financial advantages especially on systems where a single parameter needs to be monitored or where there are no complex management requirements.

### FLOW MEASUREMENT

The pool water management circuit is based on correct hydraulic balancing and therefore benefits from flow monitoring at several points in the circuit.

The characteristics of the water before or after the filtration system may require the application of different technologies for correct measurement.

If there are solid particles in suspension it is preferable to use electromagnetic instruments which, having no moving parts, ensure reliable measurement over time.

In the case of already filtered water, however, a simple rotor sensor may be the best compromise for monitoring the various parts of the system.

The FLS instrumentation range offers solutions based on electromagnetic technology as well as simple rotor sensors based on insertion installation, which gives considerable advantages in terms of both installation and subsequent maintenance.

## EASYFIT® VALVES



### BUTTERFLY AND BALL VALVES WITH PATENTED EASY-LABELLING SYSTEM

#### Technical data

##### FE PVC-U butterfly valve

- Standards: UNI EN ISO 1452, UNI EN ISO 15493
  - Size range: DN 40 ÷ 200
  - Joint: Flanging ISO 9624, ISO 7005-1, EN 1092-1, DIN 2501, ANSI B16.5 Cl.150
  - Nominal pressure:
    - DN 40÷50: PN 16 with water at 20 °C
    - DN 65÷200: PN 10 with water at 20 °C
  - Components/Materials:
    - Body material: PVC-U
    - Disc material: PVC-U
    - Stem: Galvanised carbon steel, fluid-insulated
    - Seal material: EPDM, FKM
  - Temperature range 0 °C ÷ 60 °C
- Wide range of manually operated versions and with electric or pneumatic actuator

##### VEE PVC-U ball valve

- Standards: UNI EN ISO 15493
- Size range: DN 10÷100
- Jointing: cold welding or threaded
- Nominal pressure: PN 16 with water at 20 °C
- Components/Materials:
  - Body material: PVC-U
  - Seal material EPDM
- Temperature range 0 °C ÷ 60 °C

#### Advantages

Good fire behaviour (compliance with low flame spread test in accordance with ASTM D 635, FTP code)

#### Plus

The Easyfit labelling system allows valves to be personalised with company trademarks, serial or identification codes or service data such as the function of the valve within the system or the fluid conveyed; specific information for after-sales service to customers can also be included, for example the contact details of the installer or the date and place of installation.



# HVACR and ice production systems

## HVACR SYSTEMS

The correct design of heating, ventilation, air conditioning and refrigeration systems has the objective of achieving maximum comfort and environmental healthiness, with particular attention to saving energy.

Filtration systems and specific air treatments help to reduce the bacterial load, preventing any proliferation.

A good performance by these systems depends on regular maintenance, in accordance with the relevant regulations, and on the choice of high-quality components.

## ICE PRODUCTION

Fish products must be chilled as quickly as possible after being loaded on board.

Vessels equipped in accordance with the guidelines for the correct preservation of the catch are equipped with ice-making machines. The ice produced must be made from drinking water or purified seawater which, using innovative and sustainable systems, brings the water to a temperature of  $-3$  degrees to produce a kind of liquid slush with high refrigeration properties.



## FLUXO



### FLEXIBLE MULTILAYER SYSTEM

#### Technical data

- Standard for pipes: UNI EN ISO 21003
- Size range: d16mm – d75mm
- Joint: Mechanical crimping
- Temperature range  $-45^{\circ} \div +100^{\circ}\text{C}$
- Nominal pressure: PN 10
- Material: 5-layer PEX-b – Al – PEX-b insulated tube
- Wide range of pipes, connections and valves

#### Advantages

- Flexible hoses, easy to bend also by hand
- Minimised thermal expansion
- Limited pressure drops
- Classification of reaction to fire BL S1 D0

## FRIALEN



### PE100 PIPES AND FITTINGS SYSTEM FOR ELECTROFUSION

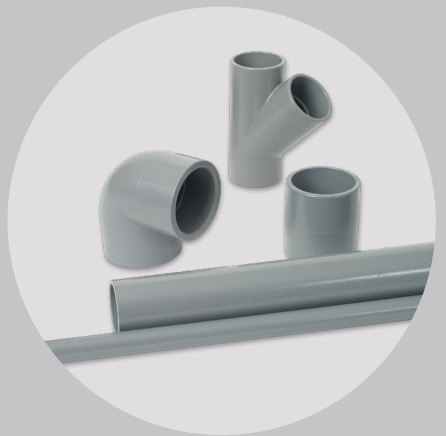
#### Technical data

- Standard for pipes: UNI EN 12201, ISO 4427
- Size range:
  - Tubes up to d1200mm
  - Connections:
    - Butt welding d16mm–800mm
    - Electrofusion d20mm–1200mm
- Jointing: butt welding, electrofusion
- Temperature range  $-20^{\circ}\text{C} \div +60^{\circ}\text{C}$
- Nominal pressure: PN 10 – PN 16 with water at  $20^{\circ}\text{C}$

