



# Cooling

From Applications to Products

+GF+

GEORG FISCHER
PIPING SYSTEMS

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# GF Piping Systems

## Your global system provider

**We are dedicated to designing, manufacturing and marketing piping systems for the safe and secure conveyance of liquids and gases.**

### We put customers first
- customer needs guide our product development
- we offer customer support and training worldwide
- we measure your satisfaction

### We act fast
- local presence worldwide
- superior logistics
- speed in all aspects

### We do what we say
- tested quality
- always trustworthy

## Your global benefits at a glance

### Training
- different types of materials and products
- installation techniques
- connection and jointing techniques

### Planning
- professionally trained staff
- planning documentation (online, CD-ROM)
- product library (online and CD-ROM)
- online catalogues

### Standards
- ISO
- BS
- ASTM
- JIS

### Distribution network and availability

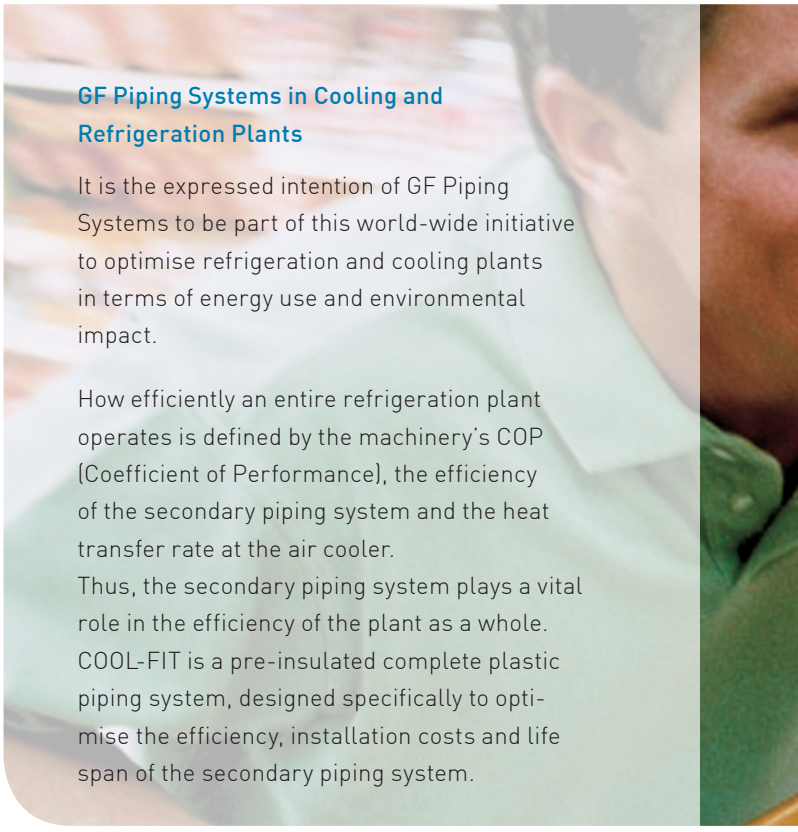
# Introduction

## GF Piping Systems and your Refrigeration / Cooling application

The origin of the artificial refrigeration process occurred not uncoincidentally at the same time as initial research into physics and thermodynamics. Linde, Carrier, Carre, Cullen and Harrison are prominent names in the history of refrigeration.

GF Piping Systems has been producing piping components since 1802, initially in malleable iron, nowadays with engineered system solutions for specific applications. One example is the high-purity, top-grade plastic piping systems developed by GF Piping Systems for the manufacture of semi-conductors.

Refrigeration systems place high demands on the piping system, which has a direct impact on the reliability, efficiency and life span of the plant.



## GF Piping Systems in Cooling and Refrigeration Plants

It is the expressed intention of GF Piping Systems to be part of this world-wide initiative to optimise refrigeration and cooling plants in terms of energy use and environmental impact.

How efficiently an entire refrigeration plant operates is defined by the machinery's COP (Coefficient of Performance), the efficiency of the secondary piping system and the heat transfer rate at the air cooler.
Thus, the secondary piping system plays a vital role in the efficiency of the plant as a whole.
COOL-FIT is a pre-insulated complete plastic piping system, designed specifically to optimise the efficiency, installation costs and life span of the secondary piping system.

## Secondary Refrigeration

One of the consequences of national and international regulation to reduce and eliminate freons is an increase in the use of so-called secondary refrigeration systems. Such systems reduce the amount of environmentally unfriendly primary charge (freon gas) in a plant by about 80 %.
Leaks in standard refrigeration systems can be as high as 35 % of the original charge per year. This is not only immensely damaging to the environment, but also costs a great deal to refill the systems.

# GF Piping Systems

## → Your benefits

- no corrosion
- zero maintenance
- energy efficient
- reduced plant running costs
- simple, reliable installation
- dedicated system solutions
- sustainable

Commonly used in larger industrial refrigeration installations where large charges of refrigerant gases can be a health and safety issue, secondary refrigeration plants have several advantages:

- higher safety
- lower refill costs
- higher temperature stability and control
- lower maintenance costs
- environmentally friendly.

Secondary systems also allow removal of refrigerant gases from the working or retail area into a separate machine room. This means that natural refrigerant gases such as ammonia or propane can be used to replace man-made freons with no danger to the personnel or public. The result is a 100 % sustainable plant with zero impact on the environment and with an improved efficiency.

# The Environment

## The Environment

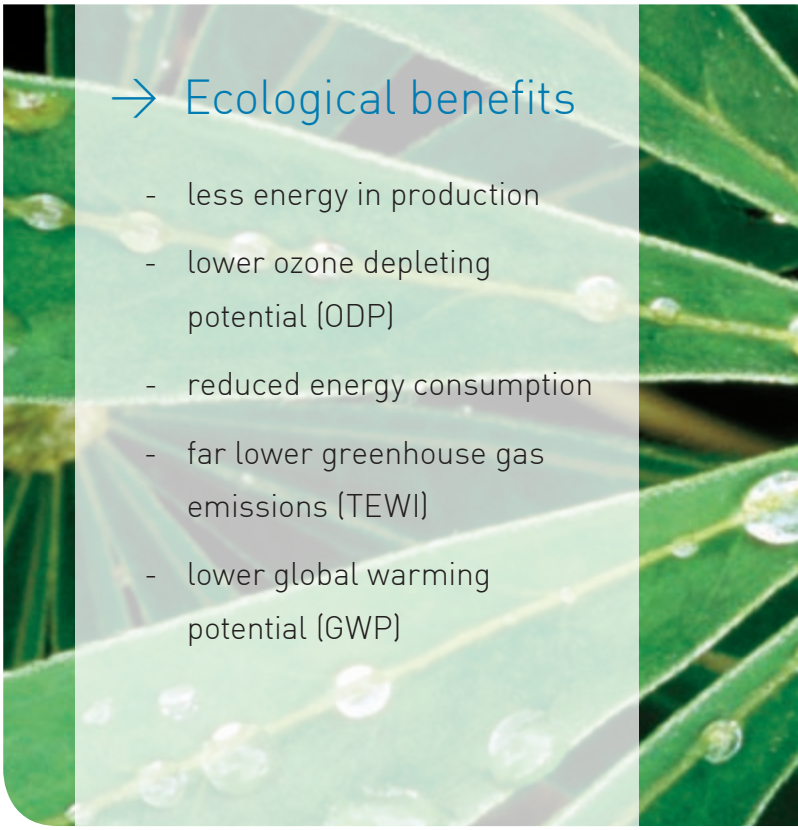
The "Montreal Protocol" in 1987 set the first internationally agreed timetable for the elimination of CFC gases. The Kyoto Protocol followed in 1997 with the intention of further accelerating the reduction of green-house gas emissions, including F-gases (fluorinated refrigerant).

The latest regulation in Europe is the EC Regulation No. 842/2006. The aim of which is to contain, prevent and thereby reduce emissions of fluorinated greenhouse gases, as outlined in the Kyoto Protocol.

## Efficiency is the key

The cold chain and environmental climate control are integral parts of modern-day life. We simply expect fresh food twelve months of the year and of course the fresher the better. Climate control whether in hospitals or for medicines are determining factors in the quality of our lives. The generation of cold for a whole range of applications is part of day-to-day life.

Refrigeration plants are major users of energy and play a key role in environmental protection. In a supermarket, for example, 70 % of the daily energy costs are attributed to the cooling and refrigeration plant. Cold stores and food production facilities with cooling performance energy requirements of many megawatts are common. Any technology improvements which improve the efficiency of refrigeration and cooling plants have real ecological as well as economical benefits.



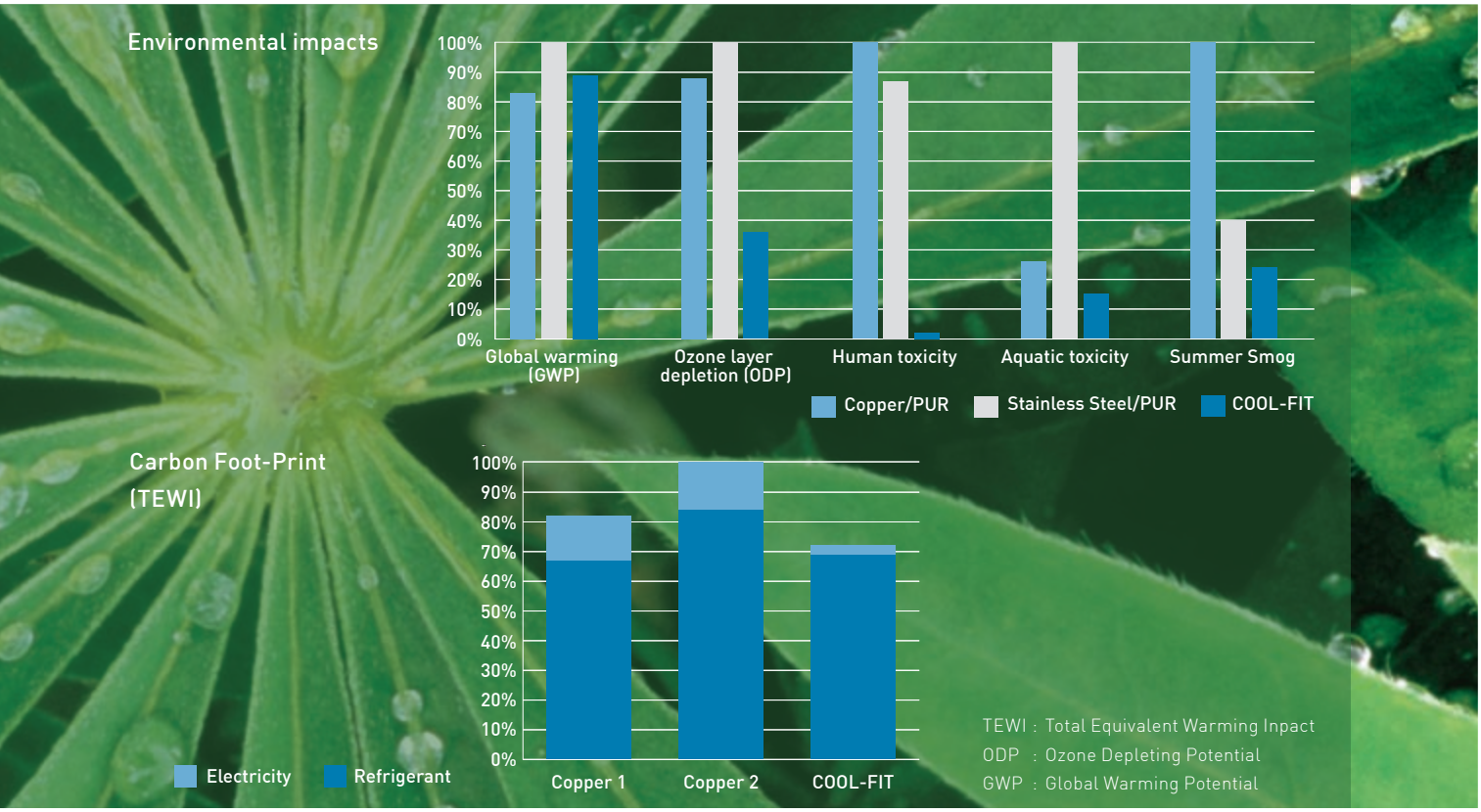
## → Ecological benefits

- less energy in production
- lower ozone depleting potential (ODP)
- reduced energy consumption
- far lower greenhouse gas emissions (TEWI)
- lower global warming potential (GWP)

## COOL-FIT

Simplicity and efficiency were the driving forces behind one of the most significant innovations introduced by GF Piping Systems in recent years: COOL-FIT, a plastic piping system for cooling and refrigeration systems with a secondary cooling circuit.

# GF Piping Systems




The system's advantages in terms of energy consumption and resource conservation as compared with traditional metal piping extend to all aspects of its life cycle – from the selection of materials and production to daily use in the plant. For example, the elaborate melting and processing involved in the production of copper releases significantly more $CO_2$ into the atmosphere than the production process for ABS plastic. And we are talking about considerable magnitudes. Take, for example, this sample calculation for a 500-metre- long piping system required for a Wal-Mart supermarket in the USA. The use of copper would have resulted in the release of 4600 kilograms of $CO_2$ at the material production stage alone.

By using ABS, $CO_2$ emissions are reduced to just 2200 kilograms. And what's more, the latter process produces fewer toxic emissions than metal production.

COOL-FIT is used exclusively in "secondary refrigeration systems". This type of installation allows the required volume of refrigerant to be reduced by 80 to 90% compared to that used by conventional systems. COOL-FIT therefore undercuts existing systems in terms of its TEWI (Total Equivalent Warming Impact) value, which is based on energy and coolant requirements, by over 50% – with welcome effects not just for the environment, but also for reduced overall costs for the operator.

# Added Value

## GF Piping Systems at your service

### We support you throughout

| | End Customer | Engineering Company | Distributor | OEM/ Installer | End Customer |
|---|---|---|---|---|---|
| | Project Decision | Material Definition Specifications Planning | Warehousing | Installation | Post-Sales Support |
| piping system solutions consulting | ■ | ■ | ■ | ■ | ■ |
| technical and cost optimization | ■ | | | | |
| mechanical and chemical advice | ■ | ■ | | | ■ |
| material recommendation | ■ | ■ | | | |
| CAD library | | ■ | | ■ | |
| planning fundamentals training | | ■ | | ■ | |
| documentation (printed and electronic) | ■ | ■ | ■ | ■ | |
| submit a quote | ■ | ■ | ■ | ■ | |
| jointing technologies and installation training | | | | ■ | |
| efficient logistics system | | | ■ | ■ | ■ |
| local standards and approvals | ■ | ■ | ■ | ■ | ■ |
| international standards | ■ | ■ | ■ | ■ | ■ |
| global subsidiaries | ■ | ■ | ■ | ■ | ■ |
| spare parts | | | | | ■ |
| technical advice | ■ | ■ | ■ | ■ | ■ |
| complaints | | | | | ■ |

# How to use the brochure

1 Start with your market

2 Build your system solution


3 Technical information and support


4 Find the products

# We supply what you are looking for

## The Cooling and Refrigeration Plant

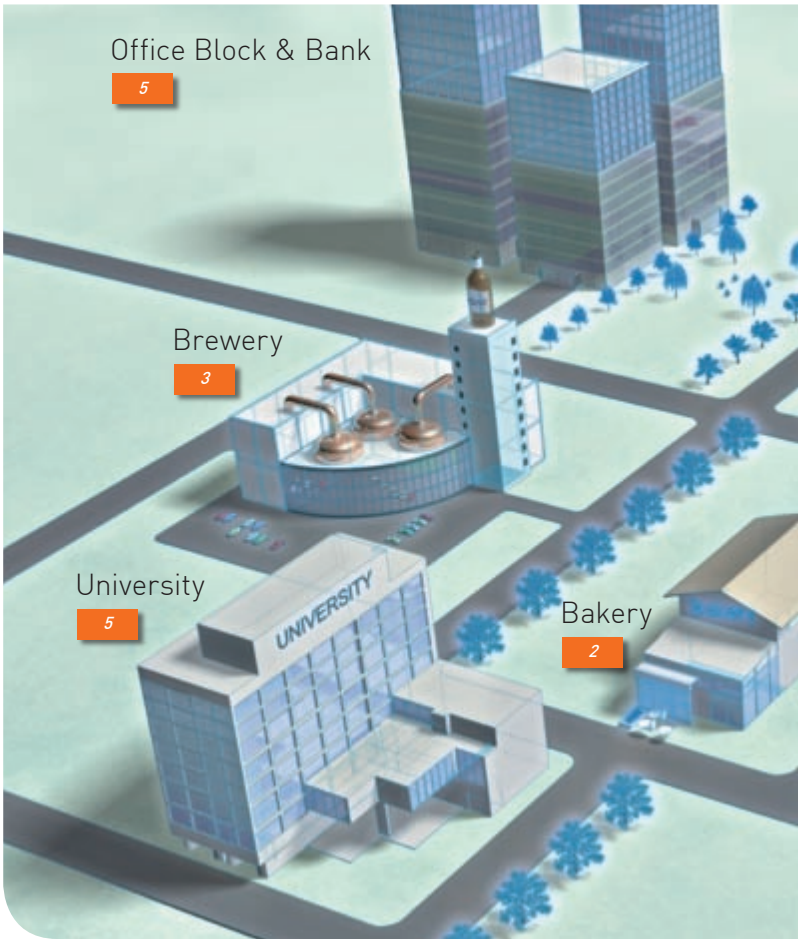
The design of refrigeration and cooling plants is currently going through a state of change, as probably never seen since the conception of man-made refrigeration some 130 years ago.

