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European Association for Ductile Iron Pipe Systems

Fachgemeinschaft Guss-Rohrsysteme

NEWSLETTER

07/2017

Dear Readers,

Pipeline replacement using the burst lining technique in Switzerland, development of renewable energies in the Austrian Alps and the use of valves with low pressure loss coefficients in the construction of an untreated water transfer system in Germany are the topics for this edition of the Newsletter:

The protection of an old tree-lined avenue and the low number of connection pipelines were factors which led the water supply company for the community of Biberist (Switzerland) to the decision to replace a grey cast iron pipeline dating back to 1925, using the static burst lining technique. Positive locking, deflectable ductile iron pipes were used. Ductile iron pipe systems are also always the number one choice when it comes to developing renewable energies in small hydropower plants. This is the case with the construction of a small hydropower plant by ÖBf AG (Österreichische Bundesforste AG), in which energy from the Luggauer stream in the Gastein valley is used in order to reduce annual CO_2 emissions by up to 3,400 tonnes. The choice of valves with low pressure loss coefficients helps to save pumping costs and to reduce CO_2 emissions. This was taken into account when constructing a water transfer system between the Primstal reservoir in Saarland and the Steinbach reservoir in Rhineland-Palatinate.

Have an enjoyable and stimulating read
Sincerely yours

Christoph Bennerscheidt

Always topical, always informed

The online Newsletter published periodically provides professionals in the field with up-to-date information about interesting European pipeline projects as well as the many and varied activities of EADIPS®/FGR®.

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22nd Pipe Construction Congress in Weimar

We look forward to your visit to give us the opportunity to talk together about the latest applications of ductile iron pipe systems.

Imprint

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Pipeline renewal using the burst lining technique with ECOPUR pipes

Vorder-Bleichenberg Castle in Biberist

To the South of the Swiss Canton capital of Solothurn in the community of Biberist is the Vorder-Bleichenberg castle, which was built in the 17th century as a Summer residence for the old aristocratic and patrician family of Solothurn von Roll. In 1810 Ludwig von Roll, a direct descendant of this family, was a co-founder of the von Roll ironworks and hence an initiator of the successful business of the vonRoll hydro Group of today.

In the course of a renovation project, the water supply association for the municipality of Biberist planned to replace the ageing supply pipeline along the Asylweg, which is the approach road to Vorder-Bleichenberg castle. Because of the topographical position of the old grey cast iron DN 180/200 pipeline laid in 1925, to protect a beautiful tree-lined avenue and because of the low number of lateral connection pipelines, the client in consultation with the planning office, decided to carry out the construction work using the trenchless static burst lining technique. This meant that overall construction costs could be reduced by around 30% as compared with the open trench technique.

For years now, the Biberist water supply company has been using durable vonRoll ECOPUR ductile iron pipes with reinforced polyurethane coating to EN 545 for its drinking water supply network. And in this project too, the pipeline was replaced with tried and tested ECOPUR pipes. ECOPUR full-protection pipes have integral polyurethane (PUR) lining and coating in accordance with EN 15655 and EN 15189; with their mechanically high resistant, ultra-smooth PUR coating they are perfect for trenchless installation techniques. And the slim socket contour of ECOPUR pipes also has a positive effect on the resulting pulling-in forces. The positive locking, deflectable vonRoll HYROTIGHT trenchless joint technology deals with the forces occurring, as well as deflections in the route of the pipeline of up to 5° without problem. During the entire project, completed in a number of daily stages, some 310 m of ductile vonRoll ECOPUR DN 200 cast iron pipes were laid using the static burst lining technique. The pulling-in and installation work was carried out according to requirements and directives of DVGW technical information sheet GW 323 and SVGW guideline W4.

Connecting the traction head to the expansion cone

HYDROTIGHT trenchless push-in joint

Assembly of ECOPUR HYDROTIGHT trenchless joint

Pulling the ECOPUR ductile iron pipes into old grey cast iron pipeline after bursting

Energy from water – clean electricity for Dorfgastein

The Austrian Federal Forestry Office (Österreichische Bundesforste AG or ÖBf) has special responsibility for the natural resources and habitats of the Republic of Austria. Sustainability is the number one principle here: only take out as much as grows back.