#### Advantages

- Lightweight, flexible and impact-resistant material, fully recyclable
- Suitable for longitudinally stressed pipes due to the inherent elasticity of the material
- Easy and safe installation using butt welding or electrofusion techniques

## SUPERFLO



### ABS PIPES AND CONNECTIONS SYSTEM

#### Technical data

- Standard for pipes: UNI EN ISO 15493, BS 5391
- Size range: d16mm – 315mm
- Joint: Cold welding
- Temperature range  $-40^{\circ}\text{C} \div +60^{\circ}\text{C}$
- Nominal pressure: PN10 – d16– d250mm, PN8 – d315mm
- Seal material: EPDM, FKM
- Wide range of ball valves, butterfly valves and diaphragm valves, manually operated and with electric or pneumatic actuator

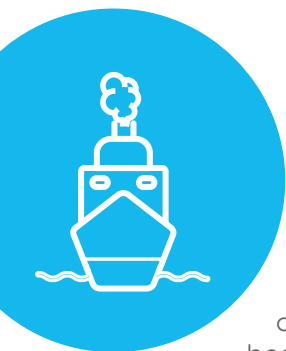
#### Advantages

- Simple, fast and secure jointing
- High resistance to low temperatures
- Low surface roughness
- Corrosion and impact-resistant
- Good fire behaviour (ASTM D635, low flame spread)

#### Plus

- Complete system consisting of pipe, connections, and manual and actuated valves





# Exhaust gas scrubber

Reducing sulphur oxide (SOx) and nitrogen oxide (NOx) emissions from ships has been a priority for a number of years. These emissions are harmful to human health because they are responsible for respiratory disorders and lung diseases.

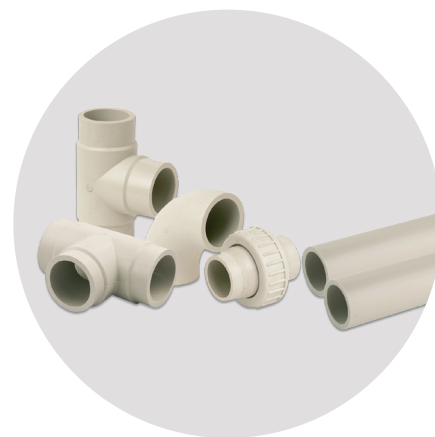
In the atmosphere they cause acid rain which damages crops, forests, and marine and terrestrial wildlife.

IMO regulations to reduce these emissions first came into force in 2005, under Annex VI of the International Convention for the Prevention of Pollution from Ships, known as the MARPOL Convention. Increasingly stringent enforcement of these regulations will significantly reduce the amount of SOx and NOx emitted by from ships, thus bringing tangible health and environmental benefits particularly to areas close to ports and major shipping lanes.

This can be achieved using low-sulphur concentration fuels, and by applying scrubbers and flue gas treatment systems based on scrubbing with urea injections for NOx or with strong alkaline solutions for SOx, before disposal through chimneys.

To reduce the production of nitrogen oxides, IMO Tier III regulations require diesel engines to use SCR (Selective Catalytic Reduction) systems.