The main driver of these changes are concerns regarding the environment and compliance to regulations being enforced locally and globally. The aim of which is to reduce refrigerant charge or to eliminate certain types of refrigerants.

The economic implications of any re-design are naturally of major interest to the market as a whole. More and more end-users and general contractors must think long term when designing the plant of today, in order to accommodate future regulations and the resulting cost implications.

Everyone has the same fundamental goal, namely an environmentally friendly plant with zero ODP (Ozone Depleting Potential) and GWP (Global Warming Potential). Also, no individual company wants to suffer a financial penalty in terms of either the running costs or capital costs compared to his global or local competition.

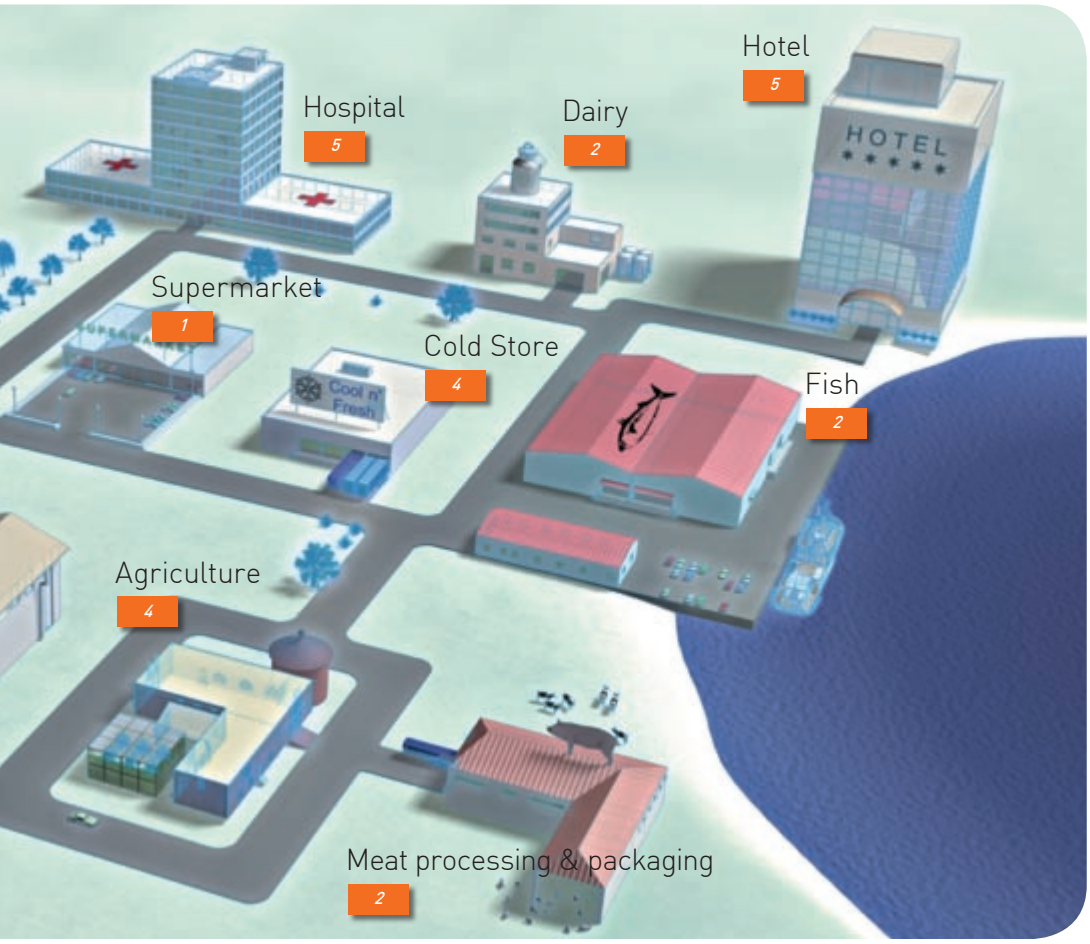
There will never be one optimum design for all types of plants. The environments and sheer size of the plants vary too profoundly for this ever to be the case. One thing is however clear; it is in everyone's best interest to reduce the environmental impact caused by the types of refrigerant charges used and to conserve energy with the technologies available to us today.




Secondary refrigeration will no doubt be an integral part of the refrigeration and cooling plants of the future, with $CO_2$, ammonia, propane and even low GWP refrigerant gases all playing their respective roles.

# Our Customers

Modern day life would be unimaginable without the cold chain and environmental climate control. We simply expect fresh food twelve months of the year and of course the fresher the better. Climate control whether in hospitals or for medicines are determining factors in the quality of our lives. The generation of cold for a whole range of applications is part of day-to-day life.

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3 Beverages

4 Cold Stores

5 Specialities



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# Commercial Refrigeration

## Fresh Foods – Dairy Products

Medium-temperature cooling is required for the storage of milk, cheese, yogurts and other assorted dairy-based products, as well as fresh meats and deli products in the retail and storage areas of a supermarket. Air temperatures vary from 0.5° C to +6° C, requiring fluid temperatures of normally -6° C.

Propylene glycol (MPG) is by far the most commonly used fluid for this type of application. MPG combined with a smooth, efficient, non-corroding plastic piping system offers the customer a low maintenance and highly efficient secondary refrigeration loop.
Food quality is of the essence, and yet the visual aspect of food presentation and the positive effect it has on sales should not be underestimated. Secondary systems combined with soft defrosting have shown positive results in practice regarding food shrinkage.

**COOL-FIT Pre-insulated ABS**
Pre-insulated pipe and fittings using top quality PUR insulation (including pipe and fittings) prevent condensation, reduce on-site installation time to a minimum and increase the efficiency of the heat-transfer secondary pipe system, thereby optimising running costs.

**ABS**
Temperature-resistant down to -40° C , the ABS pipe system from GF Piping Systems is ideal for refrigeration applications. Halogen-free and a tried and tested solvent cemented jointing technique render ABS a cost-effective alternative to copper systems.

**iFIT**
Available in smaller dimensions (up to d32), using the push-fit jointing technology and multi-layer or standard plastic pipe, iFIT is ideal at the end of loops to hook up to the cooling cabinets. Multi-layer pipe includes a layer of aluminium giving added resistance to accidental impacts, especially important in the critical area of the supermarket.

**COOL-FIT Easy-Flow**
Is a simple, handheld, pre-calibrated flow measuring device, which allows accurate and speedy balancing of the cooling points. Correct balancing of a hydraulic system is essential to optimise the pumping energy costs. Use of Easy-Flow combined with GF Piping Systems manual valves offers a 100 % plastic solution with guaranteed accuracy and with pressure drops over valves reduced to a minimum.

Dairy and Fresh Foods



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# Commercial Refrigeration

## Frozen Goods



Frozen goods are a key element of a supermarket chain's product offering. Traditional technology uses direct expansion of a freon (combined with an electric defrost cycle) to keep the goods frozen, both in the store room and in the retail area.

Can secondary refrigeration be used for low-temperature cooling ? Yes.
The use of glycols at fluid temperatures of -33° C incurs a high pumping energy penalty. Salt solutions can be used at these temperatures very efficiently; however you do need to carefully select the right material for the piping system.

The use of secondary systems also enables the use of fluid defrosting, thus eliminating the need for costly electrical defrosting.

For $CO_2$ systems, using a fluid defrost line to replace commonly used electrical defrost fans helps to significantly reduce electricity demand and thus also running costs. Fluid defrost offers a softer cycle helping to improve the appearance and shelf life of the goods.

**COOL-FIT Pre-insulated ABS**
Pre-insulated pipe and fittings using top quality PUR insulation (including pipe and fittings) can be used for fluid temperatures down to -50° C. No condensation, reduced on-site installation time and an increased efficiency of the heat-transfer secondary pipe system are just some of the advantages of pre-insulated pipe.

**Electrically Actuated Ball Valve Type 107**
The type 107 consists of the type 546s valve base body with the electric actuator EA series. With its modular system manual valves can be actuated more efficiently and economically.

**Check Valve Type 303**
GF Piping Systems offers all-plastic housing check valves with optional filters in different sizes in stainless steel. The strainer can be cemented directly to the ABS plastic pipe system, avoiding unreliable mechanical joints.


**GF Signet Multi-Channel Transmitter Type 8900**
With modular boards that are easy to install into the base unit, a number of inputs, outputs and relays can be achieved. The 8900 offers e.g. digital input, long cable runs, advanced relay logic, derived mathematical calculations, multi-language display and multi-relay outputs.

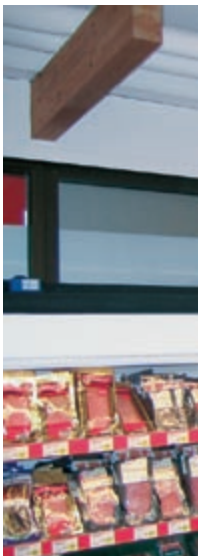
**Diaphragm Valve Type 314**
Using low-temperature elastomers, the GF Piping Systems diaphragm valve range offers several options for connections: either flanges, unions or direct solvent cementing. The valve is lockable and can be used for balancing adjustment of the system.

## References

GF Piping Systems has been supplying plastic piping for secondary refrigeration systems in supermarkets since 1995. Over 500 supermarkets are now functioning perfectly all over the globe in countries such as Norway, Sweden, Denmark, Belgium, Switzerland, Germany, Italy, Portugal, UK and USA.
Although plastic has primarily been used in MT systems with glycol, since the introduction of the pre-insulated COOL-FIT ABS system, LT systems can now also be installed with no danger of corrosion or condensation build-up.

The use of secondary fluid systems in supermarkets is growing world-wide. Consumers have become increasingly aware of environmental issues and now more frequently take the ecological effects of what they buy and where they buy into consideration. Buying patterns are changing. This consumer trend coupled with environmental action and laws coming into place as a result of the Kyoto and Montreal Protocols is causing supermarket chains to be far more aware of the energy balance and environmental impact of the plants they build.

In reducing the charge of freon gas by 80 to 90 % as well as the electricity demand, secondary refrigeration systems can help to significantly reduce the carbon footprint of the refrigeration plant and also the supermarket.



# Commercial Refrigeration

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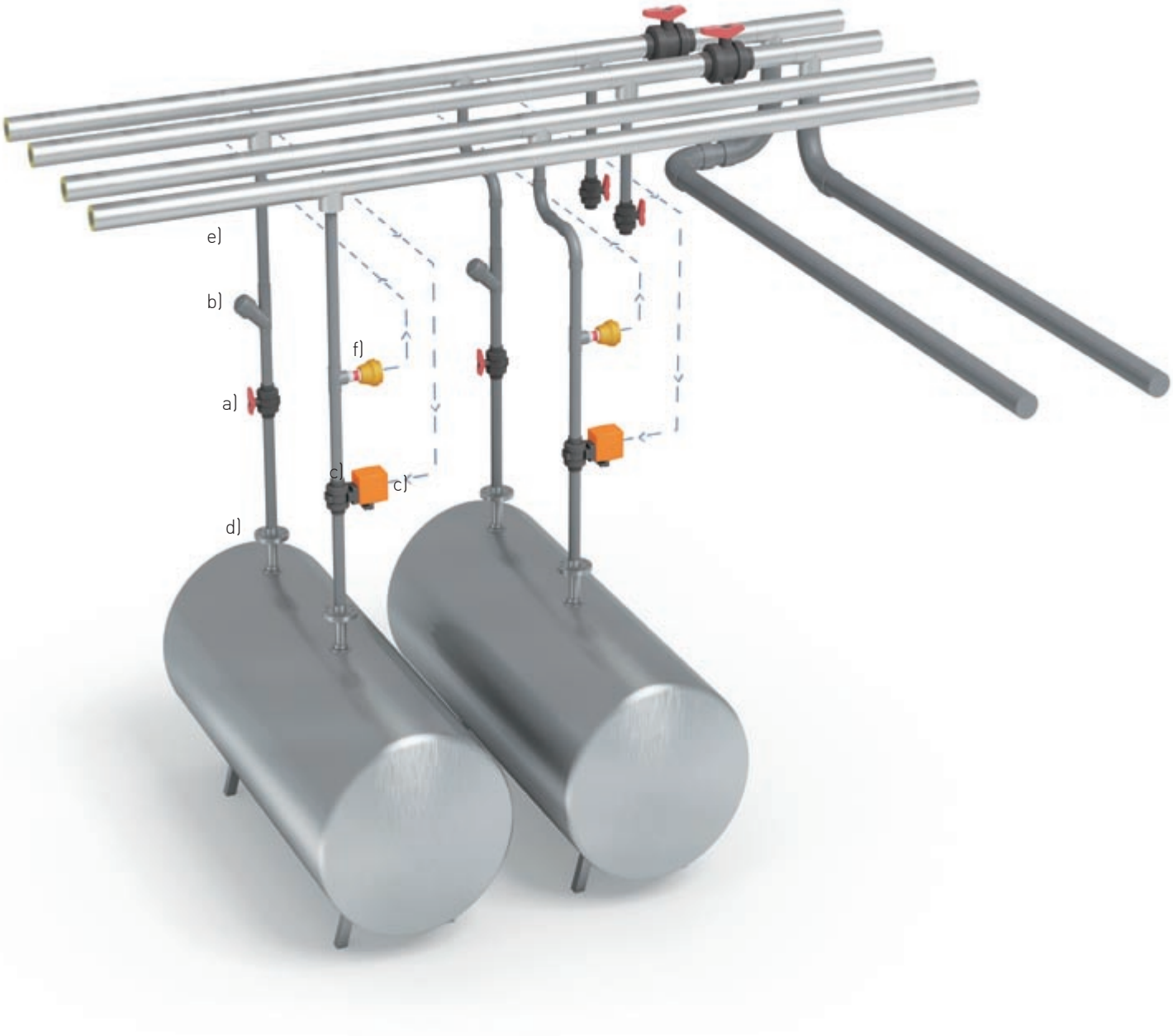


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# Food Production

## Dairies





The dairy industry has numerous requirements for cooling and refrigeration. Cooling of milk via a plate heat exchanger, cooling of the storage tanks for the milk or storage areas for other milk-based products and foodstuffs are the most common applications.
In addition to milk, production plants for cheese, yogurt and chocolate are other areas where glycol and water chillers in combination with an HFC (for example: R404a) can reduce the risk of contamination and increase safety throughout the whole plant.

Process refrigeration often requires accurate temperature control combined with a high cooling capacity. Steady-flow secondary refrigeration fluids in a pre-insulated plastic pipe can be controlled accurately and cost effectively. The excellent high-grade insulation means that temperature loss in the pipe system from evaporator to cooling point is minimal and also easy and reliable to calculate.

