PROGEF
More than a system

Polypropylene welded system for industrial applications
The system

PROGEF – more than a system

The outstanding material for any challenge in industrial applications

We are dedicated to designing, manufacturing and marketing piping systems for the safe and secure treatment or conveyance of water, liquids, chemicals and gases. As a leading piping systems provider with global presence, we offer our customers not only reliable and innovative products of highest quality, but we supply also tailor-made solutions from one source. In close coordination with end-customers and based on their needs, GF Piping Systems introduced the PROGEF family, a specified polypropylene system based on certified raw material, serving a wide variety of industrial applications. Thanks to its beneficial mechanical properties, chemical resistance, outstanding weldability and especially its high resistance to thermal distortion, the PROGEF systems guarantee a maximum of safety, reliability and performance.

+ Individuality – from the planning stage to installation

PROGEF Welded Systems are ideally adapted to customer needs

Whether installed above or below ground, our system meets any demanding requirement, in every phase of the project, worldwide. Therefore, the variety of our product portfolio is as diverse as our customers and their individual challenges. Together with high level services such as technical support, low- or single-item customizing production and training courses, our specific system range generates exceptional added value for our customers.

With a comprehensive piping system solution, comprised of pipes, fittings, valves, related jointing as well as automation technologies in high quality thermoplastics, GF Piping Systems provides the right fit and quality for many industrial media conveyance systems and for many industrial applications.

Customizing

The focus of our worldwide located customizing teams is manufacturing custom parts for special systems. Standardized processes guarantee the highest level of quality.

Technical support

Technical support such as material selection is a key factor for a successful installation. A team of experts is available for individual support all around the world.
Technical documentation
Our extensive know-how of more than 50 years is fully documented in detail in our technical manuals, planning fundamentals and application guides.

Chemical resistance
In the area of chemical resistance our specialist teams offer individual support and advice in selecting the right material for the corresponding requirements.

Online and mobile calculation tools
Our numerous online and mobile calculation tools, available in many different languages, support our customers in configuring and commissioning automation products.

CAD library
The extensive CAD library is the most frequently used planning tool. The freely available database comprises over 30,000 drawings as well as technical data for our customers. Many formats are available.

Training courses and on-site training
Offering a wide range of training courses we provide participants an excellent opportunity to gain confidence in working with our products and proven jointing technologies.

System lifetime warranty *
Confirming confidence in the premium quality of our Polypropylene product and system range, we grant a limited system lifetime warranty.

* Detailed information regarding the warranty can be found under: www.gfps.com - Planning fundamentals

PROGEF Standard – for a wide range of industrial applications

The highly resistant system offers numerous fields of application in industries. High stress fracture, pressure, abrasion, corrosion and temperature resistance are only some of the advantageous characteristic properties for the durable polypropylene system. Its fine, homogeneous material structure furthermore offers outstanding weldability and low heat distortion.

PROGEF Plus – for defined water qualities and clean applications

Cleaned and packed in specified processes, the silicone-free or oil-free PROGEF Plus system has a high purity factor. The system is widely used in demanding applications in microelectronics or coating and surface treatment, where features such as an outstanding surface finish and excellent leach-out characteristics offer additional benefit. The components are double-bagged to ensure cleanliness and prevent contamination before installation.

PROGEF Natural – for laboratories and pharmaceutical applications

Wherever pure solutions are needed, especially for applications in chemical or life science industries, PROGEF Natural is predestined. Beneficial properties of the transparent, pigment-free polypropylene such as excellent clean, smooth surface, high chemical and temperature resistance, and additionally the bead and crevice free jointing technologies, ensure highest system quality.

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**System range**

**Everything from one source**

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System specification

* Standards:

