Product Information
Version 11/2010

Drinking water pipes for special applications
open laying without sand embedding  ploughing  horizontal directional drilling  long-pipe relining  burst lining

AQUALINE
Drinking water pipes for special applications

PIPELIFE
Pipe systems from Pipelife Austria for the drinking water supply already guaranteed a high degree of safety and of course comply all international standards and quality specifications.

Polyethylene (PE) is the most widely used material for buried pressure piping systems for the supply of drinking water. Its high flexibility, good elasticity, and chemical resistance are impressive. With an impressive service life of 100 years and more, polyethylene pipe systems can reduce overall costs in network operation.

Modern laying methods require new kinds of pipe with special properties. These can be realized with the new material PE 100-RC.

**PE 100-RC – Resistance to Crack**

PE 100-RC is the continued development of the proven material PE100.

PE 100-RC exhibits an extraordinarily high resistance to the slow crack growth and to highly concentrated loads. So pipes made of PE 100-RC are suitable especially for special requirements by trenchless laying procedures.

Pipelife Austria has developed **AQUALINE RC** and **AQUALINE RC ROBUST** using the material’s advantages.

**AQUALINE RC**

AQUALINE RC are drinking water pipes from Pipelife Austria made of the material PE 100-RC. They distinguish themselves through:

- high resistance to the slow crack growth,
- very good resistance to highly concentrated loads,

and therefore have an extraordinarily long service life even under difficult conditions.

**AQUALINE RC ROBUST**

AQUALINE RC ROBUST is the continued development of Robust Pipe, proven on the market for years, in combination with the outstanding properties of PE 100-RC. This pipe is a combination of the Aqualine RC pipe and an additional peelable protective layer made of mineral-reinforced polypropylene.

AQUALINE RC ROBUST drinking water pipes are especially characterized (beyond AQUALINE RC’s positive properties) by:

- additional extreme protection against external damage as notches, scratches, abrasions and wear
- enhanced resistance to concentrated loading
AQUALINE RC and AQUALINE RC ROBUST from Pipelife Austria are high-quality products for special applications and laying methods.

**AQUALINE RC is optimally suited for the following installation methods:**

**Open laying without sand embedding**
Appropriate bedding material according to ÖNORM EN 805 and ÖNORM B 2538 is not always available. Transportation of appropriate bedding material to the construction site can cause high costs.

Due to their resistance to highly concentrated loads, AQUALINE RC pipes can be laid with conditioned, compatible excavated earth with a grain size of up to 100 mm.

**Ploughing**
When ploughing, the soil is displaced without conditioning. Pipes with very good protection against point loads must therefore be used for this. With their proven, high stress cracking resistance, AQUALINE RC pipes from Pipelife meet the demands imposed by this laying method with the highest degree of safety. Moreover, they also have the flexibility required for this technique. Ploughing probably represents the most economical way to lay new plastic pipe.

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**Which pipe for which intended purpose**
Suitable pipe system selection depends on the intended purpose and its associated technical factors.

 Pipelife pipes made of PE80 and PE100 are optimally suited for open laying with sand bed. For sand bed free or trenchless laying techniques, AQUALINE RC and AQUALINE RC ROBUST are the first choice.

We have juxtaposed various laying methods for you in the following table next to the respective pipe systems we recommend. We will gladly inform you in more detail in a personal conversation about Pipelife pipe systems properties and application areas for drinking water supply.

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### New installation

<table>
<thead>
<tr>
<th></th>
<th>Advantages</th>
<th>Open laying in the sand bed</th>
<th>Open laying without sand embedding</th>
<th>Ploughing/Milling</th>
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</thead>
</table>
| **Standard pressure pipes**
from Pipelife made of PE80 or PE100 |
+ high flexibility
+ low weight
+ no corrosion
+ low notch sensitivity | ![Checkmark] | ![Checkmark] | ![Checkmark] |
| **AQUALINE RC**
Pressure pipes made of PE 100-RC |
additional
+ high stress cracking resistance
+ high resistance to point loads (e.g. stones and shards)
+ high resistance to slow crack growth | ![Checkmark] | ![Checkmark] | ![Checkmark] |
| **AQUALINE RC ROBUST**
Pressure pipes made of PE 100-RC with scratch resistant protective layer |
+ Extreme protection against mechanical surface damage | ![Checkmark] | ![Checkmark] | ![Checkmark] |

**Note**
AQUALINE RC and AQUALINE RC ROBUST are best suited for the following installation methods.

**Long-pipe relining**

The rehabilitation of damaged pipelines by inserting a new solid-wall pipe into the defective older pipe is becoming ever more significant. Prerequisites for successful relining measures are:

- tight pipe connections, and
- cleaning and TV inspection of the existing pipes.

Depending on the old pipe’s condition, like incrustations, we recommend AQUALINE RC or AQUALINE RC ROBUST.

**Horizontal directional drilling**

This technique is often selected in preference to open trench installation methods, because it reduce installation cost and time. But horizontal directional drilling places higher demands on the pipe surface, because the pipes are pulled through the soil. Since visual inspection of the installed pipe cannot be carried out, pipes made of PE 100-RC, which feature a particularly high resistance to the slow crack growth should be used during this laying method. Depending on the soil, we recommend AQUALINE RC or AQUALINE RC ROBUST for this method.