In order to be able to supply around 1,000 households with clean electricity in future, the ÖBf decided to build a new small-scale hydropower plant in the district of Dorfgastein. This is a modern high-pressure power plant which, in future, will use energy from the water of the Luggauerbach. This new power plant has been constructed in accordance with the highest ecological standards, using environmentally friendly construction methods. For example, the minimum residual flow value of the stream has been determined according to the latest legal requirements. In order to keep the encroachment into the natural landscape of the Gastein valley as low as possible, the width of the route during construction was limited to 6 m. Once commissioned, the small hydropower plant with an installed capacity of 1,099 KW should save approximately 3,400 tonnes of CO_2 emissions per year.

Assembling the pressure pipeline with VRS®-T restrained push-in joints in the pipe trench

Backfilling the pipe trench with the soil previously excavated

The project sponsor, ÖBf Wasserkraft GesmbH, decided in favour of using ductile iron pipes from TRM – Tiroler Rohre GmbH for the penstock pipeline. 1,630 m of DN 500 pressure pipes were installed, equipped with VRS®-T positive locking push-in joints. This choice of product avoided the necessity of constructing thrust blocks all along the route, e.g. by encasing bends in concrete, thereby reducing overall building costs.

Technical data:

- Capacity 1,099 kW
- Production 4,050 MWh
- Pressure pipe 1,630 m ductile iron pipes, VRS®-T, DN 500
- Fall 270 m
- Nominal discharge 500 l/s
- Turbine 1 x 4-nozzle Pelton
- Construction time May – July 2017

Untreated water transfer between the Prims and Steinbach valley reservoirs

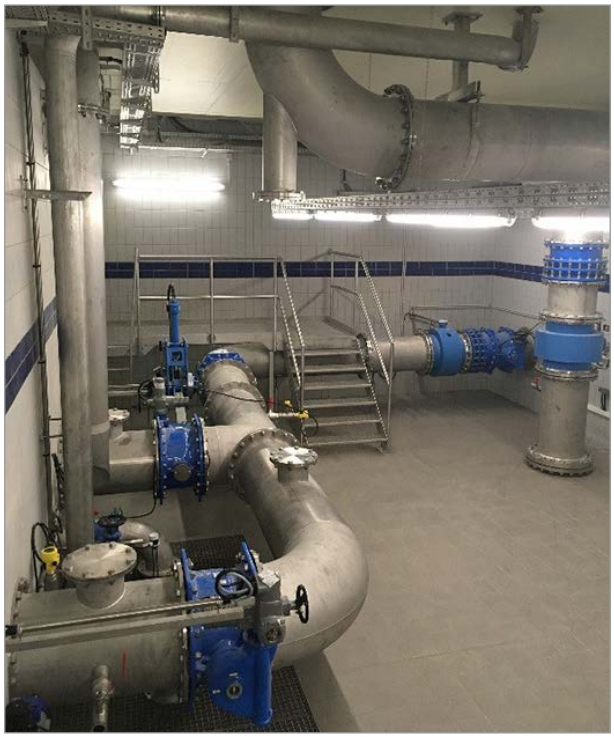
The water supply association in the district of Birkenfeld has the task of ensuring the extraction, treatment and distribution of water for its members, the local authority associations of Baumholder, Birkenfeld, Herrstein and Idar-Oberstein, to provide approx. 77,000 inhabitants with a total annual volume of 4.8 million cubic metres of water. In order to be able to continue to guarantee a reliable supply into the future, a renovation of the dam at the Steinbach valley reservoir – important for raw water extraction – is necessary. This was the reason for the construction of an untreated water transfer pipeline using ductile iron pipes between the Steinbach valley reservoir (Rhineland-Palatinate) and the Prims valley reservoir (Saarland). During the renovation work on the Steinbach valley reservoir dam, the task of delivering water for the Steinbach valley reservoir waterworks is being taken over by the Prims valley reservoir.

In the first 20 km long section of the transfer pipeline, the raw water from the Prims valley reservoir is pumped into a DN 500 pipeline from Saarland to the highest geodetic point at the Hattgenstein water tower. From there onwards it flows along a 12 km long double gravity-fed pipeline (DN 400) to the Steinbach valley reservoir waterworks. The hydraulic energy released in this process is used to produce electricity in a "Pump as Turbine" unit, or PAT for short, in the Steinbach waterworks.