The distribution of chilled water and glycols using smooth-bore, non-corroding plastic piping with its smooth, chemical-resistant, outer PE jacket is the perfect solution for dairy production areas.

**COOL-FIT Pre-insulated ABS**
Pre-insulated ABS and standard ABS offer the perfect combination for iced water and glycol applications in dairies. Pre-insulated COOL-FIT offers top quality durable insulation to help reduce running costs with virtually no maintenance required.

**Flange**
The corrosion-free, reinforced PP flange features the following properties: high chemical resistance, maximum break resistance, UV stabilised, self-centering of the flanges on the flange adaptors and a symmetric design, allowing double-sided installation.

**Ball Valve Type 546**
GF Piping Systems quality by design and its innovative features make this ball valve unique. Features: modular system, compact design, floating ball permitting a tight seal, highly dynamic backing seals result in maintenance-free operation.

**Electrically Actuated Ball Valve Type 107**
The type 107 consists of the 546 ball valves base body with the electric actuator EA series. This modular system enables actuating manual valves more efficiently and economically.

**Temperature Sensor Type 2350**
The GF Signet temperature sensor has a one piece injection moulded PVDF body to provide excellent chemical resistance. It also outlasts metal sensors in aggressive media and eliminates the need for costly thermowells.


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# Food Production

## Bakeries





The baking process is a highly temperature-sensitive process. For large industrial bakeries or smaller regional plants, the cooling system is critical in bakery operations. Chilled water and glycol solutions must be distributed efficiently, accurately and safely in such plants.

Many of the ingredients and processes in modern bakeries are very temperature-dependent. Ingredients, such as liquid yeast or cream for cakes, need to be stored in temperature-controlled environments. The mixing of the dough needs to be performed under precise, temperature-controlled conditions to ensure product quality and plant efficiency.

Many bakeries use fluorocarbon-based cooling systems, but the proximity of these toxic, taste-impacting gases to the dough and production process has led more and more bakeries world-wide to switch to chilled glycol and chilled water systems.

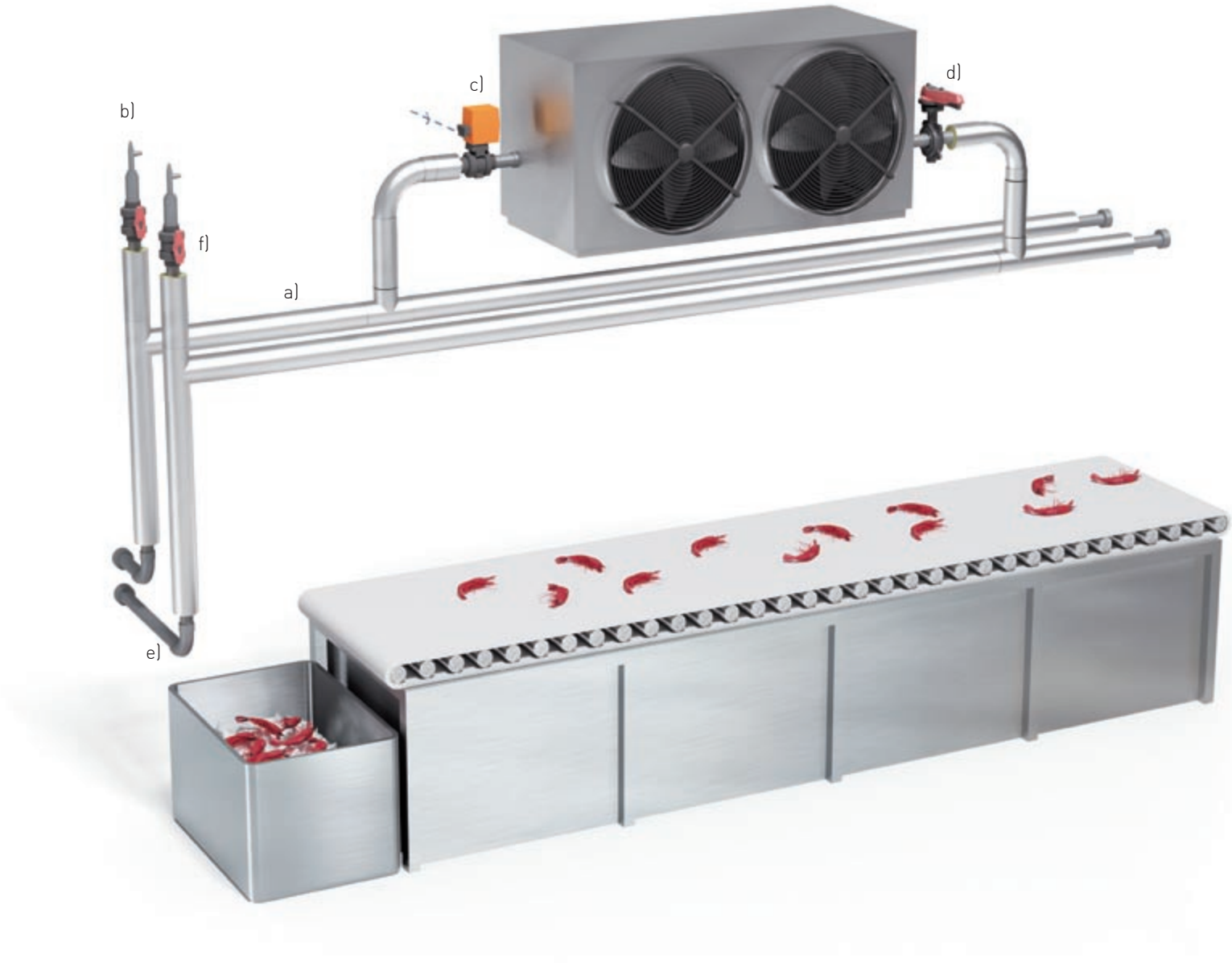
**COOL-FIT Pre-insulated ABS**
Pre-insulated pipe and fittings using top quality PUR insulation prevent condensation, reduce on-site installation time to a minimum and increase the efficiency of the heat-transfer secondary pipe system, ultimately reduc-ing running costs. With vapour-tight and water-tight seals for all joints, the system is guaranteed against water ingress.

**Transition Unions**
Transition from plastics to metal cannot be avoided as all the air coolers and heat exchangers are manufactured from metal. GF Piping Systems offers a range of transition unions in copper, brass and stainless steel. The unions from GF Piping Systems use O-rings to compensate for the differences in expansion and contraction and offer reliable jointing even under the most severe temperature fluctuations.

**Flange**
The corrosion-free, reinforced PP flange has the following properties: high chemical resistance, maximum break resistance, UV stabilised, self-centering of the flanges on the flange adaptors and a symmetric design, allowing double-sided installation.

**Butterfly Valve Type 567/568**
Unique double eccentric plastic butterfly valve with many options due to the multifunctional principle. Features that distinguish this product are: double eccentric principle, reduced torque, less wear, lockable, 5° ratchet setting, available in all GF Piping Systems plastics.

**Line Strainer Type 305**
Angle seat line strainers are available in dimensions d20 to d63, with stainless steel exchangeable 0.5 mm hole dimensioned screens. The union connections on both sides of the strainer allow simple maintenance.

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# Food Production

## Meat and Fish



Food production halls, packaging areas for fresh food and the production processes themselves are all areas where temperature-controlled environments are essential.
Especially in working areas where foodstuffs are exposed to the surrounding environment, secondary refrigeration systems with propylene glycol (MPG) are not only common, but often also required by law, due to the possibility of food contamination by leaking refrigerant gases.

Meat processing and packaging in working areas where direct expansion (DX) R22 or HFCs are in use has a distinct disadvantage in that strictly regulated safety conditions require the installation of a leak detection system .
Modern secondary refrigeration fluids and piping systems now enable the use of indirect refrigeration for freezing applications with air temperatures down to -22° C (fluid temperatures -36° C).
So all the typical air temperatures, e.g. for a slaughterhouse, can now be covered using an indirect refrigeration plant. Working rooms (+12° C), storage (+2° C) freezing (-22° C).



**COOL-FIT Pre-insulated ABS**
Pre-insulated pipe and fittings using top quality PUR insulation prevent condensation, reduce on-site installation time to a minimum and increase the efficiency of the heat-transfer secondary pipe system, ultimately reduc-ing running costs. With vapour-tight and water-tight seals for all joints, the system is guaranteed against water ingress.

**Air Relief Valve Type V 91a/V 95**
The V 91/V 95 filler and breather valves are primarily used where containers and pipes have to be aerated and/or vented. The method of operation is simple but effective: as the level of the liquid falls the valve opens. When the liquid rises, the float is raised and pressed against a seal, closing the valve.

**Ball Valve Type 546**
GF Piping Systems quality by design and its innovative features make this ball valve unique. Features: modular system, compact design, floating ball permitting tight seal, highly dynamic backing seals result in maintenance-free operation.

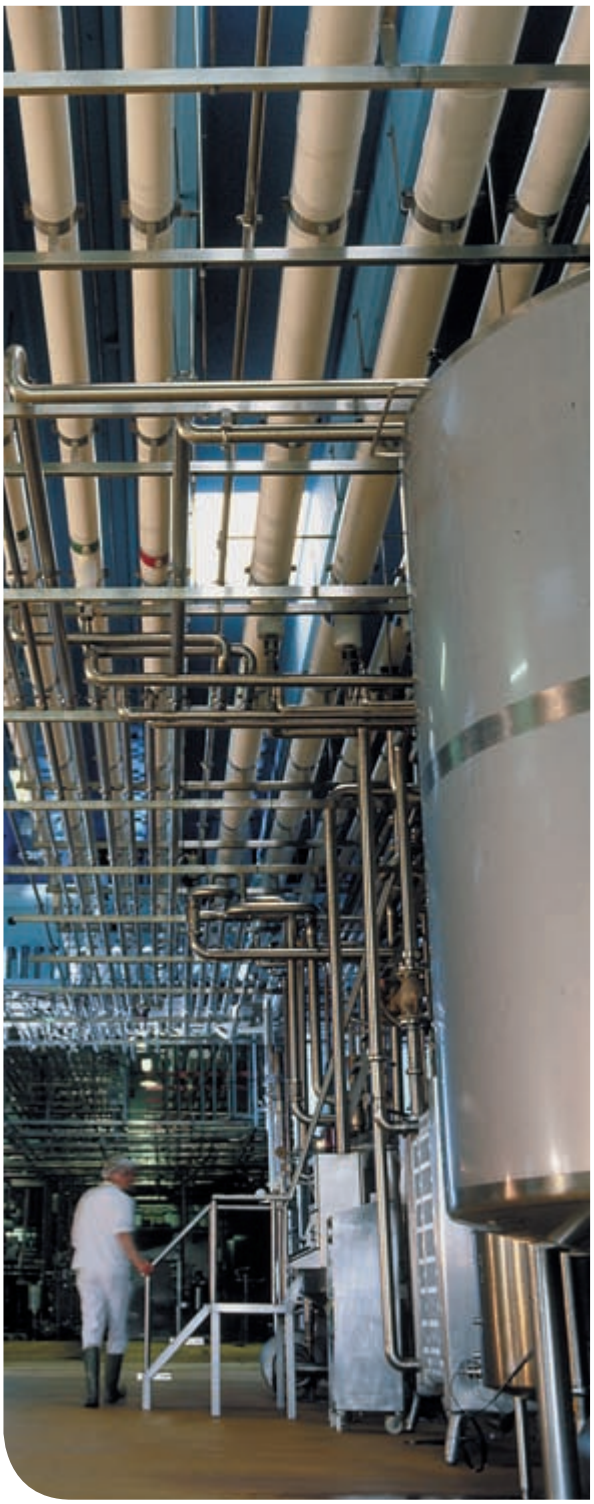
**Butterfly Valve Type 567/568**
Unique double eccentric plastic butterfly valve with many options due to the multifunctional principle. Features that distinguish this product are: double eccentric principle, reduced torque, less wear, lockable, 5° ratchet setting, available in all GF Piping Systems plastics.

## References

Whether bread buns for fast food chains, cheese or meat packaging, GF Piping Systems has a long list of references in the food production industry. They may be producing very different types of goods, but end producers all have the same basic requirements which include a reliable and efficient pipe system that complies with all environmental regulations and helps reduce the carbon footprint of the plant. An all-plastic system will reduce maintenance to virtually zero and thanks to its light weight, low ODP (Ozone Depleting Potential) and low GWP (Global Warming Potential), COOL-FIT will reduce the carbon footprint of your plant.

The COOL-FIT system, including pre-insulated pipe and a wide range of all-plastic valves and measuring and regulating equipment, is a top quality solution for the investor and a cost-effective alternative to metal for the contractor.

The plastic jacket on the outside of the COOL-FIT preinsulated pipe represents a cost-effective and hygienic alternative to stainless steel.



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# Beverages

## Breweries

Breweries have a long and famous tradition regarding refrigeration, starting with the "invention" of man-made refrigeration at the Vienna Brewery Conference in 1870 in a paper presented by Carl Linde. The history of secondary refrigeration in breweries is also long with brines and salt solutions often being used to cool and control the fermentation process as well as for climate control in the storage rooms.

Simple and cost-effective installation followed by an efficient, maintenance-free system – that is what every brewery manager is looking for. And this is exactly what COOL-FIT offers: a "fit-and-forget" system.

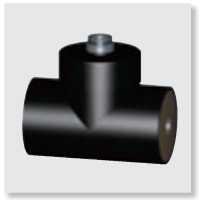
"Do It Yourself"
All it takes is a local training course conducted by the specialists from GF Piping Systems and brewery staff themselves can easily install the system. No sub-contracting labour required, just buy in and install directly yourself.





**COOL-FIT Pre-Insulated ABS**
Pre-insulated pipe and fittings using top quality PUR insulation prevent condensation, reduce on-site installation time to a minimum and increase the efficiency of the heat-transfer secondary pipe system, ultimately reduc-ing running costs. With vapour-tight and water-tight seals for all joints, the system is guaranteed against water ingress.

**DIASTAR Type 025/028**
This actuator has been optimized especially for elastomer diaphragms and 6 bar working pressure. The perfect solution if you are looking for an economical valve with compact dimensions and long life cycle.



**Installation Fittings**
GF Piping systems offers pre-insulated and standard installation fittings including $^{1}/_{2}$" Rp reinforced threads for easy system integration of measuring equipment. Available in dimensions from d20 to d225 in the ABS system material.

**Flow Monitor Type 5500**
The GF Signet 5500 Flow Monitor is an instrument which comes fully equipped with all of the basic tools needed for monitoring and controlling system flow. The analog dial enables the user to easily read instantaneous flow rate, while the backlit LCD is useful for calibration, set-up and displaying totalized flow volume. Connect any of Signet`s wide array of flow sensors, then decide which output features are best for your application.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# Beverages

## Wineries

Throughout the wine production process, a temperature-controlled environment and process is of paramount importance to the efficiency of the winery and the quality of the wine. The fermentation process itself is very temperature-sensitive, requiring the storage tanks to be cooled. This is one of the core cooling applications in wineries; other applications, such as the freshly crushed grape juice and all storage areas, also need to be cooled.

Seasonality means limited time
The wine industry is infamously seasonal with maintenance and expansion work usually taking place in a limited 4 - 5 month period. This means that time is of the essence.
COOL-FIT is the quickest-to-install secondary piping system in the world. Pre-insulation and fast solvent cement jointing mean an extension to an existing system can be built in just a few days and there is no need for specialised installers.



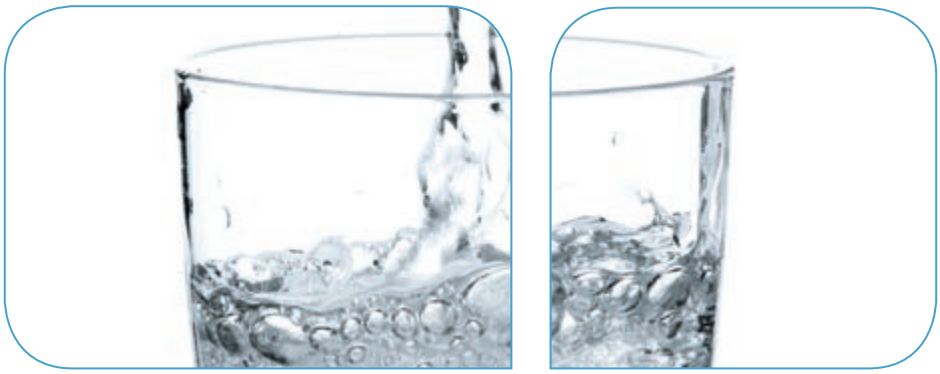


**COOL-FIT Pre-Insulated ABS**
Pre-insulated pipe and fittings using top quality PUR insulation prevent condensation, reduce on-site installation time to a minimum and increase the efficiency of the heat-transfer secondary pipe system, ultimately reduc-ing running costs. With vapour-tight and water-tight seals for all joints, the system is guaranteed against water ingress.

