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Fachgemeinschaft Guss-Rohrsysteme

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Dear Readers,

shortly before the effects of the corona virus on daily life are now becoming noticeable, the pipeline industry traditionally met at the Oldenburger Rohrleitungsforum 2020. Many thanks to the organisers of the 34 Forum: As usual, the trade exhibition, the technical presentations and the supporting programme interacted harmoniously, so that individual exchange was possible and one was informed „incidentally" about the current trends in the industry. Planning, construction and operation of ductile cast iron pipe systems were traditionally represented in a separate lecture block.

In the first article of this newsletter we take you to Mongolia as a country of extremes: climate, distances, population, topography - nothing reminds of European conditions. The population density alone is 120 times less than in Germany, the distances are gigantic. This is the field for sophisticated logistics, where the task is to build a 55 km long drinking water transport pipeline for a provincial town with 30,000 inhabitants.

However, action was also needed in the Swiss canton of Basel-Landschaft after the extreme rainfall in the Birs catchment area flooded several villages in the summer of 2007 and the groundwater became so polluted by the release of heating oil that the pumping stations and water treatment plants had to be shut down. A 2.5 km long „Birs transit pipeline" and a new pumping station now secure the drinking water supply for the communities in the Birs Valley.

Finally, read about a resilient seated gate valve which is used to transfer the problematic transition between metal and plastic from the construction site to the quality-controlled production of the valve manufacturer.

Enjoy and inspire reading
Yours

Christoph Bennerscheidt

Always topical, always informed

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Extreme challenges for 55 km of a cast drinking water pipeline

Extreme temperatures from -40 °C to +30 °C, challenging gradients, a very narrow time frame and transport logistics which, because of the remoteness of the site, presented some serious snags: all this was expected by **cast iron pipe manufacturers** Tiroler Rohre (TRM) in Mongolia who are providing a **drinking water supply** for the city of Altai with its 30,000 inhabitants. This will run through a 55 km long **drinking water pipeline** which has to overcome an altitude of 500 m. The conditions place high demands not only on the project management team but also and in particular on the logistics, the **installation** and the **piping material** itself. Finally, in places the **cast iron pipes** must withstand pressures of 50 bars as well as seismic activity.

But, with some sophisticated planning and with utmost know how, even these challenges can be overcome as is being proved by the latest international project of the Tiroler Rohre GmbH company. “We are supplying and laying the **cast iron pipes** as well as the water purification system and pumping stations”, explains Andreas Weiler, the International Sales Director for TRM who is in charge of the project.

In the vast open spaces of the rocky West Mongolian desert: the transport pipeline extends over 55 km from the reservoir close to the village of Taishir to Altai.

Transport presents the greatest challenge

Die Mongolia faces enormous challenges when it comes to securing its fresh water resources. Therefore, for **supplying drinking water** to the 30,000 inhabitants of the city of Altai they need experienced specialists for geologically demanding construction sites and the appropriate extremely robust material. They found what they were looking for in the experts from TRM who started planning the project in the late summer of last year. As the prime contractor, TRM has overall responsibility for delivering all the materials, such as **ductile cast iron pipes** in nominal size DN 250 for example, and also for planning, executing and supervising the construction work. With ÖSTAP Engineering & Consulting company from Vienna an experienced partner was able to be gained.

By far the greatest hurdle when constructing the **drinking water pipeline** is logistics: transporting materials from the factory in the Tyrol to the construction site represents a considerable effort and expense for the transporter. For this, the Spedition Strieder company with its many years of experience in transporting **ductile iron pipes** was able to offer the best solution: the **pipes** travel by rail to the Mongolian capital of Ulaanbaatar, from where they are taken by road – in some cases dirt roads – on to the construction site. Andreas Weiler has accompanied the transport part of the way which, in total, amounts to just about 1,000 km.

Cast iron pipes must withstand earthquakes

The water for the **drinking water supply** will be taken from the reservoir near the village of Taishir, then it will be treated and pumped 500 m upwards to the city of Altai at an altitude of 2,200 m. The material requirements for this are enormous. Because of the major height difference, the pressure in the pipeline increases to more than 50 bars in places. "This high pressure can easily be absorbed with **cast iron pipes**, but with other materials one would have to incorporate pressure reduction stages", explains Andreas Weiler. The fact that these requirements are not met by just any material has been confirmed in a preliminary study – the **cast iron pipe** proved to be the best solution. Mongolia lies in a highly seismically active area where earthquakes are a frequent occurrence. Therefore, it is extremely important that the joints of the **cast iron pipes** can absorb tremors and earth movements.

Temperatures as low as -40°C, which prevail in the Mongolian winter and cause the ground to freeze to a depth of up to 3.5 m, make it necessary to lay the pipes 4 m deep.

