The FLOWTITE GRP piping products and accessories sold by the AMIANTIT Group offer many advantages for the use in sewer applications.

The worldwide product availability of FLOWTITE GRP pipes has established sewer projects all over the world. This case study brochure represents only a small extract of the available references.

Many other countries around the world realized a huge number of installations and an increasing number of projects are recently in work.

Further information about additional references and case studies can be found on our website at www.amiantit.com!

Additional information about product advantages and the available product range of our GRP pipes for the use in sewer projects are available in our sewer gravity and sewer pressure brochures. Please request them from your local dealer.
## Case Study -1-  

<table>
<thead>
<tr>
<th><strong>PROJECT NAME:</strong></th>
<th>Cloaca Maxima Cordoba</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community/Country:</strong></td>
<td>Cordoba, Provincia de Cordoba, Argentina</td>
</tr>
<tr>
<td><strong>Amiantit location:</strong></td>
<td>AMITECH Argentina</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Installation of 6.3 kilometers of 1800mm pipeline from the Barrio San Vicente collectors across the Suquia river to the San Vicente pumping station. This project connects more than 160,000 inhabitants.</td>
</tr>
<tr>
<td><strong>application:</strong></td>
<td>Sewer</td>
</tr>
<tr>
<td><strong>transported medium:</strong></td>
<td>Sewage</td>
</tr>
<tr>
<td><strong>working pressure:</strong></td>
<td>Gravity</td>
</tr>
<tr>
<td><strong>type of project:</strong></td>
<td>• new installation</td>
</tr>
</tbody>
</table>
| **demanded standards / specifications / approvals:** | IRAM 13432  
AWWA C950 |
| **Special requirement on pipe-system:** | Light weight, fast and easy installation |
| **Project owner:** | Municipalidad de Cordoba, Cordoba |
| **consultant / engineer:** | Enohsa, Buenos Aires |
| **contractor:** | Electroingenieria – Paschini Michelotti – Estructuras (Ute), Cordoba |
| **Pipe Details - material:** |  |
| **Total pipeline length (m):** | 6,500 |
| **Diameter DN min / max (mm):** | 1600 / 1700 / 1800 |
| **Pressure PN min / max (bar):** | 1 |
| **Stiffness SN min / max (N/m²):** | 5000 |
| **joint types:** | FLOWTITE standard couplings |
| **fittings used:** | Reducer, concentric tees |
| **Installation Details:** |  |
| **type:** | • open trench |
| **trench dimensions (m):** | 3 |
| **laying depth (m):** | 2.50 / 7.50 |
| **native soil type:** | Slightly Compact |
| **backfill soil type / compaction:** | Soil class SC2 |
| **thrust blocks / lockjoints:** | No |
| **deflection min/max:** | max. 3° |
| **quality measures during installation:** | Tightness test per section |
| **Project duration:** | 24 months |
| **Year start / end:** | 2009 / 2011 |
**Case Study -2-**

**PROJECT NAME:** Cloaca Maxima Rawson  
**Community/Country:** Rawson, Provincia de San Juan, Argentina  
**Amiantit location** AMITECH Argentina  
**Description:** This mega work will provide sewer service for public network to an area of high population density and limited services. The project includes the laying of the primary system, large collector pipes, three pumping stations and driving in Rawson.

<table>
<thead>
<tr>
<th>application</th>
<th>Sewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>transported medium</td>
<td>Sewage</td>
</tr>
<tr>
<td>working pressure</td>
<td>Gravity</td>
</tr>
<tr>
<td>type of project</td>
<td>new installation</td>
</tr>
</tbody>
</table>
| demanded standards / specifications / approvals | IRAM 13432  
AWWA C950 |
| Special requirement on pipe-system | Light weight, fast and easy installation |

**chosen pipe system:**  
- GRP round filament  
- light weight

**Project owner:** ENOHLSA, Bs, As  
**contractor:** ISOLUX-CORSAN

**Pipe Details - material:**

- **Total pipeline length (m):** 20,000
- **Diameter DN min / max (mm):** 1000
- **Pressure PN min / max (bar):** 1
- **Stiffness SN min / max (N/m²):** 5000
- **joint types:** FLOWTITE standard couplings
- **fittings used:** Manholes

**Installation Details:**

- **type:** open trench
- **trench dimensions (m):** 2
- **laying depth (m):** 2 / 4
- **native soil type:** Soft
- **backfill soil type / compaction:** Soil class SC2
- **thrust blocks / lockjoints:** No
- **deflection min/max:** max. 3°
- **quality measures during installation:** Tightly test per section
- **Project duration:** 24 months
- **Year start / end:** 2006 / 2008
## Case Study -3-  

**PROJECT NAME:** Colector Cloacal y Estaciones Elevadoras Rosario  
**Community/Country:** Rosario, Provincia De Santa Fe, Argentina  
**Amiantit location:** AMITECH Argentina  

**Description:** This project provides sewer service for public network to an area of high population density and limited services. It includes the laying of the primary system, large collector pipes, three pumping stations and driving in the west of Rosario.