**Paddlewheel Flow Sensor Type 515**
This model is offered in a variety of materials for a wide range of pipe sizes (DN15 up to DN900) and insertion configurations. It is easy to install, self-powered and features highly repeatable output, and due to its high chemical resistance and robust design requires minimal maintenance.

**Installation Fittings**
GF offers pre-insulated and standard installation fittings including 1/2" Rp reinforced threads for simple and efficient system integration of measuring equipment. Available in dimensions from d20 to d225 in the ABS system material.

**Transition Unions**
Transition from plastics to metal cannot be avoided as all the air coolers and heat exchangers are manufactured from metal. GF Piping Systems offers a range of transition unions in copper, brass and stainless steel. The unions from GF Piping Systems use O-rings to compensate for the differences in expansion and contraction and offer reliable jointing even under the most severe temperature fluctuations.

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# Beverages

## Carbonated Drinks

The fizz and characteristic taste of soft drinks and carbonated water comes from dissolving $CO_2$ in water, causing a reaction of dilute carbonic acid.
Some of the largest companies in the world are in the soft drinks and water business. Cooling is an essential part of the bottling process for all carbonated drinks.
All types of carbonated drinks from the sweetened varieties to plain sparkling water need a cooling plant because water will only absorb carbon dioxide when cooled to +6° C. Furthermore, the mixing of the sugar molasses with water needs to be done under temperature-controlled conditions.
Although direct expansion fluorocarbons are commonly implemented, the use of glycol and chilled water systems are also widely used due to safety and maintenance considerations.





**Butterfly Valve Type 567/568**
Unique double eccentric plastic butterfly valve with many options due to the multifunctional principle. Features that distinguish this product are: double eccentric principle, reduced torque, less wear, lockable, 5° ratchet setting, available in all GF Piping Systems plastics.

**Electrically Actuated Ball Valve Type 107**
The type 107 consists of the 546 ball valves base body with the electric actuator EA series. The modular system enables actuating manual valves more efficiently and economically.

**Flange**
The corrosion-free reinforced PP flange features the following properties: high chemical resistance, maximum break resistance, UV stabilised, self-centering of the flanges on the flange adaptors and a symmetric design, allowing double-sided installation.

**Paddlewheel Flow Sensor Type 515**
This model is offered in a variety of materials for a wide range of pipe sizes (DN15 up to DN900) and insertion configurations.
It is easy to install, self-powered and features highly repeatable output, and due to its high chemical resistance and robust design requires minimal maintenance.

**Flow Transmitter Type 5500**
The GF Signet 5500 Flow Monitor is an instrument which comes fully equipped with all the basic tools needed for monitoring and controlling a flow system. The analog dial enables the user to easily read instantaneous flow rate, while the backlit LCD is useful for calibration, set-up and displaying totalized flow volume.Connect any of Signet`s wide array of flow sensors, then decide which output features are best for your application.

## References

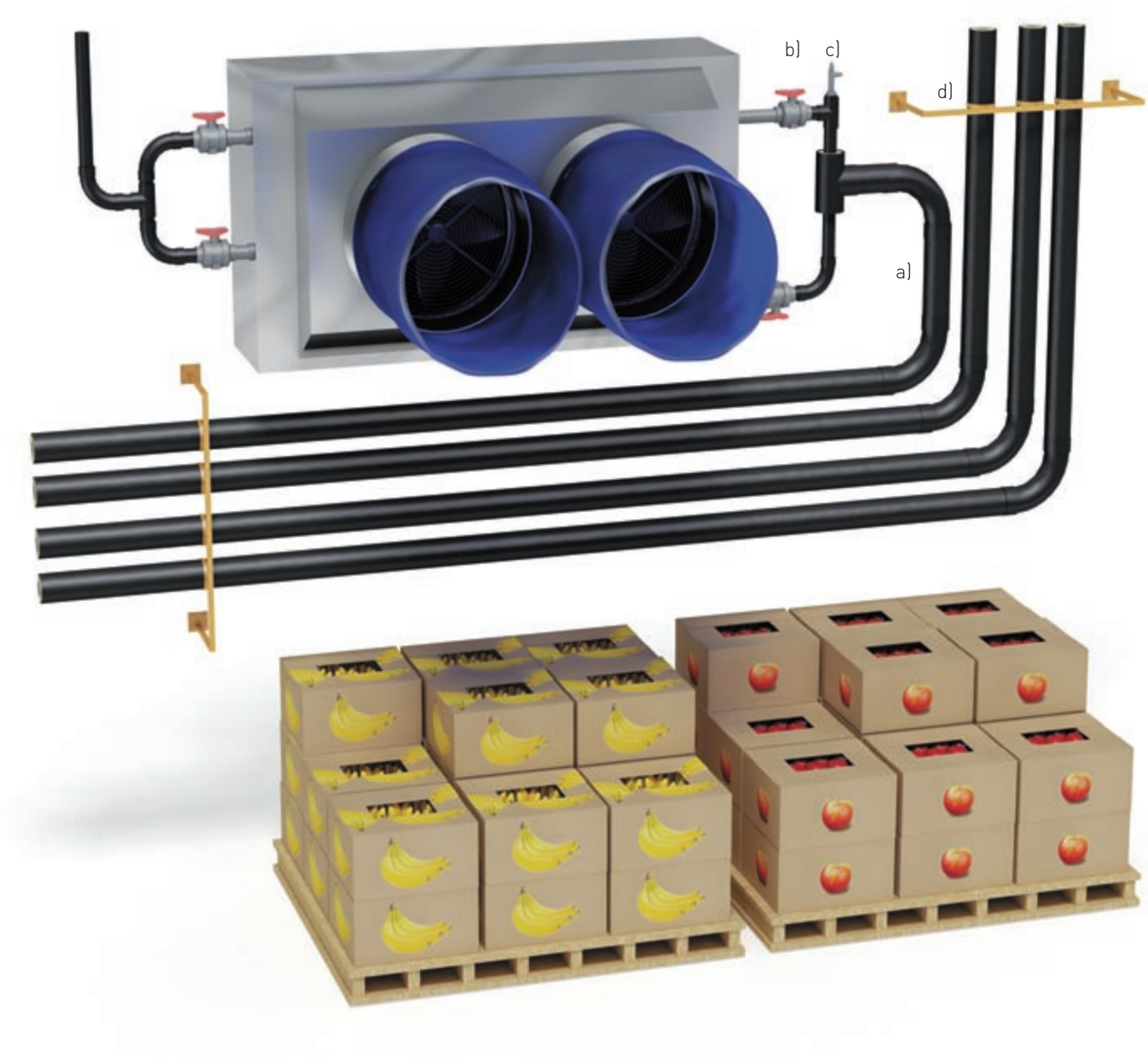
Breweries and wineries the world over are frequent users of glycol or salt secondary refrigeration systems. GF Piping Systems has a long list of references and repeat customers from VSA "best beer 2007" Dog Fish Brewery to the traditional German Augustiner Bräu or "world beer of the year" Delirium in Belgium. The end-users recognise the efficiency and maintenance benefits of a pre-insulated vapour and water-tight all-plastic system.

GF Piping Systems supplies some of the top brewery companies in the world and has been involved in greenfield site projects as well as many retrofit maintenance and plant extension projects.

# Beverages

References



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# Cold Stores

Cold stores are a vital link in the cold food chain. The modern world, as we know it, is dependent on fresh or refrigerated foodstuffs. The cold food chain is an integral part of our daily life. The responsibility of the cold store for the smooth functioning of the cold food chain logistics process is huge. Produce must be stored reliably and with accurate temperature control. The energy costs of cold stores are significant, so any technical advances that can be made will have economic as well as ecological benefits.

Generally, cold stores operate with direct expansion systems, often using standard CFC or HFC refrigerant technology. However, for many types of produce, such as fruits, secondary refrigeration technology, thanks to the excellent temperature control possible, has proven to be an excellent and economically viable alternative to traditional refrigeration.

The modern cold store
Large megawatt cold stores now exist in most countries, from Europe to Japan to the USA, everyone is using secondary refrigeration.
The huge reduction in refrigerant charge, the stable temperature control and practically maintenance-free running of such a system make secondary systems an economically viable option in terms of total cost of ownership.



Cold Stores

**COOL-FIT Pre-Insulated ABS**
Pre-insulated pipe and fittings using top quality PUR insulation prevent condensation, reduce on-site installation time to a minimum and increase the efficiency of the heat-transfer secondary pipe system, ultimately reduc-ing running costs. With vapour-tight and water-tight seals for all joints, the system is guaranteed against water ingress.

**PE Large Dimensions**
PE pipe and fittings are available in dimensions up to d630 mm.
Large megawatt cold stores using one-loop technology often require a large-dimension distribution pipe system. The easy welding of PE allows pre-fabrication of all types of fittings. Low weight is a major advantage of plastics in these dimensions, reducing static load measures in the building drastically.

**Ball Valve Type 546**
GF Piping Systems quality by design and its innovative features make this ball valve unique. Features: modular system, compact design, floating ball permitting a tight seal, highly dynamic backing seals result in maintenance-free operation.

**Pipe Supports**
Pre-insulated pipes allow fixation and support of the pipe on the outer jacket of the pipe. No contact with the carrier pipe and simple cost effective installation. Type 060 and 061 plastic pipe clips from GF Piping Systems offer an alternative solution.

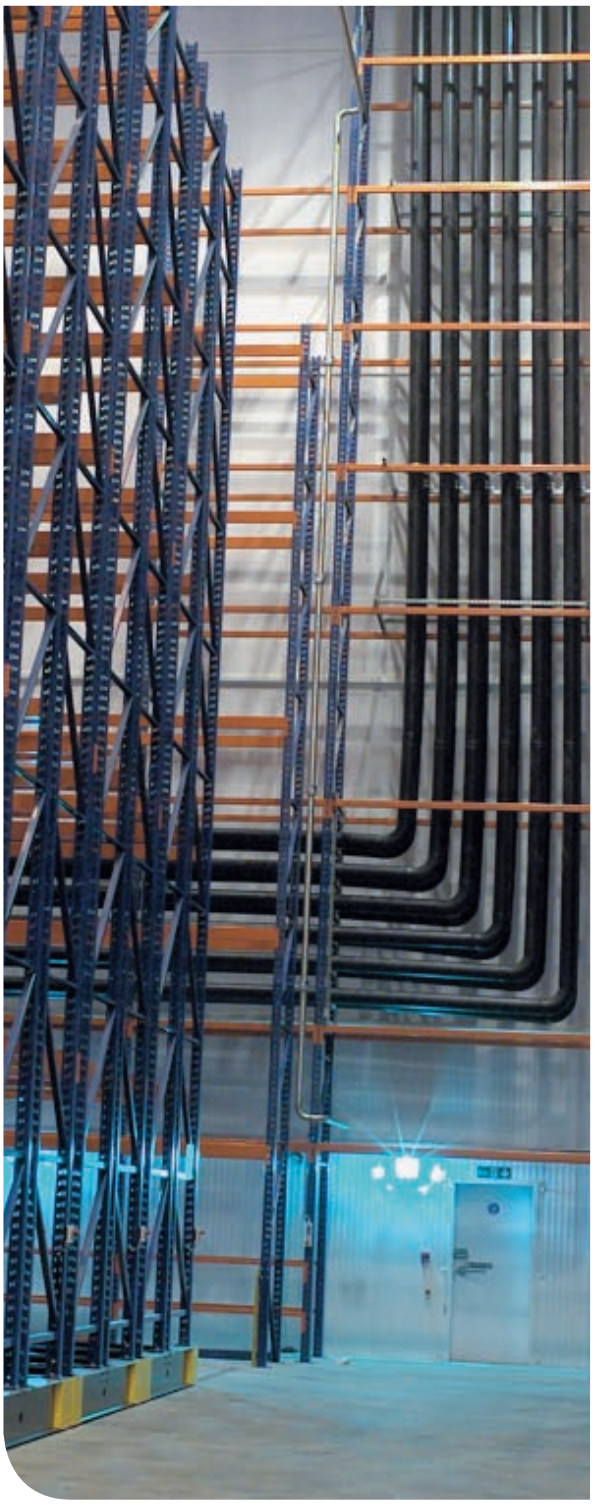
## References

GF Piping Systems has a long history of successful projects in the cold store and distribution business. Most often, COOL-FIT and all associated products are used in normal-temperature cooling warehouses for the storage and distribution of fruits, dairy products, vegetables and meat.

Whether in large single room cold stores or multi-temperature warehouses, the advantages of this complete plastic system are manifold; simple, cost -effective installation, reliable low-maintenance life span, top quality insulating properties.

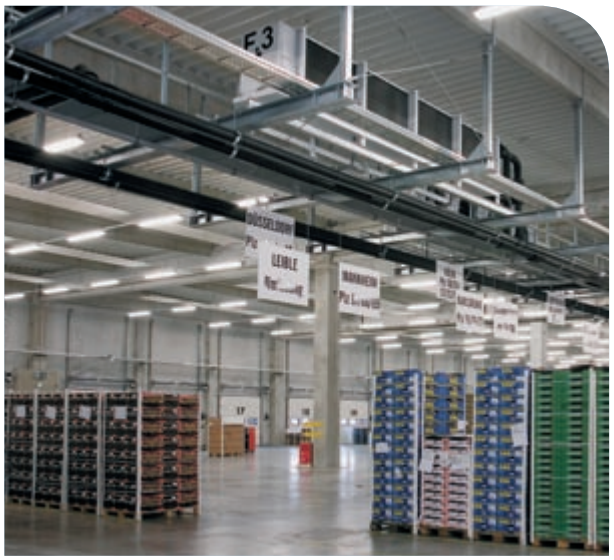
Low-temperature, secondary freezing cold stores (fluid temperatures -25° C to -33° C) use low-temperature salt brine solutions as an alternative to large charges of primary refrigerant.

The financial benefits of a secondary system store also apply to the insurance premiums for such designs, which should be far lower than a DX traditional store.