The course of the 32 km connection pipeline between the Prims valley and Steinbach valley reservoirs, showing the territory of the water supply association in the district of Birkenfeld
(Source: http://www.wzv-birkenfeld.de/aktuell2.htm)

In addition to the pumping stations at the Prims reservoir and at the Steinbach reservoir, a variety of valves have been installed in low-point, pressure-break and valve chambers. Erhard valves from Heidenheim were able both to cover the broad spectrum of valves required and to supply the relevant technical calculations. In the context of the project, Roco wave type butterfly valves, plunger valves, check valves, air valves and ball valves with the corresponding adaptors and spacers as well as pipe-break safety devices with break-and-lift units in DN 500 to PN 40 were delivered. By way of example, a few of the valves used are described below:

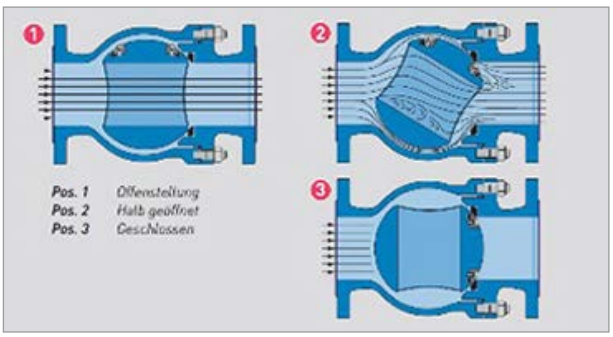
High-quality ERHARD ROCO wave butterfly valves ensure the reliable and clean transport of water. With their optimised gate geometry, the valve is characterised by a low pressure loss coefficient (ζ value), which helps reduce pumping costs. The slider-crank mechanism (SCM) developed and produced by ERHARD and used here is the ideal solution for the secure opening and closing of the valve. The movement kinematics of the SCM are perfectly tuned to the torque progression of the valve; the slowed-down speed of closing minimises the risk of water hammers.



Pipe basement in the Hattgenstein water tower with ERHARD ROCO wave butterfly valves in the background with a hydraulic drive and built-in adaptors and spacers.

ROCO wave butterfly valve with slider-crank mechanism (SCM)

ERHARD ball valve with slider-crank mechanism, double eccentric shaft bearing



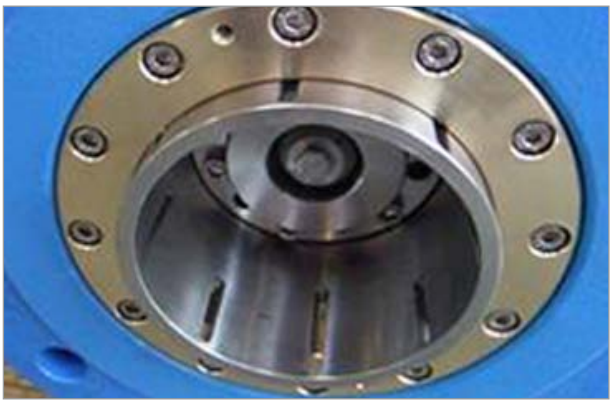
Ball valve positions (1) open position with free passage; (2) half-open; (3) closed

The smooth-running SCM mechanism is also used with the ERHARD ball valves installed. In the open position, ball valves are characterised by a free passage and hence a very low pressure loss coefficient (ζ value). With the high speeds of flow, as well as pressures of up to 40 bars, to be expected in the untreated water pipeline, the choice of this type of valve means a reduction of energy costs for transporting the water.

The ERHARD plunger valves used for controlling the volume of water have been designed for the specific use in each case, e.g. with special slotted cylinders. The advantages are:

- Optimised flow controls allow cost-effective operation.
- The main seal is located in the hydraulically non-critical pressure zone and is anchored in a stainless steel chamber. This offers both optimum sealing and minimum wear.
- The four wide guide bars in aluminium-bronze mean that the weight force of the plunger is evenly distributed. This reduces wear and increases working life.
- Even when the valve is open to just 4% the volume of water can be precisely controlled, which corresponds to a control range of 96%.

ERHARD plunger valve with slider-crank mechanism (SCM)



Close-up of the special slotted cylinder