A tight time window for the construction work

And it is not only the altitude distance that poses a great challenge, the extreme climate has a part to play as well. If a certain amount of preliminary work could still be completed in autumn 2018, the watchword soon became: wait. Because winter in Mongolia lasts a long time. The time framework for the construction work is accordingly cut very narrow and only leaves room for manoeuvre from May to October. Temperatures as low as -40°C, which cause the ground to freeze to a depth of 3.5 m, make it necessary to lay the **pipes** 4 m deep. Also, the depth to which the reservoir freezes is greater than one would expect in Central Europe: water extraction is done at a depth of 14 m.

The weather does not only hold extreme temperatures in store, sandstorms also make the construction work more difficult. "When we are actually assembling the pipes, it is important that everything is a clean as possible so that the **seal** sits in the right position. If the **sockets** are totally dirty and full of sand, then they have to be cleaned", says the project director, thinking of the additional time and effort expended because of the Mongolian weather phenomena.

Completion is in sight

Currently the construction work is fully underway and should be completed in the middle of 2020, thus ensuring the supply of clean **drinking water** for around 30,000 people. At the moment the population is being supplied with water of uncertain quality from deep wells. The entire project, with a contract value of 14 million euros, is financed by an Austrian development aid loan.

Author:
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A secure drinking water supply even at times of flooding

From the afternoon of 8 August 2007 until the morning of 9 August 2007, the volume of rainfall in the **Swiss valley of the River Birs** reached unexpected dimensions: between 90 and 120 mm of rain fell there in just 15 hours. "Normally this represents the total average rainfall for a month. The hydraulic catchment area of the (Sorne, La Scheulte and Lützel) above Laufen is approximately 701 km². This means that an average volume of rain of 1,168 m³/sec was falling onto this area."

This was stated by the Basel-Landschaft Canton crisis team in its report on the devastating **floods** of 8/9 August 2007, which caused major problems in more or less the whole of the Canton of Basel-Landschaft.

Fuel oil released into the Birs

In almost no time at all, the **extreme rainfall** of this night caused the level of the streams and rivers across the entire Canton of Basel-Landschaft to rise menacingly and burst their banks, flooding towns and villages. As a result, numerous and extensive **releases of fuel oil** also occurred: around 180,000 litres escaped into the environment, of which about 150,000 litres were quickly eliminated. Around 30,000 litres of fuel oil were carried along with the Birs, flowing through the flooded area. As the fuel oil infiltrated the groundwater of the Birs in some places, and pumping station meaning that it had to be shut down, the neighbouring communities were no longer able to use it for treating their drinking water for days on end. Tankers now supplied drinking water to the communities affected.

After the flood

More than ten years later, the massive damage has more or less disappeared and been forgotten; around 120 million Swiss francs had to be spent to eliminate it.

Such **bottlenecks**, or even **total breakdowns**, should no longer happen in the future. But because the water supply to the communities of the Birs valley usually comes from only one "source", such as the Reinach and district waterworks (WWR), in the event of flooding a **second water supply** is needed.

Transporting the pipes from the factory directly to the construction site.

The different types of soil are clearly visible, but the ductile iron pipe with cement mortar coating is up to any situation. Unpolluted excavation material can also be used again for backfilling the trench.

A second pipeline

It took a long time, but all good things are worth waiting for: the decision to construct the so-called **"Birs valley transit pipeline"** along the River Birs – a generation project – was also taken after the flooding event of August 2007. In order to be able to react better to crisis situations like the one in 2007 and to guarantee **security of supply for drinking water**, the Reinach and district waterworks (WWR) decided to install a second water supply pipeline with a larger capacity as well as a new pumping station. The green light was given in August 2017.

The section of the new pipeline from Basel/St. Jakob to Münchenstein includes a 2.5 km long pipeline in **DN 500 ductile iron pipes** with **cement mortar coating** and **BLS® restrained joints**, various installation and dismantling joints and Roco Wave electro-drive butterfly valves, all supplied by TMH Hagenbucher AG.

In January 2019 the water supply pipeline and pumping station were able to go into regular operation.

Author:
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New generation of resilient seated gate valves

The INFINITY gate valve design from ERHARD with the usual flange connection to EN 1092-2 is now be supplemented in the product range by a version with PE welding ends. Depending on the pressure stage, the resilient seated gate valve according to EN 1074 has HDPE ends to SDR 17 (PN 10) or to SDR 11 (PN 16) applied on both sides.

The weld-in pipe sockets in HDPE 100, coloured blue, meet the requirements of DIN 8074 and are suitable for welding with HDPE pipes and fittings according to melt flow index group MFI 005 and 010 in accordance with DVS guideline DVS 2207.