# Cold Stores

References





References



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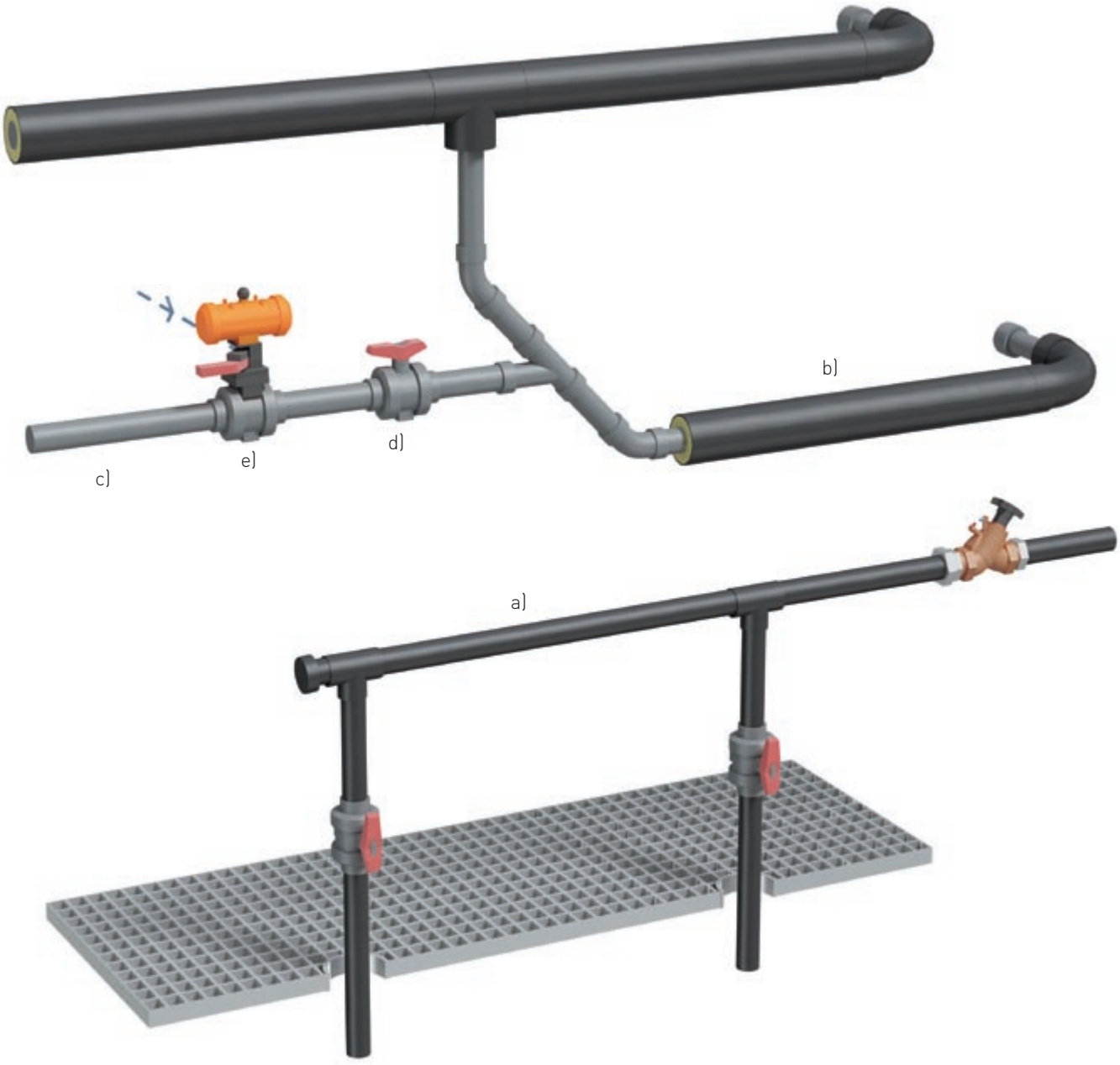


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# Specialities

## Pharmaceutical/Industrial

Refrigeration and cooling plants are not only to be found in the food and beverage industry but also in the manufacture and storage of medicines, as well as in medical research. Just as with foodstuffs, many medicines are sensitive to temperature and thus often need to be distributed in controlled environments. In the manufacturing process the storage rooms and often working rooms need to be temperature-controlled and of course in the research rooms it is critical that temperatures are maintained accurately.

Peace of mind
Whether for storage rooms or in biotechnology research areas, plastics offer zero corrosion and top efficiency.

**PE**
GF Piping Systems is the world's leading producer of PE electro-fusion fittings. PE pipe and fittings are on offer from GF in a wide range of dimensions from d20 to d630 with various fusion jointing techniques. PE black is UV resistant and has excellent chemical resistance.

**Ball Valve Type 546**
GF Piping Systems quality by design and its innovative features make this ball valve unique. Features: modular system, compact design, floating ball permitting a tight seal, highly dynamic backing seals result in maintenance-free operation.

**ABS**
Temperature-resistant down to -40° C , the ABS pipe system from GF Piping Systems is ideal for refrigeration applications. Halogen-free and a tried and tested solvent cemented jointing technique render ABS a cost-effective alternative to copper systems.

**Pneumatic Ball Valve Actuator Type 230**
The PA11 and PA21 pneumatic actuators can be mounted on ball valves type 546. By using the correct coupling piece and selecting a suitable adapter plate, the actuators are connected to the multi-functional module with the provided clamps. The purpose of these actuators is to actuate ball valves with a control pressure of 2.8 to 5 bar and up to a driving torque of 20Nm.
They are available with single or double acting with springs for FC (fail closed) or FO (fail open). These valves can be controlled to open or close positions via a built-in solenoid valve.


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# Specialities

## Residential

Apartment Buildings, Universities, Hotels, Offices Blocks

For small capacity air conditioning systems, direct expansion is still cost-effective; however as soon as the cooling capacity of a plant exceeds approximately 1000 KW, chilled water systems are the system of choice in terms of capital cost and efficiency. The other major advantage of chilled water systems in larger building complexes is their flexibility. Extensions and retrofitting are very simple as the plant then only requires a change to the secondary loop and no extra chilling capacity.

Air conditioning improves the quality of life both at work and at home and is a rapidly growing market, especially in the case of large residential complexes. Using chilled water at +6° C and +12° C and usually relatively low pressures of 3 - 4 bar, plastic systems offer an ideal solution for the mains and all the distribution lines in the building.

**iFIT**
Available in smaller dimensions (up to d32) using a push-fit jointing technology and multi-layer or standard plastic pipe, iFIT is ideal at the end of loops to hook up to air coolers. Multi-layer pipe includes a layer of aluminium, providing added protection against accidental impacts, especially important in the critical areas of a plant.

**INSTAFLEX**
INSTAFLEX is a modern all-plastic system which demonstrates outstanding flexibility in installation and operation. Installation is cost-effective and maintenance and energy costs are reduced. This system offers a long service life as well as noise insulation and is corrosion and incrustation-free.

**PE**
GF Piping Systems is the worlds leading producer of PE electrofusion fittings. PE pipe and fittings from GF Piping Systems offer a wide range of dimensions from d20 to d630 with various fusion jointing techniques. PE black is UV resistant and has an excellent chemical resistance.

**COOL-FIT Pre-Insulated ABS**
Pre-insulated pipe and fittings using top quality PUR insulation (including pipe and fittings) prevent condensation, reduce on-site installation time to a minimum and increase the efficiency of the heat-transfer secondary pipe system, ultimately reducing running costs.

**Electrical Actuators Types EA 11 / EA 21**
Are the basic versions for open/close operation. It is expandable to include fail safe return, heating element and two additional limit switches for feed-back.




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# Specialities

## Data Centres

Peace of mind
Cooling systems in computer data centres whether for a bank or insurance company are absolutely essential systems for the end user. The data stored is critical information and therefore the computers storing and assimilating this data must not be allowed to overheat. For this reason most modern data centres will have parallel back-up systems; nevertheless 100 % reliability of the cooling system is essential for the complete life span of the data centre.

Reliability for peace of mind with a low-risk, tried and tested piping system – GF Piping Systems offers all this and much more with a complete, non-corroding, non-scaling, pressure-bearing, all-plastic piping system.

**PE**
GF Piping Systems is the world's leading producer of PE electrofusion fittings. PE pipe and fittings are on offer from GF Piping Systems in a wide range of dimensions from d20 to d630 with various fusion jointing techniques. PE black is UV resistant and has excellent chemical resistance.

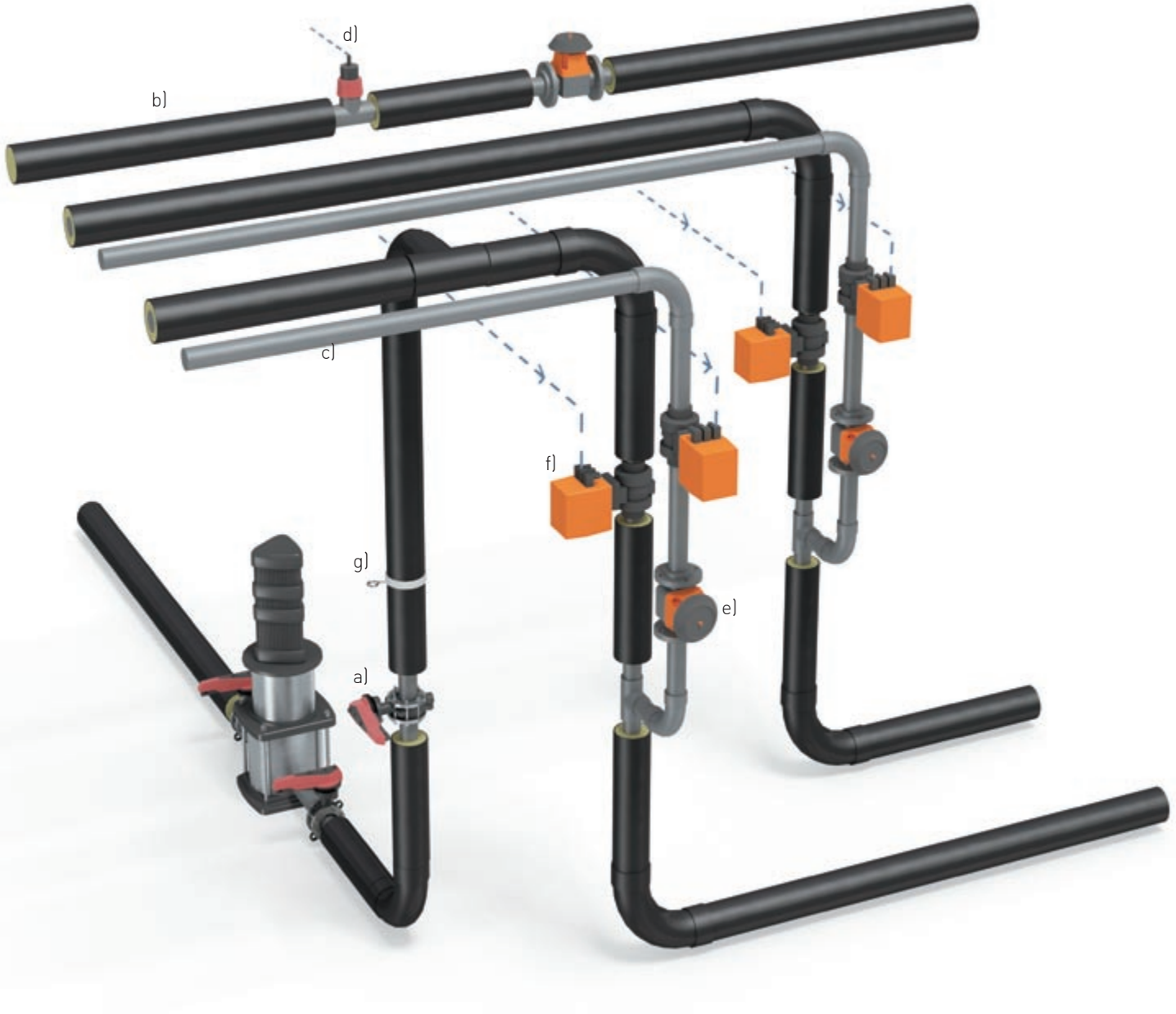
**COOL-FIT Pre-Insulated ABS**
Pre-insulated pipe using top quality PUR insulation (including pipe and fittings) prevent condensation, reduce on-site installation time to a minimum and increase the efficiency of the heat-transfer secondary pipe system, ultimately optimising running costs.

**Ball Valve Type 546**
GF Piping Systems quality by design and its innovative features make this ball valve unique. Features: modular system, compact design, floating ball permitting a tight seal, highly dynamic backing seals result in maintenance-free operation.

**Electrically Actuated Ball Valve Type 107**
The type 107 consists of the 546 ball valves base body with the electric actuator EA series. The modular system enables actuating manual valves more efficiently and economically.

**ABS**
With a temperature range of -40° C to +60° C the ABS pipe system is ideal for cooling systems in highly critical environments. Halogen-free and a tried and tested solvent cemented jointing technique render ABS a cost-effective alternative to copper systems. Solvent cementing together with the compactness and modularity of this system allows installation in areas where space is restricted, e.g. under floors.

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# Specialities

## Pumping Stations

The plant room of a cooling or refrigeration plant is the heart of the plant. The chiller units and all other core equipment such as heat exchangers, pumps and control system are located separate from the factory or retail area for maintenance, safety and environmental reasons. The pumping station, i.e. the fluid control equipment, for a secondary plant can be designed and built off-site at an OEM or installed on-site according to a technical drawing. In both cases plastics have a significant advantage in terms of fittings costs, jointing technique and weight.

**Diaphragm Valve Type 314**
Using low-temperature elastomers, the GF Piping Systems diaphragm valve range comes with numerous options for connections, such as flanges, unions or direct solvent cementing. The valve is lockable and can be used for balancing adjustment of the system.

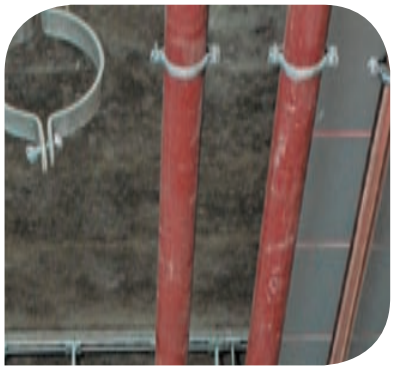
**Electrical Actuators Types EA 11 / EA 21**
Standard versions for open/close operation. They are expandable to include fail-safe return, heating element and two additional limit switches for feedback.

**Butterfly Valve Type 567 / 568**
Unique double eccentric plastic butterfly valve with many options due to the multifunctional principle. Features that distinguish this product are: double eccentric principle, reduced torque, less wear, lockable, 5° ratchet setting, available in all GF Piping Systems plastics.

**Paddlewheel Flow Sensor Type 515**
This model is offered in a variety of materials for a wide range of pipe sizes (DN15 up to DN900) and insertion configurations. It is easy to install, self-powered, features highly repeatable output, and due to its high chemical resistance and robust design requires minimal maintenance.

**Wafer Check Valve Type 369 and Ball Check Valve Type 360**
The wafer check valves prevent the medium from flowing back and are available in PVC-U, PP and PVDF with reset springs in V4A and Hastelloy for chemical processes. These wafer check valves are suitable for vertical and horizontal mounting. They are robust and maintenance-free and designed for a nominal pressure of 6 bar. Also available are the type 360 ball check valves for smaller sizes.





## References

### Data Centres

We deliver peace of mind. Data centres are critical installations and the cooling system is essential for efficient 24/7 operation. The distribution piping for cooling systems is often installed under severe space restrictions, e.g. under the floor or in a ceiling void. Durable, efficient, maintenance-free piping is a big advantage. Pre-insulated plastic pipes with all-plastic valves and actuators guarantee no condensation and no corrosion.

### Residential

Large chilled-water installations in hospitals, office blocks or hotels have large cooling requirements. The initial distribution piping is often DN150 (6") and above. Here the weight per metre of pipe and installation in cramped areas are important factors. Pre-insulated plastics are lightweight and can easily be installed in pipe shafts and other awkward areas.

### Pharmaceutical Industry

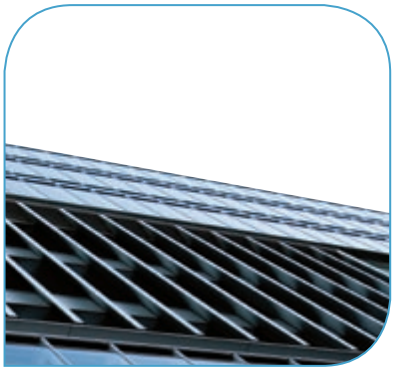
Production, storage and distribution of medicines and related products demands a temperature-controlled environment. The cooling capacities required in such plants can be very large, often 2 MW and above. Efficiency and long-term, maintenance-free functionality are key requirements for the entire cooling plant and thus also for the piping system.