<table>
<thead>
<tr>
<th>application</th>
<th>Sewer Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>transported medium</td>
<td>Sewage</td>
</tr>
<tr>
<td>working pressure</td>
<td>10 bar</td>
</tr>
<tr>
<td>type of project</td>
<td>new installation</td>
</tr>
</tbody>
</table>
| demanded standards / specifications / approvals | IRAM 13432  
AWWA C950 |

**Special requirement on pipe-system:** Light weight, fast and easy installation

**chosen pipe system:**  
- GRP round filament  
- Light weight

---

**Project owner:** ENOHSA, Bs, As.  
**contractor:** WERK – OBRING, Rosario

**Pipe Details - material:**  
- **Total pipeline length (m):** 26,884  
- Diameter DN min / max (mm): 300 / 700  
- Pressure PN min / max (bar): 1 / 10  
- Stiffness SN min / max (N/m²): 5000  
- joint types: FLOWTITE standard couplings  
- fittings used: none

**Installation Details:**  
- **type:** open trench  
- **trench dimensions (m):** 0.60 to 1.20  
- **laying depth (m):** 1.20 / 6  
- **native soil type:** Slightly Compact  
- **backfill soil type / compaction:** Soil class SC1 / SC2  
- **thrust blocks / lockjoints:** Yes  
- **deflection min/max:** max. 3°  
- **quality measures during installation:** Permanent sheeting  
- **Project duration:** 24 months  
- **Year start / end:** 2009 / 2011
### Case Study -4-  

**PROJECT NAME:** Proyecto Interceptor Izquierdo Canal del Rio Fucha  
**Community/Country:** Bogotá / Colombia  
**Amiantit location:** O-tek Internacional S.A.  
**Description:** The project installed parallel to the Fucha River Canalization is collecting the sewage of the south East Populations of Bogotá City. The 3,200 mm GRP pipes where installed mainly in open trench but the pass beneath the Ciudad de Cai Avenue and Agoberto Mejia Street was installed with tunnel liner system (40m each case).

<table>
<thead>
<tr>
<th>Application</th>
<th>Sewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transported medium</td>
<td>Sewage</td>
</tr>
<tr>
<td>Working pressure</td>
<td>Gravity</td>
</tr>
<tr>
<td>Type of project</td>
<td>• new installation</td>
</tr>
</tbody>
</table>
| Demanded standards / specifications / approvals | NTC 3870  
AWWA C950  
ASTM D 3262 |
| Special requirement on pipe-system | Rapid installation time.  
Light weight. |
| Project value in US$ | US$ 4,400,000 |

Chosen pipe system:  
• GRP round filament  
• Reinforced Concrete pipes  
• light weight  
• flow characteristics  
• mech. properties

**Project owner:** Empresa de Acueducto de Bogotá, Colombia  
**Consultant / engineer:** H.M.V. Ingenieros, Medellín, Colombia  
**Contractor:** U.T. Canal del Fucha, Bogota, Colombia

#### Pipe Details - material 1: GRP

<table>
<thead>
<tr>
<th>Total pipeline length (m)</th>
<th>3,096</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter DN min / max (mm)</td>
<td>2800 / 3200</td>
</tr>
<tr>
<td>Pressure PN min / max (bar)</td>
<td>2</td>
</tr>
<tr>
<td>Stiffness SN min / max (N/m²)</td>
<td>2500</td>
</tr>
<tr>
<td>Joint types</td>
<td>FLOWTITE standard couplings</td>
</tr>
<tr>
<td>Fittings used</td>
<td>None</td>
</tr>
</tbody>
</table>

#### Pipe Details - material 2: Concrete

<table>
<thead>
<tr>
<th>Total pipeline length (m)</th>
<th>600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter DN min / max (mm)</td>
<td>2400</td>
</tr>
<tr>
<td>Pressure PN min / max (bar)</td>
<td>1</td>
</tr>
<tr>
<td>Stiffness SN min / max (N/m²)</td>
<td>2500</td>
</tr>
<tr>
<td>Joint types</td>
<td>Spigot &amp; Socket Joint with rubber gasket</td>
</tr>
<tr>
<td>Fittings used</td>
<td>None</td>
</tr>
</tbody>
</table>

#### Installation Details

| Type | • open trench  
• micro tunneling  
• slip lining |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Trench dimensions (m)</td>
<td>5.0</td>
</tr>
<tr>
<td>Laying depth (m)</td>
<td>7.0</td>
</tr>
<tr>
<td>Native soil type</td>
<td>Soft Cohesive soil (Type 4)</td>
</tr>
<tr>
<td>Backfill soil type / compaction</td>
<td>SC2 – Clean, coarse-grain soils with &lt;12% fines</td>
</tr>
<tr>
<td>Thrust blocks / lockjoints</td>
<td>No</td>
</tr>
<tr>
<td>Deflection min/max</td>
<td>0.5</td>
</tr>
<tr>
<td>Quality measures during installation</td>
<td>Diameter deflection control plan.</td>
</tr>
<tr>
<td><strong>Project duration:</strong></td>
<td>18 months</td>
</tr>
<tr>
<td><strong>Year start / end:</strong></td>
<td>2007 / 2009</td>
</tr>
</tbody>
</table>
### Case Study -5-  