## PP-H SYSTEM



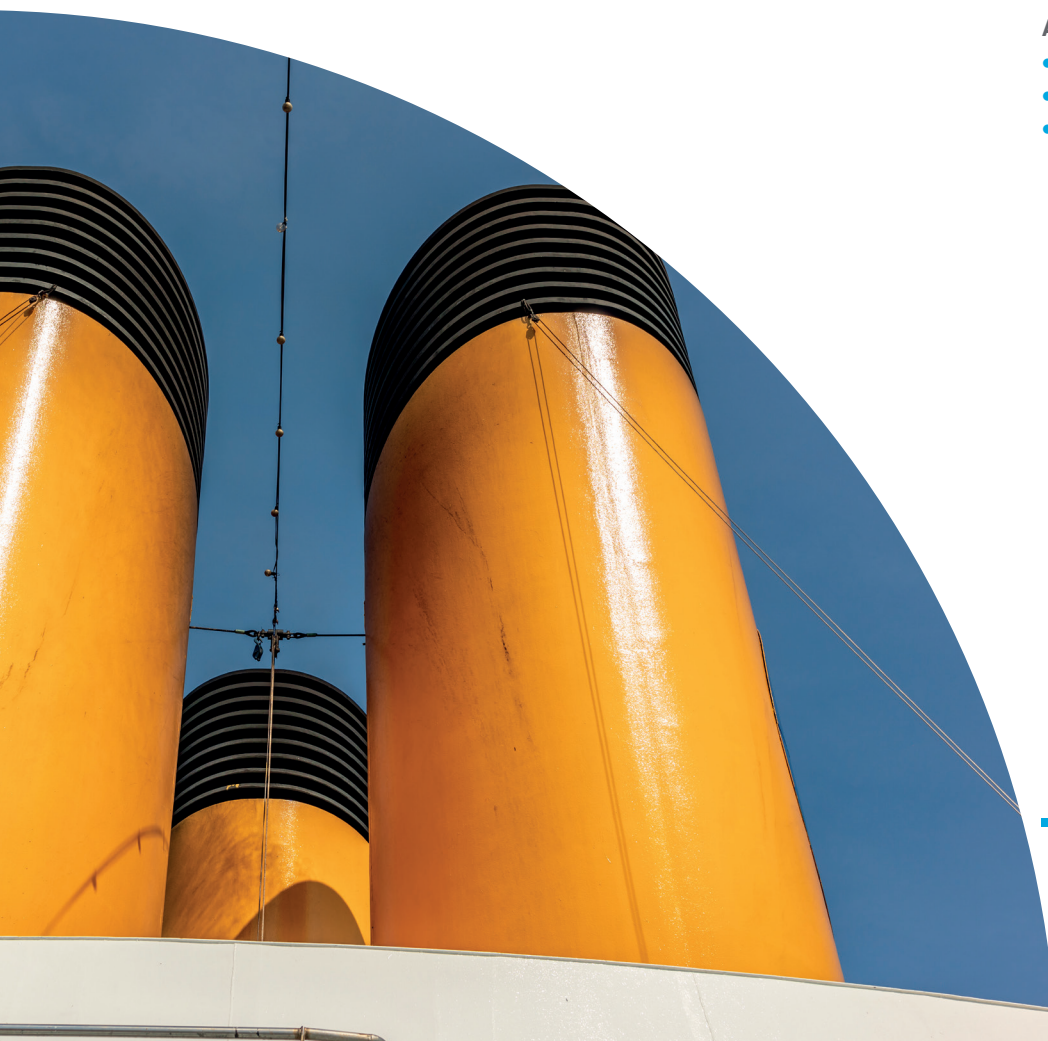
## PP-H PIPES AND CONNECTIONS SYSTEM

### Technical data

- Standard for pipes: UNI EN ISO 15494
- Size range:
  - Pipes up to d20mm - d800mm
  - Connections:
    - Butt welding d20mm- d630mm
    - Pocket welding d20mm-110mm
- Jointing: butt welding, pocket welding
- Temperature range 0°C÷+100°C
- Wide range of ball valves, butterfly valves and diaphragm valves, manually operated and with electric or pneumatic actuator

### Advantages

- High chemical resistance:
- Excellent thermal stability:
- Practical and safe installation using butt or pocket welding techniques





### PE100 PIPES AND FITTINGS SYSTEM FOR ELECTROFUSION

#### Technical data

- Standard for pipes: UNI EN 12201, ISO 4427
- Size range:
  - Tubes up to d1200mm
  - Connections:
    - Butt welding d16mm-800mm
    - Electrofusion d20mm-1200mm
- Jointing: butt welding, electrofusion
- Temperature range  $-20^{\circ}\text{C} \div +60^{\circ}\text{C}$
- Nominal pressure: PN 10 – PN 16 with water at  $20^{\circ}\text{C}$

#### Advantages

- Lightweight, flexible and impact-resistant material, fully recyclable
- Suitable for longitudinally stressed pipes due to the inherent elasticity of the material
- Easy and safe installation using butt welding or electrofusion techniques



Flue gas treatment systems, like other systems including those for ballast water treatment, are assembled by OEMs specialised in building complete systems for specific treatments and are delivered to shipyards on a turnkey basis.

The maintenance and servicing of pre-assembled systems requires specific skills, and identifying the primary supplier is essential for quickly resolving any problems without putting the functionality and efficiency of the entire system at risk.