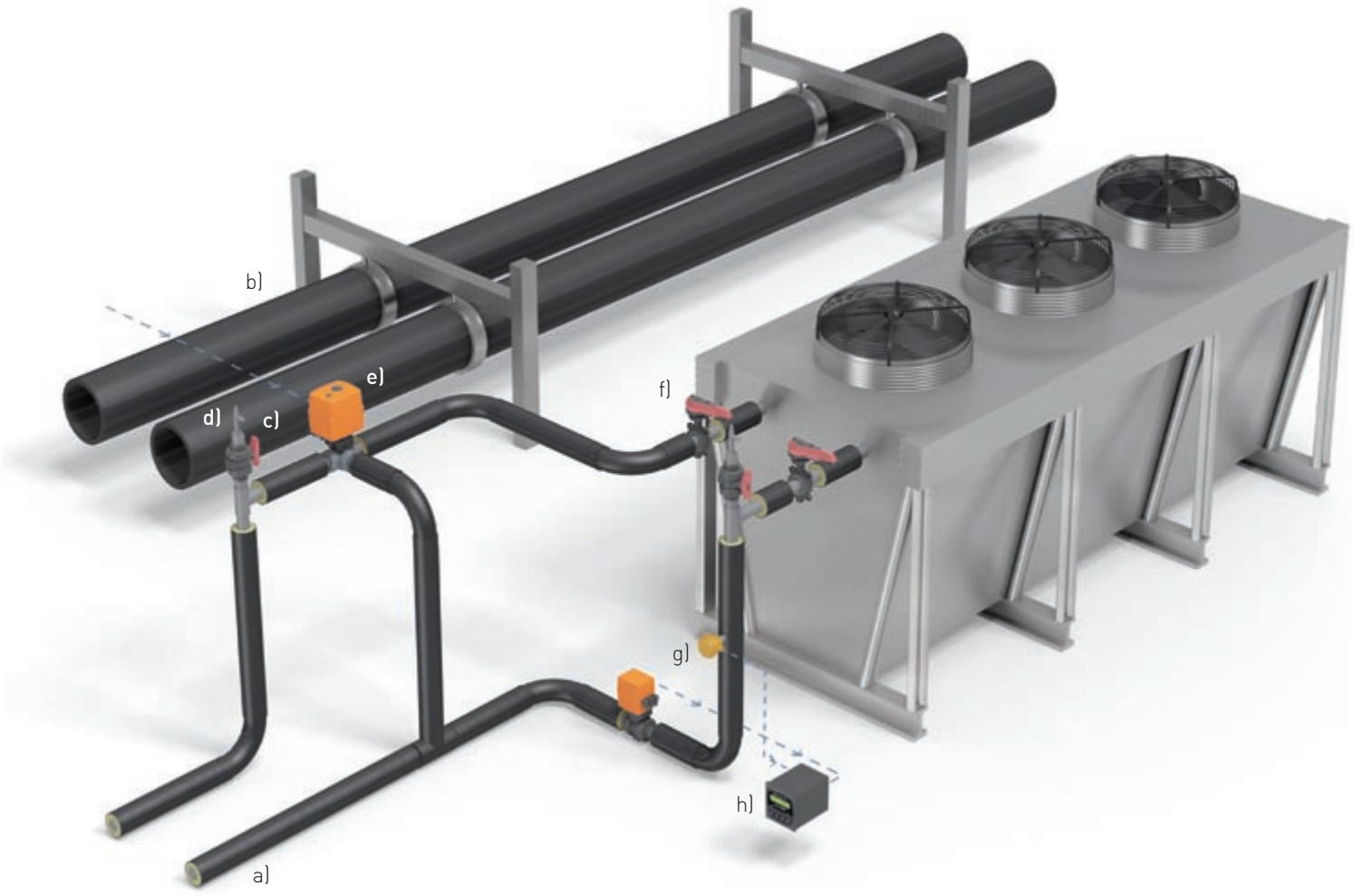
# Specialities

References: Pharmaceutical/Industrial, Residential, Data Centres, Pumping Stations

GF Piping Systems has years of experience in these types of installations. Contractors and end-users appreciate how fast and efficiently lightweight plastics are installed and their long life span with little maintenance.





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# Specialities

## Rooftops, Cooling Towers, Heat Recovery

Although their temperatures are above zero, cooling towers and heat recovery systems are an essential element for the energy balance of all cooling and refrigeration systems.
A fundamental law of thermodynamics is that energy cannot be destroyed, so the cooling of one area by reducing its temperature results in an increase of energy (temperature) in the chilling unit. This energy needs to be released to the atmosphere or it can be "recovered" to be used for hot water or under-floor heating. Logically these cooling towers are located outdoors.

Outdoor installations place considerable demands on the piping system. Day and night temperature fluctuation, together with UV light and the static load criteria for laying pipe on a rooftop are problems not to be underestimated. Designing a building structure to bear high static loads is expensive so the sheer weight of a piping system can be a significant cost factor.

**COOL-FIT Pre-Insulated ABS**
Pre-insulated ABS pipe and fittings have a UV-resistant outer jacket and a vapour and water-tight sealing system for all the joints. This combined with the inherent low weight of plastics makes COOL-FIT ideal for rooftop installations and cooling towers. The high-density PUR foam is extremely durable even under excessive mechanical loads.

**PE**
GF Piping Systems is the world's leading producer of PE electrofusion fittings. PE pipe and fittings are on offer from GF in a wide range of dimensions from d20 to d630 with various fusion jointing techniques. PE black is UV resistant and has excellent chemical resistance.

**pH Sensor Type 2714**
Feature-packed GF Signet 2714 - 2717 twist-lock pH and ORP electrodes provide unsurpassed simplicity, reliability and accuracy. A rugged construction, large reference volume and intelligent positioning of internal elements combine to extend the service life of the reliable electrodes.

**Conductivity Sensor Type 2850**
The GF Signet Conductivity sensor is available in blind and display versions, several cell constant for diverse applications. Its compact design with ¾" process connection and IP65 junction box provide a maximum installation flexibility.


**GF Signet Multi-Channel Transmitter Type 8900**
With modular boards that are easy to install into the base unit, a number of inputs, outputs and relays can be achieved. The 8900 offers e.g. digital input, long cable runs, advanced relay logic, derived mathematical calculations, multi-language display and multi-relay outputs.



## References

**The COOL-FIT system with its black outer jacket, vapour/water-tight insulation seal and low weight is ideal for demanding environments, which is why it is used in innumerable applications of this kind.**

### Outdoor Freezing

It is not uncommon for a cooling tower or heat recovery system to not always be running, which means the fluid in the pipe may be stagnant and in danger of freezing.

### Underground

Whether crossing a road in an industrial environment or accessing cabinets in a supermarket, sections of a refrigeration or cooling system sometimes need to be designed for underground installation. A soft or low-density insulation may compress under the weight of the pipe and fluid. Only a system with a non-compressible, high-density insulation with protective outer jacket, such as COOL-FIT, can be used for pipe systems laid underground.

### COOL-FIT

The robust and hard PE outer jacket is "bird proof" (which means birds and other wildlife cannot pick through the outer casing). The insulation also does not crush if trodden on as traditional mineral wool-jacketed systems would (of course care must be taken with pipe supports and joints).

# Specialities

References: Rooftops, Cooling Towers, Heat Recovery



# Metal versus Plastic

**What is Corrosion?**

Corrosion is a natural process. It is a chemical or electrochemical reaction of materials with substances from the environment. Metal corrosion causes a redution of mechanical strength and pollutes the media in the pipe.

How rapidly the corrosion progresses depends on the properties of the respective metals, as well as on the type of medium which comes into contact with the metal.

Moisture plays a major role in corrosion. The simplest form of corrosion is the reaction of a metal surface with aggressive media from the environment. In addition to these common redox reactions, there are also more complex redox processes.

**Fast Plastics Jointing**

Project lead times are under pressure in every business and it is no different when designing and installing a cooling or refrigeration plant. Time is precious and any technology advances that can save time in planning or on-site installation are always welcome.

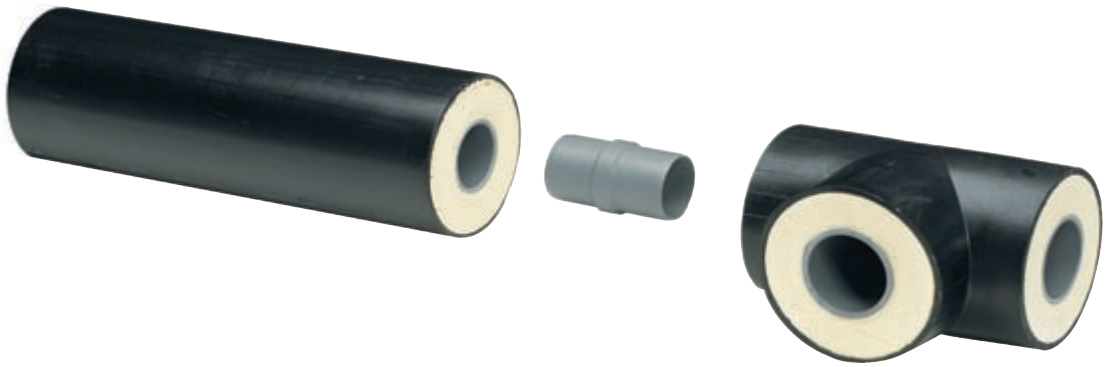
Plastic piping systems can be jointed quickly and reliably. Whether plastics are fused or solvent cemented, the time savings in jointing is significant compared to metal pipe welding.


**Jointing Times Comparison**

| Diameter | ABS Welding | COOL-FIT Pipe to Pipe Welding | Carbon Steel Welding Jointing Times | Stainless Steel Jointing Times | Copper Jointing Times |
|---|---|---|---|---|---|
| 50 | 114 | 565 | 538 | 607 | 250 |
| 110 | 257 | 913 | 1620 | 1332 | 488 |
| 140 | 319 | 1052 | 2400 | 2400 | - |
| 200 | 498 | 1329 | - | 3213 | - |
| 225 | 557 | 1444 | 3430 | 3430 | - |

*all values in seconds

*Note:
Times are representative, jointing times measured by GF Piping Systems with the same personnel and working conditions.




**Plastics and Corrosion**

Classic "rusting" or oxidation does not occur with plastics.

Since 1957, GF Piping Systems has been instrumental in developing plastics for use in pressure-bearing applications often in highly critical environments as well as specific jointing techniques.

**Life Span**

Life span is defined in the pressure-temperature curve for each GF Piping Systems system and is usually 25 years.

**Vapour Seal**

The COOL-FIT pre-insulated system uses vapour-sealing shrink sleeve technology. This prevents any ingress of moisture from the surrounding environment into the insulation.

**Weight Advantages**

Plastic piping systems have a considerable weight advantage compared to metal systems. This can be extremely advantageous in the planning of a cooling or refrigeration plant.
20 metres of 4" carbon steel weighs about 220 kg. 20 metres ABS weighs only 50 kg!



**Weight per 100 meters, kg**

| Diameter | Polybutylene | ABS | Welding Carbon Steel | Stainless Steel Press | Copper |
|---|---|---|---|---|---|
| 25 | 16.5 kg | 16.0 kg | - | 80.0 kg | 58.7 kg |
| 50 | 64.5 kg | 52.8 kg | 310.0 kg | 197.2 kg | 291.0 kg |
| 110 | 305.0 kg | 248.0 kg | 927.0 kg | 434.0 kg | 737.5 kg |

# System Solution

## COOL-FIT

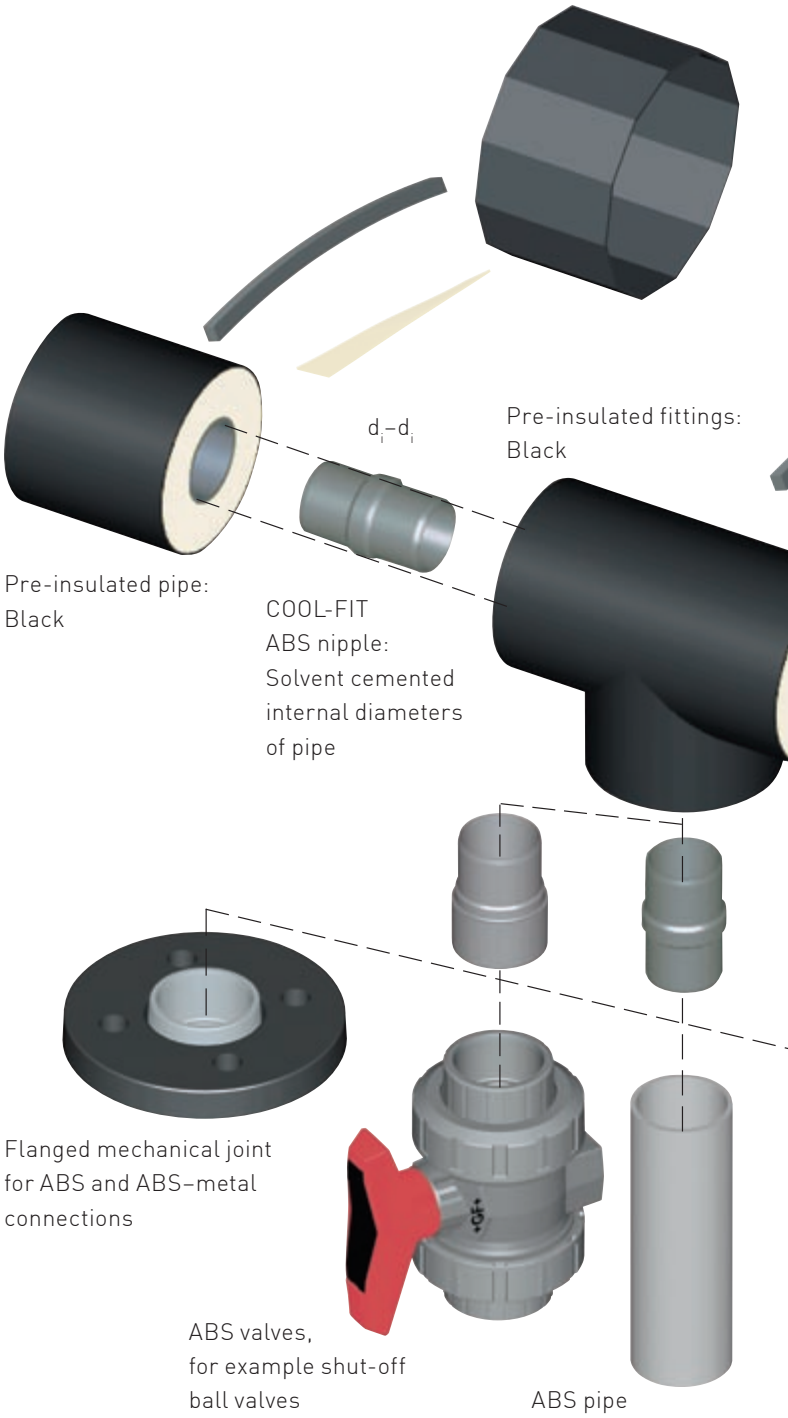
**Pre-insulated Pipe and Fittings**
Delivered ready to install on site. High quality PUR insulation, black outer jacket, UV and weather resistant, water and vapour-tight joints.

**Complete System**
Carrier pipe system in ABS, low temperature and high impact resistant. Manual and actuated valves for shut-off and flow control.
Transition unions for plastic to metal connections.

**Jointing Technique**
Reliable, fast jointing using TANGIT ABS solvent cement, completely homogeneous joint ,"cold welding" pipe and fitting.

