

BRIDGE BUILDING

WITH HIGH QUALITY PRODUCTS FROM AGRU



agru

Worldwide Competence
in Plastics

1 Bridge building with high quality products from AGRU

AGRU Kunststofftechnik GmbH is a family-owned, highly productive enterprise headquartered in Austria with worldwide activities in production and sales of high-quality thermoplastic products.



Figure 1: Project KAO PING HIS BRIDGE C-381.

1.1 Engineering usage of thermoplastic products at bridge construction

Nowadays high-grade thermoplastic products were used in bridge construction, because thermoplastic materials are suitable for bridge construction due to the fact of following advantages:

- Good durability
- Flexible material
- Superior chemical resistance
- Good resistance against environmental effects
- No environmental impact during installation (preparation, processing, adhesive)
- Easy handling
- Easy installation
- Good weldability
- UV resistance
- Clean material
- Physiologically harmless
- Environmentally friendly – halogen free

These advantages are very important due to the fact that bridges are in motion, are going to deteriorate by environmental effects (earthquakes, storms, etc.), chemicals, sea water, salt water etc. High-grade thermoplastic products were used at different types of bridge constructions:

- Beam bridge
- Cantilever bridge
- Arch bridge
- Cable-stayed bridge
- Truss bridge

1.2 Good resistance against environmental effects of AGRU high quality products

Earthquakes are forces of nature causing heavy damages on buildings, infrastructure and facilities. Seismic events are mostly evaluated acc. to Richter scale. Already small quakes can cause serious damages on wrongly designed buildings. During the past years the frequency of earthquakes increased, also partly with very high magnitudes (e.g. Haiti – 2010 with 7.0, Sumatra – 2004 with 9.1 and Japan – 2011 with 9.0)

After the earthquake in Japan our client analyzed and documented the installed PE 100 piping systems in the earthquake region. AGRU PE piping products have been applied since several years in this region for infrastructure pipelines.

At the regions which were struck by the highest earthquake and tsunami damages show that the PE piping held up against the earthquake with a magnitude of 9.0 and also the tsunami, resulting in the fact that these systems are still fulfilling their requirements.

Due to these reasons the demand for high-grade piping systems, but also semi-finished products for the construction of earthquake proof facilities and infrastructures will increase. This means new application possibilities for AGRU products has already been increased and our products are used for essential infrastructure installations all over Japan now. Also in New Zealand the demand for earthquake proven piping and lining systems has been increased since the last earthquake in Christchurch last year.

1.3 Field of application of AGRU high-grade products in bridge construction



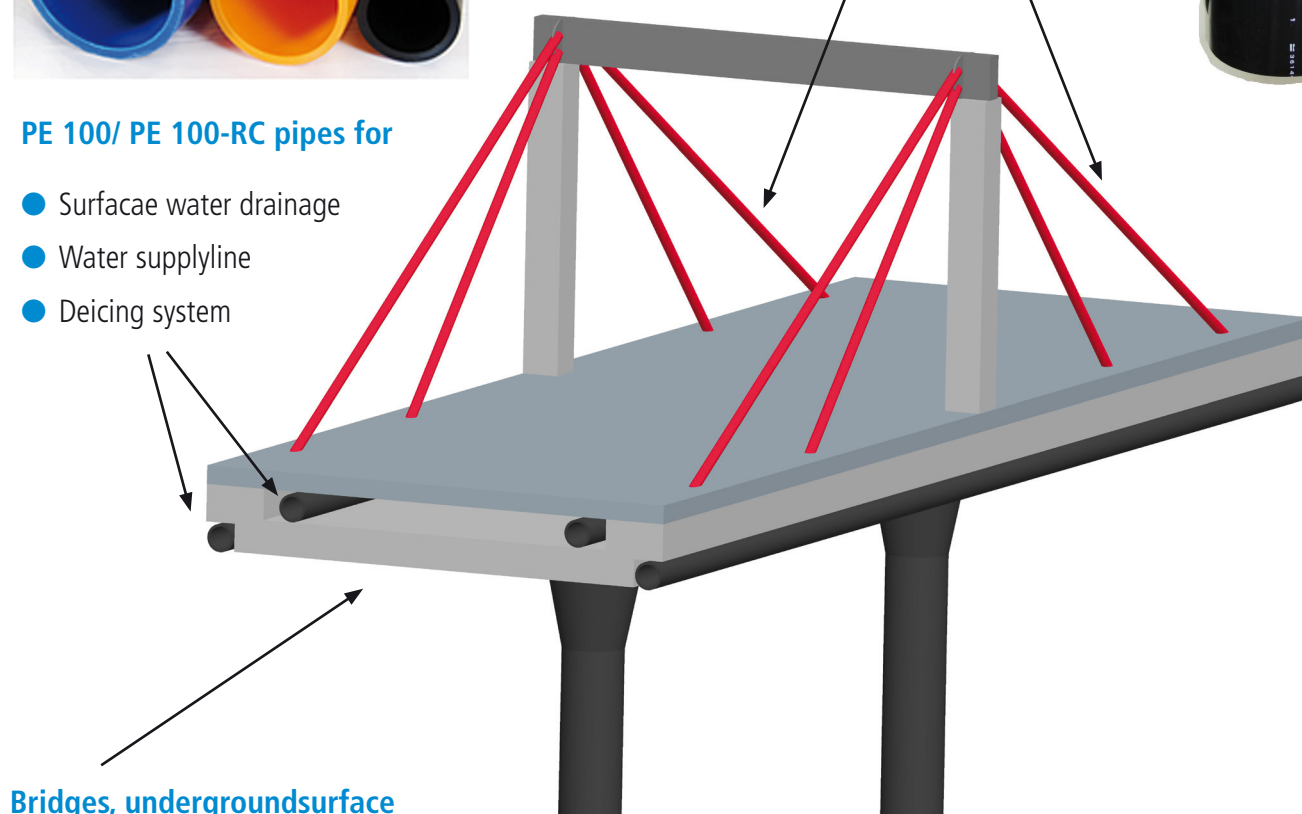
PE 100/ PE 100-RC pipes for

- Surface water drainage
- Water supplyline
- Deicing system

Stay cables

protect by

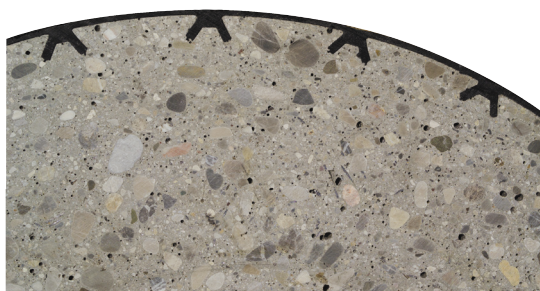
- PE 100/ PE 100-RC pipes (different colors available)
- Well pipes
- Spiral pipes



Bridges, underground surface

protect by

- Concrete protective liner



Bridge piles

Concrete protective liner or pipe lining

2 Reference Reports

2.1 Foundation protection with AGRU Sure Grip® concrete protective liner



AGRU Sure Grip® concrete protective liner, were used to seal and protect concrete foundations against sea water or sweet water. Concrete protective liners prevent concrete degradation and thus expand the lifetime of the construction.

2.1.1 Bridge Foundations at Highway-AuRouge (Belgium)

- 1990-1992
- AGRU Sure Grip® HDPE black concrete protective liner
- 1000 m²



Figure 2: AGRU Sure Grip® concrete protective liner seal and protect concrete foundations.



Figure 3: Cast in Situ-installation method.

2.1.2 Palm Jumeirah Island – Dubai (Emirates)

- 10,000 m² HDPE Sure Grip® concrete protective liners 3.0 mm
- Our local partner in Dubai: www.bmc-gulf.com



Figure 4: Palm Jumeirah.

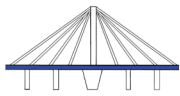


Figure 5: View of Burj Khalifah.



Figure 6: Bridge piers protected by AGRU Sure Grip® concrete protective liners.

2.2 Bridge drainage



AGRU pipes and fittings were used to drain bridges.

2.2.1 Reference report – Bridge drainage system-Tauernautobahn (Austria)

- Listertalbrücke A10 Tauernautobahn - Austria
- HDPE pipes and fittings DIM 160 and DIM 315



Figure 7: Middle drainage system.



Figure 8: Side drainage system.



Figure 9: Listertalbrücke A10 Tauernautobahn drainage system.



2.3 PE 100 piping components for rail de-icing system

To keep the rails free of snow and ice in the cold and high-rainfall season sprinkler systems have been installed to meet the high quality standards.

2.3.1 Reference report – De-icing system

- Japan
- E-couplers (PE 100) OD 110 mm to OD 400 mm
- Moulded AGRU sweep bends (PE 100) OD 125 mm to OD 400 mm



Figure 10: High speed train.



Figure 11: Installation of the PE 100 sprinkler system.

For the sprinkler system at the high speed railway track AGRU E-couplers in the dimension OD 110 mm to OD 400 mm were applied because of the easy and safe installation at the rail track. Furthermore moulded AGRU sweep bends OD 125 mm to OD 400 mm were applied to ensure excellent flow characteristics and high pressure ratings of the installed piping system.

Figure 12: A G R U E-fusion couplers were applied for joining all piping components.



2.4 PE-pipes for protection of bridge stay cables



In order to give the stay cables a more distinctive architectural appearance, VT invented the HDPE – tubes furnished with a coloured outside layer, which is co-extruded directly during tube production. Light colors will, of course, reduce sun-radiation effects to some extent.

2.4.1 Reference report – Kao Ping HIS Bridge C-381

- 1998-2000
- Protection pipe: DIM 200, 225 and 280, Coextruded PE 80 pipe inside black layer 17 mm – outside red layer 2.5 mm (Color of red layer similar RAL 3002)



Figure 13: Cable stay bridge.

Among the various materials in question, HDPE has prevailed against the others. The Advantageous properties of HDPE – tubes for stay cables are mainly.



Figure 14: PE-pipes for protection of bridge stay cables.