PROGEF Standard & PROGEF Plus

<table>
<thead>
<tr>
<th>Systems</th>
<th>PROGEF Standard</th>
<th>PROGEF Plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>- d16–d315 Ø PP-H 100 (β Polypropylene Homopolymer)</td>
<td>- d20–d315 Ø PP-H 100 (β Polypropylene Homopolymer)</td>
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<tr>
<td></td>
<td>- d355–d500 state-of-the-art PP</td>
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<tr>
<td>Colour</td>
<td>RAL 7032</td>
<td>RAL 7032</td>
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<tr>
<td>Density</td>
<td>~ 0.90 g / cm³ (ISO 1183 / ASTM D 792)</td>
<td>~ 0.90 g / cm³ (ISO 1183/ASTM D 792)</td>
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<tr>
<td>Thermal expansion coeff.</td>
<td>0.16 mm / mK (DIN 53752)</td>
<td>0.16 mm / mK (DIN 53752)</td>
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<tr>
<td>Thermal conductivity</td>
<td>0.23 W / mK (EN 12664)</td>
<td>0.23 W / mK (EN 12664)</td>
</tr>
<tr>
<td>Surface resistivity</td>
<td>&gt; 1016 Ω (IEC 60093)</td>
<td>&gt; 1016 Ω (IEC 60093)</td>
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<tr>
<td>Dimensions</td>
<td>d16–d500 in accordance to EN ISO 15494</td>
<td>d20–d315 in accordance to EN ISO 15494</td>
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<tr>
<td>Surface condition</td>
<td>accordance to EN ISO 15494</td>
<td></td>
</tr>
</tbody>
</table>
| Material- and product-approvals | FDA CFR 21 177.1520  
USP 25 class VI (physiological non-toxic)  
DIBT (Z-40.23-4, Z-40.34-264, Z - 40.23-265)  
DNV (K-2630, K - 2636)  
Loyd’s Register (01/20030(E1))  
UL94HB (horizontal burning) | FDA CFR 21 177.1520  
USP 25 class VI (physiological non-toxic)  
UL94HB (horizontal burning) |
| Packaging                | pipes, fittings and valves bulk bagged                                        | pipes, fittings and valves, each component double bagged                    |
| Marking                  | - brand name  
- product description  
- article number  
- material  
- dimensions  
- standards and approvals | - brand name  
- product description  
- article number  
- material  
- dimensions  
- standards and approvals |

* Approvals / Acceptance:

* The most significant standards and approvals are shown above. An overview of all approvals online: www.gfps.com
**System range & system specification**

**PROGEF Natural**

<table>
<thead>
<tr>
<th>Products</th>
<th>SDR</th>
<th>d</th>
<th>PN</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>32</th>
<th>40</th>
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<th>63</th>
<th>80</th>
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<td>11</td>
<td>10</td>
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<tr>
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<tr>
<td>Ball valves PP-H body/PP-R</td>
<td>11</td>
<td>10</td>
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<td>Ball valves PP-H</td>
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<td>Diaphragm valves PP-R</td>
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<td>Diaphragm valves PP-H</td>
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<td>Butterfly valves PP-H</td>
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<td>Cone check vales</td>
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<td>PP-H body/PP-R</td>
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<td>Automation</td>
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<tr>
<td>Flanges PP-V / PP-steel</td>
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<td>Flange seals EPDM / FKM</td>
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<td>Pipe clips PP / PE</td>
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</table>

**Welding machines**

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<th>20</th>
<th>25</th>
<th>32</th>
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<th>50</th>
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<tbody>
<tr>
<td>Butt fusion machines</td>
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<td>Infrared (IR) fusion machines</td>
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<td>BCF fusion machine</td>
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</table>

**System**

- d20–d110 PP-R (Polypropylene Random Copolymer)
- pigment-free, transparent
- Density ~ 0.90g / cm³ (ISO 1183 / ASTM D 792)
- Thermal expansion coefficient 0.16mm / mK (DIN 53752)
- Thermal conductivity 0.23W / mK (EN 12664)
- Surface resistivity > 10¹⁶ Ω (IEC 60093)
- Dimensions d20–d110 according to EN ISO 15494

**Surface condition**

- Inner surface: Ra < 1.0 μm (39μin)

**Material- and product approvals**

- FDA CFR 21 177.1520
- USP 25 class VI (physiological non-toxic)
- Food conformity (D)

**Packaging**

- pipes, fittings and valves, each component single bagged

**Marking**

- brand name
- product description
- article number
- material
- dimensions
- standards and approvals

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**Standards:**

ISO, DIN, ASME BPE, 3A, JIS

**Approvals / Acceptance:**

CE, FDA, USP

**Sanitary adaptor Standards:**

ISO, DIN, ASME BPE, 3A, JIS

* The most significant standards and approvals are shown.

An overview of all approvals online: www.gfps.com
Proven technologies for your installation

A large diversity of innovative and intelligent welding solutions enriched with global training and service offerings

As a pioneer in the field, GF Piping Systems has always been placing a high priority on developing innovative jointing techniques to fulfill specific requirements and materials in use. Simplicity in application, chemical resistance, thermal stability and long-term weld strength are the key drivers in our jointing technologies. With a global jointing training program, international machine rental and a worldwide network of service centres, our customers benefit from expert know-how and practical experience.