**AQUALINE RC ROBUST is the ideal choice for the following methods:**

**Burst lining**

With this method, a bursting tool destroys the old pipe and the resulting shards are pushed into the surrounding soil. The new pipeline is pulled in immediately following the cutting head. It cannot be ruled out that sharp shards from destruction of the old pipe will not damage the surface of the new polyethylene pipes when they are pulled in. Therefore, pipes with an additional protective layer are recommended for this method in the Austrian testing guideline ÖVGW/GRIS PW 405/1. With AQUALINE RC ROBUST, the protective layer sufficiently protects the medium-carrying AQUALINE RC pipe from damage.

<table>
<thead>
<tr>
<th>Renovation</th>
<th>Horizontal-directional drilling</th>
<th>Long-pipe relining</th>
<th>Burst lining</th>
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<tr>
<td>dependent on soiltype</td>
<td>dependent on old pipe’s condition</td>
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Tests and approvals

The new testing guideline ÖVGW/GRIS PW 405/1 establishes requirements for the material and for pipes made of PE 100-RC for installation without a sand embedding as well as installation methods without the use of trenching in addition to the standards ÖNORM EN 12201 and the testing guideline ÖVGW/GRIS PW 406/1 requirements. It defines the following test procedures, among others:

- Full notch creep test (FNCT)
- Point loading test
- Notch pipe test

The minimum lifetime of these tests at the initial test amounts to 8,760 hours (= 1 year)

The tests serve to demonstrate the extraordinary properties of pipes made of PE 100-RC.

- High resistance to the slow crack growth
- Very good resistance to highly concentrated loads
- Very low notch sensitivity

The testing guideline ÖVGW/GRIS PW 405/1 offers the tendering agencies (water supply companies, municipalities, planners) a secure basis for an exact specification of pipes made of PE 100-RC for alternative installation methods. It is therefore advisable to tender this test basis. Please contact your Pipelife partner to get more information about the complete test program.

Pipelife Austria views it as its obligation therefore, to have its AQUALINE RC and AQUALINE RC ROBUST products tested and registered according to the new PW405/1 testing guideline.

Tender specifications

Aqualine RC pressure-pipe system made of polyethylene for the supply of drinking water and for high requirements for installation techniques (laying without sand embedding, ploughing, milling, relining, horizontal directional drilling) drinking water pressure pipes made of polyethylene PE 100-RC, manufactured and tested according to ÖNORM EN 12201 and ÖVGW/GRIS PW405/1, with ÖVGW/GRIS registration (Reg. no. W ....... ), suitable for drinking water (according to ÖNORM B 5014), SDR..., C=1.25 (1.6), PN...(…), dimension...

Aqualine RC Robust pressure-pipe system made of polyethylene for the supply of drinking water and for highest requirements for installation techniques (relining, horizontal directional drilling, burst lining) medium pipe: Drinking water pressure pipes made of polyethylene PE 100-RC, manufactured and tested according to ÖNORM EN 12201 and ÖVGW/GRIS PW405/1, with ÖVGW/GRIS - registration (Reg. no. W ...), suitable for drinking water (according to ÖNORM B 5014), SDR..., C=1.25(1.6), PN..., dimension...

with additional scratch-resistant protective layer made of mineral-reinforced polypropylene, protective layer: Color: blue with white stripes - as identifier for special application in the drinking water area. The protective layer must feature suitable protection against external damages of the product pipe. This is to be demonstrated.

Monitoring

ÖVGW/GRIS testing guideline PW405-1 also defines on-going in-house monitoring besides initial testing and external monitoring. In this connection, each batch of material used and the finished pipe are tested according to an exactly defined test method in regard to the "resistance to slow crack growth" property.

Additional AQUALINE RC ROBUST testing

Although solid-wall pipes made of PE 100-RC demonstrated very low notch sensitivity, but the permitted depth of scratch and score damage amounts to more than 10% of the pipe's wall thickness. Therefore, pipes with additional peelable protective layer should be used when increased demands are expected on the pipes' surface. Thanks to the protective layer, AQUALINE RC ROBUST is considerably more resistant to scratches and scores than unprotected solid-wall pipes made of PE 100-RC. This is demonstrated.
Product range

- Drinking water pressure pipe made of PE 100-RC
- Manufactured and tested according to ÖNORM EN 12201 and ÖVGW/GRIS PW405/1
- ÖVGW/GRIS W 1.474
- Color: black with blue double stripes – as identifier for special application in the drinking water area
- standard lengths: 12 m and 100 m coils
- Pressure ratings: PN 10, PN 16, PN 25
- Dimensions: DN/OD 63 mm to 400 mm

Proven fittings from our PE-HD pressure-pipe system come into play for line construction with AQUALINE RC and AQUALINE RC ROBUST. They are available as standard with long ends and are therefore suitable for both electric and butt welding.

For more detailed information about Aqualine please contact your PIPELIFE partner.

Connection techniques

You can use all of the traditional connection techniques for connecting AQUALINE RC. Clamp fittings made of plastic or cast are just as well suited as welded connections.

You must peel off the additional protective layer for all traditional connection techniques with AQUALINE RC ROBUST.

Pipes for other applications are obtainable in request.
The color code then matches:
Wastewater pipes:
brown layer, white stripes
Gas pipes:
orange layer, white stripes

Proven fittings from our PE-HD pressure-pipe system come into play for line construction with AQUALINE RC and AQUALINE RC ROBUST. They are available as standard with long ends and are therefore suitable for both electric and butt welding.