# 50 Years of Application Knowledge

Our long experience in plastic piping systems applications is also for your security. Approvals and third party controls are your guarantee for continuously high quality. Many of our products have the necessary approvals of the relevant institutes and thanks to batch identification they are traceable.

### Fields of Application

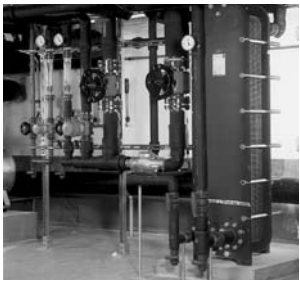
Our specialists are proving their wide material knowledge and their application experience every day in various industries:

- Water treatment
- Waste water treatment
- Galvanics
- Chemical industry
- Automotive industry
- Electronic industry
- Energy
- Swimming pools
- Photo industry
- Chlorine industry
- Mining
- Food
- Refrigeration plants
- Cellulose and paper industry
- Cooling and air conditioning
- Shipbuilding
- Beverage industry
- Exhaust gas cleaning
- Textile industry

### Important Note

The technical data given in this catalogue is for preliminary information purposes only and is published without guarantee. All pictures are for illustrative purposes only and should not be regarded as wholly accurate in every detail. We reserve the right to withdraw or to alter the specification of any product without notice. Please consult our General Conditions of Supply available upon request.

# Quality products with many advantages for professional users



**A wide range of products**

**Pipe**
**Fittings**
**Manual Valves**
**Actuated Valves**
**Jointing Systems**
**Measurement and Control**
**Machines and Tools**

**Available in two standards: EN/ISO/DIN and ASTM/ANSI**

**Advantage of Quality**

**Compound**
Strict quality controls for each raw material delivery form the basis for GF's high quality products.

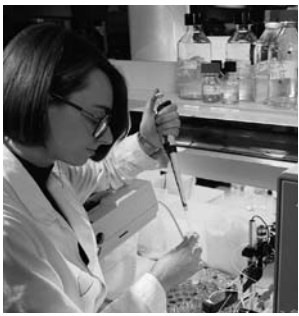
**Production Knowledge**
Thanks to knowledge gained over 40 years we are able to produce our products to exceptionally high tolerances.

*Steel Copper HDPE PVC*

Energy required for 100m pressurised pipe

**Advantage for the Environment**

In addition to the economical advantage of PVC-C there are also ecological advantages:
Preserving diminishing natural resources
Less energy required
Possibility of recycling
Very long life span



**Advantage of Production Quality Control Tests**

Pressure Pulsation Testing
1000h Test
Chemical Resistance
Functions
Temperature Cycling Test

**Independently accredited test laboratory for components of plastic piping systems according to SN EN ISO 45001.**

## Advantage in Planning

### One-stop-shopping for complete systems

Many customers prefer to purchase the complete piping system from one supplier. Because only systems that are designed to complement each other guarantee easy planning, installation and efficient functioning of the piping system.

### CAD Product Library

For drawing and providing a list of orders GF's CAD Product Library is an optimal solution. It can be used with AutoCAD and other CAD systems.

## Advantage of Choosing the Right Material

For maximum safety and optimal durability of a piping system the choice of raw material and pressure class of the pipe parts is highly important. The raw materials suitability to the medium can be checked with the help of our chemical resistance information.


## Advantage of Installation Technique

Solvent cement jointing is simple, fast, economical and very reliable.

Over 100 million homogenous joints have been made over the total lifetime of piping systems, achieving the highest quality requirements.

## Advantage of Support

### Training

GF offers training courses at our Coventry headquarters and at customer's premises. For solvent cement jointing we can also supply video instruction.

### Worldwide Distribution

GF has a global presence and our sales offices can supply you with complete technical advice, punctual distribution and fast service in almost every corner of the world.

# GF quality is no coincidence!

More than 50 years of research, development and experience have shaped our high standard of quality. You will find your application solution in our extensive product range.