**PROJECT NAME:** Refurbishing of the Sewer Treatment Plant in Avignon  
**Community/Country:** Avignon, France  
**Amiantit Location:** APS France SAS  
**Description:** The existing sewer treatment plant has been put into service in 1994. Due to capacity problems, the refurbishing will ensure a waste water clean-up of 7400 m³/hour peak rate against 3000 m³/hour currently.  

| application | Sewer  
|-------------|--------  
| transported medium | Sewage  
| working pressure | Gravity  
| type of project | replacement  
| demanded standards / specifications / approvals | Avis Techniques CSTB  
| Special requirement on pipe-system | Corrosion resistance  
| project value in US$ | US$ 400,000  

- **chosen pipe system:** GRP round filament  
- **why our product?** corrosion resistance  

**Project Owner:** Communauté d'Agglomération d'Avignon, Avignon  
**Consultant/Engineer:** DEGREMONT – Aix en Provence  
**Contractor:** RAMPA TP – Miramas, France  

### Pipe Details - Material:  
- Total pipeline length (m): 700  
- Diameter DN min / max (mm): 500 / 1400  
- Pressure PN min / max (bar): 1  
- Stiffness SN min / max (N/mm²): 10000  
- Joint types: FLOWTITE standard couplings  
- Fittings used: Tees, special manholes  

### Installation Details:  
- Type: open trench  
- Trench dimensions (m): 1.5"DN  
- Laying depth (m): 1 - 3  
- Native soil type: Soil classes G3 / G4  
- Backfill soil type / compaction: Gravel  
- Thrust blocks / lockjoints: No  
- Deflection min/max: max. 1°  
- Quality measures during installation: Tightness was proven by testing the complete pipeline with air at 0.4b according NF EN1610  
- Project duration: 24 months  
- Year start/end: 2009 / 2010  

**Comments from Owner/Consultant/Contractor:** At the beginning the project was expected in Ductile Iron. But due to the cost and the various tailor made fittings to be used, DEGREMONT finally choose GRP FLOWTITE pipes.
### Case Study -6-  

**PROJECT NAME:** Alimentation de la station d’Epuration de Wingles  
**Community/Country:** Wingles, FRANCE  
**Amiantit location** APS France SAS  

**Description:** GRP FLOWTITE pipes were used to replace an old and not well design concrete pipeline that transports sewer from town to the new sewage treatment plant.  

- **application:** Sewer  
- **transported medium:** Sewage  
- **working pressure:** Gravity  
- **type of project:** replacement  
- **demanded standards / specifications / approvals:** Avis Techniques, CSTB  

**Special requirement on pipe-system:** Corrosion resistance  
- Total tighness  
- Hydraulic properties  

**project value in US$:** US$ 470,000  

**Project owner:** Wingles municipality, Wingles France  
**consultant / engineer:** Service Eau et Assainissement de Wingles, France  
**contractor:** SADE - France  

### Pipe Details - material:  

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total pipeline length (m)</td>
<td>1,500</td>
</tr>
<tr>
<td>Diameter DN min / max (mm)</td>
<td>1000 / 1400</td>
</tr>
<tr>
<td>Pressure PN min / max (bar)</td>
<td>1</td>
</tr>
<tr>
<td>Stiffness SN min / max (N/m²)</td>
<td>10000</td>
</tr>
<tr>
<td>joint types</td>
<td>FLOWTITE standard couplings</td>
</tr>
<tr>
<td>fittings used</td>
<td>Tees</td>
</tr>
</tbody>
</table>

### Installation Details:  

- **type:** open trench  
- **trench dimensions (m):** 1.5*DN  
- **laying depth (m):** 1 - 3  
- **native soil type:** Soil classes G3 / G4  
- **backfill soil type / compaction:** Gravel  
- **thrust blocks / lockjoints:** No  
- **deflection min/max:** max 1.5°  
- **quality measures during installation:** Tightness was proven by testing the complete pipeline with air at 0.4b according NF EN15180  
- **Project duration:** 6 months  
- **Year start / end:** 2007 / 2008  

**chosen pipe system:**  
- GRP round filament  
- corrosion resistance
### Case Study -7-

<table>
<thead>
<tr>
<th><strong>PROJECT NAME:</strong></th>
<th>Kiel Fuhlenseebrücke</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community/Country:</strong></td>
<td>Kiel / Germany</td>
</tr>
<tr>
<td><strong>Amiantit location:</strong></td>
<td>AMITECH Germany GmbH</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Aboveground sewage pipeline of the city Kiel; installed as double pipeline on bearings.</td>
</tr>
</tbody>
</table>

- **application:** Sewer
- **transported medium:** Sewage
- **working pressure:** Gravity
- **type of project:** replacement
- **demanded standards / specifications / approvals:** DIBT – Deutsches Institut für Bautechnik
- **Special requirement on pipe-system:** UV resistance; aboveground installation
- **project value in US$:** US$ 395,000

