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European Association for Ductile Iron Pipe Systems

Fachgemeinschaft Guss-Rohrsysteme

NEWSLETTER

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Dear Readers,

You will certainly be aware that the wall thickness of ductile iron pipes produced using the centrifugal casting process can be adapted according to the particular application. This guarantees the efficient use of ductile iron pipes for gravity sewer systems, fresh water supply pipelines or high-pressure applications in power station pipelines.

The effects on the calculation of the wall thickness of ductile iron pipes are described in an article about the content of the updated Chapter 5 "Wall thickness calculation for ductile iron pipes". As usual, Chapter 5 can be downloaded either on its own or as part of the "Ductile Iron Pipe Systems" manual via www.eadips.org.

The restrained locking of pipe systems and the loads thus transmitted affect the wall thickness of the cast iron pipes which are used in the three construction projects described below: the construction of a turbine pipeline in the Bavarian Forest (Germany), the extension of the snowmaking system at Brixen im Thale (Austria) and the installation of an extinguishing water pipe in a service duct beneath the 3rd tube of the Belchen tunnel (Switzerland).

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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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Doncaster-Platz 5 · 45699 Herten/Germany · Phone: +49 (0)23 66/99 43 905 · Fax: +49 (0)23 66/99 43 906 · E-mail: info@eadips.org · www.eadips.org
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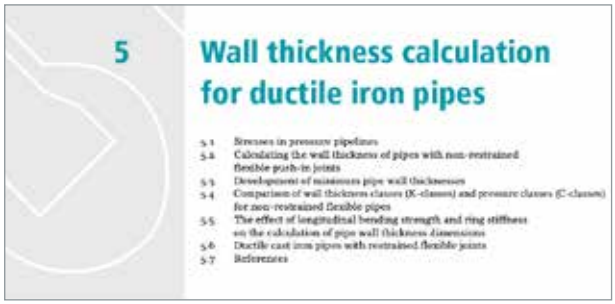
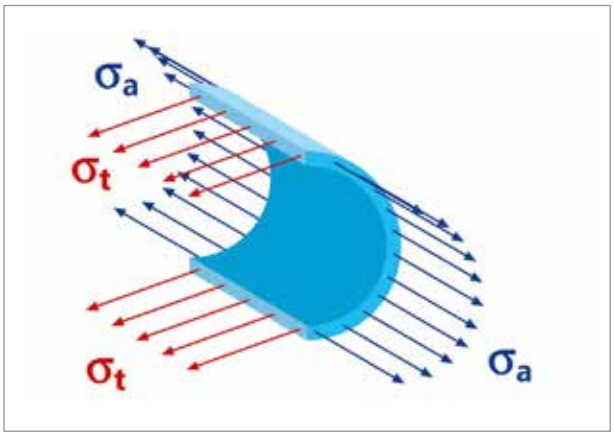
Ductile Iron Pipe Systems manual: Calculating wall thicknesses for ductile iron pipes

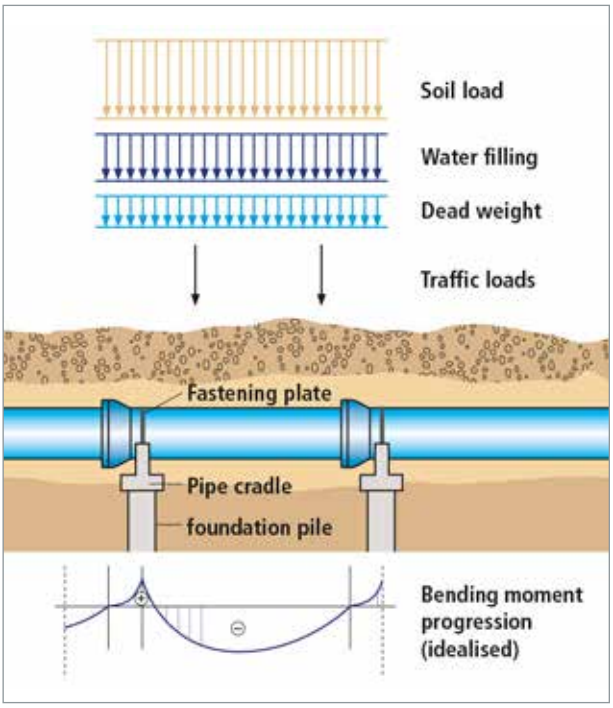
The **Ductile Iron Pipe Systems manual** provides planners, construction companies and network operators, as well as higher education and training institutions, with an overview of current expertise in the field of **ductile cast iron pipes, valves and fittings**. The individual chapters are regularly checked to make sure they are up to date and revised by the EADIPS technical committee if necessary. In addition, the manual is supplemented by new, user-oriented chapters.