## Solvent Cement Jointed Systems

# PVC-C

**Post-chlorinated PVC-C**
**Range of sizes:**
d16 - d225mm

**Resistant to:**
Acids and alkalis at high temps (max. 90°C) and high concentrations.

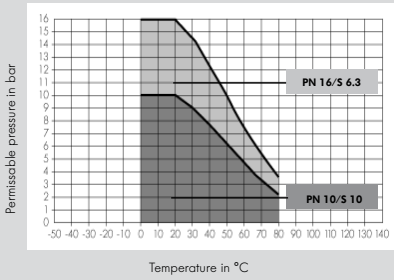
**Recommended Applications:**
Hot and aggressive mediums, high temperature, high corrosive environments, chemical industry generally (e.g. mixed acid waste) and hot water industrial applications.
(Always check GF's chemical resistance tables)

**Not recommended for:**
Aromatic solvents, ester, ketones, chlorinated hydrocarbons.

Low temperatures uses (<0°C)

**Application Limits for Pipes and Fittings in PVC-C**

25 year values with Design Factor C included at 20°C water




These diagrams are subject to adaptations to new European standards about to be issued. Ask your **GF** dealer for more information.

# List of abbreviations

| | |
|---|---|
| AL | Number of bolt holes |
| ANSI | American National Standard Institute |
| CR | Chloroprene Rubber, e.g. Neopren® |
| d | Pipe outside diameter |
| DIN | German standard |
| DN | Nominal bore |
| e | Wall thickness |
| EPDM | Ethylene Propylene Rubber |
| FM | Fusion Method |
| FPM | Fluorine Rubber, e.g. Viton® |
| kg | Weight in kilograms |
| G | Pipe thread, not pressure tight in the thread to ISO 288 |
| HTR | High Temperature Resistant |
| ISO | International Standardization Organisation |
| Ms | Brass |
| NBR | Nitrile Rubber |
| NPT | Taper male thread pressure tight in the thread to ANSI B 1.20.1 |
| PA | Polyamide |
| PBTP | Polybutylene therephthalate |
| PE | Polyethylene |
| PN | Nominal pressure at 20°C, water |
| PP | Polypropylene, heat stabilised |
| PTFE | Polytetrafluorethylene, e.g. Teflon® |
| PVC-C | Polyvinyl Chloride, chlorinated |
| PVDF | Polyvinylidene fluoride |
| R | Taper male thread, pressure tight in the thread to ISO 7 |
| Rp | Parallel female thread, pressure tight in the thread to ISO 7 |
| ® | Registered trade-mark |
| s | Across flats |
| SAN | Styrene-acrylonitrile |
| SC | Size of hexagon bolts |
| SP | Standard pack. The figure given indicates the quantity of fittings contained in a standard pack |
| St | Steel |
| Tg | Malleable Iron |
| ™ | Trade-mark |
| Tr | Trapezoid thread |
| PP-GF | Polypropylene, glassfibre reinforced |

# PVC-C Pressure Piping Systems

## General Information

PVC-C is a post-chlorinated polyvinylchloride that has been in use in many and varied industrial applications since 1957. PVC-C is in many ways similar to PVC-U due to their similarity in chemical structure, however PVC-C offers, in comparison to PVC-U, better mechanical strength characteristics especially at high temperatures together with better chemical resistance. The flame retardation performance of PVC-C is also better than of PVC-U. These properties have led to PVC-C being used in many wide and varying applications, not only as piping system components but also in semi-finished product applications in the chemical and aerospace industries for example.

As a pressure piping system PVC-C lends itself to highly corrosive environments where the likes of stainless steel and even GRP have relative short life spans. Semifinished products, pumps, valves and all the standard accessories required for the transmission of fluids can be found in PVC-C.