**chosen pipe system:**
- GRP round filament
- light weight
- corrosion resistance
- chem properties
- UV resistance
- resistance to bird excrement and thermal variations, fast and easy installation

### Project owner:
Stadtentwässerung, Kiel

### consultant / engineer:
Ingenieurteam Trebes, Kiel

### contractor:
Bunte Wittenförden-Schwerin

### Pipe Details - material:
- **Total pipeline length (m):** 460
- **Diameter DN min / max (mm):** 1200
- **Pressure PN min / max (bar):** 1
- **Stiffness SN min / max (N/m²):** 5000
- **joint types:** FLOWTITE standard couplings
- **fittings used:** F-pieces, elbows

### Installation Details:
- **type:** aboveground
- **thrust blocks / lockjoints:** No
- **deflection min/max:** max 2°
- **quality measures during installation:** Construction supervision by the Institut für unterirdische Infrastruktur GmbH.
- **Project duration:** 36 months
- **Year start / end:** 2006 / 2009

### Summary:
FLOWTITE GRP pipes of 1,200 mm diameter were laid aboveground as a double pipeline installed on bearings. Decisive in winning this order were the outstanding product properties of the FLOWTITE pipes. They had no problems with the requested mandatory requirements on the pipe material, such as corrosion and UV resistance, as well as resistance to bird excrement and thermal variations.
## Case Study -8-

### PROJECT NAME: GRP double pipes in Hof / Saale

#### Community/Country: Hof / Saale

#### Amiantit location: AMITECH Germany GmbH

#### Description: GRP double pipe for highly loaded waste water in an ecologically sensitive nature reserve.

- **application:** Sewer
- **transported medium:** Heavily contaminated waste water
- **working pressure:** Gravity
- **type of project:** New installation
- **demanded standards / specifications / approvals:** EN 1610
- **Special requirement on pipe-system:** Highest safety standard; tightness test EN 1610
- **project value in US$:** US$ 127,000

### chosen pipe system:
- **GRP round filament**
- **light weight**
- **corrosion resistance**
- **chem. properties**
- **high product life; fast and easy installation; economical; highest safety standard**

### Project owner:
Tiefbauamt Stadt Hof

### consultant / engineer:
Ingenieur Consult Schneider & Partner, Kronach

### contractor:
Günther-Bau GmbH, Stadtsteinach

### Pipe Details - material:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total pipeline length (m):</td>
<td>152</td>
</tr>
<tr>
<td>Diameter DN min / max (mm):</td>
<td>300 / 500</td>
</tr>
<tr>
<td>Pressure PN min / max (bar):</td>
<td>1</td>
</tr>
<tr>
<td>Stiffness SN min / max (N/m²):</td>
<td>10000</td>
</tr>
<tr>
<td>joint types:</td>
<td>FLOWTITE standard couplings</td>
</tr>
<tr>
<td>fittings used:</td>
<td>None</td>
</tr>
</tbody>
</table>

### Installation Details:

- **type:** Open trench
- **trench dimensions (m):** 1.2
- **laying depth (m):** 0.8 - 2.80
- **native soil type:** Soil class G3 - bonding compound soil
- **backfill soil type / compaction:** Soil class G1 - sand & gravel
- **thrust blocks / lockjoints:** No
- **deflection min/max:** No

#### quality measures during installation:
- Tightness test EN 1610

### Project duration:
12 months

### Year start / end:
2008 / 2009

### Summary:
The waste water canal in Hof demanded a channel in double pipe technology. AMITECH Germany supplied a FLOWTITE double pipes system containing an inside sewer pipe. The inside pipe is centred with plastic insulators.
# Case Study -9-

<table>
<thead>
<tr>
<th>PROJECT NAME:</th>
<th>Cascade sewer with storage capacity and overflow in Berg, Hardermannsgrün</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community/Country:</td>
<td>Berg Hardermannsgrün, Germany</td>
</tr>
<tr>
<td>Amiantit location</td>
<td>AMITECH Germany GmbH</td>
</tr>
<tr>
<td>Description:</td>
<td>Worldwide first „cascade sewer with storage capacity and overflow“ to defuse hydraulic bottlenecks in sewer systems; a combination of pipes with storage capacity and special sewer constructions from the continuously wound pipes of the FLOWITITE system.</td>
</tr>
<tr>
<td>application:</td>
<td>Sewer</td>
</tr>
<tr>
<td>transported medium</td>
<td>Sewage</td>
</tr>
<tr>
<td>working pressure</td>
<td>Gravity</td>
</tr>
<tr>
<td>type of project:</td>
<td>New installation</td>
</tr>
<tr>
<td>demanded standards / specifications / approvals:</td>
<td>None</td>
</tr>
<tr>
<td>Special requirement on pipe-system:</td>
<td>Installation of a pipeline without construction way; buoyancy protection; fast installation; special construction; individual solution.</td>
</tr>
<tr>
<td>project value in US$:</td>
<td>US$ 743,000</td>
</tr>
</tbody>
</table>

| chosen pipe system: | GRP round filament |
| why our product? | Light weight, high product life, fast and easy installation; economical; variable system/material; less maintenance as result of self cleaning effect |

| Project owner: | Gemeinde Berg |
| consultant / engineer: | USS Consult, Nail |
| contractor: | Vogtlandische Strassen-, Tief- und Rohrleitungsbau GmbH, Rodewisch |