Aliaxis supplies customisable products to give prominence to the OEM, facilitating immediate contact. It also makes available a worldwide distribution network to supply the correct parts and deliver them rapidly on site.

#### PH MEASUREMENT

Wet scrubbing of NO<sub>x</sub> and SO<sub>x</sub> from flue gas typically generates changes in the pH of the scrubbing solution for the transformation of these oxides into soluble inorganic compounds. This solution, during normal operation of the scrubbers, is kept at a constant pH to maintain the correct efficiency of the process. Constant and accurate monitoring of pH values is therefore essential to ensure that the treatment is working properly and that emissions into the atmosphere are clean.

The FLS range of instrumentation offers solutions to meet the needs of different treatments depending on the composition of the flue gas, even in a particularly difficult application such as in the presence of sulphur oxides (SO<sub>x</sub>) for which a strongly alkaline solution must be used.



### PE100 PROJECT-BASED PREFABRICATED CONNECTIONS

#### Technical data

- Standard for pipes: UNI EN 12201, ISO 4427
- Size range:
  - Seamless elbows d50 d710mm
  - Sector elbows and T-connections d110-d1000mm
  - Welded bypasses in segments 45°/60°
- Jointing: butt welding
- Temperature range  $20^{\circ}\text{C} \div +60^{\circ}\text{C}$
- Nominal pressure: PN 10 – PN 16 with water at  $20^{\circ}\text{C}$

#### Advantages

- Lightweight, flexible and impact-resistant material, fully recyclable

#### Plus

- 100% customised service, even for small batches
- Personalised consultancy for each project





# Compressed air

Compressed air conveyance and distribution systems on board ships are typically used in a variety of contexts: from starter engines to generating air bubbles under the hull, but also for pneumatic handling systems and in support of leisure activities.

## Air for starting engines

Compressed air is used on board ocean-going vessels as a powerful storable energy source for starting large diesel engines. Compressed air, which is used at 10 bar, is stored at higher pressures to make the best use of space and allow more start-up attempts.

## Air for hull lubrication

To minimise hydrodynamic friction, low-pressure air is blown through small holes in specially designed hulls to create a layer of air between the hull and the water. This technique reduces fuel consumption by more than 25%, which also leads to significant reductions in CO<sub>2</sub> emissions.

## Air for automation systems

There are many on-board systems and processes that require compressed air, including motorised emission monitoring systems, speed controls, control valves and pneumatic handling systems such as for automatic door opening.

## Inert gas (nitrogen)

Ships using or transporting LNG (liquefied natural gas) as a fuel source must pressure the fuel tanks with nitrogen to avoid possible explosions. The ability to generate nitrogen on-site optimises the use of space that is would otherwise be needed to house bulky nitrogen tanks.



## STRAUB-PLAST GRIP



### MECHANICAL COUPLINGS FOR METAL AND PLASTIC PIPES

#### Technical data

- Size range: d40.0 to d355.0 mm
- Temperature range -20°C to +100°C
- Special lip seals: EPDM, NBR
- Components/Materials:
  - Body: AISI 316L or similar
  - Bolts: AISI 4135, A4 - 80
  - Tie rods: AISI 12L14, AISI 316L or similar
  - Ribbon insert (optional): AISI 316L or similar/PVDF

#### Advantages

- Installation along close lines or in small spaces thanks to its compact design
- Minimal installation time and optimised downtimes
- Compensation of axial misalignments and angular deviations
- Joint and compensation in a single element
- Weight 75% lower than flange connections, increased payload
- Reduction of mechanical stress on pipes from vibrations, oscillations and water hammering
- Can be applied to plastic pipes of different types and SDRs

## AIR-LINE Xtra



### COEXTRUDED ABS/POLYAMIDE PIPE, CONNECTION AND VALVE SYSTEM

#### Technical data:

- Standard for pipes: UNI EN ISO 15493
- Size range: d16mm - 110mm
- Joint: Cold welding
- Temperature range -20°C ÷ +50°C
- Nominal pressure: PN12.5
- Seal material: EPDM, FKM
- Wide range of ball valves, butterfly valves and diaphragm valves, manually operated and with electric or pneumatic actuator

#### Advantages

- Low weight
- Ease of installation
- Corrosion resistant
- Low surface

#### Plus

- Air-Line Xtra is the ideal solution to ensure that air is kept clean and uncontaminated for use in any type of process



# Standards & Approvals

Our extensive range is approved by the world's leading certification bodies.











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