Wall thickness calculation for ductile iron pipes

Because of changes in European regulations, Chapter 5: Pipe design and wall thickness calculation (edition 04-2008) has been revised and replaced by the new **Chapter 5: Wall thickness calculation for ductile iron pipes** (edition 08-2018).





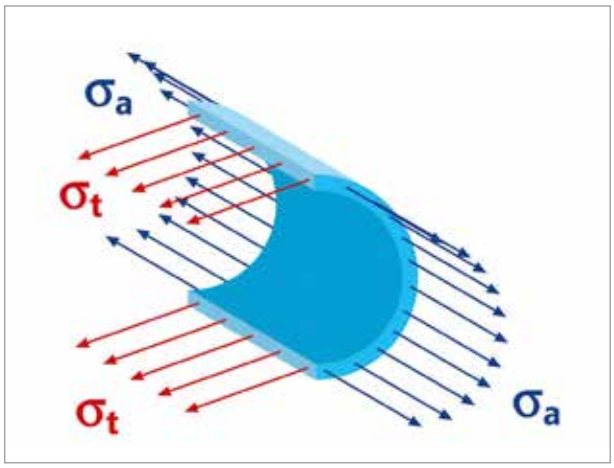
The new Chapter 5 now covers the following points:

- Explanation and illustration of the stresses in the pipe wall of **push-in-joints** and **restrained socket joints**
- **Development of minimum pipe wall thicknesses**
- The effect of longitudinal bending strength and ring stiffness on the calculation of pipe wall thickness dimensions
- Comparison of **wall thickness classes** (K-classes) and **pressure classes** (C-classes) for non-restrained flexible pipes
- The effect of **restrained socket joints** on the **wall thickness of ductile iron pipes**

Chapter 5 has been published in both the German-language version **Handbuch Guss-Rohrsysteme** and the English-language version **Ductile Iron Pipe Systems manual**. Both versions can be downloaded free of charge via the eadips.org homepage.

Turbine pipeline for the Seebachschleife hydropower plant

Seebachschleife is located in the municipality of Bayerisch Eisenstein in the Regen district of Lower Bavaria, Germany. As far back as 1934, the glassgrinding factory in Seebachschleife – now a listed building – was using **water power as its energy source**. In 1997 the hydroelectric power plant changed hands and some innovative changes have since been made to the turbines and pipelines. For example, a new, 3 km long DN 500 **power station pipeline** has been installed to supply water to the turbine building.



Stresses in the pipe wall: tangential stresses σ_t due to internal pressure and axial stresses σ_a due to the positive locking push-in joints of the pipes.

Waiting for installation: DN 500 pipes with BLS® socket joints, wall thickness class K14. High-alumina cement lining and zinc-aluminium coating with a reddish brown epoxy finishing layer.

Ductile cast iron pressure pipeline

This **pressure pipeline** carries water from the Großer Arbersee lake (approx. 935 m above sea level) to the turbines at Seebachschleife (approx. 640 m above sea level). The lower part of the **pressure pipeline** runs through the hamlet of Seebachschleife for a length of around 300 m. The altitude difference of approximately 295 m produces an operating pressure of about 30 bar; also the route of the pipeline makes a sharp change of direction at this point. To take up the pressure fluctuations and to provide an additional safety margin, the pipes and pipe joints in this area needed to be designed for a pressure of 40 bar. The developers decided to use **ductile cast iron pipes** (GGG) with positive locking BLS® socket joints, which can absorb both the tangential stresses σ_t caused by the internal pressure of 40 bar and the axial stresses σ_a produced by the positive locking joints of the pipes.