### Pipe Details - material:

- Total pipeline length (m): 750
- Diameter DN min / max (mm): 500 / 2900
- Pressure PN min / max (bar): 1
- Stiffness SN min / max (N/m²): 5000
  - joint types: FLOWITITE standard couplings
  - fittings used: Tailormade spools

### Installation Details:

- type: open trench
- laying depth (m): 1.0 - 5.80
- native soil type: Soil class G3
- backfill soil type / compaction: Soil class G1 - sand & gravel; grain size of 8/16mm and 16/32mm
- quality measures during installation: Laminated on construction site
- Project duration: 12 months
- Year start / end: 2007 / 2008

### Summary:

Worldwide first „cascade sewer with storage capacity and overflow“.
**Case Study -10-**

| PROJECT NAME: | AS Sentralrenseanlegget RA2 – Purification plant |
| Community/Country: | Strommen, Norway |
| Amiantit location | APS Norway AS - Vera AS |
| **Description:** | Pipes for ventilation and sewer, with tailor-made fittings. |
| **application:** | Ventilation and sewer |
| **transported medium** | Ventilation air and sewer |
| **working pressure** | 1 - 3 bar |
| **type of project:** | new installation |
| **demanded standards / specifications / approvals:** | NS 2628 / AWWA |
| **Special requirement on pipe-system:** | Three different colors, yellow, orange and green pipes were supplied to separate the process in the treatment plant |
| **project value in US$:** | US$ 1,500,000 |

**chosen pipe system:**
- GRP round filament
- light weight
- corrosion resistance
- price

**Project owner:** Nedre Romerike Vannverk A/L, Lillestrom, Norway
**consultant / engineer:** Cowi AS, Frederikstad, Norway
**contractor:** Peab AS, Oslo, Norway

**Pipe Details - material:**
- **Total pipeline length (m):** 3,000 / 4,000
- **Diameter DN min / max (mm):** 400 / 1200
- **Pressure PN min / max (bar):** 1 / 3
- **Stiffness SN min / max (N/m²):** 1250 / 5000
  - **joint types:** FLOWTITE standard couplings
  - **fittings used:** Different types of standard fittings

**Installation Details:**
- **type:** aboveground
- **thrust blocks / lockjoints:** Thrust blocks
- **Year start / end:** 1971 (first project); 2001 (second project)

**Summary:**
The first delivery of pipes was back in 1971. When ordering the extended project second time in 2001, there were 30 years of experience in mind from our pipes. Included, there were quite a lot of fittings, specially design for this application.
**Case Study -11-**

**PROJECT NAME:** „Czajka” Sewage Treatment Plant in Warsaw - Part 1

**Community/Country:** Warsaw, Poland

**Amiantit location:** AMITECH Poland Sp. z o.o.

**Description:** Modernization and expansion of the existing Czajka Sewage Treatment Plant in Warsaw, the largest sewage treatment plant in Poland so far.

- **application:** Rainwater, Sewer
- **transported medium:** Sewage
- **working pressure:** Gravity
- **type of project:** new installation
- **demanded standards / specifications / approvals:** Technical Approval AT-2002-1285-04
- **Special requirement on pipe-system:** Leak tightness
- **project value in US$:** US$ 4,800,000

---

**Project owner:** Miejskie Przedsiębiorstwo Wodociągów i Kanalizacji, Warsaw

**consultant / engineer:** ILF Consulting Engineers Polska Sp. z o.o., Warsaw

**contractor:** Warbud S.A., Warsaw

**Pipe Details - material:**

<table>
<thead>
<tr>
<th>Total pipeline length (m):</th>
<th>8,556</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter DN min / max (mm):</td>
<td>150 / 2800</td>
</tr>
<tr>
<td>Pressure PN min / max (bar):</td>
<td>1</td>
</tr>
<tr>
<td>Stiffness SN min / max (N/m²):</td>
<td>10000</td>
</tr>
</tbody>
</table>

**joint types:** FLOWTITE standard couplings

**fittings used:** Wells and different types of fittings

---

**Installation Details:**

- **type:** open trench
- **trench dimensions (m):** 0.7 - 3.8
- **laying depth (m):** From 0.5m to 7m below ground level
- **native soil type:** Medium sand
- **backfill soil type / compaction:** Medium sand, 98% standard Proctor
- **thrust blocks / lockjoints:** Yes
- **deflection min/max:** None
- **quality measures during installation:** Leakproof test
- **Project duration:** 4 months
- **Year start / end:** 2008 / 2009
**Case Study -12-**

**PROJECT NAME:** Gdańsk – Ołowianka II Trunk Sewer  
**Community/Country:** Gdańsk, Poland  
**Amiantit location**  
AMITECH Poland sp. z o.o.