<table>
<thead>
<tr>
<th>Welding technology</th>
<th>Welding machine</th>
<th>Joint cross-section</th>
<th>Macro-image</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Socket fusion – the strong connection</strong></td>
<td><img src="image1.png" alt="Socket fusion Machine" /></td>
<td><img src="image2.png" alt="Socket fusion Cross-section" /></td>
<td><img src="image3.png" alt="Socket fusion Macro-image" /></td>
</tr>
<tr>
<td>The fast and reliable solution to produce heavy-duty connections, in the workshop or the field.</td>
<td></td>
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</tbody>
</table>

| **Butt fusion – the economical connection** | ![Butt fusion Machine](image4.png) | ![Butt fusion Cross-section](image5.png) | ![Butt fusion Macro-image](image6.png) |
| Economical and flexible fusion especially for larger diameters. From manual machines to full CNC control with traceability. |

| **IR- (Infrared) fusion – the fast, clean connection** | ![IR-fusion Machine](image7.png) | ![IR-fusion Cross-section](image8.png) | ![IR-fusion Macro-image](image9.png) |
| Fast, repeatable and clean welds via non-contact heating. Full traceability of the welding process, with user guidance. |

| **BCF-Plus fusion – the smooth connection** | ![BCF-Plus Machine](image10.png) | ![BCF-Plus Cross-section](image11.png) | ![BCF-Plus Macro-image](image12.png) |
| Bead and Crevice Free jointing with the highest weld factor, lowest stress and completely smooth fusion zone without any intrusions. |

For more information about training courses from GF Piping Systems please contact our local sales companies.
Specifications

Exceeding quality standards

Technical specifications with focus on pressure-/temperature attributes

PROGEF Systems*

Standard - Plus - Natural

PROGEF Systems out of polypropylene show excellent physical properties and mechanical characteristics, indicating its status as a highly versatile and universal solution. Having a high operational temperature range and ensuring outstanding chemical resistance, high abrasion resistance and high impact strength values, the material meets all requirements of demanding industrial conditions or environments.

Furthermore, properties such as low weight, low density, minimum internal stresses and an excellent smooth internal surface with high finish quality, make PROGEF systems a high-grade piping material.

According to the 10˚C line in the hydrostatic strength curve for PP, a permissible pressure of 12.0 bar / 7.4 bar in the temperature range of 0˚C to 10˚C for the SDR11 / PN10 and SDR17.6 / PN6 system can be applied.

The pressure-/temperature curve based on medium water, operating temperature of 20 ˚C, valid life time of 25 years and the design factor C = 2.

*More information regarding technical specifications can be found online in our planning fundamentals: www.gfps.com
Chemical resistance

For your operational safety

Polypropylene (PP) - a high quality material with outstanding characteristics for a safe and efficient operation

<table>
<thead>
<tr>
<th>Media</th>
<th>Chemicals</th>
<th>Partially crystalline thermoplastics</th>
<th>Amorphous thermoplastics</th>
<th>Stainless Steel</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>PP</td>
<td>PE</td>
<td>PVD</td>
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<tr>
<td>Oxidizing Acids</td>
<td>HNO₃ ≤ 25 %</td>
<td>0</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>25 % ≤ HNO₃ ≤ 65 %</td>
<td>-</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>H₂CrO₄ aqueous solution</td>
<td>0</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>H₂SO₄ ≤ 70 %</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>70 % ≤ H₂SO₄ ≤ 96 %</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Non Oxidizing Acids</td>
<td>HCl ≤ 30 %</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>HF ≤ 40 %</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>40 % ≤ HF ≤ 75 %</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Organic</td>
<td>HCOOH ≤ 25 %</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>25 % ≤ HCOOH ≤ tech. pure</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>CH₃COOH ≤ 50 %</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>50 % ≤ CH₃COOH ≤ tech. pure</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>C₃H₄(OH)₃</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Bases</td>
<td>Inorganic (NaOH, KOH, etc.)</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Organic (amine, imidazole, etc.)</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Salts</td>
<td>NaCl, FeCl₂, FeCl₃, CaCl₂, etc.</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Halogens</td>
<td>Chlorine, bromine, iodine, (no fluorine)</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Fuels / Oils</td>
<td>Aliphatic hydrocarbons</td>
<td>0</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Aromatic hydrocarbons</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Solvents</td>
<td>Chlorinated hydrocarbons</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Ketones</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Alcohols</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Esters</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Phenols</td>
<td>Phenol, Cresol, etc.</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

Please contact us for help in selecting the right materials.

+ resistant  0 conditionally resistant, please consult us  - not resistant

Please note: The above list is only intended as a guideline and does not replace an indepth review of material suitability for the particular application. The information is based on our experience and is state of the art. These data are general indicators only. In practice, however, other factors such as concentration, pressure and jointing technology must also be taken into consideration. The technical data are not binding and are not expressly warranted characteristics of the goods.
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As versatile as your applications

Leading applications enabled by safe and reliable systems adapted to fit the needs of demanding industries

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Wherever defined water qualities and controlled processes are required PROGEF Plus offers reliable and economical system solutions. With PROGEF Plus high purity water specifications and quality standards are dependably met.

Demanding Applications in Water Treatment
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