## Some Advantages of PVC-C as a Piping System:

- Excellent chemical resistance
- Long life span even in highly corrosive conditions
- Low material costs
- Quick and easy installation
- Very low maintenance costs
- Smooth internal surface
- No natural corrosion
- No electrolytic corrosion
- Very low thermal conductivity

## Chemical Resistance

PVC-C has an excellent chemical resistance. It offers a wide ranging chemical resistance against many aggressive mediums at high temperatures and high concentrations.

For example PVC-C is resistant to sodium chlorites, chlorates and hypochlorites, many varied mixed acid solutions and chlorine gas.

The above is also true, with certain exceptions, for the joint that is achieved using a gap filling solvent cement containing PVC-C.

If in any doubt, please consult the GF chemical resistance list or your local GF representative.

## Physical Properties

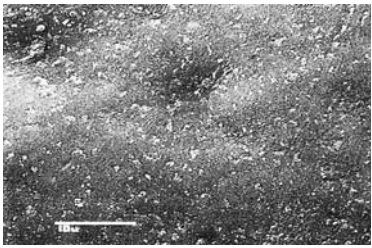
GF's PVC-C Piping System fulfills internationally recognised standards whereby the Vicat point (softening point) of the pipe raw material lies over 110°C and for the fittings over 103°C.

GF recommends a working temperature range of 0°C to 80°C for PVC-C. For limited times PVC-C can be used up to 90°C - please consult GF for advice on any applications outside of our standard guidelines. The physical advantages of the material become most apparent at temperatures between +40°C and +80°C. All components sold by GF, including the joint, have a design factor of 2.5.

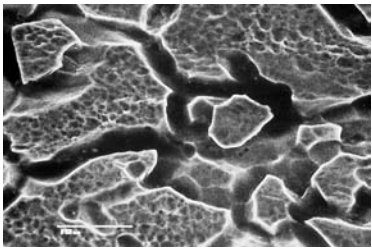
The system has been designed based on pipe series 6.25 or SDR 13.5 to ISO 4065. PN 16 to DIN 8079.

Another excellent physical characteristic of PVC-C is its very smooth internal surface which not only reduces pressure losses to a minimum but also offers very low bacterial growth possibilities and thus a high level of cleanliness.

The following pictures show the roughness of PVC-C pipe in comparison with standard stainless steel.



PVC-C Ra value 0.07µm
Rt value 0.6µm



V4A Stainless Steel
Rt Value 3.37µm

## Burning Characteristics

PVC-C is not self-burning. PVC-C releases very little energy itself (i.e. it has a very low heat of combustion) and is therefore classified as non-combustible. To DIN 4102 part 2 PVC-C is classified under section B1, i.e. difficult to ignite. Colour: RAL 7038 aqate grey.

## Electrical Properties

PVC-C is, like all standard thermoplastics, non-conducting. This means that PVC-C systems incur no electrolytic corrosion. On the other hand the non-conducting properties must be taken into account as electrostatic charge can build up on the pipe. Please take special care in environments where explosive gases may exist. Various methods exist to avoid the build-up of static charge on plastic pipes, please consult your GF representative for advice.

## Weathering

PVC-C can resist prolonged exposure to sunlight, wind and rain. However PVC-C will lose some of its impact resistance under exposure to UV light and therefore painting the pipework (with solvent free paint) or protecting it in some other way from direct exposure to UV light is beneficial.

## Limitations

The following limitations of PVC-C should be observed:

- Use with gases should be checked as gas installations often suffer pressure surges.
- PVC-C cannot be used with most organic solvents, chlorinated or aromatic hydrocarbons, esters and ketones prior testing is recommended when used with oils, lacquers and greases.

If in any doubt, please consult the GF chemical resistance list and or your local GF representative.

## Standards

The GF pipe and fittings are produced in accordance to DIN 8079/8080 and ISO 727.

## WRAS Approval

Water Regulators Advisory Scheme - approved material for potable water.