**Description:** Municipal sewage pressure pipeline between Ołowianka sewage pumping station (drainage area of old Sewage Treatment Plant in the city centre), and Wschód Sewage Treatment Plant.

<table>
<thead>
<tr>
<th>application:</th>
<th>Sewer Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>transported medium</td>
<td>Sewage</td>
</tr>
<tr>
<td>working pressure</td>
<td>4 bar</td>
</tr>
<tr>
<td>type of project:</td>
<td>new installation</td>
</tr>
</tbody>
</table>
| demanded standards / specifications / approvals: | DIN 16868  
DIN 19565 |
| Special requirement on pipe-system: | Use of a biaxial pipe system; no thrust blocks necessary |
| project value in US$: | US$ 4,000,000 |

**Pipe Details - material:**

- **Total pipeline length (m):** 6,583
- **Diameter DN min / max (mm):** 1200
- **Pressure PN min / max (bar):** 10
- **Stiffness SN min / max (N/m²):** 10000
  - **joint types:** FLOWTITE standard couplings / biaxial lock joints
  - **fittings used:** Elbows with lock joints having angles of 0 – 45 degrees

**Installation Details:**

- **type:** open trench
- **trench dimensions (m):** 3 m
  - **laying depth (m):** Trench bottom stabilised by fundation made of crushed stone and sandy gravel. Wrapped in geotextile mesh forming mattress under the pipeline
  - **native soil type:** Acc. to ATV 127P-GA. Silt, peat and other unstable cohesive soils.
- **backfill soil type / compaction:** Sand and gravel soil; Compaction degree of bedding material Dₚ=95%
- **thrust blocks / lockjoints:** Lock joints
  - **deflection min/max:** max 2 % vertical diameter of pipeline
  - **quality measures during installation:** Leakproof test with pressure 10 bar and ovalization measurements.

**Project duration:** 24 months

**Year start / end:** 2007 / 2009

---

**Project owner:** Gdańskeka Infrastruktura Wodno-Kanalizacyjna Sp. z o.o., Gdańsk
**consultant / engineer:** Biuro Studiów i Pomiarów Proekologicznych EKOMETRIA Sp. z o.o., Gdańsk
**contractor:**
- Hydrobudowa 9 - Poznań
- Przedsiębiorstwo Wielobranżowe Instalacyjno-Sanitarne i Remontowo-Budowlane „Skibiński” Mieczysław Skibiński, Sierakowice
## Case Study -13-  

<table>
<thead>
<tr>
<th><strong>PROJECT NAME:</strong></th>
<th>Renovation of sewer collector Prosna at the sewage treatment plant in Kuchary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community/Country:</strong></td>
<td>Kuchary, Poland</td>
</tr>
<tr>
<td><strong>Amiantit location:</strong></td>
<td>AMITECH Poland sp. z o.o.</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>The collector sewer was built in 1991 made of concrete pipes and due to aggressive sewage it has corroded and began to collapse at some sections.</td>
</tr>
<tr>
<td><strong>application:</strong></td>
<td>Sewer</td>
</tr>
<tr>
<td><strong>transported medium:</strong></td>
<td>Sewage</td>
</tr>
<tr>
<td><strong>working pressure:</strong></td>
<td>Gravity</td>
</tr>
<tr>
<td><strong>type of project:</strong></td>
<td>relining</td>
</tr>
<tr>
<td><strong>demanded standards / specifications / approvals:</strong></td>
<td>Pipes with flush connector as per AT</td>
</tr>
<tr>
<td><strong>Special requirement on pipe-system:</strong></td>
<td>Pipes with flush connector as per AT pH 1-10 resistance</td>
</tr>
<tr>
<td><strong>project value in US$:</strong></td>
<td>US$ 875,000</td>
</tr>
<tr>
<td><strong>chosen pipe system:</strong></td>
<td>GRP round filament</td>
</tr>
<tr>
<td><strong>why our product?</strong></td>
<td>light weight, corrosion resistance</td>
</tr>
</tbody>
</table>

### Project owner:
Spółka wodno-ściekowa w Kucharach, Kuchary

### consultant / engineer:
Amitech Poland Sp. z o.o. – Technical Department, Poznań

### contractor:
ZISBD, Wrocław

### Pipe Details - material:
- **Total pipeline length (m):** 3,700
- **Diameter DN min / max (mm):** 1400
- **Pressure PN min / max (bar):** 1
- **Stiffness SN min / max (N/m²):** 10000
- **joint types:** Flush sliplining
- **fittings used:** 7 GRP manholes

### Installation Details:
- **type:** renovation
- **thrust blocks / lockjoints:** No
- **deflection min/max:** 1.5° / 3°
- **quality measures during installation:** Tightness test acc. EN 1610
- **Project duration:** 24 months
- **Year start / end:** 2008 / 2009