The INFINITY gate valve with PE ends benefits from the DIN-DVGW type examination certificate for drinking water. It is available for the nominal size range DN 40 to DN 300, in pressure stages PN 10 and PN 16.

Enamelled Infinity gate valve

Properties and advantages at a glance

The gate valve has the following properties and features:

- Firmly integrated, torsion-free PE pipe ends. The PE pipe is pressed onto the cast ends of the body which are correspondingly provided with claws and/or prongs. Two O-rings set into grooves also ensure the tightness of the connection. The push-on socket positioned next to this secures the connection, which is finally protected against corrosion and damage during installation by a shrink tube.
- The pipe ends are suitable for two welds.
- Weldable using electrofusion sockets or by butt welding.
- The use of PE standard pipes results in uniform pipe sockets (drinking water approval).
- PE pipe colours and classes matched to the operating medium (drinking water in blue or black with blue stripes).
- Medium-free spindle seal.

- Patented bayonet locking system in the bonnet mounting with continuous coating (avoids corrosion problems).
- The wear-resistant single-piece spindle with rolled thread prevents deposits.
- Easy operation with the composite sliding skate integrated into the wedge guide.
- The compact cap without water retention areas reduces risk of bacterial growth.

Applications for the gate valve

This design of gate valve with PE welding ends is usually installed underground. Consequently the standard actuation version is with a square spindle and hence it is equipped for the attachment of an extension stem. Optionally, the gate valve can also be equipped for the attachment of an extension stem according to DVGW worksheet GW 336 (with adapter disk and coupling sleeve).

Materials and dimensions

Materials (standard)

- Body, bonnet and wedge: spheroidal graphite cast iron EN-GJS-500-7 (EN-JS 1050)
- Rubber-coating of the gate and O-ring: EPDM, KTW drinking water guideline, DVGW W 270 for drinking water
- Spindle: ferritic Cr steel 1.4021
- Spindle nut: brass 2.0402 (UBA)
- Connecting bolts: A4, countersunk and sealed
- Pipe sockets: HDPE 100, blue or black-blue for drinking water
- Push-on socket: steel, protected with a shrink tube

Coating, choice of two proven corrosion protection systems

Internal and external, seamless amd pore-free epoxy resin coating, coating thickness min. 250 µm to GSK guideline (or internal and external, seamless enamelling) to EN ISO 11177. The advantages of enamelling are e.g.:

- It is bonded with the casting surface and so protected from infiltration.
- Extremely smooth surface for hygienically problem-free conditions (no depositing of mineral or organic constituents, incrustations).
- Good resistance, even in the presence of abrasive media.
- Underground installation: suitable even for soil class III (DVGW GW 9 worksheet).

Dimensions, weights and areas of application

Dimensions, weights and areas of application can be taken from the table.

Dimensions and areas of application for the INFINITY gate valve with PE welding ends.

Pipe wall thickness [mm]	Overall length L [mm]	P [mm]	C [mm]	Overall height H [mm]	Foot height h [mm]	Square spindle [mm]	Spindle revolutions revs/stroke	Approx. weight excl. hand-wheel [kg]
4.6	880	105	64	170	46	14	11.5	6
5.8	880	110	64	185	60	14	14	8
3.8	880	110	64	185	60	14	14	8
6.8	900	120	74	227	68	17	14	11.5
4.5	900	120	74	227	68	17	14	11.5
8.2	900	127	79	250	75	17	17	13
5.4	900	127	79	250	75	17	17	13
10	900	154	82	287	91	19	21.5	15.5
6.6	900	154	94	287	97	19	21.5	15.5
11.4	975	154	94	287	97	19	21.5	15.7
7.4	975	154	94	287	97	19	21.5	15.7
12.7	1,000	170	97	324	105	19	27	22
8.3	1,000	170	97	324	105	19	27	22
14.6	1,100	171	102	368	127	19	32	26.5
9.5	1,100	171	102	368	130	19	32	26.5
16.4	1,100	171	102	368	130	19	32	27
10.7	1,100	171	102	368	130	19	32	27
18.2	1,100	1,100	160	450	162	24	41.5	46
11.9	1,100	1,100	160	450	162	24	41.5	46
20.5	1,100	1,100	160	450	167	24	41.5	46.5
13.4	1,100	1,100	160	450	167	24	41.5	46.5
22.7	1,350	1,350	160	546	12	27	43.5	68
14.8	1,350	1,350	160	546	192	27	43.5	68
28.6	1,350	1,350	160	621	240	27	51	94
18.7	1,350	1,350	160	621	240	27	51	94

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