## Temperature/Pressure Relationship and Life Span

The GF PVC-C Piping System has excellent temperature resistance over a wide temperature scale. It is a basic fundamental of thermoplastic plastic piping systems that if the temperature is increased then the pressure rating must be reduced. See the temperature/pressure table below for details. All values are based on water as the medium, with a life span of 25 years with a built-in design factor of 2.5.

| Temperatures °C | PN 16 bar | PN 10 bar |
|---|---|---|
| 0 | 16 | 10 |
| 20 | 16 | 10 |
| 30 | 16 | 10 |
| 40 | 14.5 | 9 |
| 50 | 12 | 7.5 |
| 60 | 9 | 5.6 |
| 70 | 6 | 3.8 |
| 80 | 3 | 2.0 |

# Pipe Fittings PVC-C for Solvent Cement Jointing

## 23 00 01 Bend 90°, PVC-C


| d | Code | | | kg |
|---|---|---|---|---|
| 20 | 723 000 106 | | | 0.030 |
| 25 | 723 000 107 | | - | 0.055 |
| 32 | 723 000 108 | | - | 0.075 |
| 40 | 723 000 109 | | - | 0.276 |
| 50 | 723 000 110 | | - | 0.297 |
| 63 | 723 000 111 | | - | 0.574 |
| 75 | 723 000 112 | | - | 0.830 |
| 90 | 723 000 113 | | - | 1.489 |
| 110 | 723 000 114 | | - | 2.965 |
| 160 | 723 000 117 | | - | 7.950 |

## 23 01 01 Bend 90° short pattern, PVC-C


| d | Code | | | kg |
|---|---|---|---|---|
| 225 | 723 010 120 | | - | 7.950 |

## 23 10 01 Elbow 90°, PVC-C

| d | Code | | | kg |
|---|---|---|---|---|
| 16 | 723 100 105 | | - | 0.010 |
| 20 | 723 100 106 | | - | 0.014 |
| 25 | 723 100 107 | | - | 0.026 |
| 32 | 723 100 108 | | - | 0.046 |
| 40 | 723 100 109 | | - | 0.082 |
| 50 | 723 100 110 | | - | 0.138 |
| 63 | 723 100 111 | | - | 0.257 |
| 75 | 723 100 112 | | - | 0.439 |
| 90 | 723 100 113 | | - | 0.606 |
| 110 | 723 100 114 | | - | 1.625 |
| 160 | 723 100 117 | | - | 3.120 |

## 23 15 01 Elbow 45°, PVC-C

| d | Code | | | kg |
|---|---|---|---|---|
| 16 | 723 150 105 | | | 0.005 |
| 20 | 723 150 106 | | | 0.011 |
| 25 | 723 150 107 | | | 0.020 |
| 32 | 723 150 108 | | | 0.029 |
| 40 | 723 150 109 | | | 0.052 |
| 50 | 723 150 110 | | | 0.094 |
| 63 | 723 150 111 | | | 0.172 |
| 75 | 723 150 112 | | - | 0.277 |
| 90 | 723 150 113 | | - | 0.630 |
| 110 | 723 150 114 | | - | 1.151 |
| 160 | 723 150 117 | | - | 2.400 |
| 225 | 723 150 120 | | - | 4.460 |

## 23 20 01 Tee 90°, PVC-C

| d | Code | | | kg |
|---|---|---|---|---|
| 16 | 723 200 105 | | | 0.014 |
| 20 | 723 200 106 | | | 0.020 |
| 25 | 723 200 107 | | | 0.034 |
| 32 | 723 200 108 | | | 0.060 |
| 40 | 723 200 109 | | | 0.106 |
| 50 | 723 200 110 | | - | 0.186 |
| 63 | 723 200 111 | | - | 0.360 |
| 75 | 723 200 112 | | - | 0.645 |
| 90 | 723 200 113 | | - | 1.118 |
| 110 | 723 200 114 | | - | 2.400 |
| 160 | 723 200 117 | | - | 5.280 |
| 225 | 723 200 120 | | - | 9.550 |