**System Parameters**
- PN10 (nominal working pressure 10 bar)
- -50° C to +40° C nominal working temperatures
- DN10 to DN 300 dimensions

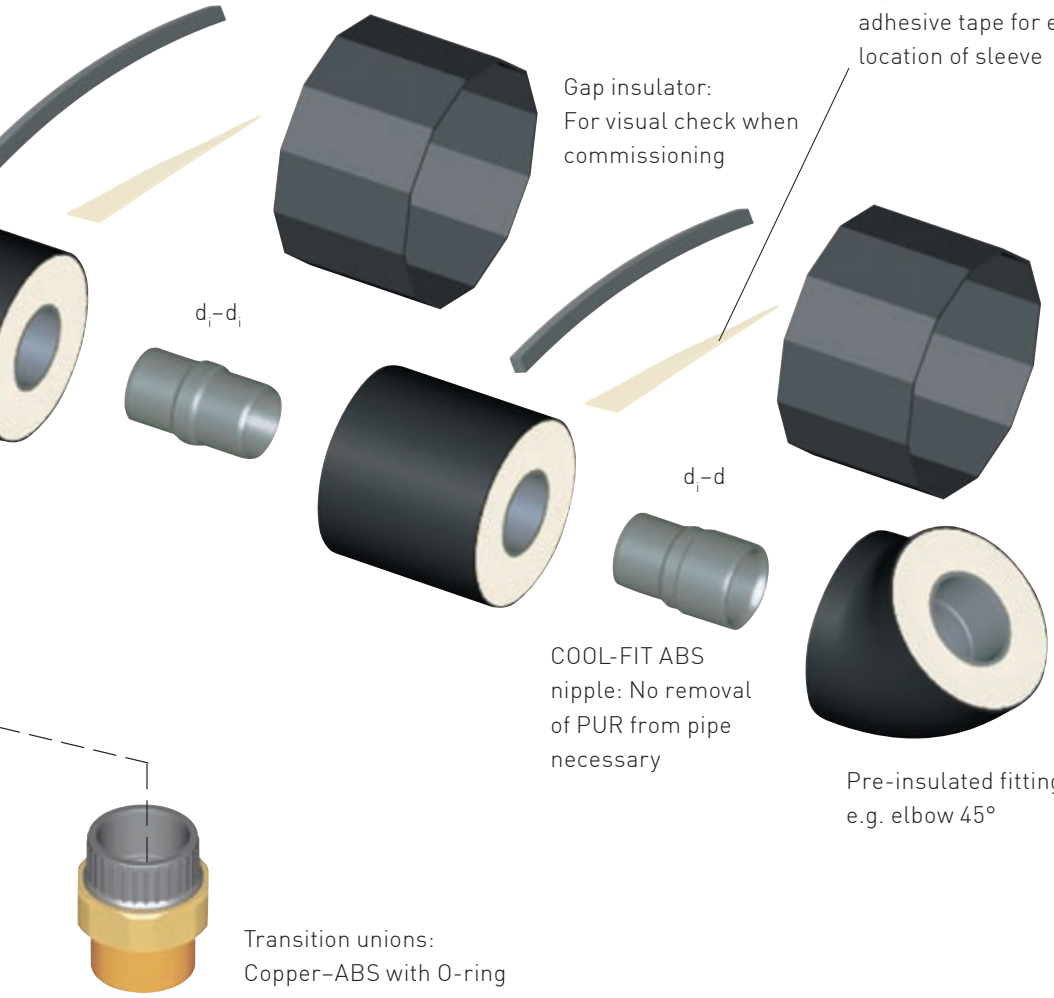
**Suitable Media**
(not for use with refrigerants eg. R22)
- water
- iced water
- salt solutions
- glycol solutions
- organic salt solutions



# COOL-FIT

## → Your benefits

- top efficiency lambda 0.026 W/m.K
- cost-effective installation
- reliable, "fit-and-forget" system
- 25-year life span
- tried and tested system






Transition unions:
Copper–ABS with O-ring
for reliable sealing,
stainless steel and threaded
connections also available

System Solution

Sales Support



+GF+

# Market Support

**Market Support**
GF Piping Systems understands the needs of the market for pre- and post-sales service. For the re-engineering of your piping system we offer local support together with an international engineering back-up based on 40 years of experience in the design and installation of plastic piping systems.

**Technical Support**
We offer key technical support when designing a plastic piping system. The pre-sales technical support offered by GF Piping Systems is second to none and is supported by a global network of local sales companies backed by our expert technical staff in Switzerland.
www.piping.georgfischer.com

**CAD Data**
Our extensive CAD library offers 3-D and 2-D models in numerous formats compatible with all standard CAD systems in the world. The data is on the Internet free of charge
www.piping.georgfischer.com /go/support

**On-Line Calculation Tool**
The calculation tool enables different calculations, for example, pressure drops, condensation build-up, heat loss, contraction and expansion.

The tool is available in 10 different languages and allows an easy verification or calculation of the key piping system parameters required in a cooling or refrigeration system.
www.cool-fit.georgfischer.com

**Technical Handbook**
GF Piping Systems extensive know-how re-gard-ing the design and installation of plastic piping systems can be found in our Technical Handbook, also available on-line.
www.piping.georgfischer.com →
Planning Fundamentals/go/support

**Training Courses**
GF Piping Systems has a dedicated trai-ning centre in Schaffhausen, Switzerland and also training facilities at most of its sales companies offering expert training courses.
For training please contact your local GF Piping Systems sales office


**On-site Training**
Our personnel are available locally, pro-viding jointing, handling and installation training to installers where it matters most, namely on site. The length and detail of the training varies depending on the project and system to be installed, but we always recommend giving installers this training.

**Logistics - Locally available world-wide**
The GF Piping Systems network of local sales companies and distributors offers you local availability when you need the product where you need it. All products are sold to the same quality standards world-wide.

**Chemical Resistance**
The effect chemicals can have on the piping system material is absolutely critical when deciding the pipe material for the system. The many years of experience which GF Piping Systems has in this field is visible in its Chemical Resistance List. Our specialists also offer a case-by-case recommendation for mate-rials selection.
www.piping.georgfischer.com /go/support

# Market Support

**www.cool-fit.georgfischer.com**

The COOL-FIT homepage offers a free-of-charge, real-time, on-line calculation tool to calculate all the important characteristics of a piping system. Available in 11 different languages for all the standard fluids and concentrations thereof available on the market.

The planning engineer or consultant can calculate his system parameters using this tool for COOL-FIT ensuring optimal dimensioning and design of the system.

The core functions which can be calculated are shown at the top of the menu; the various sub-functions appear below in a drop-down menu. The core functions are :

- pressure drop (for pipe, fittings, valves and a complete network)
- condensation (whether condensation will appear or not)
- heat loss (energy savings can be compared between systems)
- pipe dimensioning (calculate the optimum size for your conditions)
- pipe support distances
- contraction and expansion (including also expansion elbow lengths)
- temperature (temperature gain along the pipe and also time to freeze)

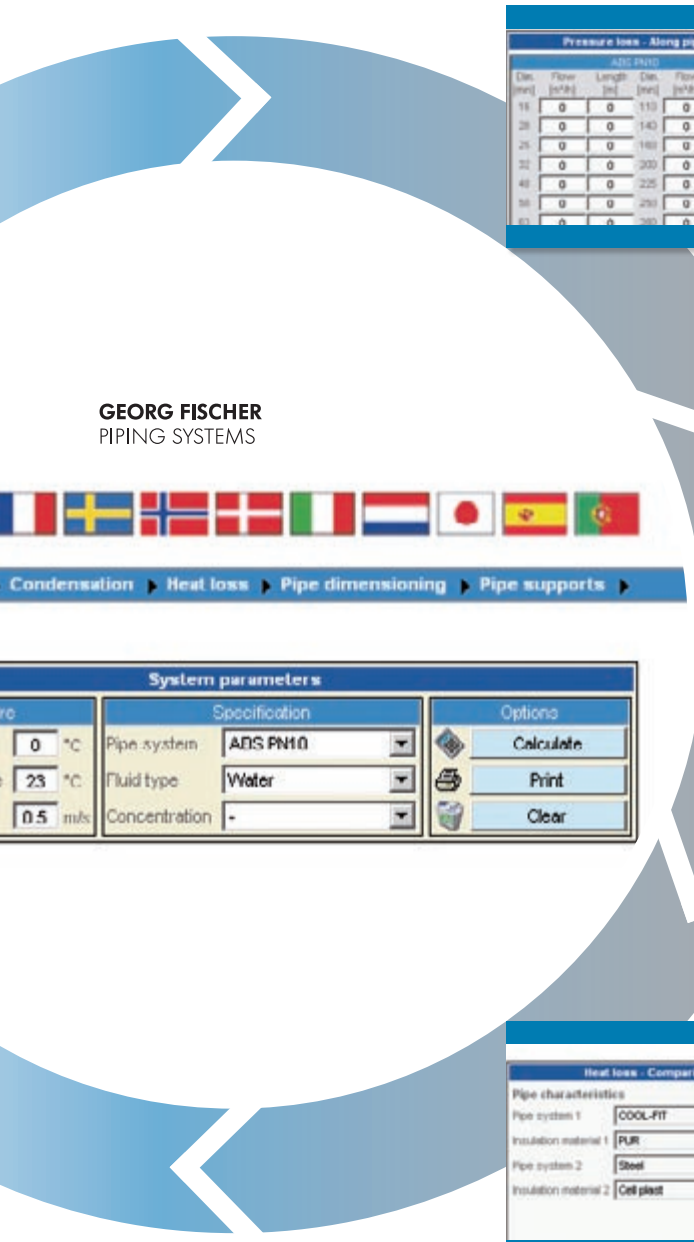
The system also allows the user to compare the results of COOL-FIT to traditional metal carrier pipe with a post-insulation. For example energy benefits can be compared to show the financial benefits of a high quality insulation.

**Contraction**
How much will the pipe expand or contract under given installation operating and environmental conditions?
Once calculated the required flexible length is also shown.


**Pipe Dimensioning**
The 3 variables for dimensioning are velocity, flow and dimension of pipe. Tabular function allows the user to pick the optimum pipe size.

**Temperature - "Time to Freeze"**
COOL-FIT is absolutely ideal for use on rooftops. The "Safety Against Freezing" option allows the user to calculate how long it will take for the system to start freezing if the ambient conditions lie under the freezing point of the medium and the fluid is stagnant.

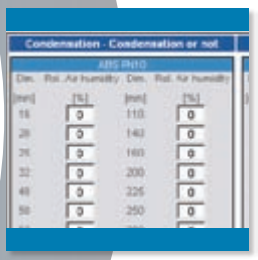
# Internet On-Line Calculation Tool






**Pressure Drop**

- individual calculations for all dimensions and types of products
- network option allows the user to calculate the pressure drop in complete pipeline
- pressure drop along COOL-FIT compared to metal



**Condensation**

Will condensation appear on the outer surface of the pipe and if yes how much insulation do I require to avoid condensation?



**Energy Efficiency (Heat Loss):**

What are the efficiency benefits, in terms of energy loss, when using COOL-FIT pre-insulated pipe compared to traditional insulation? How much money can the end-user save ?

# Material Selection

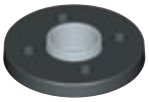
**Your benefits at a glance**

- corrosion or scaling are no longer a problem
- cost savings due to easy and fast installation, early production start, low maintenance costs
- highest production safety guaranteed by the best piping system combined with total confidence in the welding process produced by certified welders
- besides our standard products we provide a wide range of specialities

**PVC-U**

cementable, versatile, very good chemical resistance, easy and fast to connect, only basic tools required.

Product range: 6 - 400 mm
$^{3}/_{8}$ - 8 inch



**ABS**

cementable, excellent low-temperature resistance, high impact strength, basic tools required.

Product range: 16 - 315 mm
$^{3}/_{8}$ – 8 inch

**PE**

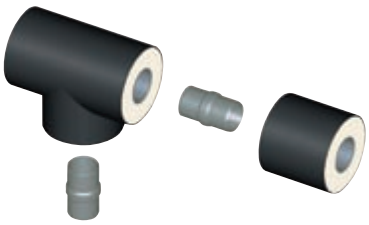
weldable (butt, socket & electrofusion and IR Plus fusion), long lifetime, UV-resistant, flexible and strong at low temperatures, impact resistant.

Product range: 16 - 630 mm

# Our Solutions

**CONTAIN-IT Plus**
double containment system for the highest safety and leak control. Easy installation in accordance with DVS standards. Can be retrofitted.

Product range: 20/50 up to 225/315
1/2 - 4 inch inner pipe



**SYGEF Standard and SYGEF Plus**
weldable (socket, butt, IR Plus and BCF Plus), outstanding chemical resistance and pressure/temperature range.

Product range: 16 - 315 mm

**PROGEF Standard and PROGEF Natural**
weldable (butt, socket and IR Plus fusion, BCF Plus), high impact strength, high rigidity, very good chemical resistance.

Product range: 16 - 400 mm PROGEF Standard
1/2 - 4 inch PROGEF Standard
20 - 110 mm PROGEF Natural

**FUSEAL**
weldable (electrofusion) and MJ (mechanical jointing), PP and PVDF, chemical resistant properties and temperature capabilities, flame retardant and available in double containment.

Product range: 1 1/2 – 12 inch

# Automation with AS-Interface

## Introduction

AS-Interface (Actuator Sensor Interface) is an industrial standard, specially developed for fieldbus connection of actuators and sensors. It maps the lowest automation level.

The AS-Interface complements advanced fieldbus systems ideally and is used in place of conventional parallel wiring. It is suitable for simple on/off applications. The cable structure is not limited. This interface is a single master system, which polls the configured slaves in cycles, thereby exchanging input and output data.

Gateways are used to connect the AS-Interface network to the next higher automation level (e.g. Profibus DP or Foundation Fieldbus) as a slave. Flexibility in the choice of fieldbus system is thus given, enabling cooperation in international projects.

**Advantages of AS-Interface**

- gateways to all fieldbus systems are available
- interoperability with valves of other manufacture
- low connection costs per node
- simple installation technique
- easy setup, configuration and maintenance
- highly effective error protection
- very reliable operation in an industrial environment
- electronic slave addressing
- expandable as required

**General system data**

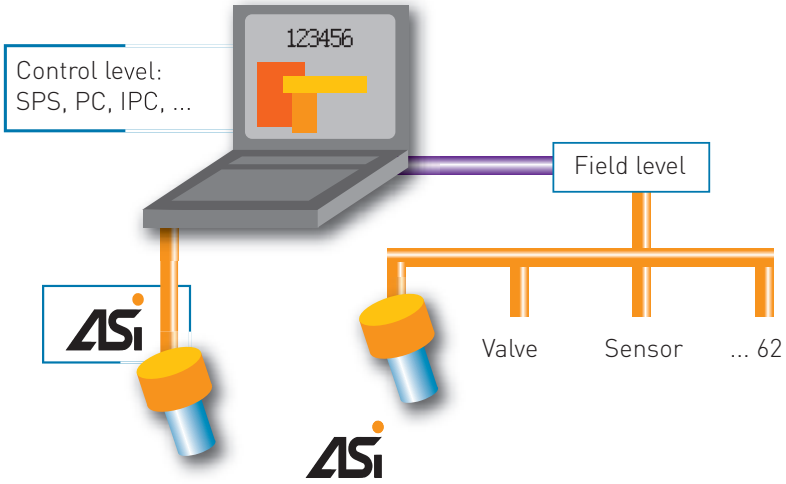
- single master
- master-slave principle
- each slave has a static address
- 4-bit transfer per slave and cycle
- up to 62 slaves possible
- standard voltage 24 V DC
- up to 8 A per bus line (depending on the power supply)
- power and data via a two-wire cable
- cable length 100 m, with repeater up to 300 m
- medium unshielded cable 2 x 1.5 $mm^2$
- IP 67 for use with cabinets and industrial environments
- piercing technology

**Cost-effectiveness of AS-Interface**

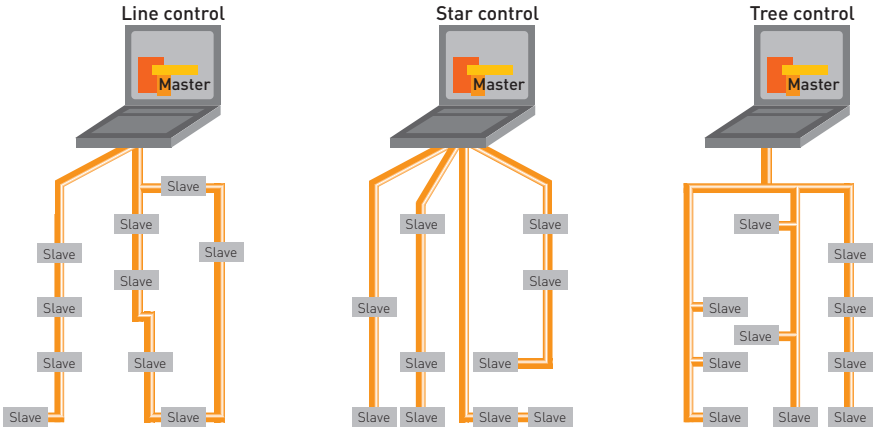
The benefits of an AS-Interface system depend on the actual application. A general rule of thumb: The use of AS-Interface is profitable from approximately 12 sensors or actuators. The most convincing features of the AS-Interface system:

- quick installation
- high potential for cost savings
- saves a lot of space in cabinets
- low wiring costs
- fast setup
- fewer wiring errors

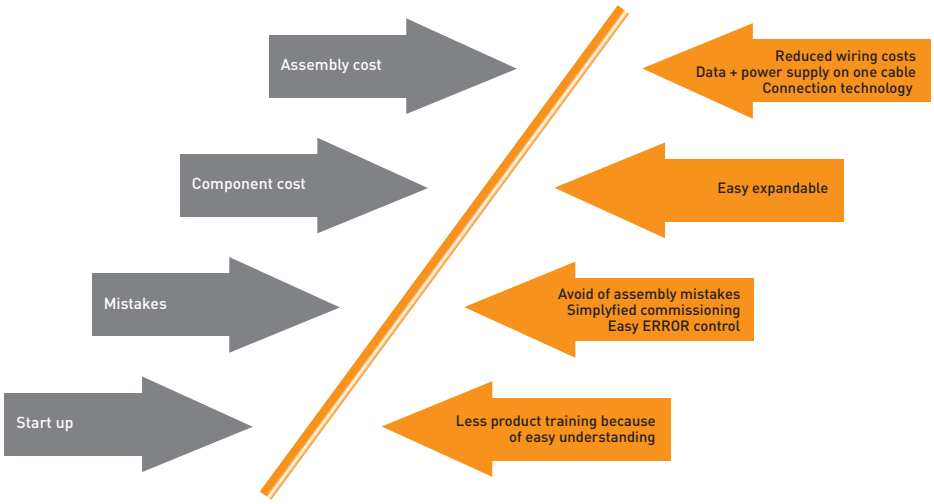
## AS-Interface in automation




## Unlimited possibilities in network structure




## Efficiency at a glance






# Measurement & Control

## Your benefits at a glance

GF Signet provide fluid handling solutions for numerous applications to our industrial clients.
For almost 40 years, GF Signet has manufactured high-quality liquid flow and analytical measurement equipment.