### Summary:
Only GRP pipes provided appropriate resistance to the aggressive sewage in the pipeline.
## Case Study -15-

<table>
<thead>
<tr>
<th>PROJECT NAME:</th>
<th>Sewer Network Faysalia East, Dammam – Saudi Arabia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community/Country:</td>
<td>Dammam – Saudi Arabia</td>
</tr>
<tr>
<td>Amiantit location</td>
<td>Amiantit Fiberglass Industries Limited (AFIL)</td>
</tr>
<tr>
<td>Description:</td>
<td>A housing project developed by Dammam municipality to meet growing demand of housing in the city. FLOWTITE GRP pipes of different diameters were used for sewer network.</td>
</tr>
</tbody>
</table>

- **application:** Sewer pressure
- **transported medium:** Sewage
- **working pressure:** 3 - 10 bar
- **type of project:** New installation
- **demanded standards / specifications / approvals:** ASTM D-3262, AWWA C950
- **Special requirement on pipe-system:** Fast delivery, installation support and high quality product
- **project value in US$:** US$ 5,300,000

**Project owner:** Water and Sewerage Authority (Ministry of Water)
**consultant / engineer:** Al-Sughair – Dammam
**contractor:** Al-Yamama, Dammam

### Pipe Details - material:
- **Total pipeline length (m):** 24,390
- **Diameter DN min / max (mm):** 300 / 1600
- **Pressure PN min / max (bar):** 6 / 12
- **Stiffness SN min / max (N/m²):** 5000 / 10000
- **joint types:** FLOWTITE standard couplings
- **fittings used:** Elbows (90 and 45 degrees)

### Installation Details:
- **type:** Open trench
- **trench dimensions (m):** 1.5 - 2.0
- **laying depth (m):** 2.3 - 4.4
- **native soil type:** Sometimes unstable, sometimes semi stable
- **backfill soil type / compaction:** Crushed Stones as bedding, Clean sand as pipe zone backfill compacted to 90% standard proctor
- **thrust blocks / lockjoints:** Thrust blocks
- **deflection min/max:** Average 1.1% at 2.1 m D.O.C.
- **quality measures during installation:** Crushed stone bedding compacted; Pipe zone sand compacted in layers of each 300 mm. Achieved required SPD (Standard Proctor Density) values.
- **Project duration:** 8 months
- **Year start / end:** 2009 / 2010

**chosen pipe system:**
- GRP round filament
- Light weight
- Corrosion resistance
- Flow characteristics
- Chem. properties
- Mech. properties
Case Study -16-

**PROJECT NAME:** ETAR Alverca

**Community/Country:** Portugal – Distrito de Lisboa – Freguesia de Alverca no Concelho de Vila Franca de Xira

**Amiantit location:** AMITECH Spain

**Description:** Pipeline between treatment plant and outfall in the Tejo river.

- **application:** Sewer pressure
- **transported medium:** Sewage
- **working pressure:** 6 - 10 bar
- **type of project:** New installation
- **demanded standards / specifications / approvals:** AENOR certificate
- **Special requirement on pipe-system:** Pressure characteristics
- **project value in US$:** US$ 500,000

**Project owner:** SIMTEJO, S.A – Lisboa

**consultant / engineer:** PROCESL (SOMAGUE Group), Amadora, Portugal

**contractor:** Consorcio Somague/Mota-Engil/Degremont, Sintra/Porto/Lisboa

**Pipe Details - material:**

| Total pipeline length (m): | 692 |
| Diameter DN min / max (mm): | 1200 / 2000 |
| Pressure PN min / max (bar): | 6 / 10 |
| Stiffness SN min / max (N/m²): | 5000 |

| joint types: | FLOWTITE standard couplings |
| fittings used: | Elbows 42°, 45° and 90°; tee’s 1600x200 and 1600x800; flanges DN 1200 |

**Installation Details:**

- **type:** Open trench
- **trench dimensions (m):** 5.0
- **laying depth (m):** 4.0
- **native soil type:** Unstable soil
- **backfill soil type / compaction:** Gravel wrapped in geotextile
- **thrust blocks / lockjoints:** No
- **deflection min/max:** 1.5° / 3°

| Project duration: | 6 months |
| Year start / end: | 2008 / 2009 |

**Summary:** At the beginning the contractor wanted to install Polyethylene but when they knew FLOWTITE GRP Characteristics, they changed the material. For the stiffness, facilities to install and final price.

- **chosen pipe system:** GRP round filament
  - **other materials in this project:** HDPE
  - **why our product:** price, possibility to connect to concrete;
**Case Study -17-**

**PROJECT NAME:** Parking del Hospital Provincial de Castellón  
**Community/Country:** Castellón, Spain  
**Amiantit location** AMITECH Spain  
**Description:** This is the first Spanish project in GRP pipes for sewer in the city.