## 23 91 01 Socket, PVC-C

| d | Code | | | kg |
|---|---|---|---|---|
| 16 | 723 910 105 | | | 0.006 |
| 20 | 723 910 106 | | | 0.010 |
| 25 | 723 910 107 | | | 0.015 |
| 32 | 723 910 108 | | | 0.024 |
| 40 | 723 910 109 | | | 0.049 |
| 50 | 723 910 110 | | | 0.069 |
| 63 | 723 910 111 | | | 0.127 |
| 75 | 723 910 112 | | - | 0.199 |
| 90 | 723 910 113 | | - | 0.347 |
| 110 | 723 910 114 | | - | 0.760 |
| 160 | 723 910 117 | | - | 1.600 |
| 225 | 723 910 120 | | - | 3.750 |

## 23 90 03 Reducing Bush, PVC-C (short pattern)

| d-d1 | Code | | SP | kg |
|---|---|---|---|---|
| 20-16 | 723 900 334 | | - | 0.004 |
| 25-20 | 723 900 337 | | - | 0.004 |
| 32-20 | 723 900 342 | | - | 0.015 |
| 32-25 | 723 900 341 | | | 0.009 |
| 40-20 | 723 900 348 | | | 0.023 |
| 40-25 | 723 900 347 | | | 0.024 |
| 40-32 | 723 900 346 | | - | 0.017 |
| 50-20 | 723 900 355 | | | 0.036 |
| 50-25 | 723 900 354 | | | 0.038 |
| 50-32 | 723 900 353 | | - | 0.051 |
| 50-40 | 723 900 352 | | - | 0.031 |
| 63-32 | 723 900 360 | | - | 0.088 |
| 63-40 | 723 900 359 | | | 0.067 |
| 63-50 | 723 900 358 | | - | 0.065 |
| 75-50 | 723 900 365 | | | 0.105 |
| 75-63 | 723 900 364 | | - | 0.111 |
| 90-50 | 723 900 372 | | - | 0.195 |
| 90-63 | 723 900 371 | | - | 0.231 |
| 90-75 | 723 900 370 | | - | 0.149 |
| 110-63 | 723 900 378 | | - | 0.334 |
| 110-90 | 723 900 376 | | - | 0.279 |
| 160-110 | 723 900 390 | | - | 0.950 |
| 225-160 | 723 900 396 | | - | 2.380 |

# Unions PVC-C

## 23 51 01 Union, PVC-C

- Union End: Solvent cement socket
- Union Bush: Solvent cement socket
- Gasket: O-Ring EPDM No. 48 41 00, FPM No. 49 41 00

| d | EPDM Code | | | kg |
|---|---|---|---|---|
| 16 | 723 510 105 | | | 0.027 |
| 20 | 723 510 106 | | | 0.044 |
| 25 | 723 510 107 | | | 0.072 |
| 32 | 723 510 108 | | | 0.098 |
| 40 | 723 510 109 | | | 0.167 |
| 50 | 723 510 110 | | | 0.098 |
| 63 | 723 510 111 | | - | 0.400 |
| 75 | 723 510 112 | | - | 0.670 |
| 90 | 723 510 113 | | - | 1.008 |
| 110 | 723 510 114 | | - | 1.553 |
| **d** | **FPM Code** | | | **kg** |
| 16 | 723 510 130 | | - | 0.027 |
| 20 | 723 510 131 | | - | 0.044 |
| 25 | 723 510 132 | | - | 0.072 |
| 32 | 723 510 133 | | - | 0.098 |
| 40 | 723 510 134 | | - | 0.167 |
| 50 | 723 510 135 | | - | 0.098 |
| 63 | 723 510 136 | | - | 0.400 |
| 75 | 723 510 137 | | - | 0.670 |
| 90 | 723 510 138 | | - | 1.008 |
| 110 | 723 510 139 | | - | 1.553 |

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