The GF Signet product range includes sensors and instruments to cover a variety of process controls:
- flow – paddlewheel, vortex, magmeter,
- pH/ORP
- conductivity/resistivity
- temperature
- pressure
- level
- multi-parameter

The GF Signet product range also features trademarked and patented technologies that lead the fluid measurement industry. Committed to product excellence, we continue our pursuit of quality through innovative, leading-edge technology in flow control and measurement. We're proud of our:
- award-winning innovative design
- ISO 9001 and 14001 certification
- comprehensive customer support
- product quality and reliability
- easy-to-use instrumentation
- extensive network of worldwide distributors
- unmatched delivery

# GF Signet Compatibility Overview

Below is an overview of the GF Signet sensors. Further detailed information on GF Signet can be obtained from your local sales office or via www.gfsignet.com.


Measurement & Control

Technical Information



+GF+

# Jointing Technologies

## Jointing Plastic Pipe Systems

A piping system is only as strong as its weakest link. Over the years GF has placed a high priority on developing new jointing techniques to fit specific applications and materials. Starting with the invention of TANGIT cement in 1963 to the recent iFit push-fit system, GF places emphasis on a reliable and simple jointing technique.

There are 3 different methods of jointing plastic pipes, namely; fusion, cementing and mechanical connections. GF always recommends on-site training to ensure certification of the complete installer team.

Fusion jointing plastics is easy, simple and very reliable. It requires specialised machinery which offers the option of traceability and a consistent jointing process. GF Piping Systems offers all of the fusion techniques shown here.

Solvent cementing requires no special tooling. Using the solvent to soften and swell the components has been a reliable jointing method for pressure-bearing plastic pipes for over 40 years.

## Different Jointing Options

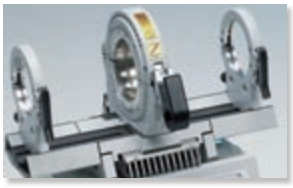
**Solvent Cementing**
simple and reliable jointing – no machine is required, only gap filling cement and a few simple tools
- the fast connection

**Electrofusion**
semi-automatic welding with minimal manpower required
- the easy connection

**Socket Fusion**
fast and easy welding
- the strong connection

**Butt Fusion**
economical welding up to large diameters
- the connection for larger dimensions

**BCF Plus**
best welding quality with highest welding factor and no welding beads
- the smooth connection

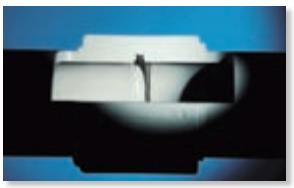


**Mechanical Joints**
fast exchangeability, detachable, customising and different connections are just a few of the benefits
- the fast connection

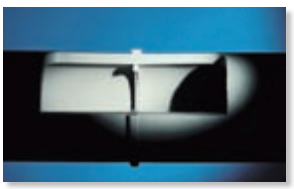
## COOL-FIT Pre-Insulated Pipe Jointing Technique

Cleaning the pipe and socket

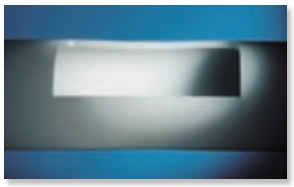
Apply the ABS cement to the inside surface of the pipe and fitting



Pressure test joints before sealing



Apply the double-sided sealing tape around the outer pipe.

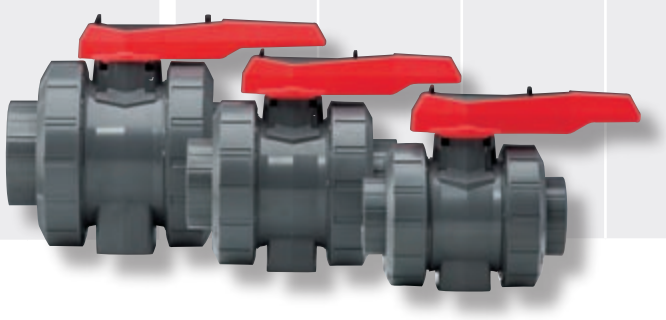


Using an open flame apply heat to the shrink sleeve.

# Ball Valves




| | | Manual | | | | | |
|---|---|---|---|---|---|---|---|
| General | Title | lab valve | metering valve | coloro | | | 3-way ball valve |
| | Type | 322 | 323 | 353-355 | 375 | 546 | 343 |
| | Basic Type | | | | | | |
| | Actuator Type | | | | | | |
| | Dimension DN | 6-8 | 10-15 | 10-50 | 10-100 | 10-100 | 10-50 |
| | Pressure Range PN | 10 | 10 | socket: 16 | DN10-50: 16 | ABS/PP-H 10 | 10 |
| | | | | threaded: 10 | DN65-100: 10 | PVC/PVDF 16 | |
| Materials | PVC-U | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | PVC-C | | | | | ✓ | ✓ |
| | ABS | | | | | ✓ | ✓ |
| | PP-H | | ✓ | | | ✓ | ✓ |
| | PP-N | | | | | | |
| | PE | | | | | | |
| | PVDF | | | | | ✓* | ✓ |
| | PVDF-HP | | | | | | |
| | Ductile iron/Aluminium | | | | | | |
| | Disc ductile iron Rilsan coated | | | | | | |
| | *St.steel* | | | | | | |
| Type of conection | Sockets | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Spigots | | ✓ | | ✓ | ✓ | ✓ |
| | Flanges Wafer Style | | | | ✓ | ✓ | |
| | Flanges Lug Style | | | | | | |
| | Threaded sockets | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Sealing materials | EPDM | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | PTFE | | | | | | |
| | NBR | | | | | | |
| | FPM | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | FFPM | | | | | ✓ | |
| | FPM/PTFE coated | | | | | | |
| | CSM | | | | | | |
| | Other | | | | | | |
| Actuation | Hand operated | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Pneumatic actuated | | | | | | |
| | Electric actuated | | | | | | |
| | With gearbox | | | | | | |
| Accessories | | | | | | ■ handle extenstion<br>■ additional limit switches (MFM)<br>■ threaded inserts<br>■ mounting plate | |







## Actuated

| electric ball valves | | | pneumatic ball valves | | |
|---|---|---|---|---|---|
| 107 | 130-135 | 175-178 | 230-235 | 275-277 | Type |
| 546 | 546 | 343 | 546 | 343 | Basic Type |
| EA11 | EA21/31 | EA21 | PA11-45 | PA11/21 | Actuator Type |
| 10-50 | 10-100 | 10-50 | 10-100 | 10-50 | Dimension DN |
| 10 | 10 | 10 | 10 | 10 | Pressure Range PN |
| | | | | | |
| ✓ | ✓ | ✓ | ✓ | ✓ | PVC-U |
| ✓ | ✓ | ✓ | ✓ | ✓ | PVC-C |
| ✓ | ✓ | ✓ | ✓ | ✓ | ABS |
| ✓ | ✓ | ✓ | ✓ | ✓ | PP-H |
| | | | | | PP-N |
| | | | | | PE |
| ✓ | ✓* | ✓ | ✓* | ✓ | PVDF |
| | | | | | PVDF-HP |
| | | | | | Ductile iron/Aluminium |
| | | | | | Disc ductile iron Rilsan coated |
| | | | | | *St.steel* |
| ✓ | ✓ | ✓ | ✓ | ✓ | Sockets |
| ✓ | ✓ | ✓ | ✓ | ✓ | Spigots |
| ✓ | ✓ | | ✓ | | Flanges Wafer Style |
| | | | | | Flanges Lug Style |
| ✓ | ✓ | ✓ | ✓ | ✓ | Threaded sockets |
| ✓ | ✓ | ✓ | ✓ | ✓ | EPDM |
| | | | | | PTFE |
| | | | | | NBR |
| ✓ | ✓ | ✓ | ✓ | ✓ | FPM |
| ✓ | ✓ | | ✓ | | FFPM |
| | | | | | FPM/PTFE coated |
| | | | | | CSM |
| | | | | | Other |
| | | | | | Hand operated |
| | | | ✓ | ✓ | Pneumatic actuated |
| ✓ | ✓ | ✓ | | | Electric actuated |
| | | | | | With gearbox |

- heating element with fail-safe return unit
- limit switches AgNi
- integrated manual override module for ASi

- heating element with fail-safe return unit
- limit switches AgNi, Au, NPN or PNP
- middle position kit
- monitorings, e.g motor current
- 4-20mA feedback
- positioner
- integrated manual override
- module for ASi

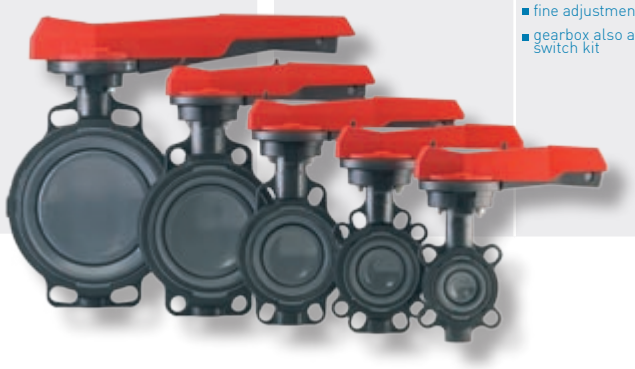
- manual override
- limit switch boxes
- solenoid pilot valves
- module for ASi

* up to DN 50



# Butterfly Valves

| | | Manual | | | | Actuated | | | |
|---|---|---|---|---|---|---|---|---|---|
| General | Title | butterfly valve manual | | | | butterfly valve electric | | butterfly valve pneumatic | |
| | Type | 037 | 038 | 567 | 568 | 037-E/038-E | 140/141/142 | 037-P/ 038-P | 240/241/242 |
| | Basic Type | | | | | 037/038 | 567/ 568 | 037/ 038 | 567/ 568 |
| | Actuator Type | | | | | EA31/42 | EA31/42 | PA30-70 | PA30-70 |
| | Dimension DN | 50-300 | 50-300 | 50-300 | 50-200 | 50-300 | 50-300 | 50-300 | 50-300 |
| | Pressure Range PN | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | | | | | | | | | |
| Materials | PVC-U | | | ✓ | ✓ | | ✓ | | ✓ |
| | PVC-C | | | ✓ | ✓ | | ✓ | | ✓ |
| | ABS | | | ✓ | ✓ | | ✓ | | ✓ |
| | PP-H | | | ✓ | ✓ | | ✓ | | ✓ |
| | PP-N | | | | | | | | |
| | PE | | | | | | | | |
| | PVDF | | | ✓ | ✓ | | ✓ | | ✓ |
| | PVDF-HP | | | | | | | | |
| | Ductile iron/Aluminium | ✓ | ✓ | | | ✓ | | ✓ | |
| | Disc ductile iron Rilsan coated | ✓ | ✓ | | | ✓ | | ✓ | |
| | *St.steel* | ✓ | ✓ | | | ✓ | | ✓ | |
| Type of conection | Sockets | | | | | | | | |
| | Spigots | | | | | | | | |
| | Flanges Wafer Style | ✓ | | ✓ | | ✓ | ✓ | ✓ | ✓ |
| | Flanges Lug Style | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Threaded sockets | | | | | | | | |
| Sealing materials | EPDM | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | PTFE | | | | | | | | |
| | NBR | | | | | | | | |
| | FPM | | | ✓ | ✓ | | ✓ | | ✓ |
| | FFPM | | | | | | | | |
| | FPM/PTFE coated | | | ✓ | ✓ | | ✓ | | ✓ |
| | CSM | | | | | | | | |
| | Other | | | ✓ | ✓ | | ✓ | | ✓ |
| Actuation | Hand operated | ✓ | ✓ | ✓ | ✓ | | | | |
| | Pneumatic actuated | | | | | | | ✓ | ✓ |
| | Electric actuated | | | | | ✓ | ✓ | | |
| | With gearbox | ✓ | ✓ | ✓ | ✓ | | | | |
| Accessories | | ▪ additional limit switches via limit switch kits | | ▪ additional limit switches via integrated position indicator up to DN 200<br>▪ fine adjustment handlever<br>▪ gearbox also available with limit switch kit | | **Valves**<br>▪ manual override up to DN200<br>▪ additional limit switches via integrated position indicator for Type 140 up to DN 200<br>**Actuators**<br>▪ heating element with fail-safe return unit<br>▪ limit switches AgNi, Au, NPN or PNP<br>▪ middle position kit<br>▪ monitorings, e.g motor current<br>▪ 4-20m feedback<br>▪ ...see ball valve electric actuated | | ▪ manual override up to DN200<br>▪ additional limit switches via integrated position indicator for Type 240 up to DN 200<br>▪ limit switch kits<br>▪ solenoid pilot valves<br>▪ module for ASi | |



# Diaphragm Valves








| Manual | | | | Actuated | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Diastar diaphragm valves | | | | Title |
| 314 | 315 | 317 | 319 | Eco | 028 | 025 | | Type |
| | | | | | | | | Basic Type |
| | | | | | | | | Actuator Type |
| 15-50 | 15-50 | 15-150 | 15-15/100-50 | 15-50 | 15-50 | 15-50 | 65-150 | Dimension DN |
| 10 | 10 | 10 | 10 | 6 | 10 | 10 | 6-10 | Pressure Range PN |
| | | | | | | | | |
| ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | PVC-U |
| ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | PVC-C |
| ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ABS |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | PP-H |
| | ✓ | ✓ | ✓ | | ✓ | ✓ | | PP-N |
| | | | | | | | | PE |
| ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | PVDF |
| ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | PVDF-HP |
| | | | | | | | | Ductile iron/Aluminium |
| | | | | | | | | Disc ductile iron Rilsan coated |
| | | | | | | | | *St.steel* |
| ✓ | | | | ✓ | ✓ | ✓ | | Sockets |
| ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | Spigots |
| | | ✓ | | | ✓ | ✓ | ✓ | Flanges Wafer Style |
| | | | | | | | | Flanges Lug Style |
| ✓ | | | | ✓ | ✓ | ✓ | | Threaded sockets |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | EPDM |
| ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | PTFE |
| ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | NBR |
| ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | FPM |
| | | | | | | | | FFPM |
| | | | | | | | | FPM/PTFE coated |
| ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | CSM |
| | | | | | | | | Other |
| ✓ | ✓ | ✓ | ✓ | | | | | Hand operated |
| | | | | ✓ | ✓ | ✓ | ✓ | Pneumatic actuated |
| | | | | | | | | Electric actuated |
| | | | | | | | | with Gearbox |

- manual override
- limit switches AgNi, Au
- positioner
- module for ASi



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