288 m of **GGG pipes** in nominal size DN 500 with **BLS® socket joints** in wall thickness class K14 (**minimum cast iron wall thickness** 12.2 mm) were installed. The pipes are lined on the inside with high-alumina cement and coated on the outside with zinc-aluminium and a reddish brown epoxy finishing layer. They were produced specifically for this project and delivered within 4 weeks. This meant that the tight time schedule set by the client of around 8 weeks from placing the order to completion of the construction project was able to be met.

A 30° change of direction of the power station pipeline in Seebachschleife with a MMK 500/30° fitting and BLS® socket joints, lined and coated with epoxy blue.

Once the ductile iron pipes had been laid alongside a forest road, the backfill material is compacted layer by layer.

SkiWelt Brixen im Thale equipped for the future

SkiWelt Wilder Kaiser-Brixental is one of the largest and most modern ski resorts in the world. The 9 direct access points from the villages of Brixen im Thale, Ellmau, Going, Hopfgarten, Itter, Kelchsau, Scheffau, Söll and Westendorf with more than 284 km of pistes perfectly prepared each day, as well as 21 downhill runs await their guests.

In July 2018, a construction project was started in Brixen im Thale in **preparation for the major Zinsberg cable railway** planned for next year. During the course of this construction work, the existing snowmaking pipeline is being rerouted and its pipe dimensions enlarged. Ductile iron pipes from the **Tiroler Rohre GmbH (TRM) company** in nominal sizes DN 80, 250 and 300 are being used over a length of just about 1,000 m.

Under the direction of an expert snowmaker, all snowmaking pipelines are carefully installed by employees of SkiWelt Brixen im Thale. The fact that the tried and tested **VRS®-T socket joint from TRM** is easy to assemble makes the i**nstallation of the ductile iron pipes** considerably simpler and guarantees the greatest degree of reliability for the operation of the snowmaking equipment – even at high pressures.

Careful installation of ductile iron pipes in a new trench for the Zinsberg cable railway

Installation of ductile iron fittings and pipes in tight situations

Ductile cast iron extinguishing water pipelines in the Belchen rehabilitation tunnel

The service duct beneath the 3rd tube of the Belchen tunnel.

The **Belchen motorway tunnel**, opened in December 1970, is one of the most important sections of the North-South route through Switzerland with around 50,000 vehicles driving through it every day. The 3.2 km long, twin-tube **Belchen tunnel** runs through highly expansive layer of plaster (Gipskeuper) for approximately 40 % of its total length. Because of damage due to anhydrite swelling, even while it was still under construction during the nineteen sixties around 1,000 m of the already concreted invert had to be replaced. An initial overhaul of the existing tunnel tubes was carried out between 2001 and 2003, when visible local damage such as cracks and flaking was repaired and the surfacing, including the shoulder area, was renewed.

vonRoll ECOPUR ductile iron pipes before their installation in the service duct.

Ductile cast iron extinguishing water pipeline

The project for **constructing the Belchen rehabilitation tunnel** was approved in 2003. This 3rd tunnel tube is currently being extended and it should be commissioned in the year 2022. It is planned that the phased rehabilitation of the two existing tunnel tubes will take place from this point. After the repair work, two tunnel tubes with four lanes will be opened up for traffic. The central tube will then serve as an escape tunnel, except during maintenance work on either of the other two tunnel tubes. In the new tunnel profile, beneath the carriageway there is an **accessible service duct**, 3 m wide and 2 m high, in which all service pipelines including the extinguishing water pipeline are installed. The **extinguishing water pipeline** was produced with vonRoll ECOPUR **ductile iron pipes** with integral internal and **external coating in polyurethane** (PUR) to EN 545, giving it perfect corrosion protection in the aggressive climate of the tunnel.

Lateral feed pipeline to the hydrant recesses with ECOFIT fittings.

The entire pressure pipeline was designed with easy-assembly, flexible, fully **restrained HYDROTIGHT push-in joints**. There are lateral feed pipelines arranged every 150 m to the hydrant recesses in the area of the carriageway.

Nominal sizes and lengths installed:

- Main extinguishing water pipeline ECOPUR DN 200, length 3,200 m
- Feed pipelines to hydrants ECOPUR DN 100, length 120 m

The push-in joint system was completed with ECOFIT fittings with integral epoxy coating to GSK/RAL-GZ 662 and with vonRoll VS 5000 shutoff valves.

vonRoll VS 5000 shutoff valve in the service duct.