- **application:** Sewer  
- **transported medium:** Sewage  
- **working pressure:** Gravity  
- **type of project:** new installation  
- **Special requirement on pipe-system:** Light weight  
- **project value in US$:** US$ 45,500

**Project owner:** Castellón Council, Castellón  
**consultant / engineer:** Lubasa, Castellón  
**contractor:** Lubasa, Castellón

**Pipe Details - material:**
- Total pipeline length (m): 176  
- Diameter DN min / max (mm): 1100  
- Pressure PN min / max (bar): 1  
- Stiffness SN min / max (N/m²): 5000
  - joint types: FLOWTITE standard couplings  
  - fittings used: none

**Installation Details:**
- **type:** open trench  
- trench dimensions (m): 1.3  
- laying depth (m): 2  
- native soil type: Gravel-Sound SC2  
- backfill soil type / compaction: Concrete  
- thrust blocks / lockjoints: no  
- deflection min/max: $1.5^\circ / 3^\circ$  
- Project duration: 2 days - 90m per day  
- Year start / end: 2008
**Case Study -18-**

<table>
<thead>
<tr>
<th><strong>PROJECT NAME:</strong></th>
<th>Sorfert Fertiliser Complex</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community/Country:</strong></td>
<td>Arzew Industrial Zone, Wahran province - ALGERIA</td>
</tr>
<tr>
<td><strong>Amiantit location:</strong></td>
<td>AMITECH Spain</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Cooling System for a Fertilizer plant; Production of ammonia and urea.</td>
</tr>
<tr>
<td><strong>application:</strong></td>
<td>Sewer</td>
</tr>
<tr>
<td><strong>transported medium:</strong></td>
<td>Sewage</td>
</tr>
<tr>
<td><strong>working pressure:</strong></td>
<td>Gravity</td>
</tr>
<tr>
<td><strong>type of project:</strong></td>
<td>▪ new installation</td>
</tr>
<tr>
<td><strong>demanded standards / specifications / approvals:</strong></td>
<td>AWWA, C950, M-45</td>
</tr>
<tr>
<td><strong>Special requirement on pipe-system:</strong></td>
<td>Vinylester, Sea Water at very high Temperature (up to 65°C)</td>
</tr>
<tr>
<td><strong>project value in US$:</strong></td>
<td>US$ 1,600,000</td>
</tr>
<tr>
<td><strong>chosen pipe system:</strong></td>
<td>GRP round filament</td>
</tr>
<tr>
<td><strong>why our product:</strong></td>
<td>▪ corrosion resistance</td>
</tr>
<tr>
<td></td>
<td>▪ chem. properties</td>
</tr>
<tr>
<td></td>
<td>▪ mech. properties</td>
</tr>
<tr>
<td></td>
<td>▪ tightness</td>
</tr>
<tr>
<td><strong>Project owner:</strong></td>
<td>Sorfert Algerie Spa- Oran (Jv 51% Orascom – 49% Sonatrach)</td>
</tr>
<tr>
<td><strong>consultant / engineer:</strong></td>
<td>Uhde (Thyssen Krupp) – Dortmund, Germany</td>
</tr>
<tr>
<td><strong>contractor:</strong></td>
<td>Orascom Construccion Industries</td>
</tr>
<tr>
<td><strong>Pipe Details - material:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Diameter DN min / max (mm):</strong></td>
<td>2400</td>
</tr>
<tr>
<td><strong>Pressure PN min / max (bar):</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Stiffness SN min / max (N/m²):</strong></td>
<td>2500</td>
</tr>
<tr>
<td><strong>joint types:</strong></td>
<td>FLOWTITE standard couplings / Kroll and Ziller</td>
</tr>
<tr>
<td><strong>fittings used:</strong></td>
<td>38 manholes + 4 end caps made of steel</td>
</tr>
<tr>
<td><strong>Installation Details:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>type:</strong></td>
<td>▪ open trench</td>
</tr>
<tr>
<td><strong>trench dimensions (m):</strong></td>
<td>5.3</td>
</tr>
<tr>
<td><strong>laying depth (m):</strong></td>
<td>5.6 max</td>
</tr>
<tr>
<td><strong>native soil type:</strong></td>
<td>Unstable soil</td>
</tr>
<tr>
<td><strong>backfill soil type / compaction:</strong></td>
<td>Gravel</td>
</tr>
<tr>
<td><strong>Project duration:</strong></td>
<td>4 months</td>
</tr>
<tr>
<td><strong>Year start / end:</strong></td>
<td>2009</td>
</tr>
<tr>
<td><strong>Summary:</strong></td>
<td>Industrial application with high temperature (65°C) and tightness requirements.</td>
</tr>
</tbody>
</table>
Handbook is intended as a guide only. All values listed in the product specifications are nominal. Unsatisfactory product results may occur due to environmental fluctuations, variations in operating procedures, or interpolation of data. We highly recommend that any personnel using this data have specialised training and experience in the application of these products and their normal installation and operating conditions. The engineering staff should always be consulted before any of these products are installed to ensure the suitability of the products for their intended purpose and applications. We hereby state that we do not accept any liability, and will not be held liable, for any losses or damage which may result from the installation or use of any products listed in this handbook as we have not determined the degree of care required for product installation or service. We reserve the right to revise this data, as necessary, without notice. We welcome comments regarding this handbook.

The Flowtite technology is owned and licensed worldwide by Amiblu. Find more information and contact details at www.amiblu.com.

Amiblu®
Sustainable Water Solutions

Amiblu Technology AS
Østre Kullerod 3
3241 Sandefjord
Norway
T: + 47 971 00 300
info.technology@amiblu.com
www.amiblu.com

Distributed by: