

The Arnoldstein-Villach district heating pipeline

01.03.2019 / Österreich / Josef Wildhaber

Civil engineering/ Infrastructure



Factbox

Client: KELAG Energie & Wärme GmbH

Contractor: PORR Bau GmbH,
Niederlassung Kärnten/Osttirol

Contract Type: Baumeisterleistungen

Project Type: Civil
Engineering/Infrastructure . Utility line
construction

Scope: Construction of a district heating
transport pipeline

Contract Volume: 5.7 million euros

Construction Start: 04/2017

Construction End: 08/2018

When waste becomes energy

With the construction of the district heating pipeline from Arnoldstein to Villach, PORR made an important contribution to climate protection in Carinthia.

Thanks to the perfect interaction between the various companies and trades, a new district heating pipeline was laid from the waste incineration plant in Arnoldstein to Villach in just 16 months.

Background

Over the last ten years, the district heating network in the city of Villach has grown to around 100 kilometers. Now another 17.5 km are being added, which will transport around 100 million kilowatt hours of heat per year to Villach from the waste incineration plant in Arnoldstein. KELAG Energie & Wärme GmbH commissioned PORR Bau GmbH to implement the project, which will not only double the fuel efficiency of the waste incineration plant in Arnoldstein, but also replace the use of natural gas for district heating in Villach and improve the emissions balance. In just under 16 months, a double steel pipe for the supply and return lines with an inner diameter of 300 mm each and an outer diameter of 500 mm including insulation material was laid. This pipe transports water at temperatures of up to 130 degrees Celsius and pressures of up to 25 bar from Arnoldstein to Villach.

The contract volume for the excavation and repair work amounted to around EUR 5.7 million. The contract also included the construction of a ring connection from Villach/Warmbad to Villach/Auen, which will make the supply to the city on the Drau even greener, more modern, and more efficient.

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44,000 m³ of excavated material correspond to around 6,000 3-axle lorry loads, which would be 50 km long if they were lined up in a row.

Josef Wildhaber
Site manager, PORR Bau GmbH

Fluid traffic

The route runs from the heat transfer station in Villach/Warmbad along Warmbader Straße and the B83 Kärntner Straße via the villages of Fürnitz, Hart, Neuhaus and Pöckau to Arnoldstein. During the entire construction work, care had to be taken to minimise the impact on traffic. Traffic was regulated by traffic lights along Warmbader Straße in Villach. The area of the federal roads where work had to be carried out while maintaining traffic was particularly tricky. Weather-resistant red road markings were applied to the carriageway during the construction phase and then removed again. The measures required by the traffic licence had to be strictly adhered to and were also continuously monitored by the authorities.



Hand in hand

On 17 April, PORR started construction work from Villach in the direction of Arnoldstein. The work was carried out in sections and sometimes simultaneously with five tunnelling sections, each consisting of two construction workers, two excavators and two lorries. For the entire runtime, construction fences and grouting material had to be provided for a route length of 3,000 metres to secure and support the trench. Timber shoring elements 400/180/5 cm with 5/16 cm or 8/16 cm supports and 10/10 cm sprinklers were manufactured, used and statically verified for the fencing.

The client's requirement was that the work of the individual trades should not interfere with each other. It was only possible for the various companies and

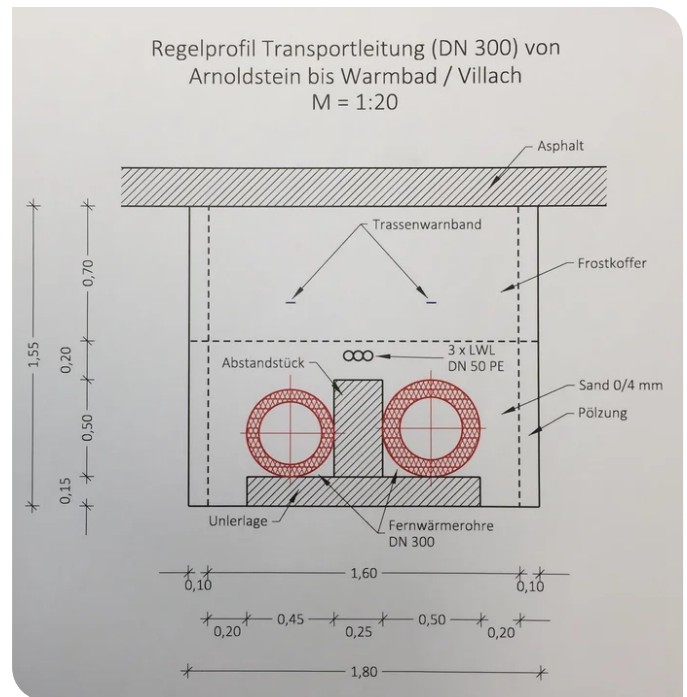
trades to actually work hand in hand thanks to the excellent teamwork of the foremen. PORR started with the excavation work. From a trench length of approx. 200-300 metres, the pipe-laying company immediately began laying the pipes. PORR then took care of relocating the blasters for lowering the pipes.

All of the excavated material was transported to an interim storage area and stored separately according to backfill material and technical fill material. The disposal material was separated into inert materials, construction waste and residual materials for proper recycling.

Bedding and compacting

Material with a grain size of 0/4 mm was used to bed the district heating pipes, empty pipes and cables. The material was placed in the trench using an excavator bucket, as the lorry was not tipped from the side in order to avoid risking damage to the pipes and cables. The bedding, tamping, wrapping and covering of the pipes was carried out exactly as specified by the client or pipe supplier.

The BMP 8500 and BW 138 trench rollers were used for the compaction work for both the backfill material and the technical fill material. Further compaction work was carried out with a 13 tonne combination roller. After positive load plate tests, the asphaltting work could begin. In the area of the federal roads, the asphalt was applied in three layers. Overall completion with the application of the fine surface will take place in spring 2019.



The rule sheet for the bedding of district heating pipes. Source: PORR

Lots of excavation, little rock removal



One third of the route was built in green areas, the rest in the area of municipal and federal roads. Source: PORR

Almost a third of the 17,500 m long pipeline was laid in green areas, the rest in the area of municipal and federal roads. The excavation volume of around 44,000 m³ corresponds to around 6,000 3-axle lorry loads, which would result in a length of almost 50 km if laid end to end. Rock removal was kept to a

minimum at 2% of the excavated volume. Over the entire length of the route, PORR constructed ten inspection shafts with precast concrete flat covers and concreted abutments for five pipe bridges at the water crossings.

17.700 m

Route length

30.500 m²

Asphalt

11.500 to

Asphalt

Technical data

Trench width	1,80 m
Trench depth	1,70 m bis 3,20 m
Amount of excavated material	44.000 m³
Bedding sand	16.500 m³
External pipe diameter	500 mm
Internal pipe diameter	300 mm

Scheduled handover

Construction site supervision was carried out by KELAG's local construction supervisor and an external construction site coordinator. Particular attention was also paid to the erection of barriers and lighting, the cleanliness of the construction site and a high level of occupational safety. After 16 months of runtime, the district heating pipeline went into operation on schedule in August

2018. Since then, half of Villach's heating requirements have been covered by waste heat from the Arnoldstein waste incineration plant, not least thanks to the help of PORR. Natural gas is now only used as a back-up and to cover peak demand.