KPPS
Krah Pressure Pipe System
ISO/AWI 29561-1
(PE-GFR)
Krah PE GFR PIPES

The tough new breed in town

**PRODUCT:** GLASS FIBRE REINFORCED POLYETHYLENE PRESSURE PIPES FROM Krah AG

**APPLICATION:** RETICULATION OF
- POTABLE WATER,
- CHILLED WATER,
- WASTE WATER
- AND ALL OTHER FLUIDS

**TESTING:**
- ASTM TESTING,
- ISO STANDARDISATION,
- THIRD PARTY – BECETEL, BELGIUM
To improve the properties of the material we have created a new compound consisting of polyethylene, chopped fibre and a bonding agent.
<table>
<thead>
<tr>
<th>Description</th>
<th>Test method</th>
<th>Test period</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>EN ISO 1183</td>
<td></td>
<td>1.06</td>
<td>g/cm³</td>
</tr>
<tr>
<td>Bending E-modulus</td>
<td>DIN 53457</td>
<td>1 min</td>
<td>2515</td>
<td>N/mm²</td>
</tr>
<tr>
<td></td>
<td>DIN 54852</td>
<td>24h</td>
<td>1804</td>
<td>N/mm²</td>
</tr>
<tr>
<td>Linear thermal expansion coefficient</td>
<td>DIN 53752</td>
<td></td>
<td>5 x 10⁻⁵</td>
<td>K-1</td>
</tr>
<tr>
<td>Determination of the oxidation introduction time (OIT)</td>
<td>EN 728</td>
<td></td>
<td>&gt; 55</td>
<td>min</td>
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<tr>
<td>Tensile characteristics stress at yield (mean value)</td>
<td>ISO 527-4</td>
<td></td>
<td>38.6</td>
<td>N/mm²</td>
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<tr>
<td>Tensile strength</td>
<td></td>
<td></td>
<td>38.6</td>
<td>N/mm²</td>
</tr>
<tr>
<td>Strain at break</td>
<td></td>
<td></td>
<td>5.4</td>
<td>%</td>
</tr>
<tr>
<td>Tensile E-modulus</td>
<td>ISO 527-4</td>
<td></td>
<td>2355</td>
<td>N/mm²</td>
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<tr>
<td>Flexural E-modulus</td>
<td>NBNEN ISO 178</td>
<td></td>
<td>2566</td>
<td>MPa</td>
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<tr>
<td>Progression curves</td>
<td>ISO 9080</td>
<td></td>
<td>&gt; 20</td>
<td>Mpa</td>
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</tbody>
</table>
ISO 9080 analysis proves that the minimum required strength (MRS-value) of the KPPS-pipe material (PE-GR 200) at 20°C/50 years is 23 MPa.
The pipe wall consists of three layers but in only one extrusion process.

Inner / outer wall: 100% polyethylene
Middle layer: out of the compound
Pipe
Nominal Diameter

- Due to our production technology the pipe is calibrated on the inside diameter according to (DIN 8074)

- Our nominal diameter is always the inside diameter and also the hydraulic diameter

- Every increase of stiffness or pressure rate will lead to an increase of the wall thickness and the outer diameter

DIN 8074

KPPS
Pipe Length

- Diameter ranging from 500 mm up to 4000 mm
- The laying length is between 1 m and 6 m
- Integrated socket and spigot
- With complete set of fittings
- With solid wall
**Joints**

Homogeneous jointing

**Electro- Fusion**

- Integrated part in the pipe
- Integrated in all fittings
- Electro fusion device used to trace back the specific product
- 100% tight

![Image of Electro Fusion device and Krah KPPS PE – GR DN 2000 pipe](image)
Butt – Fusion

- Ends of the pipes and fittings are butt-welded
- Recommended for maximum wall thickness of 150 mm
- Diameter from 500 mm up to 2500 mm
Flange Connection

- The stub end and the flange are directly integrated in the pipe
- Available as separate fitting
- Used for open sea discharge applications
- Facility of disjointing
E-Fusion

Can be fabricated and designed according to the application's requirements
Bends can be fabricated according to the application's requirements from 15° up to 90°.
Fittings
Reductions

We can produce any type of reduction according to the customers requirements.
Tests done on our pipes

- Short – term burst pressure according to ASTM D1599
- Slow crack growth according to EN ISO 13479
- Rapid crack propagation S4 according to EN ISO 13477
- Decohesion of an electro fusion joint according to EN 1555 and EN 12201
- Deflection test according to EN1440
- Pipe stiffness test EN ISO 9969
- Ring stiffness DIN 16961
- Creep ratio according to ISO 9667
- Abrasion test according to Darmstadt procedure
ISO/AWI 29561-1
Plastics piping systems -- Glass fibre reinforced polyethylene (PE-GFR) piping systems for water supply -- Part 1: General

ISO/AWI 29561-2
Plastics piping systems -- Glass fibre reinforced polyethylene (PE-GFR) piping systems for water supply -- Part 2: Pipes

ISO/AWI 29561-3
Plastics piping systems -- Glass fibre reinforced polyethylene (PE-GFR) piping systems for water supply -- Part 3: Fittings
Production Line
Cross Winding

Principle of winding process

1. Extrusion die head
2. Production tool